



**TABLE OF CONTENTS**

INTRODUCTION ..... 1

THE PARTIES ..... 19

OTHER PERSONS AND THINGS MENTIONED IN THIS COMPLAINT ..... 22

FACTUAL BACKGROUND..... 26

    A.    SUNY RF is a Leading Research Institution..... 26

    B.    SUNY RF’s Dr. Robert Brainard, Ph.D., Is a Pioneer in the Field of  
          Photoresists ..... 27

    C.    SUNY RF and Inpria Entered into the 2015 Research Agreement to  
          Research and Develop Organometallic Photoresist Materials..... 29

        1.    Under the 2015 SRA, SUNY RF Owns Its PRIOR  
              PROJECT IP, and Inpria Agreed Not to Use Such IP  
              Outside of the Project ..... 31

        2.    Under the 2015 SRA, SUNY RF Owns All  
              FOUNDATION Inventions, and Inpria Was Not Granted  
              Any License to Such IP ..... 32

        3.    Under the 2015 SRA, SUNY RF Holds Joint Title to All  
              JOINT IP, and Inpria Was Not Granted Any Interest in or  
              License to SUNY RF’s JOINT IP Interests ..... 33

        4.    Under the 2015 SRA, Inpria Holds Title to Only Such  
              Intellectual Property that “Exclusively” Utilized Inpria’s  
              Personnel and Facilities ..... 34

        5.    Under the 2015 SRA, Inpria Agreed to Protect SUNY RF’s  
              Ownership Rights ..... 34

        6.    The Second Amendment to the 2015 SRA Stated  
              Additional Research Goals and FOUNDATION Resources..... 34

    D.    SUNY RF and Inpria Entered into the 2017 Research Agreement to  
          Continue Researching and Developing Organometallic Photoresists ..... 35

        1.    Under the 2017 SRA, SUNY RF Owns Its PRIOR  
              PROJECT IP, and Inpria Agreed Not to Use Such IP  
              Outside the Project..... 37

2.	Under the 2017 SRA, SUNY RF Owns All FOUNDATION Inventions, and Inpria Was Not Granted Any License to Such IP .....	37
3.	Under the 2017 SRA, SUNY RF Holds Joint Title to All JOINT IP, and Inpria Was Not Granted Any Interest in or License to SUNY RF’s JOINT IP Interests.....	38
4.	Under the 2017 SRA, Inpria Holds Title to Only Such Intellectual Property that “Exclusively” Utilized Inpria’s Facilities and Personnel .....	39
5.	Under the 2017 SRA, Inpria Agreed to Protect SUNY RF’s Ownership Rights .....	40
E.	Dr. Brainard and His Co-Inventors Invented the Challenged Patents .....	40
1.	SUNY RF Invented and Owns the ’684, ’179, and ’554 Patents.....	40
2.	SUNY RF Invented and Owns the ’505, ’924, ’696, ’048, ’081, and ’618 Patents .....	51
3.	SUNY RF Invented and Owns the ’559, ’986, and ’719 Patents.....	75
4.	SUNY RF Invented and Owns the ’874 Patent .....	84
5.	SUNY RF Invented and Owns the ’564 and ’312 Patents.....	95
6.	SUNY RF Invented and Owns the ’153, ’029, and ’284 Patents.....	104
7.	SUNY RF Invented and Owns the ’903, ’466, and ’109 Patents.....	126
8.	SUNY RF Invented and Owns the ’070 Patent .....	147
9.	SUNY RF Invented and Owns the ’028 Patent .....	156
10.	SUNY RF Invented and Owns the ’876 and ’046 Patents.....	176
F.	Inpria and JSR Have Commercialized SUNY RF’s PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP Concerning MORE .....	198
	CLAIMS FOR RELIEF .....	202
	Breach of Contract.....	202

Correction of Inventorship.....	211
Unjust Enrichment.....	347
Declaratory Relief.....	348
Constructive Trust and Accounting.....	349
Unfair Competition.....	350
Conversion.....	351
Successor Liability .....	359
Alter Ego Liability.....	360
Principal–Agent Liability .....	362
Attorneys’ Fees, Costs, and Expenses .....	363
DEMAND FOR JURY TRIAL .....	365
COMPLIANCE WITH NOTICE REQUIREMENTS UNDER 35 U.S.C. § 256.....	365
PRAYER FOR RELIEF .....	365



The Research Foundation for the State University of New York (“SUNY RF”) brings this action for breach of contracts, correction of inventorship, unjust enrichment, declaratory and injunctive relief, constructive trust and accounting, unfair competition, conversion, successor liability, alter ego liability, principal–agent liability, and attorneys’ fees and costs against Defendants Inpria Corporation (“Inpria”) and JSR Corporation (“JSR”) (collectively, “Defendants”).

### **INTRODUCTION**

1. SUNY RF is the largest comprehensive university-connected research foundation in the country. SUNY RF works with the academic and business leadership of The State University of New York (“SUNY”) campuses to facilitate research and discovery by administering sponsored projects and delivering intellectual property and technology transfer services that fuel innovation and move ideas and inventions to the marketplace.

2. Photoresists are light-sensitive materials that are used in nearly every step of the microchip manufacturing process and are thus highly valuable in and essential to the global semiconductor industry, which is projected to become a trillion-dollar industry by 2030.

3. Dr. Robert Brainard, Ph.D. (“Dr. Brainard”) is a Professor in the Department of Nanoscale Science & Engineering at SUNY at Albany, in the College of Nanotechnology, Science, and Engineering (CNSE). Dr. Brainard is a leader and early pioneer in the field of photoresists. In 1998, Dr. Brainard became the first chemist in the world to design photoresists for use in Extreme Ultraviolet (“EUV”) Lithography. Dr. Brainard’s groundbreaking work has revolutionized the field of photoresist materials, particularly with respect to EUV lithography.

4. EUV lithography uses extreme ultraviolet (13.5 nm) wavelengths to produce a pattern in a silicon wafer by using a reflective photomask to expose a substrate covered by a

photoresist. It is one of the most important developments, both technologically and economically, to semiconductor fabrication in decades. It has been widely reported that chipmakers around the world are investing billions of dollars into developing and commercializing EUV fabrication technology: “The reason for all this investment is not only that EUV is hard but that chipmakers are coming around to the idea that, soon, they may not be able to move forward without it. If you ask Anthony Yen, who leads EUV lithography development at TSMC, how critical EUV is to Moore’s Law, he won’t beat around the bush: ‘Totally critical. 100 percent critical. Very, very critical.’”<sup>1</sup>

5. EUV lithography allows for the manufacture of smaller, more powerful, and more cost-efficient and energy-efficient circuit boards and microchips. But the semiconductor industry long struggled to develop photoresist materials that are compatible with EUV lithography and that would enable chipmakers to realize the full technological and economic promise of EUV lithography.

6. In 2011, however, Dr. Brainard pioneered a project at CNSE to design and synthesize never-before-explored organometallic compounds containing transition or main group metallic elements to develop Molecular Organometallic Resists for EUV (“MORE”), also known as metal oxide photoresists, rather than the then-vogue chemically amplified resists using organic materials.

7. Specifically, in 2011, Dr. Brainard invented the revolutionary idea of using thin films of organometallic compounds with high EUV optical density and high mass densities as high resolution, low line edge roughness (LER) EUV photoresists—including as particularly relevant

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<sup>1</sup> Rachel Courtland, *Leading Chipmakers Eye EUV Lithography to Save Moore’s Law*, IEEE Spectrum (Oct. 31, 2016), <https://spectrum.ieee.org/leading-chipmakers-eye-euv-lithography-to-save-moores-law>.

here, tin-oxide photoresists. The use of such materials for photoresists capitalized on the strengths of prior hafnium-based resists while avoiding their weaknesses. Dr. Brainard's breakthrough invention enabled the creation of photoresists with, for example, high stopping power for EUV photons and secondary electrons, yielding increased control over particle size, photoreactivity, solution stability, particle defects, and tunable properties—in short, photoresists that would meet the demands of, and solve the contemporary problems faced by, the semiconductor industry.

8. Since then, Dr. Brainard and his students have continued their state-of-the-art research and have worked to design, synthesize, and characterize revolutionary new materials and methods for use in photoresists and EUV lithography, including over a thousand MORE compounds that have been synthesized and evaluated lithographically.

9. Today, Inpria Corporation holds itself out as “the world leader in metal oxide photoresist design, development and manufacturing.”<sup>2</sup> According to Inpria, “[b]y absorbing more of the light from the EUV scanner, Inpria photoresists reduce the photon shot noise otherwise amplified in conventional Chemically Amplified Resists. Furthermore, by removing the acid diffusion mechanism of conventional photoresists, patterning resolution is further improved.” *Id.* Inpria “manufactures and sells a suite of EUV metal oxide photoresists,” and now proclaims that “[o]rganometallic clusters with a tin-oxide core serve as the foundation of our chemistry.” *Id.*

10. Inpria and its parent company, JSR, now tout that their foundational product is a tin oxide metal photoresist. *Id.* But Inpria did not invent this revolutionary product. Dr. Brainard and his team of researchers and students at SUNY RF did.

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<sup>2</sup> *Metal Oxide Photoresists*, Inpria, a JSR Company, <https://www.inpria.com> (last visited December 9, 2023).

11. Back in 2012, Inpria was just getting started when it was accepted to join CNSE's SEMATECH (SEmiconductor MAnufacturing TECHnology)—a consortium aimed at cooperation between companies, universities, regional government, and others in order to foster technology innovation in the semiconductor industry—Resist Materials and Development Center in order to collaborate “on critical issues for resists in extreme ultraviolet (EUV) lithography,” including to “work to increase the photosensitivity of its resist materials to meet productivity requirements for future manufacturing applications.”<sup>3</sup> As Inpria's CEO Andrew Grenville put it at the time, Inpria's “partnership with SEMATECH provide[d] Inpria the opportunity to rapidly increase the rate of development for our EUV lithography materials.” *Id.*

12. Prior to that point, Inpria had focused its research on another type of photoresist—those made out of hafnium—which, as described above, were inferior to the innovative and superior MORE photoresists invented by Dr. Brainard.

13. In or around October 2014, Inpria took its research and development partnership with CNSE one step further when Inpria and Grenville sought out Dr. Brainard and his team of researchers to learn from their prior research and to conduct additional research into MORE that could be shared with Inpria. In particular, Inpria and Grenville entered into a two-year Research Agreement with SUNY RF—effective January 1, 2015 (hereinafter the “2015 Research Agreement” or the “2015 SRA,” attached as Ex. A)—to promote “research and development activities related to organometallic photoresist materials.”

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<sup>3</sup> *Inpria Joins SEMATECH's Resist Center at UAlbany NanoCollege for Advanced EUV Resist Development*, Businesswire (Apr. 24, 2012, 8:00 AM EDT), <https://www.businesswire.com/news/home/20120424005187/en/Inpria-Joins-SEMATECH%E2%80%99s-Resist-Center-at-UAlbany-NanoCollege-for-Advanced-EUV-Resist-Development>.

14. Recognizing that SUNY RF, Dr. Brainard, and students and researchers working under Dr. Brainard’s direction had developed an expertise in the MORE field—as well as certain “PRIOR PROJECT IP” concerning “Molecular Organometallic Resists for EUV”—Inpria requested and SUNY RF agreed to provide Dr. Brainard as the “principal investigator” to “supervise and conduct the work on the PROJECT,” as described in the “Scope of Work” attached as Exhibit A to the 2015 SRA. Inpria’s Grenville was designated as Inpria’s “principal liaison” for the Project, and he signed the 2015 SRA on January 15, 2015.

15. Given the successes of the 2015 Research Project, Inpria immediately entered into another two-year Research Agreement with SUNY RF—effective May 1, 2017 (hereinafter the “2017 Research Agreement” or the “2017 SRA,” attached as Ex. E)—to continue to promote “research and development activities related to organometallic photoresist materials.” Again expressly recognizing that SUNY RF, Dr. Brainard, and researchers working under his direction had developed an expertise in the field and additional “PRIOR PROJECT IP”—Inpria again requested Dr. Brainard to serve as the “principal investigator” to supervise and conduct the work of the 2017 Project, as described in the 2017 “Scope of Work.” Inpria’s Grenville was again designated as Inpria’s “principal liaison” for the Project, and he signed the 2017 SRA on May 5, 2017. On April 11, 2019, SUNY RF and Inpria agreed to extend the term of the 2017 Project to August 31, 2019.

16. For the purposes of completing these Research Projects, SUNY RF agreed to grant Inpria a limited license to the intellectual property that SUNY RF had acquired during the course of Dr. Brainard’s previous research and development in the MORE field. These licenses were expressly limited and could only be used for the purposes of completing the Research Projects and for no other purposes, and SUNY RF expressly stated in both Research Agreements that SUNY

RF did not grant Inpria a license to otherwise use, make, sell, offer to sell, export, commercialize, etc., or profit in any way from SUNY RF's PRIOR PROJECT IP.

17. SUNY RF and Inpria also expressly agreed that any intellectual property conceived of and reduced to practice by SUNY RF during the course of the Research Projects (referred to as "FOUNDATION Inventions") was owned exclusively by SUNY RF. SUNY RF did not grant Inpria any license to the FOUNDATION Inventions. Instead, both Research Agreements offered Inpria an exclusive 120-day option to acquire an exclusive, royalty bearing, license to the FOUNDATION Inventions. However, Inpria never exercised these options and thus never acquired any license to any FOUNDATION Inventions, and SUNY RF has never otherwise granted Inpria any license to use, make, sell, offer to sell, export, commercialize, etc., or profit in any way from SUNY RF's FOUNDATION Inventions.

18. SUNY RF and Inpria also expressly agreed that SUNY RF and Inpria would hold joint title to all intellectual property rights generated, conceived, or reduced to practice during the Research Projects that were not generated, conceived or reduced to practice exclusively by either SUNY RF or Inpria (hereinafter referred to as "JOINT IP"). SUNY RF did not grant Inpria any license with respect to SUNY RF's interest in said JOINT IP. Instead, both Research Agreements offered Inpria an exclusive 120-day option to acquire an exclusive, royalty bearing license to SUNY RF's interest in such JOINT IP. Inpria, however, never exercised these options and thus never acquired any license to SUNY RF's interest in such JOINT IP, and SUNY RF has never otherwise granted Inpria a license to use, make, sell, offer to sell, export, commercialize, etc., or profit in any way from SUNY RF's interest in such JOINT IP.

19. For several years, from January 1, 2015 to August 31, 2019, SUNY RF and Dr. Brainard and his researchers conducted the Research Projects, researching and developing MORE

photoresists, and methods concerning the same, for use with EUV lithography and provided Inpria access to SUNY RF's inventions and intellectual property for the limited purpose of completing the Research Projects and for no other purpose. Over this nearly five-year project, Dr. Brainard and his researchers provided at least monthly reports of their findings to Inpria and attended countless meetings and phone calls with Inpria scientists and business executives during which Dr. Brainard and the SUNY RF team relayed their breakthrough research and development concerning MORE materials and methods. At no time during this nearly five-year project did Inpria disclose to SUNY RF that Inpria had secretly been incorporating SUNY RF's PRIOR PROJECT IP, FOUNDATION Inventions, and/or JOINT IP into both Inpria's commercial products and methods and patent applications that Inpria had filed around the world.

20. Inpria and JSR also hired many of Dr. Brainard's former graduate students and researchers from his MORE program, including Brian Cardineau (now Principal Chemist at Inpria), Amrit Narasimhan (now Lead Engineer (Lithography) at Inpria) and Dr. William Earley (a former Senior Research Chemist at Inpria, now deceased), and included them on the Research Projects while simultaneously filing the Challenged Patents and commercializing the research and technology owned and disclosed by SUNY RF.

21. On information and belief, Inpria and JSR failed to establish an ethical wall or information barrier protocol to prevent exchange of SUNY RF information or communications from such former students, researchers, and employees or from the 2015 and 2017 Research Projects—including PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP—to, for example, Inpria's and JSR's research and development and technical and business teams working to commercialize MORE technology.

22. Then, in October 2022, Inpria filed a patent infringement action against Lam Research Corporation asserting that Inpria is “the world leader in cutting edge metal oxide photoresist design, development and manufacturing, with an emphasis on applications for extreme ultraviolet light (EUV) semiconductor processing” and admitting that “Inpria practices its patented EUV semiconductor processing technology,” including the technology claimed in U.S. Patent Nos. 10,732,505, 9,823,564, and 9,310,684.<sup>4</sup> And on December 13, 2023, Inpria filed an Amended Complaint admitting that it also practices the technology claims in U.S. Patent Nos. 10,642,153, 11,537,048, 11,673,903, 11,693,312, and 11,809,081.<sup>5</sup>

23. Shockingly, as illustrated below and explained throughout this Complaint, the MORE technology that Inpria now admits to practicing and otherwise commercializing is a carbon copy of SUNY RF’s PRIOR PROJECT IP that Inpria agreed *not* to use for any purpose other than the 2015 and 2017 Research Agreements. For example:

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<sup>4</sup> Complaint for Patent Infringement ¶¶ 2, 11, *Inpria Corp. v. Lam Research Corp.*, No. 1:22-cv-01359 (D. Del. Oct. 14, 2022), ECF No. 1.

<sup>5</sup> Amended Complaint for Infringement ¶¶ 16–17, *Inpria Corp. v. Lam Research Corp.*, No. 1:22-cv-01359 (D. Del. Oct. 14, 2022), ECF No. 43.



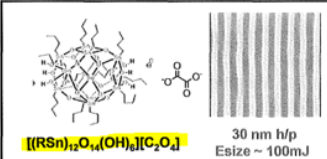
**Figure 1: SUNY RF's PRIOR PROJECT IP → Inpria's "Patented EUV" Products**

1. CAMPUS SUBMITTING THIS DISCLOSURE  
CNSE, University at Albany and SUNY New Paltz

2. TITLE **Molecular Organometallic Resists for EUV (MORE):**

The purpose of this three-year program is to **invent revolutionary new photoresists based on Molecular Organometallic Resists for EUV (MORE)** that will be capable of meeting the needs of the 10-nm node. The proposed work will be to screen a broad selection of materials with the capability of stopping EUV photons in 20-nm films (high EUV OD), and to convert them into secondary electrons with short diffusion lengths causing a photochemical change that will result in negative- or positive-tone imaging. We propose that this approach is the best way to meet the LER and sensitivity needs of EUV resists capable of resolution down to 10-nm half-pitch.

**Our best organometallic Tin-based resist was our Tin-12 Oxocluster** with an oxalate counteranion (see below). This inorganic resist film shows nice LER if synthetic purity can be controlled. The sensitivity is quite low, but we think that these materials are capable of providing excellent capabilities once a higher speed exposure mechanism can be discovered.



**[(RSn)<sub>12</sub>O<sub>12</sub>(OH)<sub>12</sub>][C<sub>2</sub>O<sub>4</sub>]**

30 nm h/p  
Esize ~ 100mJ

**Structure and Predictions on Photoreactivity.** The Sn-12 cluster has a "football-shaped" cage structure,<sup>43</sup> containing 12 tin atoms. **Each tin has one bond to carbon and four or five bonds to oxygen.** **At each side of the structure are three hydroxyl groups, and each cluster has a +2 net charge which is accompanied by two anionic ligands.** We predict that there are three likely mechanisms that could cause a solubility change during exposure: **anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework (Figure 6).** To evaluate each of these three reaction pathways,

the C-H bond should correlate with the relative radical stability of the organic group. **The goal of this study is to synthesize a series of Sn-12 clusters containing alkyl groups with different radical stabilities, and to then test these clusters for sensitivity and imaging.**

**ORGANOMETALLIC SOLUTION BASED HIGH RESOLUTION PATTERNING COMPOSITIONS**

Applicant: **Inpria Corporation**, Corvallis, OR (US)

This example described preparation of precursor solutions for the deposition of **Tin based organometallic compositions for the formation of a radiation resist coating.**

insoluble material. Solvent evaporation and calcination of this sample at 600° C. revealed a tin concentration of 0.093 M on the basis of SnO<sub>2</sub> residual mass. Dynamic light scattering (DLS) analysis with a Möbius apparatus (Wyatt Technology) of the precursor solution (FIG. 10) is consistent with a monomodal distribution of particles with a mean diameter of ~2 nm, consistent with the reported diameter (Eychenne-Baron et al., *Organometallics*, 19, 1940-1949 (2000)) of **dodecameric butyltin hydroxide oxide polyatomic cations.**

1. A method for patterning a substrate with radiation, the method comprising:

irradiating a coated substrate along a selected pattern to form an irradiated structure with a region of irradiated coating and a region with un-irradiated coating, wherein **the coated substrate comprises a coating having an average thickness from about 5 nm to about 200 nm and that comprises a metal oxo-hydroxo network with organic ligands with metal carbon bonds and/or with metal carboxylate bonds and free of peroxide ligands;**

heating the irradiated structure at a temperature from about 45° C. to about 250° C. for 0.1 minutes to about 30 minutes to form an annealed irradiated structure; and

selectively developing the annealed irradiated structure to remove a substantial portion of the irradiated coating or of the un-irradiated coating to form a patterned substrate wherein **the metal oxo-hydroxo network comprises both M-O—H linkages and M-O-M linkages.**

24. As illustrated in Figure 1, SUNY RF disclosed to Inpria its “revolutionary new photoresists based on Molecular Organometallic Resists for EUV (MORE)”—conceived of by Dr. Brainard on June 28, 2011—including a “Tin-12 Oxocluster with an oxalate counterion” (also known as dodecameric butyltin hydroxide oxide polyatomic cations) in which “each tin has one bond to carbon and four or five bonds to oxygen” with “three hydroxyl groups” at “each side of the structure” and “prepared with sulfonate and carboxylate anionic ligands.” One of the expressly stated goals of SUNY RF invention and PRIOR PROJECT IP disclosed to Inpria was “to synthesize a series of Sn-12 clusters containing alkyl groups with different radical stabilities.”

25. And yet, despite agreeing in the Research Agreements not to use or otherwise commercially exploit any such PRIOR PROJECT IP and failing to exercise its option to take a license to such PRIOR PROJECT IP, Inpria now *admits* that it practices and commercially exploits “Tin based organometallic compositions” of “dodecameric butyltin hydroxide oxide polyatomic cations” which are coated to “an average thickness from about 5 nm to about 200 nm” and comprise “metal oxo-hydroxo network with organic ligands with metal carbon bonds and/or with metal carboxylate bonds” wherein “the metal oxo-hydroxo network comprises both M-O—H linkages and M-O-M linkages” with an “alkyl ligand.”

26. Not only has Inpria used, and continues to use, SUNY RF’s PRIOR PROJECT IP commercially in violation of the Research Agreements and without a license to do so, Inpria also failed to list Dr. Brainard and his co-inventors of this SUNY RF PRIOR PROJECT IP as inventors or co-inventors of U.S. Patent No. 9,310,684, or any of its children or foreign counterparts, all of which are now assigned solely to Inpria.

27. This is just one example, and as explained throughout this Complaint, Inpria also has breached the 2015 and 2017 Research Agreements by failing to name Dr. Brainard and his co-inventors as inventors or co-inventors of additional patents and patent applications that Inpria has claimed as its own but which are plainly PRIOR PROJECT IP or FOUNDATION Inventions under the express terms of the Research Agreements, by failing to assign those patent and patent applications to SUNY RF, and by failing to acquire a license to use or otherwise commercially exploit such PRIOR PROJECT IP or FOUNDATION Inventions. Indeed, the conduct of Inpria and JSR has increasingly and more severely encroached on SUNY RF’s rights since the time Inpria first disclosed in its lawsuit against Lam Research Corporation in fall 2022 that Inpria’s commercial photoresist technology incorporates SUNY RF’s IP. For example:

**Figure 2: SUNY RF’s FOUNDATION Inventions → U.S. Patent No. 11,740,559**

1. Title of Disclosed Technology (A brief, descriptive title that does not reveal unique features.)

**Carboxylic-Acid Developers for Metal-Based EUV Resists**

The invention is to use carboxylic acids in organic or aqueous solvents as developers for organometallic (MORE) photoresists. We have shown that the use of these developers has shown these benefits:

- The ability to shift a resist from negative tone to positive tone.
- Improved clearing for both negative and positive tone resists.
- Potential for significant modification by simple exchange of acid.
- Enhanced contrast and imaging.
- Manipulation of dissolution properties through concentration of acid.

Figure 1. Structures of Carboxylic Acids. These carboxylic acids have been tested in developer with metal-based resists from the MORE Project.

**IV. PSI Results from May 2015: Acid Developers**

Resist:

Acid in Developer:	Acetic	Benzoic	Malonic	Lactic
Structure:	<chem>CC(=O)O</chem>	<chem>c1ccccc1C(=O)O</chem>	<chem>OC(=O)CC(=O)O</chem>	<chem>CC(O)C(=O)O</chem>
Concentration:	0.4M	0.3M	0.2M	
Tone:	Positive	Positive	Negative	Negative
E <sub>0</sub> (mJ/cm <sup>2</sup> ):	23	>57	Need Ellipsometry	Need Ellipsometry

Developer: 1-4% Acid, 10% MEK, Remaining % Toluene

**BACKGROUND OF THE INVENTION**

The processing of semiconductor circuits and devices has involved the continued shrinkage of critical dimensions over each generation. As these dimensions shrink, new materials and methods are required to meet the demands of processing and patterning smaller and smaller features. Patterning generally involves selective exposure of a thin layer of a radiation sensitive material (resist) to form a pattern that is then transferred into subsequent layers or functional materials. Promising new classes of metal based radiation resists especially suitable for providing good absorption of extreme UV light and electron beam radiation, while simultaneously providing very high etch contrast have been discovered. To provide for commercialization of these new classes of resists, consideration of the process integration for the achievement of desired final products can be a significant step.

1. A method of cleaning a substrate provided with a metal-based resist, the method comprising cleaning a substrate provided with a metal-based resist comprising at least one metal selected from the group consisting of Sn, Hf, Zr, In, Te, Sb, Ni, Co, Ti, W, Ta, and Mo using a metal resist cleaning liquid comprising an organic solvent and a carboxylic acid, thereby removing the metal-based resist from the substrate.

3. The method according to claim 1 wherein the organic solvent comprises a propylene glycol methyl ether (PGME), propylene glycol methyl ether acetate (PGMEA), propylene glycol butyl ether (PGBE), ethylene glycol methyl ether, cyclic esters, n-butyl acetate, ether acetate, ketones, liquid cyclic carbonates, or a mixture thereof.

5. The method according to claim 3 wherein the amount of carboxylic acid based on the total weight of the cleaning liquid is 0.1 wt % to 50 wt %.

6. The method according to claim 1 wherein the metal-based resist comprises Sn.

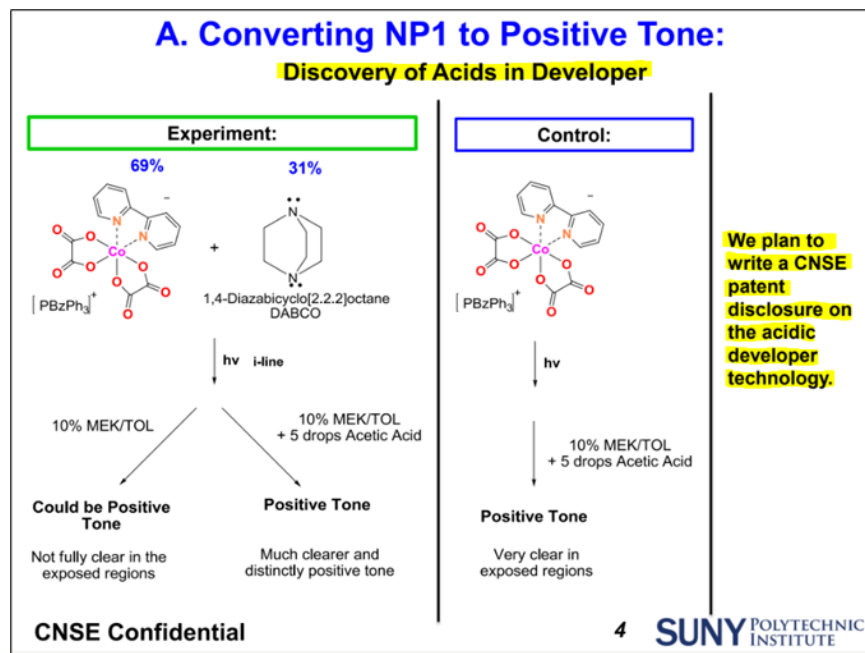
7. The method of claim 1 wherein the carboxylic acid comprises formic acid and/or acetic acid.

28. As illustrated Figure 2, SUNY RF disclosed to Inpria its invention—conceived on February 19, 2015—to use “carboxylic acids in organic or aqueous solvents as developers for organometallic (MORE) photoresists,” including those “from the MORE Project,” such as tin, cobalt, or antimony. SUNY RF further expressly disclosed to Inpria that such invention used acids such as “formic acid” or “acetic acid” at concentrations of “.2M”, “.3M”, and “.4M” along with organic solvents such as “PGME” or “MEK,” also known as methyl ethyl ketone.

29. Indeed, as illustrated below in Figure 3, SUNY RF expressly disclosed to Inpria that SUNY RF planned to write “a patent disclosure on this acidic developer technology.” As explained further below, in the 2017 Research Agreement, Inpria further expressly agreed that these SUNY RF inventions concerning carboxylic acid developers for metal-based EUV resists

were SUNY RF “PRIOR PROJECT IP” under the 2017 SRA—to which Inpria thus had no ownership or commercial license rights.

**Figure 3: SUNY RF’s PRIOR PROJECT IP and FOUNDATION Invention**



30. And yet, despite agreeing in the 2015 Research Agreement that SUNY RF “shall hold title” to all such FOUNDATION Inventions—and further that such inventions were SUNY RF PRIOR PROJECT IP to the 2017 Research Agreement—and failing to exercise its option to acquire a license to such FOUNDATION Inventions, Inpria filed for and was granted U.S. Patent No. 11,740,559 on August 29, 2023—dating to a provisional patent application filed on December 6, 2016 by former SUNY RF graduate student, and current Principal Chemist at Inpria, Brian Cardineau—for a method of developing a “metal-based resist,” comprising at least one of tin, cobalt, or antimony, from a solution comprising (1) “an organic solvent” such as “PGMEA” or a combination of methyl ethyl ketone, and (2) a “carboxylic acid” such as “formic acid” or “acetic acid” in amount between “0.1 wt % to 50 wt %.”

31. Here again, as illustrated in this example, Inpria has not only breached the Research Agreements, including by claiming this SUNY RF FOUNDATION Invention and PRIOR PROJECT IP as its own and by using and commercializing this SUNY RF intellectual property without a license to do so, Inpria also (1) failed to name Dr. Brainard and his co-inventors of this FOUNDATION Invention as inventors or co-inventors of U.S. Patent No. 11,740,559, or any of its children or foreign counterparts, and (2) failed to assign U.S. Patent No. 11,740,559, or any of its children or foreign counterparts, to SUNY RF.

32. In fact, according to official assignments records filed with the United States Patent and Trademark Office on July 31, 2023, Inpria instead assigned all rights to U.S. Patent No. 11,740,559 to *Tokyo Electron Limited* (“Tokyo Electron” or “TEL”) “pursuant to the terms of the Patent License and Co-Ownership Agreement between the Parties executed on 1<sup>st</sup> day of March, 2023.” This Inpria-to-TEL assignment was signed by Inpria CEO Andrew Grenville, Inpria’s “principal liaison” for the Research Projects with SUNY RF. Inpria never disclosed such applications, patent, assignment, license, or co-ownership agreement to SUNY RF, never obtained SUNY RF’s consent to file and/or execute any of those agreements, and has not made any remuneration to SUNY RF.

33. As explained throughout this Complaint, these are but two examples of Inpria breaching the Research Agreements, using or otherwise commercially exploiting SUNY RF’s intellectual property without a license to do so, and omitting SUNY RF and its inventors as inventors or co-inventors and as assignee or co-owner on patents and patent applications filed by Inpria around the world. Evidence uncovered to date without the benefit of discovery has revealed that Inpria’s breaches and omissions extend to at least U.S. Patent Nos. 9,310,684 (attached as Ex. G); 10,025,179 (attached as Ex. H); 10,416,554 (attached as Ex. I); 10,732,505 (attached as Ex. J);

11,754,924 (attached as Ex. K); 10,775,696 (attached as Ex. L); 11,537,048 (attached as Ex. M); 11,809,081 (attached as Ex. N); 10,228,618 (attached as Ex. O); 11,740,559 (attached as Ex. P); 11,187,986 (attached as Ex. Q); 10,627,719 (attached as Ex. R); 11,480,874 (attached as Ex. S); 9,823,564 (attached as Ex. T); 11,693,312 (attached as Ex. U); 10,642,153 (attached as Ex. V); 11,392,029 (attached as Ex. W); 11,500,284 (attached as Ex. X); 11,673,903 (attached as Ex. Y); 10,787,466 (attached as Ex. Z); 10,975,109 (attached as Ex. AA); 11,098,070 (attached as Ex. BB); 11,392,028 (attached as Ex. CC); 11,300,876 (attached as Ex. DD); 11,868,046 (attached as Ex. EE), as well as the children and foreign counterparts of these patents, whether granted and issued, pending, or yet-to-be-filed children and foreign counterparts of these patents (the “Challenged Patents,” *see* Appendix A).

34. Inpria and its parent company, JSR, have *benefited massively* from SUNY RF’s PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP concerning MORE. In July 2017, Inpria announced that it had raised \$23.5 million in Series B funding, which it intended to use “to complete its pilot manufacturing facility and to commence commercial production.” In February 2020, Inpria announced that it had raised \$31 million in Series C funding—which it attributed to its belief that its “EUV photoresists enable semiconductor manufacturers to realize the full potential of EUV lithography”—and had “recently brought online its high-volume manufacturing plant to support the initial production ramp for customers.” In September 2021, JSR agreed to acquire Inpria—the so-called “world’s leading innovator of metal oxide photoresist design” with “a culture that is centered on R&D and moves with an innovation-driven mindset”—for \$514 million at a reported valuation of \$742 million. As industry observers commented at the time, “[i]t’s very obvious the firm has IP worth a lot of money”—because “[t]hat’s a damn



impressive valuation for an industrials firm that develops chemicals on a pre-revenue basis.”<sup>6</sup> An early Inpria investor celebrated by claiming that *Inpria* had “cracked the nut and, to paraphrase Mark Twain, reports of Moore’s Law’s death were greatly exaggerated.”

35. In 2021, reports came that “Inpria’s inorganic photoresist” was going to be used by the world’s largest chipmaker, Taiwan Semiconductor Manufacturing Company Limited (“TSMC”), and by Samsung Electronics Co., Ltd. (“Samsung”) by the end of 2021.

36. In 2022, reports came that SK hynix Inc. would apply “Inpria’s” metal oxide resist for manufacturing advanced DRAM chips, based on “Inpria’s broadly-patented metal oxide photoresist platform for EUV,” and that Tokyo Electron would be joining with Inpria to provide an all-in-one, wet metal oxide resist development method for EUV patterning technology. As a Managing Officer at JSR put it in a press release announcing its co-development partnership with SK Hynix, “[t]he science is pioneering but so are the economics.” In October 2022, Inpria alleged in federal court that the market just for Lam Research’s dry resist products that allegedly practice certain of Inpria’s MORE patents would be “greater than \$1B in the coming years.”

37. In JSR’s 2022 Report for Materials Innovation, for the year ended March 31, 2022, JSR attributed nearly 83% of the assets it acquired from Inpria to “intangible” or “technology” assets based on the assistance of an “external valuation expert” based on future sales “generated from the technology related to metal based EUV resists,” which is “superior to conventional resists in terms of pattern transfer performance during dry etching and highly suitable for semiconductor mass production processes.”

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<sup>6</sup> Dylan Patel, *Lam Research, Tokyo Electron, JSR Battle It Out In The \$5B+ EUV Photoresist, Coater, and Developer Market - CAR vs MOR vs Dry Resist*, SemiAnalysis (Nov. 18, 2021), <https://www.semianalysis.com/p/lam-research-tokyo-electron-jsr-battle>.

38. In JSR's 2023 Report, President and CEO Eric Johnson boasted about JSR's competitive advantage due to its investment in metal oxide resists, stating "[i]n semiconductor materials, we continue to invest in new applications for metal oxide resist (MOR) and are already seeing its implementation in commercial use. MOR is enabling a new regime for semiconductor materials businesses and investing in this technology will give us a strong competitive advantage. Seeing adoption of leading-edge extreme ultraviolet (EUV) imaging technology as the insertion point for MOR in the next generation of equipment, we have invested in early MOR production to capitalize on its benefits over conventional chemically-amplified resists. We see strong potential in these areas moving forward."

39. Indeed, JSR's acquisition of Inpria and its "Next-Generation EUV Technology" quickly became integral to JSR's product portfolio and plans of "developing the MOR business through creating synergy with Inpria to bring mass production technology and quality control to the next level," noting in particular that Inpria "[p]ossess[es] patented technologies," as illustrated in Figure 4 below.



**Figure 4: JSR Report 2023**

40. Then, in June 2023, reports came that JSR’s Board of Directors had resolved to unanimously express an opinion supporting a tender offer from Japan Investment Corporation (“JIC”)—an investment company majority owned by the Government of Japan, which was created to “enhance Japan’s industrial competitiveness to ensure the sustainable development of its economy—to buy and take private JSR Corporation, and wholly-owned subsidiary Inpria, for approximately **\$6.4 billion**. JIC’s announcement concerning the planned commencement of this tender offer expressly stated that the decision-making process and reasons for the offer included JSR making Inpria a wholly-owned subsidiary, expanding its product portfolio, and JSR “constructing a new building for expanding production capacity of cutting-edge lithography materials, including EUV resists.” According to JIC and JSR, this tender offer is currently subject

to competition law procedures of China and is expected to commence in late February 2024. In late December 2023, JIC issued a press release stating that, once the tender offer is completed, it may not be possible to sue either JSR or JIC (or their directors) outside of the United States, it may be difficult to enforce any right or claim against them, and “there is no guarantee” that they could be compelled “to subject themselves to the jurisdiction of a U.S. court.”

41. Coupled with Defendants’ refusal to agree not to further commercialize SUNY RF’s IP (including outside of the United States, whether in Japan, China, or elsewhere); not to transfer, license, or otherwise further dissipate SUNY RF’s IP and the revenues obtained therefrom; and not to transfer or otherwise dissipate assets sufficient to satisfy the judgment sought by this action, this planned tender offer will irreparably harm SUNY RF absent preliminary relief.

42. Indeed, neither Inpria nor JSR have paid SUNY RF any of the compensation that SUNY RF is due under the Research Agreements, the United States patent laws, and New York common laws. Worse, none of the foregoing patent applications or press releases or any others of Inpria or JSR even mention—much less credit or attribute—the contributions of SUNY RF, CNSE, and Dr. Brainard and his co-inventors to these foundational MORE inventions and the technological and economic breakthroughs that they have engendered and which will continue to revolutionize and advance semiconductor fabrication for decades to come. And most concerning, Defendants’ conduct has become increasingly hostile to and in disregard of SUNY RF’s contractual and legal rights, as evidenced by Defendants’ expanding commercial operations, licensing or otherwise transferring SUNY RF’s IP to third parties, and now stated intention to sell off all of SUNY RF’s IP and dissipate the profits owed to SUNY RF to a quasi-state entity in Japan, which has already publicly proclaimed to be beyond U.S. laws and this Court’s jurisdiction.

43. Inpria has failed in this regard despite its CEO Andrew Grenville's public proclamations that supposedly "Inpria respects the legitimate intellectual property of others, and we expect others to honor our intellectual property as well."

44. SUNY RF thus brings this action to remedy and enjoin Inpria's and JSR's breaches of the Research Agreements, to correct the named inventors on the Challenged Patents, and to account for the licensing revenue, consideration, and other compensation duly owed to SUNY RF.

### **THE PARTIES**

45. SUNY RF is a private non-profit education corporation tax-exempt under Internal Revenue Code (IRC) Section 501(c)(3), organized under the laws of New York, and based in Albany, New York. SUNY RF owns or has an interest by assignment, document, or contract the entire right, title, and interest to and right to income and ownership in all PRIOR PROJECT IP, FOUNDATION Inventions, JOINT IP, and all inventions, co-inventions, contributions to, SUNY RF's interests in the Challenged Patents, as further described in this Complaint.

46. Inpria is a corporation organized under the laws of Delaware and has a regular and established place of business at 1100 NE Circle Blvd., Suite 360, Corvallis, Oregon 97330. Inpria is engaged in research, design, development, manufacturing, sale, and exportation of metal oxide photoresists, with an emphasis on applications for EUV semiconductor processing.

47. JSR is a corporation organized under the laws of Japan and has a principal place of business at 1-9-2 Higashishimbashi Minato-Ku, Tokyo 105-0021, Japan. On or around July 10, 2017, JSR became an investor in Inpria and acquired a seat on Inpria's Board of Directors through its wholly-owned U.S. subsidiary, JSR Micro, Inc. ("JSR Micro"). Eric Johnson, then-President of JSR Micro and now-President and CEO of JSR, sat on Inpria's board of directors beginning no later than July 11, 2017. JSR held its position on Inpria's board of directors and owned a large

percentage of Inpria's voting shares starting on or around July 11, 2017, until it acquired Inpria as a wholly-owned subsidiary on October 29, 2021 for \$514 million. JSR controlled approximately 21.3% of Inpria's voting rights immediately before the date of acquisition. JSR sells materials for various industries, including but not limited to EUV photoresists for semiconductor manufacturing.

### **JURISDICTION AND VENUE**

48. This Court has jurisdiction pursuant to 28 U.S.C. § 1332(d) because the amount in controversy exceeds \$75,000 and the dispute is between citizens of different States.

49. This Court also has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331, 1338(a), and 2201 because claims for correction of inventorship pursuant to 35 U.S.C. § 256 arise under the patent laws of the United States.

50. This Court also has supplemental jurisdiction over Plaintiff's state and common law claims under 28 U.S.C. § 1367 because the state and common law claims are so related to the federal claims that they form part of the same case or controversy and derive from a common nucleus of operative facts.

51. Personal jurisdiction is proper over all Defendants in this District pursuant to C.P.L.R. § 302(a)(1) and § 302(a)(3)(ii) and because Defendants purposefully availed themselves of the privilege of conducting activities within the state of New York, and Defendants' contacts with the state give rise and are related to SUNY RF's claims. Indeed, both Research Agreements (the 2015 SRA and the 2017 SRA) contain a forum selection clause providing that "[v]enue shall be exclusively in any state or federal court of competent jurisdiction located in the State of New York, County of Albany," and both Research Agreements are "binding upon the successors, assigns, heirs, and personal representatives of the Parties hereto."

52. Inpria entered into the 2015 SRA and 2017 SRA with SUNY RF to sponsor research located at the premises of SUNY RF in Albany, New York. As stated in both Research Agreements, Inpria agreed that each SRA would be interpreted under New York law and that venue would exclusively be in any state or federal court located in New York, County of Albany.

53. At the time of JSR's initial investment on July 10, 2017, Inpria had already been engaged with SUNY RF and had already entered into the Research Agreements. Thus, by deciding to invest in Inpria in 2017 and obtaining and maintaining a seat on Inpria's board of directors until it wholly acquired Inpria in 2021, JSR purposefully availed itself of the benefits of Inpria's contacts to and agreements with SUNY RF. In collaboration with Inpria, JSR commercializes and profits from SUNY RF's technology, including, e.g., by making, selling, and offering for sale metal oxide photoresists for use in EUV lithography in breach of the Research Agreements and without remuneration to SUNY RF under the Research Agreements, Patent Laws, and common law.

54. Moreover, the 2015 SRA and 2017 SRA also provide that the agreements "shall accrue to the benefit of and be binding upon the successors, assigns, heirs, and personal representatives of the Parties hereto." Because JSR is Inpria's successor, the Research Agreements and forum selection clauses therein are binding upon JSR as well.

55. Venue is proper in this district under 28 U.S.C. § 1391(b)–(d) because the Research Agreements provide that "[v]enue shall be exclusively in any state or federal court of competent jurisdiction located in the State of New York, County of Albany," a substantial part of the events or omissions giving rise to the claims herein occurred in this District, and JSR Corporation also is a defendant not resident in the United States and is subject to personal jurisdiction in this District, and thus is subject to venue in any judicial district including this District.

**OTHER PERSONS AND THINGS MENTIONED IN THIS COMPLAINT**

56. On information and belief, Andrew Grenville is Chief Executive Officer at Inpria. Grenville was the “principal liaison” at Inpria for both Research Agreements and is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

57. On information and belief, Brian Cardineau is a former graduate student and advisee of Dr. Brainard at SUNY RF and is now a Principal Chemist at Inpria. Cardineau is one of the named inventors and unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

58. On information and belief, Alan Telecky is Director of Intellectual Property at Inpria. Telecky is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

59. On information and belief, Joseph Edson is director of synthesis scaleup at Inpria. Edson is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

60. On information and belief, Stephen T. Meyers is director of resist development at Inpria. Meyers is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

61. On information and belief, Douglas A. Keszler is a professor of chemistry at Oregon State University and a founder and officer of Inpria. Keszler is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

62. On information and belief, Kai Jiang is a principal chemist at Inpria. Jiang is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

63. On information and belief, Mollie Waller is a senior staff chemist at Inpria. Waller is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

64. On information and belief, Benjamin L. Clark is senior vice president of operations at Inpria. Clark is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

65. On information and belief, Michael Kocsis is vice president of applications at Inpria. Kocsis is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

66. On information and belief, Peter De Schepper is a principal engineer at Inpria. De Schepper is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

67. On information and belief, Michael Greer is a lead engineer of photolithography at Inpria. Greer is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

68. On information and belief, Shu-Hao Chang is a country manager at Inpria. Chang is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

69. On information and belief, Jeremy Anderson is an Inpria scientist. Anderson is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

70. On information and belief, Dominick Smiddy is a senior product engineer at Inpria. Smiddy is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

71. On information and belief, Jason Stowers is a director of product integration at Inpria. Stowers is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

72. On information and belief, Lauren McQuade is a senior staff chemist at Inpria. McQuade is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

73. On information and belief, Margaret Wilson-Moses is a product engineer at Inpria. Wilson-Moses is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

74. On information and belief, Thomas Lamkin is a lead engineer at Inpria. Lamkin is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

75. On information and belief, Truman Wambach was a senior staff chemist at Inpria. Wambach is one of the named inventors of the patent applications and issued patents that are the subject of this Complaint.

76. On information and belief, Dan Freedman was a member of Dr. Brainard's research group. Freedman is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.



77. On information and belief, Jodi Hotalen was a member of Dr. Brainard's research group. Hotalen is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

78. On information and belief, James Passarelli was a member of Dr. Brainard's research group. Passarelli is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

79. On information and belief, Michael Murphy was a member of Dr. Brainard's research group. Murphy is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

80. On information and belief, Miles Marnell was a member of Dr. Brainard's research group. Marnell is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

81. On information and belief, Miriam Sortland was a member of Dr. Brainard's research group. Sortland is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

82. On information and belief, Ryan Del Re was a member of Dr. Brainard's research group. Del Re is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

83. On information and belief, William Earley was a member of Dr. Brainard's research group. Earley is one of the unnamed inventors of the patent applications and issued patents that are the subject of this Complaint.

84. The Challenged Patents refer to issued United States patents assigned to and/or obtained by Inpria, its employees and/or agents, which omitted Dr. Brainard and/or his co-

inventors (while at and under an obligation of assignment to SUNY RF) as sole or joint inventors. The Challenged Patents include U.S. Patent Nos. 9,310,684 (the “ ’684 Patent”); 10,025,179 (the “ ’179 Patent”); 10,416,554 (the “ ’554 Patent”); 10,732,505 (the “ ’505 Patent”); 11,754,924 (the “ ’924 Patent”); 10,775,696 (the “ ’696 Patent”); 11,537,048 (the “ ’048 Patent”); 11,809,081 (the “ ’081 Patent”); 10,228,618 (the “ ’618 Patent”); 11,740,559 (the “ ’559 Patent”); 11,187,986 (the “ ’986 Patent”); 10,627,719 (the “ ’719 Patent”); 11,480,874 (the “ ’874 Patent”); 9,823,564 (the “ ’564 Patent”); 11,693,312 (the “ ’312 Patent”); 10,642,153 (the “ ’153 Patent”); 11,392,029 (the “ ’029 Patent”); 11,500,284 (the “ ’284 Patent”); 11,673,903 (the “ ’903 Patent”); 10,787,466 (the “ ’466 Patent”); 10,975,109 (the “ ’109 Patent”); 11,098,070 (the “ ’070 Patent”); 11,392,028 (the “ ’028 Patent”); 11,300,876 (the “ ’876 Patent”); and 11,868,046 (the “ ’046 Patent”), as well as the children and foreign counterparts of these Patents, whether granted and issued, pending, or yet-to-be-filed children and foreign counterparts of these Patents.

## **FACTUAL BACKGROUND**

### **A. SUNY RF is a Leading Research Institution**

85. SUNY RF is the largest comprehensive university-connected research foundation in the country. SUNY RF provides essential administrative services that enable SUNY faculty to focus their efforts on educating students and performing life-changing research across a wide range of disciplines including Artificial Intelligence, Clean Energy, Biotechnology, Longevity, Substance Addiction, Nextgen Quantum Computing, Environmental Health, and Resiliency.

86. SUNY RF works with the academic and business leadership of SUNY campuses to facilitate research and discovery by administering sponsored projects and delivering intellectual property and technology transfer services that fuel innovation and move ideas and inventions to the marketplace.

87. SUNY's Albany campus is home to CNSE, which is a higher education leader in research and development for nanotechnology programs.

88. In 2003, SUNY's CNSE partnered with SEMATECH (SEmiconductor MAnufacturing TECHnology), a consortium aimed at cooperation between companies, universities, regional government, and others in order to foster technology innovation in the semiconductor industry. SEMATECH had access to laboratories and other facilities in Albany, New York, and its headquarters were at CNSE in Albany, New York. In 2015, SEMATECH was merged into SUNY Polytechnic Institute, and SUNY RF is the successor to and owner of all, right, title and interest in SEMATECH and its intellectual property.

89. In April 2012, Inpria joined SEMATECH's Resist Materials and Development Center (RMDC). In an April 24, 2012, press release, Inpria announced that, "[a]s a resist member of SEMATECH's lithography program, Inpria will collaborate with SEMATECH engineers on critical issues for resist in extreme ultraviolet (EUV) lithography." Inpria's CEO, Andrew Grenville, praised the partnership, stating that "[o]ur partnership with SEMATECH provides Inpria the opportunity to rapidly increase the rate of development for our EUV lithography materials . . . . This collaboration further demonstrates our commitment to tackle the grand challenges in lithography faced by the semiconductor industry."

**B. SUNY RF's Dr. Robert Brainard, Ph.D., Is a Pioneer in the Field of Photoresists**

90. Dr. Brainard is a Professor in the Department of Nanoscale Science & Engineering at SUNY at Albany in the College of Nanotechnology, Science, and Engineering (CNSE). Dr. Brainard's research is concerned with the design, synthesis, and characterization of new molecules and polymers for their use in nanotechnology. Much of Dr. Brainard's research is focused on photoresists, which are light-sensitive layers used in nearly every step in the manufacture of

integrated circuits and the building of circuit boards. Photoresists are also essential to the fabrication of micro-electro-mechanical systems (MEMs).

91. Photoresists play a critical role in photolithography. Literally meaning “writing with light,” photolithography is the process of using light to create patterns on silicon wafers and ultimately producing circuit boards. Photoresists are light-sensitive materials that interact with light to produce a pattern on the wafer after development. This pattern is then used as an “etch mask” to protect portions of its substrate during a pattern-transfer step, in which the resist pattern is transferred to an underlying substrate. In this way individual layers are constructed to become a circuit board on the microchip.

92. In order to fit more intricate circuit board patterns onto smaller microchips, the semiconductor industry constantly needs to produce higher resolution patterns. One method to do so is EUV photolithography, which uses shorter, EUV wavelengths to produce higher resolution patterns. However, semiconductor manufacturers have been troubled by finding photoresist materials that provide optimal sensitivity and resolution in the context of EUV photolithography.

93. Dr. Brainard is the first chemist in the world to design photoresists for use in EUV, 13.5 nm Lithography, starting in 1998, while working at Rohm and Haas.

94. Since Dr. Brainard joined SUNY as a professor in 2005, he and his students have continued to design, synthesize, and characterize new materials for use in photoresists. Much of his group’s research has focused on understanding the fundamental mechanism of exposure to EUV light.

95. Many of Dr. Brainard’s key contributions in the field of photoresists concern his work on molecular organometallic resists for EUV (MORE). Since second-row elements (e.g., carbon, oxygen, nitrogen, and fluorine) are relatively transparent to EUV light, Dr. Brainard

realized it was essential to use other elements in EUV photoresist materials. Dr. Brainard embarked on a project in 2011 to design and synthesize organometallic compounds containing transition or main group metallic elements. To date, over a thousand compounds have been synthesized and evaluated lithographically. This project continues to this day.

C. **SUNY RF and Inpria Entered into the 2015 Research Agreement to Research and Develop Organometallic Photoresist Materials**

96. Due to Dr. Brainard's early breakthrough work in the field of photoresists, he and SUNY RF had developed an expertise in the field, particularly with respect to Dr. Brainard's MORE project, which focused on metal-based photoresists.

97. Given SUNY RF's and Dr. Brainard's established expertise in the field, Inpria sought to enter a research partnership with SUNY RF and Dr. Brainard to research and develop metal-based photoresists. 2015 SRA Preamble.

98. Effective on January 1, 2015, SUNY RF and Inpria entered into the 2015 SRA. *Id.*

99. The Parties acknowledged that SUNY RF had initiated a "PRIOR PROJECT" entitled "Molecular Organometallic Resists for EUV," on which Dr. Brainard and his group worked. *Id.*

100. The Parties further recognized that during Dr. Brainard's work on the PRIOR PROJECT, SUNY RF acquired certain INTELLECTUAL PROPERTY RIGHTS, defined as "PRIOR PROJECT IP." *Id.* Some such "PRIOR PROJECT IP" was expressly listed in Exhibit C:

**Figure 5: SUNY RF PRIOR PROJECT IP to 2015 SRA**

EXHIBIT C	
PRIOR PROJECT IP	
<b>1. Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metal Resists</b>	CNSE Disclosure Number: RN2-11-27 Developer(s): Robert Brainard; Brian Cardineau; Dan Freedman Patent(s): None Application(s): Submitted as "Molecular Organometallic Resists for EUV" and "High Sensitivity Metal Olefin Resists for EUV Lithography"
<b>2. Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metal Resists</b>	CNSE Disclosure Number: RN2-11-27.3 Developer(s): Robert Brainard; Dan Freedman; Miles Marnell; Brian Cardineau Patent(s): None Application(s): Submitted as "Molecular Organometallic Resists for EUV"
<b>3. Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds</b>	CNSE Disclosure Number: RN2-11-27.2 Developer(s): Robert Brainard; Brian Cardineau; Dan Freedman; Miles Marnell Patent(s): None Application(s): None Submitted
<b>4. Molecular Organometallic Resists for EUV (MORE): Tin, Bismuth, Tellurium and Antimony Resists</b>	CNSE Disclosure Number: RN2-11-27.4 Developer(s): Robert Brainard; James Passarelli; Brian Cardineau; Patent(s): None Application(s): Submitted as "High Sensitivity Metal Olefin Resists for EUV Lithography"
<b>5. MORE Refinement: High Sensitivity Antimony Acrylate Resists for EUV Lithography</b>	CNSE Disclosure Number: RN2-11-27.6 Developer(s): Robert Brainard and James Passarelli Patent(s): None Application(s): Submitted as "High Sensitivity Metal Olefin Resists for EUV Lithography"
<b>6. Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists</b>	CNSE Disclosure Number: RN2-11-27.5 Developer(s): Robert Brainard and Ryan Del Re Patent(s): None Application(s): None Submitted
<b>7. Molecular Organometallic Resists for EUV (MORE): Palladium and Platinum Resists</b>	CNSE Disclosure Number: RN2-11-27.7 Developer(s): Robert Brainard and Miriam Sortland Patent(s): None Application(s): None Submitted

101. The 2015 SRA defined "INTELLECTUAL PROPERTY RIGHTS" as:

all industrial and other intellectual property rights comprising or relating to: (a) patents; (b) trademarks; (c) works of authorship, expressions, designs and design registrations, whether or not copyrightable, including copyrights and copyrightable works, software and firmware, data, data files, and databases and other specifications and documentation; (d) know how and/or trade secrets; and (e) all industrial and other intellectual property rights, and all rights, interests and protections that are associated with, equivalent or similar to, or required for the exercise of, any of the foregoing, however arising, in each case whether registered or unregistered and including all registrations and applications for, and renewals or extensions of, such rights or forms of protection pursuant to the laws of any jurisdiction throughout in any part of the world.

*Id.* § 9(k).

102. Under the 2015 SRA, Inpria approved funding to support the “PROJECT” entitled “Molecular Organometallic Resists for EUV (MORE),” and SUNY RF agreed to conduct and carry out the PROJECT and provide Dr. Brainard as the principal investigator to supervise and conduct the work on the PROJECT. *Id.*

***1. Under the 2015 SRA, SUNY RF Owns Its PRIOR PROJECT IP, and Inpria Agreed Not to Use Such IP Outside of the Project***

103. Under the 2015 SRA, SUNY RF agreed to “contribute the PRIOR PROJECT IP set forth in Exhibit C to complete and carry out the PROJECT” and granted Inpria a limited license solely “to use the PRIOR PROJECT IP to carry out the PROJECT.” *Id.* § 9(h).

104. SUNY RF did not grant Inpria a license to use the PRIOR PROJECT IP for any purpose other than carrying out the PROJECT.

105. On August 1, 2015, the Parties amended Paragraph (h) of Section 9 of the 2015 SRA (“2015 SRA First Amendment,” attached as Ex. B). As relevant here, the Parties agreed that SUNY RF would “provide the PRIOR PROJECT IP disclosures” listed in Exhibit C to Inpria and that (1) such “disclosures are confidential information of” SUNY RF, and (2) Inpria “will only use the disclosures and the information contained in the disclosures to carry out the PROJECT.” 2015 SRA First Amendment ¶ 1.

106. The 2015 SRA was binding and inured to the benefit of the Parties to the agreement and to their respective successors or assigns. 2015 SRA § 12.

107. As Inpria’s successor, JSR is also bound by the 2015 SRA.

108. Under the 2015 SRA, the Challenged Patents and Defendants’ tin-oxide photoresist products and methods constitute PRIOR PROJECT IP.

**2. Under the 2015 SRA, SUNY RF Owns All FOUNDATION Inventions, and Inpria Was Not Granted Any License to Such IP**

109. Under the 2015 SRA, the Parties agreed SUNY RF “shall hold title to all INTELLECTUAL PROPERTY RIGHTS which are generated, conceived or reduced to practice during the conduct of work under this Agreement utilizing facilities or personnel of FOUNDATION, SUNY Poly or SUNY exclusively,” referred to as “FOUNDATION Inventions.” *Id.* § 9(a).

110. SUNY RF granted Inpria an exclusive 120-day option to acquire an exclusive, royalty bearing, license to the FOUNDATION Inventions. *Id.* § 9(c).

111. Had Inpria exercised its option and acquired an exclusive license in “any FOUNDATION Invention,” the Parties were to “negotiate a mutually acceptable license agreement,” which would include “any royalty provisions” and address “the costs of patenting new technology developed in connection with such FOUNDATION INVENTION and control over prosecution and maintenance of such patents and related patent applications.” *Id.* § 9(c)–(d).

112. Inpria did not exercise its option pursuant to § 9(c) to acquire a license to the FOUNDATION Inventions or to assume control over prosecution of such patents and related patent applications.

113. The Parties expressly agreed SUNY RF granted “no license or other rights in FOUNDATION Inventions” to Inpria or any of its successors, such as JSR. *Id.* § 9(b).

114. Under the 2015 SRA, if the Challenged Patents and Defendants’ tin-oxide photoresists products and methods are not PRIOR PROJECT IP, the Challenged Patents and Defendants’ tin-oxide photoresist products and methods constitute FOUNDATION INVENTIONS.



**3. Under the 2015 SRA, SUNY RF Holds Joint Title to All JOINT IP, and Inpria Was Not Granted Any Interest in or License to SUNY RF's JOINT IP Interests**

115. Under the 2015 SRA, the Parties also agreed that SUNY RF and Inpria “shall hold joint title to all INTELLECTUAL PROPERTY RIGHTS generated, conceived or reduced to practice during the conduct of work under this Agreement that are not FOUNDATION Inventions or SPONSOR Inventions” (“JOINT IP”).<sup>7</sup> *Id.* § 9(e).

116. Inpria was granted the right “to exercise the option and exclusive licensing set forth in Section 9(c) above with respect to Foundation's interest in said INTELLECTUAL PROPERTY RIGHTS.” *Id.* § 9(e). Thus, Inpria also had “an exclusive 120-day option to acquire an exclusive, royalty bearing, license” to SUNY RF’s interest in any JOINT IP generated, conceived, or reduced to practice during the 2015 Research Agreement. *See id.* §§ 9(e), 9(c).

117. Inpria did not exercise its option to acquire a license to SUNY RF’s interest in any JOINT IP or to assume control over prosecution of such patents and related patent applications.

118. SUNY RF granted no license or other rights in its interest in any JOINT IP to Inpria or any of its successors, such as JSR.

119. Under the 2015 SRA, if the Challenged Patents and Defendants’ tin-oxide photoresists products and methods are neither PRIOR PROJECT IP nor FOUNDATION INVENTIONS, the Challenged Patents and Defendants’ tin-oxide photoresist products and methods at the very least constitute JOINT IP.

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<sup>7</sup> The 2015 SRA defined “SPONSOR Inventions” as INTELLECTUAL PROPERTY RIGHTS which were generated, conceived, or reduced to practice during the conduct of work under the 2015 SRA “utilizing [Inpria] facilities and [Inpria] personnel exclusively.” 2015 SRA § 9(f).

**4. Under the 2015 SRA, Inpria Holds Title to Only Such Intellectual Property that “Exclusively” Utilized Inpria’s Personnel and Facilities**

120. Under the 2015 SRA, the parties also agreed that Inpria shall hold titled to only such “INTELLECTUAL PROPERTY RIGHTS which are generated, conceived or reduced to practice during the conduct of work under this Agreement utilizing SPONSOR facilities and SPONSOR personnel exclusively,” referred to as SPONSOR INVENTIONS. *Id.* § 9(f)

121. None of the Challenged Patents nor Defendants’ tin-oxide photoresist products or methods are SPONSOR INVENTIONS under the 2015 SRA because none of them was generated, conceived, and reduced to practice utilizing Inpria’s facilities and personnel exclusively.

122. Regardless, under the 2015 SRA, Inpria granted SUNY RF and SUNY an irrevocable, perpetual, fully paid up, worldwide, nonexclusive, royalty-free license to use SPONSOR INVENTIONS, if any, for academic research and other not for profit scholarly purposes. *Id.* § 9(g).

**5. Under the 2015 SRA, Inpria Agreed to Protect SUNY RF’s Ownership Rights**

123. Under the 2015 SRA, Inpria also “agree[d] to cooperate in executing such documents, render such assistance, and take such other action as the other Party may reasonably request to apply for, register, perfect, confirm, and protect the ownership rights set forth in this Section 9” of the 2015 SRA. *Id.* § 9(j).

**6. The Second Amendment to the 2015 SRA Stated Additional Research Goals and FOUNDATION Resources**

124. On December 20, 2015, the Parties amended the 2015 SRA (“2015 SRA Second Amendment,” attached as Ex. C) to include a list of “Tasks and Milestones (Year 2)” and to confirm that SUNY RF would provide, among other materials and equipment, “[t]hree week-long

trips per year to perform EUV characterization of resist materials at the Paul Scherrer Institute (PSI).” 2015 SRA Second Amendment ¶¶ 1–2.

125. On December 16, 2016, the Parties amended the 2015 a third time (“2015 SRA Third Amendment,” attached as Ex. D) to extend the 2015 SRA to March 9, 2017.

**D. SUNY RF and Inpria Entered into the 2017 Research Agreement to Continue Researching and Developing Organometallic Photoresists**

126. Effective on May 1, 2017, the Parties entered into the 2017 SRA. 2017 SRA Preamble.

127. As relevant here, the terms of the 2017 SRA were the same as those of the 2015 SRA.

128. Like in the 2015 SRA, the Parties recognized they had a mutual interest in promoting research and development activities related to organometallic photoresist materials, a field in which SUNY RF had developed an expertise. 2017 SRA Preamble.

129. The Parties acknowledged that SUNY RF had conducted a “PRIOR PROJECT” entitled “Molecular Organometallic Resists for EUV,” on which Dr. Brainard and his group worked. *Id.*

130. The Parties further recognized that during the course of Dr. Brainard’s work on the PRIOR PROJECT, SUNY RF acquired certain INTELLECTUAL PROPERTY RIGHTS, defined as “PRIOR PROJECT IP.” *Id.* Certain “PRIOR PROJECT IP” was expressly delineated in Exhibit C to the 2017 SRA. The list of PRIOR PROJECT IP in Exhibit C to the 2017 SRA was inclusive of the list of PRIOR PROJECT IP in Exhibit C to the 2015 SRA, but Exhibit C to the 2017 SRA also included additional SUNY RF PRIOR PROJECT IP, as illustrated below in Figure 6.

**Figure 6: Additional SUNY RF PRIOR PROJECT IP to 2017 SRA**

<p><b>8. Control over Polymerization in Negative-Tone MORE Resists for EUV</b> CNSE Disclosure Date: April 18, 2016 Developer(s): Michael Murphy, Robert Brainard, Jodi Hotalen Patent(s): None Application(s): None Submitted</p>
<p><b>9. Ideas for Positive-Tone Metal-Based Resists for EUV</b> CNSE Disclosure Date: April 18, 2016 Developer(s): Jodi Hotlen, Robert Brainard and Michael Murphy Patent(s): None Application(s): None Submitted</p>
<p><b>10. Carboxylic-Acid Developers for Metal-Based EUV Resists</b> CNSE Disclosure Date: February 8, 2016 Developer(s): Jodi Hotlen, Robert Brainard and William Earley Patent(s): None Application(s): None Submitted</p>

131. The 2017 SRA defined “INTELLECTUAL PROPERTY RIGHTS” as:

all industrial and other intellectual property rights comprising or relating to: (a) patents; (b) trademarks; (c) works of authorship, expressions, designs and design registrations, whether or not copyrightable, Including copyrights and copyrightable works, software and firmware, data, data files, and databases and other specifications and documentation; (d) know how and/or trade secrets; and (e) all industrial and other intellectual property rights, and all rights, interests and protections that are associated with, equivalent or similar to, or required for the exercise of, any of the foregoing, however arising, in each case whether registered or unregistered and including all registrations and applications for, and renewals or extensions of, such rights or forms of protection pursuant to the laws of any jurisdiction throughout in any part of the world.

*Id.* § 9(k).

132. Under the 2017 SRA, Inpria approved funding to support the “PROJECT” entitled “Molecular Organometallic Resists for EUV (MORE),” and SUNY RF agreed to conduct and carry out the PROJECT and provide Dr. Brainard as the principal investigator to supervise and conduct the work on the PROJECT. *Id.*

133. Effective on April 1, 2019, the Parties amended the 2017 SRA (“2017 SRA Amendment,” attached as Ex. F). In the 2017 SRA Amendment, the Parties extended the 2017 SRA term until August 31, 2019. 2017 SRA Amendment § 1.

**1. Under the 2017 SRA, SUNY RF Owns Its PRIOR PROJECT IP, and Inpria Agreed Not to Use Such IP Outside the Project**

134. Under the 2017 SRA, SUNY RF agreed to “contribute the PRIOR PROJECT IP to complete and carry out the PROJECT” and granted Inpria a limited license solely “to use the PRIOR PROJECT IP to carry out the PROJECT.” *Id.* § 9(h).

135. SUNY RF did not grant Inpria a license to use the PRIOR PROJECT IP for any purpose other than carrying out the PROJECT.

136. The 2017 SRA was binding and inured to the benefit of the Parties to the agreement and to their respective successors or assigns. *Id.* § 12.

137. As Inpria’s successor, JSR is also bound by the 2017 SRA.

138. Under the 2017 SRA, the Challenged Patents and Defendants’ tin-oxide photoresist products and methods constitute PRIOR PROJECT IP.

**2. Under the 2017 SRA, SUNY RF Owns All FOUNDATION Inventions, and Inpria Was Not Granted Any License to Such IP**

139. Under the 2017 SRA, the Parties agreed SUNY RF “shall hold title to all INTELLECTUAL PROPERTY RIGHTS which are generated, conceived or reduced to practice during the conduct of work under this Agreement utilizing facilities or personnel of FOUNDATION, SUNY Poly or SUNY exclusively,” referred to as “FOUNDATION Inventions.” *Id.* § 9(a).

140. SUNY RF granted Inpria an exclusive 120-day option to acquire an exclusive, royalty bearing, license to the FOUNDATION Inventions. *Id.* § 9(c).

141. Had Inpria exercised its option and acquired an exclusive license in “any FOUNDATION Invention,” the Parties were to “negotiate a mutually acceptable license agreement,” which would include “any royalty provisions” and address “the costs of patenting new technology developed in connection with such FOUNDATION INVENTION and control over

prosecution and maintenance of such patents and related patent applications.” *Id.* § 9(c)–(d).

142. Inpria did not exercise its option pursuant to § 9(c) to acquire a license to any FOUNDATION Inventions or to assume control over prosecution of such patents and related patent applications.

143. The Parties expressly agreed SUNY RF granted “no license or other rights in FOUNDATION Inventions” to Inpria or any of its successors, such as JSR. *Id.* § 9(b).

144. Under the 2017 SRA, if the Challenged Patents and Defendants’ tin-oxide photoresists products and methods are not PRIOR PROJECT IP, the Challenged Patents and Defendants’ tin-oxide photoresist products and methods constitute FOUNDATION INVENTIONS.

**3. *Under the 2017 SRA, SUNY RF Holds Joint Title to All JOINT IP, and Inpria Was Not Granted Any Interest in or License to SUNY RF’s JOINT IP Interests***

145. Under the 2017 SRA, the Parties also agreed that SUNY RF and Inpria “shall hold joint title to all INTELLECTUAL PROPERTY RIGHTS generated, conceived or reduced to practice during the conduct of work under this Agreement that are not FOUNDATION Inventions or SPONSOR Inventions” (“JOINT IP”).<sup>8</sup> *Id.* § 9(e).

146. Inpria was granted the right “to exercise the option and exclusive licensing set forth in Section 9(c) above with respect to Foundation’s interest in said INTELLECTUAL PROPERTY RIGHTS” *Id.* § 9(e). Thus, Inpria also had “an exclusive 120-day option to acquire an exclusive, royalty bearing, license” to SUNY RF’s interest in any JOINT IP generated, conceived, or reduced to practice during the 2017 Research Agreement. *See id.* §§ 9(e), 9(c).

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<sup>8</sup> The 2017 SRA defined SPONSOR Inventions as INTELLECTUAL PROPERTY RIGHTS which were generated, conceived, or reduced to practice during the conduct of work under the 2017 SRA utilizing Inpria facilities and Inpria personnel exclusively. 2017 SRA § 9(f).

147. Inpria did not exercise its option to acquire a license to SUNY RF's interest in any JOINT IP or to assume control over prosecution of such patents and related patent applications.

148. SUNY RF granted no license or other rights in its interest in any JOINT IP to Inpria or any of its successors, such as JSR.

149. Under the 2017 SRA, if the Challenged Patents and Defendants' tin-oxide photoresists products and methods are neither PRIOR PROJECT IP nor FOUNDATION INVENTIONS, the Challenged Patents and Defendants' tin-oxide photoresist products and methods at the very least constitute JOINT IP.

***4. Under the 2017 SRA, Inpria Holds Title to Only Such Intellectual Property that "Exclusively" Utilized Inpria's Facilities and Personnel***

150. Under the 2017 SRA, the parties also agreed that Inpria shall hold titled to only such "INTELLECTUAL PROPERTY RIGHTS which are generated, conceived or reduced to practice during the conduct of work under this Agreement utilizing SPONSOR facilities and SPONSOR personnel exclusively," referred to as SPONSOR INVENTIONS. *Id.* § 9(f)

151. None of the Challenged Patents nor Defendants' tin-oxide photoresist products or methods are SPONSOR INVENTIONS under the 2017 SRA because none of them was generated, conceived, and reduced to practice utilizing Inpria's facilities and personnel exclusively.

152. Regardless, under the 2017 SRA, Inpria granted SUNY RF and SUNY an irrevocable, perpetual, fully paid up, worldwide, nonexclusive, royalty-free license to use SPONSOR INVENTIONS, if any, for academic research and other not for profit scholarly purposes. *Id.* § 9(g).

**5. Under the 2017 SRA, Inpria Agreed to Protect SUNY RF's Ownership Rights**

153. Inpria “agree[d] to cooperate in executing such documents, render such assistance, and take such other action as the other Party may reasonably request to apply for, register, perfect, confirm, and protect the ownership rights set forth in this Section 9” of the 2017 SRA. *Id.* § 9(j).

**E. Dr. Brainard and His Co-Inventors Invented the Challenged Patents**

154. Separate and independent of the allocation of ownership and prosecution rights bargained for and agreed under the 2015 and 2017 Research Agreements, Dr. Brainard, alone or with one or more of his student advisees (including then-SUNY graduate student and now Inpria Principal Chemist Brian Cardineau and then-SUNY researcher and former Inpria INSERT William Earley), conceived of and/or reduced to practice one or more of the claimed inventions recited in each of the Challenged Patents and then disclosed these inventions to Inpria through SEMATECH and/or through the Parties' Research Agreements.

**1. SUNY RF Invented and Owns the '684, '179, and '554 Patents**

155. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, and James Passarelli, conceived of and/or reduced to practice one or more of the inventions claimed in the '684, '179, and '554 Patents.

156. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '684, '179, and '554 Patents.

157. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income



and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '684, '179, and '554 Patents.

158. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '684, '179, and '554 Patents.

159. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '684, '179, and '554 Patents.

160. At all relevant times, James Passarelli was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '684, '179, and '554 Patents.

161. The '684, '179, and '554 Patents all derive from the same patent application, share the same specification, and concern "Organometallic Solution Based High Resolution Patterning Compositions." As stated in their specification, these patents relate to "radiation based methods for the performance of patterning materials using an organometallic coating composition" and to "precursor solutions that can be deposited to form organometallic coatings that can be patterned with very high resolution with radiation and to the coated substrates and coatings formed with the precursor solutions before and after patterning." In particular, these inventions comprise "a coating that comprises a metal oxo-hydroxo network with organic ligands with metal carbon bonds and/or with metal carboxylate bonds" wherein "the oxo-hydroxo network comprises M-OH linkages and

M-O-M linkages,” where “M represents a metal atom.” The specification further describes “Example 1” of such a precursor solution, and method of preparing the same, as a “Tin based organometallic composition” comprising “dodecameric butyltin hydroxide oxide polyatomic cations” from “Eychenne-Baron et al, Organometallics, 19, 1940-1949 (2000)”—or what is now known in the art as “Tin-12.”

162. The claims of the '684, '179, and '554 Patents all claim various precursor solutions, coated and/or patterned substrates, and methods of patterning and coating the same, wherein the coating comprises a metal oxo-hydroxo network with organic ligands with metal carbon bonds and/or with metal carboxylate bonds and the oxo-hydroxo network comprises M-OH linkages and M-O-M linkages. For example:

**Figure 7: Exemplary Independent Claim from '684 Patent**

1. A method for patterning a substrate with radiation, the method comprising:  
 irradiating a coated substrate along a selected pattern to form an irradiated structure with a region of irradiated coating and a region with un-irradiated coating, wherein the coated substrate comprises a coating having an average thickness from about 5 nm to about 200 nm and that comprises a metal oxo-hydroxo network with organic ligands with metal carbon bonds and/or with metal carboxylate bonds and free of peroxide ligands;  
 heating the irradiated structure at a temperature from about 45° C. to about 250° C. for 0.1 minutes to about 30 minutes to form an annealed irradiated structure; and  
 selectively developing the annealed irradiated structure to remove a substantial portion of the irradiated coating or of the un-irradiated coating to form a patterned substrate wherein the metal oxo-hydroxo network comprises both M-O—H linkages and M-O-M linkages.

**Figure 8: Exemplary Independent Claim from '179 Patent**

1. A precursor solution comprising an organic liquid and metal polynuclear oxo/hydroxo cations with branched alkyl ligands having metal carbon bonds with a metal concentration from about 0.01M to about 1.4M, and wherein the polynuclear oxo/hydroxo cations have M-OH linkages and M-O-M linkages.

**Figure 9: Exemplary Independent Claim from '554 Patent**

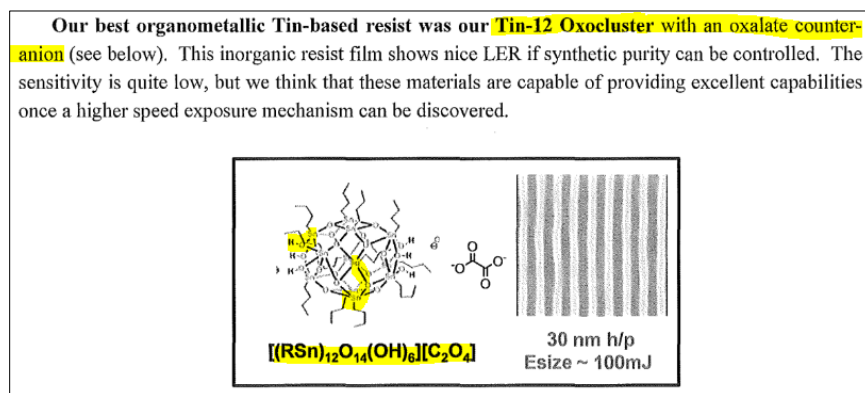
1. A precursor solution comprising an organic liquid and metal polynuclear oxo/hydroxo species with alkenyl ligands having metal carbon bonds with a metal concentration from about 0.01M to about 1.4M.

163. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, and James Passarelli, conceived of and/or reduced to practice one or more of the inventions claimed in the '684, '179, and '554 Patents—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metal Resists,” “RN2-11-27.2: Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metals,” “RN2-11-27.4: Molecular Organometallic Resists for EUV (MORE): Tin, Bismuth, Tellurium and Antimony Resists,”—all of which are signed by each inventor, accompanied by the signature of a witness, and include documented conception dates of no later than “June 28, 2011.”

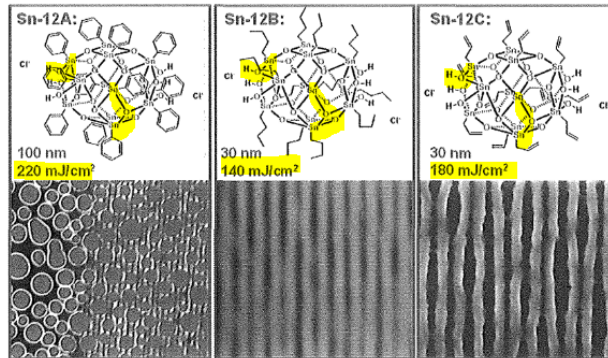
164. For example, the invention disclosure report RN2-11-27.2 concerning Tin and Bismuth Compounds discloses an invention “to use organo-tin and organo-bismuth compounds or

polymers as resists for use in Extreme Ultraviolet Lithography.” It expressly discloses “Sn-12 clusters,” which “are oxoclusters containing twelve tin atoms found to undergo EUV photochemistry in our preliminary trials,” which have been investigated “through anionic ligand exchange and containing butyl, phenyl, and allyl organometallic groups.” As is explained in the ’684, ’179, and ’554 Patent specifications, butyl and phenyl are alkyl group ligands, whereas allyl is an alkenyl group ligand. RN2-11-27.2 also expressly discloses that “Our best organometallic Tin-based resist was our Tin-12 Oxocluster with an oxalate counter-anion” containing Sn-O-H linkages and Sn-O-Sn linkages, as illustrated in Figure 10 (below). It expressly explained that the “Sn-12 cluster has a ‘football-shaped’ cage structure, containing 12 tin atoms,” where “[e]ach tin has one bond to carbon and four or five bonds to oxygen” and “[a]t each side of the structure are three hydroxyl groups,” and “each cluster has a +2 net charge which is accompanied by two anionic ligands. RN2-11-27.2 also expressly disclosed Dr. Brainard’s work making and testing such Tin-12 oxoclusters containing various alkyl and alkenyl group ligands, as illustrated in Figure 10.

**Figure 10: RN2-11-27.2 Invention Disclosure Report**



**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn-12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.




**Figure 10.** Three Sn-12 clusters were made and tested containing phenyl (Sn-12A), butyl(Sn-12B) and allyl(Sn-12C) organic groups. Sn-12A appears to have purity issues, and phase separation is occurring in the film. Sn-12B and Sn-12C were both capable of resolving 30 nm features but further work is required.

165. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 1, 2012, Dr. Brainard made a confidential presentation to SEMATECH members, including Inpria, describing his objective to "[i]nvent revolutionary new photoresists based on Molecular Organometallic Resists for EUV (MORE)." This presentation explained that his MORE program was focused on five classes of compounds, including "Mono-Nuclear Organometallic or Inorganic Compounds," "Transition Metal Oxide/Oxo-Carboxylate Clusters," and "Tin Oxoclusters" among others. It explained that his MORE program was focused "on elements with high EUV OD's and high mass densities," including "In" (indium), "Sn" (tin), and "Sb" (antimony) among others. And as illustrated in Figure 11 below, it also explained why Dr. Brainard's MORE compounds were superior to the hafnium resists on which Inpria was then focusing its research and development. Dr. Brainard made additional such confidential MORE presentations to SEMATECH members, including Inpria, including on June 14, 2013.

**Figure 11: CNSE MORE SEMATECH PRESENTATION 5-1-12**

**Why MORE Resists will work better than HfNp Resists**

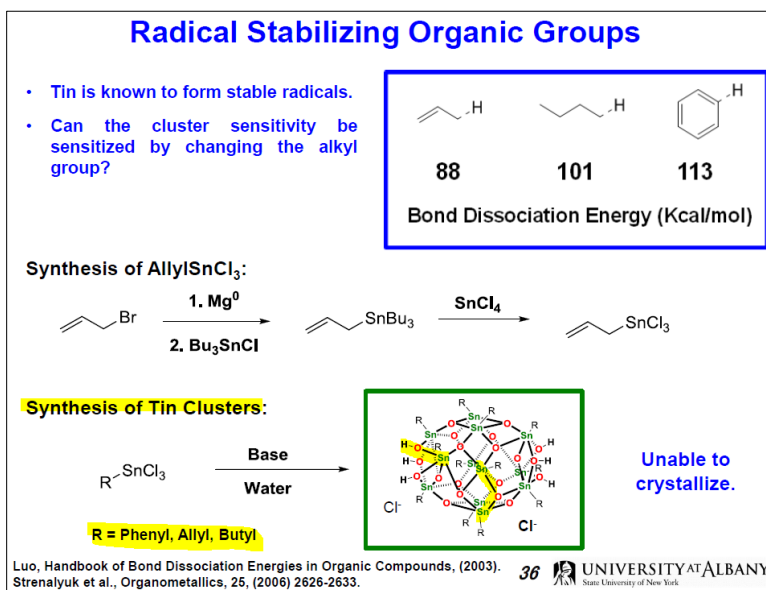
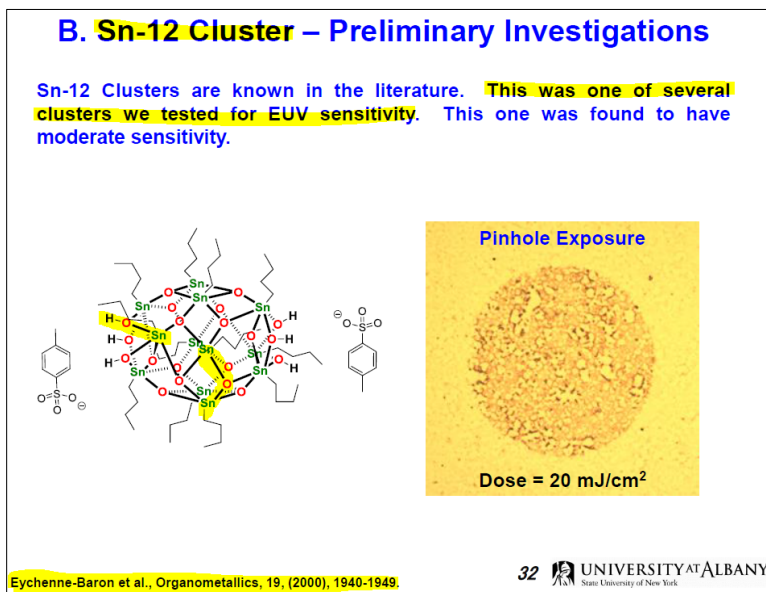
- (1) **Size.** The molecules proposed here will be 3-6 times smaller in diameter than Hf Np's, and yield better LER and resolution.
- (2) **Control over Photoreactivity.** The proposed photochemical reaction of the Inpria resist is thermodynamically unfavorable, leading to poor sensitivity. We will be able to tune the reactivity of our MORE resists.
- (3) **Dispersions vs. Solutions.** Our molecular solutions will be more stable than Np Dispersions.
- (4) **Particle Defects.** We propose that resists based on inherently soluble molecules will create fewer defects.
- (5) **Tunable Properties.** Our synthesis of molecular compounds → excellent control over molecular structure, kinetics and thermodynamics.

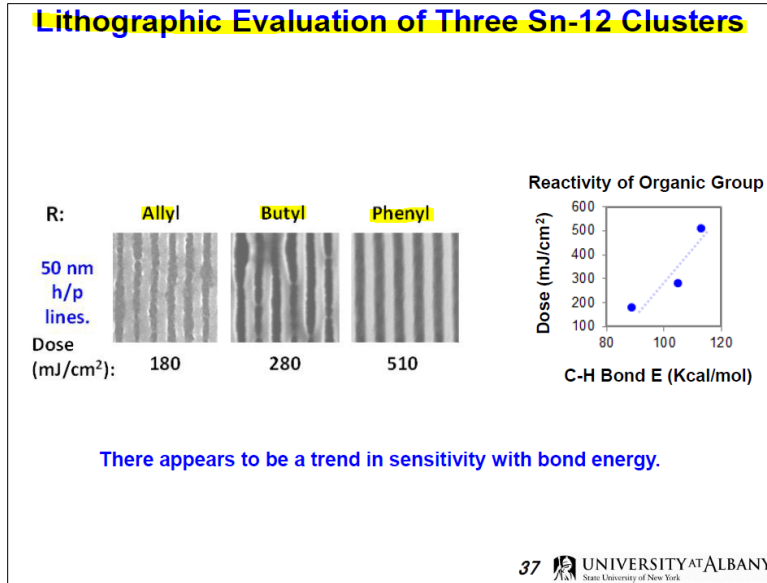
*CNSE-SEMATECH Confidential*
3  UNIVERSITY AT ALBANY  
State University of New York

166. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 20, 2013, then-CNSE graduate student Brian Cardineau presented his doctoral thesis titled "Novel Resist Systems for EUV Lithography: LER, Nanoparticle, Chain-Scission and MORE" in "partial fulfillment of the degree of Doctor of Philosophy in Nanoscale Science at the College of Nanoscale Science and Engineering." The thesis was conducted at CNSE under his researcher adviser Dr. Brainard. Inpria had access to and, on information and belief, obtained this doctoral thesis presentation. In explaining "MORE Benefits," the thesis presentation explained, "[w]e have proposed a new platform of resist consisting of high optical density metal oxide organometallic compounds," which potential benefits included "High EUV OD," "High Mass Density," "No Acid Diffusion," "Excellent Etch Rates," and "High Uncatalyzed Reactivity." The thesis presentation also expressly concerned "Sn-12 Clusters" which "we tested for EUV sensitivity" and which cluster was known in the literature at "Eychenne-Baron et al, Organometallics, 19, (2000), 1940-1949"—the exact same reference that Inpria would later quote in its application for the '684, '179, and '554 Patents, as illustrated in Figure 12. It also included

results of SUNY RF's synthesis of Tin-12 oxoclusters with phenyl, allyl, and butyl ligands, as illustrated in Figure 12.

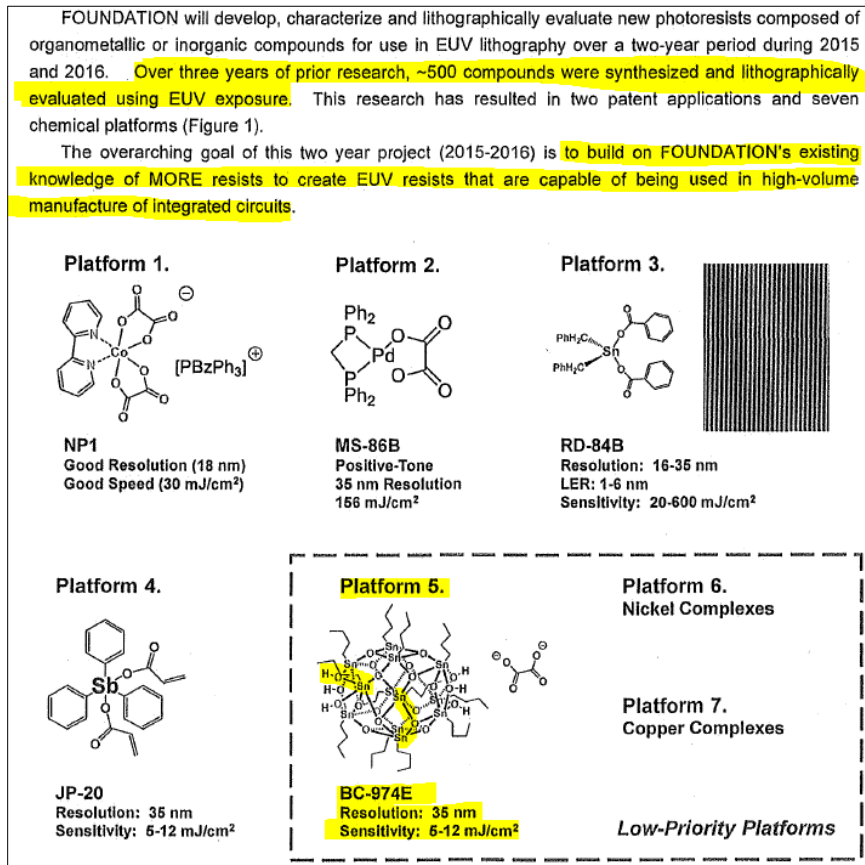
**Figure 12: CNSE MORE THESIS PRESENTATION 5-20-13**





167. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, SUNY RF also recounted these SUNY RF inventions in the Scope of Work (Exhibit A) "Molecular Organometallic Resists for EUV (MORE)" attached to the 2015 Research Agreement. This Scope of Work explained that "[o]ver three years of prior research, ~500 compounds were synthesized and lithographically evaluated using EUV exposure," including "Platform 5" "BC-9743," or Tin-12. The Scope of Work further explained that these "Tin-Oxo Cluster" resists were developed "during the first year of prior research," and that Dr. Brainard and his team has completed their evaluation of them no later than May 2013, as illustrated in Figure 13 below.



**Figure 13: Exhibit A to 2015 Research Agreement****(5) Tin-Oxo Clusters (Past work).**

- These resists were developed during the first year of prior research. Additional development of this platform will not be considered in the first year of this project. FOUNDATION includes it here for completeness.
- BC-974E is one representative of this platform, [(BuSn)<sub>12</sub>O<sub>14</sub>(OH)<sub>6</sub>][Ox], which has a resolution of 50 nm and E<sub>size</sub> of 440 mJ/cm<sup>2</sup>.
- These resists show an improvement in sensitivity when the anions are smaller (similar to Platform 3). They also show improvements in sensitivity when the Sn-carbon bonds are weaker.
- Although never measured, FOUNDATION thinks that these compounds will have excellent EUV absorption and excellent etch resistance.
- FOUNDATION has not worked on these materials since May 2013, but FOUNDATION may use the tin-oxo clusters in combination with Platforms 1, 3 and 4, to provide improved EUV absorption and improved etch resistance.

168. As further non-limiting examples, SUNY RF also recounted these SUNY RF inventions to Inpria on April 8, 2015 and June 19, 2015 in confidential research reports disclosed pursuant to the terms of the Research Agreements, and in the Scope of Work (Exhibit A) attached to the Parties' 2017 Research Agreement.

169. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the '684, '179 and '554 Patents.

170. Specifically, months and years after these inventions and disclosures, on August 22, 2013, scientists from Inpria—Stephen Meyers, Douglas Keszler, Kai Jiang, Jeremy Anderson, and Andrew Grenville (the “purported '684, '179, and '554 inventors”)—filed U.S. Patent Application No. 13/973,098 (ORGANOMETALLIC SOLUTION BASED HIGH RESOLUTION PATTERNING COMPOSITIONS) (the “'098 Application”). The purported '684, '179, and '554 inventors then filed two continuation applications during the course of the Research Agreements bearing the same title: U.S. Patent Application Nos. 14/983,220 (filed on December 29, 2015), and 16/007,242 (filed on June 13, 2018). As explained above, the applications disclosed methods of EUV lithography using an organometallic coating as the resist.

171. During prosecution, the purported '684, '179, and '554 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, or James Passarelli to the invention described in the '098 Application or its continuation applications, and did not ask that Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, or James Passarelli be named as an inventor.

172. In September 2013, the purported '684, '179, and '554 inventors assigned to Inpria all right, title, and interest in the '098 Application, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on October 2, 2013, at Reel/Frame 031327/0541.

173. The U.S. Patent and Trademark office issued U.S. Patent No. 9,310,684 on April 12, 2016; it issued U.S. Patent No. 10,025,179 on July 17, 2018; and it issued U.S. Patent No. 10,416,554 on September 17, 2019, all during the course of the Research Agreements.

174. Inpria and the purported '684, '179, and '554 inventors did not disclose to SUNY RF the existence of the '098 Application, any of its subsequent continuation applications, or the '684, '179, and '554 Patents.

175. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '684, '179, and '554 Patents in the United States, as well as foreign counterparts to the '684, '179, and '554 Patents around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, or James Passarelli contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

***2. SUNY RF Invented and Owns the '505, '924, '696, '048, '081, and '618 Patents***

176. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

177. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

178. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

179. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

180. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

181. At all relevant times, James Passarelli was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

182. At all relevant times, Michael Murphy was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

183. At all relevant times, Ryan Del Re was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to

practice in one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents.

184. The '505, '924, '696, '048, '081, and '618 Patents all claim priority to the same provisional patent application filed by former CNSE graduate student Brian Cardineau during the course of the Research Agreements on October 13, 2015, share the same specification, and concern "Organotin Oxide Hydroxide Patterning Compositions, Precursors, and Patterning." As stated in their specifications, these patents relate to "precursor compositions that can be coated and in situ hydrolysed to form coatings comprising organotin oxide hydroxide," and are expressly stated to be based on the inventions claimed in the '684 Patent discussed above and which were informed by SUNY RF inventions and disclosures to Inpria of the same. According to the specifications, the organometallic composition in the claimed precursor solutions '505, '924, '696, '048, '081, and '618 Patents "can be represented by the formula  $R_zSnO_{(2-(z/2)-(x/2))}(OH)_x$  where  $0 < z \leq 2$  and  $0 < (z+x) \leq 4$ , by the formula  $R_nSnX_{4-n}$  where  $n=1$  or  $2$ , or a mixture thereof, in which R is a hydrocarbyl group with 1-31 carbon atoms, and X is a ligand with a hydrolysable M-X bond."

185. The claims of the '505, '924, '696, '048, and '618 Patents claim various precursor compositions and methods used to form organotin oxide hydroxide coatings, solutions, and films, comprising some mixture of the formula  $R_nSnX_{4-n}$  where R refers to hydrocarbyl groups with 1-31 carbon atoms,  $n=1$  or  $2$ , and X is a ligand with a hydrosoluble bond to Sn, that can be patterned using EUV lithography. Similarly, the '081 Patent claims "depositing a tin composition having organic ligands and hydrolysable ligands" "wherein the organic ligands comprise radiation sensitive Sn-C bonds." Certain of the claims variously claim and add polynuclear structures, hydrolysis development, vapor deposition, and addition and variation of R groups. For example:

**Figure 14: Exemplary Independent Claim from '618 Patent**

1. A coating solution comprising:  
 an organic solvent;  
 a first organometallic composition represented by the formula  $R_z\text{SnO}_{(2-(z/2)-(x/2))}(\text{OH})_x$  where  $0 < z \leq 2$  and  $0 < (z+x) \leq 4$ , by the formula  $R'_n\text{SnX}_{4-n}$  where  $n=1$  or  $2$ , or a mixture thereof, wherein R and R' are independently hydrocarbyl groups with 1-31 carbon atoms, and X is a ligand with a hydrolysable bond to Sn or a combination thereof; and  
 a hydrolysable metal compound represented by the formula  $\text{MX}'_v$ , where M is a metal chosen from groups 2-16 of the periodic table of elements, v=a number from 2 to 6, and X' is a ligand with a hydrolysable M-X bond or combination thereof.

**Figure 15: Exemplary Independent Claim from '505 Patent**

1. A method for forming a radiation patternable film comprising an oxo-hydroxo network with metal cations having organic ligands with metal carbon bonds and metal oxygen bonds, the method comprising:  
 inputting into a deposition chamber closed from the ambient atmosphere a first precursor vapor comprising a composition represented by the formula  $R_n\text{SnX}_{4-n}$  wherein R is an organic ligand with 1-31 carbon atoms bound to Sn with a metal-carbon bond,  $n=1-3$  and X is a ligand having a hydrolysable bond with Sn; and  
 inputting a second precursor vapor comprising an oxygen-containing compound capable of reacting with the composition in the first precursor vapor under conditions in the deposition chamber to form a composition with non-volatile components and a volatile component comprising a reaction product with X ligand or ligands, wherein a substrate is configured with a surface to receive the non-volatile components of the composition.

**Figure 16: Exemplary Independent Claim from '696 Patent**

1. A method for forming a radiation patternable coating, the method comprising:

- exposing a precursor coating on a substrate to water, wherein the precursor coating comprises:
  - a first organometallic composition  $R_zSnO_{(2-(z/2)-(x/2))}(OH)_x$ , where  $0 < z \leq 2$  and  $0 < (z+x) \leq 4$ , or  $R'_nSnX_{4-n}$ , where  $n=1$  or  $2$  and  $R$  and  $R'$  are independently hydrocarbyl groups with 1-31 carbon atoms and  $X$  is a ligand with a hydrolysable Sn—X bond or combination thereof, or a mixture thereof; and
  - a second organometallic composition  $R''_ySnX'_{4-y}$ , where  $y=1$  or  $2$  and  $R''$  is different from  $R'$  and  $X'$  is a ligand with a hydrolysable Sn—X' bond or combination thereof that is the same or different from  $X$ , or an inorganic composition  $ML_v$ , where  $v$  is  $2 \leq v \leq 6$  and  $L$  is a ligand with a hydrolysable M-L bond or combination thereof that is the same or different from  $X$  and  $X'$ , or a mixture thereof,
- wherein the exposing results in hydrolysis of the precursor coating to form a coating comprising  $((R$  and/or  $R')_a(R'')_b)SnO_{(2-((a+b)/2)-(w/2))}(OH)_w$ , where  $0 < (a+b) \leq 2$  and  $0 < (a+b+w) < 4$ ; or comprising  $y ((R$  or  $R')_a(R'')_b)SnO_{(2-((a+b)/2)-(w/2))}(OH)_w \cdot z MO_{((m/2)-1/2)}(OH)_l$ , where  $0 < (a+b) \leq 2$ ,  $0 < (a+b+w) < 4$ ,  $m$ =formal valence of  $M^{m+}$ ,  $0 \leq l \leq m$ ,  $y/z=(0.05$  to  $0.6)$ , and  $M=M'$  or Sn, where  $M'$  is a non-tin metal of groups 2-16 of the periodic table.

**Figure 17: Exemplary Independent Claim from '924 Patent**

1. A radiation sensitive coating comprising an organotin composition having a blend of different hydrocarbyl ligands, wherein the organotin composition is represented by the formula  $((R$  and/or  $R')_a(R'')_b)SnO_{2-((a+b)/2)-(w/2)}(OH)_w$ , where  $0 < (a+b) \leq 2$  and  $0 < (a+b+w) < 4$ , and  $R$ ,  $R'$ ,  $R''$  are independently hydrocarbyl ligands with 1-31 carbon atoms, wherein  $R$ ,  $R'$ , and  $R''$  are different hydrocarbyl ligands.

**Figure 18: Exemplary Independent Claim from '081 Patent**

1. A method for forming a radiation patternable organometallic coating, the method comprising:  
 depositing a tin composition having organic ligands and hydrolysable ligands to form a coating with a dry thickness from about 1 nanometers (nm) to about 50 nm,  
 wherein the organic ligands comprise radiation sensitive Sn—C bonds, and  
 wherein the depositing is by a vapor-based deposition process.

186. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '505, '924, '696, '048, '081, and '618 Patents—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP and in CNSE disclosures and reports under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE),” “RN2-11-27.2: Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metals,” “RN2-11-27.5: Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists.” Such SUNY RF inventions were also recounted in the Scopes of Work attached to the 2015 and 2017 Research Agreements, as well as in numerous CNSE reports provided to Inpria during the 2015 and 2017 Research Projects.

187. For example, the invention disclosure report RN2-11-27 Molecular Organometallic Resists for EUV (MORE) discloses an invention “to use thin films of organometallic compounds with high EUV OD and high mass densities” “as high resolution, low LER EUV photoresists,”



including “Mono-Nuclear Organometallic or Inorganic Compounds,” “Transition Metal Oxide/Oxo-Carboxylate Clusters,” and “Tin Oxoclusters.” RN2-11-27 explains that “[b]ecause the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required [for] resists based on organic polymers.” RN2-11-27 also discloses that “[w]e will start by dissolving the high OD compounds in organic solvents or water and spin coating to a target thickness of 20 nm.”

**Figure 19: RN2-11-27 Invention Disclosure Report**

The invention is to use thin films of organometallic compounds with high EUV OD and high mass densities (as outlined in Table 1 and shown as examples in the set of five classes of compounds shown below) as high resolution, low LER EUV photoresists.

- Mono-Nuclear Organometallic or Inorganic Compounds
- Transition Metal Oxide/Oxo-Carboxylate Clusters
- Tin Oxoclusters
- Bismuth-Clusters
- Iron-Sulfide Clusters

**2. Experimental Approach**

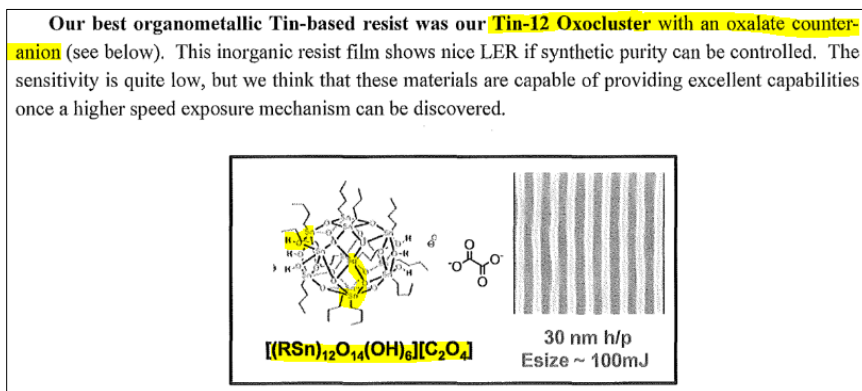
Because the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required resists based on organic polymers (e.g. coating, air stability). We will start by synthesizing new molecules at both SUNY New Paltz and CNSE. Simultaneously, we will purchase all the commercially available mononuclear compounds described in Section 3B. These commercially available compounds will “prime the pump” and allow us to quickly start evaluating the capabilities of EUV resists based on organometallic/inorganic compounds (Figure 3).

**Coating Quality.** We will start by dissolving the high OD compounds in organic solvents or water and spin coating to a target thickness of 20 nm. We will determine if they give high quality, uniform coatings using visual inspection and spectroscopic ellipsometry. If they are not amorphous (e.g. crystalline), we may re-design their structure (ligand exchange) or we may use additives to disrupt their tendency to crystallize. If their viscosity is insufficient to produce 20 nm films, we may need to add small quantities of high molecular weight polymers (e.g. polyvinylalcohol,<sup>10</sup> polyethyleneoxide, polymethylmethacrylate) to increase viscosity sufficiently to coat to 20 nm.

188. As further exemplary evidence of SUNY RF’s invention and Inpria’s knowledge thereof, the invention disclosure report RN2-11-27.2 concerning Tin and Bismuth Compounds discloses various inventions related to precursor solutions containing Tin-12 oxoclusters, such as in the form “[ $(\text{RSn})_{12}\text{O}_{14}(\text{OH})_6$ ][ $\text{X}$ ]<sub>2</sub>”, including mechanisms causing solubility changes during exposure including anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework. As one example, it expressly discloses synthesis of novel Tin-12 oxoclusters with various alkyl groups, including phenyl and butyl, or allyl groups using an organic amine,

tetrahydrofuran, and water under hydrolysis conditions, including as illustrated below in Figure 20.

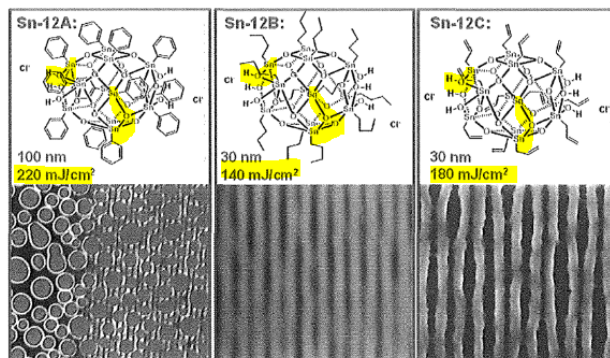
### Figure 20: RN2-11-27.2 Invention Disclosure Report



**Synthesis of Novel Sn-12 Clusters.** Initially, we modified two literature procedures for **preparing the Sn-12 clusters with variation in alkyl groups**. Our first approach was to hydrolyze phenyltin trichloride to get phenylstannoic acid and to then dehydrate to the Sn-12 cluster. Unfortunately, this procedure only yielded an insoluble white precipitate. From our prior work with these clusters, we knew that this insoluble precipitate could not be our target compound. **Our next approach involved the slow hydrolysis of phenyltin trichloride with sodium hydroxide, maintaining a pH of 4.7<sup>41-43</sup>**. With this method, again only an insoluble white precipitate was produced. We then modified this synthetic route to involve a less nucleophilic, amine base. **Using an organic amine in water and THF, we found the phenyltin-12 cluster (PhSn-12) could be made in excellent yield, along with the analogous Sn-4 cluster (PhSn-4) as indicated by GPC results.** Furthermore, by changing the relative base concentration in the reaction, the product formation could be controlled to form one cluster over another (Figure 5).

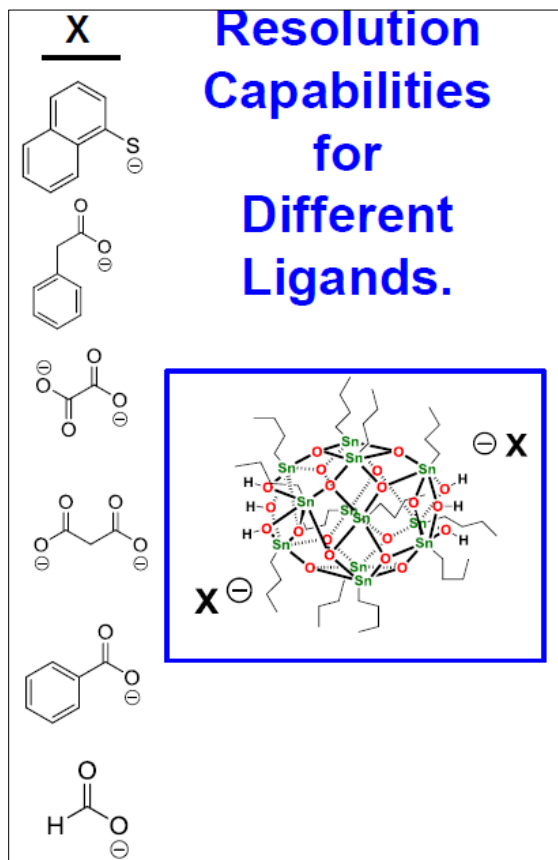
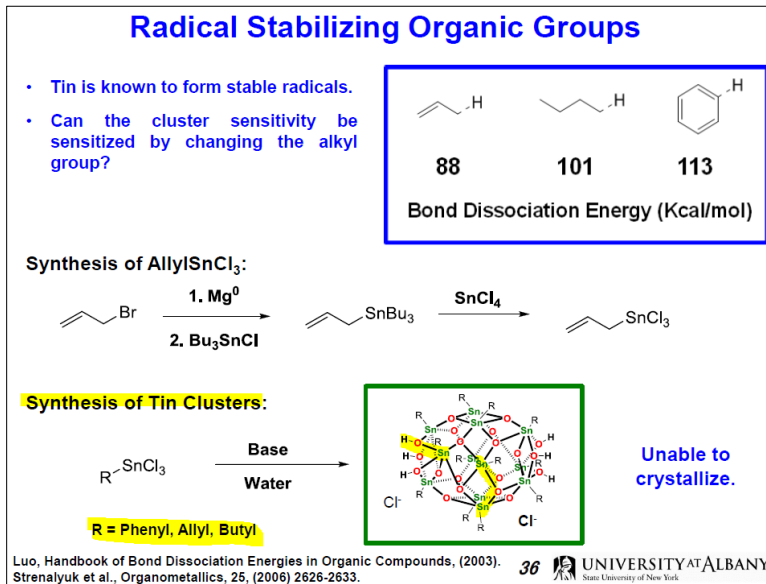
**Evaluation of Sn-C Bond Homolysis Study.** **Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10).** Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.

**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn-12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.



**Figure 10.** Three Sn-12 clusters were made and tested containing phenyl (Sn-12A), butyl(Sn-12B) and allyl(Sn-12C) organic groups. Sn-12A appears to have purity issues, and phase separation is occurring in the film. Sn-12B and Sn-12C were both capable of resolving 30 nm features but further work is required.

189. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 20, 2013, then-CNSE graduate student Brian Cardineau presented his doctoral thesis titled "Novel Resist Systems for EUV Lithography: LER, Nanoparticle, Chain-Scission and MORE" in "partial fulfillment of the degree of Doctor of Philosophy in Nanoscale Science at the College of Nanoscale Science and Engineering." The thesis was conducted at CNSE under his researcher adviser Dr. Brainard. It discloses synthesizing tin-oxoclusters with R groups phenyl, allyl, butyl, in a base and water, as well as modifying the various ligands to affect EUV resolution, including as illustrated below in Figure 21.

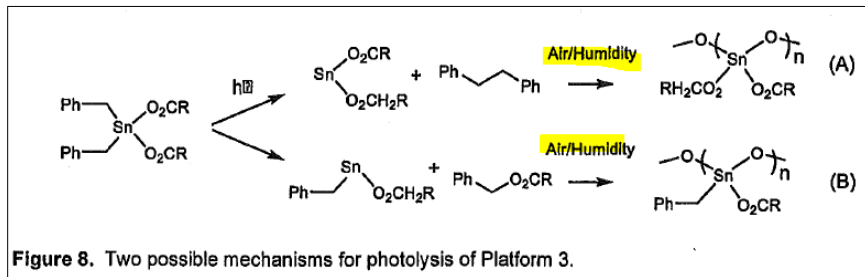
**Figure 21: CNSE MORE Thesis Presentation 5-20-13**

190. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, in the 2015 Statement of Work, SUNY RF described its conception and reduction to

practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including its discovery that one of the “key features” of the mechanism of tin-based resists “is the idea that the exposed resist reacts with air or moisture to create an insoluble tin-oxide compound” and to synthesize tin clusters with benzyl groups and expose them to “air/humidity,” including as illustrated below in Figure 22.

**Figure 22: 2015 Research Agreement Statement of Work**

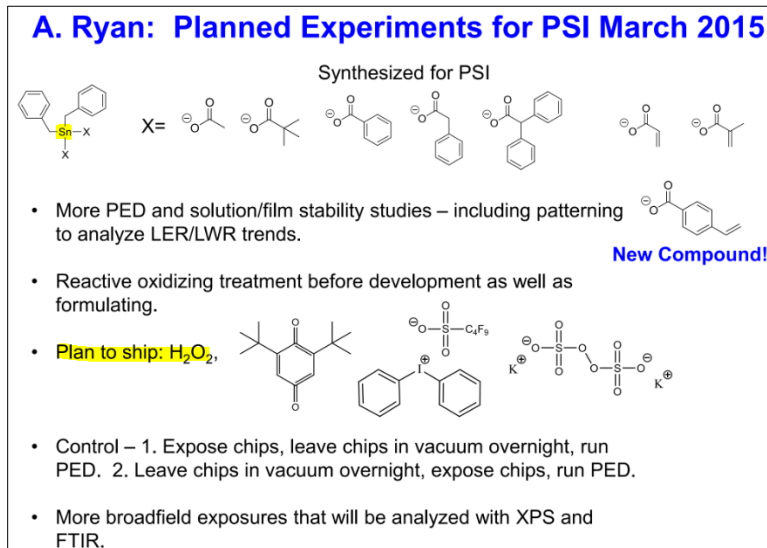
FOUNDATION is currently considering a full cascade of mechanisms for this platform, although the mechanism shown in Figure 8 matches some of the key elements of the reaction. One of the key features of this mechanism is the idea that the exposed resist **reacts with air or moisture** to create an insoluble tin-oxide compound which would help explain the solubility differences observed by these resists.



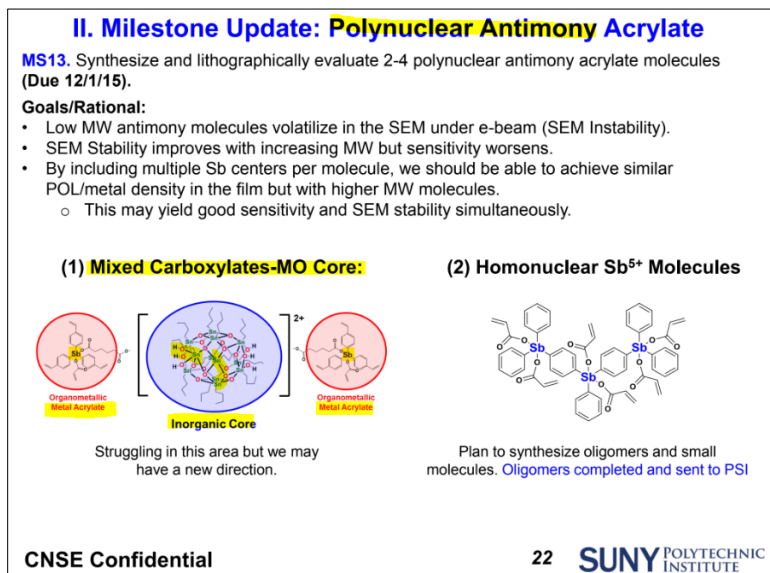
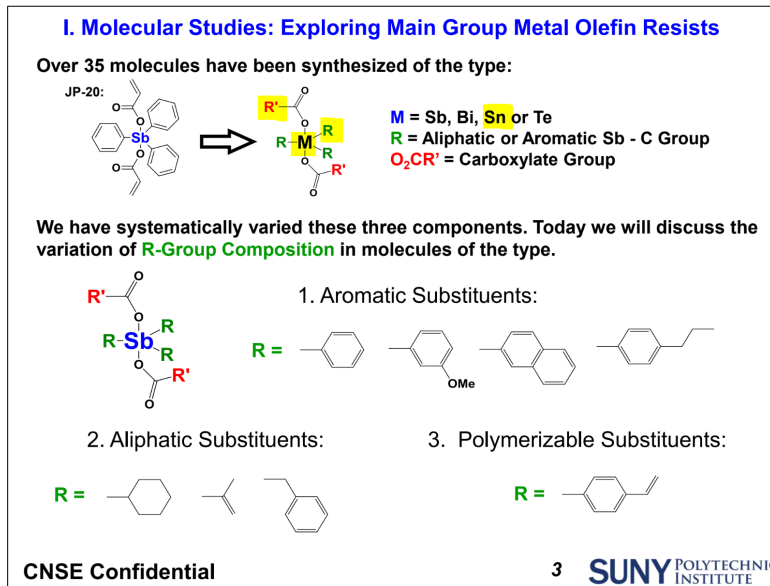
The following experiments will be done to characterize the initial photoreaction and **to investigate the possibility and nature of a second reaction with air or moisture:**

- o UV/e-beam exposure experiments before and **after exposure to air.** CNSE: XPS, EDX; Center for Sustainable Materials Chemistry: TPD/mass spectroscopy.
- o Characterize photoproducts by full-field exposure of coated films.
- o Compare contrast curves at 0 and 60 min post-exposure delay (**after removal from vacuum chamber**).
- o Test the possibility that the homolytic cleavage of the benzyl-tin bond is important in the photomechanism by synthesizing and comparing the sensitivity of a range of benzyl groups with different structures (Figure 9).

191. As further exemplary evidence of SUNY RF’s invention and Inpria’s knowledge thereof, on April 8, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by incorporating  $H_2O_2$  (hydrogen peroxide), though patterning to analyze LER/LWR trends and by exposing the chips in vacuum chambers, including as illustrated in Figure 23 below.

**Figure 23: CNSE Report 4-8-2015**

192. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, in May 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{5-n}$ , including both its molecular studies of Tin-based resists with different R and X groups, including those in aliphatic, aromatic Sb – C, and carboxylate groups, and its milestones concerning polynuclear metal-based resists including those that combined Tin-12 with organometallic metal acrylate, including as illustrated in Figure 24 below.

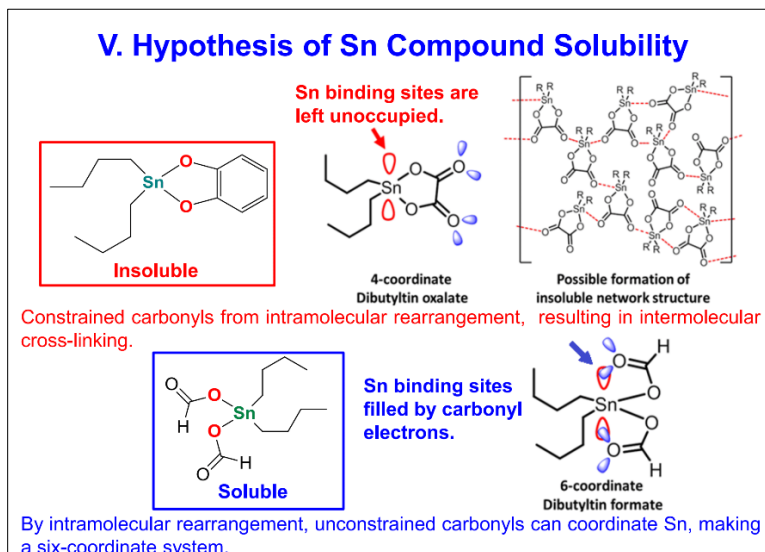
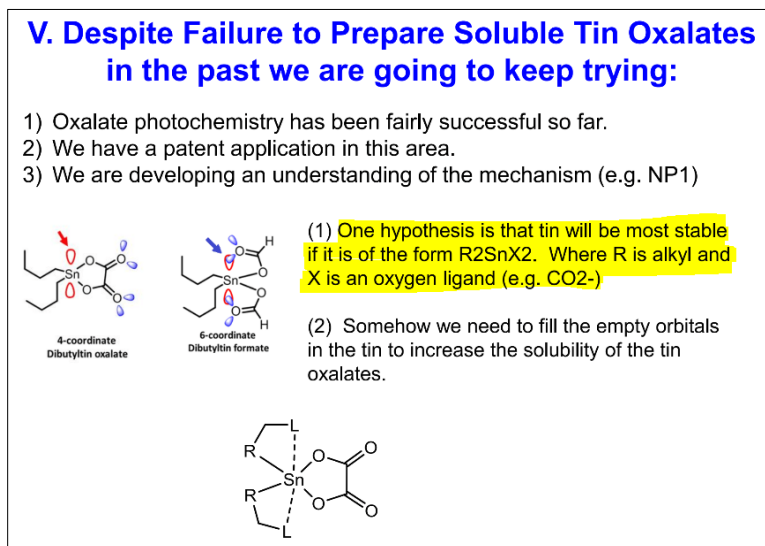
**Figure 24: CNSE Report May 2015**

193. As further exemplary evidence of this invention and Inpria's knowledge thereof, on June 19, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including its discovery that "tin will be most stable if it is of the form  $R_2SnX_2$ " "[w]here R is alkyl and X is an oxygen ligand (e.g.,  $CO_2$ -)" and the "need to fill the empty orbitals in the tin to increase the



solubility of the tin oxalates,” including by intramolecular rearrangement” where “unconstrained carbonyls can coordinate Sn, making a six coordinate system,” as illustrated in Figure 25.

**Figure 25: CNSE Report 6-19-2015**

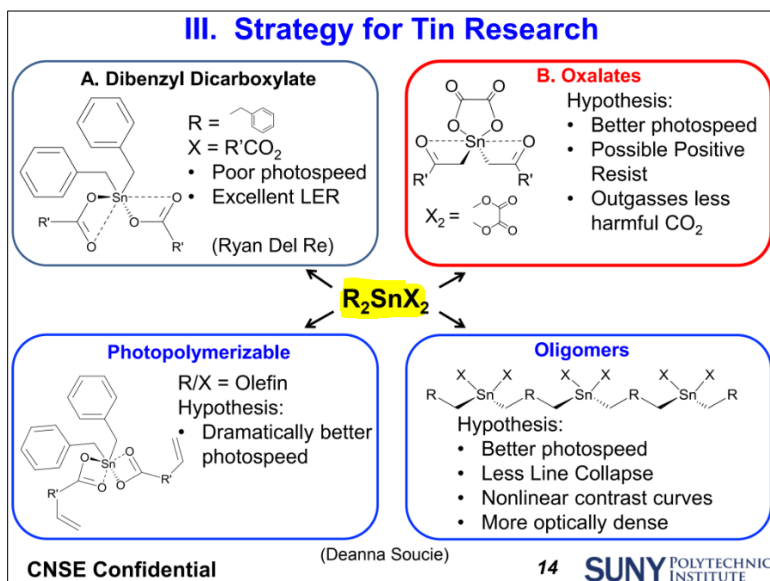


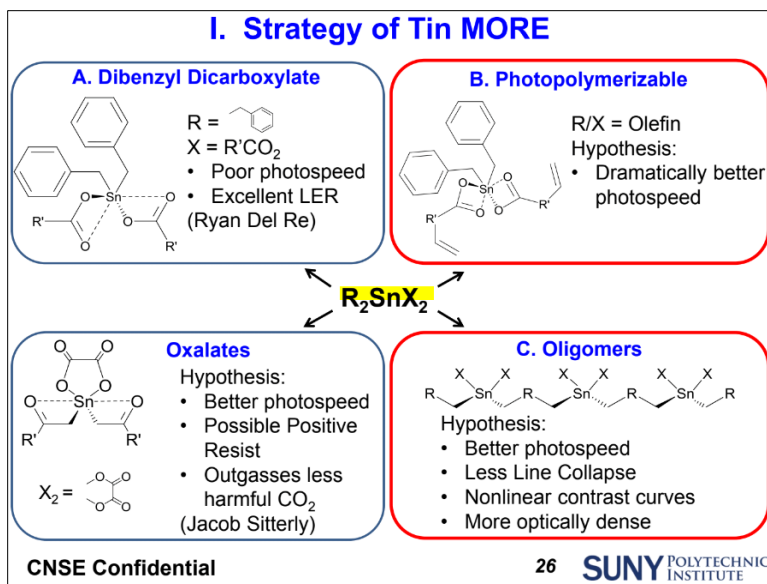
194. As further exemplary evidence of this invention and Inpria’s knowledge thereof, on August 17, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by recounting its past successes synthesizing benzyl tin complexes and outlining its strategy for



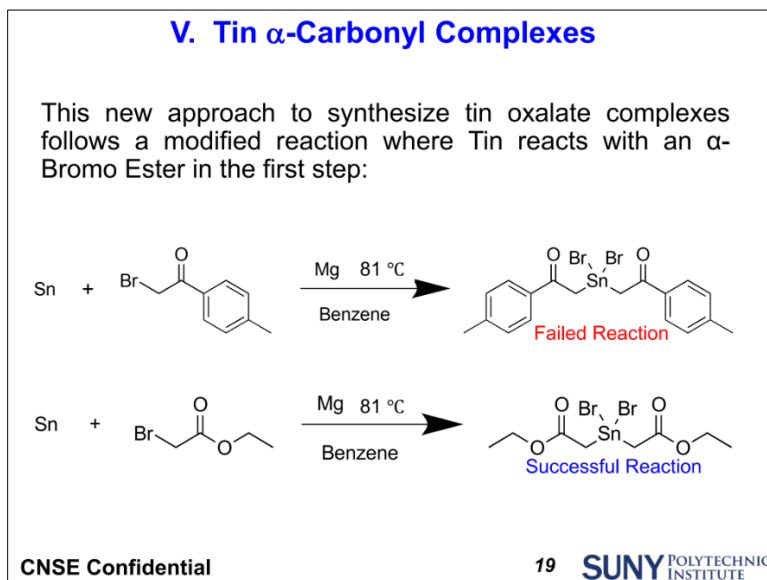
further tin research in the form “ $R_2SnX_2$ ” with varying R and X groups, as illustrated below in Figure 26. One such invention was to synthesize tin-based resists by reacting  $\alpha$ -bromo esters with tin metal in combination with magnesium metal, using benzene as a solvent, where the  $\alpha$ -bromo ester could include methyl bromoacetate, tert-butyl bromoacetate, 4-iodophenyl 2-bromoacetate, or the like, including below in Figure 26. Other such inventions were to incorporate iodine into organotin resists in order to increase optical density and improve sensitivity or synthesize a multinuclear tin resist where the R group was a methyl group like  $CH_3$ , as illustrated in Figure 26.

**Figure 26: CNSE Report 8-17-2015**



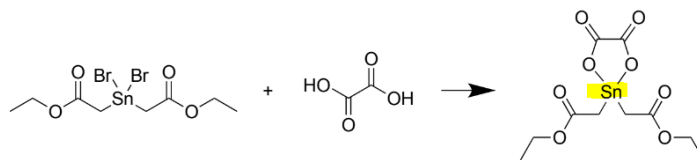


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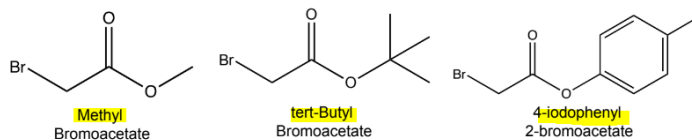


## VI. Future Directions

Step Two of Proposed Tin Oxalate Synthesis:



Synthesis Using Alternative  $\alpha$ -Bromo Esters:



CNSE Confidential

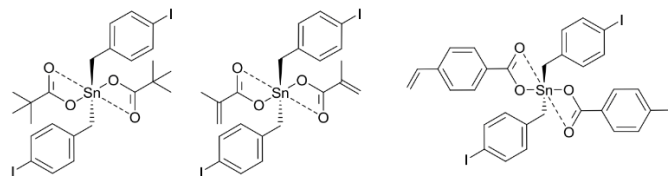
23 SUNY POLYTECHNIC INSTITUTE

## III. Iodobenzyl Groups

Incorporating optically dense iodine into our organotin resists increases optical density, improving sensitivity.

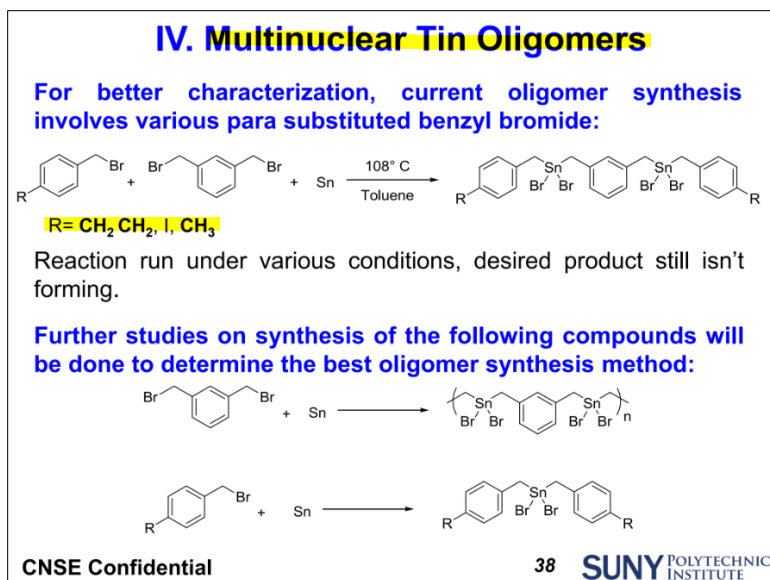
Three high OD components

Synthesis directions:

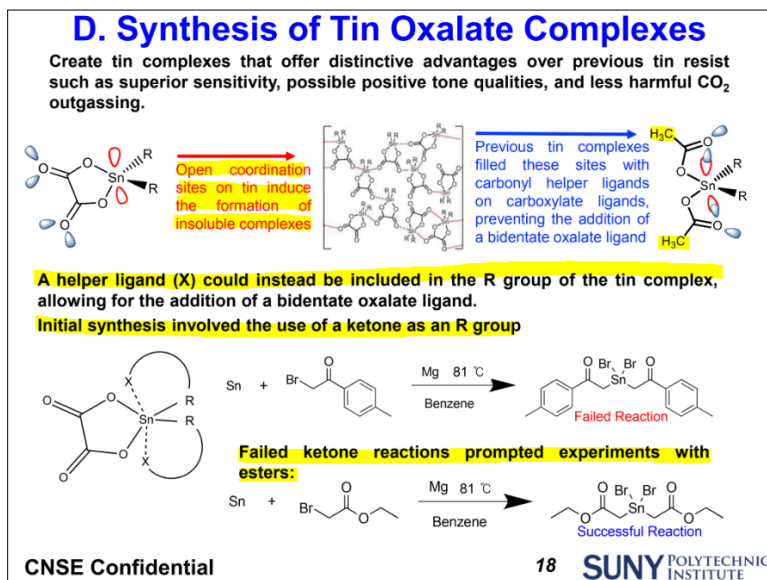
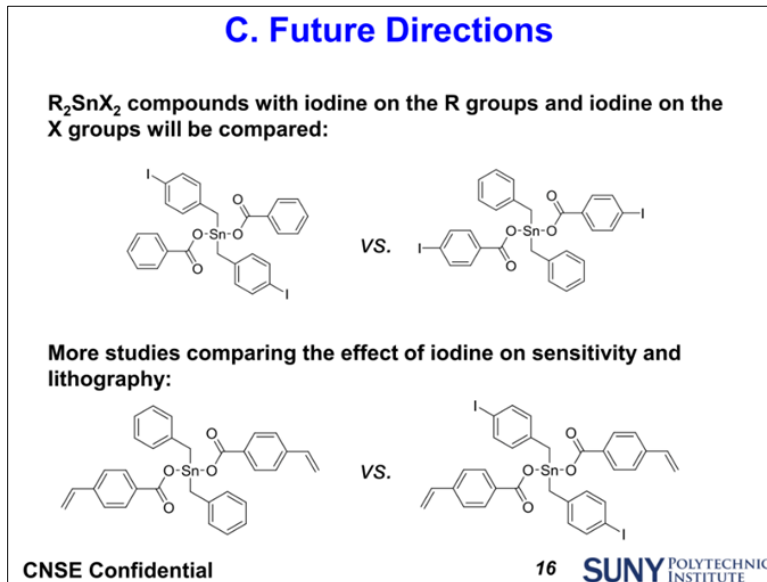


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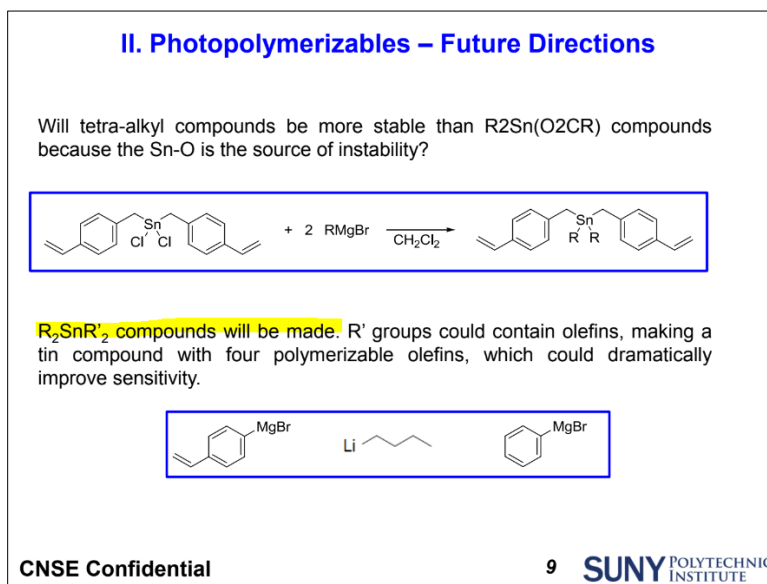
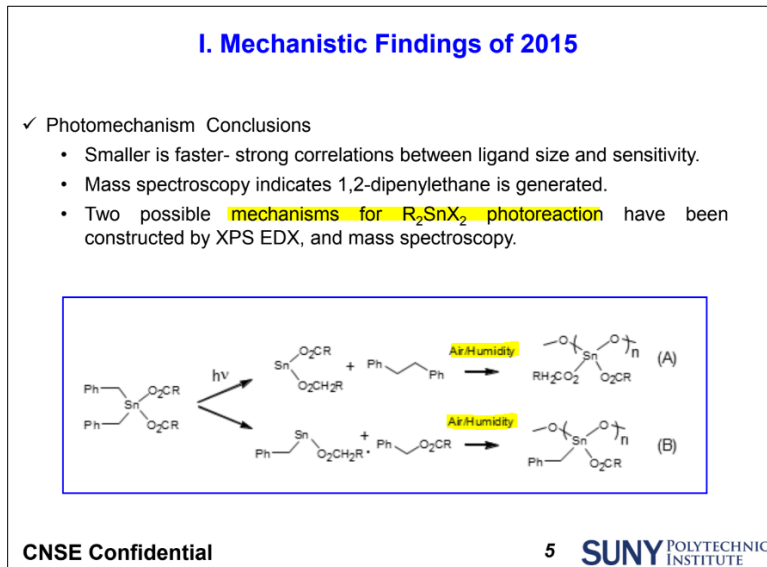
31 SUNY POLYTECHNIC INSTITUTE



195. As further exemplary evidence of this invention and Inpria's knowledge thereof, on September 30, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including synthesizing  $R_2SnX_2$  compounds with iodine in the R and/or X groups, and using helper ligands in the form of a ketone or an ester as an R group to increase the solubility of such organotin resists, including as illustrated in Figure 27 below. It also recounted again that one of the attributes that made "MORE an industry leading resist" was that it was capable of "aqueous development."

**Figure 27: CNSE Report 9-30-2015**

196. As further exemplary evidence of this invention and Inpria's knowledge thereof, on December 4, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by summarizing its mechanistic findings in 2015 concerning  $R_2SnX_2$  compounds developed in water vapor and describing further changes in R and R' groups to increase stability and sensitivity of such organotin compositions and resists, including as illustrated in Figure 28.

**Figure 28: CNSE Report 12-4-2015**

197. As further exemplary evidence of this invention and Inpria's knowledge thereof, throughout 2016, SUNY RF sent confidential research presentations to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including those that were synthesized by incorporating water into the resist films and into vacuum chambers, through for example, formulation solvents, hydrates, and hygroscopic polymers, as well as SUNY

RF's so-called "Return to Aqueous Development," to research and develop why water development allowed for superior contrast in MORE resists, including as illustrated below.

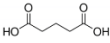
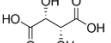
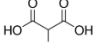
**Figure 29: CNSE Reports 2-26-16 and 6-13-16**

**III. Current Work + PSI Plans**

**MS1. Reactive Developers.**

$R-C(=O)OH$ Carboxylic acids	$R_3N$ Amine bases	$R_4NOH$ Ammonium bases	R/O Redox agents
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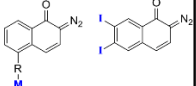
**New carboxylic acids:**

Glutaric 	Tartaric 	Tartronic 
---	--	--

**MS3. Feasibility Studies: Strategies for producing high-contrast metal-based positive-tone resists.**

**Strategies:**

DNQ with MORE



Will be testing an i-line resist (AZ 5206) in EUV.

**Concern: Lack of water in vacuum.**

**Solution: Incorporate water into resist film via:**

1. Formulation solvents.
2. Hydrates in formulation.
3. Hygroscopic polymers in formulation

**Cobalt(II) nitrate hexahydrate**

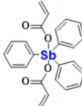
- Slightly soluble in PGMEA
- Soluble in PM and water.

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**IV. Return to Aqueous Development – Why H<sub>2</sub>O?**

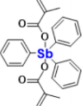
- **What is it about H<sub>2</sub>O development that allows for superior contrast?**
- JP-30 will not develop in H<sub>2</sub>O unlike JP-20 & JP-21
  - Why is JP-30 not soluble in water?
  - Can we change ligands to improve solubility?
  - Will a developer such as 1:1 IPA:H<sub>2</sub>O improve contrast over Hex or IPA alone?

**JP-20**



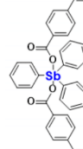
**Can develop in H<sub>2</sub>O?** **Yes!**

**JP-21**



**Can develop in H<sub>2</sub>O?** **Yes!**

**JP-30**



**Can develop in H<sub>2</sub>O?** **No!**

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198. Indeed, the Statement of Work attached to the 2017 Research Agreement, similarly recounts SUNY RF's prior inventions concerning using hydrolysis to synthesize and develop organotin resists and describes SUNY RF's forthcoming research and development concerning

further conception and reduction to practice of additional MORE hydrolysis methods and compounds, including as illustrated in Figure 30 below.

**Figure 30: 2017 Research Agreement Statement of Work**

B. Sb **MORE Hydrolysis Studies**. We propose that understanding the **interactions of MORE compounds with water** will provide useful information about how these resists work. For example:

- Low levels of **hydrolysis** may be important in allowing pure-crystalline compounds to be spin-coated to produce amorphous (non-crystalline films).
- **Trace moisture** in films may provide sources of protons that are critical to the photochemistry or dissolution properties of unexposed or exposed films.
- **Aqueous development** of MORE compounds seems to provide the highest contrast images.
- Understanding development of MORE compounds **in aqueous developers** will be critical to optimizing these systems for EUV lithography.

199. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the ‘505, ‘924, ‘696, ‘048, ‘081, and ‘618 Patents.

200. Specifically, months and years after these inventions and disclosures from SUNY RF, on October 13, 2015, during the course of the Research Agreements, scientists from Inpria and a former CNSE graduate student and researcher—Stephen Meyers, Jeremy Anderson, Brian Cardineau, Joseph Edson, Kai Jiang, Douglas Keszler, and Alan Telecky (the “purported ‘505, ‘924, ‘696, ‘048, ‘081, and ‘618 inventors”)—filed U.S. Provisional Patent Application No. 62/240,812 (ORGANOTIN OXIDE HYDROXIDE PATTERNING COMPOSITIONS WITH PRECURSOR VAPOR DEPOSITION). On February 19, 2016, during the course of the Research Agreements, the purported ‘505, ‘924, ‘696, ‘048, ‘081, and ‘618 inventors filed U.S. Provisional Patent Application No. 62/297,540 (PRECURSOR COMPOSITIONS FOR ORGANOTIN OXIDE HYDROXIDE PHOTORESIST FILMS). As explained above, the provisional applications disclosed use of precursor compositions for forming organotin oxide hydroxide coatings that can be patterned using EUV lithography.



201. Brian Cardineau, who previously worked on the MORE project at SUNY under Dr. Brainard, at that point had joined Inpria.

202. The purported '505, '924, '696, '048, '081, and '618 inventors then filed a series of U.S. patent applications that claim priority to one or both of the two provisional applications filed in 2015 and 2016. Specifically, during the course of the Research Agreements and thereafter based on knowledge gleaned from and disclosures made by SUNY RF:

- On October 12, 2016, the purported '505, '924, '696, '048, '081, and '618 inventors filed U.S. Patent Application No. 15/291,738 (“ ’738 Application,” the application that matured into the '618 Patent).
- On January 3, 2019, the purported '505, '924, '696, '048, '081, and '618 inventors filed U.S. Patent Application No. 16/238,779 (the application that matured into the '696 Patent).
- On April 29, 2020, the purported '505, '924, '696, '048, '081, and '618 inventors filed U.S. Patent Application No. 16/861,333 (the application that matured into the '505 Patent).
- On August 6, 2020, the purported '505, '924, '696, '048, '081, and '618 inventors filed U.S. Patent Application No. 16/987,120 (the application that matured into the '048 Patent).
- On June 6, 2022, the purported '505, '924, '696, '048, '081, and '618 inventors filed U.S. Patent Application No. 17/832,920 (the application that matured into the '081 Patent).
- On July 6, 2022, the purported '505, '924, '696, '048, '081, and '618 inventors filed U.S. Patent Application No. 17/858,129 (the application that matured into the '924 Patent).

203. During prosecution, the purported '505, '924, '696, '048, '081, and '618 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re to the invention described in the '738 Application and the provisional applications to which it claims priority, and did not ask that Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, or Ryan Del Re be named as an inventor.

204. In October 2016, the purported '505, '924, '696, '048, '081, and '618 inventors assigned to Inpria all right, title, and interest in the '738 Application, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on November 23, 2016, at Reel/Frame 040409/0171.

205. The U.S. Patent and Trademark office issued U.S. Patent No. 10,228,618 on March 12, 2019; it issued U.S. Patent No. 10,732,505 on August 4, 2020; it issued U.S. Patent No. 10,775,696 on September 15, 2020; it issued U.S. Patent No. 11,537,048 on December 27, 2022; it issued U.S. Patent No. 11,754,924 on September 12, 2023; and it issued U.S. Patent No. 11,809,081 on November 7, 2023.

206. Inpria and the purported '505, '924, '696, '048, '081, and '618 inventors did not disclose to SUNY RF the existence of the '738 Application or the provisional applications to which it claims priority, any of its subsequent continuation applications, or the '505, '924, '696, '048, '081, and '618 Patents.

207. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '505, '924, '696, '048, '081, and '618 Patents in the United States, as well as foreign counterparts to '505, '924, '696, '048, '081, and '618 Patents around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

**3. *SUNY RF Invented and Owns the '559, '986, and '719 Patents***

208. Dr. Brainard, with assistance from Jodi Hotalen and William Earley, conceived and/or reduced to practice of one or more of the inventions claimed in the '559, '986 and '719 Patents.

209. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '559, '986 and '719 Patents.

210. At all relevant times, Jodi Hotalen was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '559, '986 and '719 Patents.

211. At all relevant times, William Earley was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '559, '986 and '719 Patents.

212. The '559, '986 and '719 Patents all claim priority to the same provisional patent applications, share the same specification, and concern coating or treating a metal-based resist, such as a tin, cobalt, or antimony resist, with a solution comprising an organic solvent, such as PGME or TEK, and a carboxylic acid, such as formic acid, acetic acid, or tartaric acid. The claims of the '559, '986 and '719 Patents all claim various methods and systems for using these carboxylic acid and organic solvent solutions to develop metal-based resists. For example:

**Figure 31: Exemplary Claims from '559 Patent**

1. A method of cleaning a substrate provided with a metal-based resist, the method comprising cleaning a substrate provided with a metal-based resist comprising at least one metal selected from the group consisting of Sn, Hf, Zr, In, Te, Sb, Ni, Co, Ti, W, Ta, and Mo using a metal resist cleaning liquid comprising an organic solvent and a carboxylic acid, thereby removing the metal-based resist from the substrate.
2. The method according to claim 1, comprising applying the metal resist cleaning liquid along the periphery of the substrate to remove an edge bead on the substrate.
3. The method according to claim 1 wherein the organic solvent comprises a propylene glycol methyl ether (PGME), propylene glycol methyl ether acetate (PGMEA), propylene glycol butyl ether (PGBE), ethylene glycol methyl ether, cyclic esters, n-butyl acetate, ether acetate, ketones, liquid cyclic carbonates, or a mixture thereof.
4. The method according to claim 2 wherein the amount of carboxylic acid based on the total weight of the cleaning liquid is 0.1 wt % to 50 wt %.
5. The method according to claim 3 wherein the amount of carboxylic acid based on the total weight of the cleaning liquid is 0.1 wt % to 50 wt %.
6. The method according to claim 1 wherein the metal-based resist comprises Sn.
7. The method of claim 1 wherein the carboxylic acid comprises formic acid and/or acetic acid.

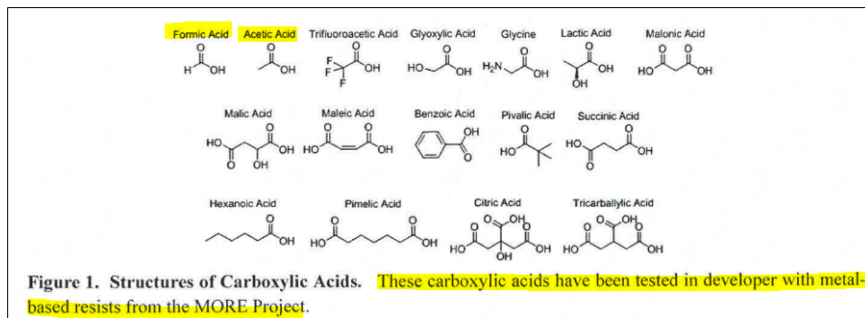
213. But Dr. Brainard, with assistance from Jodi Hotalen and William Earley, conceived and/or reduced to practice of one or more of the inventions claimed in the '559, '986 and '719 Patents—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP and in CNSE disclosures and reports under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2017 Research Agreement, including for example, “RN2-15-15: Carboxylic-Acid Developers for Metal-Based EUV Resists.” Such SUNY RF inventions were also disclosed Inpria in numerous CNSE reports provided to Inpria during the 2015 and 2017 Research Projects.

214. For example, the invention disclosure report RN2-15-15 concerning Carboxylic-Acid Developers for Metal-Based EUV Resists, SUNY RF disclosed an invention—conceived not later than February 19, 2015—to use “carboxylic acids in organic or aqueous developers for organometallic (MORE) photoresists,” including acetic and formic acids in MEK solutions to develop metal-based resists such as cobalt and antimony resists, including to “completely clear the unexposed regions,” including as illustrated in Figure 32 below.

### **Figure 32: RN2-15-15 Invention Disclosure Report**

The invention is to use carboxylic acids in organic or aqueous solvents as developers for organometallic (MORE) photoresists. We have shown that the use of these developers has shown these benefits:

- The ability to shift a resist from negative tone to positive tone.
- Improved clearing for both negative and positive tone resists.
- Potential for significant modification by simple exchange of acid.
- Enhanced contrast and imaging.
- Manipulation of dissolution properties through concentration of acid.



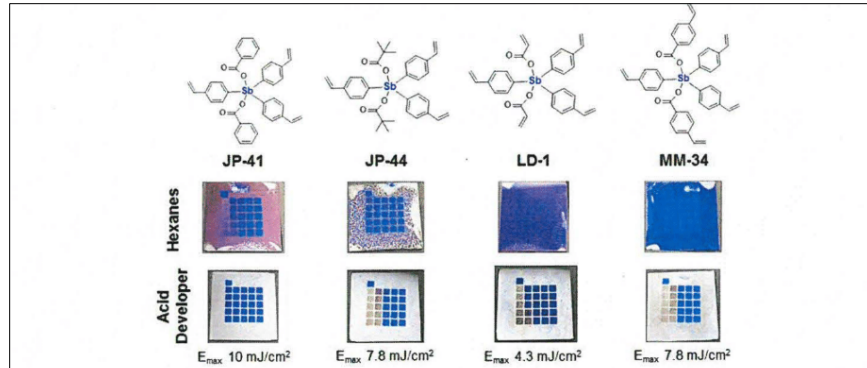


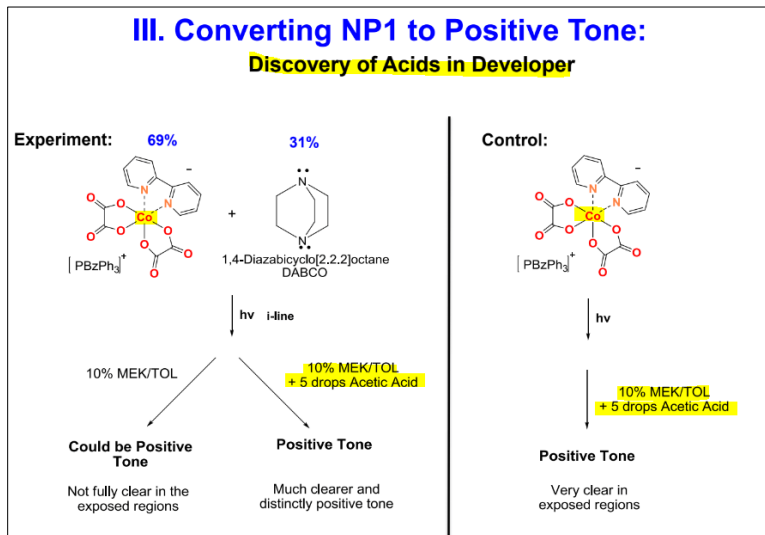
Figure 6. **Antimony Based Resists Developed with Acids.** Structures of the antimony based resists are shown above the contrast curve chip.

Figure 7 displays the chemical structure of Resist: JP-54. It lists several developers that were tested: Dichloromethane, Methanol, 2-butanone, Acetone, Hexanes, and Toluene. A photograph shows a dark, unexposed chip. A second photograph shows a chip developed with acetic acid, which is significantly clearer. The  $E_{max}$  for the acetic acid developer is 6 mJ/cm<sup>2</sup>.

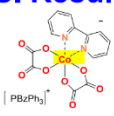
Figure 7. **Antimony Based Oligomer Resist Developed with Acetic Acid.** New oligomer resist was not clearing in normal developers. However, the acetic acid developer was able to completely clear the unexposed regions.






215. As further exemplary evidence of this invention and Inpria’s knowledge thereof, on June 19, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of using acids, such as acetic acid in various concentrations, in a developer containing MEK or PGME to develop metal-based resists, such as a cobalt resist, including as illustrated below in Figure 33.

**Figure 33: CNSE Report 6-19-2015**




**IV. PSI Results from March 2015: CC's**

Resist: JH1  All doses are calibrated to BMET


Acid in Developer:	Acetic	Benzoic	Malonic	Pivalic	2-Picolinic
Structure:					
Concentration:	0.2M	0.2M	0.2M	0.2M	Did not arrive at PSI
Tone:	Positive	Positive	Positive	No Effect	
E <sub>0</sub> (mJ/cm <sup>2</sup> ):	27	>57	Need Ellipsometry	--	

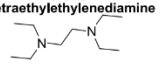
**Tried salt:**  
Sodium Acetate



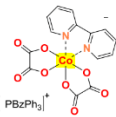
- In film (created a precipitate)  
- In developer (did nothing)





**Tried ligands:** (films were hazy) (poor dissolution contrast)

Ethylenediamine 





N,N,N',N'-tetraethylethylenediamine 

**IV. PSI Results from May 2015: Acid Developers**

Resist:  Developer: 1-4% Acid  
10% MEK  
Remaining % Toluene

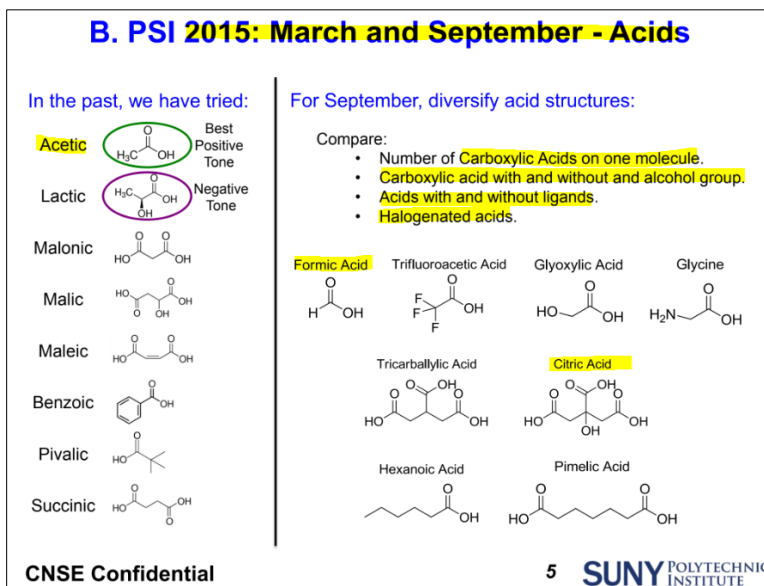
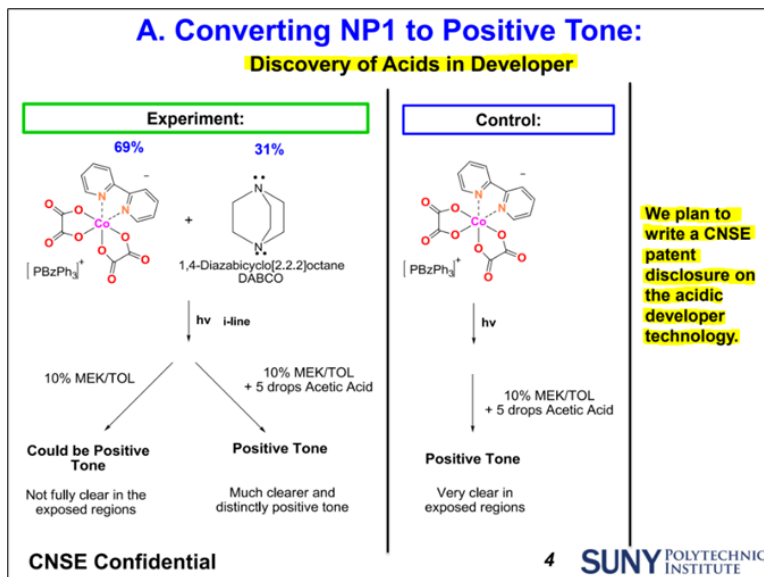
Acid in Developer:	Acetic	Benzoic	Malonic	Lactic
Structure:				
Concentration:	0.4M	0.3M	0.2M	0.2M
Tone:	Positive	Positive	Negative	Negative
E <sub>0</sub> (mJ/cm <sup>2</sup> ):	23	>57	Need Ellipsometry	Need Ellipsometry

Acid in Developer:	Malic	Maleic	2-Picolinic	Succinic
Structure:				
Concentration:	0.2M	0.2M	0.2M	0.2M
Tone:	Positive	Need Ellipsometry	Positive	Positive
E <sub>0</sub> (mJ/cm <sup>2</sup> ):	>57		31	27-42

NP1 Negative Tone (DEV: 30s MEK) E<sub>max</sub> 36 mJ/cm<sup>2</sup>

216. As further exemplary evidence of this invention and Inpria's knowledge thereof, on September 30, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of using acids, such as acetic acid, in a developer containing MEK or PGME to develop metal-based resists, such as a cobalt or antimony resist, including as illustrated below in Figure 34. Indeed, this disclosure expressly disclosed to Inpria that SUNY RF intended to write a patent disclosure on this acidic developer technology.

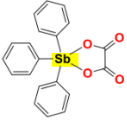
**Figure 34: CNSE REPORT 9-30-15**





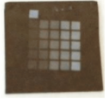


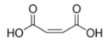
**B. PSI September 2015: Acid Developers**  
**Positive Tone MM-101A**

**First antimony based positive tone resist.**

**Resist:**



These values will be verified with ellipsometry at Inpria.

Image of CC chip:			
Acid in Dev.:	<b>Acetic</b> 	<b>Hexanoic</b> 	<b>Maleic</b> 
$E_0$ (mJ/cm <sup>2</sup> ):	<b>36.4</b>	<b>30.1</b>	<b>33.1</b>
Amount Acid Dev.:	<b>2mL Acid Dev. in 10% MEK/TOL</b>		
Dev. Solvents:	<b>18mL Hexanes</b>		

All chips developed for **5 seconds**.

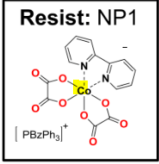
**CNSE Confidential** 7 **SUNY** POLYTECHNIC INSTITUTE

217. As further exemplary evidence of this invention and Inpria's knowledge thereof, on February 1, 2016, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of using acids, such as acetic, lactic, tartronic, glutaric, and tartaric acids in various concentrations, in a developer containing MEK or PGME to develop metal-based resists, such as a cobalt resist, including as illustrated below in Figure 35.

**Figure 35: CNSE REPORT 2-1-2016**


**III. Current Work + PSI Plans**

**Resist: NP1**




**Acid in Developer:**

**Lactic Acid:**



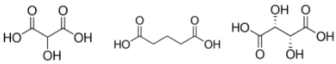
1. Reproducibility.
2. Dissolution rates.
3. Imaging.

**Acetic Acid:**



1. Dissolution rates.
2. Vary developer solvents.
3. Imaging.

**Tartronic** **Glutaric** **Tartaric**



**New Acids:**

1. Contrast curves.
2. Image best results.

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218. On information and belief, Inpria then incorporated the inventions contained in these disclosures into the provisional patent applications and patent applications that matured into the '559, '986, and '719 Patents.

219. Specifically, months and years after these inventions and disclosures from SUNY RF, on August 12, 2016 and December 6, 2016, during the course of the Research Agreements, scientists from Inpria and a former CNSE graduate student—Mollie Waller, Brian Cardineau, Kai Jiang, Alan Telecky, Stephen Meyers, and Benjamin Clark (the “purported '559, '986, and '719 inventors”)—filed U.S. Provisional Patent Application Nos. 62/374,582 (BEAD WASHING FOR METAL OXIDE BASED RESISTS) and 62/430,722 (METHOD OF REDUCING METAL RESIDUE IN EDGE BEAD REGION FROM METAL CONTAINING RESISTS). The provisional applications disclosed methods of cleaning substrates with metal-based resists by using a cleaning material comprising an organic solvent and a carboxylic acid.

220. Brian Cardineau, who previously worked on the MORE project at SUNY under Dr. Brainard, at that point had joined Inpria.

221. The purported '559, '986, and '719 inventors then filed a series of U.S. patent applications that claim priority to the two provisional applications filed in 2016. Specifically, during the course of the Research Agreements and thereafter based on knowledge gleaned from and disclosures made by SUNY RF:

- On August 11, 2017, the purported '559, '986, and '719 inventors filed U.S. Patent Application No. 15/674,934 (“'934 Application,” the application that matured into the '719 Patent).
- On March 6, 2020, the purported '559, '986, and '719 inventors filed U.S. Patent Application No. 16/810,924 (the application that matured into the '986 Patent) as a continuation of the '934 Application.
- On October 11, 2021, the purported '559, '986, and '719 inventors filed U.S. Patent Application No. 17/498,437 (the application that matured into the '559 Patent) as a continuation of the '934 Application.

222. During prosecution, the purported '559, '986, and '719 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Jodi Hotalen, and William Earley to the invention described in the '934 Application and the provisional applications to which it claims priority, and did not ask that Dr. Brainard, Jodi Hotalen, or William Earley be named as an inventor.

223. In October 2017, the purported '559, '986, and '719 inventors assigned to Inpria all right, title, and interest in the '934 Application, all resulting divisional or continuation applications, and any patents that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on October 9, 2017, at Reel/Frame 043812/0195.

224. The U.S. Patent and Trademark office issued U.S. Patent No. 10,627,719 on April 21, 2020; it issued U.S. Patent No. 11,187,986 on November 30, 2021; and it issued U.S. Patent No. 11,740,559 on August 29, 2023.

225. Inpria and the purported '559, '986, and '719 inventors did not disclose to SUNY RF the existence of the '934 Application or the provisional applications to which it claims priority, any of its subsequent continuation applications, or the '559, '986, and '719 Patents.

226. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '559, '986, and '719 Patents in the United States, as well as foreign counterparts to '559, '986, and '719 Patents around the world, to which SUNY RF, Dr. Brainard, Jodi Hotalen, and William Earley contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

227. In March 2023, Inpria entered into a Patent License and Co-Ownership Agreement with Tokyo Electron in which Inpria assigned to TEL, jointly with Inpria, all right, title, and

interest in the '559, '986, and '719 Patents. Inpria recorded the assignment at the United States Patent and Trademark Office on July 31, 2023, at Reel/Frame 064439/0580.

228. Inpria did not receive consent from SUNY RF to assign the '559, '986, and '719 Patents to TEL and did not share proceeds or consideration from the assignment with SUNY RF.

***4. SUNY RF Invented and Owns the '874 Patent***

229. Dr. Brainard, with assistance from Miriam Sortland, Ryan Del Re, Jodi Hotalen, and William Earley, conceived of and/or reduced to practice one or more of the inventions claimed in the '874 Patent.

230. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '874 Patent.

231. At all relevant times, Miriam Sortland was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '874 Patent.

232. At all relevant times, Ryan Del Re was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '874 Patent.

233. At all relevant times, Jodi Hotalen was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '874 Patent.

234. At all relevant times, William Earley was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '874 Patent.

235. The '874 Patent, and the applications giving rise to the same, concern methods for forming patterns in organometallic resists comprising rinsing an initial patterned structure to remove a portion of a photoresist to form a developed photoresist in which either the unexposed or the exposed portions are selectively soluble in the developing solution, wherein the rinse and the developing solution comprise either ammonium hydroxide, such as tetramethylammonium hydroxide (TMAH), or an organic solvent, such as aromatic compounds, esters, alcohols, ketones, ethers, or aqueous acids or bases, respectively. The specification further explains that TMAH can be a rinse in negative tone resists, whereas TMAH can be a developer in positive tone resists. Other developers for positive tone resists can be aqueous acids or bases, whereas developers for negative tone resists can be organic solvents, including, for example, toluene or ketones.

236. The claims of the '874 Patent concern various methods for forming patterned structures in the metal-based resists, such as organotin resists, wherein the method comprises applying a rinsing solution to remove a portion of a developed photoresist and a developing solution to form a developed photoresist, wherein either the exposed or unexposed portions are selectively soluble. For example:

**Figure 36: Exemplary Claims from '874 Patent**

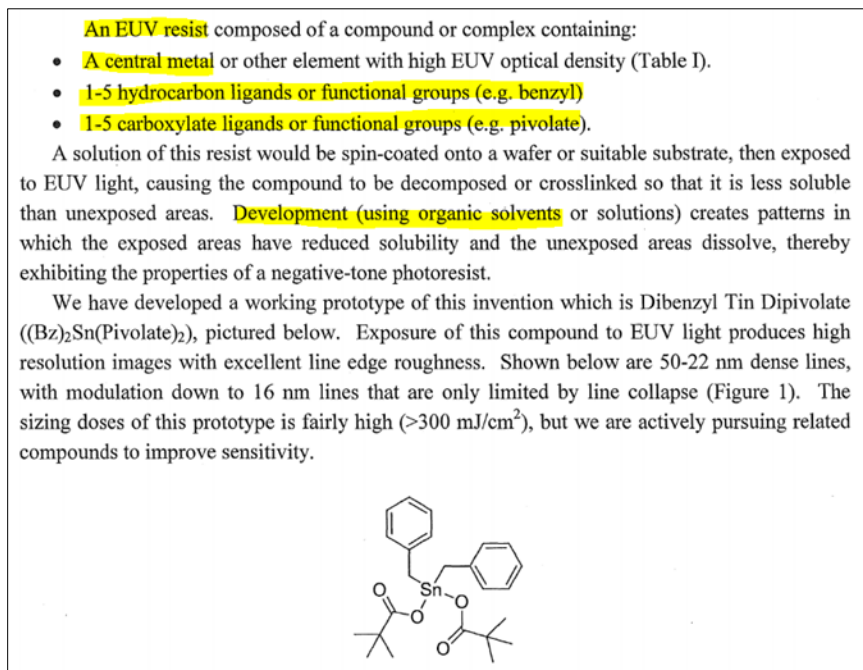
1. A method for forming an adjusted patterned structure, the method comprising rinsing an initial patterned structure with a rinse solution to remove a portion of developed photoresist to control pattern dimensions and to form an adjusted patterned structure, wherein the initial patterned structure was formed by (i) coating the surface of the substrate with an organometallic radiation sensitive resist material to form the radiation sensitive resist film, (ii) exposing the radiation sensitive resist film to patterned radiation to form an exposed film with exposed portions and unexposed portions, and (iii) contacting the exposed film with a developing solution to form a developed photoresist wherein either the exposed portions or the unexposed portions are selectively soluble in the developing solution.
2. The method of claim 1 wherein the rinse solution comprises aqueous quaternary ammonium hydroxide and the developing solution comprises an organic solvent.
3. The method of claim 1 wherein the developing solution comprises aqueous quaternary ammonium hydroxide and the rinse solution comprises an organic solvent.
4. The method of claim 1 wherein the rinse solution is about 0.5 to 30 weight percent aqueous tetramethyl ammonium hydroxide (TMAH).
5. The method of claim 1 wherein the organometallic radiation sensitive resist material comprises an alkyltin oxide hydroxide approximately represented by the formula  $R_xSnO_{(2-x/2-x/2)}(OH)_x$ , where  $0 < x < 3$ ,  $0 < z \leq 2$ ,  $x+z \leq 4$ , and R is a hydrocarbyl group forming a carbon bond with the tin atom.

237. But Dr. Brainard, with assistance from Miriam Sortland, Ryan Del Re, Jodi Hotalen, and William Earley, conceived and/or reduced to practice of one or more of the inventions claimed in the '874 Patent—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP and in CNSE disclosures and reports under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27.5 Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists,” “RN2-11-27.7 Molecular Organometallic Resists for

EUV (MORE): Palladium and Platinum Resists,” RN2-15-15 Carboxylic-Acid Developers for Metal-Based EUV Resists.” Such SUNY RF inventions were also disclosed to Inpria in numerous CNSE reports provided to Inpria during the 2015 and 2017 Research Projects.

238. For example, in the invention disclosure report RN2-11-27.5 Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists, SUNY RF disclosed an invention—conceived on January 28, 2014—to use an “EUV resist” composed of “central metal or other element with high EUV optical density,” including, for example, tin, with 1-5 hydrocarbon ligands or functional groups and 1-5 carboxylate ligands or functional groups, which resist would then be spin-coated onto a silicon wafer, exposed to light, and developed with an organic solvent to create “patterns in which the exposed areas have reduced solubility and the unexposed areas dissolve, including as illustrated below in Figure 37.

**Figure 37: RN2-11-27.5 Invention Disclosure Report**



239. As further exemplary evidence of this SUNY RF invention and Inpria’s knowledge thereof, in the invention disclosure report RN2-11-27.7 Molecular Organometallic Resists for

EUV (MORE): Palladium and Platinum Resists, SUNY RF disclosed an invention—conceived on March 5, 2014—to use “an EUV resist” containing “a metal or other element with EUV optical density,” including tin, along with “a photo-labile ligand that is highly polar” and which makes the resist film “have a limited solubility in selected solvents or developers, but the conversion of this group to a gas, causes an increase in solubility,” which resist would then be spin-coated onto a silicon wafer, exposed to light, and developed with an organic solvent to create “patterns in which the exposed areas dissolve, and the unexposed areas remain behind, thereby exhibiting the properties of a positive-tone photoresist,” including as illustrated below in Figure 38.

**Figure 38: RN2-11-27.7 Invention Disclosure Report**

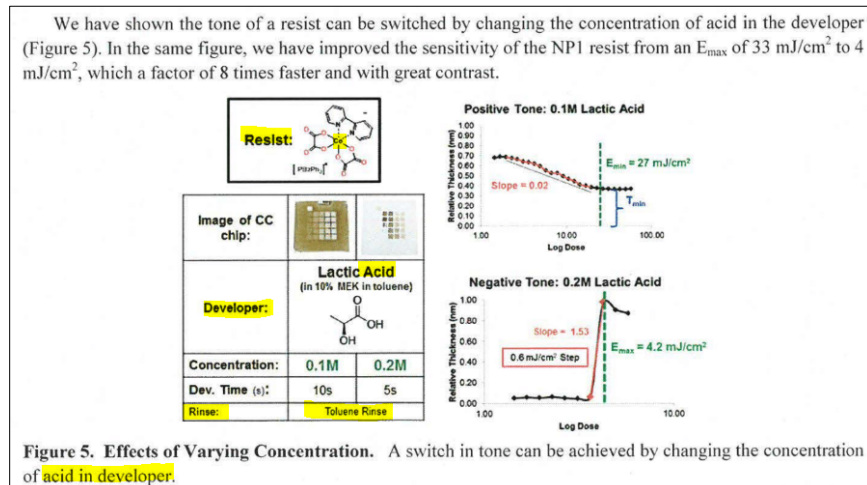
This invention is:

- An EUV resist composed of a compound or complex containing:
  - A metal or other element with high EUV optical density (Table I).
  - A photo-labile ligand that is highly polar, but creates a gas when exposed (e.g. Oxalate will create CO<sub>2</sub> and Azide will create N<sub>2</sub>).
  - This highly polar group makes the resist film have a limited solubility in selected solvents or developers, but the conversion of this group to a gas, causes an increase in solubility, and concomitantly an increase in dissolution rate.

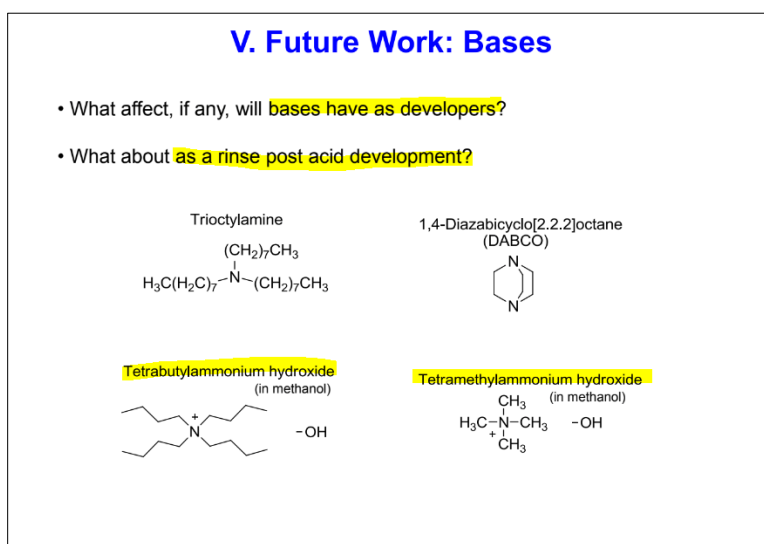
A solution of this resist would be spin-coated onto a wafer or suitable substrate, then exposed to light, causing the polar groups to photochemically dissociate from the complex leaving a new compound with greater solubility and dissolution rate. Development (using organic solvents or solutions) creates patterns in which the exposed areas dissolve, and the unexposed areas remain behind, thereby exhibiting the properties of a positive-tone photoresist.

240. As further exemplary evidence of this SUNY RF invention and Inpria’s knowledge thereof, in the invention disclosure report RN2-15-15 Carboxylic-Acid Developers for Metal-Based EUV Resists, SUNY RF disclosed an invention—conceived on February 19, 2015—to create positive- and negative-tone metal-based resists, such as using cobalt, wherein the developer comprised an aqueous acid such as lactic acid, and the rinse comprised an organic solvent in the form of toluene, including as illustrated below in Figure 39.



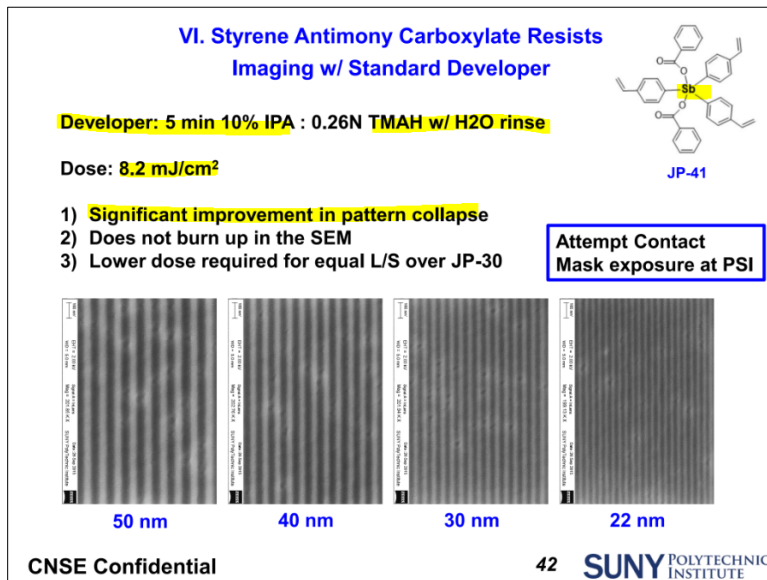
**Figure 39: RN2-15-15 Invention Disclosure Report**

241. As further exemplary evidence of this invention and Inpria's knowledge thereof, on June 19, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of using bases such as, tetrabutylammonium hydroxide and tetramethylammonium hydroxide (TMAH), as both developers in metal-based resists and as rinsing agents in metal-based resists that use aqueous acids as their developing solutions, including as illustrated below in Figure 40.

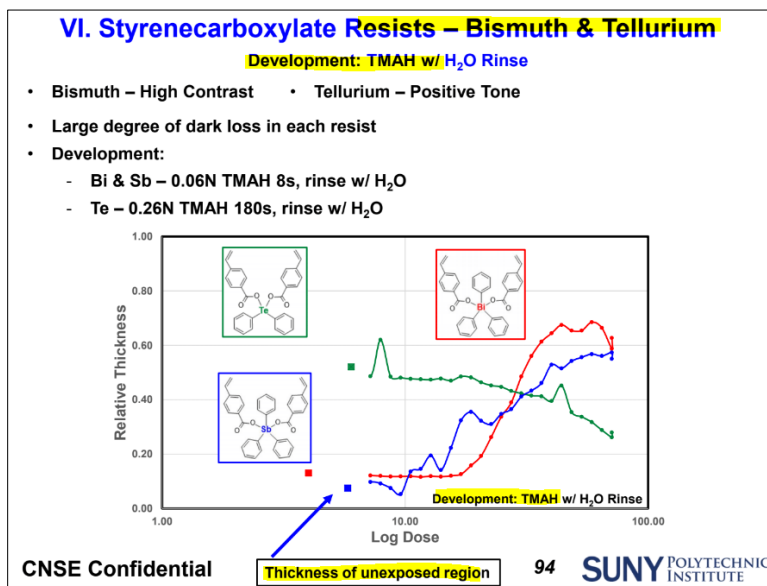
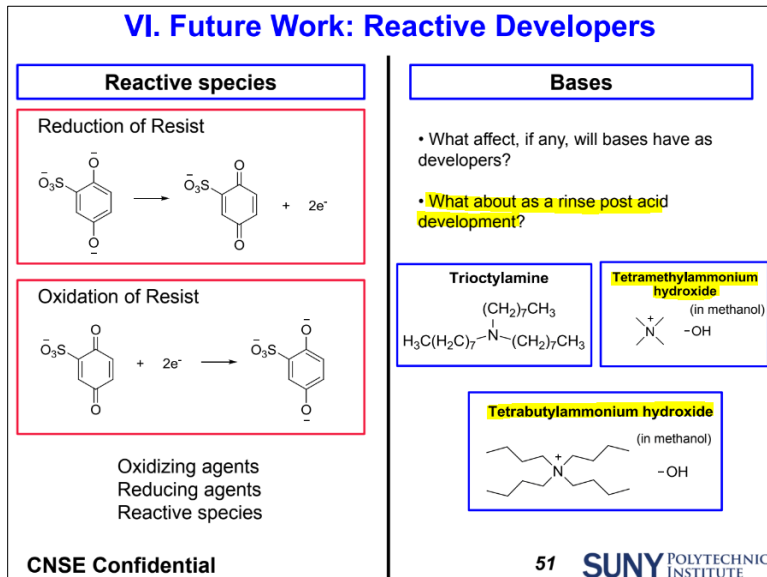
**Figure 40: CNSE REPORT 6-19-2015**

242. As further exemplary evidence of this invention and Inpria's knowledge thereof, on September 30, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of a method of developing a metal-based photoresist, including for example an antimony-based resist, using TMAH as the developing solution, which showed significant improvement in pattern collapse, including as illustrated below in Figure 41.

**Figure 41: CNSE REPORT 9-30-2015**



243. As further exemplary evidence of this invention and Inpria's knowledge thereof, on December 4, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of a method of developing a metal-based photoresist, including for example bismuth, antimony, and tellurium resists, using TMAH as the developing solution, and "as a rinse post acid development," including as illustrated below in Figure 42. This research presentation also discloses, for example, using organic solvents such as PGMEA as the developing solution in other embodiments.

**Figure 42: CNSE REPORT 12-4-2015**

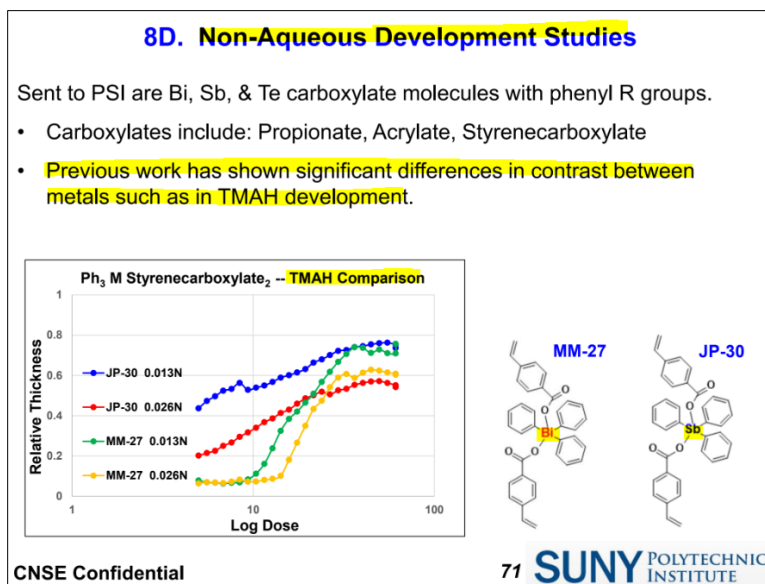
244. As further exemplary evidence of this invention and Inpria's knowledge thereof, on February 26, 2016, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of a method of developing a metal-based photoresist, including for example a cobalt resist, using an organic solvent like toluene as the developer in a negative-tone resist and using an aqueous acid like lactic acid as the developer in a positive-tone resist, including as illustrated below in Figure 43.

**Figure 43: CNSE REPORT 2-26-2016**

<b>I. Spin Coating/Development Conditions for NP1 Analogs</b>				
Compound	Coating Solvent	Coating Quality	Negative Tone Development Solvent	Positive Tone Development Solvent
BTP[Co(phen)(ox) <sub>2</sub> ]	1:1 ethyl lactate:MeCN	Very thin, not very soluble	2:1 MEK:Tol	0.2 M Lactic Acid (or whatever Jodi wants to try)
BTP[Co(4,4'-Me <sub>2</sub> Bpy)(ox) <sub>2</sub> ]	2:1 ethyl lactate:MeCN	Good	4:1 cyclohexanone:toluene	0.2 M Lactic Acid (or whatever Jodi wants to try)
BTP[Co(5,5'-Me <sub>2</sub> Bpy)(ox) <sub>2</sub> ]	2:1:1 ethyl lactate:MeOH:MeCN	Good	3:2 cyclohexanone:toluene Better contrast than NP1	0.2 M Lactic Acid (or whatever Jodi wants to try)

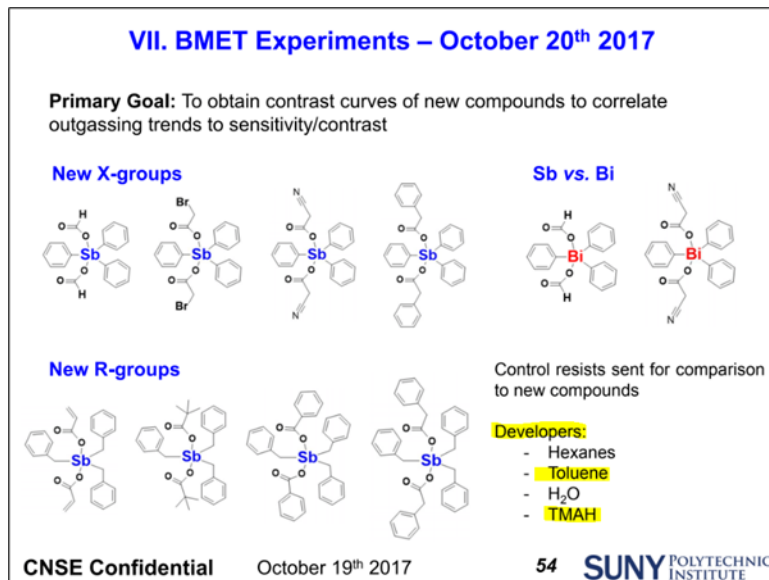
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245. As further exemplary evidence of this invention and Inpria's knowledge thereof, on August 25, 2016, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of a method of developing a metal-based photoresist, including for example bismuth, antimony, and tellurium resists, using TMAH as a developer, including as illustrated below in Figure 44.

**Figure 44: CNSE REPORT 8-25-2016**

246. As further exemplary evidence of this invention and Inpria's knowledge thereof, on October 20, 2017, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of a method of developing metal-based photoresists, including for example bismuth and antimony resists, using toluene, TMAH, hexanes, and water as the developers, including as illustrated below in Figure 45.

**Figure 45: CNSE REPORT 10-20-2017**



247. On information and belief, Inpria incorporated the inventions contained in these disclosures into the provisional patent applications and patent applications that matured into the '874 Patent.

248. Specifically, years after these inventions and disclosures from SUNY RF, on October 17, 2018, during the course of the Research Agreements, scientists from Inpria—Michael Kocsis, Peter De Schepper, Michael Greer, and Shu-Hao Chang (the “purported '874 inventors”)<sup>9</sup>—filed U.S. Provisional Patent Application Nos. 62/746,808 (PATTERNED

<sup>9</sup> The applicants initially omitted the names of Michael Greer and Shu-Hao Chang from the provisional application, but later filed a petition to request correction of inventorship in January 2019 to include their names as inventors.

ORGANOMETALLIC PHOTORESISTS AND METHOD OF PATTERNING). On October 16, 2019, the purported '874 inventors then filed U.S. Patent Application No. 16/654,080 (the "'080 Application") with the same title, which claimed priority to the underlying provisional application. As explained, both applications disclosed methods of forming patterns in radiation sensitive films on a substrate using radiation sensitive resist material that can be removed with a solution after exposure.

249. During prosecution, the purported '874 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Miriam Sortland, Ryan Del Re, Jodi Hotalen, and William Earley to the invention described in the '080 Application and the provisional applications to which it claims priority, and did not ask that Dr. Brainard, Miriam Sortland, Ryan Del Re, Jodi Hotalen, or William Earley be named as an inventor.

250. In November 2019, the purported '874 inventors assigned to Inpria all right, title, and interest in the '080 Application and any patents that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on November 18, 2019, at Reel/Frame 051034/0225.

251. The U.S. Patent and Trademark office issued U.S. Patent No. 11,480,874 on October 25, 2022.

252. Inpria and the purported '874 inventors did not disclose to SUNY RF the existence of the '080 Application, the provisional application to which it claims priority, or the '874 Patent.

253. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '874 Patent in the United States, as well as foreign counterparts to '874 Patent around the world, to which SUNY RF, Dr. Brainard, Miriam Sortland, Ryan Del Re,

Jodi Hotalen, or William Earley contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

254. In March 2023, Inpria entered into a Patent License and Co-Ownership Agreement with Tokyo Electron in which Inpria assigned to TEL, jointly with Inpria, all right, title, and interest in the '874 Patent. Inpria recorded the assignment at the United States Patent and Trademark Office on July 31, 2023, at Reel/Frame 064439/0580.

255. Inpria did not receive consent from SUNY RF to assign the '874 Patent to TEL and did not share any proceeds or consideration from the assignment with SUNY RF.

**5. *SUNY RF Invented and Owns the '564 and '312 Patents***

256. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miriam Sortland, Miles Marnell, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '564 and '312 Patents.

257. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '564 and '312 Patents.

258. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '564 and '312 Patents.

259. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '564 and '312 Patents.

260. At all relevant times, Miriam Sortland was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '564 and '312 Patents.

261. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '564 and '312 Patents.

262. At all relevant times, Ryan Del Re was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '564 and '312 Patents.

263. The '564 and '312 Patents concern a structure comprising a substrate and coating material, where the coating material comprises metal ions, with radiation sensitive ligands, wherein the coating material has an average thickness from 5 nm to 30 nm, and the exposure of the coating material to light alters the dissolution rate compared to the unexposed portions. For example:



**Figure 46: Exemplary Claims from '564 Patent**

What we claim is:

1. A structure comprising a substrate and a coating material on a surface of the substrate, wherein the coating material comprises metal ions with radiation sensitive ligands and wherein the coating material has an average thickness from 5 nm to 30 nm, wherein exposure of the coating material to UV, EUV and/or electron-beam radiation alters the chemical properties of the coating material creating an exposed coating material with differential dissolution rates between exposed and un-exposed regions of the coating material.
2. The structure of claim 1 wherein the metal ions comprise metal suboxide ions.
3. The structure of claim 1 wherein the metal of the metal ions comprises Cu, Al, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Zn, Y, Zr, Nb, Mo, In, Sn, Sb, Hf, Ta, W, Ir, Pt, La, Ce, Pr, Nb, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu or a combination thereof.

**Figure 47: Exemplary Claims from '312 Patent**

1. An article comprising:  
a substrate comprising a semiconductor wafer; and  
a film on a surface of the substrate, wherein the film is composed of a first material comprising metal ions with radiation sensitive ligands and wherein the film has a thickness in a range from about 1 nm to about 40 nm, wherein exposure of the film to EUV radiation breaks at least some of the bonds between the metal ions and the radiation sensitive ligands in exposed regions of the film.

2. The article of claim 1 wherein the breaking of at least some of the bonds results in differential dissolution rates between exposed and un-exposed regions of the film.

264. Upon review of the application that matured into the '564 Patent, the patent examiner permitted the claims of the '564 Patent because “[n]o other prior art teaches a structure comprising a coating material comprising metal ions with radiation sensitive ligands, wherein the coating materials has an average thickness from 5 nm to 30 nm and wherein the exposure of the coating material to UV, EUV, and/or electron-beam radiation alters the chemical properties of the

coating material creating an exposed coating material with differential dissolution rates between exposed and un-exposed regions of the coating material as instantly claimed.”

265. Similarly, upon review of the application that matured into the '312 Patent, the patent examiner permitted the claims of the '312 Patent because “[n]o prior art teaches an article comprising: a substrate comprising a semiconductor wafer; and a film on a surface of the substrate, wherein the film is composed of a first material comprising metal ions with radiation sensitive ligands and wherein the film has a thickness in a range from about 1 nm to about 40 nm, wherein exposure of the film to EUV radiation breaks at least some of the bonds between the metal ions and the radiation sensitive ligands in exposed regions of the film as instantly claimed.”

266. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miriam Sortland, Miles Marnell, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '564 and '312 Patents—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 Research Agreement, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE),” “RN2-11-27.2: Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metal Resists,” and “RN2-11-27.7: Molecular Organometallic Resists for EUV (MORE): Palladium and Platinum Resists.”

267. For example, the invention disclosure report RN2-11-27 Molecular Organometallic Resists for EUV (MORE) discloses an invention “to use thin films of organometallic compounds with high EUV OD and high mass densities” as shown in Figure 48 “as high resolution, low LER

EUV photoresists.” RN2-11-27 explains that “[b]ecause the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required [for] resists based on organic polymers.” It expressly discloses a table of “[o]ptical and mass densities of the first 88 elements,” noting “[e]lements marked with \$\$ have been rejected because they are too expensive; elements marked with RA have been rejected because they are radioactive; [and] elements marked with Tox have been eliminated because they are too toxic.” RN2-11-27 also discloses that “[w]e will start by dissolving the high OD compounds in organic solvents or water and spin coating to a target thickness of 20 nm.”

### **Figure 48: RN2-11-27 Invention Disclosure Report**

<p>The invention is to use thin films of organometallic compounds with high EUV OD and high mass densities (as outlined in Table 1 and shown as examples in the set of five classes of compounds shown below) as high resolution, low LER EUV photoresists.</p> <ul style="list-style-type: none"> <li>• Mono-Nuclear Organometallic or Inorganic Compounds</li> <li>• Transition Metal Oxide/Oxo-Carboxylate Clusters</li> <li>• Tin Oxoclusters</li> <li>• Bismuth-Clusters</li> <li>• Iron-Sulfide Clusters</li> </ul>
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**Table 1. Optical and mass densities of the first 88 elements.** Elements marked with \$\$ have been rejected because they are too expensive; elements marked with RA have been rejected because they are radioactive; elements marked with Tox have been eliminated because they are too toxic.

Z	Sym-bol	Density g/cm <sup>3</sup>	EUV OD/um	Z	Sym-bol	Density g/cm <sup>3</sup>	EUV OD/um	Note	Z	Sym-bol	Density g/cm <sup>3</sup>	EUV OD/um	Note
1	H	0.09	0.1	31	Ga	6.1	15.9		61	Pm	7.3	5.5	
2	He	0.1785	0.6	32	Ge	5.35	13.1		62	Sm	7.52	6.9	
3	Li	0.534	4.3	33	As	5.73	11.0		63	Eu	5.24	5.0	
4	Be	1.85	0.7	34	Se	4.81	6.5		64	Gd	7.9	6.8	
5	B	2.31	1.6	35	Br	3.12	2.4		65	Tb	8.23	8.9	
6	C	2.25	2.8	36	Kr	3.74	7.7		66	Dy	8.55	10.9	
7	N	1.25	2.8	37	Rb	1.63	0.3		67	Ho	8.8	10.3	
8	O	1.43	4.9	38	Sr	2.54	0.5		68	Er	9.07	10.9	
9	F	1.69	7.5	39	Y	4.47	0.9		69	Tm	9.32	11.4	
10	Ne	0.9	5.3	40	Zr	6.51	1.5		70	Yb	6.9	8.9	
11	Na	0.97	6.3	41	Nb	8.57	2.1		71	Lu	9.84	10.9	
12	Mg	1.74	11.2	42	Mo	10.22	2.6		72	Hf	13.31	14.0	
13	Al	2.7	12.0	43	Tc	11.5	4.9		73	Ta	16.65	16.5	
14	Si	2.33	0.7	44	Ru	12.37	6.9		74	W	19.35	13.4	
15	P	1.82	0.8	45	Rh	12.41	12.6	\$\$	75	Re	21.04	16.1	\$\$
16	S	2.07	1.4	46	Pd	12.02	18.8	\$\$	76	Os	22.6	17.6	\$\$
17	Cl	3.21	2.6	47	Ag	10.5	32.1		77	Ir	22.4	17.9	\$\$
18	Ar	1.78	1.6	48	Cd	8.65	22.2	Tox	78	Pt	21.45	24.3	\$\$
19	K	0.86	0.9	49	In	7.31	28.3		79	Au	19.32	20.9	\$\$
20	Ca	1.54	1.4	50	Sn	7.31	29.4		80	Hg	13.55	18.0	Tox
21	Sc	2.99	3.7	51	Sb	6.68	27.2		81	Tl	11.85	17.0	Tox
22	Ti	4.5	7.0	52	Te	6.24	30.3		82	Pb	11.35	19.9	Tox
23	V	5.96	9.8	53	I	4.93	23.6		83	Bi	9.75	22.4	
24	Cr	7.2	15.6	54	Xe	5.9	29.8		84	Po	9.3	22.5	RA
25	Mn	7.47	13.0	55	Cs	1.87	7.9		85	At			RA
26	Fe	7.86	21.0	56	Ba	3.59	2.9		86	Rn	9.73	29.7	RA
27	Co	8.92	26.7	57	La	6.15	2.0		87	Fr			RA
28	Ni	8.9	29.2	58	Ce	6.77	2.5		88	Ra	5.5	21.0	RA
29	Cu	8.94	24.7	59	Pr	6.77	3.0						
30	Zn	7.14	22.4	60	Nd	7.01	5.2						

## 2. Experimental Approach

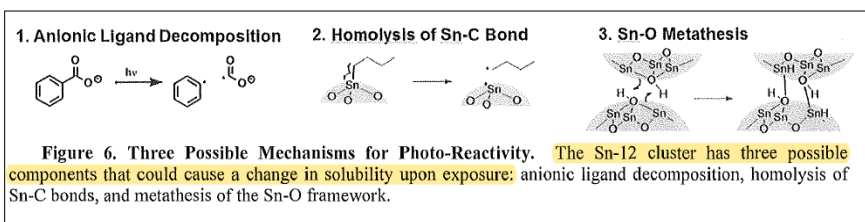
Because the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required resists based on organic polymers (e.g. coating, air stability). We will start by synthesizing new molecules at both SUNY New Paltz and CNSE. Simultaneously, we will purchase all the commercially available mononuclear compounds described in Section 3B. These commercially available compounds will "prime the pump" and allow us to quickly start evaluating the capabilities of EUV resists based on organometallic/inorganic compounds (Figure 3).

**Coating Quality.** We will start by dissolving the high OD compounds in organic solvents or water and spin coating to a target thickness of 20 nm. We will determine if they give high quality, uniform coatings using visual inspection and

268. As further exemplary evidence of this SUNY RF invention and Inpria's knowledge thereof, in the invention disclosure report RN2-11-27.2, Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds, SUNY RF disclosed an invention—conceived on March 1, 2014—of an "Sn-12 cluster" "containing 12 tin atoms," "accompanied by two anionic ligands," predicting "there are three likely mechanisms that could cause a solubility change during exposure: anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework" as shown in Figure 49 below:

### **Figure 49: RN2-11-27.2 Invention Disclosure Report**

**Structure and Predictions on Photoreactivity.** The Sn-12 cluster has a "football-shaped" cage structure,<sup>43</sup> containing 12 tin atoms. Each tin has one bond to carbon and four or five bonds to oxygen. At each side of the structure are three hydroxyl groups, and each cluster has a +2 net charge which is accompanied by two anionic ligands. We predict that there are three likely mechanisms that could cause a solubility change during exposure: anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework (Figure 6). To evaluate each of these three reaction pathways,



269. As further exemplary evidence of this SUNY RF invention and Inpria's knowledge thereof, in the invention disclosure report RN2-11-27.3 Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metal Resists, SUNY RF disclosed an invention—conceived on June 28, 2011—"to use thin films of organometallic or inorganic compounds with high EUV OD and high mass densities as high resolution, low LER EUV photoresists," involving "first row

transition metals Cr, Mn, Fe, Co, Ni, Cu and Zn” and MORE complexes that are “reactive enough so that they will efficiently undergo EUV-induced changes in solubility,” including the solubilities of compounds in various solvents as shown in Figure 50 below:

**Figure 50: RN2-11-27.3 Invention Disclosure Report**

The invention is to use thin films of organometallic or inorganic compounds with high EUV OD and high mass densities as high resolution, low LER EUV photoresists.

- First-row transition metal complexes containing oxalate ligands

**2.0 Results and Discussion**

**2.1 Mononuclear Metal Oxalate, Diimine and Diammine Complexes.**

Transition metal complexes give an enormous range of possibilities for MORE because of the wide range of ligands and metals available. The first row transition metals Cr, Mn, Fe, Co, Ni, Cu and Zn have sufficiently high EUV optical densities, are inexpensive and non-toxic and will be helpful in elucidating any trends in periodic reactivity. Since the EUV photochemistry of transition metal complexes has not previously been investigated, we used the following criteria to select complexes to investigate for MORE:

- 1) The complexes must be prepared through high yield and relatively simple procedures.
- 2) Ligands must be commercially available or easy to prepare.
- 3) Subtle variations in ligands and ligand substituents should be possible.
- 4) The ideal MORE complexes should exhibit a good balance in stability. They must be stable enough for good shelf-life—yet reactive enough so that they will efficiently undergo EUV-induced changes in solubility.

**2.3 Screening for Solubility, Coating and EUV Response**

A summary of the solubility, coating and EUV response for all of the compounds is shown in Table 3. Initial screening of the compounds was performed to determine whether they had suitable solubility and coating characteristics to perform as resists. The oxalate ligand makes all of the compounds very polar,

**Table 3.** Solubility, coating, contrast curve and imaging data for metal oxalate/diimine /diammine and [CpFe(arene)]<sup>+</sup> complexes. <sup>a</sup>Solvent ratios are given for volume. <sup>b</sup>PGMEA = propyleneglycol-methyletheracetate, PMA = 1-methoxy-2-propanol acetate, IPA = 2-propanol, EL = ethyl lactate, ACN = acetonitrile.

Compound #	Soluble?	<sup>b</sup> Coating Solvent	Coating Quality	Prebake	<sup>b</sup> Developing Solvent	Contrast Curve Result	Egel (mJ/cm <sup>2</sup> )	E <sub>max</sub> (mJ/cm <sup>2</sup> )	Imaging Data?	E <sub>size</sub> (mJ/cm <sup>2</sup> )	Resolution (nm)	modulation (nm)
100	Y	1:1 ACN/EL	good	60s @ 90	85% IPA(aq)	no image			n			
101	no data											
102	Y	1:1 ACN/EL	good	60s @ 90	85% IPA(aq)	image at >1400 mJ/cm <sup>2</sup>			n			
103	Y	1:1 ACN/EL	poor	60s @ 90	10% IPA(aq)	image at high dose			n			
104	Y	1:1 ACN/EL	poor	60s @ 90	10% IPA(aq)	no image			n			
105	Y	2:1 ACN/EL	crystal line									
106	Y	2:1 ACN/EL	poor	60s @ 90	95% IPA(aq)	no image			n			
107	Y	2:1 ACN/EL	poor	60s @ 90	20% IPA(aq)	poor image		~40	n			
109	Y	1:1 ACN/EL	good	60s @ 90	1:1 acetone / PGMEA	ok image		~25	y	70	30	
110	Y	1:2 ACN/EL	good	60s @ 90	1:1 acetone / PGMEA	good image		~5	y	50		16
111	Y	33/66 ACN/EL	good	60s @ 90	6:4 acetone / PGMEA	good image	0	8	y	<1	30	15
112	Y	EL	good	60s @ 90	4:6 acetone / PMA	poor contrast			n			
113	Y	EL	good	60s @ 90	1:2 acetone / PGMEA	good image		~25	n			

270. As further exemplary evidence of this SUNY RF invention and Inpria's knowledge thereof, in the invention disclosure report RN2-11-27.7 Molecular Organometallic Resists for EUV (MORE): Palladium and Platinum Resists, SUNY RF disclosed an invention—conceived on March 5, 2014—to use “an EUV resist” containing “a metal or other element with EUV optical density,” including tin, along with “a photo-labile ligand,” which “would be spin-coated onto a wafer or suitable substrate, then exposed to light,” the development of which “creates patterns in

which the exposed areas dissolve, and the unexposed areas remain behind, including as illustrated below in Figure 51.

**Figure 51: RN2-11-27.7 Invention Disclosure Report**

An EUV resist composed of a compound or complex containing:

- A metal or other element with high EUV optical density (Table I).
- A photo-labile ligand that is highly polar, but creates a gas when exposed (e.g. Oxalate will create CO<sub>2</sub> and Azide will create N<sub>2</sub>).
- This highly polar group makes the resist film have a limited solubility in selected solvents or developers, but the conversion of this group to a gas, causes an increase in solubility, and concomitantly an increase in dissolution rate.

A solution of this resist would be spin-coated onto a wafer or suitable substrate, then exposed to light, causing the polar groups to photochemically dissociate from the complex leaving a new compound with greater solubility and dissolution rate. Development (using organic solvents or solutions) creates patterns in which the exposed areas dissolve, and the unexposed areas remain behind, thereby exhibiting the properties of a positive-tone photoresist.

271. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the '564 and '312 Patents.

272. Specifically, months and years after these inventions and disclosures, on September 18, 2015 and August 25, 2022, during the course of the Research Agreements and thereafter based on knowledge and information gleaned from and disclosed by SUNY RF, scientists from Inpria— Jason Stowers, Alan Telecky, Douglas Keszler, and Andrew Grenville (the “purported '564 and '312 inventors”)—filed U.S. Patent Application No. 14/858,612 (PATTERNED INORGANIC LAYERS, RADIATION BASED PATTERNING COMPOSITIONS AND CORRESPONDING METHODS) (the “ '612 Application”) and U.S. Patent Application No. 17/895,657 (RADIATION BASED PATTERNING METHODS) (the “ '657 Application”). As explained above, the applications disclosed methods of EUV lithography using an organometallic coating as the resist.

273. During prosecution, the purported '564 and '312 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Brian Cardineau, Dan Freedman, Miriam Sortland, Miles Marnell, or Ryan Del Re to the invention described in the '612



or '657 Applications, and did not ask that Dr. Brainard, Brian Cardineau, Dan Freedman, Miriam Sortland, Miles Marnell, or Ryan Del Re be named as an inventor.

274. The purported '564 and '312 inventors assigned to Inpria all right, title, and interest in the '612 and '657 Applications, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office.

275. The U.S. Patent and Trademark office issued U.S. Patent No. 9,823,564 on November 21, 2017 and U.S. Pat. No. 11,693,312 on July 4, 2023.

276. Inpria and the purported '564 and '312 inventors did not disclose to SUNY RF the existence of the '612 or '657 Applications or the '564 or '312 Patents.

277. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '564 and '312 Patents in the United States, as well as foreign counterparts to the '564 and '312 Patents around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miriam Sortland, Miles Marnell, or Ryan Del Re contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

**6. *SUNY RF Invented and Owns the '153, '029, and '284 Patents***

278. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '153, '029, and '284 Patents.

279. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '153, '029, and '284 Patents.



280. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '153, '029, and '284 Patents.

281. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '153, '029, and '284 Patents.

282. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '153, '029, and '284 Patents.

283. At all relevant times, James Passarelli was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '153, '029, and '284 Patents.

284. At all relevant times, Michael Murphy was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '153, '029, and '284 Patents.

285. At all relevant times, Ryan Del Re was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and

ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '153, '029, and '284 Patents.

286. The '153, '029, and '284 Patents concern a coating solution consistent of an organic solvent and a tin-based organometallic compound represented by the formula  $\text{RSnO}_{(3/2-x/2)}(\text{OH})_x$  where  $(0 < x < 3)$ , where R is an alkyl group. For example:

**Figure 52: Exemplary Claims from '153 Patent**

1. A coating solution consisting essentially of volatile organic solvent and an organometallic composition comprising a first organometallic compound represented by the formula  $\text{RSnO}_{(3/2-x/2)}(\text{OH})_x$  where  $(0 < x < 3)$  with from about 0.0025M to about 1.0M tin in the solution, where R is an alkyl group bonded to the tin at a secondary or tertiary carbon atom.

18. A patterned structure comprising a substrate having a surface and a coating associated with the surface wherein at least portions of the coating are represented by the formulation  $(\text{R})_z\text{SnO}_{2-z/2-x/2}(\text{OH})_x$  ( $z > 0$ ,  $x > 0$ , and  $0 < (x+z) < 4$ ), where R is an alkyl group bonded to the tin at a secondary or tertiary carbon atom, wherein the coating has an average thickness of no more than about 50 nm.

**Figure 53: Exemplary Claim from '029 Patent**

1. A solution comprising a solvent and a compound represented by the formula  $\text{RSnO}_{(3/2-x/2)}(\text{OH})_x$  where  $(0 < x < 3)$ , where R is an alkyl, cycloalkyl, or substituted alkyl moiety having from 1 to 31 carbon atoms, the solution having individual concentrations of contaminant metals of no more than about 1 ppm by weight wherein the concentration of tin in the solution is from about 0.01 M to about 1.5 M.

**Figure 54: Exemplary Claims from '284 Patent**

1. An article comprising a container and, within the container, a compound represented by the formula  $(\text{CH}_3)_2\text{CHSn}(\text{N}(\text{CH}_3)_2)_3$  and an inert atmosphere, wherein the container is sealed from the ambient atmosphere prior to processing of the compound through hydrolysis.
4. A solution comprising an organic solvent and  $(\text{CH}_3)_2\text{CHSn}(\text{N}(\text{CH}_3)_2)_3$ .
9. The solution of claim 4 further comprising  $\text{RSnO}_{(3/2-x/2)}(\text{OH})_x$  ( $0 < x < 3$ ), where R is an alkyl, cycloalkyl, or substituted alkyl moiety having from 1 to 31 carbon atoms.

287. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '153, '029, and '284 Patents—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP and in CNSE disclosures and reports under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE),” “RN2-11-27.2: Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metals,” “RN2-11-27.5: Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists.” Such SUNY RF inventions were also recounted in numerous CNSE reports provided to Inpria during the 2015 and 2017 Research Projects.

288. For example, the invention disclosure report RN2-11-27 Molecular Organometallic Resists for EUV (MORE) discloses an invention “to use thin films of organometallic compounds with high EUV OD and high mass densities” “as high resolution, low LER EUV photoresists,”

including “Mono-Nuclear Organometallic or Inorganic Compounds,” “Transition Metal Oxide/Oxo-Carboxylate Clusters,” and “Tin Oxoclusters.” RN2-11-27 explains that “[b]ecause the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required [for] resists based on organic polymers.”

**Figure 55: RN2-11-27 Invention Disclosure Report**

The invention is to use thin films of organometallic compounds with high EUV OD and high mass densities (as outlined in Table 1 and shown as examples in the set of five classes of compounds shown below) as high resolution, low LER EUV photoresists.

- Mono-Nuclear Organometallic or Inorganic Compounds
- Transition Metal Oxide/Oxo-Carboxylate Clusters
- Tin Oxoclusters
  - Bismuth-Clusters
  - Iron-Sulfide Clusters

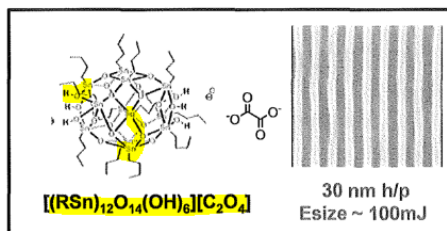
**2. Experimental Approach**

Because the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required resists based on organic polymers (e.g. coating, air stability). We will start by synthesizing new molecules at both SUNY New Paltz and CNSE. Simultaneously, we will purchase all the commercially available mononuclear compounds described in Section 3B. These commercially available compounds will "prime the pump" and allow us to quickly start evaluating the capabilities of EUV resists based on organometallic/inorganic compounds (Figure 3).

289. As further exemplary evidence of SUNY RF’s invention and Inpria’s knowledge thereof, the invention disclosure report RN2-11-27.2 concerning Tin and Bismuth Compounds discloses various inventions related to precursor solutions containing Tin-12 oxoclusters, including mechanisms causing solubility changes during exposure including anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework. As one example, it expressly discloses synthesis of novel Tin-12 oxoclusters with various alkyl groups, including phenyl and butyl, or allyl groups using an organic amine, tetrahydrofuran, and water under hydrolysis conditions, including as illustrated below in Figure 56.

### Figure 56: RN2-11-27.2 Invention Disclosure Report

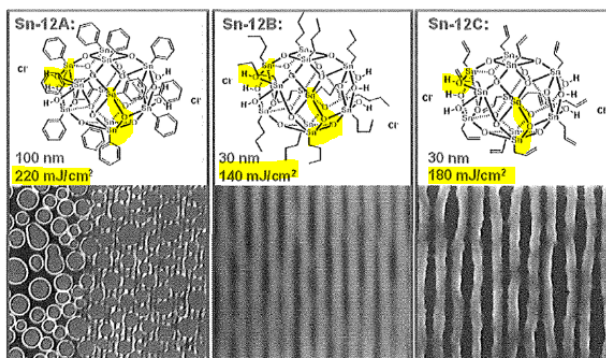
Our best organometallic Tin-based resist was our **Tin-12 Oxocluster** with an oxalate counter-anion (see below). This inorganic resist film shows nice LER if synthetic purity can be controlled. The sensitivity is quite low, but we think that these materials are capable of providing excellent capabilities once a higher speed exposure mechanism can be discovered.



**Synthesis of Novel Sn-12 Clusters.** Initially, we modified two literature procedures for preparing the Sn-12 clusters with variation in alkyl groups. Our first approach was to hydrolyze phenyltin trichloride to get phenylstannic acid and to then dehydrate to the Sn-12 cluster. Unfortunately, this procedure only yielded an insoluble white precipitate. From our prior work with these clusters, we knew that this insoluble precipitate could not be our target compound. Our next approach involved the slow hydrolysis of phenyltin trichloride with sodium hydroxide, maintaining a pH of 4.<sup>7, 41-43</sup> With this method, again only an insoluble white precipitate was produced. We then modified this synthetic route to involve a less nucleophilic, amine base. Using an organic amine in water and THF, we found the phenyltin-12 cluster (PhSn-12) could be made in excellent yield, along with the analogous Sn-4 cluster (PhSn-4) as indicated by GPC results. Furthermore, by changing the relative base concentration in the reaction, the product formation could be controlled to form one cluster over another (Figure 5).

**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.

**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.




**Figure 10.** Three Sn-12 clusters were made and tested containing phenyl (Sn-12A), butyl(Sn-12B) and allyl(Sn-12C) organic groups. Sn-12A appears to have purity issues, and phase separation is occurring in the film. Sn-12B and Sn-12C were both capable of resolving 30 nm features but further work is required.

290. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 1, 2012, Dr. Brainard made a confidential presentation to SEMATECH members, including Inpria, describing his objective to "[i]nvent revolutionary new photoresists based on Molecular Organometallic Resists for EUV (MORE)." This presentation explained that his MORE program was focused on five classes of compounds, including "Mono-Nuclear Organometallic or Inorganic Compounds," "Transition Metal Oxide/Oxo-Carboxylate Clusters," and "Tin Oxoclusters" among others. It explained that his MORE program was focused "on elements with high EUV OD's and high mass densities," including "In" (indium), "Sn" (tin), and "Sb" (antimony) among others. And as illustrated in Figure 57 below, it also explained why Dr. Brainard's MORE compounds were superior to the hafnium resists on which Inpria was then focusing its research and development. Dr. Brainard made additional confidential MORE presentations to SEMATECH members, including Inpria, including on June 14, 2013.

**Figure 57: CNSE MORE SEMATECH PRESENTATION 5-1-12**

**Why MORE Resists will work better than HfNp Resists**

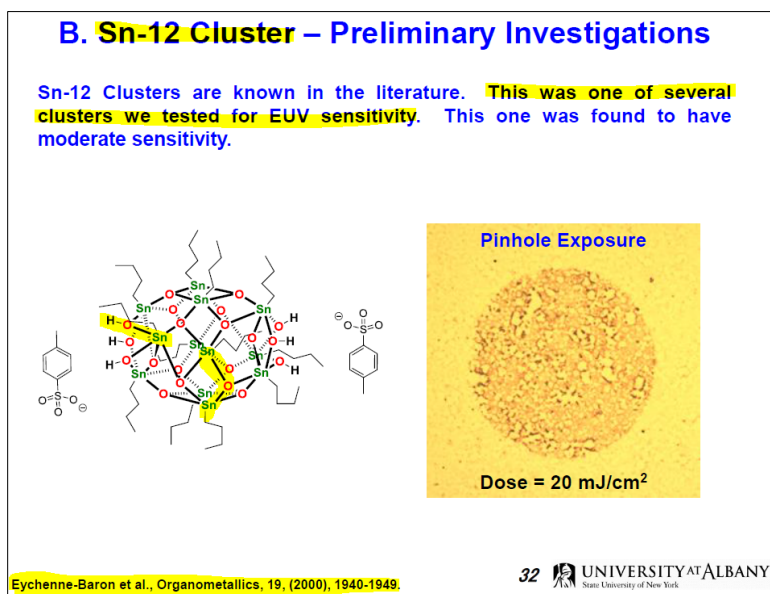
- (1) **Size.** The molecules proposed here will be 3-6 times smaller in diameter than Hf Np's, and yield better LER and resolution.
- (2) **Control over Photoreactivity.** The proposed photochemical reaction of the Inpria resist is thermodynamically unfavorable, leading to poor sensitivity. We will be able to tune the reactivity of our MORE resists.
- (3) **Dispersions vs. Solutions.** Our molecular solutions will be more stable than Np Dispersions.
- (4) **Particle Defects.** We propose that resists based on inherently soluble molecules will create fewer defects.
- (5) **Tunable Properties.** Our synthesis of molecular compounds → excellent control over molecular structure, kinetics and thermodynamics.

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State University of New York

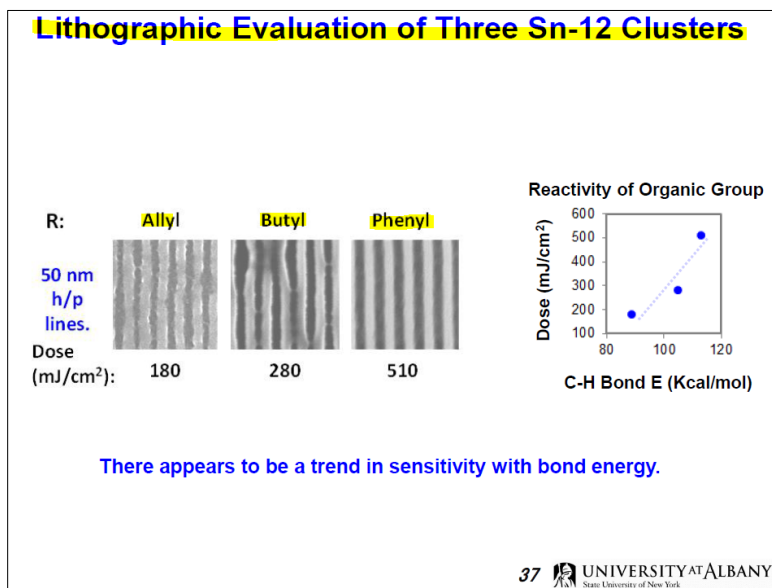
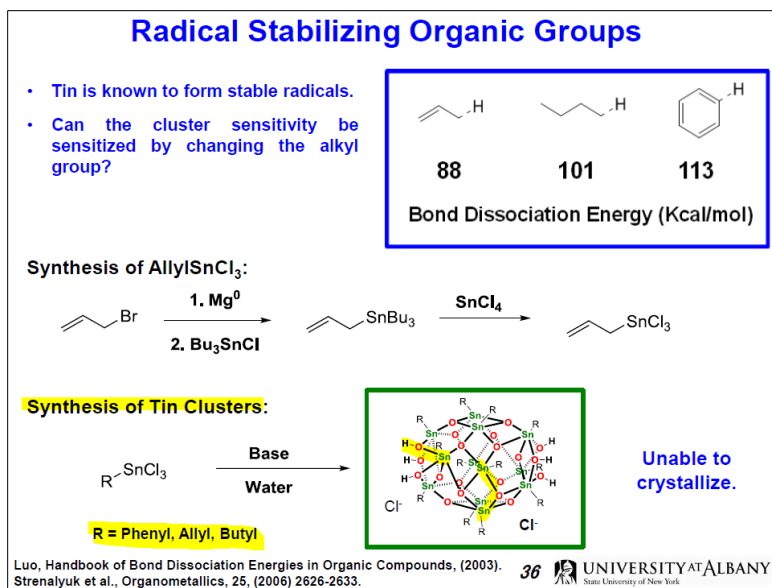
291. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 20, 2013, then-CNSE graduate student Brian Cardineau presented his doctoral

thesis titled “Novel Resist Systems for EUV Lithography: LER, Nanoparticle, Chain-Scission and MORE” in “partial fulfillment of the degree of Doctor of Philosophy in Nanoscale Science at the College of Nanoscale Science and Engineering.” The thesis was conducted at CNSE under his researcher adviser Dr. Brainard. Inpria had access to and, on information and belief, obtained this doctoral thesis presentation. In explaining “MORE Benefits,” the thesis presentation explained, “[w]e have proposed a new platform of resist consisting of high optical density metal oxide organometallic compounds,” which potential benefits included “High EUV OD,” “High Mass Density,” “No Acid Diffusion,” “Excellent Etch Rates,” and “High Uncatalyzed Reactivity.” The thesis presentation also expressly concerned “Sn-12 Clusters” which “we tested for EUV sensitivity” and which cluster was known in the literature at “Eychenne-Baron et al, Organometallics, 19, (2000), 1940-1949”—the exact same reference that Inpria would later quote in its application for the ’153 Patent, as illustrated in Figure 58. It also included results of SUNY RF’s synthesis of Tin-12 oxoclusters with phenyl, allyl, and butyl ligands, as illustrated in Figure 58.

**Figure 58: CNSE MORE THESIS PRESENTATION 5-20-13**

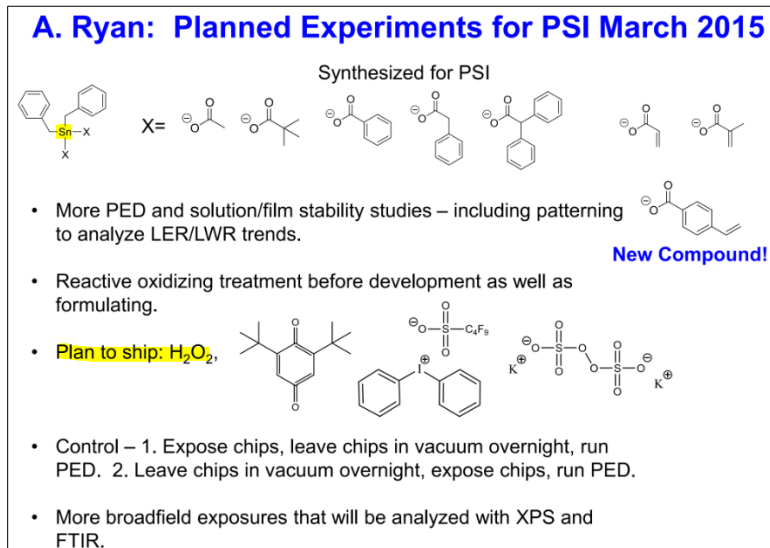




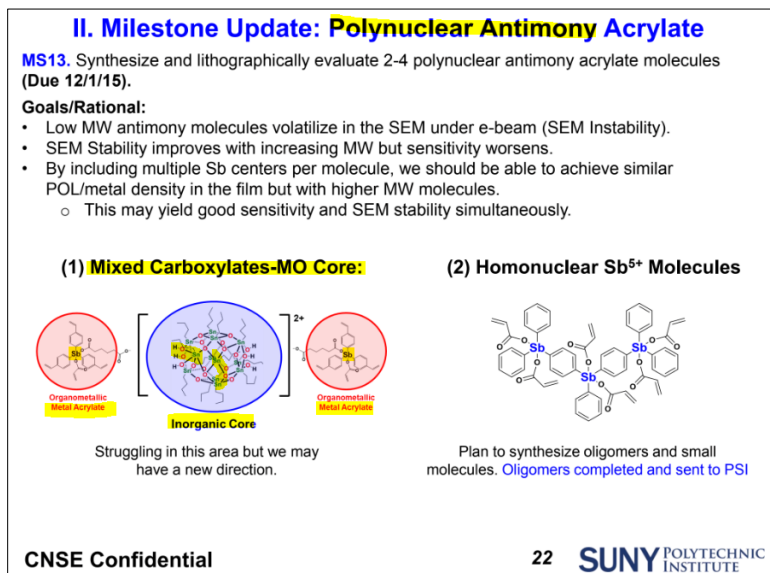
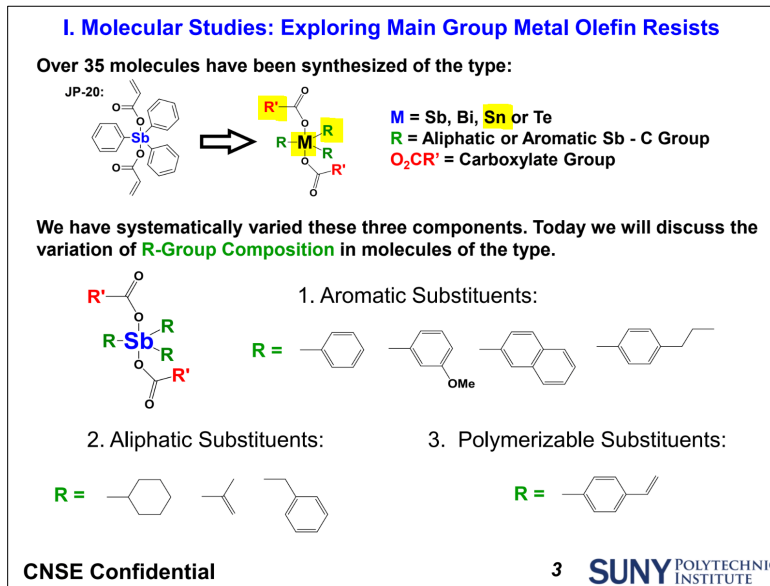


292. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on April 8, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form R<sub>n</sub>SnX<sub>4-n</sub>, including by incorporating H<sub>2</sub>O<sub>2</sub> (hydrogen peroxide), though patterning to analyze LER/LWR trends and by exposing the chips in vacuum chambers, including as illustrated in Figure 59 below.



**Figure 59: CNSE Report 4-8-2015**

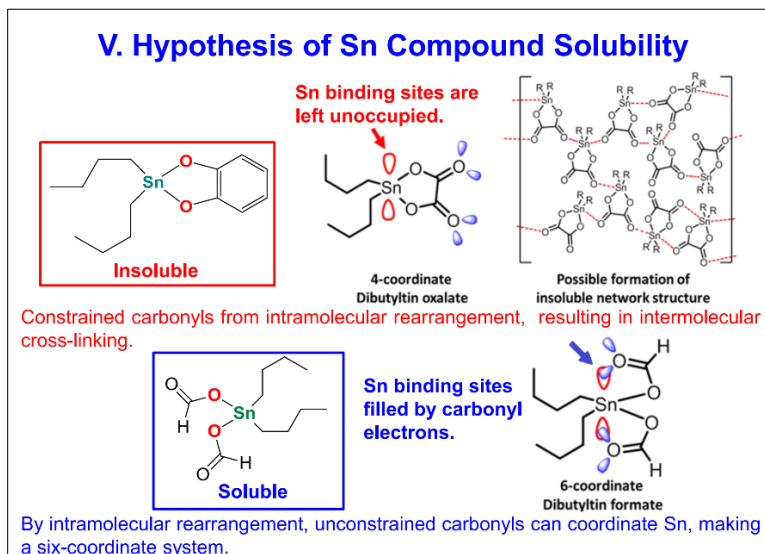
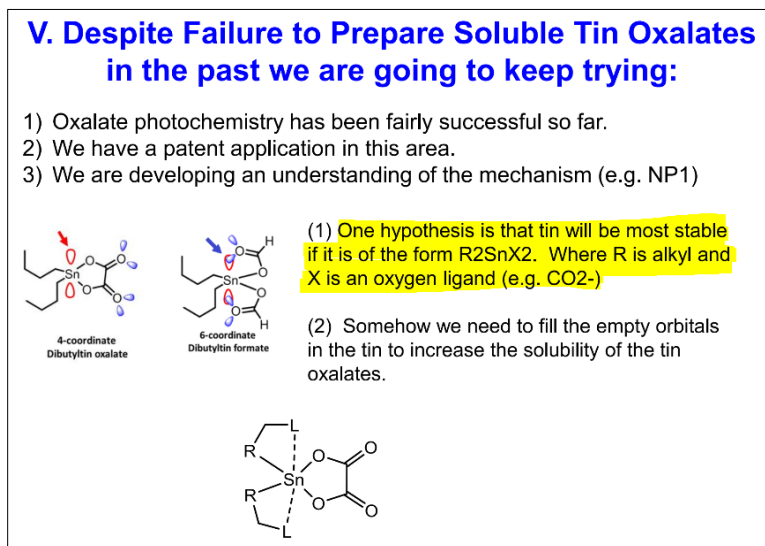
293. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, in May 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_n\text{SnX}_{5-n}$ , including both its molecular studies of Tin-based resists with different R and X groups, including those in aliphatic, aromatic Sb – C, and carboxylate groups, and its milestones concerning polynuclear metal-based resists including those that combined Tin-12 with organometallic metal acrylate, including as illustrated in Figure 60 below.

**Figure 60: CNSE Report May 2015**

294. As further exemplary evidence of this invention and Inpria's knowledge thereof, on June 19, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_n\text{SnX}_{4-n}$ , including its discovery that "tin will be most stable if it is of the form  $R_2\text{SnX}_2$ " "[w]here R is alkyl and X is an oxygen ligand (e.g.,  $\text{CO}_2$ -)" and the "need to fill the empty orbitals in the tin to increase the

solubility of the tin oxalates,” including by intramolecular rearrangement” where “unconstrained carbonyls can coordinate Sn, making a six coordinate system,” as illustrated in Figure 61.

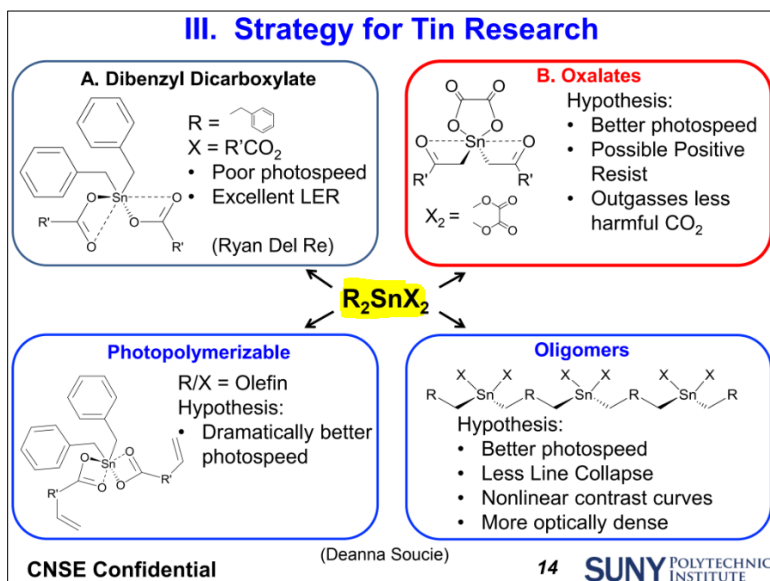
**Figure 61: CNSE Report 6-19-2015**

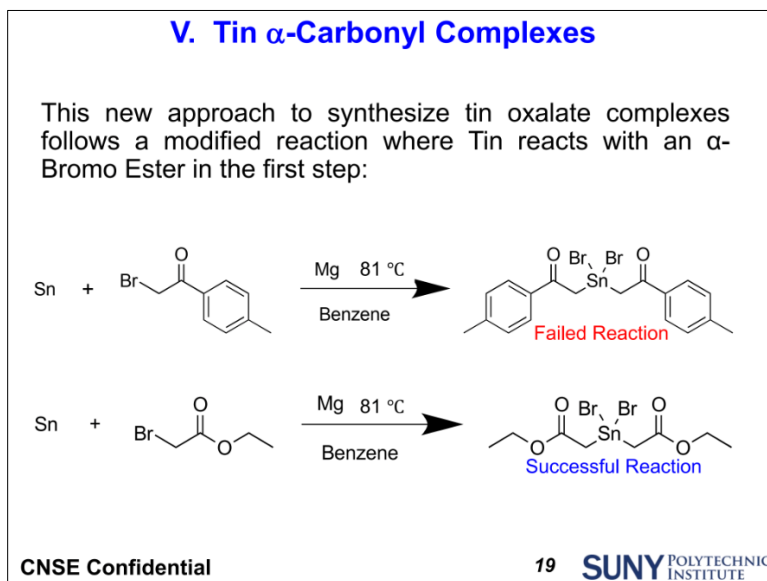
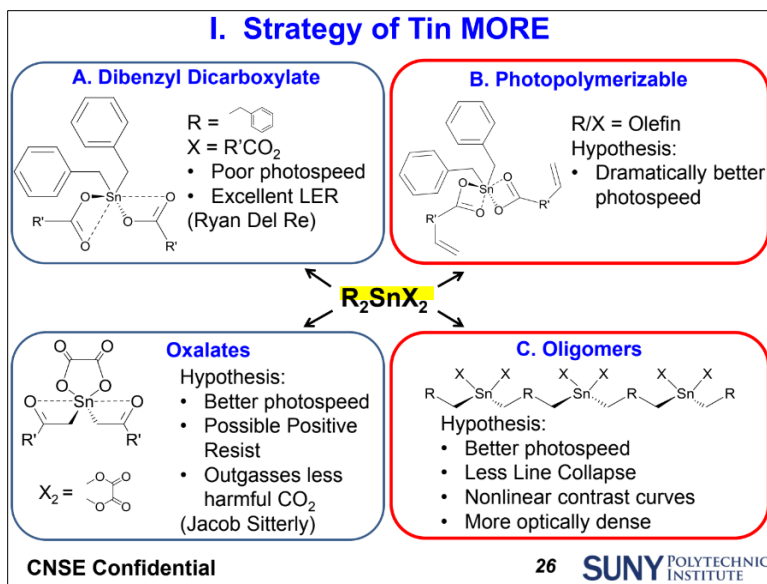


295. As further exemplary evidence of this invention and Inpria’s knowledge thereof, on August 17, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by recounting its past successes synthesizing benzyl tin complexes and outlining its strategy for

further tin research in the form “ $R_2SnX_2$ ” with varying R and X groups, as illustrated below in Figure 62. One such invention was to synthesize tin-based resists by reacting  $\alpha$ -bromo esters with tin metal in combination with magnesium metal, using benzene as a solvent, where the  $\alpha$ -bromo ester could include methyl bromoacetate, tert-butyl bromoacetate, 4-iodophenyl 2-bromoacetate, or the like, including below in Figure 62. Other such inventions were to incorporate iodine into organotin resists in order to increase optical density and improve sensitivity or synthesize a multinuclear tin resist where the R group was a methyl group like  $CH_3$ , as illustrated in Figure 62.

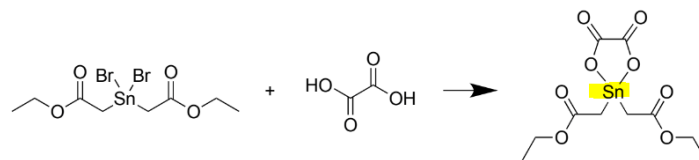
**Figure 62: CNSE Report 8-17-2015**



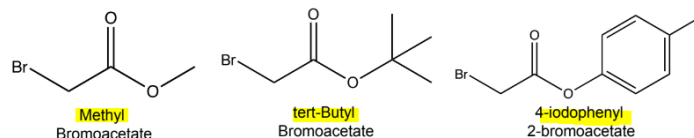


## VI. Future Directions

Step Two of Proposed Tin Oxalate Synthesis:



Synthesis Using Alternative  $\alpha$ -Bromo Esters:

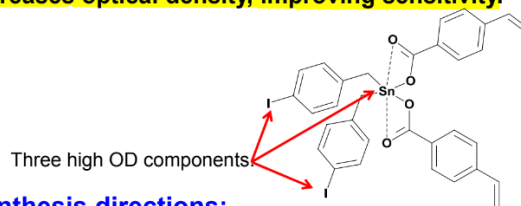


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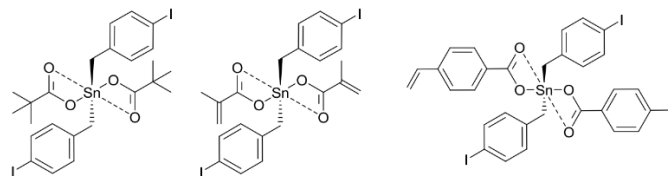
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## III. Iodobenzyl Groups

Incorporating optically dense iodine into our organotin resists increases optical density, improving sensitivity.

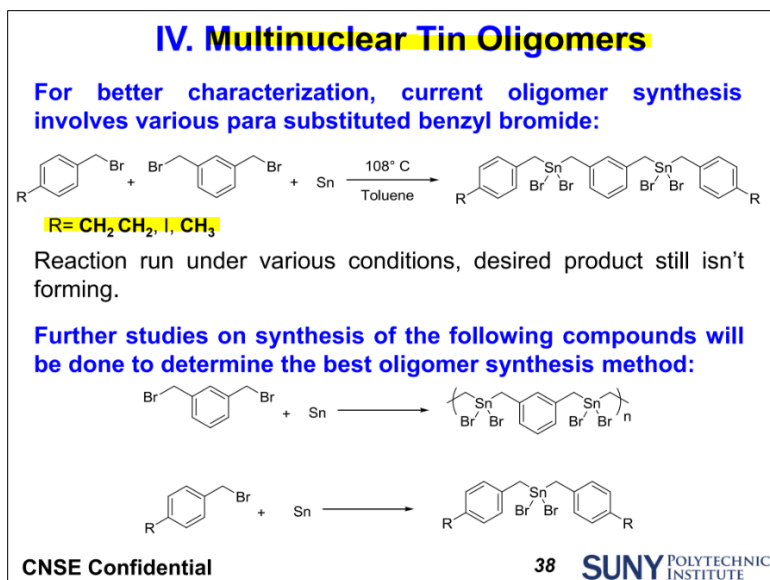


Synthesis directions:

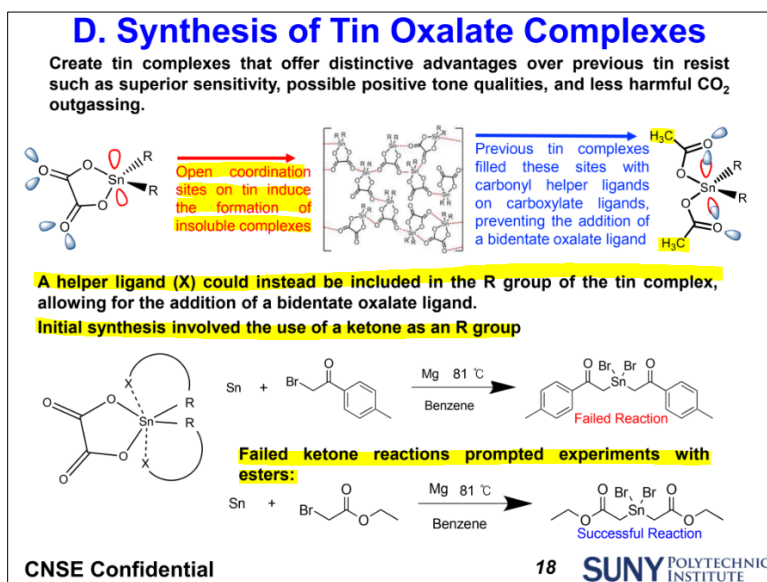
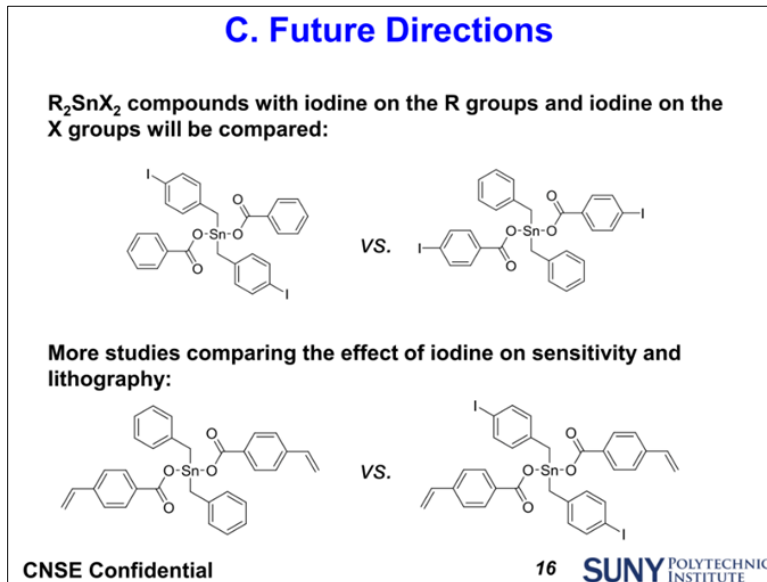


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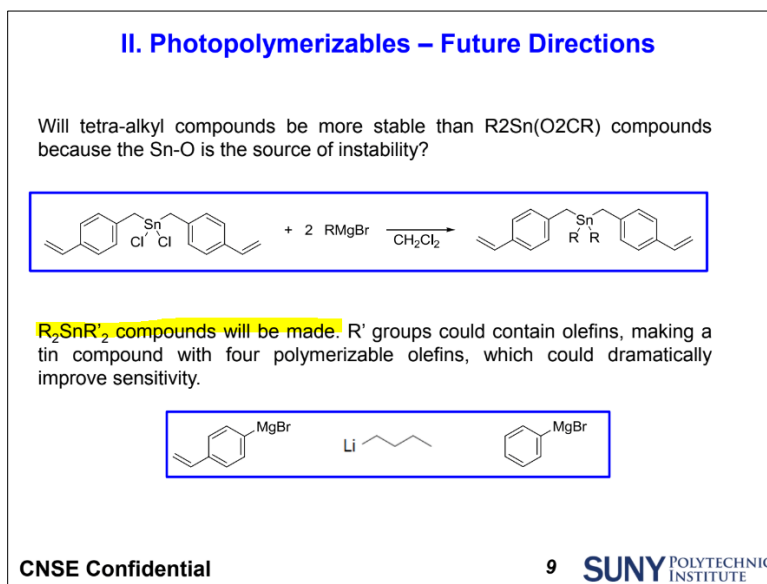
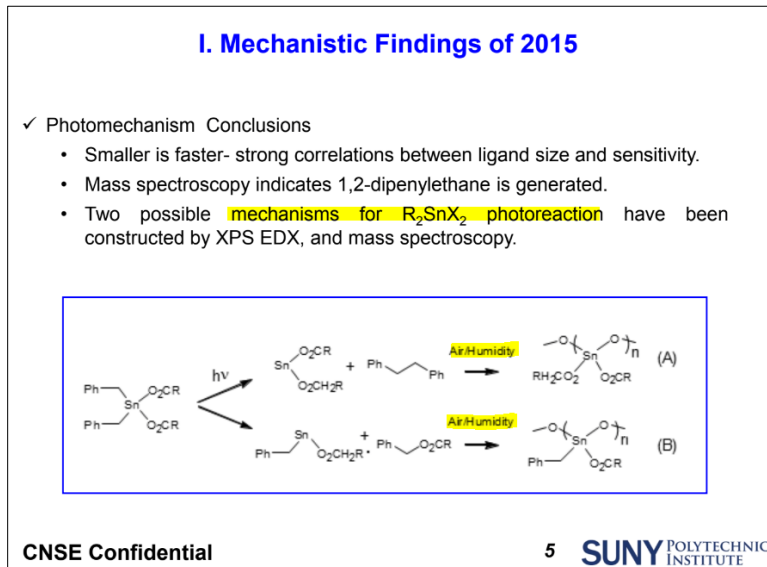


296. As further exemplary evidence of this invention and Inpria's knowledge thereof, on September 30, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including synthesizing  $R_2SnX_2$  compounds with iodine in the R and/or X groups, and using helper ligands in the form of a ketone or an ester as an R group to increase the solubility of such organotin resists, including as illustrated in Figure 63 below. It also recounted again that one of the attributes that made "MORE an industry leading resist" was that it was capable of "aqueous development."

**Figure 63: CNSE Report 9-30-2015**

297. As further exemplary evidence of this invention and Inpria's knowledge thereof, on December 4, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by summarizing its mechanistic findings in 2015 concerning  $R_2SnX_2$  compounds developed in water vapor and describing further changes in R and R' groups to increase stability and sensitivity of such organotin compositions and resists, including as illustrated in Figure 64.



**Figure 64: CNSE Report 12-4-2015**


298. As further exemplary evidence of this invention and Inpria's knowledge thereof, throughout 2016, SUNY RF sent confidential research presentations to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including those that were synthesized by incorporating water into the resist films and into vacuum chambers, through for example, formulation solvents, hydrates, and hygroscopic polymers, as well as SUNY RF's so-called "Return to Aqueous Development," to research and develop why water

development allowed for superior contrast in MORE resists. SUNY RF also described the use of “smaller R-groups on tin starting material, such as ethyl or methyl,” as depicted below:

**Figure 65: CNSE Reports 2-26-16, 6-13-16, and 8-25-16**

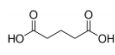
**III. Current Work + PSI Plans**

**MS1. Reactive Developers.**

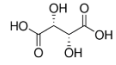
	$R_3N$	$R_4NOH$	R/O
Carboxylic acids	Amine bases	Ammonium bases	Redox agents

**New carboxylic acids:**

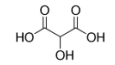
Glutaric



Tartaric



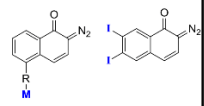
Tartronic



**MS3. Feasibility Studies: Strategies for producing high-contrast metal-based positive-tone resists.**

**Strategies:**

DNQ with MORE



Will be testing an i-line resist (AZ 5206) in EUV.

**Concern: Lack of water in vacuum.**

**Solution: Incorporate water into resist film via:**

1. Formulation solvents.
2. Hydrates in formulation.
3. Hygroscopic polymers in formulation

**Cobalt(II) nitrate hexahydrate**

- Slightly soluble in PGMEA
- Soluble in PM and water.

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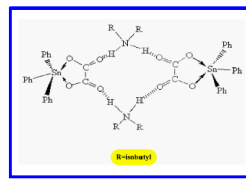
**IIIC. Tin Oxalates: Intern (Lucas)**

**PRO's**

- Synthetically easy and reproducible
- Soluble form of tin oxalates
- Good film quality

**CON's**

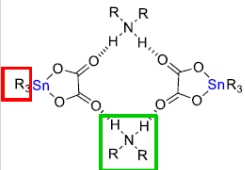
- Only seen negative tone behavior so far (may be able to fix with dev)
- Not yet successful at patterning
- Some film speckling seen in SEM



**R-isobutyl**

### IIIC. Tin Oxalates: Intern (Lucas)

**Pentacoordinate**



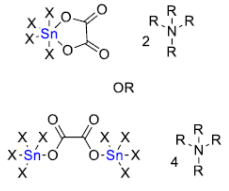
- Soluble in organic solvents.
- EUV sensitive.

- Explore other cations.
- Metal based cations
- $R_3Te^{\oplus}$   $R_2I^{\oplus}$

- Use smaller R groups.
- R = Methyl, Ethyl

**Concept:** Photolysis eliminates the polar oxalate ligand, largely reducing polarity of molecule, which should result in a large change in dissolution.

**Hexacoordinate**



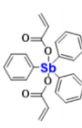
- These have not yet been explored.
- Paper: Explores the effects of the size of the cation on the structure of the molecule.

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### IV. Return to Aqueous Development – Why H<sub>2</sub>O?

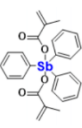
- What is it about H<sub>2</sub>O development that allows for superior contrast?
- JP-30 will not develop in H<sub>2</sub>O unlike JP-20 & JP-21
  - Why is JP-30 not soluble in water?
  - Can we change ligands to improve solubility?
  - Will a developer such as 1:1 IPA:H<sub>2</sub>O improve contrast over Hex or IPA alone?

**JP-20**



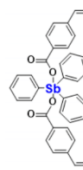
Can develop in H<sub>2</sub>O? **Yes!**

**JP-21**



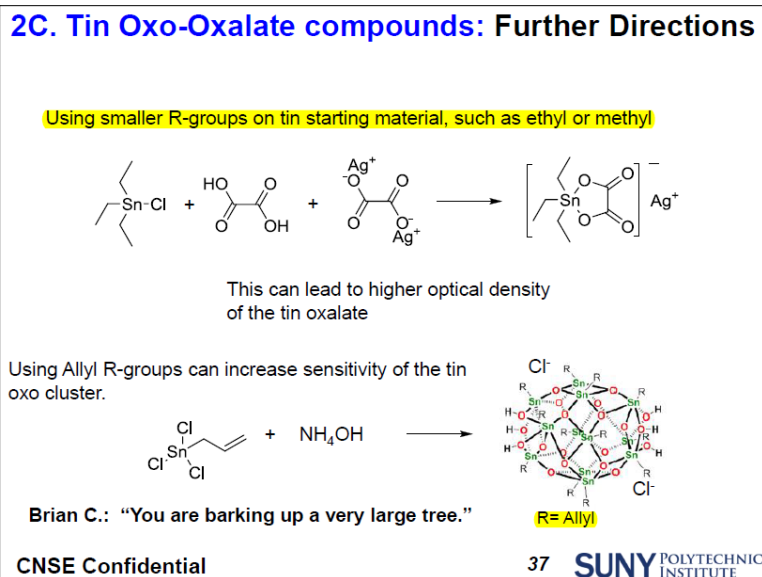
Can develop in H<sub>2</sub>O? **Yes!**

**JP-30**



Can develop in H<sub>2</sub>O? **No!**

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299. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the '153, '029, and '284 Patents.

300. On October 22, 2015, during the course of the Research Agreements, scientists from Inpria and a former CNSE graduate student—Stephen Meyers, Jeremy Anderson, Joseph Edson, Kai Jiang, Douglas Keszler, Michael Kocsis, Alan Telecky, and Brian Cardineau (the “purported '153, '029, and '284 inventors”)—filed U.S. Patent Application No. 14/920,107 (the “'107 Application,” which matured into the '153 Patent). On November 5, 2019, based on knowledge and information gleaned from and disclosures made by SUNY RF, the purported '153, '029, and '284 inventors filed U.S. Patent Application No. 16/674,714 (the “'714 Application,” which matured into the '029 Patent). On October 30, 2020, based on knowledge and information gleaned from and disclosures made by SUNY RF, the purported '153, '029, and '284 inventors filed U.S. Patent Application No. 17/085,024 (the “'024 Application,” which matured into the '284 Patent).

301. Brian Cardineau, who previously worked on the MORE project at SUNY under Dr. Brainard, at that point had joined Inpria.

302. During prosecution, the purported '153, '029, and '284 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re to the invention described in the '107, '714, or '024 Applications and the provisional applications to which they claim priority, and did not ask that Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, or Ryan Del Re be named as an inventor.

303. On November 20, 2015, the purported '153, '029, and '284 inventors assigned to Inpria all right, title, and interest in the '107 Application, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on December 4, 2015, at Reel/Frame 037216/0639.

304. The U.S. Patent and Trademark office issued U.S. Patent No. 10,642,153 on May 5, 2020, U.S. Patent No. 11,392,029 on July 19, 2022, and U.S. Patent No. 11,500,284 on November 15, 2022.

305. Inpria and the purported '153, '029, and '284 inventors did not disclose to SUNY RF the existence of the '107, '714, or '024 Applications, any of their subsequent continuation applications, or the '153, '029, and '284 Patents.

306. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '153, '029, and '284 Patents in the United States, as well as foreign counterparts to '153, '029, and '284 Patents around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

**7. *SUNY RF Invented and Owns the '903, '466, and '109 Patents***

307. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '903, '466, and '109 Patents.

308. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '903, '466, and '109 Patents.

309. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '903, '466, and '109 Patents.

310. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '903, '466, and '109 Patents.

311. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '903, '466, and '109 Patents.

312. At all relevant times, James Passarelli was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '903, '466, and '109 Patents.

313. At all relevant times, Michael Murphy was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '903, '466, and '109 Patents.

314. At all relevant times, Ryan Del Re was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '903, '466, and '109 Patents.

315. The '903, '466, and '109 Patents concern monoalkyl tin triamide compounds containing a hydrocarbyl group with 1-31 carbon atoms and hydrocarbyl groups with 1-10 or 1-8 carbon atoms. For example:

**Figure 66: Exemplary Claims from '903 Patent**

1. A high purity liquid composition comprising: a monoalkyl tin triamide compound represented by the chemical formula  $\text{RSn}(\text{NR}'_2)_3$  and no more than 0.5 mole % dialkyltin compounds as an impurity relative to the total tin amount, wherein R is a hydrocarbyl group with 1-31 carbon atoms, and wherein R' is a hydrocarbyl group with 1-10 carbon atoms.
2. The composition of claim 1 wherein R is a branched alkyl ligand represented by  $\text{R}^1\text{R}^2\text{R}^3\text{C}-$ , where  $\text{R}^1$  and  $\text{R}^2$  are independently an alkyl group with 1-10 carbon atoms, and  $\text{R}^3$  is hydrogen or an alkyl group with 1-10 carbon atoms.
3. The composition of claim 1 wherein R comprises methyl ( $\text{CH}_3-$ ), ethyl ( $\text{CH}_3\text{CH}_2-$ ), isopropyl ( $\text{CH}_3\text{CH}_2\text{CH}-$ ), tert-butyl ( $(\text{CH}_3)_3\text{C}-$ ), tert-amyl ( $\text{CH}_3\text{CH}_2(\text{CH}_3)_2\text{C}-$ ), sec-butyl ( $\text{CH}_3(\text{CH}_3\text{CH}_2)\text{CH}-$ ), neopentyl ( $(\text{CH}_3)_3\text{CCH}_2-$ ), cyclohexyl, cyclopentyl, cyclobutyl, or cyclopropyl.
4. The composition of claim 1 wherein R' comprises a methyl group, ethyl group, isopropyl group, or t-butyl group.

**Figure 67: Exemplary Claims from '466 Patent**

1. A method to form a monoalkyltin triamide compound, the method comprising, reacting an alkylating agent selected from the group consisting of  $\text{RMgX}$ ,  $\text{R}_2\text{Zn}$ ,  $\text{RZnNR}'_2$ , or a combination thereof, with  $\text{Sn}(\text{NR}'_2)_4$  in a solution comprising an organic solvent, wherein R is a hydrocarbyl group with 1-31 carbon atoms, wherein X is a halogen, and wherein R' is a hydrocarbyl group with 1-10 carbon atoms.
2. The method of claim 1 wherein the solution has a concentration between about 0.01 M and about 5 M in tin.

**Figure 68: Exemplary Claims from '109 Patent**

1. A method for forming monoalkyl triamido tin, the method comprising, reacting a monoalkyltin triamide compound represented by the chemical formula  $\text{RSn}(\text{NR}'_2)_3$  with an amide ( $\text{R}''\text{CONHR}'''$ ) in an organic solvent, wherein R is a hydrocarbyl group with 1-31 carbon atoms, and wherein R', R'' and R''' are independently a hydrocarbyl with 1-8 carbon atoms; and collecting a solid product represented by the formula  $\text{RSn}(\text{NR}'''\text{COR}'')_3$ .
2. The method of claim 1 wherein the monoalkyl tin triamide is at an initial concentration from about 0.1M to about 8M and wherein the solvent is an alkane, an aromatic hydrocarbon, or an ether.

316. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '903, '466, and '109 Patents—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP and in CNSE disclosures and reports under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE),” “RN2-11-27.2: Molecular



Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metals,” “RN2-11-27.5: Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists.” Such SUNY RF inventions were also recounted in numerous CNSE reports provided to Inpria during the 2015 and 2017 Research Projects.

317. For example, the invention disclosure report RN2-11-27 Molecular Organometallic Resists for EUV (MORE) discloses an invention “to use thin films of organometallic compounds with high EUV OD and high mass densities” “as high resolution, low LER EUV photoresists,” including “Mono-Nuclear Organometallic or Inorganic Compounds,” “Transition Metal Oxide/Oxo-Carboxylate Clusters,” and “Tin Oxoclusters.” RN2-11-27 explains that “[b]ecause the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required [for] resists based on organic polymers.”

### **Figure 69: RN2-11-27 Invention Disclosure Report**

The invention is to use thin films of organometallic compounds with high EUV OD and high mass densities (as outlined in Table 1 and shown as examples in the set of five classes of compounds shown below) as high resolution, low LER EUV photoresists.

- Mono-Nuclear Organometallic or Inorganic Compounds
- Transition Metal Oxide/Oxo-Carboxylate Clusters
- Tin Oxoclusters
- Bismuth-Clusters
- Iron-Sulfide Clusters

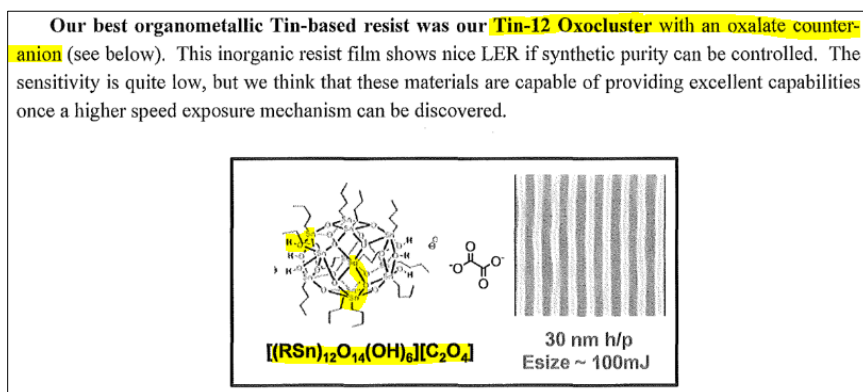
**2. Experimental Approach**

Because the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required resists based on organic polymers (e.g. coating, air stability). We will start by synthesizing new molecules at both SUNY New Paltz and CNSE. Simultaneously, we will purchase all the commercially available mononuclear compounds described in Section 3B. These commercially available compounds will “prime the pump” and allow us to quickly start evaluating the capabilities of EUV resists based on organometallic/inorganic compounds (Figure 3).

318. As further exemplary evidence of SUNY RF’s invention and Inpria’s knowledge thereof, the invention disclosure report RN2-11-27.2 concerning Tin and Bismuth Compounds discloses various inventions related to precursor solutions containing Tin-12 oxoclusters,

including mechanisms causing solubility changes during exposure including anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework. As one example, it expressly discloses synthesis of novel Tin-12 oxoclusters with various alkyl groups, including phenyl and butyl, or allyl groups using an organic amine, tetrahydrofuran, and water under hydrolysis conditions, including as illustrated below in Figure 70.

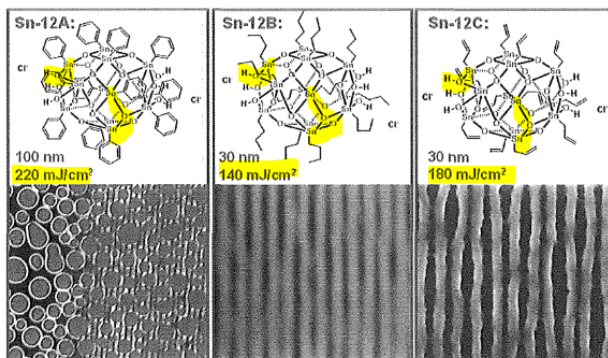
### **Figure 70: RN2-11-27.2 Invention Disclosure Report**



**Synthesis of Novel Sn-12 Clusters.** Initially, we modified two literature procedures for preparing the Sn-12 clusters with variation in alkyl groups. Our first approach was to hydrolyze phenyltin trichloride to get phenylstannic acid and to then dehydrate to the Sn-12 cluster. Unfortunately, this procedure only yielded an insoluble white precipitate. From our prior work with these clusters, we knew that this insoluble precipitate could not be our target compound. Our next approach involved the slow hydrolysis of phenyltin trichloride with sodium hydroxide, maintaining a pH of 4.<sup>7, 41-43</sup> With this method, again only an insoluble white precipitate was produced. We then modified this synthetic route to involve a less nucleophilic, amine base. Using an organic amine in water and THF, we found the phenyltin-12 cluster (PhSn-12) could be made in excellent yield, along with the analogous Sn-4 cluster (PhSn-4) as indicated by GPC results. Furthermore, by changing the relative base concentration in the reaction, the product formation could be controlled to form one cluster over another (Figure 5).

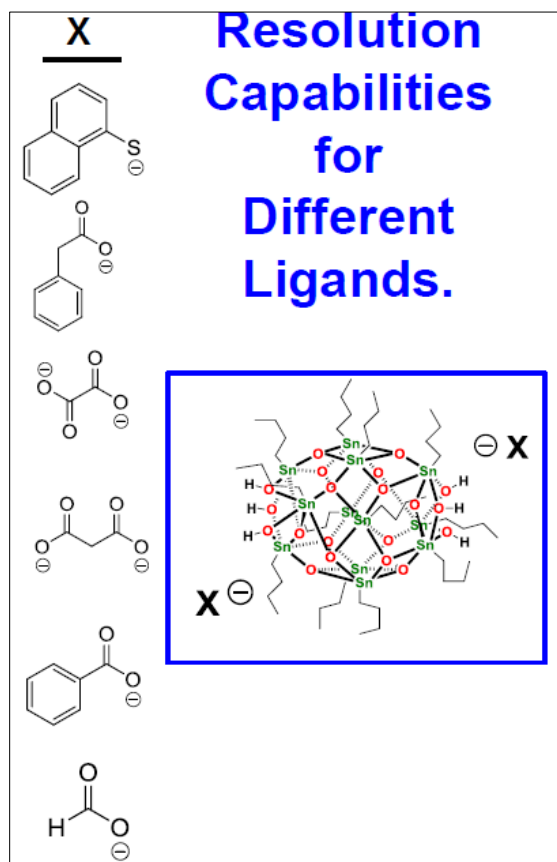
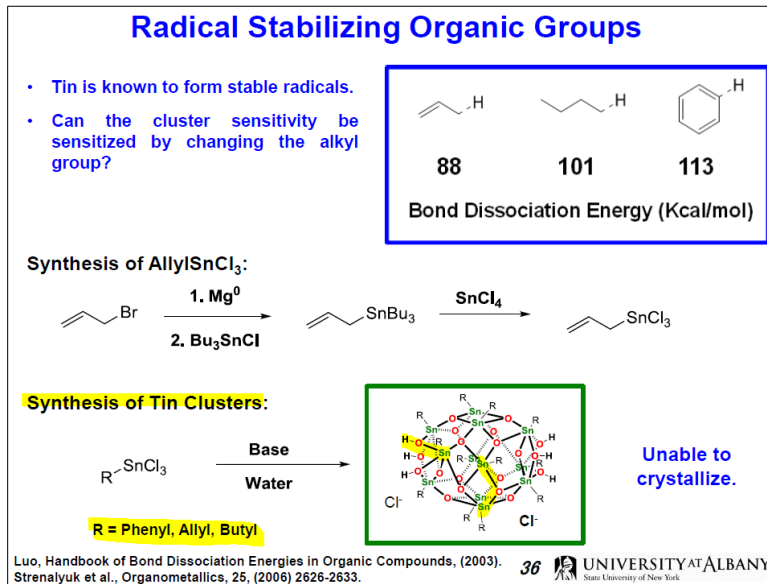
**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.

**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn-12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.



**Figure 10.** Three Sn-12 clusters were made and tested containing phenyl (Sn-12A), butyl(Sn-12B) and allyl(Sn-12C) organic groups. Sn-12A appears to have purity issues, and phase separation is occurring in the film. Sn-12B and Sn-12C were both capable of resolving 30 nm features but further work is required.

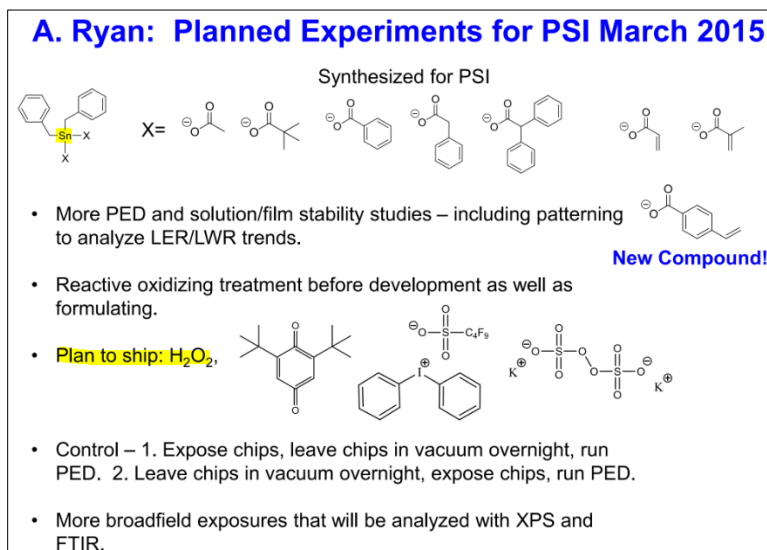
319. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 20, 2013, then-CNSE graduate student Brian Cardineau presented his doctoral thesis titled "Novel Resist Systems for EUV Lithography: LER, Nanoparticle, Chain-Scission and MORE" in "partial fulfillment of the degree of Doctor of Philosophy in Nanoscale Science at the College of Nanoscale Science and Engineering." The thesis was conducted at CNSE under his researcher adviser Dr. Brainard. It discloses synthesizing tin-oxoclusters with R groups phenyl, allyl, butyl, in a base and water, as well as modifying the various ligands to affect EUV resolution, including as illustrated below in Figure 71.

**Figure 71: CNSE MORE Thesis Presentation 5-20-13**

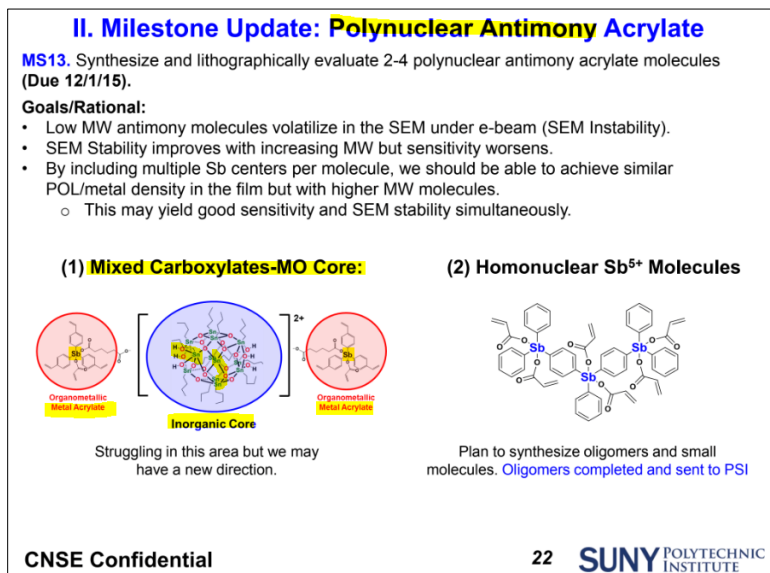
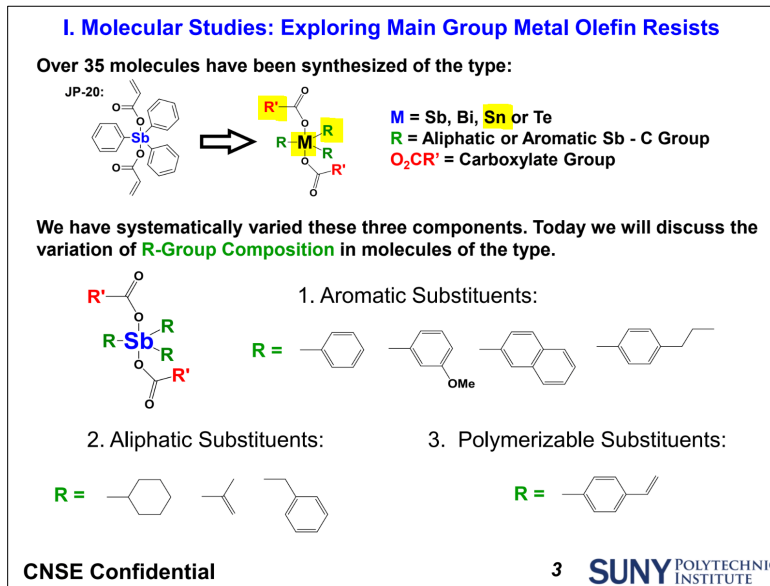
320. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on April 8, 2015, SUNY RF sent a confidential research presentation to Inpria describing

its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by incorporating  $H_2O_2$  (hydrogen peroxide), though patterning to analyze LER/LWR trends and by exposing the chips in vacuum chambers, including as illustrated in Figure 72 below.

**Figure 72: CNSE Report 4-8-2015**



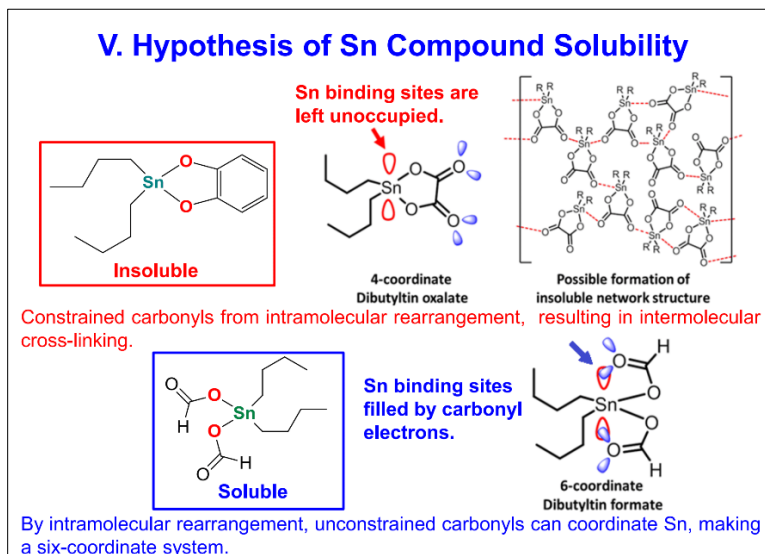
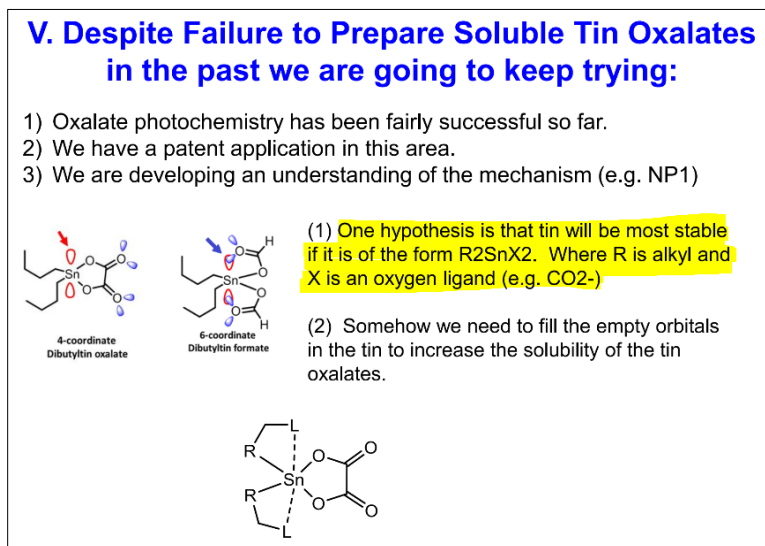
321. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, in May 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{5-n}$ , including both its molecular studies of Tin-based resists with different R and X groups, including those in aliphatic, aromatic Sb – C, and carboxylate groups, and its milestones concerning polynuclear metal-based resists including those that combined Tin-12 with organometallic metal acrylate, including as illustrated in Figure 73 below.

**Figure 73: CNSE Report May 2015**

322. As further exemplary evidence of this invention and Inpria's knowledge thereof, on June 19, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including its discovery that "tin will be most stable if it is of the form  $R_2SnX_2$ " "[w]here R is alkyl and X is an oxygen ligand (e.g., CO<sub>2</sub>-)" and the "need to fill the empty orbitals in the tin to increase the

solubility of the tin oxalates,” including by intramolecular rearrangement” where “unconstrained carbonyls can coordinate Sn, making a six coordinate system,” as illustrated in Figure 74.

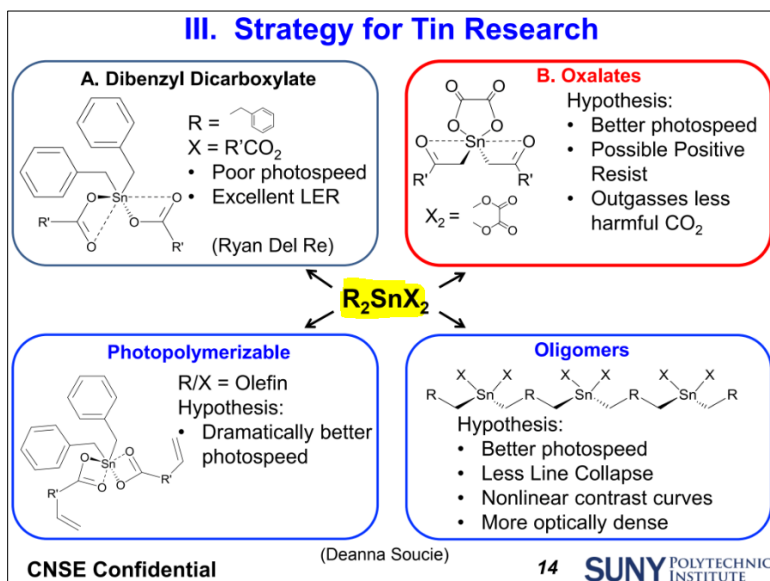
**Figure 74: CNSE Report 6-19-2015**



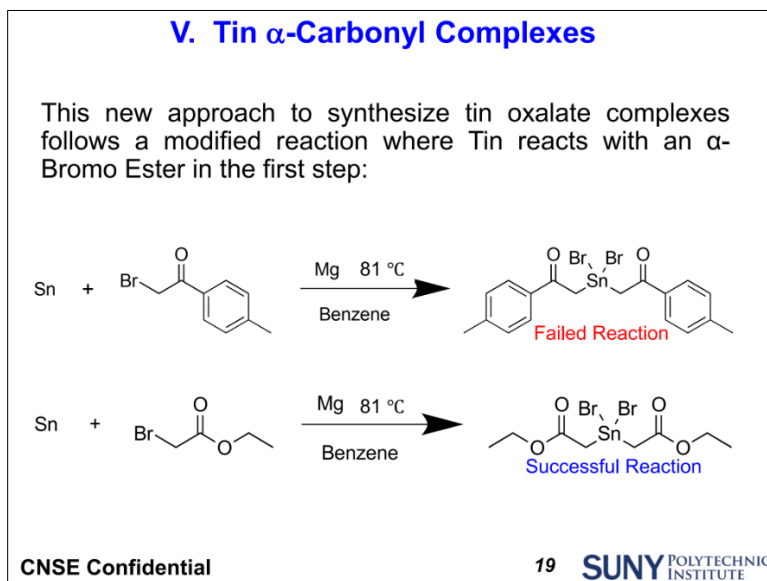
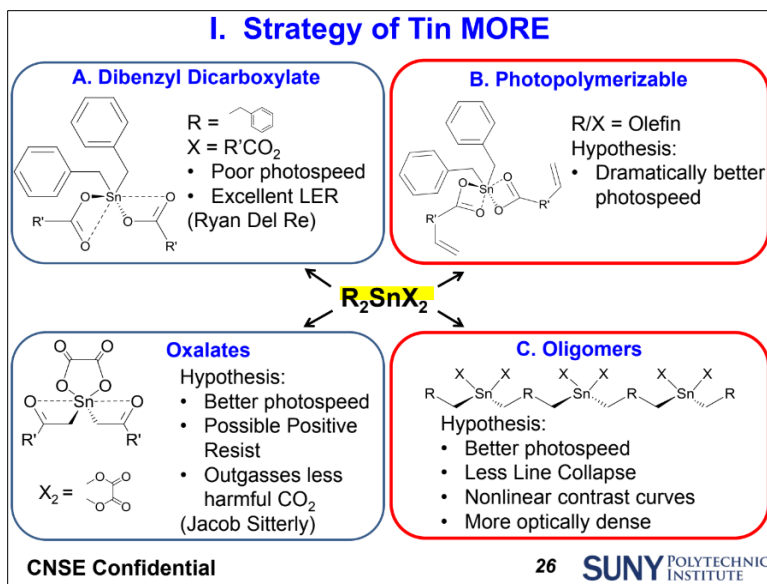
323. As further exemplary evidence of this invention and Inpria’s knowledge thereof, on August 17, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by recounting its past successes synthesizing benzyl tin complexes and outlining its strategy for

further tin research in the form “ $R_2SnX_2$ ” with varying R and X groups, as illustrated below in Figure 75. One such invention was to synthesize tin-based resists by reacting  $\alpha$ -bromo esters with tin metal in combination with magnesium metal, using benzene as a solvent, where the  $\alpha$ -bromo ester could include methyl bromoacetate, tert-butyl bromoacetate, 4-iodophenyl 2-bromoacetate, or the like, including below in Figure 75. Other such inventions were to incorporate iodine into organotin resists in order to increase optical density and improve sensitivity or synthesize a multinuclear tin resist where the R group was a methyl group like  $CH_3$ , as illustrated in Figure 75.

**Figure 75: CNSE Report 8-17-2015**

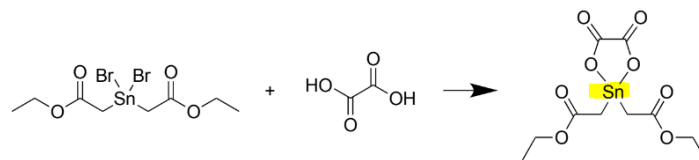




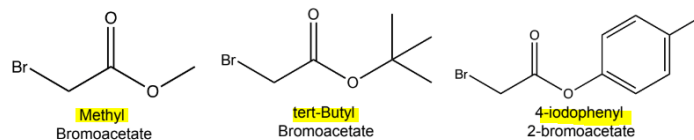


## VI. Future Directions

Step Two of Proposed Tin Oxalate Synthesis:



Synthesis Using Alternative  $\alpha$ -Bromo Esters:

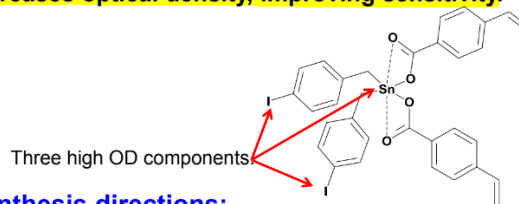


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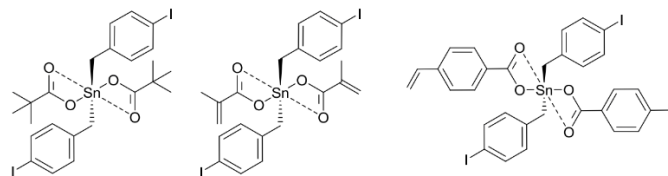
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## III. Iodobenzyl Groups

Incorporating optically dense iodine into our organotin resists increases optical density, improving sensitivity.

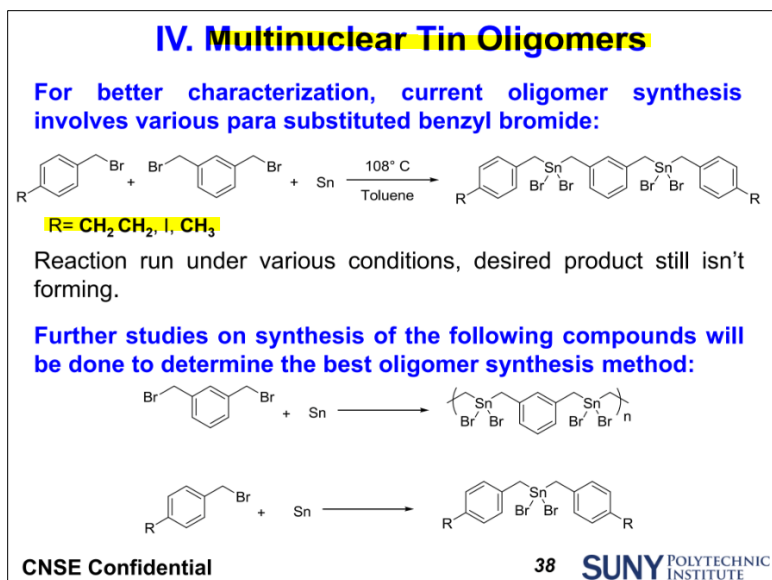


Synthesis directions:

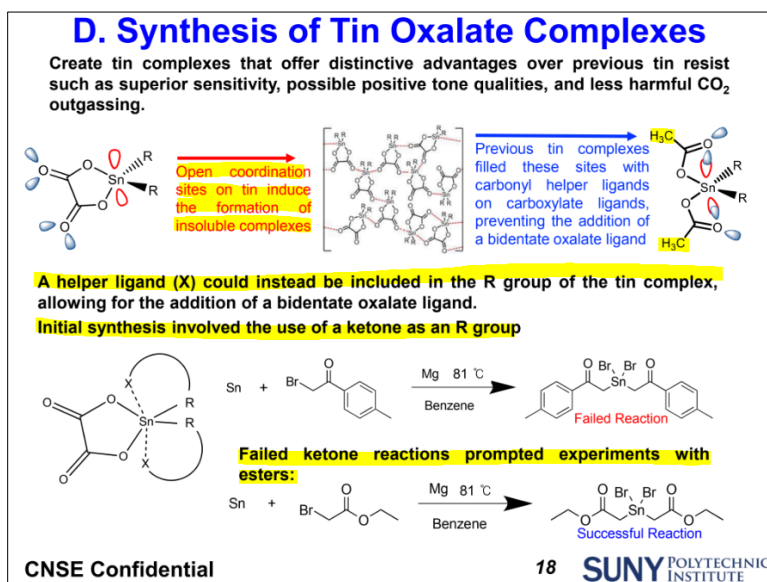
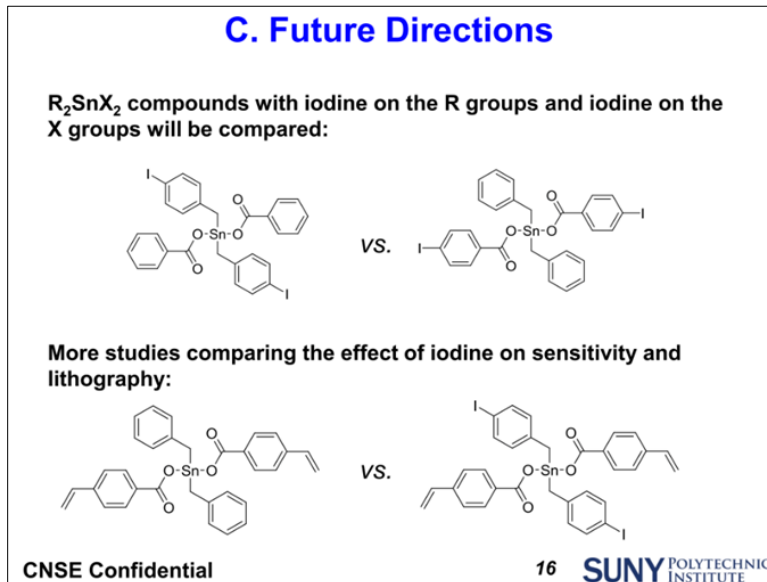


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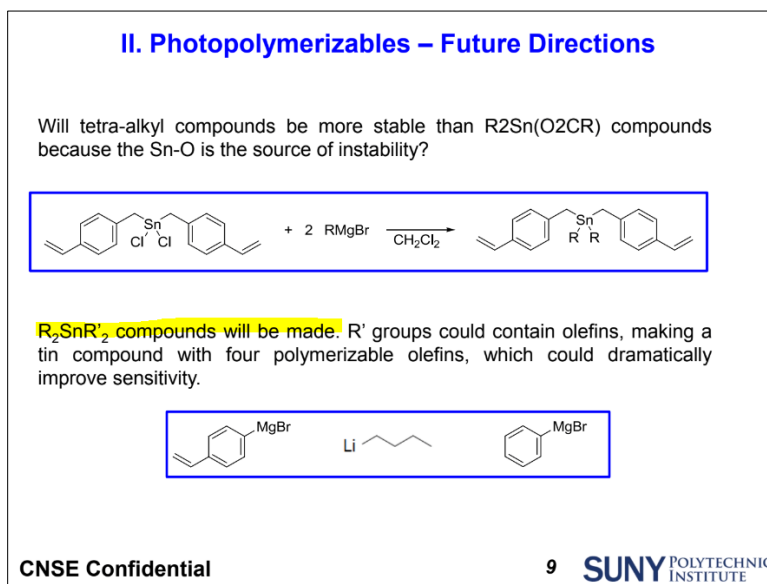
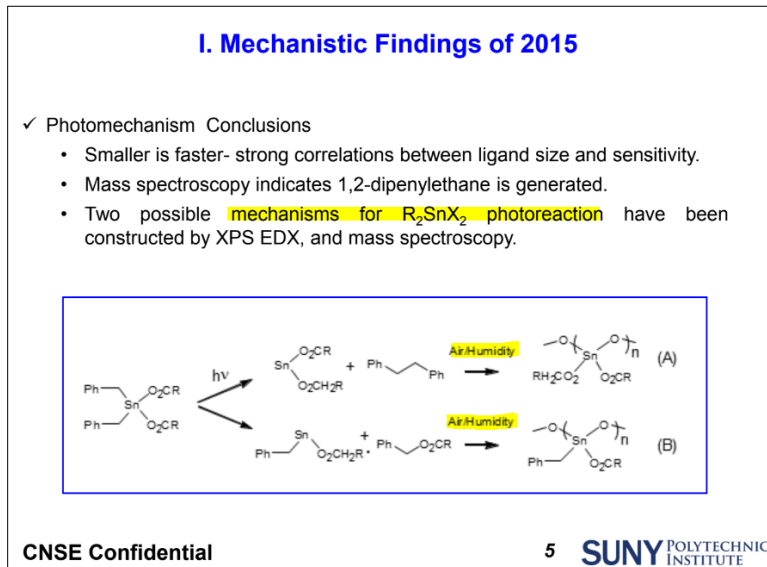
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324. As further exemplary evidence of this invention and Inpria's knowledge thereof, on September 30, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including synthesizing  $R_2SnX_2$  compounds with iodine in the R and/or X groups, and using helper ligands in the form of a ketone or an ester as an R group to increase the solubility of such organotin resists, including as illustrated in Figure 76 below. It also recounted again that one of the attributes that made "MORE an industry leading resist" was that it was capable of "aqueous development."

**Figure 76: CNSE Report 9-30-2015**

325. As further exemplary evidence of this invention and Inpria's knowledge thereof, on December 4, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by summarizing its mechanistic findings in 2015 concerning  $R_2SnX_2$  compounds developed in water vapor and describing further changes in R and R' groups to increase stability and sensitivity of such organotin compositions and resists, including as illustrated in Figure 77.

**Figure 77: CNSE Report 12-4-2015**


326. As further exemplary evidence of this invention and Inpria's knowledge thereof, throughout 2016, SUNY RF sent confidential research presentations to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including those that were synthesized by incorporating water into the resist films and into vacuum chambers, through for example, formulation solvents, hydrates, and hygroscopic polymers, as well as SUNY RF's so-called "Return to Aqueous Development," to research and develop why water

development allowed for superior contrast in MORE resists. SUNY RF also described the use of “smaller R-groups on tin starting material, such as ethyl or methyl,” as depicted below:

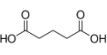
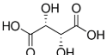
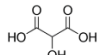
**Figure 78: CNSE Reports 2-26-16, 6-13-16, and 8-25-16**

**III. Current Work + PSI Plans**

**MS1. Reactive Developers.**

 Carboxylic acids	$R_3N$ Amine bases	$R_4NOH$ Ammonium bases	R/O Redox agents
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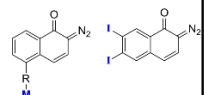
**New carboxylic acids:**

Glutaric 	Tartaric 	Tartronic 
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**MS3. Feasibility Studies: Strategies for producing high-contrast metal-based positive-tone resists.**

**Strategies:**

DNQ with MORE



Will be testing an i-line resist (AZ 5206) in EUV.

**Concern: Lack of water in vacuum.**

**Solution: Incorporate water into resist film via:**

1. Formulation solvents.
2. Hydrates in formulation.
3. Hygroscopic polymers in formulation

**Cobalt(II) nitrate hexahydrate**

- Slightly soluble in PGMEA
- Soluble in PM and water.

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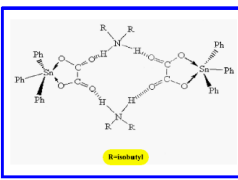
**IIIC. Tin Oxalates: Intern (Lucas)**

**PRO's**

- Synthetically easy and reproducible
- Soluble form of tin oxalates
- Good film quality

**CON's**

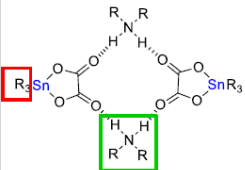
- Only seen negative tone behavior so far (may be able to fix with dev)
- Not yet successful at patterning
- Some film speckling seen in SEM



**R-oxalates?**

### IIIC. Tin Oxalates: Intern (Lucas)

**Pentacoordinate**



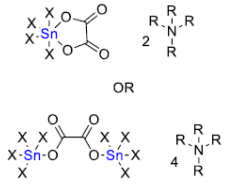
- Soluble in organic solvents.
- EUV sensitive.

- Explore other cations.
- Metal based cations
- $R_3Te^{\oplus}$   $R_2I^{\oplus}$

- Use smaller R groups.
- R = Methyl, Ethyl

**Concept:** Photolysis eliminates the polar oxalate ligand, largely reducing polarity of molecule, which should result in a large change in dissolution.

**Hexacoordinate**



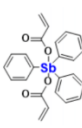
- These have not yet been explored.
- Paper: Explores the effects of the size of the cation on the structure of the molecule.

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### IV. Return to Aqueous Development – Why H<sub>2</sub>O?

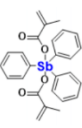
- What is it about H<sub>2</sub>O development that allows for superior contrast?
- JP-30 will not develop in H<sub>2</sub>O unlike JP-20 & JP-21
  - Why is JP-30 not soluble in water?
  - Can we change ligands to improve solubility?
  - Will a developer such as 1:1 IPA:H<sub>2</sub>O improve contrast over Hex or IPA alone?

**JP-20**



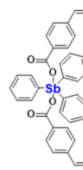
Can develop in H<sub>2</sub>O? **Yes!**

**JP-21**



Can develop in H<sub>2</sub>O? **Yes!**

**JP-30**

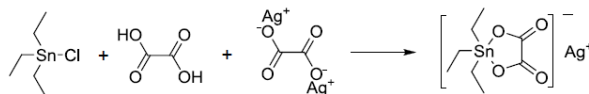


Can develop in H<sub>2</sub>O? **No!**

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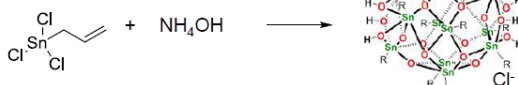
## 2C. Tin Oxo-Oxalate compounds: Further Directions

Using smaller R-groups on tin starting material, such as ethyl or methyl



This can lead to higher optical density of the tin oxalate

Using Allyl R-groups can increase sensitivity of the tin oxo cluster.



Brian C.: "You are barking up a very large tree."

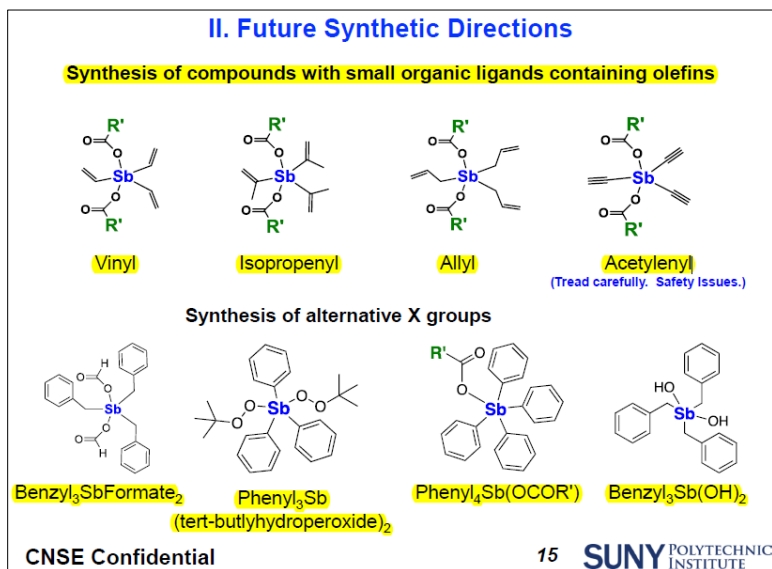
R= Allyl

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327. As further exemplary evidence of this invention and Inpria's knowledge thereof, on August 23, 2017, SUNY RF sent confidential research presentations to Inpria describing its "Future Synthetic Directions" of metal-based carboxylate photoresists, including its synthesis of "compounds with small ligands containing olefins," including various hydrocarbyl and alkyl groups, as depicted below:

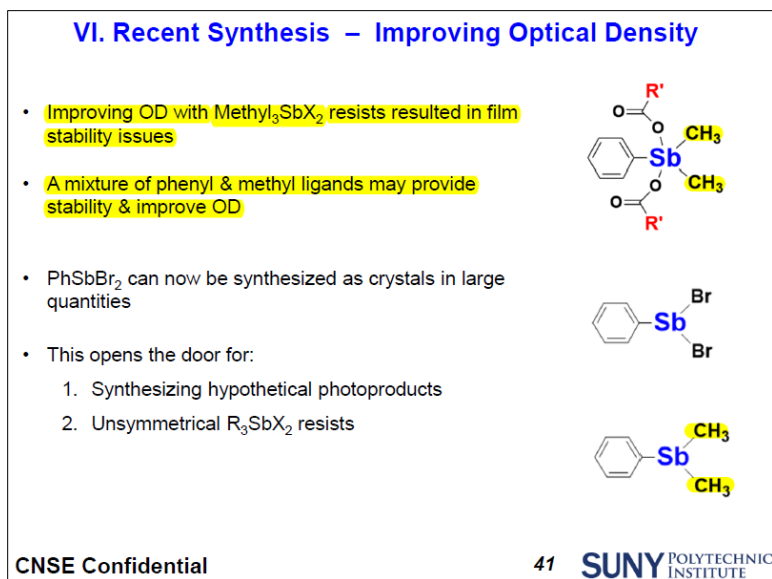
**Figure 79: CNSE Report 8-23-17**





328. As further exemplary evidence of this invention and Inpria's knowledge thereof, on January 17, 2018, SUNY RF sent confidential research presentations to Inpria describing its recent research and synthesis, explaining that optical density and stability of metal-based photoresists could be improved through the use of a mixture of phenyl and methyl ligands, as depicted below:

**Figure 80: CNSE Report 1-17-18**



329. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the '903, '466, and '109 Patents.


330. Specifically, months and years after these inventions and disclosures from SUNY RF, on April 11, 2018, during the course of the Research Agreements, scientists from Inpria and a former CNSE researcher who worked on the MORE project—Joseph Edson, Thomas Lamkin, William Earley, and Truman Wambach (the “purported '903 inventors”)—filed U.S. Patent Application No. 15/950,286 (MONOALKYL TIN COMPOUNDS WITH LOW POLYALKYL CONTAMINATION, THEIR COMPOSITIONS AND METHODS) (the “'286 Application,” the application that matured into the '903 Patent). On the same day, Joseph Edson, Thomas Lamkin, William Earley, Truman Wambach, and Jeremy Anderson (the “purported '466 and '109


inventors”) filed U.S. Patent Application No. 15/950,292 (MONOALKYL TIN COMPOUNDS WITH LOW POLYALKYL CONTAMINATION, THEIR COMPOSITIONS AND METHODS) (the “ ’292 Application,” the application that matured into the ’466 Patent). On July 23, 2020, based on knowledge and information gleaned from and disclosures by SUNY RF, the purported ’466 and ’109 inventors filed U.S. Patent Application No. 16/936,861 (MONOALKYL TIN COMPOUNDS WITH LOW POLYALKYL CONTAMINATION, THEIR COMPOSITIONS AND METHODS) (the “ ’861 Application,” which matured into the ’109 Patent).

331. William Earley, who previously worked on the MORE project at SUNY under Dr. Brainard, at that point had joined Inpria, as noted in SUNY RF’s confidential CNSE presentation to Inpria during the Research Agreements, dated January 17, 2018:

**Figure 81: CNSE Presentation 1-17-2018**

### Acknowledgements

<p><b>Project Funding By:</b></p>  <p><b>Inpria:</b>          Andrew Grenville          Stephen Meyers  <b>Brian Cardineau</b>          Jason Stowers  <b>William Earley</b>          Lauren McQuade</p>	<p><b>Group Members:</b></p> <p>Jacob Sitterly          Phil Schuler          Shaheen Hasan</p> <p style="text-align: right;">} <b>MORE Synthesis Team</b></p> <p>Tracy Flynn          Christian Ackerman          Dr. Amrit Narasimhan          Steven Grzeskowiak</p> <p style="text-align: right;">} <b>MORE Characterization Team</b></p> <p><b>Committee Members:</b></p> <p>Dr. Greg Denbeaux      Dr. Dan Freedman          Dr. Scott Tenenbaum      Dr. Mike Hagerman</p>
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**44** 

332. During prosecution, the purported ’903, ’466, and ’109 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re to the invention described in the ’286, ’292, or ’861 Applications, and did not ask that Dr. Brainard, Brian

Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, or Ryan Del Re be named as an inventor.

333. On January 29, 2019, the purported '903 and '466 inventors assigned to Inpria all right, title, and interest in the '286 and '292 Applications, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on January 31, 2019, at Reel/Frames 048210/0777 and 048210/0617.

334. The U.S. Patent and Trademark office issued U.S. Patent No. 11,673,903 on June 13, 2023, U.S. Patent No. 10,787,466 on September 29, 2020, and U.S. Patent No. 10,975,109 on April 13, 2021.

335. Inpria and the purported '903, '466, and '109 inventors did not disclose to SUNY RF the existence of the '286, '292, or '861 Applications, the applications to which they claim priority, any of its subsequent continuation applications, or the '903, '466, or '109 Patents.

336. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '903, '466, and '109 Patents in the United States, as well as foreign counterparts to '903, '466, and '109 Patents around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

**8. *SUNY RF Invented and Owns the '070 Patent***

337. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, and James Passarelli, conceived of and/or reduced to practice one or more of the inventions claimed in the '070 Patent.

338. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '070 Patent.

339. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '070 Patent.

340. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '070 Patent.

341. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '070 Patent.

342. At all relevant times, James Passarelli was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '070 Patent.

343. The '070 Patent concerns “Organotin clusters, solutions of organotin clusters, and application to high resolution patterning.” In particular, the '070 Patent claims a composition comprising molecular clusters represented by the formula  $R_3Sn_3(O_2CR')_{3+x}(L)_{2-x}(OH)_2(\mu_3-O)$  with

$0 \leq x < 2$ , wherein L is a ligand and R is a hydrocarbyl group with 1-31 carbon atoms, and R' is a hydrogen atom or alkyl group with 1-20 carbon atoms. For example:

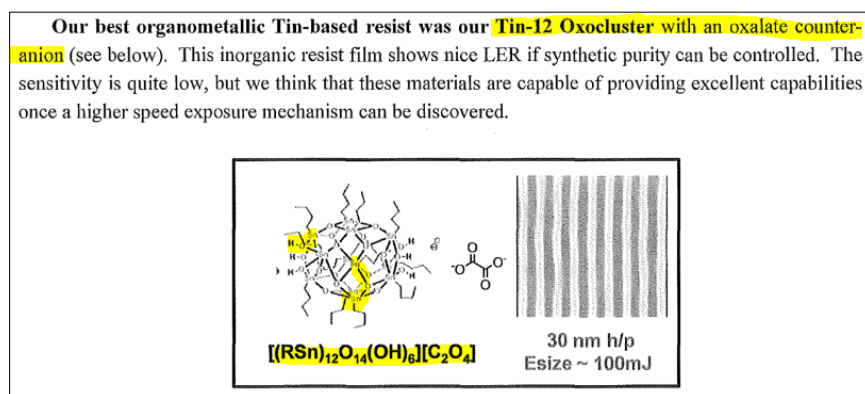
**Figure 82: Exemplary Claims from '070 Patent**

1. A composition comprising molecular clusters represented by the formula  $R_3Sn_3(O_2CR')_{3+x}(L)_{2-x}(OH)_2(\mu_3-O)$  with  $0 \leq x < 2$ ; L is a ligand with the formula  $OR_a$  or  $SR_a$ , where  $R_a$  is H or an organo group with 1 to 20 carbon atoms; R=hydrocarbyl group with 1 to 31 carbon atoms; R'=H or alkyl with 1 to 20 carbon atoms.
2. The composition of claim 1 wherein the composition is crystalline.
3. The composition of claim 2 wherein  $x=0$ .
4. The composition of claim 1 wherein R comprises a branched alkyl group.
5. The composition of claim 1 wherein R is a methyl, ethyl, i-propyl, n-butyl, s-butyl or t-butyl group, t-amyl, neopentyl or combination thereof.

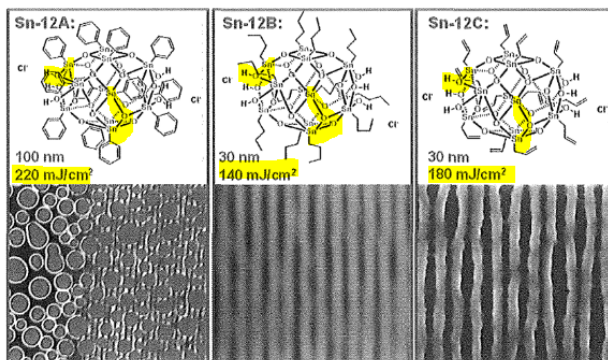
344. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, and James Passarelli, conceived of and/or reduced to practice one or more of the inventions claimed in the '070—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metal Resists,” “RN2-11-27.2: Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metals,” “RN2-11-27.4: Molecular Organometallic Resists for EUV (MORE): Tin, Bismuth, Tellurium and Antimony Resists,”—all of which are signed by each inventor, accompanied by the signature of a witness, and include documented conception dates of no later than “June 28, 2011.”

345. For example, the invention disclosure report RN2-11-27.2 concerning Tin and Bismuth Compounds discloses an invention “to use organo-tin and organo-bismuth compounds or polymers as resists for use in Extreme Ultraviolet Lithography.” It expressly discloses “Sn-12 clusters,” which “are oxoclusters containing twelve tin atoms found to undergo EUV photochemistry in our preliminary trials,” which have been investigated “through anionic ligand exchange and containing butyl, phenyl, and allyl organometallic groups.” As is explained in the ’684, ’179, and ’554 Patent specifications, butyl and phenyl are alkyl group ligands, whereas allyl is an alkenyl group ligand. RN2-11-27.2 also expressly discloses that “Our best organometallic Tin-based resist was our Tin-12 Oxocluster with an oxalate counter-anion” containing Sn-O-H linkages and Sn-O-Sn linkages, as illustrated in Figure 83 (below). It expressly explained that the “Sn-12 cluster has a ‘football-shaped’ cage structure, containing 12 tin atoms,” where “[e]ach tin has one bond to carbon and four or five bonds to oxygen” and “[a]t each side of the structure are three hydroxyl groups,” and “each cluster has a +2 net charge which is accompanied by two anionic ligands. RN2-11-27.2 also expressly disclosed Dr. Brainard’s work making and testing such Tin-12 oxoclusters containing various alkyl and alkenyl group ligands, as illustrated in Figure 83.

**Figure 83: RN2-11-27.2 Invention Disclosure Report**



**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn-12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.




**Figure 10.** Three Sn-12 clusters were made and tested containing phenyl (Sn-12A), butyl(Sn-12B) and allyl(Sn-12C) organic groups. Sn-12A appears to have purity issues, and phase separation is occurring in the film. Sn-12B and Sn-12C were both capable of resolving 30 nm features but further work is required.

346. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 1, 2012, Dr. Brainard made a confidential presentation to SEMATECH members, including Inpria, describing his objective to "[i]nvent revolutionary new photoresists based on Molecular Organometallic Resists for EUV (MORE)." This presentation explained that his MORE program was focused on five classes of compounds, including "Mono-Nuclear Organometallic or Inorganic Compounds," "Transition Metal Oxide/Oxo-Carboxylate Clusters," and "Tin Oxoclusters" among others. It explained that his MORE program was focused "on elements with high EUV OD's and high mass densities," including "In" (indium), "Sn" (tin), and "Sb" (antimony) among others. And as illustrated in Figure 84 below, it also explained why Dr. Brainard's MORE compounds were superior to the hafnium resists on which Inpria was then focusing its research and development. Dr. Brainard made additional such confidential MORE presentations to SEMATECH members, including Inpria, including on June 14, 2013.

**Figure 84: CNSE MORE SEMATECH PRESENTATION 5-1-12**

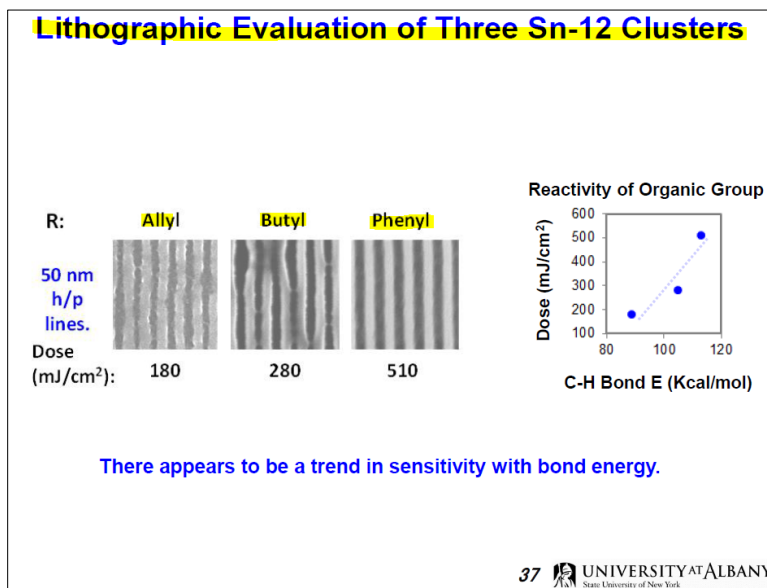
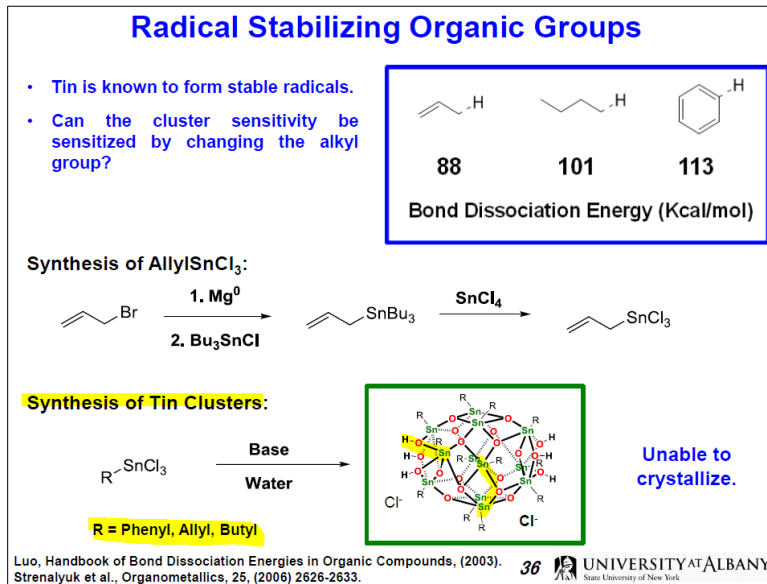
**Why MORE Resists will work better than HfNp Resists**

- (1) **Size.** The molecules proposed here will be 3-6 times smaller in diameter than Hf Np's, and yield better LER and resolution.
- (2) **Control over Photoreactivity.** The proposed photochemical reaction of the Inpria resist is thermodynamically unfavorable, leading to poor sensitivity. We will be able to tune the reactivity of our MORE resists.
- (3) **Dispersions vs. Solutions.** Our molecular solutions will be more stable than Np Dispersions.
- (4) **Particle Defects.** We propose that resists based on inherently soluble molecules will create fewer defects.
- (5) **Tunable Properties.** Our synthesis of molecular compounds → excellent control over molecular structure, kinetics and thermodynamics.

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347. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 20, 2013, then-CNSE graduate student Brian Cardineau presented his doctoral thesis titled "Novel Resist Systems for EUV Lithography: LER, Nanoparticle, Chain-Scission and MORE" in "partial fulfillment of the degree of Doctor of Philosophy in Nanoscale Science at the College of Nanoscale Science and Engineering." The thesis was conducted at CNSE under his researcher adviser Dr. Brainard. Inpria had access to and, on information and belief, obtained this doctoral thesis presentation. In explaining "MORE Benefits," the thesis presentation explained, "[w]e have proposed a new platform of resist consisting of high optical density metal oxide organometallic compounds," which potential benefits included "High EUV OD," "High Mass Density," "No Acid Diffusion," "Excellent Etch Rates," and "High Uncatalyzed Reactivity." It also included results of SUNY RF's synthesis of Tin-12 oxoclusters with phenyl, allyl, and butyl ligands, as illustrated in Figure 85.

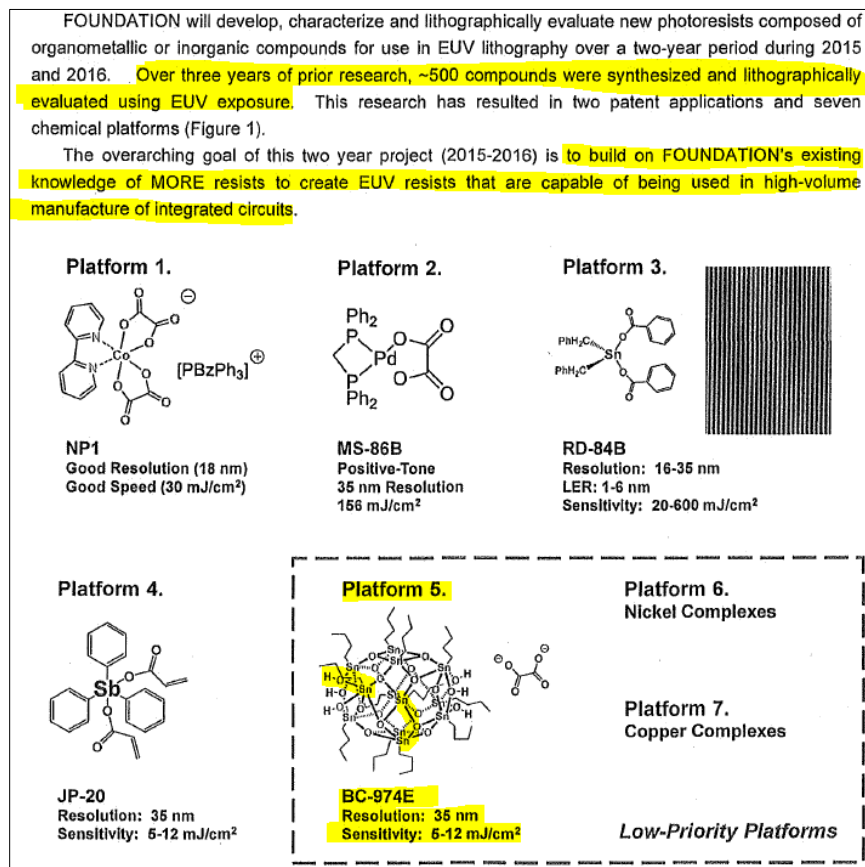


**Figure 85: CNSE MORE THESIS PRESENTATION 5-20-13**

348. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, SUNY RF also recounted these SUNY RF inventions in the Scope of Work (Exhibit A) "Molecular Organometallic Resists for EUV (MORE)" attached to the 2015 Research Agreement. This Scope of Work explained that "[o]ver three years of prior research, ~500 compounds were synthesized and lithographically evaluated using EUV exposure," including "Platform 5" "BC-9743," or Tin-12. The Scope of Work further explained that these "Tin-Oxo Cluster" resists were

developed “during the first year of prior research,” and that Dr. Brainard and his team has completed their evaluation of them no later than May 2013, as illustrated in Figure 86 below.

**Figure 86: Exhibit A to 2015 Research Agreement**



**(5) Tin-Oxo Clusters (Past work).**

- These resists were developed during the first year of prior research. Additional development of this platform will not be considered in the first year of this project. FOUNDATION includes it here for completeness.
- BC-974E is one representative of this platform, [(BuSn)<sub>12</sub>O<sub>14</sub>(OH)<sub>6</sub>][Ox], which has a resolution of 50 nm and E<sub>size</sub> of 440 mJ/cm<sup>2</sup>.
- These resists show an improvement in sensitivity when the anions are smaller (similar to Platform 3). They also show improvements in sensitivity when the Sn-carbon bonds are weaker.
- Although never measured, FOUNDATION thinks that these compounds will have excellent EUV absorption and excellent etch resistance.
- FOUNDATION has not worked on these materials since May 2013, but FOUNDATION may use the tin-oxo clusters in combination with Platforms 1, 3 and 4, to provide improved EUV absorption and improved etch resistance.

349. As further non-limiting examples, SUNY RF also recounted these SUNY RF inventions to Inpria on April 8, 2015 and June 19, 2015 in confidential research reports disclosed

pursuant to the terms of the Research Agreements, and in the Scope of Work (Exhibit A) attached to the Parties' 2017 Research Agreement.

350. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the '070 Patent.

351. Specifically, months and years after these inventions and disclosures, on November 20, 2017, during the course of the Research Agreements, scientists from Inpria and a former CNSE graduate student and former CNSE researcher—Brian Cardineau, Stephen Meyers, Kai Jiang, Jeremy Anderson, and William Earley (the “purported '070 inventors”)—filed U.S. Provisional Patent Application No. 62/588,546 (ORGANOMETALIC METAL CLUSTERS AND APPLICATON TO HIGH RESOLUTION PATTERNING) (the “ '546 Application”). On November 19, 2018, the purported '070 inventors filed U.S. Patent Application No. 16/194,491 (the “ '491 Application,” which matured into the '070 Patent).

352. Brian Cardineau and William Earley, who previously worked on the MORE project at SUNY under Dr. Brainard, at that point had joined Inpria.

353. During prosecution, the purported '070 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Dan Freedman, Miles Marnell, or James Passarelli to the invention described in the '491 Application or its continuation applications, and did not ask that Dr. Brainard, Dan Freedman, Miles Marnell, or James Passarelli be named as an inventor.

354. In January 2019, the purported '070 inventors assigned to Inpria all right, title, and interest in the '491 Application, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on January 31, 2019, at Reel/Frame 048210/0750.

355. The U.S. Patent and Trademark office issued U.S. Patent No. 11,098,070 on August 24, 2021.

356. Inpria and the purported '070 inventors did not disclose to SUNY RF the existence of the '491 Application, any of its subsequent continuation applications, or the '070 Patent.

357. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '070 Patent in the United States, as well as foreign counterparts to the '070 Patent around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, or James Passarelli contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

***9. SUNY RF Invented and Owns the '028 Patent***

358. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '028 Patent.

359. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '028 Patent.

360. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '028 Patent.

361. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and

ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '028 Patent.

362. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '028 Patent.

363. At all relevant times, James Passarelli was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '028 Patent.

364. At all relevant times, Michael Murphy was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '028 Patent.

365. At all relevant times, Ryan Del Re was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '028 Patent.

366. The '028 Patent concerns alkyl tin clusters suitable for formation of radiation patternable coatings; the invention further relates to alkyl ligands with tin atoms incorporated into the ligands. Specifically, the '028 Patent claims a tin compound represented by the formula  $(RCC)_3SnQ$ , wherein R is a hydrocarbyl group with 1-15 carbon atoms, Q is an alkyltin group with three independently alkyl groups and a total of 4-15 carbon atoms. For example:

**Figure 87: Exemplary Claim from '028 Patent**

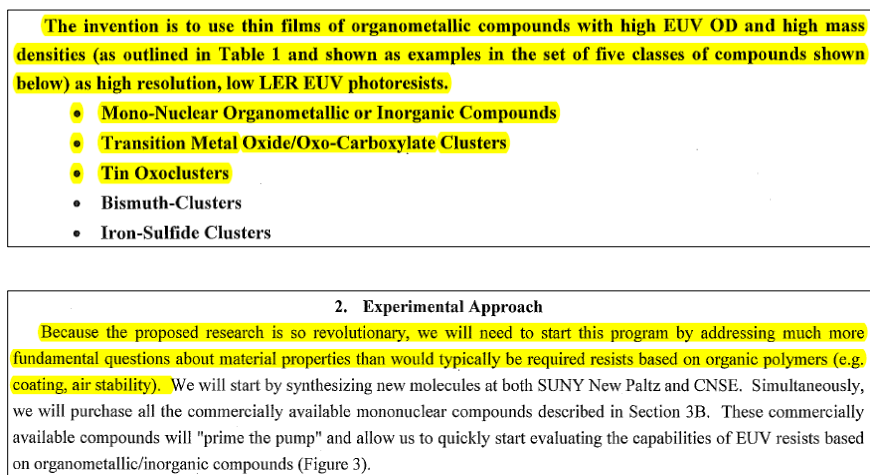
1. A composition comprising a tin compound represented by the formula  $(RCC)_3SnQ$ , wherein R is a hydrocarbyl group with 1 to 15 carbon atoms and wherein Q is an alkyltin group with a structure  $-(CH_2)_nSn(R_1R_2R_3)$  wherein n=1 to 4 and R<sub>1</sub>, R<sub>2</sub>, and R<sub>3</sub> are independently alkyl groups with 1 to 5 carbon atoms, with the proviso that Q has 4 to 15 total carbon atoms.

367. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '028 Patent—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP and in CNSE disclosures and reports under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE),” “RN2-11-27.2: Molecular Organometallic Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metals,” “RN2-11-27.5: Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists.” Such SUNY RF inventions were also recounted in numerous CNSE reports provided to Inpria during the 2015 and 2017 Research Projects.

368. For example, the invention disclosure report RN2-11-27 Molecular Organometallic Resists for EUV (MORE) discloses an invention “to use thin films of organometallic compounds with high EUV OD and high mass densities” “as high resolution, low LER EUV photoresists,” including “Mono-Nuclear Organometallic or Inorganic Compounds,” “Transition Metal Oxide/Oxo-Carboxylate Clusters,” and “Tin Oxoclusters.” RN2-11-27 explains that “[b]ecause the

proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required [for] resists based on organic polymers.”

**Figure 88: RN2-11-27 Invention Disclosure Report**

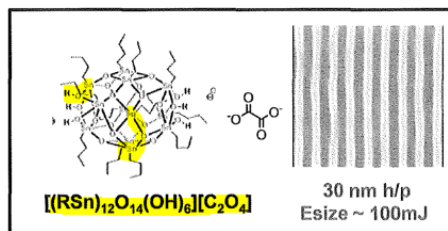


369. As further exemplary evidence of SUNY RF’s invention and Inpria’s knowledge thereof, the invention disclosure report RN2-11-27.2 concerning Tin and Bismuth Compounds discloses various inventions related to precursor solutions containing Tin-12 oxoclusters, including mechanisms causing solubility changes during exposure including anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework. As one example, it expressly discloses synthesis of novel Tin-12 oxoclusters with various alkyl groups, including phenyl and butyl, or allyl groups using an organic amine, tetrahydrofuran, and water under hydrolysis conditions, including as illustrated below in Figure 89.



### Figure 89: RN2-11-27.2 Invention Disclosure Report

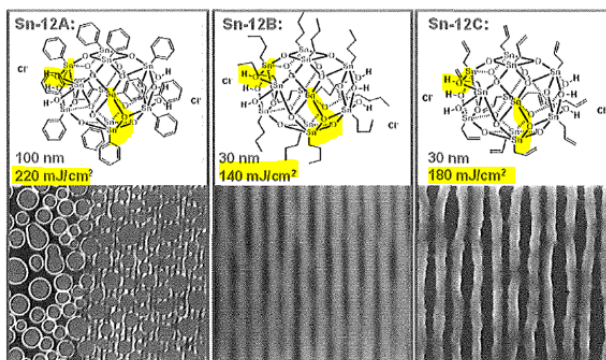
Our best organometallic Tin-based resist was our **Tin-12 Oxocluster** with an oxalate counter-anion (see below). This inorganic resist film shows nice LER if synthetic purity can be controlled. The sensitivity is quite low, but we think that these materials are capable of providing excellent capabilities once a higher speed exposure mechanism can be discovered.



**Synthesis of Novel Sn-12 Clusters.** Initially, we modified two literature procedures for preparing the Sn-12 clusters with variation in alkyl groups. Our first approach was to hydrolyze phenyltin trichloride to get phenylstannic acid and to then dehydrate to the Sn-12 cluster. Unfortunately, this procedure only yielded an insoluble white precipitate. From our prior work with these clusters, we knew that this insoluble precipitate could not be our target compound. Our next approach involved the slow hydrolysis of phenyltin trichloride with sodium hydroxide, maintaining a pH of 4.<sup>7, 41-43</sup> With this method, again only an insoluble white precipitate was produced. We then modified this synthetic route to involve a less nucleophilic, amine base. Using an organic amine in water and THF, we found the phenyltin-12 cluster (PhSn-12) could be made in excellent yield, along with the analogous Sn-4 cluster (PhSn-4) as indicated by GPC results. Furthermore, by changing the relative base concentration in the reaction, the product formation could be controlled to form one cluster over another (Figure 5).

**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.

**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.



**Figure 10.** Three Sn-12 clusters were made and tested containing phenyl (Sn-12A), butyl(Sn-12B) and allyl(Sn-12C) organic groups. Sn-12A appears to have purity issues, and phase separation is occurring in the film. Sn-12B and Sn-12C were both capable of resolving 30 nm features but further work is required.




370. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 1, 2012, Dr. Brainard made a confidential presentation to SEMATECH members, including Inpria, describing his objective to "[i]nvent revolutionary new photoresists based on Molecular Organometallic Resists for EUV (MORE)." This presentation explained that his MORE program was focused on five classes of compounds, including "Mono-Nuclear Organometallic or Inorganic Compounds," "Transition Metal Oxide/Oxo-Carboxylate Clusters," and "Tin Oxoclusters" among others. It explained that his MORE program was focused "on elements with high EUV OD's and high mass densities," including "In" (indium), "Sn" (tin), and "Sb" (antimony) among others. And as illustrated in Figure 90 below, it also explained why Dr. Brainard's MORE compounds were superior to the hafnium resists on which Inpria was then focusing its research and development. Dr. Brainard made additional such confidential MORE presentations to SEMATECH members, including Inpria, including on June 14, 2013.

**Figure 90: CNSE MORE SEMATECH PRESENTATION 5-1-12**

**Why MORE Resists will work better than HfNp Resists**

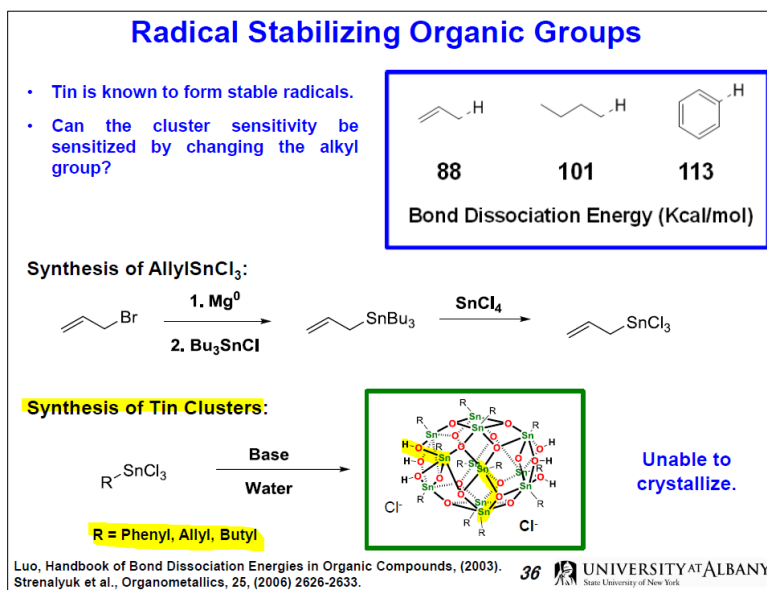
- (1) **Size.** The molecules proposed here will be 3-6 times smaller in diameter than Hf Np's, and yield better LER and resolution.
- (2) **Control over Photoreactivity.** The proposed photochemical reaction of the Inpria resist is thermodynamically unfavorable, leading to poor sensitivity. We will be able to tune the reactivity of our MORE resists.
- (3) **Dispersions vs. Solutions.** Our molecular solutions will be more stable than Np Dispersions.
- (4) **Particle Defects.** We propose that resists based on inherently soluble molecules will create fewer defects.
- (5) **Tunable Properties.** Our synthesis of molecular compounds → excellent control over molecular structure, kinetics and thermodynamics.

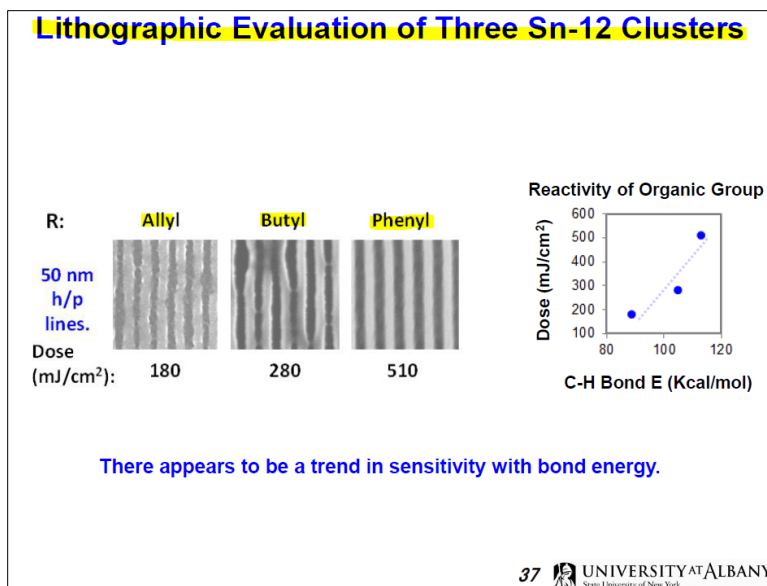
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State University of New York

371. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 20, 2013, then-CNSE graduate student Brian Cardineau presented his doctoral

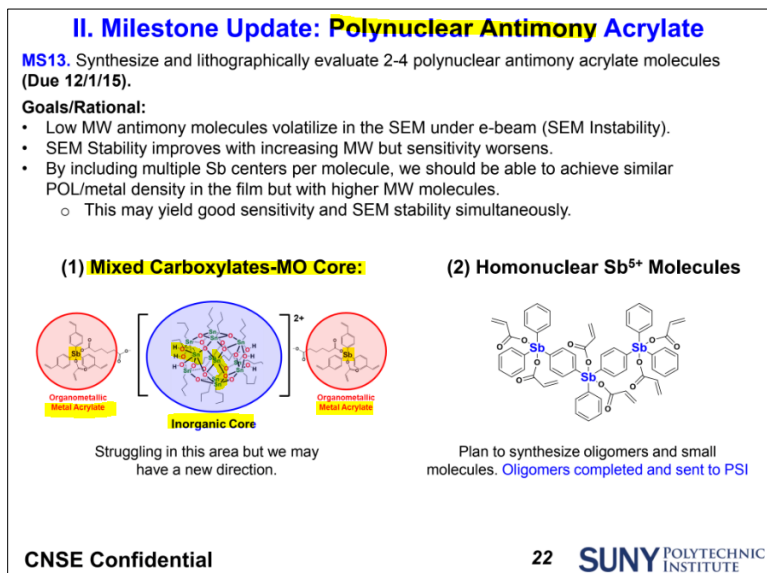
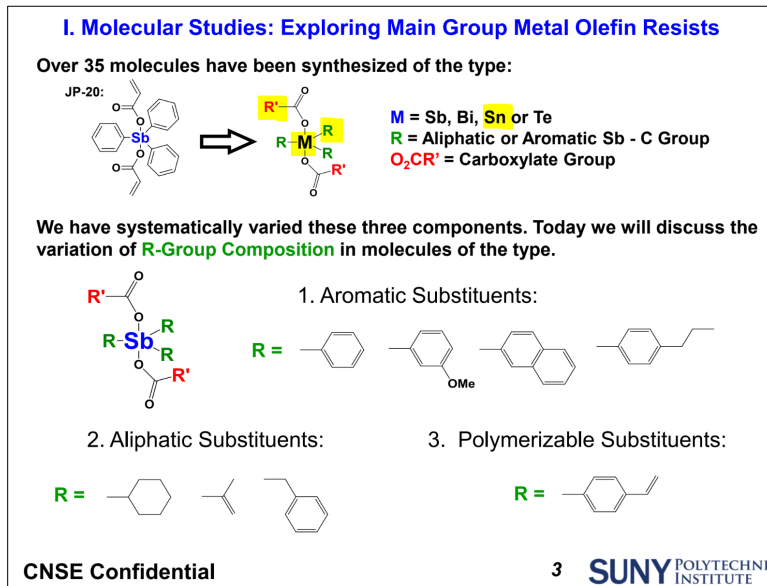
thesis titled “Novel Resist Systems for EUV Lithography: LER, Nanoparticle, Chain-Scission and MORE” in “partial fulfillment of the degree of Doctor of Philosophy in Nanoscale Science at the College of Nanoscale Science and Engineering.” The thesis was conducted at CNSE under his researcher adviser Dr. Brainard. Inpria had access to and, on information and belief, obtained this doctoral thesis presentation. In explaining “MORE Benefits,” the thesis presentation explained, “[w]e have proposed a new platform of resist consisting of high optical density metal oxide organometallic compounds,” which potential benefits included “High EUV OD,” “High Mass Density,” “No Acid Diffusion,” “Excellent Etch Rates,” and “High Uncatalyzed Reactivity.” It also included results of SUNY RF’s synthesis of Tin-12 oxoclusters with phenyl, allyl, and butyl ligands, as illustrated in Figure 91.

**Figure 91: CNSE MORE THESIS PRESENTATION 5-20-13**





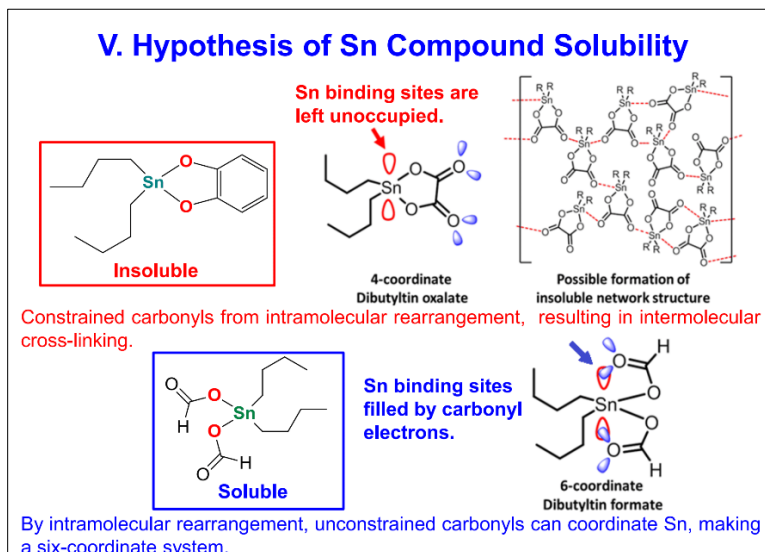
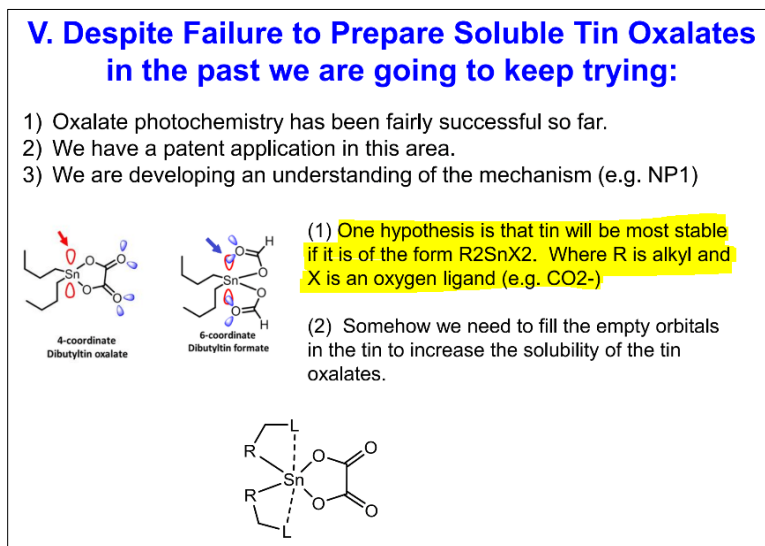
372. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, in May 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{5-n}$ , including both its molecular studies of Tin-based resists with different R and X groups, including those in aliphatic, aromatic Sb – C, and carboxylate groups, and its milestones concerning polynuclear metal-based resists including those that combined Tin-12 with organometallic metal acrylate, including as illustrated in Figure 92 below.

**Figure 92: CNSE Report May 2015**

373. As further exemplary evidence of this invention and Inpria's knowledge thereof, on June 19, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including its discovery that "tin will be most stable if it is of the form  $R_2SnX_2$ " "[w]here R is alkyl and X is an oxygen ligand (e.g.,  $CO_2$ -)" and the "need to fill the empty orbitals in the tin to increase the

solubility of the tin oxalates,” including by intramolecular rearrangement” where “unconstrained carbonyls can coordinate Sn, making a six coordinate system,” as illustrated in Figure 93.

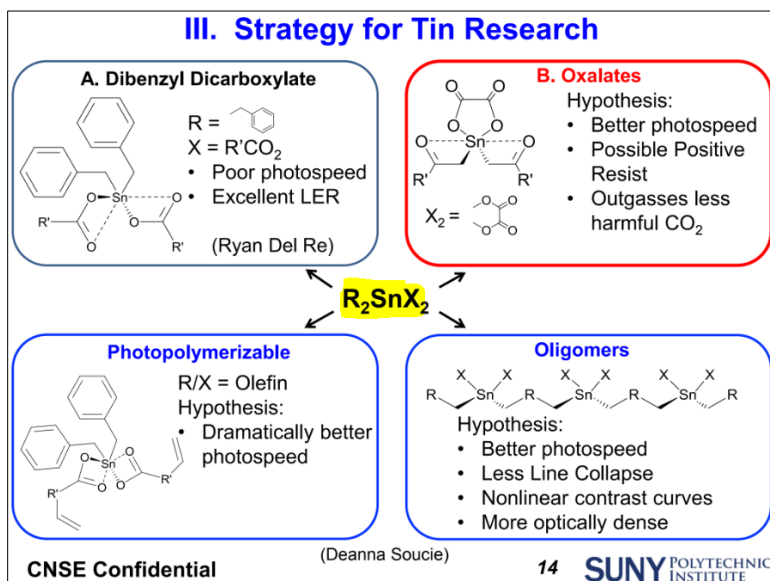
**Figure 93: CNSE Report 6-19-2015**

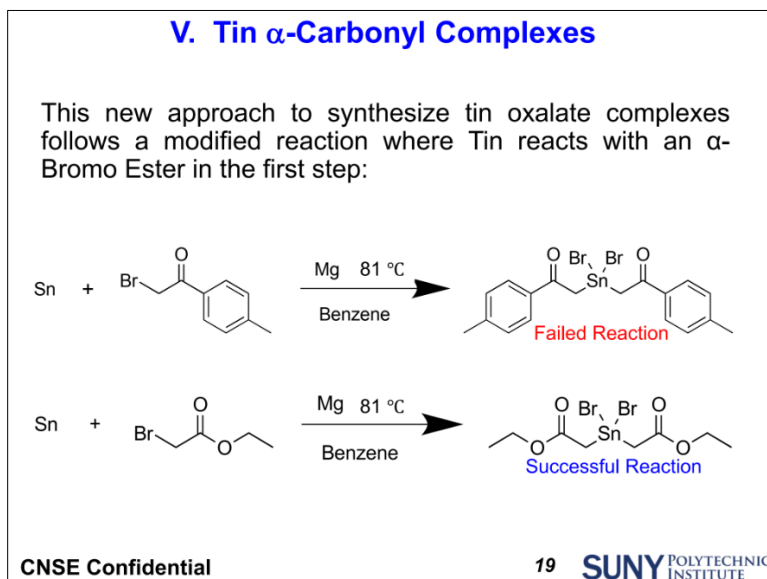
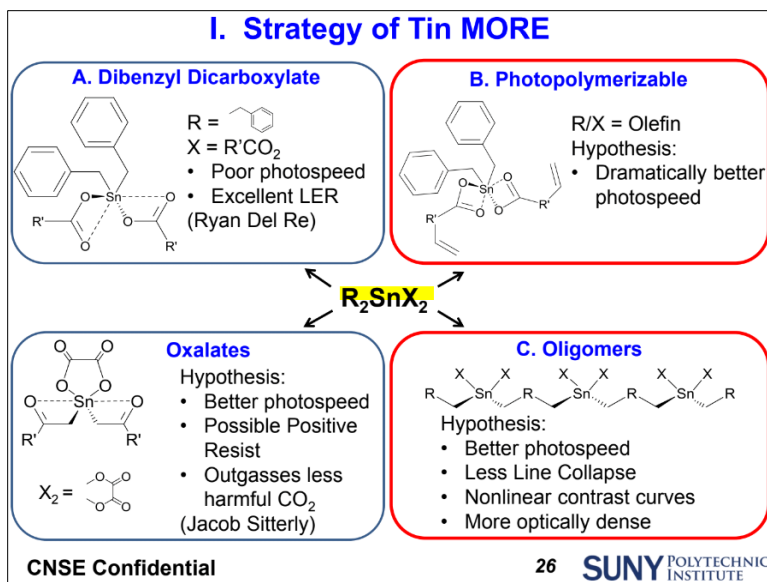


374. As further exemplary evidence of this invention and Inpria’s knowledge thereof, on August 17, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by recounting its past successes synthesizing benzyl tin complexes and outlining its strategy for

further tin research in the form “ $R_2SnX_2$ ” with varying R and X groups, as illustrated below in Figure 94. One such invention was to synthesize tin-based resists by reacting  $\alpha$ -bromo esters with tin metal in combination with magnesium metal, using benzene as a solvent, where the  $\alpha$ -bromo ester could include methyl bromoacetate, tert-butyl bromoacetate, 4-iodophenyl 2-bromoacetate, or the like, including below in Figure 94. Other such inventions were to incorporate iodine into organotin resists in order to increase optical density and improve sensitivity or synthesize a multinuclear tin resist where the R group was a methyl group like  $CH_3$ , as illustrated in Figure 94.

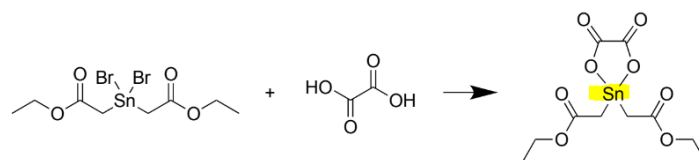
**Figure 94: CNSE Report 8-17-2015**



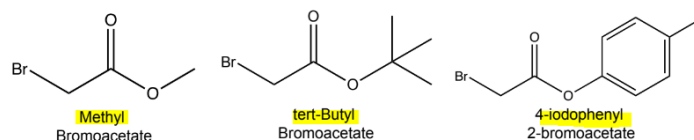


## VI. Future Directions

Step Two of Proposed Tin Oxalate Synthesis:



Synthesis Using Alternative  $\alpha$ -Bromo Esters:

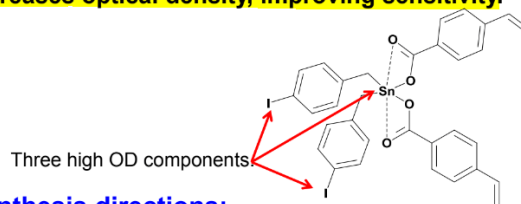


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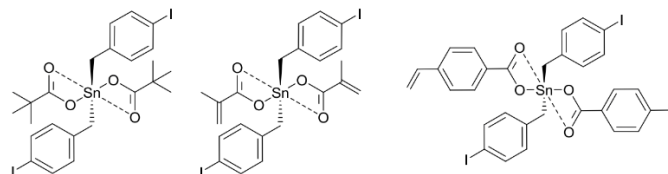
23 SUNY POLYTECHNIC INSTITUTE

## III. Iodobenzyl Groups

Incorporating optically dense iodine into our organotin resists increases optical density, improving sensitivity.



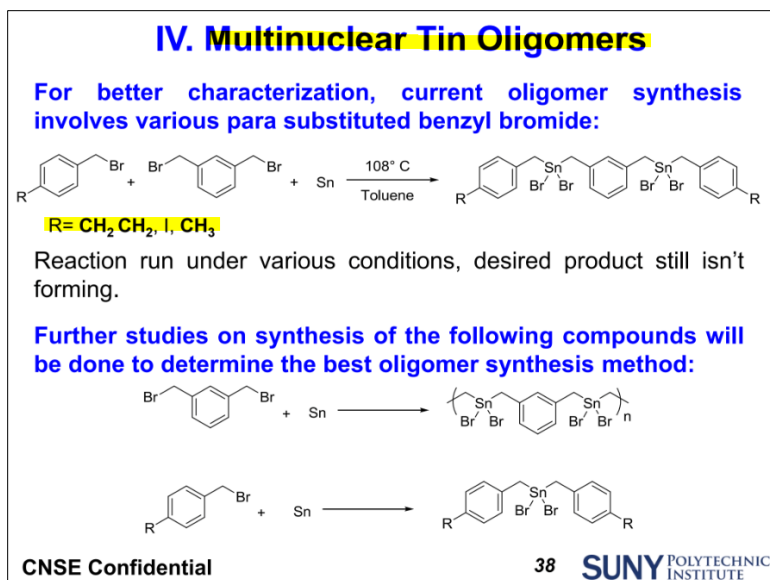
Synthesis directions:



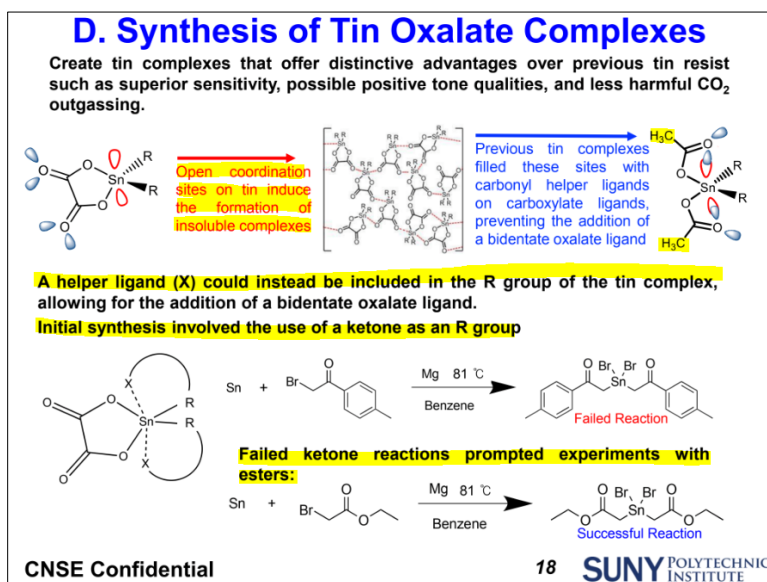
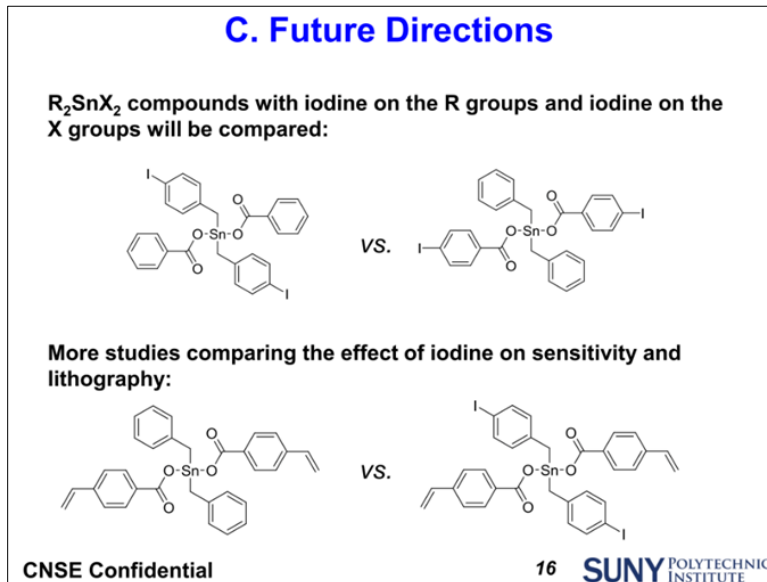
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31 SUNY POLYTECHNIC INSTITUTE

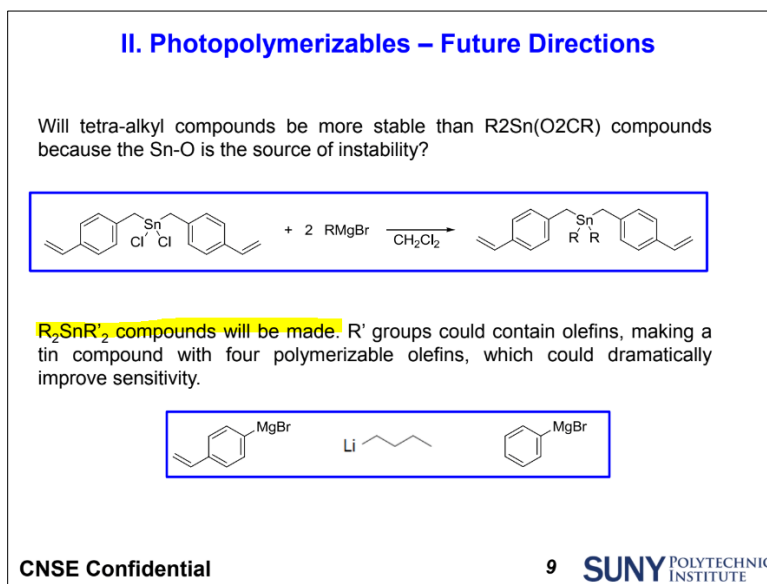
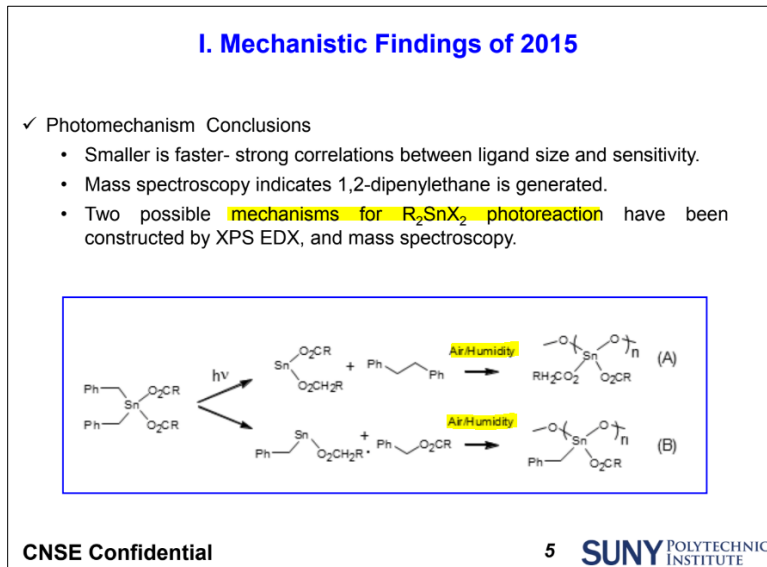




375. As further exemplary evidence of this invention and Inpria's knowledge thereof, on September 30, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including synthesizing  $R_2SnX_2$  compounds with iodine in the R and/or X groups, and using helper ligands in the form of a ketone or an ester as an R group to increase the solubility of such organotin resists, including as illustrated in Figure 95 below. It also recounted again that one of the attributes that made "MORE an industry leading resist" was that it was capable of "aqueous development."

**Figure 95: CNSE Report 9-30-2015**

376. As further exemplary evidence of this invention and Inpria's knowledge thereof, on December 4, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by summarizing its mechanistic findings in 2015 concerning  $R_2SnX_2$  compounds developed in water vapor and describing further changes in R and R' groups to increase stability and sensitivity of such organotin compositions and resists, including as illustrated in Figure 96.

**Figure 96: CNSE Report 12-4-2015**


377. As further exemplary evidence of this invention and Inpria's knowledge thereof, throughout 2016, SUNY RF sent confidential research presentations to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including those that were synthesized by incorporating water into the resist films and into vacuum chambers, through for example, formulation solvents, hydrates, and hygroscopic polymers, as well as SUNY RF's so-called "Return to Aqueous Development," to research and develop why water

development allowed for superior contrast in MORE resists. SUNY RF also described the use of “smaller R-groups on tin starting material, such as ethyl or methyl,” as depicted below:

**Figure 97: CNSE Reports 2-26-16, 6-13-16, and 8-25-16**

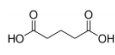
**III. Current Work + PSI Plans**

**MS1. Reactive Developers.**

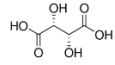
	$R_3N$	$R_4NOH$	R/O
Carboxylic acids	Amine bases	Ammonium bases	Redox agents

**New carboxylic acids:**

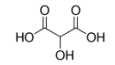
Glutaric



Tartaric



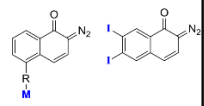
Tartronic



**MS3. Feasibility Studies: Strategies for producing high-contrast metal-based positive-tone resists.**

**Strategies:**

DNQ with MORE



Will be testing an i-line resist (AZ 5206) in EUV.

**Concern: Lack of water in vacuum.**

**Solution: Incorporate water into resist film via:**

1. Formulation solvents.
2. Hydrates in formulation.
3. Hygroscopic polymers in formulation

**Cobalt(II) nitrate hexahydrate**

- Slightly soluble in PGMEA
- Soluble in PM and water.

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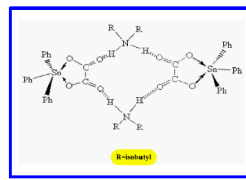
**IIIC. Tin Oxalates: Intern (Lucas)**

**PRO's**

- Synthetically easy and reproducible
- Soluble form of tin oxalates
- Good film quality

**CON's**

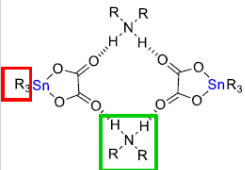
- Only seen negative tone behavior so far (may be able to fix with dev)
- Not yet successful at patterning
- Some film speckling seen in SEM



**R-oxalates?**

### IIIC. Tin Oxalates: Intern (Lucas)

**Pentacoordinate**

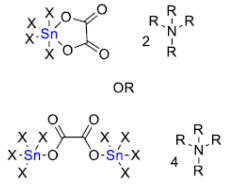


- Soluble in organic solvents.
- EUV sensitive.

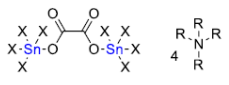
- Explore other cations.
- Metal based cations
- $R_3Te^{\oplus}$   $R_2I^{\oplus}$

- Use smaller R groups.
- R = Methyl, Ethyl

**Hexacoordinate**



OR



- These have not yet been explored.
- Paper: Explores the effects of the size of the cation on the structure of the molecule.

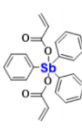
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### IV. Return to Aqueous Development – Why H<sub>2</sub>O?

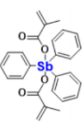
- What is it about H<sub>2</sub>O development that allows for superior contrast?
- JP-30 will not develop in H<sub>2</sub>O unlike JP-20 & JP-21
  - Why is JP-30 not soluble in water?
  - Can we change ligands to improve solubility?
  - Will a developer such as 1:1 IPA:H<sub>2</sub>O improve contrast over Hex or IPA alone?

**JP-20**



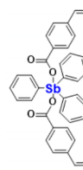
Can develop in H<sub>2</sub>O? **Yes!**

**JP-21**



Can develop in H<sub>2</sub>O? **Yes!**

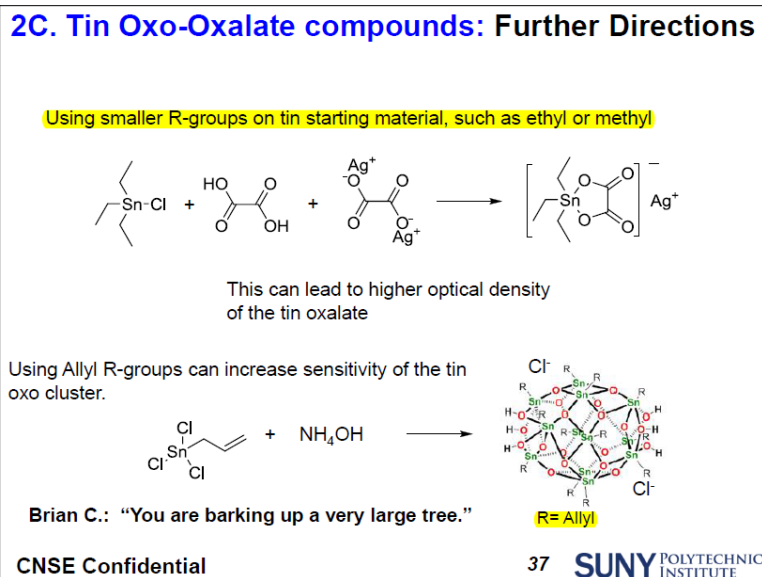
**JP-30**



Can develop in H<sub>2</sub>O? **No!**

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378. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the '028 Patent.

379. Specifically, months and years after these inventions and disclosures from SUNY RF, on April 5, 2018, during the course of the Research Agreements, scientists from Inpria and a former CNSE graduate student and a former CNSE researcher—Brian Cardineau, William Earley, and Stephen Meyers—filed U.S. Provisional Patent Application No. 62/653,043 (PHOTORESISTS WITH HIGH EUV ABSORPTION). And on April 4, 2019, during the course of the Research Agreements, these same former CNSE researchers and scientists from Inpria—Brian Cardineau, William Earley, Stephen Meyers, Kai Jiang, and Jeremy Anderson (the “purported '028 inventors”)—filed U.S. Patent Application No. 16/375,032 (TIN DODECAMERS AND RADIATION PATTERNABLE COATINGS WITH STRONG EUV ABSORPTION) (the “'032 Application,” which matured into the '028 Patent).

380. Brian Cardineau and William Earley, who previously worked on the MORE project at SUNY under Dr. Brainard, at that point had joined Inpria.

381. During prosecution, the purported '028 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re to the invention described in the '032 Application and the provisional applications to which they claim priority, and did not ask that Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, or Ryan Del Re be named as an inventor.

382. On March 27, 2020, the purported '028 inventors assigned to Inpria all right, title, and interest in the '032 Application, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on March 31, 2020, at Reel/Frame 052270/0942.

383. The U.S. Patent and Trademark office issued U.S. Patent No. 11,392,028 on July 19, 2022.

384. Inpria and the purported '028 inventors did not disclose to SUNY RF the existence of the '032 Application, the provisional applications to which it claims priority, any of its subsequent continuation applications, or the '028 Patent.

385. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '028 Patent in the United States, as well as foreign counterparts to '028 Patent around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.

***10. SUNY RF Invented and Owns the '876 and '046 Patents***

386. Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '876 and '046 Patents.

387. At all relevant times, Dr. Brainard was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '876 and '046 Patents.

388. At all relevant times, Brian Cardineau was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '876 and '046 Patents.

389. At all relevant times, Dan Freedman was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '876 and '046 Patents.

390. At all relevant times, Miles Marnell was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '876 and '046 Patents.

391. At all relevant times, James Passarelli was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '876 and '046 Patents.



392. At all relevant times, Michael Murphy was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '876 and '046 Patents.

393. At all relevant times, Ryan Del Re was subject to an obligation to assign to SUNY RF, and did expressly assign to SUNY RF, all right, title, and interest and right to income and ownership in the technology and all intellectual property rights conceived or and/or reduced to practice in one or more of the inventions claimed in the '876 and '046 Patents.

394. The '876 and '046 Patents concern stable solutions of monoalkyl tin alkoxides and their hydrolysis and condensation products, particularly the compositions of stable solutions and the methods to make them. Specifically, the '876 and '046 Patents claim a radiation patternable coating comprising a solvent and a monoalkyl tin trialkoxide ( $\text{RSn}(\text{OR}')_3$ ), wherein R and R' are independently a hydrocarbyl ligand with one or more carbon atoms optionally substituted with one or more heteroatom functional groups, wherein the hydrocarbyl ligand comprises an alkyl, an aryl, an alkenyl, or a cycloalkyl group with 1-31 carbon atoms. For example:

**Figure 98: Exemplary Claims from '876 Patent**

1. A method for preparing an adjusted precursor solution for a radiation patternable coating comprising a mixture of an organic solvent and a first monoalkyl tin trialkoxide ( $\text{RSn}(\text{OR}')_3$ ) having a tin concentration that is from about 0.004 M to about 1.0 M, the method comprising:  
mixing the organic solvent and the first monoalkyl tin trialkoxide to form the adjusted precursor solution, wherein the solvent has been adjusted to have a water content to within  $\pm 15$  percent of a selected water wherein R and R' are independently a hydrocarbyl ligand with one or more carbon atoms optionally substituted with one or more heteroatom functional groups, wherein the hydrocarbyl ligand comprises an alkyl, an aryl, an alkenyl, or a cycloalkyl group with 1-31 carbon atoms.

**Figure 99: Exemplary Claim from '046 Patent**

1. A plurality of coated substrates each comprising a substrate and a dry coating comprising an organometallic patterning composition having an average thickness from about 6 nanometers (nm) to about 50 nm, wherein the plurality of coated substrates has an average three sigma variation in dry coating thickness of no more than about 1.2 nm with a one centimeter edge exclusion.

3. The plurality of coated substrates of claim 1 wherein the dry coating comprises tin.

4. The plurality of coated substrates of claim 3 wherein the dry coating comprises tin oxo hydroxo composition with tin carbon bonds.

6. The plurality of coated substrates of claim 1 wherein the coating is formed using spin coating of a solution and drying.

7. The plurality of coated substrates of claim 6 wherein the solution comprises a mixture of alcohol with a selected water content and a first monoalkyl tin trialkoxide (RSn(OR')<sub>3</sub>), wherein the solution has a tin concentration from about 0.004 M to about 1.0 M and wherein the selected water content is at least about 250 pm by weight and wherein the solution is stable for at least 42 days.

8. The plurality of coated substrates of claim 7 wherein R and R' are independently hydrocarbyl groups having from 1-31 carbon atoms with one or more carbon atoms optionally substituted with one or more heteroatom functional groups containing O, N, Si, Ge, Sn, Te, halogen atoms, or a combination thereof.

395. But Dr. Brainard, with assistance from Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re, conceived of and/or reduced to practice one or more of the inventions claimed in the '876 and '046 Patents—and disclosed them to Inpria and its agents such as Inpria CEO Andrew Grenville, including as PRIOR PROJECT IP and in CNSE disclosures and reports under the Research Agreements. For example, such SUNY RF inventions and disclosures to Inpria were documented in invention disclosure reports listed in Exhibit C to the 2015 and 2017 Research Agreements, including for example, “RN2-11-27: Molecular Organometallic Resists for EUV (MORE),” “RN2-11-27.2: Molecular Organometallic

Resists for EUV (MORE): Tin and Bismuth Compounds,” “RN2-11-27.3: Molecular Organometallic Resists for EUV (MORE): Oxalate Transition Metals,” “RN2-11-27.5: Molecular Organometallic Resists for EUV (MORE): Alkyl Metal Carboxylate Resists.” Such SUNY RF inventions were also recounted in numerous CNSE reports provided to Inpria during the 2015 and 2017 Research Projects.

396. For example, the invention disclosure report RN2-11-27 Molecular Organometallic Resists for EUV (MORE) discloses an invention “to use thin films of organometallic compounds with high EUV OD and high mass densities” “as high resolution, low LER EUV photoresists,” including “Mono-Nuclear Organometallic or Inorganic Compounds,” “Transition Metal Oxide/Oxo-Carboxylate Clusters,” and “Tin Oxoclusters.” RN2-11-27 explains that “[b]ecause the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required [for] resists based on organic polymers.”

### **Figure 100: RN2-11-27 Invention Disclosure Report**

The invention is to use thin films of organometallic compounds with high EUV OD and high mass densities (as outlined in Table 1 and shown as examples in the set of five classes of compounds shown below) as high resolution, low LER EUV photoresists.

- Mono-Nuclear Organometallic or Inorganic Compounds
- Transition Metal Oxide/Oxo-Carboxylate Clusters
- Tin Oxoclusters
- Bismuth-Clusters
- Iron-Sulfide Clusters

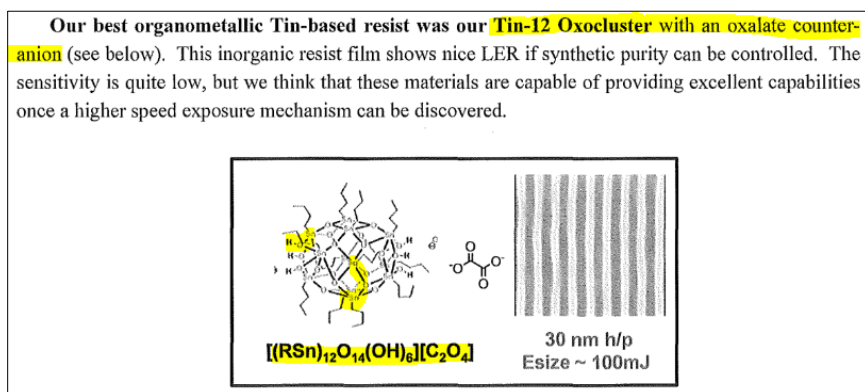
**2. Experimental Approach**

Because the proposed research is so revolutionary, we will need to start this program by addressing much more fundamental questions about material properties than would typically be required resists based on organic polymers (e.g. coating, air stability). We will start by synthesizing new molecules at both SUNY New Paltz and CNSE. Simultaneously, we will purchase all the commercially available mononuclear compounds described in Section 3B. These commercially available compounds will “prime the pump” and allow us to quickly start evaluating the capabilities of EUV resists based on organometallic/inorganic compounds (Figure 3).

397. As further exemplary evidence of SUNY RF’s invention and Inpria’s knowledge thereof, the invention disclosure report RN2-11-27.2 concerning Tin and Bismuth Compounds discloses various inventions related to precursor solutions containing Tin-12 oxoclusters,

including mechanisms causing solubility changes during exposure including anionic ligand decomposition, homolysis of the Sn-C bonds, and metathesis of the Sn-O framework. As one example, it expressly discloses synthesis of novel Tin-12 oxoclusters with various alkyl groups, including phenyl and butyl, or allyl groups using an organic amine, tetrahydrofuran, and water under hydrolysis conditions, including as illustrated below in Figure 101.

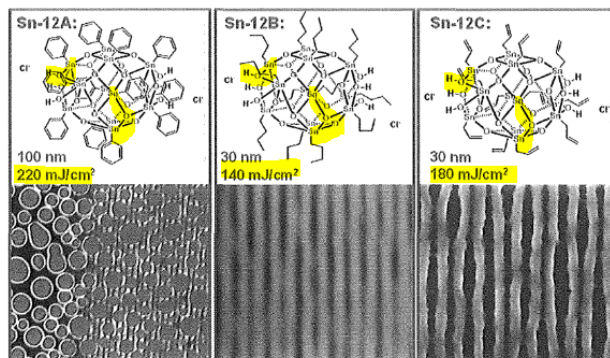
### **Figure 101: RN2-11-27.2 Invention Disclosure Report**



**Synthesis of Novel Sn-12 Clusters.** Initially, we modified two literature procedures for preparing the Sn-12 clusters with variation in alkyl groups. Our first approach was to hydrolyze phenyltin trichloride to get phenylstannic acid and to then dehydrate to the Sn-12 cluster. Unfortunately, this procedure only yielded an insoluble white precipitate. From our prior work with these clusters, we knew that this insoluble precipitate could not be our target compound. Our next approach involved the slow hydrolysis of phenyltin trichloride with sodium hydroxide, maintaining a pH of 4.<sup>7, 41-43</sup> With this method, again only an insoluble white precipitate was produced. We then modified this synthetic route to involve a less nucleophilic, amine base. Using an organic amine in water and THF, we found the phenyltin-12 cluster (PhSn-12) could be made in excellent yield, along with the analogous Sn-4 cluster (PhSn-4) as indicated by GPC results. Furthermore, by changing the relative base concentration in the reaction, the product formation could be controlled to form one cluster over another (Figure 5).

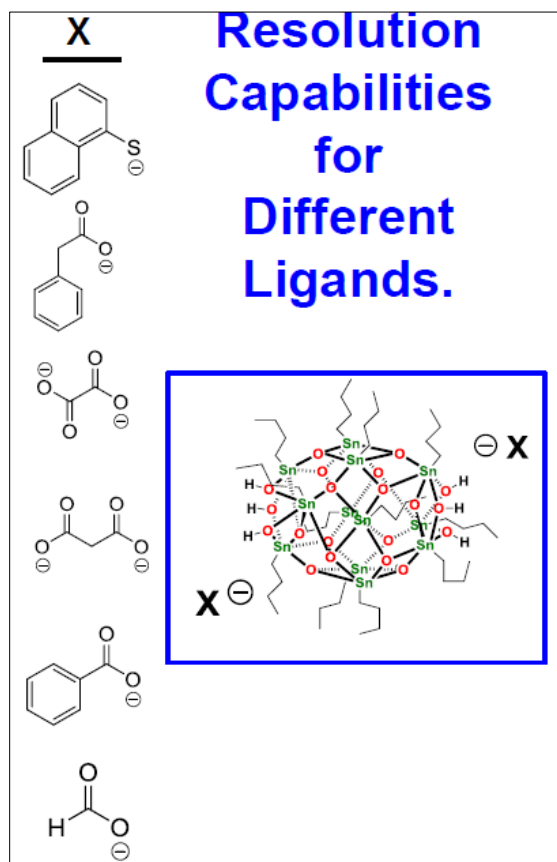
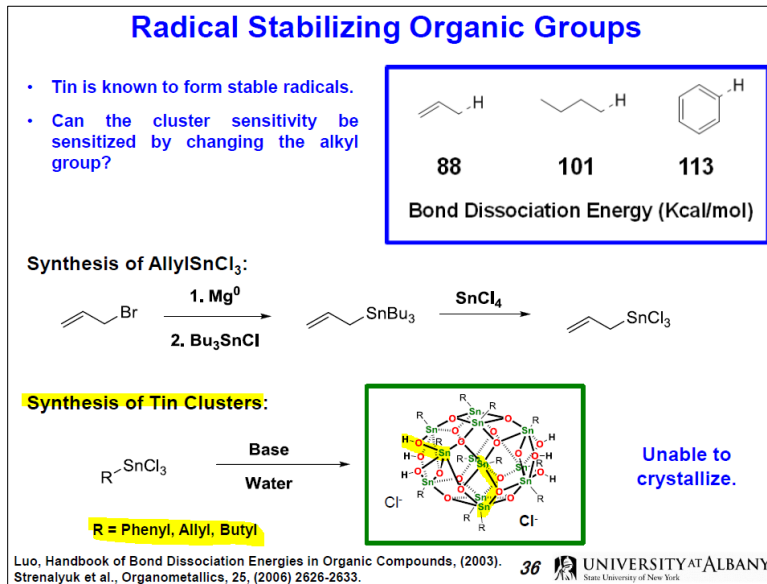
**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.

**Evaluation of Sn-C Bond Homolysis Study.** Under similar hydrolysis conditions, three Sn-12 clusters containing phenyl (Sn-12A), butyl (Sn-12B) and allyl (Sn-12C) organic groups were synthesized and tested at the PSI interferometer (Figure 10). Sn-12A appears to have an impurity which is phase separating and creating pockets in the film matrix. Sn-12B and Sn-12C both are capable of resolving 30 nm features, however due to mask failure and lack of time more work on these resists is needed.



**Figure 10.** Three Sn-12 clusters were made and tested containing phenyl (Sn-12A), butyl(Sn-12B) and allyl(Sn-12C) organic groups. Sn-12A appears to have purity issues, and phase separation is occurring in the film. Sn-12B and Sn-12C were both capable of resolving 30 nm features but further work is required.

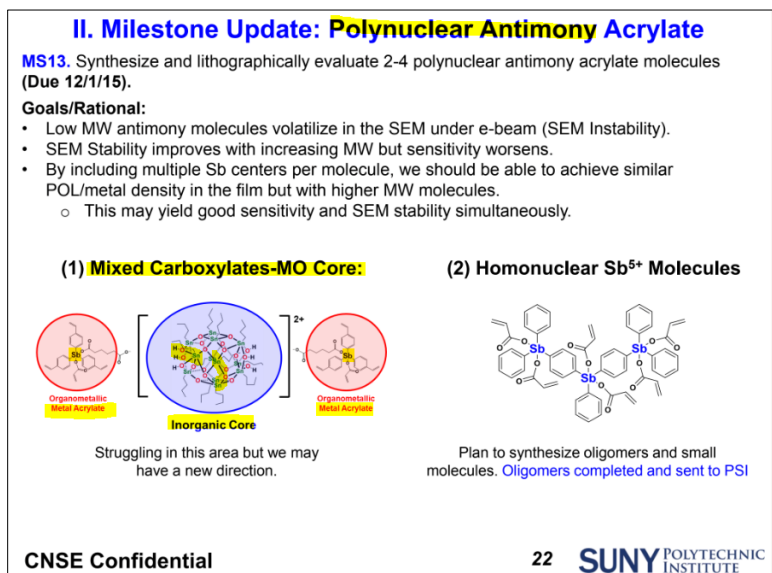
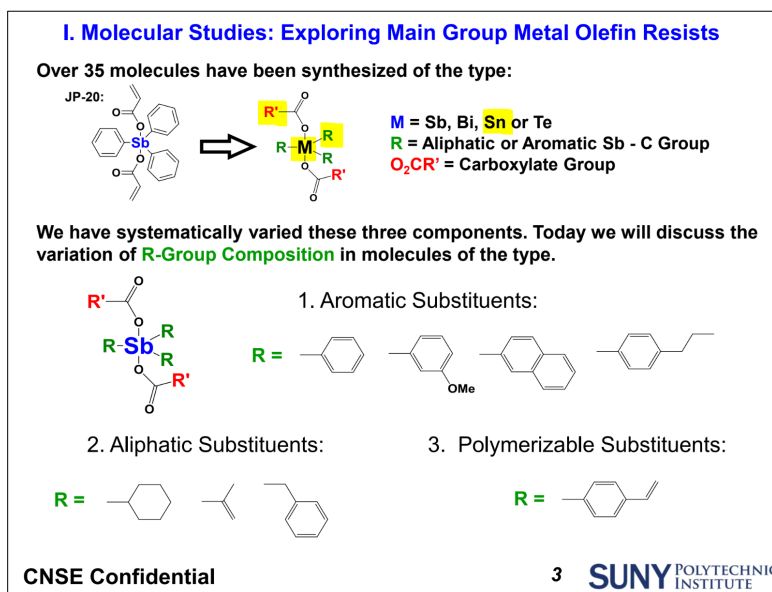
398. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, on May 20, 2013, then-CNSE graduate student Brian Cardineau presented his doctoral thesis titled "Novel Resist Systems for EUV Lithography: LER, Nanoparticle, Chain-Scission and MORE" in "partial fulfillment of the degree of Doctor of Philosophy in Nanoscale Science at the College of Nanoscale Science and Engineering." The thesis was conducted at CNSE under his researcher adviser Dr. Brainard. It discloses synthesizing tin-oxoclusters with R groups phenyl, allyl, butyl, in a base and water, as well as modifying the various ligands to affect EUV resolution, including as illustrated below in Figure 102.

**Figure 102: CNSE MORE Thesis Presentation 5-20-13**

399. As further exemplary evidence of SUNY RF's invention and Inpria's knowledge thereof, in May 2015, SUNY RF sent a confidential research presentation to Inpria describing its

conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{5-n}$ , including both its molecular studies of Tin-based resists with different R and X groups, including those in aliphatic, aromatic Sb – C, and carboxylate groups, and its milestones concerning polynuclear metal-based resists including those that combined Tin-12 with organometallic metal acrylate, including as illustrated in Figure 103 below.

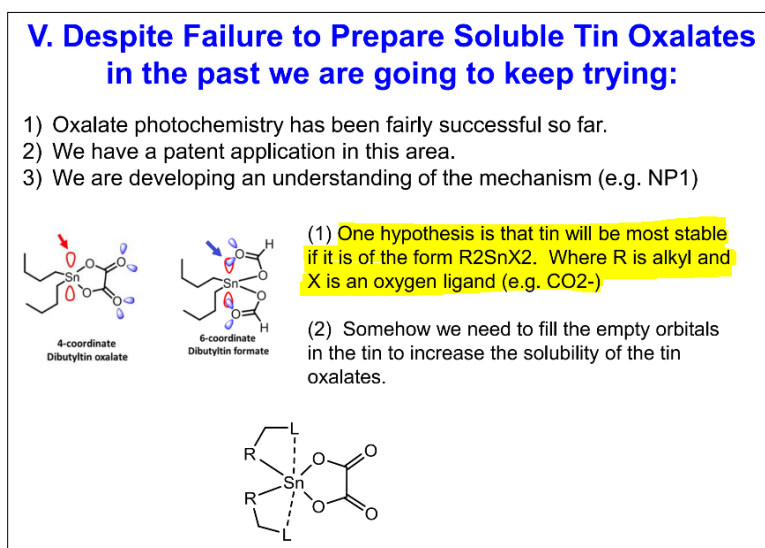
**Figure 103: CNSE Report May 2015**



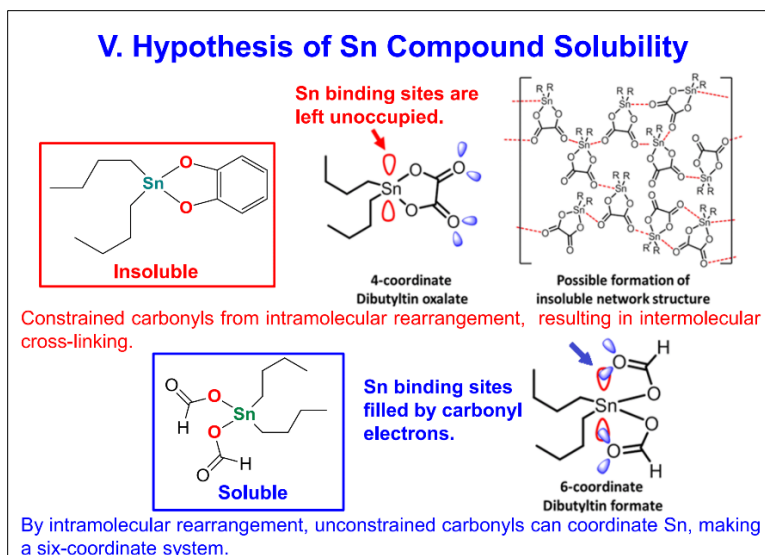


400. As further exemplary evidence of this invention and Inpria's knowledge thereof, on June 19, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including its discovery that "tin will be most stable if it is of the form  $R_2SnX_2$ " "[w]here R is alkyl and X is an oxygen ligand (e.g.,  $CO_2^-$ )" and the "need to fill the empty orbitals in the tin to increase the solubility of the tin oxalates," including by intramolecular rearrangement" where "unconstrained carbonyls can coordinate Sn, making a six coordinate system," as illustrated in Figure 104.

**Figure 104: CNSE Report 6-19-2015**

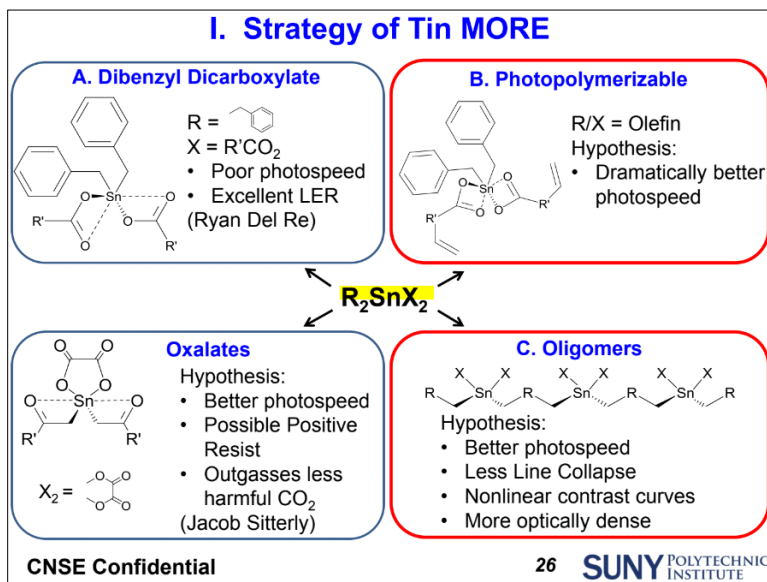
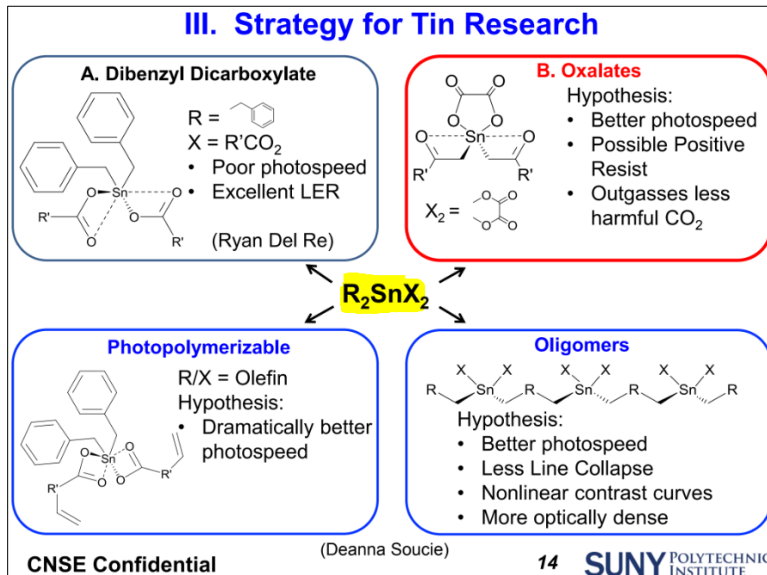






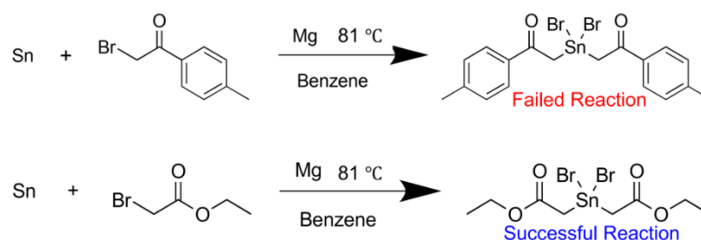
401. As further exemplary evidence of this invention and Inpria's knowledge thereof, on August 17, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by recounting its past successes synthesizing benzyl tin complexes and outlining its strategy for further tin research in the form " $R_2SnX_2$ " with varying R and X groups, as illustrated below in Figure 105. One such invention was to synthesize tin-based resists by reacting  $\alpha$ -bromo esters with tin metal in combination with magnesium metal, using benzene as a solvent, where the  $\alpha$ -bromo ester could include methyl bromoacetate, tert-butyl bromoacetate, 4-iodophenyl 2-bromoacetate, or the like, including below in Figure 105. Other such inventions were to incorporate iodine into organotin resists in order to increase optical density and improve sensitivity or synthesize a multinuclear tin resist where the R group was a methyl group like  $CH_3$ , as illustrated in Figure 105.

Figure 105: CNSE Report 8-17-2015



## V. Tin $\alpha$ -Carbonyl Complexes

This new approach to synthesize tin oxalate complexes follows a modified reaction where Tin reacts with an  $\alpha$ -Bromo Ester in the first step:

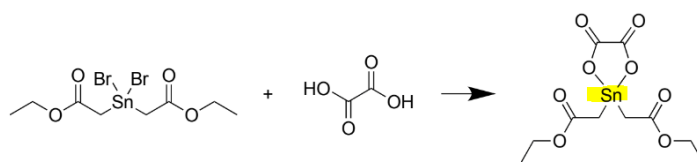


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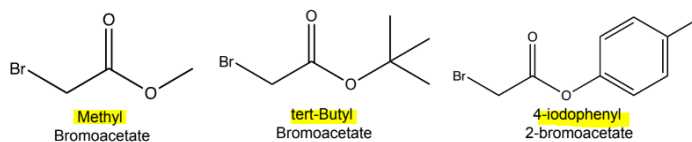
19 SUNY POLYTECHNIC INSTITUTE

## VI. Future Directions

Step Two of Proposed Tin Oxalate Synthesis:

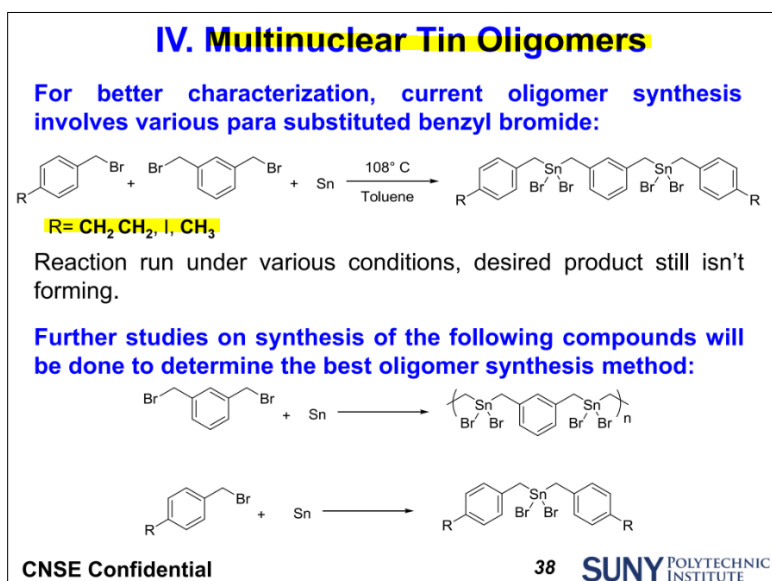
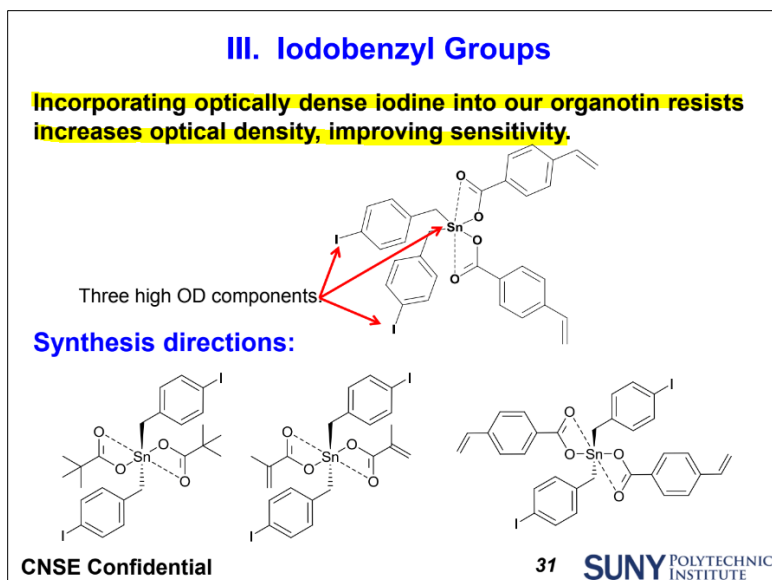


Synthesis Using Alternative  $\alpha$ -Bromo Esters:

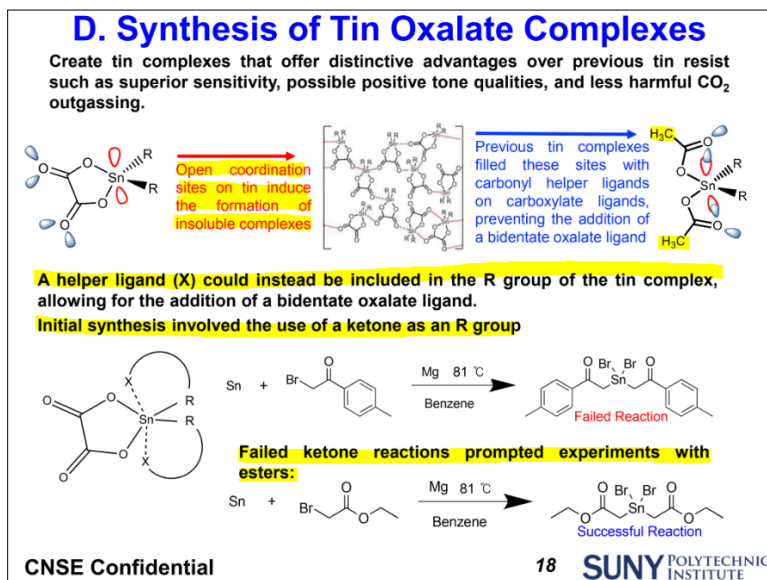
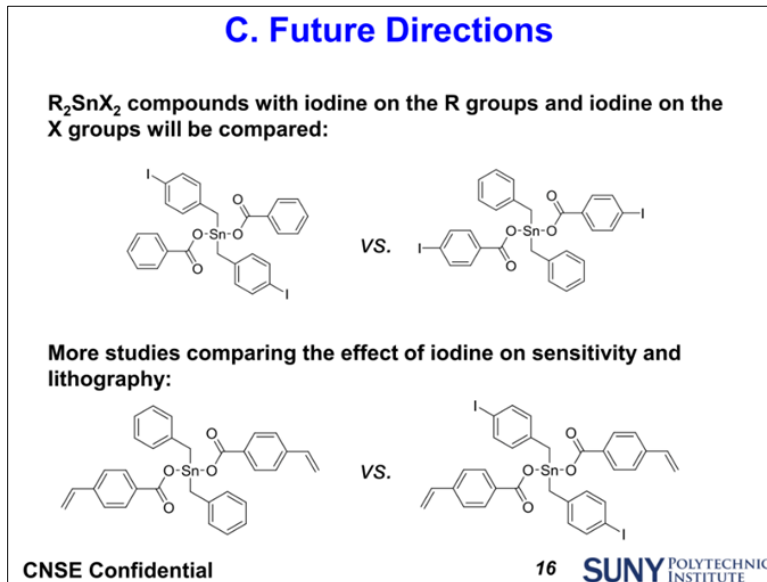


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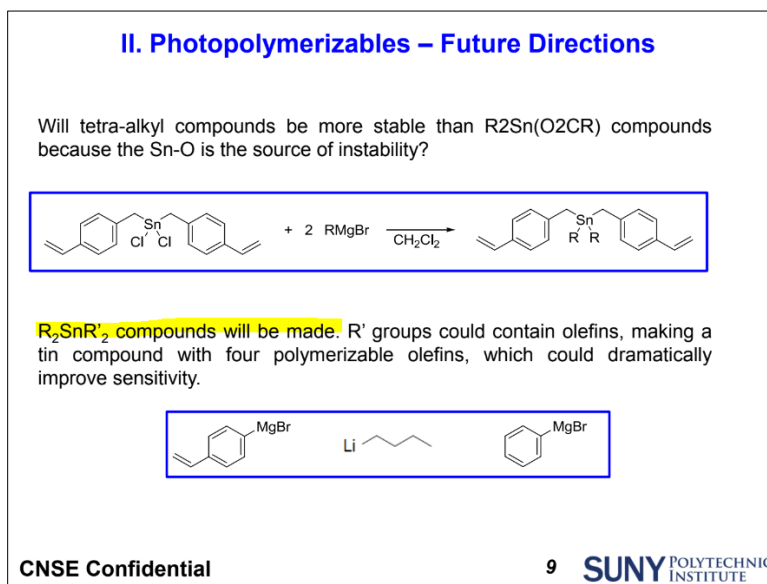
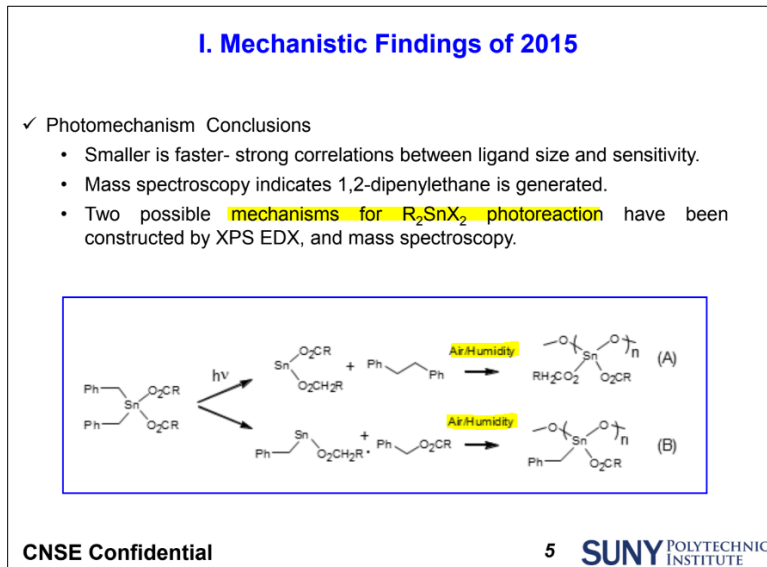
23 SUNY POLYTECHNIC INSTITUTE



402. As further exemplary evidence of this invention and Inpria's knowledge thereof, on September 30, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including synthesizing  $R_2SnX_2$  compounds with iodine in the R and/or X groups, and using helper ligands in the form of a ketone or an ester as an R group to increase the solubility of such organotin resists, including as illustrated in Figure 106 below. It also recounted again that one of the attributes that made "MORE an industry leading resist" was that it was capable of "aqueous development."

**Figure 106: CNSE Report 9-30-2015**

403. As further exemplary evidence of this invention and Inpria's knowledge thereof, on December 4, 2015, SUNY RF sent a confidential research presentation to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including by summarizing its mechanistic findings in 2015 concerning  $R_2SnX_2$  compounds developed in water vapor and describing further changes in R and R' groups to increase stability and sensitivity of such organotin compositions and resists, including as illustrated in Figure 107.

**Figure 107: CNSE Report 12-4-2015**


404. As further exemplary evidence of this invention and Inpria's knowledge thereof, throughout 2016, SUNY RF sent confidential research presentations to Inpria describing its conception and reduction to practice of various metal-based resists of the form  $R_nSnX_{4-n}$ , including those that were synthesized by incorporating water into the resist films and into vacuum chambers, through for example, formulation solvents, hydrates, and hygroscopic polymers, as well as SUNY RF's so-called "Return to Aqueous Development," to research and develop why water

development allowed for superior contrast in MORE resists. SUNY RF also described the use of “smaller R-groups on tin starting material, such as ethyl or methyl,” as depicted below:

**Figure 108: CNSE Reports 2-26-16, 6-13-16, and 8-25-16**

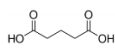
### III. Current Work + PSI Plans

**MS1. Reactive Developers.**

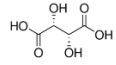
	$R_3N$	$R_4NOH$	R/O
Carboxylic acids	Amine bases	Ammonium bases	Redox agents

**New carboxylic acids:**

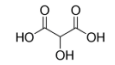
Glutaric



Tartaric



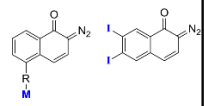
Tartronic



**MS3. Feasibility Studies: Strategies for producing high-contrast metal-based positive-tone resists.**

**Strategies:**

DNQ with MORE



Will be testing an i-line resist (AZ 5206) in EUV.

**Concern: Lack of water in vacuum.**

**Solution: Incorporate water into resist film via:**

1. Formulation solvents.
2. Hydrates in formulation.
3. Hygroscopic polymers in formulation

**Cobalt(II) nitrate hexahydrate**

- Slightly soluble in PGMEA
- Soluble in PM and water.

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9 **SUNY** POLYTECHNIC INSTITUTE

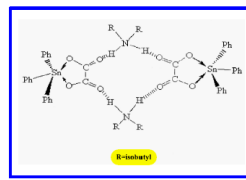
### IIIC. Tin Oxalates: Intern (Lucas)

**PRO's**

- Synthetically easy and reproducible
- Soluble form of tin oxalates
- Good film quality

**CON's**

- Only seen negative tone behavior so far (may be able to fix with dev)
- Not yet successful at patterning
- Some film speckling seen in SEM



**R-isobutyl**

### IIIC. Tin Oxalates: Intern (Lucas)

**Pentacoordinate**

- Soluble in organic solvents.
- EUV sensitive.

- Explore other cations.
- Metal based cations
- $R_3Te^{\oplus}$   $R_2I^{\oplus}$

- Use smaller R groups.
- R = Methyl, Ethyl

**Concept:** Photolysis eliminates the polar oxalate ligand, largely reducing polarity of molecule, which should result in a large change in dissolution.

**Hexacoordinate**

- These have not yet been explored.
- Paper: Explores the effects of the size of the cation on the structure of the molecule.

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### IV. Return to Aqueous Development – Why H<sub>2</sub>O?

- What is it about H<sub>2</sub>O development that allows for superior contrast?
- JP-30 will not develop in H<sub>2</sub>O unlike JP-20 & JP-21
  - Why is JP-30 not soluble in water?
  - Can we change ligands to improve solubility?
  - Will a developer such as 1:1 IPA:H<sub>2</sub>O improve contrast over Hex or IPA alone?

**JP-20**

Can develop in H<sub>2</sub>O? **Yes!**

**JP-21**

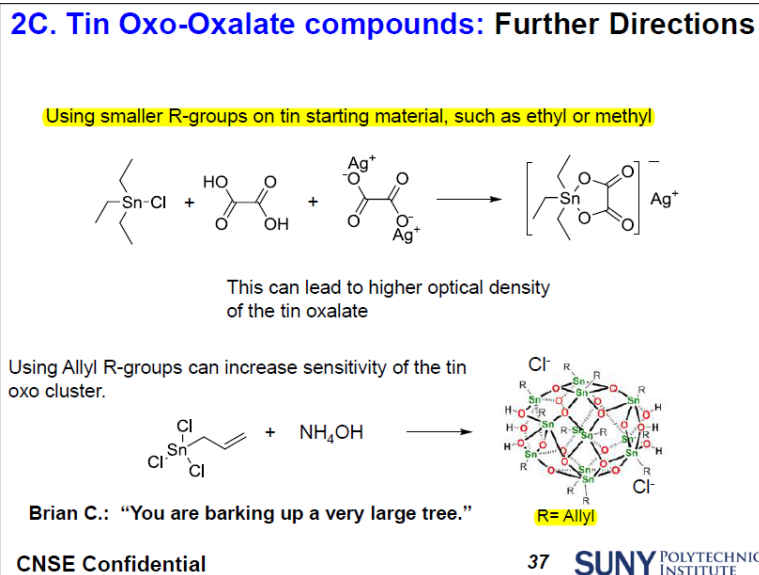
Can develop in H<sub>2</sub>O? **Yes!**

**JP-30**

Can develop in H<sub>2</sub>O? **No!**

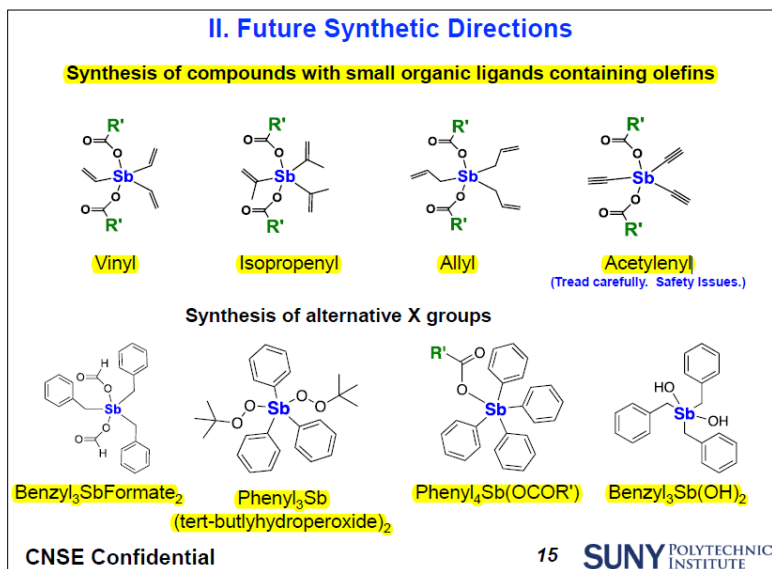
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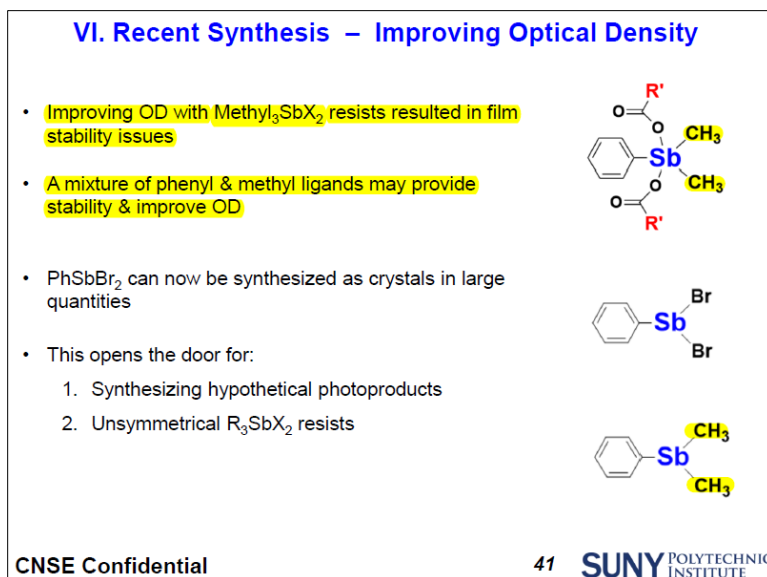
405. As further exemplary evidence of this invention and Inpria's knowledge thereof, on August 23, 2017, SUNY RF sent confidential research presentations to Inpria describing its "Future Synthetic Directions" of metal-based carboxylate photoresists, including its synthesis of "compounds with small ligands containing olefins," including various hydrocarbyl and alkyl groups, as depicted below:

**Figure 109: CNSE Report 8-23-17**

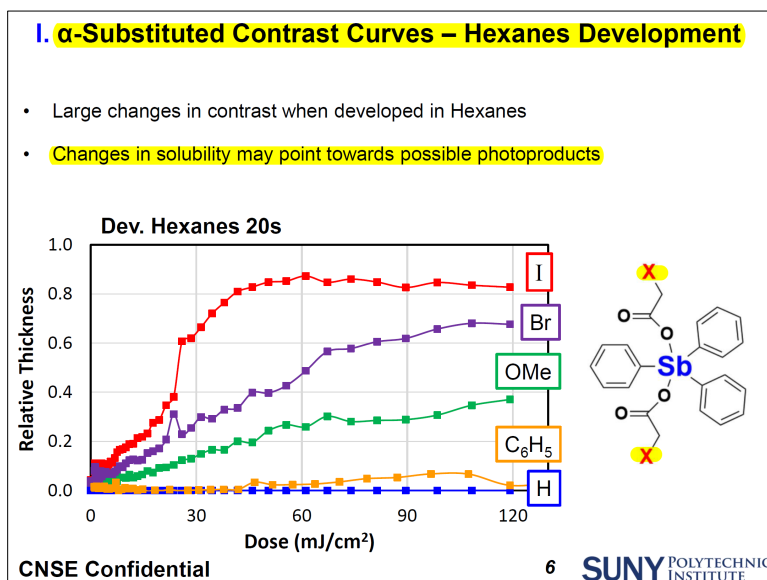
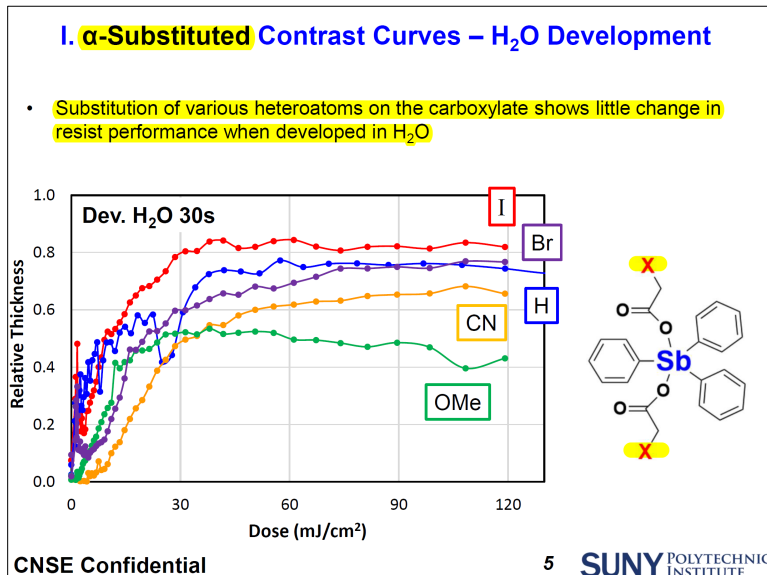


406. As further exemplary evidence of this invention and Inpria's knowledge thereof, on January 17, 2018, SUNY RF sent confidential research presentations to Inpria describing its recent research and synthesis, explaining that optical density and stability of metal-based photoresists could be improved through the use of a mixture of phenyl and methyl ligands, as depicted below:

**Figure 110: CNSE Report 1-17-18**




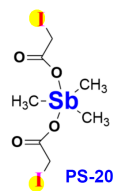
407. As further exemplary evidence of this invention and Inpria's knowledge thereof, on February 28, 2018, SUNY RF sent confidential research presentations to Inpria describing its recent research and synthesis regarding heteroatoms, explaining the effects on resist performance of heteroatom substitution on metal-based carboxylate resists and viability of potential photoproducts based on changes in solubility, as depicted below:

**Figure 111: CNSE Report 2-28-2018**

**I. Synthesized  $\alpha$ -Substituted Carboxylate Resists**

Heteroatom (X)	Sb	Bi
-CN	✓	✓
-Br	✓	✓
-I	✓	✓
-OMe	✓	✓
-OH	✓	✓





PS-20

- New  $\alpha$ -substituted carboxylates have been synthesized:
  - Glycolic acid (X = OH)
  - 5 Bismuth analogues
- Successful synthesis of  $\text{Me}_3\text{Sbldoacetate}_2$ 
  - Film volatile at ambient pressure even with higher MW than JP-18

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408. On information and belief, Inpria incorporated the inventions contained in these disclosures into the patent applications that matured into the '876 and '046 Patents.

409. Specifically, months and years after these inventions and disclosures from SUNY RF, on June 21, 2018, during the course of the Research Agreements, scientists from Inpria and a former CNSE graduate student—Kai Jiang, Stephen Meyers, Lauren McQuade, Jeremy Anderson, and Brian Cardineau—filed U.S. Provisional Patent Application No. 62/688,215 (STABLE SOLUTIONS OF MONOALKYL TIN ALKOXIDES AND THEIR HYDROLYSIS AND CONDENSATION PRODUCTS) (the “ '215 Application”). On June 20, 2019, based on knowledge and information gleaned from and disclosures made by SUNY RF, scientists from Inpria—Kai Jiang, Stephen Meyers, Lauren McQuade, Jeremy Anderson, Brian Cardineau, Benjamin Clark, Dominick Smiddy, and Margaret Wilson-Moses (the “purported '876 and '046 inventors”)—filed U.S. Patent Application No. 16/446,732 (the “ '732 Application,” which matured into the '876 Patent), claiming priority to the '215 Application. Then, on March 8, 2022, the purported '876 and '046 inventors filed a continuation of the '732 Application, U.S. Patent Application No. 17/689,135 (the “ '135 Application,” which matured into the '046 Patent).

410. Brian Cardineau, who previously worked on the MORE project at SUNY under Dr. Brainard, at that point had joined Inpria.

411. During prosecution, the purported '876 and '046 inventors did not disclose to the U.S. Patent and Trademark Office the contributions of Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re to the invention described in the '732 or '135 Applications, and did not ask that Dr. Brainard, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, or Ryan Del Re be named as an inventor.

412. On March 27, 2020, the purported '876 and '046 inventors assigned to Inpria all right, title, and interest in the '732 and '135 Applications, all resulting divisional or continuation applications, and any patent that issued therefrom. Inpria recorded the assignment at the United States Patent and Trademark Office on March 31, 2020, at Reel/Frame 052271/0363, and on March 8, 2022, at Reel/Frame 059195/0001.

413. The U.S. Patent and Trademark office issued U.S. Patent No. 11,300,876 on April 12, 2022, and U.S. Patent No. 11,868,046 on January 9, 2024.

414. Inpria and the purported '876 and '046 inventors did not disclose to SUNY RF the existence of the '732 or '135 Applications, the applications to which they claim priority, any of their subsequent continuation applications, or the '876 or '046 Patents.

415. On information and belief, Inpria has filed and/or intends to file both additional continuation applications to the '876 and '046 Patents in the United States, as well as foreign counterparts to '876 and '046 Patents around the world, to which SUNY RF, Dr. Brainard, Brian Cardineau, Dan Freedman, Miles Marnell, James Passarelli, Michael Murphy, and Ryan Del Re contributed and, by virtue of which, SUNY RF also owns in whole or in part under the terms of the Research Agreements and U.S. and foreign patent laws.


**F. Inpria and JSR Have Commercialized SUNY RF's PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP Concerning MORE**


416. Inpria was in a formal, contractual relationship with SUNY RF for nearly five years from January 1, 2015, to August 31, 2019.

417. Inpria and JSR have hired many of Dr. Brainard's former graduate students and researchers from his MORE program, including Brian Cardineau (now Principal Chemist at Inpria), Amrit Narasimhan (now Lead Engineer (Lithography) at Inpria) and Dr. William Earley (a former Senior Research Chemist at Inpria, now deceased). Including as explained above, Inpria included Brain Cardineau and William Earley on the Research Projects while simultaneously filing the Challenged Patents and commercializing the research and technology owned and disclosed by SUNY RF, as demonstrated in SUNY RF's confidential CNSE presentation to Inpria, dated January 17, 2018:

**Figure 112: CNSE Report 1-17-2018**

### Acknowledgements

<p><b>Project Funding By:</b></p>  <p><b>Inpria:</b>          Andrew Grenville          Stephen Meyers  <b>Brian Cardineau</b>          Jason Stowers  <b>William Earley</b>          Lauren McQuade</p>	<p><b>Group Members:</b></p> <p>Jacob Sitterly          Phil Schuler          Shaheen Hasan } <b>MORE Synthesis Team</b></p> <p>Tracy Flynn          Christian Ackerman          Dr. Amrit Narasimhan          Steven Grzeskowiak } <b>MORE Characterization Team</b></p> <p><b>Committee Members:</b></p> <p>Dr. Greg Denbeaux      Dr. Dan Freedman          Dr. Scott Tenenbaum      Dr. Mike Hagerman</p>
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44 

418. On information and belief, Inpria and JSR failed to establish an ethical wall or information barrier protocol to prevent exchange of SUNY RF information or communications from such former students, researchers, and employees—including PRIOR PROJECT IP,

FOUNDATION Inventions, and JOINT IP—to, for example, Inpria’s and JSR’s research and development and technical and business teams working to commercialize MORE technology.

419. On information and belief, Inpria and JSR also failed to establish an ethical wall or information barrier protocol to prevent exchange of SUNY RF information or communications from the 2015 and 2017 Research Projects—including PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP concerning MORE—to, for example, Inpria’s and JSR’s research and development and technical and business teams working to commercialize MORE technology.

420. In an article dated February 20, 2020, Inpria stated it had “recently brought online its high-volume manufacturing plant to support the initial production ramp for customers.”

421. According to a September 17, 2021, press release regarding JSR’s acquisition of Inpria, “Inpria’s metal oxide photoresist platform enables customers to pattern advanced node device architectures meeting the low defectivity levels required for manufacturing. Inpria material solutions provide the performance to significantly reduce the cost of EUV patterning for the rapidly growing fleet of EUV scanners in the field.” Additionally, Grenville stated that JSR and Inpria “would work together to combine Inpria’s metal oxide photoresist technology with JSR’s unmatched experience in quality, manufacturing, and customer focus to accelerate the full adoption of our platform in high volume semiconductor manufacturing.” Grenville also stated that “JSR’s global operations will also allow us to meet customer needs as we ramp our product introductions in critical markets.” According to the press release, JSR’s planned “to add Inpria’s non-chemically amplified metal-based resist to its photoresist product portfolio to seamlessly provide value as an advanced electronic materials supplier.”

422. Inpria and JSR now manufacture, sell, export, license, and/or otherwise commercialize a suite of EUV metal oxide photoresists and methods of developing the same, as

well as developers and other ancillary materials to enable and improve EUV lithography. According to its 2023 Annual Report, JSR's EUV metal oxide photoresist products are based on and/or incorporate Inpria technology.

423. On information and belief, Inpria's and JSR's customers include semiconductor equipment and materials companies, such as Tokyo Electron and others, as well as semiconductor manufacturers, such as TSMC, SK hynix, and Samsung, and others. Inpria's and JSR's list of customers, licenses, and commercial partners is not publicly available.

424. Inpria's and JSR's main product is a tin-oxide photoresist.

425. Inpria and JSR offer for sale at least three different tin-based photoresists as part of its "Y-series": YA-BA, YF-AA, and YD-AA.

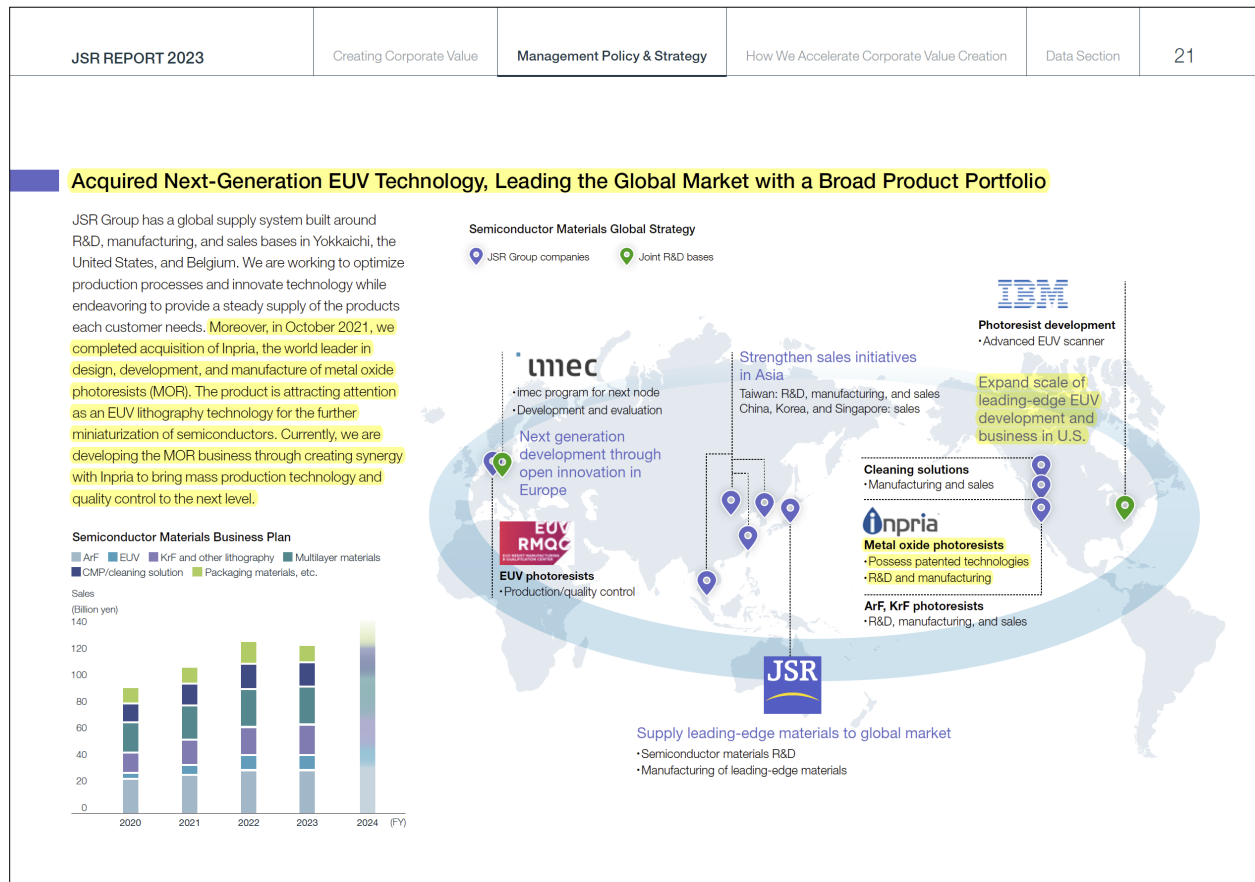
426. Inpria and JSR produce EUV photoresists in, at least, their manufacturing plant in Corvallis, Oregon, and, on information and belief, are now expanding or will soon expand such manufacturing to other locations around the world.

427. In JSR's 2023 Report, President and CEO Eric Johnson highlighted JSR's competitive advantage due to its investment in metal oxide resists, stating "[i]n semiconductor materials, we continue to invest in new applications for metal oxide resist (MOR) and are already seeing its implementation in commercial use. MOR is enabling a new regime for semiconductor materials businesses and investing in this technology will give us a strong competitive advantage. Seeing adoption of leading-edge extreme ultraviolet (EUV) imaging technology as the insertion point for MOR in the next generation of equipment, we have invested in early MOR production to capitalize on its benefits over conventional chemically-amplified resists. We see strong potential in these areas moving forward."



428. JSR’s acquisition of Inpria and its “Next-Generation EUV Technology” quickly became integral to JSR’s product portfolio and plans of “developing the MOR business through creating synergy with Inpria to bring mass production technology and quality control to the next level,” noting in particular that Inpria “[p]ossess[es] patented technologies,” as illustrated in Figure 113 below.

**Figure 113: JSR Report 2023**



429. In October 2022 and December 2023, Inpria admitted in federal court that “Inpria practices its patented EUV semiconductor processing technology,” including the technology claimed in ’505, ’564, ’684, ’153, ’048, ’903, ’312, and ’081 Patent families. On information and belief, JSR’s products also incorporate such technology, and Inpria and JSR also practice the

technology claimed in the '179, '554, '924, '696, '618, '559, '986, '719, '874, '029, '284, '466, '109, '070, '028, '876, and '046 Patent families.

430. As explained throughout this Complaint, Inpria's and JSR's products, and those of their customers and licensees, incorporate SUNY RF's PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP to the 2015 and 2017 Research Agreements, without a license to do so and without any remuneration to SUNY RF.

431. Inpria's and JSR's acts of have harmed, and will continue to harm, SUNY RF.

### **CLAIMS FOR RELIEF**

#### **Breach of Contract**

##### **FIRST CLAIM FOR RELIEF**

##### **Breach of Contract – 2015 SRA §§ 9(h), 9(j) (PRIOR PROJECT IP)**

432. SUNY RF realleges and incorporates herein the allegations of the paragraphs above of this Complaint as if fully set forth herein.

433. The 2015 SRA and the amendment thereto is a binding and enforceable contract.

434. The 2015 SRA is binding upon the successors, assigns, heirs, and personal representatives of Inpria, including JSR.

435. SUNY RF has performed all of its obligations under the 2015 SRA and amendment thereto.

436. Pursuant to 2015 SRA § 9(h) and 2015 SRA First Amendment ¶ 1, SUNY RF contributed its PRIOR PROJECT IP to complete and carry out the PROJECT and granted Inpria a royalty-free license to use the PRIOR PROJECT IP solely to carry out the PROJECT.

437. Inpria and JSR breached, and continue to breach, the license Inpria received in Section 9(h) the 2015 SRA and amendment thereto by using and continuing to use SUNY RF's

PRIOR PROJECT IP beyond the scope of the license, which is limited to “carry[ing] out the PROJECT.” 2015 SRA § 9(h); 2015 SRA First Amendment ¶ 1.

438. By using and continuing to use SUNY RF’s PRIOR PROJECT IP beyond the purposes permitted by the 2015 SRA and 2015 SRA First Amendment, Inpria and JSR also breached and continue to breach Section 9(j) of 2015 SRA, which required Inpria to “cooperate in executing such documents, render such assistance, and take such other action as the other Party may reasonably request to apply for, register, perfect, confirm, and protect the ownership rights set forth in” Section 9 of the 2015 SRA.

439. Inpria’s and JSR’s use and continued use of SUNY RF’s PRIOR PROJECT IP beyond the scope of the license also constitutes breach of the 2015 SRA First Amendment, under which Inpria agreed to “only use the [PRIOR PROJECT IP] disclosures and the information contained in the disclosures to carry out the project.” 2015 SRA First Amendment ¶ 1.

440. Inpria and JSR have used and continue to use SUNY RF’s PRIOR PROJECT IP for commercial purposes, including but not limited to each instance of using, manufacturing, offering for sale, selling, exporting, and licensing of EUV metal oxide photoresists and related materials.

441. Inpria and JSR also breached and continue to breach the 2015 SRA and the amendment thereto by incorporating the technology disclosed in SUNY RF’s PRIOR PROJECT IP into the provisional patent applications and patent applications that matured or will mature into the Challenged Patents.

442. Inpria’s and JSR’s unpermitted and continuing uses of SUNY RF’s PRIOR PROJECT IP has also breached and continues to breach the covenant of good faith and fair dealing that is implied by law in all contracts.

443. As a direct and proximate cause of Inpria's and JSR's material and continuing breaches of the 2015 SRA and 2015 SRA First Amendment, SUNY RF has been damaged and continues to suffer damages as alleged herein in an amount to be proven at trial.

**SECOND CLAIM FOR RELIEF**  
**Breach of Contract – 2015 SRA § 9(a)–(d) (FOUNDATION Inventions)**

444. SUNY RF realleges and incorporates herein the allegations of the paragraphs above of this complaint as if fully set forth herein.

445. The 2015 SRA is a binding and enforceable contract.

446. The 2015 SRA is binding upon the successors, assigns, heirs, and personal representatives of Inpria, including JSR.

447. SUNY RF has performed all of its obligations under the 2015 SRA.

448. SUNY RF held intellectual property rights in FOUNDATION Inventions, which were generated, conceived, or reduced to practice during the conduct of work under the 2015 SRA utilizing facilities or personnel of SUNY RF, SUNY Poly, or SUNY exclusively.

449. Inpria and JSR breached the 2015 SRA when they used and continue to use SUNY RF's FOUNDATION Inventions, as described in the 2015 SRA, Section 9(a)–(d), without a license. By using and continuing to use SUNY RF's FOUNDATION Inventions without a license, Inpria and JSR also breached and continue to breach Section 9(j) of the 2015 SRA, which established a continuing obligation to protect the ownership rights set forth in Section 9, including SUNY RF's ownership rights over its FOUNDATION Inventions.

450. Inpria and JSR used and continue to use SUNY RF's FOUNDATION Inventions for commercial purposes, including but not limited to each instance of using, manufacturing, offering for sale, selling, exporting, and licensing of EUV metal oxide photoresists and related materials.

451. Inpria and JSR also breached and continue to breach the 2015 SRA by incorporating SUNY RF's FOUNDATION Inventions into the provisional patent applications and patent applications that matured or will mature into the Challenged Patents.

452. Inpria's and JSR's unpermitted and continued use of SUNY RF's FOUNDATION Inventions also breached and continues to breach the covenant of good faith and fair dealing that is implied by law in all contracts.

453. As a direct and proximate cause of Inpria's and JSR's material and continuing breaches of the 2015 SRA and amendment thereto, SUNY RF has been damaged and will continue to suffer damages as alleged herein in an amount to be proven at trial.

**THIRD CLAIM FOR RELIEF**  
**Breach of Contract – 2015 SRA § 9(e)–(f) (JOINT IP)**

454. SUNY RF realleges and incorporates herein the allegations of the paragraphs above of this complaint as if fully set forth herein.

455. The 2015 SRA is a binding and enforceable contract.

456. The 2015 SRA is binding upon the successors, assigns, heirs, and personal representatives of Inpria, including JSR.

457. SUNY RF has performed all of its obligations under the 2015 SRA.

458. SUNY RF and Inpria held joint title to JOINT IP, which was generated, conceived, or reduced to practice during the conduct of work under the 2015 SRA that are not FOUNDATION Inventions or SPONSOR Inventions.

459. To the extent Defendants argue the FOUNDATION Inventions are JOINT IP, in the alternative, Inpria and JSR nevertheless breached the 2015 SRA when they used and continue to use SUNY RF's interest in the JOINT IP, as described in the 2015 SRA, Section 9(e)–(f), without a license.

460. Inpria and JSR used and continue to use SUNY RF's interest in the JOINT IP for commercial purposes, including but not limited to each instance of using, manufacturing, offering for sale, selling, exporting, and licensing of EUV metal oxide photoresists and related materials.

461. By using and continuing to use SUNY RF's interest in JOINT IP without a license, Inpria and JSR also breached and continue to breach Section 9(j) of the 2015 SRA, which established a continuing obligation to protect the ownership rights set forth in Section 9, including SUNY RF's interest in the JOINT IP.

462. Inpria and JSR also breached and continue to breach the 2015 SRA by incorporating SUNY RF's interest in the JOINT IP into the provisional patent applications and patent applications that matured and will continue to mature into the Challenged Patents.

463. Inpria's and JSR's unpermitted and continued use of SUNY RF's interest in the JOINT IP also breached and continues to breach the covenant of good faith and fair dealing that is implied by law in all contracts.

464. As a direct and proximate cause of Inpria's and JSR's material and continuing breaches of the 2015 SRA and amendment thereto, SUNY RF has been damaged and will continue to suffer damages as alleged herein in an amount to be proven at trial.

**FOURTH CLAIM FOR RELIEF**  
**Breach of Contract – 2017 SRA § 9(h) (PRIOR PROJECT IP)**

465. SUNY RF realleges and incorporates herein the allegations of the paragraphs above of this Complaint as if fully set forth herein.

466. The 2017 SRA and the amendment thereto is a binding and enforceable contract.

467. The 2017 SRA is binding upon the successors, assigns, heirs, and personal representatives of Inpria, including JSR.

468. SUNY RF has performed all of its obligations under the 2017 SRA and amendment thereto.

469. Pursuant to 2017 SRA § 9(h), SUNY RF contributed its PRIOR PROJECT IP to complete and carry out the PROJECT and granted Inpria a royalty-free license to use the PRIOR PROJECT IP solely to carry out the PROJECT.

470. Inpria and JSR breached, and continue to breach, the license Inpria received in Section 9(h) the 2017 SRA by using and continuing to use SUNY RF's PRIOR PROJECT IP beyond the scope of the license, which is limited to "carry[ing] out the PROJECT." 2017 SRA § 9(h); 2017 SRA Amendment ¶ 1.

471. Inpria and JSR have used and continue to use SUNY RF's PRIOR PROJECT IP for commercial purposes, including but not limited to each instance of using, manufacturing, offering for sale, selling, exporting, and licensing EUV metal oxide photoresists and related materials.

472. By using and continuing to use SUNY RF's PRIOR PROJECT IP beyond the purposes permitted by the 2017 SRA, Inpria and JSR also breached and continue to breach Section 9(j) of 2017 SRA, which required Inpria to "cooperate in executing such documents, render such assistance, and take such other action as the other Party may reasonably request to apply for, register, perfect, confirm, and protect the ownership rights set forth in" Section 9 of the 2017 SRA.

473. Inpria and JSR also breached and continue to breach the 2017 SRA by incorporating the technology disclosed in SUNY RF's PRIOR PROJECT IP into the provisional patent applications and patent applications that matured or will mature into the Challenged Patents.

474. Inpria's and JSR's unpermitted and continuing uses of SUNY RF's PRIOR PROJECT IP has also breached and continues to breach the covenant of good faith and fair dealing that is implied by law in all contracts.

475. As a direct and proximate cause of Inpria's and JSR's material and continuing breaches of the 2017 SRA and 2017 SRA Amendment, SUNY RF has been damaged and continues to suffer damages as alleged herein in an amount to be proven at trial.

**FIFTH CLAIM FOR RELIEF**  
**Breach of Contract – 2017 SRA § 9(a)–(d) (FOUNDATION Inventions)**

476. SUNY RF realleges and incorporates herein the allegations of the paragraphs above of this complaint as if fully set forth herein.

477. The 2017 SRA is a binding and enforceable contract.

478. The 2017 SRA is binding upon the successors, assigns, heirs, and personal representatives of Inpria, including JSR.

479. SUNY RF has performed all of its obligations under the 2017 SRA.

480. SUNY RF held intellectual property rights in FOUNDATION Inventions, which were generated, conceived, or reduced to practice during the conduct of work under the 2017 SRA utilizing facilities or personnel of SUNY RF, SUNY Poly, or SUNY exclusively.

481. Inpria and JSR breached the 2017 SRA when they used and continue to use SUNY RF's FOUNDATION Inventions, as described in the 2017 SRA, Section 9(a)–(d), without a license.

482. Inpria and JSR used and continue to use SUNY RF's FOUNDATION Inventions for commercial purposes, including but not limited to each instance of using, manufacturing, offering for sale, selling, exporting, and licensing EUV metal oxide photoresists and related materials.



483. By using and continuing to use SUNY RF's FOUNDATION Inventions without a license, Inpria and JSR also breached and continue to breach Section 9(j) of the 2017 SRA, which established a continuing obligation to protect the ownership rights set forth in Section 9, including SUNY RF's ownership rights over its FOUNDATION Inventions.

484. Inpria and JSR also breached and continue to breach the 2017 SRA by incorporating SUNY RF's FOUNDATION Inventions into the provisional patent applications and patent applications that matured or will mature into the Challenged Patents.

485. Inpria's and JSR's unpermitted and continued use of SUNY RF's FOUNDATION Inventions also breached and continues to breach the covenant of good faith and fair dealing that is implied by law in all contracts.

486. As a direct and proximate cause of Inpria's and JSR's material and continuing breaches of the 2017 SRA and amendment thereto, SUNY RF has been damaged and will continue to suffer damages as alleged herein in an amount to be proven at trial.

**SIXTH CLAIM FOR RELIEF**  
**Breach of Contract – 2017 SRA § 9(e)–(f) (JOINT IP)**

487. SUNY RF realleges and incorporates herein the allegations of the paragraphs above of this complaint as if fully set forth herein.

488. The 2017 SRA is a binding and enforceable contract.

489. The 2017 SRA is binding upon the successors, assigns, heirs, and personal representatives of Inpria, including JSR.

490. SUNY RF has performed all its obligations under the 2017 SRA.

491. SUNY RF and Inpria held joint title to JOINT IP, which was generated, conceived, or reduced to practice during the conduct of work under the 2017 SRA that are not FOUNDATION Inventions or SPONSOR Inventions.

492. To the extent Defendants argue the FOUNDATION Inventions are JOINT IP, in the alternative, Inpria and JSR nevertheless breached the 2017 SRA when they used and continue to use SUNY RF's interest in the JOINT IP, as described in the 2017 SRA, Section 9(e)–(f), without a license.

493. Inpria and JSR used and continue to use SUNY RF's interest in the JOINT IP for commercial purposes, including but not limited to each instance of using, manufacturing, offering for sale, selling, exporting, and licensing EUV metal oxide photoresists and related materials.

494. By using and continuing to use SUNY RF's interest in JOINT IP without a license, Inpria and JSR also breached and continue to breach Section 9(j) of the 2017 SRA, which established a continuing obligation to protect the ownership rights set forth in Section 9, including SUNY RF's interest in the JOINT IP.

495. Inpria and JSR also breached and continue to breach the 2017 SRA by incorporating SUNY RF's interest in the JOINT IP into the provisional patent applications and patent applications that matured and will continue to mature into the Challenged Patents.

496. Inpria's and JSR's unpermitted and continued use of SUNY RF's interest in the JOINT IP also breached and continues to breach the covenant of good faith and fair dealing that is implied by law in all contracts.

497. As a direct and proximate cause of Inpria's and JSR's material and continuing breaches of the 2017 SRA and amendment thereto, SUNY RF has been damaged and will continue to suffer damages as alleged herein in an amount to be proven at trial. Correction Of Inventorship

**Correction of Inventorship**

**SEVENTH CLAIM FOR RELIEF**

**Correction Of Inventorship of U.S. Patent 10,627,719 Under 35 U.S.C. § 256  
(Dr. Brainard as Sole Inventor)**

498. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

499. Dr. Brainard is the sole inventor of one or more claims of the '719 Patent.

500. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '719 Patent as the inventor of one or more the inventions claimed in the '719 Patent.

501. The omission of Dr. Brainard as the inventor on the '719 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**EIGHTH CLAIM FOR RELIEF**

**Correction Of Inventorship of U.S. Patent 10,627,719 Under 35 U.S.C. § 256  
(Dr. Brainard as Joint Inventor)**

502. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

503. Dr. Brainard is a joint inventor of one or more claims of the '719 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '719 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

504. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '719 Patent as joint inventor of one or more of the inventions claimed in the '719 Patent.

505. The omission of Dr. Brainard as the joint inventor of one or more claims of the '719 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,627,719 Under 35 U.S.C. § 256**  
**(Jodi Hotalen as Sole Inventor)**

506. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

507. Jodi Hotalen is the sole inventor of one or more claims of the '719 Patent.

508. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '719 Patent as the inventor of one or more the inventions claimed in the '719 Patent.

509. The omission of Jodi Hotalen as the inventor on the '719 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**TENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,627,719 Under 35 U.S.C. § 256**  
**(Jodi Hotalen as Joint Inventor)**

510. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

511. Jodi Hotalen is a joint inventor of one or more claims of the '719 Patent. Jodi Hotalen provided significant contributions to the conception and reduction to practice of the inventions claimed in the '719 Patent, her contributions were significant in quality, and Jodi Hotalen did more than explain to the purported inventors well-known concepts and the current state of the art.

512. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '719 Patent as joint inventor of one or more of the inventions claimed in the '719 Patent.

513. The omission of Jodi Hotalen as the joint inventor of one or more claims of the '719 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**ELEVENTH CLAIM FOR RELIEF**

**Correction Of Inventorship of U.S. Patent 10,627,719 Under 35 U.S.C. § 256**  
**(William Earley as Sole Inventor)**

514. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

515. William Earley is the sole inventor of one or more claims of the '719 Patent.

516. Through omission, inadvertence, and/or error, William Earley was not listed on the '719 Patent as the inventor of one or more the inventions claimed in the '719 Patent.

517. The omission of William Earley as the inventor on the '719 Patent occurred without any deceptive intent on the part of William Earley.

**TWELFTH CLAIM FOR RELIEF**

**Correction Of Inventorship of U.S. Patent 10,627,719 Under 35 U.S.C. § 256**  
**(William Earley as Joint Inventor)**

518. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

519. William Earley is a joint inventor of one or more claims of the '719 Patent. William Earley provided significant contributions to the conception and reduction to practice of the inventions claimed in the '719 Patent, his contributions were significant in quality, and William Earley did more than explain to the purported inventors well-known concepts and the current state of the art.

520. Through omission, inadvertence, and/or error, William Earley was not listed on the '719 Patent as joint inventor of one or more of the inventions claimed in the '719 Patent.

521. The omission of William Earley as the joint inventor of one or more claims of the '719 Patent occurred without any deceptive intent on the part of William Earley.

**THIRTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,187,986 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

522. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

523. Dr. Brainard is the sole inventor of one or more claims of the '986 Patent.

524. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '986 Patent as the inventor of one or more the inventions claimed in the '986 Patent.

525. The omission of Dr. Brainard as the inventor on the '986 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**FOURTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,187,986 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

526. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

527. Dr. Brainard is a joint inventor of one or more claims of the '986 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '986 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

528. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '986 Patent as joint inventor of one or more of the inventions claimed in the '986 Patent.

529. The omission of Dr. Brainard as the joint inventor of one or more claims of the '986 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**FIFTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,187,986 Under 35 U.S.C. § 256**  
**(Jodi Hotalen as Sole Inventor)**

530. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

531. Jodi Hotalen is the sole inventor of one or more claims of the '986 Patent.

532. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '986 Patent as the inventor of one or more the inventions claimed in the '986 Patent.

533. The omission of Jodi Hotalen as the inventor on the '986 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**SIXTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,187,986 Under 35 U.S.C. § 256**  
**(Jodi Hotalen as Joint Inventor)**

534. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

535. Jodi Hotalen is a joint inventor of one or more claims of the '986 Patent. Jodi Hotalen provided significant contributions to the conception and reduction to practice of the inventions claimed in the '986 Patent, her contributions were significant in quality, and Jodi Hotalen did more than explain to the purported inventors well-known concepts and the current state of the art.

536. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '986 Patent as joint inventor of one or more of the inventions claimed in the '986 Patent.

537. The omission of Jodi Hotalen as the joint inventor of one or more claims of the '986 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**SEVENTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,187,986 Under 35 U.S.C. § 256**  
**(William Earley as Sole Inventor)**

538. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

539. William Earley is the sole inventor of one or more claims of the '986 Patent.

540. Through omission, inadvertence, and/or error, William Earley was not listed on the '986 Patent as the inventor of one or more the inventions claimed in the '986 Patent.

541. The omission of William Early as the inventor on the '986 Patent occurred without any deceptive intent on the part of William Earley.

**EIGHTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,187,986 Under 35 U.S.C. § 256**  
**(William Earley as Joint Inventor)**

542. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

543. William Earley is a joint inventor of one or more claims of the '986 Patent. William Earley provided significant contributions to the conception and reduction to practice of the inventions claimed in the '986 Patent, his contributions were significant in quality, and William Earley did more than explain to the purported inventors well-known concepts and the current state of the art.

544. Through omission, inadvertence, and/or error, William Earley was not listed on the '986 Patent as joint inventor of one or more of the inventions claimed in the '986 Patent.

545. The omission of William Earley as the joint inventor of one or more claims of the '986 Patent occurred without any deceptive intent on the part of William Earley.



**NINETEENTH CLAIM FOR RELIEF**

**Correction Of Inventorship of U.S. Patent 11,740,559 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

546. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

547. Dr. Brainard is the sole inventor of one or more claims of the '559 Patent.

548. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '559 Patent as the inventor of one or more the inventions claimed in the '559 Patent.

549. The omission of Dr. Brainard as the inventor on the '559 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWENTIETH CLAIM FOR RELIEF**

**Correction Of Inventorship of U.S. Patent 11,740,559 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

550. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

551. Dr. Brainard is a joint inventor of one or more claims of the '559 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '559 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

552. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '559 Patent as joint inventor of one or more of the inventions claimed in the '559 Patent.

553. The omission of Dr. Brainard as the joint inventor of one or more claims of the '559 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWENTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,740,559 Under 35 U.S.C. § 256**  
**(Jodi Hotalen as Sole Inventor)**

554. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

555. Jodi Hotalen is the sole inventor of one or more claims of the '559 Patent.

556. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '559 Patent as the inventor of one or more the inventions claimed in the '559 Patent.

557. The omission of Jodi Hotalen as the inventor on the '559 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**TWENTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,740,559 Under 35 U.S.C. § 256**

558. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

559. Jodi Hotalen is a joint inventor of one or more claims of the '559 Patent. Jodi Hotalen provided significant contributions to the conception and reduction to practice of the inventions claimed in the '559 Patent, her contributions were significant in quality, and Jodi Hotalen did more than explain to the purported inventors well-known concepts and the current state of the art.

560. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '559 Patent as joint inventor of one or more of the inventions claimed in the '559 Patent.

561. The omission of Jodi Hotalen as the joint inventor of one or more claims of the '559 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**TWENTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,740,559 Under 35 U.S.C. § 256**  
**(William Earley as Sole Inventor)**

562. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

563. William Earley is the sole inventor of one or more claims of the '559 Patent.

564. Through omission, inadvertence, and/or error, William Earley was not listed on the '559 Patent as the inventor of one or more the inventions claimed in the '559 Patent.

565. The omission of William Earley as the inventor on the '559 Patent occurred without any deceptive intent on the part of William Earley.

**TWENTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,740,559 Under 35 U.S.C. § 256**  
**(William Earley as Joint Inventor)**

566. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

567. William Earley is a joint inventor of one or more claims of the '559 Patent. William Earley provided significant contributions to the conception and reduction to practice of the inventions claimed in the '559 Patent, his contributions were significant in quality, and William Earley did more than explain to the purported inventors well-known concepts and the current state of the art.

568. Through omission, inadvertence, and/or error, William Earley was not listed on the '559 Patent as joint inventor of one or more of the inventions claimed in the '559 Patent.

569. The omission of William Earley as the joint inventor of one or more claims of the '559 Patent occurred without any deceptive intent on the part of William Earley.

**TWENTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

570. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

571. Dr. Brainard is the sole inventor of one or more claims of the '874 Patent.

572. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '874 Patent as the inventor of one or more the inventions claimed in the '874 Patent.

573. The omission of Dr. Brainard as the inventor on the '874 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWENTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

574. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

575. Dr. Brainard is a joint inventor of one or more claims of the '874 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '874 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

576. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '874 Patent as joint inventor of one or more of the inventions claimed in the '874 Patent.

577. The omission of Dr. Brainard as the joint inventor of one or more claims of the '874 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWENTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Miriam Sortland as Sole Inventor)**

578. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

579. Miriam Sortland is the sole inventor of one or more claims of the '874 Patent.

580. Through omission, inadvertence, and/or error, Miriam Sortland was not listed on the '874 Patent as the inventor of one or more the inventions claimed in the '874 Patent.

581. The omission of Miriam Sortland as the inventor on the '874 Patent occurred without any deceptive intent on the part of Miriam Sortland.

**TWENTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Miriam Sortland as Joint Inventor)**

582. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

583. Miriam Sortland is a joint inventor of one or more claims of the '874 Patent. Miriam Sortland provided significant contributions to the conception and reduction to practice of the inventions claimed in the '874 Patent, her contributions were significant in quality, and Miriam Sortland did more than explain to the purported inventors well-known concepts and the current state of the art.

584. Through omission, inadvertence, and/or error, Miriam Sortland was not listed on the '874 Patent as joint inventor of one or more of the inventions claimed in the '874 Patent.

585. The omission of Miriam Sortland as the joint inventor of one or more claims of the '874 Patent occurred without any deceptive intent on the part of Miriam Sortland.

**TWENTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

586. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

587. Ryan Del Re is the sole inventor of one or more claims of the '874 Patent.

588. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '874 Patent as the inventor of one or more the inventions claimed in the '874 Patent.

589. The omission of Ryan Del Re as the inventor on the '874 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**THIRTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

590. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

591. Ryan Del Re is a joint inventor of one or more claims of the '874 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '874 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

592. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '874 Patent as joint inventor of one or more of the inventions claimed in the '874 Patent.

593. The omission of Ryan Del Re as the joint inventor of one or more claims of the '874 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**THIRTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Jodi Hotalen as Sole Inventor)**

594. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

595. Jodi Hotalen is the sole inventor of one or more claims of the '874 Patent.

596. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '874 Patent as the inventor of one or more the inventions claimed in the '874 Patent.

597. The omission of Jodi Hotalen as the inventor on the '874 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**THIRTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(Jodi Hotalen as Joint Inventor)**

598. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

599. Jodi Hotalen is a joint inventor of one or more claims of the '874 Patent. Jodi Hotalen provided significant contributions to the conception and reduction to practice of the inventions claimed in the '874 Patent, her contributions were significant in quality, and Jodi Hotalen did more than explain to the purported inventors well-known concepts and the current state of the art.

600. Through omission, inadvertence, and/or error, Jodi Hotalen was not listed on the '874 Patent as joint inventor of one or more of the inventions claimed in the '874 Patent.

601. The omission of Jodi Hotalen as the joint inventor of one or more claims of the '874 Patent occurred without any deceptive intent on the part of Jodi Hotalen.

**THIRTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(William Earley as Sole Inventor)**

602. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

603. William Earley is the sole inventor of one or more claims of the '874 Patent.

604. Through omission, inadvertence, and/or error, William Earley was not listed on the '874 Patent as the inventor of one or more the inventions claimed in the '874 Patent.

605. The omission of William Earley as the inventor on the '874 Patent occurred without any deceptive intent on the part of William Earley.

**THIRTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,480,874 Under 35 U.S.C. § 256**  
**(William Earley as Joint Inventor)**

606. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

607. William Earley is a joint inventor of one or more claims of the '874 Patent. William Earley provided significant contributions to the conception and reduction to practice of the inventions claimed in the '874 Patent, his contributions were significant in quality, and William Earley did more than explain to the purported inventors well-known concepts and the current state of the art.

608. Through omission, inadvertence, and/or error, William Earley was not listed on the '874 Patent as joint inventor of one or more of the inventions claimed in the '874 Patent.

609. The omission of William Earley as the joint inventor of one or more claims of the '874 Patent occurred without any deceptive intent on the part of William Earley.



**THIRTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

610. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

611. Dr. Brainard is the sole inventors of one or more claims of the '684 Patent.

612. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '684 Patent.

613. The omission of Dr. Brainard as the inventor on the '684 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**THIRTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

614. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

615. Dr. Brainard is a joint inventor of one or more claims of the '684 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '684 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

616. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '684 Patent as a joint inventor of one or more of the inventions claimed in the '684 Patent.

617. The omission of Dr. Brainard as a joint inventor of one or more claims of the '684 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**THIRTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Sole Inventor)**

618. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

619. Brian Cardineau is the sole inventors of one or more claims of the '684 Patent.

620. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '684 Patent.

621. The omission of Brian Cardineau as the inventor on the '684 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**THIRTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Joint Inventor)**

622. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

623. Brian Cardineau is a joint inventor of one or more claims of the '684 Patent. Brian Cardineau provided significant contributions to the conception and reduction to practice of the inventions claimed in the '684 Patent, his contributions were significant in quality, and Brian Cardineau did more than explain to the purported inventors well-known concepts and the current state of the art.

624. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '684 Patent as a joint inventor of one or more of the inventions claimed in the '684 Patent.

625. The omission of Brian Cardineau as a joint inventor of one or more claims of the '684 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**THIRTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

626. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

627. Dan Freedman is the sole inventors of one or more claims of the '684 Patent.

628. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '684 Patent.

629. The omission of Dan Freedman as the inventor on the '684 Patent occurred without any deceptive intent on the part of Dan Freedman.

**FORTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

630. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

631. Dan Freedman is a joint inventor of one or more claims of the '684 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '684 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

632. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '684 Patent as a joint inventor of one or more of the inventions claimed in the '684 Patent.

633. The omission of Dan Freedman as a joint inventor of one or more claims of the '684 Patent occurred without any deceptive intent on the part of Dan Freedman.

**FORTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

634. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

635. Miles Marnell is the sole inventors of one or more claims of the '684 Patent.

636. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '684 Patent.

637. The omission of Miles Marnell as the inventor on the '684 Patent occurred without any deceptive intent on the part of Miles Marnell.

**FORTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

638. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

639. Miles Marnell is a joint inventor of one or more claims of the '684 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '684 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

640. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '684 Patent as a joint inventor of one or more of the inventions claimed in the '684 Patent.

641. The omission of Miles Marnell as a joint inventor of one or more claims of the '684 Patent occurred without any deceptive intent on the part of Miles Marnell.

**FORTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

642. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

643. James Passarelli is the sole inventors of one or more claims of the '684 Patent.

644. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '684 Patent.

645. The omission of James Passarelli as the inventor on the '684 Patent occurred without any deceptive intent on the part of James Passarelli.

**FORTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,310,684 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

646. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

647. James Passarelli is a joint inventor of one or more claims of the '684 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '684 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

648. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '684 Patent as a joint inventor of one or more of the inventions claimed in the '684 Patent.

649. The omission of James Passarelli as a joint inventor of one or more of the '684 Patent occurred without any deceptive intent on the part of James Passarelli.

**FORTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Dr. Brainard Sole Inventor)**

650. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

651. Dr. Brainard is the sole inventor of one or more claims of the '179 Patent.

652. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '179 Patent as the inventor of one or more of the inventions claimed in the '179 Patent.

653. The omission of Dr. Brainard as the inventor on the '179 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**FORTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

654. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

655. Dr. Brainard is a joint inventor of one or more claims of the '179 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '179 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

656. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '179 Patent as a joint inventor of one or more of the inventions claimed in the '179 Patent.

657. The omission of Dr. Brainard as a joint inventor of one or more claims of the '179 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**FORTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Brian Cardineau Sole Inventor)**

658. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

659. Brian Cardineau is the sole inventor of one or more claims of the '179 Patent.

660. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '179 Patent as the inventor of one or more of the inventions claimed in the '179 Patent.

661. The omission of Brian Cardineau as the inventor on the '179 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**FORTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Joint Inventor)**

662. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

663. Brian Cardineau is a joint inventor of one or more claims of the '179 Patent. Brian Cardineau provided significant contributions to the conception and reduction to practice of the inventions claimed in the '179 Patent, his contributions were significant in quality, and Brian Cardineau did more than explain to the purported inventors well-known concepts and the current state of the art.

664. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '179 Patent as a joint inventor of one or more of the inventions claimed in the '179 Patent.

665. The omission of Brian Cardineau as a joint inventor of one or more claims of the '179 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**FORTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Dan Freedman Sole Inventor)**

666. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

667. Dan Freedman is the sole inventor of one or more claims of the '179 Patent.

668. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '179 Patent as the inventor of one or more of the inventions claimed in the '179 Patent.

669. The omission of Dan Freedman as the inventor on the '179 Patent occurred without any deceptive intent on the part of Dan Freedman.

**FIFTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

670. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

671. Dan Freedman is a joint inventor of one or more claims of the '179 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '179 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

672. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '179 Patent as a joint inventor of one or more of the inventions claimed in the '179 Patent.

673. The omission of Dan Freedman as a joint inventor of one or more claims of the '179 Patent occurred without any deceptive intent on the part of Dan Freedman.



**FIFTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Miles Marnell Sole Inventor)**

674. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

675. Miles Marnell is the sole inventor of one or more claims of the '179 Patent.

676. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '179 Patent as the inventor of one or more of the inventions claimed in the '179 Patent.

677. The omission of Miles Marnell as the inventor on the '179 Patent occurred without any deceptive intent on the part of Miles Marnell.

**FIFTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

678. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

679. Miles Marnell is a joint inventor of one or more claims of the '179 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '179 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

680. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '179 Patent as a joint inventor of one or more of the inventions claimed in the '179 Patent.

681. The omission of Miles Marnell as a joint inventor of one or more claims of the '179 Patent occurred without any deceptive intent on the part of Miles Marnell.

**FIFTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(James Passarelli Sole Inventor)**

682. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

683. James Passarelli is the sole inventor of one or more claims of the '179 Patent.

684. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '179 Patent as the inventor of one or more of the inventions claimed in the '179 Patent.

685. The omission of James Passarelli as the inventor on the '179 Patent occurred without any deceptive intent on the part of James Passarelli.

**FIFTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,025,179 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

686. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

687. James Passarelli is a joint inventor of one or more claims of the '179 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '179 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

688. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '179 Patent as a joint inventor of one or more of the inventions claimed in the '179 Patent.

689. The omission of James Passarelli as a joint inventor of one or more claims of the '179 Patent occurred without any deceptive intent on the part of James Passarelli.

**FIFTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

690. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

691. Dr. Brainard is the sole inventor of one or more claims of the '554 Patent.

692. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '554 Patent.

693. The omission of Dr. Brainard as the inventor on the '554 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**FIFTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

694. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

695. Dr. Brainard is a joint inventor of one or more claims of the '554 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '554 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

696. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '554 Patent as a joint inventor of one or more of the inventions claimed in the '554 Patent.

697. The omission of Dr. Brainard as a joint inventor of one or more claims of the '554 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**FIFTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Sole Inventor)**

698. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

699. Brian Cardineau is the sole inventor of one or more claims of the '554 Patent.

700. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '554 Patent.

701. The omission of Brian Cardineau as the inventor on the '554 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**FIFTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Joint Inventor)**

702. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

703. Brian Cardineau is a joint inventor of one or more claims of the '554 Patent. Brian Cardineau provided significant contributions to the conception and reduction to practice of the inventions claimed in the '554 Patent, his contributions were significant in quality, and Brian Cardineau did more than explain to the purported inventors well-known concepts and the current state of the art.

704. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '554 Patent as a joint inventor of one or more of the inventions claimed in the '554 Patent.

705. The omission of Brian Cardineau as a joint inventor of one or more claims of the '554 Patent occurred without any deceptive intent on the part Brian Cardineau.

**FIFTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

706. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

707. Dan Freedman is the sole inventor of one or more claims of the '554 Patent.

708. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '554 Patent.

709. The omission of Dan Freedman as the inventor on the '554 Patent occurred without any deceptive intent on the part of Dan Freedman.

**SIXTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

710. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

711. Dan Freedman is a joint inventor of one or more claims of the '554 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '554 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

712. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '554 Patent as a joint inventor of one or more of the inventions claimed in the '554 Patent.

713. The omission of Dan Freedman as a joint inventor of one or more claims of the '554 Patent occurred without any deceptive intent on the part Dan Freedman.

**SIXTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

714. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

715. Miles Marnell is the sole inventor of one or more claims of the '554 Patent.

716. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '554 Patent.

717. The omission of Miles Marnell as the inventor on the '554 Patent occurred without any deceptive intent on the part of Miles Marnell.

**SIXTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

718. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

719. Miles Marnell is a joint inventor of one or more claims of the '554 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '554 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

720. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '554 Patent as a joint inventor of one or more of the inventions claimed in the '554 Patent.

721. The omission of Miles Marnell as a joint inventor of one or more claims of the '554 Patent occurred without any deceptive intent on the part Miles Marnell.

**SIXTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

722. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

723. James Passarelli is the sole inventor of one or more claims of the '554 Patent.

724. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '684 Patent as the inventor of one or more of the inventions claimed in the '554 Patent.

725. The omission of James Passarelli as the inventor on the '554 Patent occurred without any deceptive intent on the part of James Passarelli.

**SIXTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,416,554 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

726. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

727. James Passarelli is a joint inventor of one or more claims of the '554 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '554 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

728. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '554 Patent as a joint inventor of one or more of the inventions claimed in the '554 Patent.

729. The omission of James Passarelli as a joint inventor of one or more claims of the '554 Patent occurred without any deceptive intent on the part James Passarelli.

**SIXTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

730. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

731. Dr. Brainard is the sole inventor of one or more claims of the '618 Patent.

732. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '618 Patent as the inventor of one or more the inventions claimed in the '618 Patent.

733. The omission of Dr. Brainard as the inventor on the '618 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**SIXTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

734. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

735. Dr. Brainard is a joint inventor of one or more claims of the '618 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '618 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

736. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '618 Patent as a joint inventor of one or more of the inventions claimed in the '618 Patent.

737. The omission of Dr. Brainard as a joint inventor of one or more claims of the '618 Patent occurred without any deceptive intent on the part of Dr. Brainard.



**SIXTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

738. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

739. Dan Freedman is the sole inventor of one or more claims of the '618 Patent.

740. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '618 Patent as the inventor of one or more the inventions claimed in the '618 Patent.

741. The omission Dan Freedman as the inventor on the '618 Patent occurred without any deceptive intent on the part of Dan Freedman.

**SIXTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

742. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

743. Dan Freedman is a joint inventor of one or more claims of the '618 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '618 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

744. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '618 Patent as a joint inventor of one or more of the inventions claimed in the '618 Patent.

745. The omission of Dan Freedman as a joint inventor of one or more claims of the '618 Patent occurred without any deceptive intent on the part of Dan Freedman.

**SIXTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

746. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

747. Miles Marnell is the sole inventor of one or more claims of the '618 Patent.

748. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '618 Patent as the inventor of one or more the inventions claimed in the '618 Patent.

749. The omission Miles Marnell as the inventor on the '618 Patent occurred without any deceptive intent on the part of Miles Marnell.

**SEVENTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

750. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

751. Miles Marnell is a joint inventor of one or more claims of the '618 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '618 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

752. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '618 Patent as a joint inventor of one or more of the inventions claimed in the '618 Patent.

753. The omission of Miles Marnell as a joint inventor of one or more claims of the '618 Patent occurred without any deceptive intent on the part of Miles Marnell.

**SEVENTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

754. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

755. James Passarelli is the sole inventor of one or more claims of the '618 Patent.

756. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '618 Patent as the inventor of one or more the inventions claimed in the '618 Patent.

757. The omission James Passarelli as the inventor on the '618 Patent occurred without any deceptive intent on the part of James Passarelli.

**SEVENTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

758. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

759. James Passarelli is a joint inventor of one or more claims of the '618 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '618 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

760. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '618 Patent as a joint inventor of one or more of the inventions claimed in the '618 Patent.

761. The omission of James Passarelli as a joint inventor of one or more claims of the '618 Patent occurred without any deceptive intent on the part of James Passarelli.

**SEVENTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

762. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

763. Ryan Del Re is the sole inventor of one or more claims of the '618 Patent.

764. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '618 Patent as the inventor of one or more the inventions claimed in the '618 Patent.

765. The omission Ryan Del Re as the inventor on the '618 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**SEVENTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

766. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

767. Ryan Del Re is a joint inventor of one or more claims of the '618 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '618 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

768. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '618 Patent as a joint inventor of one or more of the inventions claimed in the '618 Patent.

769. The omission of Ryan Del Re as a joint inventor of one or more claims of the '618 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**SEVENTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

770. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

771. Michael Murphy is the sole inventor of one or more claims of the '618 Patent.

772. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '618 Patent as the inventor of one or more the inventions claimed in the '618 Patent.

773. The omission Michael Murphy as the inventor on the '618 Patent occurred without any deceptive intent on the part of Michael Murphy.

**SEVENTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,228,618 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

774. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

775. Michael Murphy is a joint inventor of one or more claims of the '618 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '618 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

776. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '618 Patent as a joint inventor of one or more of the inventions claimed in the '618 Patent.

777. The omission of Michael Murphy as a joint inventor of one or more claims of the '618 Patent occurred without any deceptive intent on the part of Michael Murphy.

**SEVENTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

778. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

779. Dr. Brainard is the sole inventor of one or more claims of the '505 Patent.

780. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '505 Patent as the inventor of one or more the inventions claimed in the '505 Patent.

781. The omission of Dr. Brainard as the inventor on the '505 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**SEVENTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

782. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

783. Dr. Brainard is a joint inventor of one or more claims of the '505 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '505 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

784. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '505 Patent as joint inventor of one or more of the inventions claimed in the '505 Patent.

785. The omission of Dr. Brainard as the joint inventor of one or more claims of the '505 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**SEVENTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

786. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

787. Dan Freedman is the sole inventor of one or more claims of the '505 Patent.

788. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '505 Patent as the inventor of one or more the inventions claimed in the '505 Patent.

789. The omission of Dan Freedman as the inventor on the '505 Patent occurred without any deceptive intent on the part of Dan Freedman.

**EIGHTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

790. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

791. Dan Freedman is a joint inventor of one or more claims of the '505 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '505 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

792. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '505 Patent as joint inventor of one or more of the inventions claimed in the '505 Patent.

793. The omission of Dan Freedman as the joint inventor of one or more claims of the '505 Patent occurred without any deceptive intent on the part of Dan Freedman.

**EIGHTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

794. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

795. Miles Marnell is the sole inventor of one or more claims of the '505 Patent.

796. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '505 Patent as the inventor of one or more the inventions claimed in the '505 Patent.

797. The omission of Miles Marnell as the inventor on the '505 Patent occurred without any deceptive intent on the part of Miles Marnell.

**EIGHTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

798. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

799. Miles Marnell is a joint inventor of one or more claims of the '505 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '505 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

800. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '505 Patent as joint inventor of one or more of the inventions claimed in the '505 Patent.

801. The omission of Miles Marnell as the joint inventor of one or more claims of the '505 Patent occurred without any deceptive intent on the part Miles Marnell.



**EIGHTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

802. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

803. James Passarelli is the sole inventor of one or more claims of the '505 Patent.

804. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '505 Patent as the inventor of one or more the inventions claimed in the '505 Patent.

805. The omission of James Passarelli as the inventor on the '505 Patent occurred without any deceptive intent on the part of James Passarelli.

**EIGHTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

806. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

807. James Passarelli is a joint inventor of one or more claims of the '505 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '505 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

808. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '505 Patent as joint inventor of one or more of the inventions claimed in the '505 Patent.

809. The omission of James Passarelli as the joint inventor of one or more claims of the '505 Patent occurred without any deceptive intent on the part James Passarelli.

**EIGHTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

810. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

811. Ryan Del Re is the sole inventor of one or more claims of the '505 Patent.

812. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '505 Patent as the inventor of one or more the inventions claimed in the '505 Patent.

813. The omission of Ryan Del Re as the inventor on the '505 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**EIGHTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

814. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

815. Ryan Del Re is a joint inventor of one or more claims of the '505 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '505 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

816. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '505 Patent as joint inventor of one or more of the inventions claimed in the '505 Patent.

817. The omission of Ryan Del Re as the joint inventor of one or more claims of the '505 Patent occurred without any deceptive intent on the part Ryan Del Re.

**EIGHTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

818. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

819. Michael Murphy is the sole inventor of one or more claims of the '505 Patent.

820. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '505 Patent as the inventor of one or more the inventions claimed in the '505 Patent.

821. The omission of Michael Murphy as the inventor on the '505 Patent occurred without any deceptive intent on the part of Michael Murphy.

**EIGHTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,732,505 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

822. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

823. Michael Murphy is a joint inventor of one or more claims of the '505 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '505 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

824. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '505 Patent as joint inventor of one or more of the inventions claimed in the '505 Patent.

825. The omission of Michael Murphy as the joint inventor of one or more claims of the '505 Patent occurred without any deceptive intent on the part Michael Murphy.

**EIGHTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

826. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

827. Dr. Brainard is the sole inventor of one or more claims of the '696 Patent.

828. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '696 Patent as an inventor of one or more the inventions claimed in the '696 Patent.

829. The omission of Dr. Brainard as an inventor on the '696 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**NINTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

830. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

831. Dr. Brainard is a joint inventor of one or more claims of the '696 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '696 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

832. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '696 Patent as a joint inventor of one or more of the inventions claimed in the '696 Patent.

833. The omission of Dr. Brainard as a joint inventor of one or more claims of the '696 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**NINETY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

834. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

835. Dan Freedman is the sole inventor of one or more claims of the '696 Patent.

836. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '696 Patent as an inventor of one or more the inventions claimed in the '696 Patent.

837. The omission of Dan Freedman as an inventor on the '696 Patent occurred without any deceptive intent on the part of Dan Freedman.

**NINETY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

838. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

839. Dan Freedman is a joint inventor of one or more claims of the '696 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '696 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

840. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '696 Patent as a joint inventor of one or more of the inventions claimed in the '696 Patent.

841. The omission of Dan Freedman as a joint inventor of one or more claims of the '696 Patent occurred without any deceptive intent on the part of Dan Freedman.

**NINETY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

842. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

843. Miles Marnell is the sole inventor of one or more claims of the '696 Patent.

844. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '696 Patent as an inventor of one or more the inventions claimed in the '696 Patent.

845. The omission of Miles Marnell as an inventor on the '696 Patent occurred without any deceptive intent on the part of Miles Marnell.

**NINETY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

846. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

847. Miles Marnell is a joint inventor of one or more claims of the '696 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '696 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

848. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '696 Patent as a joint inventor of one or more of the inventions claimed in the '696 Patent.

849. The omission of Miles Marnell as a joint inventor of one or more claims of the '696 Patent occurred without any deceptive intent on the part of Miles Marnell.

**NINETY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

850. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

851. James Passarelli is the sole inventor of one or more claims of the '696 Patent.

852. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '696 Patent as an inventor of one or more the inventions claimed in the '696 Patent.

853. The omission of James Passarelli as an inventor on the '696 Patent occurred without any deceptive intent on the part of James Passarelli.

**NINETY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

854. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

855. James Passarelli is a joint inventor of one or more claims of the '696 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '696 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

856. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '696 Patent as a joint inventor of one or more of the inventions claimed in the '696 Patent.

857. The omission of James Passarelli as a joint inventor of one or more claims of the '696 Patent occurred without any deceptive intent on the part of James Passarelli.

**NINETY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

858. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

859. Ryan Del Re is the sole inventor of one or more claims of the '696 Patent.

860. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '696 Patent as an inventor of one or more the inventions claimed in the '696 Patent.

861. The omission of Ryan Del Re as an inventor on the '696 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**NINETY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

862. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

863. Ryan Del Re is a joint inventor of one or more claims of the '696 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '696 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

864. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '696 Patent as a joint inventor of one or more of the inventions claimed in the '696 Patent.

865. The omission of Ryan Del Re as a joint inventor of one or more claims of the '696 Patent occurred without any deceptive intent on the part of Ryan Del Re.



**NINETY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

866. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

867. Michael Murphy is the sole inventor of one or more claims of the '696 Patent.

868. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '696 Patent as an inventor of one or more the inventions claimed in the '696 Patent.

869. The omission of Michael Murphy as an inventor on the '696 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDREDTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,775,696 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

870. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

871. Michael Murphy is a joint inventor of one or more claims of the '696 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '696 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

872. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '696 Patent as a joint inventor of one or more of the inventions claimed in the '696 Patent.

873. The omission of Michael Murphy as a joint inventor of one or more claims of the '696 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

874. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

875. Dr. Brainard is the sole inventor of one or more claims of the '048 Patent.

876. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '048 Patent as an inventor of one or more the inventions claimed in the '048 Patent.

877. The omission of Dr. Brainard as an inventor on the '048 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

878. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

879. Dr. Brainard is a joint inventor of one or more claims of the '048 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '048 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

880. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '048 Patent as a joint inventor of one or more of the inventions claimed in the '048 Patent.

881. The omission of Dr. Brainard as a joint inventor of one or more claims of the '048 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

882. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

883. Dan Freedman is the sole inventor of one or more claims of the '048 Patent.

884. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '048 Patent as an inventor of one or more the inventions claimed in the '048 Patent.

885. The omission of Dan Freedman as an inventor on the '048 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

886. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

887. Dan Freedman is a joint inventor of one or more claims of the '048 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '048 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

888. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '048 Patent as a joint inventor of one or more of the inventions claimed in the '048 Patent.

889. The omission of Dan Freedman as a joint inventor of one or more claims of the '048 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

890. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

891. Miles Marnell is the sole inventor of one or more claims of the '048 Patent.

892. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '048 Patent as an inventor of one or more the inventions claimed in the '048 Patent.

893. The omission of Miles Marnell as an inventor on the '048 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

894. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

895. Miles Marnell is a joint inventor of one or more claims of the '048 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '048 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

896. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '048 Patent as a joint inventor of one or more of the inventions claimed in the '048 Patent.

897. The omission of Miles Marnell as a joint inventor of one or more claims of the '048 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

898. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

899. James Passarelli is the sole inventor of one or more claims of the '048 Patent.

900. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '048 Patent as an inventor of one or more the inventions claimed in the '048 Patent.

901. The omission of James Passarelli as an inventor on the '048 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

902. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

903. James Passarelli is a joint inventor of one or more claims of the '048 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '048 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

904. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '048 Patent as a joint inventor of one or more of the inventions claimed in the '048 Patent.

905. The omission of James Passarelli as a joint inventor of one or more claims of the '048 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

906. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

907. Ryan Del Re is the sole inventor of one or more claims of the '048 Patent.

908. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '048 Patent as an inventor of one or more the inventions claimed in the '048 Patent.

909. The omission of Ryan Del Re as an inventor on the '048 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-TENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

910. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

911. Ryan Del Re is a joint inventor of one or more claims of the '048 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '048 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

912. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '048 Patent as a joint inventor of one or more of the inventions claimed in the '048 Patent.

913. The omission of Ryan Del Re as a joint inventor of one or more claims of the '048 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-ELEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

914. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

915. Michael Murphy is the sole inventor of one or more claims of the '048 Patent.

916. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '048 Patent as an inventor of one or more the inventions claimed in the '048 Patent.

917. The omission of Michael Murphy as an inventor on the '048 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-TWELFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,537,048 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

918. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

919. Michael Murphy is a joint inventor of one or more claims of the '048 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '048 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

920. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '048 Patent as a joint inventor of one or more of the inventions claimed in the '048 Patent.

921. The omission of Michael Murphy as a joint inventor of one or more claims of the '048 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-THIRTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

922. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

923. Dr. Brainard is the sole inventor of one or more claims of the '924 Patent.

924. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '924 Patent as an inventor of one or more the inventions claimed in the '924 Patent.

925. The omission of Dr. Brainard as the inventor on the '924 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-FOURTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

926. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

927. Dr. Brainard is a joint inventor of one or more claims of the '924 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '924 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

928. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '924 Patent as a joint inventor of one or more of the inventions claimed in the '924 Patent.

929. The omission of Dr. Brainard as a joint inventor of one or more claims of the '924 Patent occurred without any deceptive intent on the part of Dr. Brainard.



**HUNDRED-AND-FIFTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

930. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

931. Dan Freedman is the sole inventor of one or more claims of the '924 Patent.

932. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '924 Patent as an inventor of one or more the inventions claimed in the '924 Patent.

933. The omission of Dan Freedman as the inventor on the '924 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-SIXTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

934. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

935. Dan Freedman is a joint inventor of one or more claims of the '924 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '924 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

936. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '924 Patent as a joint inventor of one or more of the inventions claimed in the '924 Patent.

937. The omission of Dr. Brainard as a joint inventor of one or more claims of the '924 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-SEVENTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

938. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

939. Miles Marnell is the sole inventor of one or more claims of the '924 Patent.

940. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '924 Patent as an inventor of one or more the inventions claimed in the '924 Patent.

941. The omission of Miles Marnell as the inventor on the '924 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-EIGHTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

942. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

943. Miles Marnell is a joint inventor of one or more claims of the '924 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '924 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

944. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '924 Patent as a joint inventor of one or more of the inventions claimed in the '924 Patent.

945. The omission of Miles Marnell as a joint inventor of one or more claims of the '924 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-NINETEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

946. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

947. James Passarelli is the sole inventor of one or more claims of the '924 Patent.

948. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '924 Patent as an inventor of one or more the inventions claimed in the '924 Patent.

949. The omission of James Passarelli as the inventor on the '924 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-TWENTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

950. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

951. James Passarelli is a joint inventor of one or more claims of the '924 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '924 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

952. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '924 Patent as a joint inventor of one or more of the inventions claimed in the '924 Patent.

953. The omission of James Passarelli as a joint inventor of one or more claims of the '924 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-TWENTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

954. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

955. Ryan Del Re is the sole inventor of one or more claims of the '924 Patent.

956. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '924 Patent as an inventor of one or more the inventions claimed in the '924 Patent.

957. The omission of Ryan Del Re as the inventor on the '924 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-TWENTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

958. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

959. Ryan Del Re is a joint inventor of one or more claims of the '924 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '924 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

960. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '924 Patent as a joint inventor of one or more of the inventions claimed in the '924 Patent.

961. The omission of Ryan Del Re as a joint inventor of one or more claims of the '924 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-TWENTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

962. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

963. Michael Murphy is the sole inventor of one or more claims of the '924 Patent.

964. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '924 Patent as an inventor of one or more the inventions claimed in the '924 Patent.

965. The omission of Michael Murphy as the inventor on the '924 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-TWENTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,754,924 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

966. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

967. Michael Murphy is a joint inventor of one or more claims of the '924 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '924 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

968. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '924 Patent as a joint inventor of one or more of the inventions claimed in the '924 Patent.

969. The omission of Michael Murphy as a joint inventor of one or more claims of the '924 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-TWENTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

970. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

971. Dr. Brainard is the sole inventor of one or more claims of the '564 Patent.

972. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '564 Patent as an inventor of one or more the inventions claimed in the '564 Patent.

973. The omission of Dr. Brainard as the inventor on the '564 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-TWENTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

974. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

975. Dr. Brainard is a joint inventor of one or more claims of the '564 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '564 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

976. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '564 Patent as a joint inventor of one or more of the inventions claimed in the '564 Patent.

977. The omission of Dr. Brainard as a joint inventor of one or more claims of the '564 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-TWENTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Sole Inventor)**

978. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

979. Brian Cardineau is the sole inventor of one or more claims of the '564 Patent.

980. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '564 Patent as an inventor of one or more the inventions claimed in the '564 Patent.

981. The omission of Brian Cardineau as the inventor on the '564 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**HUNDRED-AND-TWENTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Joint Inventor)**

982. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

983. Brian Cardineau is a joint inventor of one or more claims of the '564 Patent. Brian Cardineau provided significant contributions to the conception and reduction to practice of the inventions claimed in the '564 Patent, his contributions were significant in quality, and Brian Cardineau did more than explain to the purported inventors well-known concepts and the current state of the art.

984. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '564 Patent as a joint inventor of one or more of the inventions claimed in the '564 Patent.

985. The omission of Brian Cardineau as a joint inventor of one or more claims of the '564 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**HUNDRED-AND-TWENTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

986. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

987. Dan Freedman is the sole inventor of one or more claims of the '564 Patent.

988. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '564 Patent as an inventor of one or more the inventions claimed in the '564 Patent.

989. The omission of Dan Freedman as the inventor on the '564 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-THIRTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

990. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

991. Dan Freedman is a joint inventor of one or more claims of the '564 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '564 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

992. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '564 Patent as a joint inventor of one or more of the inventions claimed in the '564 Patent.

993. The omission of Dan Freedman as a joint inventor of one or more claims of the '564 Patent occurred without any deceptive intent on the part of Dan Freedman.



**HUNDRED-AND-THIRTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Miriam Sortland as Sole Inventor)**

994. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

995. Miriam Sortland is the sole inventor of one or more claims of the '564 Patent.

996. Through omission, inadvertence, and/or error, Miriam Sortland was not listed on the '564 Patent as an inventor of one or more the inventions claimed in the '564 Patent.

997. The omission of Miriam Sortland as the inventor on the '564 Patent occurred without any deceptive intent on the part of Miriam Sortland.

**HUNDRED-AND-THIRTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Miriam Sortland as Joint Inventor)**

998. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

999. Miriam Sortland is a joint inventor of one or more claims of the '564 Patent. Miriam Sortland provided significant contributions to the conception and reduction to practice of the inventions claimed in the '564 Patent, his contributions were significant in quality, and Miriam Sortland did more than explain to the purported inventors well-known concepts and the current state of the art.

1000. Through omission, inadvertence, and/or error, Miriam Sortland was not listed on the '564 Patent as a joint inventor of one or more of the inventions claimed in the '564 Patent.

1001. The omission of Miriam Sortland as a joint inventor of one or more claims of the '564 Patent occurred without any deceptive intent on the part of Miriam Sortland.

**HUNDRED-AND-THIRTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1002. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1003. Miles Marnell is the sole inventor of one or more claims of the '564 Patent.

1004. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '564 Patent as an inventor of one or more the inventions claimed in the '564 Patent.

1005. The omission of Miles Marnell as the inventor on the '564 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-THIRTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1006. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1007. Miles Marnell is a joint inventor of one or more claims of the '564 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '564 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1008. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '564 Patent as a joint inventor of one or more of the inventions claimed in the '564 Patent.

1009. The omission of Miles Marnell as a joint inventor of one or more claims of the '564 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-THIRTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1010. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1011. Ryan Del Re is the sole inventor of one or more claims of the '564 Patent.

1012. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '564 Patent as an inventor of one or more the inventions claimed in the '564 Patent.

1013. The omission of Ryan Del Re as the inventor on the '564 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-THIRTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 9,823,564 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1014. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1015. Ryan Del Re is a joint inventor of one or more claims of the '564 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '564 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1016. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '564 Patent as a joint inventor of one or more of the inventions claimed in the '564 Patent.

1017. The omission of Ryan Del Re as a joint inventor of one or more claims of the '564 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-THIRTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1018. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1019. Dr. Brainard is the sole inventor of one or more claims of the '903 Patent.

1020. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '903 Patent as the inventor of one or more the inventions claimed in the '903 Patent.

1021. The omission of Dr. Brainard as the inventor on the '903 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-THIRTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1022. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1023. Dr. Brainard is a joint inventor of one or more claims of the '903 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '903 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1024. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '903 Patent as joint inventor of one or more of the inventions claimed in the '903 Patent.

1025. The omission of Dr. Brainard as the joint inventor of one or more claims of the '903 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-THIRTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1026. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1027. Dan Freedman is the sole inventor of one or more claims of the '903 Patent.

1028. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '903 Patent as the inventor of one or more the inventions claimed in the '903 Patent.

1029. The omission of Dan Freedman as the inventor on the '903 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-FORTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1030. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1031. Dan Freedman is a joint inventor of one or more claims of the '903 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '903 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1032. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '903 Patent as joint inventor of one or more of the inventions claimed in the '903 Patent.

1033. The omission of Dan Freedman as the joint inventor of one or more claims of the '903 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-FORTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1034. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1035. Miles Marnell is the sole inventor of one or more claims of the '903 Patent.

1036. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '903 Patent as the inventor of one or more the inventions claimed in the '903 Patent.

1037. The omission of Miles Marnell as the inventor on the '903 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-FORTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1038. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1039. Miles Marnell is a joint inventor of one or more claims of the '903 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '903 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1040. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '903 Patent as joint inventor of one or more of the inventions claimed in the '903 Patent.

1041. The omission of Miles Marnell as the joint inventor of one or more claims of the '903 Patent occurred without any deceptive intent on the part Miles Marnell.

**HUNDRED-AND-FORTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1042. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1043. James Passarelli is the sole inventor of one or more claims of the '903 Patent.

1044. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '903 Patent as the inventor of one or more the inventions claimed in the '903 Patent.

1045. The omission of James Passarelli as the inventor on the '903 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-FORTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1046. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1047. James Passarelli is a joint inventor of one or more claims of the '903 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '903 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1048. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '903 Patent as joint inventor of one or more of the inventions claimed in the '903 Patent.

1049. The omission of James Passarelli as the joint inventor of one or more claims of the '903 Patent occurred without any deceptive intent on the part James Passarelli.

**HUNDRED-AND-FORTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1050. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1051. Ryan Del Re is the sole inventor of one or more claims of the '903 Patent.

1052. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '903 Patent as the inventor of one or more the inventions claimed in the '903 Patent.

1053. The omission of Ryan Del Re as the inventor on the '903 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-FORTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1054. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1055. Ryan Del Re is a joint inventor of one or more claims of the '903 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '903 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1056. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '903 Patent as joint inventor of one or more of the inventions claimed in the '903 Patent.

1057. The omission of Ryan Del Re as the joint inventor of one or more claims of the '903 Patent occurred without any deceptive intent on the part Ryan Del Re.



**HUNDRED-AND-FORTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1058. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1059. Michael Murphy is the sole inventor of one or more claims of the '903 Patent.

1060. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '903 Patent as the inventor of one or more the inventions claimed in the '903 Patent.

1061. The omission of Michael Murphy as the inventor on the '903 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-FORTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,673,903 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1062. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1063. Michael Murphy is a joint inventor of one or more claims of the '903 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '903 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1064. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '903 Patent as joint inventor of one or more of the inventions claimed in the '903 Patent.

1065. The omission of Michael Murphy as the joint inventor of one or more claims of the '903 Patent occurred without any deceptive intent on the part Michael Murphy.

**HUNDRED-AND-FORTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1066. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1067. Dr. Brainard is the sole inventor of one or more claims of the '109 Patent.

1068. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '109 Patent as the inventor of one or more the inventions claimed in the '109 Patent.

1069. The omission of Dr. Brainard as the inventor on the '109 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-FIFTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1070. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1071. Dr. Brainard is a joint inventor of one or more claims of the '109 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '109 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1072. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '109 Patent as joint inventor of one or more of the inventions claimed in the '109 Patent.

1073. The omission of Dr. Brainard as the joint inventor of one or more claims of the '109 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-FIFTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1074. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1075. Dan Freedman is the sole inventor of one or more claims of the '109 Patent.

1076. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '109 Patent as the inventor of one or more the inventions claimed in the '109 Patent.

1077. The omission of Dan Freedman as the inventor on the '109 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-FIFTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1078. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1079. Dan Freedman is a joint inventor of one or more claims of the '109 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '109 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1080. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '109 Patent as joint inventor of one or more of the inventions claimed in the '109 Patent.

1081. The omission of Dan Freedman as the joint inventor of one or more claims of the '109 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-FIFTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1082. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1083. Miles Marnell is the sole inventor of one or more claims of the '109 Patent.

1084. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '109 Patent as the inventor of one or more the inventions claimed in the '109 Patent.

1085. The omission of Miles Marnell as the inventor on the '109 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-FIFTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1086. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1087. Miles Marnell is a joint inventor of one or more claims of the '109 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '109 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1088. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '109 Patent as joint inventor of one or more of the inventions claimed in the '109 Patent.

1089. The omission of Miles Marnell as the joint inventor of one or more claims of the '109 Patent occurred without any deceptive intent on the part Miles Marnell.

**HUNDRED-AND-FIFTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1090. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1091. James Passarelli is the sole inventor of one or more claims of the '109 Patent.

1092. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '109 Patent as the inventor of one or more the inventions claimed in the '109 Patent.

1093. The omission of James Passarelli as the inventor on the '109 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-FIFTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1094. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1095. James Passarelli is a joint inventor of one or more claims of the '109 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '109 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1096. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '109 Patent as joint inventor of one or more of the inventions claimed in the '109 Patent.

1097. The omission of James Passarelli as the joint inventor of one or more claims of the '109 Patent occurred without any deceptive intent on the part James Passarelli.

**HUNDRED-AND-FIFTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1098. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1099. Ryan Del Re is the sole inventor of one or more claims of the '109 Patent.

1100. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '109 Patent as the inventor of one or more the inventions claimed in the '109 Patent.

1101. The omission of Ryan Del Re as the inventor on the '109 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-FIFTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1102. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1103. Ryan Del Re is a joint inventor of one or more claims of the '109 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '109 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1104. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '109 Patent as joint inventor of one or more of the inventions claimed in the '109 Patent.

1105. The omission of Ryan Del Re as the joint inventor of one or more claims of the '109 Patent occurred without any deceptive intent on the part Ryan Del Re.

**HUNDRED-AND-FIFTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1106. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1107. Michael Murphy is the sole inventor of one or more claims of the '109 Patent.

1108. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '109 Patent as the inventor of one or more the inventions claimed in the '109 Patent.

1109. The omission of Michael Murphy as the inventor on the '109 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-SIXTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,975,109 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1110. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1111. Michael Murphy is a joint inventor of one or more claims of the '109 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '109 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1112. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '109 Patent as joint inventor of one or more of the inventions claimed in the '109 Patent.

1113. The omission of Michael Murphy as the joint inventor of one or more claims of the '109 Patent occurred without any deceptive intent on the part Michael Murphy.

**HUNDRED-AND-SIXTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1114. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1115. Dr. Brainard is the sole inventor of one or more claims of the '466 Patent.

1116. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '466 Patent as the inventor of one or more the inventions claimed in the '466 Patent.

1117. The omission of Dr. Brainard as the inventor on the '466 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-SIXTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1118. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1119. Dr. Brainard is a joint inventor of one or more claims of the '466 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '466 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1120. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '466 Patent as joint inventor of one or more of the inventions claimed in the '466 Patent.

1121. The omission of Dr. Brainard as the joint inventor of one or more claims of the '466 Patent occurred without any deceptive intent on the part of Dr. Brainard.



**HUNDRED-AND-SIXTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1122. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1123. Dan Freedman is the sole inventor of one or more claims of the '466 Patent.

1124. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '466 Patent as the inventor of one or more the inventions claimed in the '466 Patent.

1125. The omission of Dan Freedman as the inventor on the '466 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-SIXTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1126. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1127. Dan Freedman is a joint inventor of one or more claims of the '466 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '466 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1128. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '466 Patent as joint inventor of one or more of the inventions claimed in the '466 Patent.

1129. The omission of Dan Freedman as the joint inventor of one or more claims of the '466 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-SIXTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1130. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1131. Miles Marnell is the sole inventor of one or more claims of the '466 Patent.

1132. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '466 Patent as the inventor of one or more the inventions claimed in the '466 Patent.

1133. The omission of Miles Marnell as the inventor on the '466 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-SIXTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1134. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1135. Miles Marnell is a joint inventor of one or more claims of the '466 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '466 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1136. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '466 Patent as joint inventor of one or more of the inventions claimed in the '466 Patent.

1137. The omission of Miles Marnell as the joint inventor of one or more claims of the '466 Patent occurred without any deceptive intent on the part Miles Marnell.

**HUNDRED-AND-SIXTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1138. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1139. James Passarelli is the sole inventor of one or more claims of the '466 Patent.

1140. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '466 Patent as the inventor of one or more the inventions claimed in the '466 Patent.

1141. The omission of James Passarelli as the inventor on the '466 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-SIXTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1142. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1143. James Passarelli is a joint inventor of one or more claims of the '466 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '466 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1144. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '466 Patent as joint inventor of one or more of the inventions claimed in the '466 Patent.

1145. The omission of James Passarelli as the joint inventor of one or more claims of the '466 Patent occurred without any deceptive intent on the part James Passarelli.

**HUNDRED-AND-SIXTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1146. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1147. Ryan Del Re is the sole inventor of one or more claims of the '466 Patent.

1148. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '466 Patent as the inventor of one or more the inventions claimed in the '466 Patent.

1149. The omission of Ryan Del Re as the inventor on the '466 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-SEVENTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1150. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1151. Ryan Del Re is a joint inventor of one or more claims of the '466 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '466 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1152. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '466 Patent as joint inventor of one or more of the inventions claimed in the '466 Patent.

1153. The omission of Ryan Del Re as the joint inventor of one or more claims of the '466 Patent occurred without any deceptive intent on the part Ryan Del Re.

**HUNDRED-AND-SEVENTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1154. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1155. Michael Murphy is the sole inventor of one or more claims of the '466 Patent.

1156. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '466 Patent as the inventor of one or more the inventions claimed in the '466 Patent.

1157. The omission of Michael Murphy as the inventor on the '466 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-SEVENTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,787,466 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1158. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1159. Michael Murphy is a joint inventor of one or more claims of the '466 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '466 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1160. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '466 Patent as joint inventor of one or more of the inventions claimed in the '466 Patent.

1161. The omission of Michael Murphy as the joint inventor of one or more claims of the '466 Patent occurred without any deceptive intent on the part Michael Murphy.

**HUNDRED-AND-SEVENTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1162. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1163. Dr. Brainard is the sole inventor of one or more claims of the '153 Patent.

1164. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '153 Patent as the inventor of one or more the inventions claimed in the '153 Patent.

1165. The omission of Dr. Brainard as the inventor on the '153 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-SEVENTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1166. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1167. Dr. Brainard is a joint inventor of one or more claims of the '153 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '153 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1168. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '153 Patent as joint inventor of one or more of the inventions claimed in the '153 Patent.

1169. The omission of Dr. Brainard as the joint inventor of one or more claims of the '153 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-SEVENTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1170. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1171. Dan Freedman is the sole inventor of one or more claims of the '153 Patent.

1172. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '153 Patent as the inventor of one or more the inventions claimed in the '153 Patent.

1173. The omission of Dan Freedman as the inventor on the '153 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-SEVENTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1174. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1175. Dan Freedman is a joint inventor of one or more claims of the '153 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '153 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1176. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '153 Patent as joint inventor of one or more of the inventions claimed in the '153 Patent.

1177. The omission of Dan Freedman as the joint inventor of one or more claims of the '153 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-SEVENTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1178. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1179. Miles Marnell is the sole inventor of one or more claims of the '153 Patent.

1180. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '153 Patent as the inventor of one or more the inventions claimed in the '153 Patent.

1181. The omission of Miles Marnell as the inventor on the '153 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-SEVENTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1182. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1183. Miles Marnell is a joint inventor of one or more claims of the '153 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '153 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1184. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '153 Patent as joint inventor of one or more of the inventions claimed in the '153 Patent.

1185. The omission of Miles Marnell as the joint inventor of one or more claims of the '153 Patent occurred without any deceptive intent on the part Miles Marnell.



**HUNDRED-AND-SEVENTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1186. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1187. James Passarelli is the sole inventor of one or more claims of the '153 Patent.

1188. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '153 Patent as the inventor of one or more the inventions claimed in the '153 Patent.

1189. The omission of James Passarelli as the inventor on the '153 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-EIGHTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1190. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1191. James Passarelli is a joint inventor of one or more claims of the '153 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '153 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1192. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '153 Patent as joint inventor of one or more of the inventions claimed in the '153 Patent.

1193. The omission of James Passarelli as the joint inventor of one or more claims of the '153 Patent occurred without any deceptive intent on the part James Passarelli.

**HUNDRED-AND-EIGHTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1194. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1195. Ryan Del Re is the sole inventor of one or more claims of the '153 Patent.

1196. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '153 Patent as the inventor of one or more the inventions claimed in the '153 Patent.

1197. The omission of Ryan Del Re as the inventor on the '153 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-EIGHTY-SECEND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1198. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1199. Ryan Del Re is a joint inventor of one or more claims of the '153 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '153 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1200. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '153 Patent as joint inventor of one or more of the inventions claimed in the '153 Patent.

1201. The omission of Ryan Del Re as the joint inventor of one or more claims of the '153 Patent occurred without any deceptive intent on the part Ryan Del Re.

**HUNDRED-AND-EIGHTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1202. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1203. Michael Murphy is the sole inventor of one or more claims of the '153 Patent.

1204. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '153 Patent as the inventor of one or more the inventions claimed in the '153 Patent.

1205. The omission of Michael Murphy as the inventor on the '153 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-EIGHTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 10,642,153 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1206. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1207. Michael Murphy is a joint inventor of one or more claims of the '153 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '153 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1208. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '153 Patent as joint inventor of one or more of the inventions claimed in the '153 Patent.

1209. The omission of Michael Murphy as the joint inventor of one or more claims of the '153 Patent occurred without any deceptive intent on the part Michael Murphy.

**HUNDRED-AND-EIGHTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1210. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1211. Dr. Brainard is the sole inventor of one or more claims of the '284 Patent.

1212. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '284 Patent as the inventor of one or more the inventions claimed in the '284 Patent.

1213. The omission of Dr. Brainard as the inventor on the '284 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-EIGHTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1214. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1215. Dr. Brainard is a joint inventor of one or more claims of the '284 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '284 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1216. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '284 Patent as joint inventor of one or more of the inventions claimed in the '284 Patent.

1217. The omission of Dr. Brainard as the joint inventor of one or more claims of the '284 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-EIGHTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1218. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1219. Dan Freedman is the sole inventor of one or more claims of the '284 Patent.

1220. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '284 Patent as the inventor of one or more the inventions claimed in the '284 Patent.

1221. The omission of Dan Freedman as the inventor on the '284 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-EIGHTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1222. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1223. Dan Freedman is a joint inventor of one or more claims of the '284 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '284 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1224. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '284 Patent as joint inventor of one or more of the inventions claimed in the '284 Patent.

1225. The omission of Dan Freedman as the joint inventor of one or more claims of the '284 Patent occurred without any deceptive intent on the part of Dan Freedman.

**HUNDRED-AND-EIGHTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1226. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1227. Miles Marnell is the sole inventor of one or more claims of the '284 Patent.

1228. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '284 Patent as the inventor of one or more the inventions claimed in the '284 Patent.

1229. The omission of Miles Marnell as the inventor on the '284 Patent occurred without any deceptive intent on the part of Miles Marnell.

**HUNDRED-AND-NINETIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1230. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1231. Miles Marnell is a joint inventor of one or more claims of the '284 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '284 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1232. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '284 Patent as joint inventor of one or more of the inventions claimed in the '284 Patent.

1233. The omission of Miles Marnell as the joint inventor of one or more claims of the '284 Patent occurred without any deceptive intent on the part Miles Marnell.

**HUNDRED-AND-NINETY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1234. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1235. James Passarelli is the sole inventor of one or more claims of the '284 Patent.

1236. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '284 Patent as the inventor of one or more the inventions claimed in the '284 Patent.

1237. The omission of James Passarelli as the inventor on the '284 Patent occurred without any deceptive intent on the part of James Passarelli.

**HUNDRED-AND-NINETY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1238. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1239. James Passarelli is a joint inventor of one or more claims of the '284 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '284 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1240. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '284 Patent as joint inventor of one or more of the inventions claimed in the '284 Patent.

1241. The omission of James Passarelli as the joint inventor of one or more claims of the '284 Patent occurred without any deceptive intent on the part James Passarelli.

**HUNDRED-AND-NINETY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1242. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1243. Ryan Del Re is the sole inventor of one or more claims of the '284 Patent.

1244. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '284 Patent as the inventor of one or more the inventions claimed in the '284 Patent.

1245. The omission of Ryan Del Re as the inventor on the '284 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**HUNDRED-AND-NINETY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1246. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1247. Ryan Del Re is a joint inventor of one or more claims of the '284 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '284 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1248. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '284 Patent as joint inventor of one or more of the inventions claimed in the '284 Patent.

1249. The omission of Ryan Del Re as the joint inventor of one or more claims of the '284 Patent occurred without any deceptive intent on the part Ryan Del Re.



**HUNDRED-AND-NINETY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1250. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1251. Michael Murphy is the sole inventor of one or more claims of the '284 Patent.

1252. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '284 Patent as the inventor of one or more the inventions claimed in the '284 Patent.

1253. The omission of Michael Murphy as the inventor on the '284 Patent occurred without any deceptive intent on the part of Michael Murphy.

**HUNDRED-AND-NINETY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,500,284 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1254. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1255. Michael Murphy is a joint inventor of one or more claims of the '284 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '284 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1256. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '284 Patent as joint inventor of one or more of the inventions claimed in the '284 Patent.

1257. The omission of Michael Murphy as the joint inventor of one or more claims of the '284 Patent occurred without any deceptive intent on the part Michael Murphy.

**HUNDRED-AND-NINETY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1258. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1259. Dr. Brainard is the sole inventor of one or more claims of the '029 Patent.

1260. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '029 Patent as the inventor of one or more the inventions claimed in the '029 Patent.

1261. The omission of Dr. Brainard as the inventor on the '029 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-NINETY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1262. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1263. Dr. Brainard is a joint inventor of one or more claims of the '029 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '029 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1264. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '029 Patent as joint inventor of one or more of the inventions claimed in the '029 Patent.

1265. The omission of Dr. Brainard as the joint inventor of one or more claims of the '029 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**HUNDRED-AND-NINETY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1266. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1267. Dan Freedman is the sole inventor of one or more claims of the '029 Patent.

1268. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '029 Patent as the inventor of one or more the inventions claimed in the '029 Patent.

1269. The omission of Dan Freedman as the inventor on the '029 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDREDTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1270. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1271. Dan Freedman is a joint inventor of one or more claims of the '029 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '029 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1272. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '029 Patent as joint inventor of one or more of the inventions claimed in the '029 Patent.

1273. The omission of Dan Freedman as the joint inventor of one or more claims of the '029 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1274. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1275. Miles Marnell is the sole inventor of one or more claims of the '029 Patent.

1276. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '029 Patent as the inventor of one or more the inventions claimed in the '029 Patent.

1277. The omission of Miles Marnell as the inventor on the '029 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND -SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1278. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1279. Miles Marnell is a joint inventor of one or more claims of the '029 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '029 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1280. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '029 Patent as joint inventor of one or more of the inventions claimed in the '029 Patent.

1281. The omission of Miles Marnell as the joint inventor of one or more claims of the '029 Patent occurred without any deceptive intent on the part Miles Marnell.

**TWO-HUNDRED-AND-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1282. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1283. James Passarelli is the sole inventor of one or more claims of the '029 Patent.

1284. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '029 Patent as the inventor of one or more the inventions claimed in the '029 Patent.

1285. The omission of James Passarelli as the inventor on the '029 Patent occurred without any deceptive intent on the part of James Passarelli.

**TWO-HUNDRED-AND-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1286. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1287. James Passarelli is a joint inventor of one or more claims of the '029 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '029 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1288. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '029 Patent as joint inventor of one or more of the inventions claimed in the '029 Patent.

1289. The omission of James Passarelli as the joint inventor of one or more claims of the '029 Patent occurred without any deceptive intent on the part James Passarelli.

**TWO-HUNDRED-AND-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1290. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1291. Ryan Del Re is the sole inventor of one or more claims of the '029 Patent.

1292. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '029 Patent as the inventor of one or more the inventions claimed in the '029 Patent.

1293. The omission of Ryan Del Re as the inventor on the '029 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**TWO-HUNDRED-AND-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1294. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1295. Ryan Del Re is a joint inventor of one or more claims of the '029 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '029 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1296. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '029 Patent as joint inventor of one or more of the inventions claimed in the '029 Patent.

1297. The omission of Ryan Del Re as the joint inventor of one or more claims of the '029 Patent occurred without any deceptive intent on the part Ryan Del Re.

**TWO-HUNDRED-AND-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1298. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1299. Michael Murphy is the sole inventor of one or more claims of the '029 Patent.

1300. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '029 Patent as the inventor of one or more the inventions claimed in the '029 Patent.

1301. The omission of Michael Murphy as the inventor on the '029 Patent occurred without any deceptive intent on the part of Michael Murphy.

**TWO-HUNDRED-AND-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,392,029 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1302. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1303. Michael Murphy is a joint inventor of one or more claims of the '029 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '029 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1304. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '029 Patent as joint inventor of one or more of the inventions claimed in the '029 Patent.

1305. The omission of Michael Murphy as the joint inventor of one or more claims of the '029 Patent occurred without any deceptive intent on the part Michael Murphy.

**TWO-HUNDRED-AND-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1306. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1307. Dr. Brainard is the sole inventor of one or more claims of the '081 Patent.

1308. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '081 Patent as the inventor of one or more the inventions claimed in the '081 Patent.

1309. The omission of Dr. Brainard as the inventor on the '081 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-TENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1310. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1311. Dr. Brainard is a joint inventor of one or more claims of the '081 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '081 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1312. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '081 Patent as joint inventor of one or more of the inventions claimed in the '081 Patent.

1313. The omission of Dr. Brainard as the joint inventor of one or more claims of the '081 Patent occurred without any deceptive intent on the part of Dr. Brainard.



**TWO-HUNDRED-AND-ELEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1314. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1315. Dan Freedman is the sole inventor of one or more claims of the '081 Patent.

1316. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '081 Patent as the inventor of one or more the inventions claimed in the '081 Patent.

1317. The omission of Dan Freedman as the inventor on the '081 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-TWELFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1318. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1319. Dan Freedman is a joint inventor of one or more claims of the '081 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '081 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1320. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '081 Patent as joint inventor of one or more of the inventions claimed in the '081 Patent.

1321. The omission of Dan Freedman as the joint inventor of one or more claims of the '081 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-THIRTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1322. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1323. Miles Marnell is the sole inventor of one or more claims of the '081 Patent.

1324. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '081 Patent as the inventor of one or more the inventions claimed in the '081 Patent.

1325. The omission of Miles Marnell as the inventor on the '081 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-FOURTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1326. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1327. Miles Marnell is a joint inventor of one or more claims of the '081 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '081 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1328. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '081 Patent as joint inventor of one or more of the inventions claimed in the '081 Patent.

1329. The omission of Miles Marnell as the joint inventor of one or more claims of the '081 Patent occurred without any deceptive intent on the part Miles Marnell.

**TWO-HUNDRED-AND-FIFTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1330. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1331. James Passarelli is the sole inventor of one or more claims of the '081 Patent.

1332. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '081 Patent as the inventor of one or more the inventions claimed in the '081 Patent.

1333. The omission of James Passarelli as the inventor on the '081 Patent occurred without any deceptive intent on the part of James Passarelli.

**TWO-HUNDRED-AND-SIXTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1334. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1335. James Passarelli is a joint inventor of one or more claims of the '081 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '081 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1336. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '081 Patent as joint inventor of one or more of the inventions claimed in the '081 Patent.

1337. The omission of James Passarelli as the joint inventor of one or more claims of the '081 Patent occurred without any deceptive intent on the part James Passarelli.

**TWO-HUNDRED-AND-SEVENTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1338. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1339. Ryan Del Re is the sole inventor of one or more claims of the '081 Patent.

1340. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '081 Patent as the inventor of one or more the inventions claimed in the '081 Patent.

1341. The omission of Ryan Del Re as the inventor on the '081 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**TWO-HUNDRED-AND-EIGHTEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1342. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1343. Ryan Del Re is a joint inventor of one or more claims of the '081 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '081 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1344. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '081 Patent as joint inventor of one or more of the inventions claimed in the '081 Patent.

1345. The omission of Ryan Del Re as the joint inventor of one or more claims of the '081 Patent occurred without any deceptive intent on the part Ryan Del Re.

**TWO-HUNDRED-AND-NINETEENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1346. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1347. Michael Murphy is the sole inventor of one or more claims of the '081 Patent.

1348. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '081 Patent as the inventor of one or more the inventions claimed in the '081 Patent.

1349. The omission of Michael Murphy as the inventor on the '081 Patent occurred without any deceptive intent on the part of Michael Murphy.

**TWO-HUNDRED-AND-TWENTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,809,081 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1350. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1351. Michael Murphy is a joint inventor of one or more claims of the '081 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '081 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1352. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '081 Patent as joint inventor of one or more of the inventions claimed in the '081 Patent.

1353. The omission of Michael Murphy as the joint inventor of one or more claims of the '081 Patent occurred without any deceptive intent on the part Michael Murphy.

**TWO-HUNDRED-AND-TWENTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1354. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1355. Dr. Brainard is the sole inventor of one or more claims of the '312 Patent.

1356. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '312 Patent as an inventor of one or more the inventions claimed in the '312 Patent.

1357. The omission of Dr. Brainard as the inventor on the '312 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-TWENTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1358. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1359. Dr. Brainard is a joint inventor of one or more claims of the '312 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '312 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1360. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '312 Patent as a joint inventor of one or more of the inventions claimed in the '312 Patent.

1361. The omission of Dr. Brainard as a joint inventor of one or more claims of the '312 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-TWENTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Sole Inventor)**

1362. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1363. Brian Cardineau is the sole inventor of one or more claims of the '312 Patent.

1364. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '312 Patent as an inventor of one or more the inventions claimed in the '312 Patent.

1365. The omission of Brian Cardineau as the inventor on the '312 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**TWO-HUNDRED-AND-TWENTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Joint Inventor)**

1366. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1367. Brian Cardineau is a joint inventor of one or more claims of the '312 Patent. Brian Cardineau provided significant contributions to the conception and reduction to practice of the inventions claimed in the '312 Patent, his contributions were significant in quality, and Brian Cardineau did more than explain to the purported inventors well-known concepts and the current state of the art.

1368. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '312 Patent as a joint inventor of one or more of the inventions claimed in the '312 Patent.

1369. The omission of Brian Cardineau as a joint inventor of one or more claims of the '312 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**TWO-HUNDRED-AND-TWENTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1370. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1371. Dan Freedman is the sole inventor of one or more claims of the '312 Patent.

1372. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '312 Patent as an inventor of one or more the inventions claimed in the '312 Patent.

1373. The omission of Dan Freedman as the inventor on the '312 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-TWENTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1374. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1375. Dan Freedman is a joint inventor of one or more claims of the '312 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '312 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1376. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '312 Patent as a joint inventor of one or more of the inventions claimed in the '312 Patent.

1377. The omission of Dan Freedman as a joint inventor of one or more claims of the '312 Patent occurred without any deceptive intent on the part of Dan Freedman.



**TWO-HUNDRED-AND-TWENTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Miriam Sortland as Sole Inventor)**

1378. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1379. Miriam Sortland is the sole inventor of one or more claims of the '312 Patent.

1380. Through omission, inadvertence, and/or error, Miriam Sortland was not listed on the '312 Patent as an inventor of one or more the inventions claimed in the '312 Patent.

1381. The omission of Miriam Sortland as the inventor on the '312 Patent occurred without any deceptive intent on the part of Miriam Sortland.

**TWO-HUNDRED-AND-TWENTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Miriam Sortland as Joint Inventor)**

1382. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1383. Miriam Sortland is a joint inventor of one or more claims of the '312 Patent. Miriam Sortland provided significant contributions to the conception and reduction to practice of the inventions claimed in the '312 Patent, his contributions were significant in quality, and Miriam Sortland did more than explain to the purported inventors well-known concepts and the current state of the art.

1384. Through omission, inadvertence, and/or error, Miriam Sortland was not listed on the '312 Patent as a joint inventor of one or more of the inventions claimed in the '312 Patent.

1385. The omission of Miriam Sortland as a joint inventor of one or more claims of the '312 Patent occurred without any deceptive intent on the part of Miriam Sortland.

**TWO-HUNDRED-AND-TWENTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1386. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1387. Miles Marnell is the sole inventor of one or more claims of the '312 Patent.

1388. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '312 Patent as an inventor of one or more the inventions claimed in the '312 Patent.

1389. The omission of Miles Marnell as the inventor on the '312 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-THIRTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1390. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1391. Miles Marnell is a joint inventor of one or more claims of the '312 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '312 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1392. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '312 Patent as a joint inventor of one or more of the inventions claimed in the '312 Patent.

1393. The omission of Miles Marnell as a joint inventor of one or more claims of the '312 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-THIRTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1394. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1395. Ryan Del Re is the sole inventor of one or more claims of the '312 Patent.

1396. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '312 Patent as an inventor of one or more the inventions claimed in the '312 Patent.

1397. The omission of Ryan Del Re as the inventor on the '312 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**TWO-HUNDRED-AND-THIRTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,693,312 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1398. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1399. Ryan Del Re is a joint inventor of one or more claims of the '312 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '312 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1400. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '312 Patent as a joint inventor of one or more of the inventions claimed in the '312 Patent.

1401. The omission of Ryan Del Re as a joint inventor of one or more claims of the '312 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**TWO-HUNDRED-AND-THIRTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1402. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1403. Dr. Brainard is the sole inventors of one or more claims of the '070 Patent.

1404. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '070 Patent as the inventor of one or more of the inventions claimed in the '070 Patent.

1405. The omission of Dr. Brainard as the inventor on the '070 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-THIRTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1406. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1407. Dr. Brainard is a joint inventor of one or more claims of the '070 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '070 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1408. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '070 Patent as a joint inventor of one or more of the inventions claimed in the '070 Patent.

1409. The omission of Dr. Brainard as a joint inventor of one or more claims of the '070 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-THIRTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Sole Inventor)**

1410. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1411. Brian Cardineau is the sole inventors of one or more claims of the '070 Patent.

1412. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '070 Patent as the inventor of one or more of the inventions claimed in the '070 Patent.

1413. The omission of Brian Cardineau as the inventor on the '070 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**TWO-HUNDRED-AND-THIRTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Brian Cardineau as Joint Inventor)**

1414. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1415. Brian Cardineau is a joint inventor of one or more claims of the '070 Patent. Brian Cardineau provided significant contributions to the conception and reduction to practice of the inventions claimed in the '070 Patent, his contributions were significant in quality, and Brian Cardineau did more than explain to the purported inventors well-known concepts and the current state of the art.

1416. Through omission, inadvertence, and/or error, Brian Cardineau was not listed on the '070 Patent as a joint inventor of one or more of the inventions claimed in the '070 Patent.

1417. The omission of Brian Cardineau as a joint inventor of one or more claims of the '070 Patent occurred without any deceptive intent on the part of Brian Cardineau.

**TWO-HUNDRED-AND-THIRTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1418. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1419. Dan Freedman is the sole inventors of one or more claims of the '070 Patent.

1420. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '070 Patent as the inventor of one or more of the inventions claimed in the '070 Patent.

1421. The omission of Dan Freedman as the inventor on the '070 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-THIRTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1422. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1423. Dan Freedman is a joint inventor of one or more claims of the '070 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '070 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1424. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '070 Patent as a joint inventor of one or more of the inventions claimed in the '070 Patent.

1425. The omission of Dan Freedman as a joint inventor of one or more claims of the '070 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-THIRTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1426. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1427. Miles Marnell is the sole inventors of one or more claims of the '070 Patent.

1428. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '070 Patent as the inventor of one or more of the inventions claimed in the '070 Patent.

1429. The omission of Miles Marnell as the inventor on the '070 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-FORTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1430. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1431. Miles Marnell is a joint inventor of one or more claims of the '070 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '070 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1432. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '070 Patent as a joint inventor of one or more of the inventions claimed in the '070 Patent.

1433. The omission of Miles Marnell as a joint inventor of one or more claims of the '070 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-FORTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1434. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1435. James Passarelli is the sole inventors of one or more claims of the '070 Patent.

1436. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '070 Patent as the inventor of one or more of the inventions claimed in the '070 Patent.

1437. The omission of James Passarelli as the inventor on the '070 Patent occurred without any deceptive intent on the part of James Passarelli.

**TWO-HUNDRED-AND-FORTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,098,070 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1438. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1439. James Passarelli is a joint inventor of one or more claims of the '070 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '070 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1440. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '070 Patent as a joint inventor of one or more of the inventions claimed in the '070 Patent.

1441. The omission of James Passarelli as a joint inventor of one or more of the '070 Patent occurred without any deceptive intent on the part of James Passarelli.



**TWO-HUNDRED-AND-FORTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1442. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1443. Dr. Brainard is the sole inventor of one or more claims of the '028 Patent.

1444. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '028 Patent as the inventor of one or more the inventions claimed in the '028 Patent.

1445. The omission of Dr. Brainard as the inventor on the '028 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-FORTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1446. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1447. Dr. Brainard is a joint inventor of one or more claims of the '028 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '028 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1448. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '028 Patent as joint inventor of one or more of the inventions claimed in the '028 Patent.

1449. The omission of Dr. Brainard as the joint inventor of one or more claims of the '028 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-FORTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1450. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1451. Dan Freedman is the sole inventor of one or more claims of the '028 Patent.

1452. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '028 Patent as the inventor of one or more the inventions claimed in the '028 Patent.

1453. The omission of Dan Freedman as the inventor on the '028 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-FORTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1454. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1455. Dan Freedman is a joint inventor of one or more claims of the '028 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '028 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1456. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '028 Patent as joint inventor of one or more of the inventions claimed in the '028 Patent.

1457. The omission of Dan Freedman as the joint inventor of one or more claims of the '028 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-FORTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1458. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1459. Miles Marnell is the sole inventor of one or more claims of the '028 Patent.

1460. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '028 Patent as the inventor of one or more the inventions claimed in the '028 Patent.

1461. The omission of Miles Marnell as the inventor on the '028 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-FORTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1462. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1463. Miles Marnell is a joint inventor of one or more claims of the '028 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '028 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1464. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '028 Patent as joint inventor of one or more of the inventions claimed in the '028 Patent.

1465. The omission of Miles Marnell as the joint inventor of one or more claims of the '028 Patent occurred without any deceptive intent on the part Miles Marnell.

**TWO-HUNDRED-AND-FORTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1466. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1467. James Passarelli is the sole inventor of one or more claims of the '028 Patent.

1468. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '028 Patent as the inventor of one or more the inventions claimed in the '028 Patent.

1469. The omission of James Passarelli as the inventor on the '028 Patent occurred without any deceptive intent on the part of James Passarelli.

**TWO-HUNDRED-AND-FIFTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1470. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1471. James Passarelli is a joint inventor of one or more claims of the '028 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '028 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1472. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '028 Patent as joint inventor of one or more of the inventions claimed in the '028 Patent.

1473. The omission of James Passarelli as the joint inventor of one or more claims of the '028 Patent occurred without any deceptive intent on the part James Passarelli.

**TWO-HUNDRED-AND-FIFTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1474. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1475. Ryan Del Re is the sole inventor of one or more claims of the '028 Patent.

1476. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '028 Patent as the inventor of one or more the inventions claimed in the '028 Patent.

1477. The omission of Ryan Del Re as the inventor on the '028 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**TWO-HUNDRED-AND-FIFTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1478. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1479. Ryan Del Re is a joint inventor of one or more claims of the '028 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '028 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1480. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '028 Patent as joint inventor of one or more of the inventions claimed in the '028 Patent.

1481. The omission of Ryan Del Re as the joint inventor of one or more claims of the '028 Patent occurred without any deceptive intent on the part Ryan Del Re.

**TWO-HUNDRED-AND-FIFTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1482. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1483. Michael Murphy is the sole inventor of one or more claims of the '028 Patent.

1484. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '028 Patent as the inventor of one or more the inventions claimed in the '028 Patent.

1485. The omission of Michael Murphy as the inventor on the '028 Patent occurred without any deceptive intent on the part of Michael Murphy.

**TWO-HUNDRED-AND-FIFTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,382,028 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1486. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1487. Michael Murphy is a joint inventor of one or more claims of the '028 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '028 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1488. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '028 Patent as joint inventor of one or more of the inventions claimed in the '028 Patent.

1489. The omission of Michael Murphy as the joint inventor of one or more claims of the '028 Patent occurred without any deceptive intent on the part Michael Murphy.

**TWO-HUNDRED-AND-FIFTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1490. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1491. Dr. Brainard is the sole inventor of one or more claims of the '876 Patent.

1492. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '876 Patent as the inventor of one or more the inventions claimed in the '876 Patent.

1493. The omission of Dr. Brainard as the inventor on the '876 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-FIFTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1494. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1495. Dr. Brainard is a joint inventor of one or more claims of the '876 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '876 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1496. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '876 Patent as joint inventor of one or more of the inventions claimed in the '876 Patent.

1497. The omission of Dr. Brainard as the joint inventor of one or more claims of the '876 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-FIFTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1498. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1499. Dan Freedman is the sole inventor of one or more claims of the '876 Patent.

1500. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '876 Patent as the inventor of one or more the inventions claimed in the '876 Patent.

1501. The omission of Dan Freedman as the inventor on the '876 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-FIFTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1502. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1503. Dan Freedman is a joint inventor of one or more claims of the '876 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '876 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1504. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '876 Patent as joint inventor of one or more of the inventions claimed in the '876 Patent.

1505. The omission of Dan Freedman as the joint inventor of one or more claims of the '876 Patent occurred without any deceptive intent on the part of Dan Freedman.



**TWO-HUNDRED-AND-FIFTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1506. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1507. Miles Marnell is the sole inventor of one or more claims of the '876 Patent.

1508. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '876 Patent as the inventor of one or more the inventions claimed in the '876 Patent.

1509. The omission of Miles Marnell as the inventor on the '876 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-SIXTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1510. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1511. Miles Marnell is a joint inventor of one or more claims of the '876 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '876 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1512. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '876 Patent as joint inventor of one or more of the inventions claimed in the '876 Patent.

1513. The omission of Miles Marnell as the joint inventor of one or more claims of the '876 Patent occurred without any deceptive intent on the part Miles Marnell.

**TWO-HUNDRED-AND-SIXTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1514. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1515. James Passarelli is the sole inventor of one or more claims of the '876 Patent.

1516. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '876 Patent as the inventor of one or more the inventions claimed in the '876 Patent.

1517. The omission of James Passarelli as the inventor on the '876 Patent occurred without any deceptive intent on the part of James Passarelli.

**TWO-HUNDRED-AND-SIXTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1518. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1519. James Passarelli is a joint inventor of one or more claims of the '876 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '876 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1520. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '876 Patent as joint inventor of one or more of the inventions claimed in the '876 Patent.

1521. The omission of James Passarelli as the joint inventor of one or more claims of the '876 Patent occurred without any deceptive intent on the part James Passarelli.

**TWO-HUNDRED-AND-SIXTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1522. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1523. Ryan Del Re is the sole inventor of one or more claims of the '876 Patent.

1524. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '876 Patent as the inventor of one or more the inventions claimed in the '876 Patent.

1525. The omission of Ryan Del Re as the inventor on the '876 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**TWO-HUNDRED-AND-SIXTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1526. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1527. Ryan Del Re is a joint inventor of one or more claims of the '876 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '876 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1528. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '876 Patent as joint inventor of one or more of the inventions claimed in the '876 Patent.

1529. The omission of Ryan Del Re as the joint inventor of one or more claims of the '876 Patent occurred without any deceptive intent on the part Ryan Del Re.

**TWO-HUNDRED-AND-SIXTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1530. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1531. Michael Murphy is the sole inventor of one or more claims of the '876 Patent.

1532. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '876 Patent as the inventor of one or more the inventions claimed in the '876 Patent.

1533. The omission of Michael Murphy as the inventor on the '876 Patent occurred without any deceptive intent on the part of Michael Murphy.

**TWO-HUNDRED-AND-SIXTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,300,876 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1534. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1535. Michael Murphy is a joint inventor of one or more claims of the '876 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '876 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1536. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '876 Patent as joint inventor of one or more of the inventions claimed in the '876 Patent.

1537. The omission of Michael Murphy as the joint inventor of one or more claims of the '876 Patent occurred without any deceptive intent on the part Michael Murphy.

**TWO-HUNDRED-AND-SIXTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Sole Inventor)**

1538. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1539. Dr. Brainard is the sole inventor of one or more claims of the '046 Patent.

1540. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '046 Patent as the inventor of one or more the inventions claimed in the '046 Patent.

1541. The omission of Dr. Brainard as the inventor on the '046 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-SIXTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Dr. Brainard as Joint Inventor)**

1542. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1543. Dr. Brainard is a joint inventor of one or more claims of the '046 Patent. Dr. Brainard provided significant contributions to the conception and reduction to practice of the inventions claimed in the '046 Patent, his contributions were significant in quality, and Dr. Brainard did more than explain to the purported inventors well-known concepts and the current state of the art.

1544. Through omission, inadvertence, and/or error, Dr. Brainard was not listed on the '046 Patent as joint inventor of one or more of the inventions claimed in the '046 Patent.

1545. The omission of Dr. Brainard as the joint inventor of one or more claims of the '046 Patent occurred without any deceptive intent on the part of Dr. Brainard.

**TWO-HUNDRED-AND-SIXTY-NINTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Dan Freedman as Sole Inventor)**

1546. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1547. Dan Freedman is the sole inventor of one or more claims of the '046 Patent.

1548. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '046 Patent as the inventor of one or more the inventions claimed in the '046 Patent.

1549. The omission of Dan Freedman as the inventor on the '046 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-SEVENTIETH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Dan Freedman as Joint Inventor)**

1550. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1551. Dan Freedman is a joint inventor of one or more claims of the '046 Patent. Dan Freedman provided significant contributions to the conception and reduction to practice of the inventions claimed in the '046 Patent, his contributions were significant in quality, and Dan Freedman did more than explain to the purported inventors well-known concepts and the current state of the art.

1552. Through omission, inadvertence, and/or error, Dan Freedman was not listed on the '046 Patent as joint inventor of one or more of the inventions claimed in the '046 Patent.

1553. The omission of Dan Freedman as the joint inventor of one or more claims of the '046 Patent occurred without any deceptive intent on the part of Dan Freedman.

**TWO-HUNDRED-AND-SEVENTY-FIRST CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Miles Marnell as Sole Inventor)**

1554. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1555. Miles Marnell is the sole inventor of one or more claims of the '046 Patent.

1556. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '046 Patent as the inventor of one or more the inventions claimed in the '046 Patent.

1557. The omission of Miles Marnell as the inventor on the '046 Patent occurred without any deceptive intent on the part of Miles Marnell.

**TWO-HUNDRED-AND-SEVENTY-SECOND CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Miles Marnell as Joint Inventor)**

1558. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1559. Miles Marnell is a joint inventor of one or more claims of the '046 Patent. Miles Marnell provided significant contributions to the conception and reduction to practice of the inventions claimed in the '046 Patent, his contributions were significant in quality, and Miles Marnell did more than explain to the purported inventors well-known concepts and the current state of the art.

1560. Through omission, inadvertence, and/or error, Miles Marnell was not listed on the '046 Patent as joint inventor of one or more of the inventions claimed in the '046 Patent.

1561. The omission of Miles Marnell as the joint inventor of one or more claims of the '046 Patent occurred without any deceptive intent on the part Miles Marnell.

**TWO-HUNDRED-AND-SEVENTY-THIRD CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(James Passarelli as Sole Inventor)**

1562. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1563. James Passarelli is the sole inventor of one or more claims of the '046 Patent.

1564. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '046 Patent as the inventor of one or more the inventions claimed in the '046 Patent.

1565. The omission of James Passarelli as the inventor on the '046 Patent occurred without any deceptive intent on the part of James Passarelli.

**TWO-HUNDRED-AND-SEVENTY-FOURTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(James Passarelli as Joint Inventor)**

1566. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1567. James Passarelli is a joint inventor of one or more claims of the '046 Patent. James Passarelli provided significant contributions to the conception and reduction to practice of the inventions claimed in the '046 Patent, his contributions were significant in quality, and James Passarelli did more than explain to the purported inventors well-known concepts and the current state of the art.

1568. Through omission, inadvertence, and/or error, James Passarelli was not listed on the '046 Patent as joint inventor of one or more of the inventions claimed in the '046 Patent.

1569. The omission of James Passarelli as the joint inventor of one or more claims of the '046 Patent occurred without any deceptive intent on the part James Passarelli.



**TWO-HUNDRED-AND-SEVENTY-FIFTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Sole Inventor)**

1570. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1571. Ryan Del Re is the sole inventor of one or more claims of the '046 Patent.

1572. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '046 Patent as the inventor of one or more the inventions claimed in the '046 Patent.

1573. The omission of Ryan Del Re as the inventor on the '046 Patent occurred without any deceptive intent on the part of Ryan Del Re.

**TWO-HUNDRED-AND-SEVENTY-SIXTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Ryan Del Re as Joint Inventor)**

1574. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1575. Ryan Del Re is a joint inventor of one or more claims of the '046 Patent. Ryan Del Re provided significant contributions to the conception and reduction to practice of the inventions claimed in the '046 Patent, his contributions were significant in quality, and Ryan Del Re did more than explain to the purported inventors well-known concepts and the current state of the art.

1576. Through omission, inadvertence, and/or error, Ryan Del Re was not listed on the '046 Patent as joint inventor of one or more of the inventions claimed in the '046 Patent.

1577. The omission of Ryan Del Re as the joint inventor of one or more claims of the '046 Patent occurred without any deceptive intent on the part Ryan Del Re.

**TWO-HUNDRED-AND-SEVENTY-SEVENTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Michael Murphy as Sole Inventor)**

1578. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1579. Michael Murphy is the sole inventor of one or more claims of the '046 Patent.

1580. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '046 Patent as the inventor of one or more the inventions claimed in the '046 Patent.

1581. The omission of Michael Murphy as the inventor on the '046 Patent occurred without any deceptive intent on the part of Michael Murphy.

**TWO-HUNDRED-AND-SEVENTY-EIGHTH CLAIM FOR RELIEF**  
**Correction Of Inventorship of U.S. Patent 11,868,046 Under 35 U.S.C. § 256**  
**(Michael Murphy as Joint Inventor)**

1582. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1583. Michael Murphy is a joint inventor of one or more claims of the '046 Patent. Michael Murphy provided significant contributions to the conception and reduction to practice of the inventions claimed in the '046 Patent, his contributions were significant in quality, and Michael Murphy did more than explain to the purported inventors well-known concepts and the current state of the art.

1584. Through omission, inadvertence, and/or error, Michael Murphy was not listed on the '046 Patent as joint inventor of one or more of the inventions claimed in the '046 Patent.

1585. The omission of Michael Murphy as the joint inventor of one or more claims of the '046 Patent occurred without any deceptive intent on the part Michael Murphy.

**Unjust Enrichment**

**TWO-HUNDRED-AND-SEVENTY-NINTH CLAIM FOR RELIEF**

**Unjust Enrichment**

1586. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1587. SUNY RF is the rightful owner and interest holder in one or more of the inventions claimed in the Challenged Patents.

1588. SUNY RF conferred a benefit on Inpria by providing Inpria with valuable intellectual property, including PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP.

1589. Inpria and JSR accepted and retained SUNY RF's valuable intellectual property, and used the intellectual property to its own advantage, at SUNY RF's expense.

1590. Inpria and JSR continue to be unjustly enriched by profiting from the conduct described herein. Inpria and JSR have made use of SUNY RF's property as described throughout this Complaint and have derived an unjust benefit from licensing these intellectual property rights and from commercially exploiting SUNY RF's PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP. It would be inequitable for Inpria and JSR to retain these benefits under these circumstances.

1591. SUNY RF has incurred, and continues to incur detriment as a proximate result of Inpria's and JSR's actions in the form of loss of money and property, including the right to any patent based on SUNY RF's property and to any patent documents (including assignment documents), U.S. and foreign that belong to SUNY RF. The intellectual property and the intellectual property rights, including the right to any patents based on SUNY RF's inventions and to any patent documents (including assignment documents), U.S. and foreign, are unique and there is no adequate remedy at law.

1592. The harm to SUNY RF is and continues to be substantial and irreparable.

**Declaratory Relief**

**TWO-HUNDRED-AND-EIGHTIETH CLAIM FOR RELIEF**

**Declaratory Relief**

1593. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1594. SUNY RF is entitled to a declaration that Dr. Brainard is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the Challenged Patents.

1595. SUNY RF is entitled to a declaration that Jodi Hotalen is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '559, '986, '719, and '874 Patents.

1596. SUNY RF is entitled to a declaration that William Earley is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '559, '986, '719, and '874 Patents.

1597. SUNY RF is entitled to a declaration that Miriam Sortland is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '874, '564, and '312 Patents.

1598. SUNY RF is entitled to a declaration that Ryan Del Re is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '505, '924, '696, '048, '081, '618, '874, '564, '312, '153, '029, '284, '903, '466, '109, '028, '876, and '046 Patents.

1599. SUNY RF is entitled to a declaration that Michael Murphy is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '505, '924, '696, '048, '081, '618, '153, '029, '284, '903, '466, '109, '028, '876, and '046 Patents.

1600. SUNY RF is entitled to a declaration that James Passarelli is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '684, '179, '554, '505, '924, '696, '048, '081, '618, '153, '029, '284, '903, '466, '109, '070, '028, '876, and '046 Patents.

1601. SUNY RF is entitled to a declaration that Miles Marnell is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '684, '179, '554, '505, '924, '696, '048, '081, '618, '564, '312, '153, '029, '284, '903, '466, '109, '070, '028, '876, and '046 Patents.

1602. SUNY RF is entitled to a declaration that Dan Freedman is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '684, '179, '554, '505, '924, '696, '048, '081, '618, '564, '312, '153, '029, '284, '903, '466, '109, '070, '028, '876, and '046 Patents.

1603. SUNY RF is entitled to a declaration that Brian Cardineau is the sole inventor or, in the alternative, co-inventor of one or more of the claims in the '684, '179, '554, '564, '312, '903, '466, and '109 Patents.

1604. SUNY RF is entitled to a declaration that and that SUNY RF, by virtue of Dr. Brainard's, Jodi Hotalen's, William Earley's, Miriam Sortland's, Ryan Del Re's, Michael Murphy's, James Passarelli's, Miles Marnell's, Dan Freedman's, and/or Brian Cardineau's inventorship, is the sole owner or, in the alternative, co-owner of the Challenged Patents.

1605. SUNY RF is entitled to a declaration that and that SUNY RF, by virtue the terms of the 2015 and 2017 Research Agreements and amendments thereto, is the sole owner or, in the alternative, co-owner of the Challenged Patents, PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP.

**Constructive Trust and Accounting**

**TWO-HUNDRED-AND-EIGHTY-FIRST CLAIM FOR RELIEF**  
**Constructive Trust and Accounting**

1606. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1607. As a result of Inpria's and JSR's conduct as alleged herein, Inpria and JSR are involuntary trustees holding profits and benefits from one or more of the inventions claimed in the

Challenged Patents, PRIOR PROJECT IP, FOUNDATION Inventions, and/or JOINT IP, in constructive trust for SUNY RF with the duty to convey the same to SUNY RF.

1608. Inpria and JSR are obligated to provide an accounting to SUNY RF reflecting all monies and benefits received, and that continue to be received, as a result of Inpria's and JSR's assignment and ownership interests in the Challenged Patents, PRIOR PROJECT IP, FOUNDATION Inventions, and/or JOINT IP, including but not limited to, licensing royalties and/or fees, equity investments, cash infusions, acquisition fees and payments, sales of patents, sales of unlicensed products, commercialization, lower costs of capital, grant awards, preferred lending terms, and other pecuniary gains.

**Unfair Competition**

**TWO-HUNDRED-AND-EIGHTY-SECOND CLAIM FOR RELIEF**  
**Unfair Competition (Misappropriation)**

1609. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1610. Inpria and JSR have misappropriated, and continue to misappropriate, SUNY RF's labors, skills, expenditures and/or goodwill by using the Challenged Patents, PRIOR PROJECT IP, FOUNDATION Inventions, and/or JOINT IP for Inpria's and JSR's own gain, contrary to the terms agreed upon in the Research Agreements.

1611. Inpria and JSR misappropriated, and continue to misappropriate, SUNY RF's intellectual property and information, including by manufacturing and selling products without a license to do so, obtaining sole ownership of the Challenged Patents, and licensing and transferring the Challenged Patents to third parties.

**Conversion**

**TWO-HUNDRED-AND-EIGHTY-THIRD CLAIM FOR RELIEF**

**Conversion ('684 Patent)**

1612. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1613. SUNY RF invented the intellectual property claimed in the '684 Patent.

1614. Independently, SUNY RF owns the intellectual property claimed in the '684 Patent.

1615. By obtaining the '684 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-EIGHTY-FOURTH CLAIM FOR RELIEF**

**Conversion ('179 Patent)**

1616. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1617. SUNY RF invented the intellectual property claimed in the '179 Patent.

1618. Independently, SUNY RF owns the intellectual property claimed in the '179 Patent.

1619. By obtaining the '179 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-EIGHTY-FIFTH CLAIM FOR RELIEF**

**Conversion ('554 Patent)**

1620. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1621. SUNY RF invented the intellectual property claimed in the '554 Patent.

1622. Independently, SUNY RF owns the intellectual property claimed in the '554 Patent.

1623. By obtaining the '554 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-EIGHTY-SIXTH CLAIM FOR RELIEF**  
**Conversion ('618 Patent)**

1624. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1625. SUNY RF invented the intellectual property claimed in the '618 Patent.

1626. Independently, SUNY RF owns the intellectual property claimed in the '618 Patent.

1627. By obtaining the '618 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-EIGHTY-SEVENTH CLAIM FOR RELIEF**  
**Conversion ('696 Patent)**

1628. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1629. SUNY RF invented the intellectual property claimed in the '696 Patent.

1630. Independently, SUNY RF owns the intellectual property claimed in the '696 Patent.

1631. By obtaining the '696 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-EIGHTY-EIGHTH CLAIM FOR RELIEF**  
**Conversion ('048 Patent)**

1632. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1633. SUNY RF invented the intellectual property claimed in the '048 Patent.

1634. Independently, SUNY RF owns the intellectual property claimed in the '048 Patent.

1635. By obtaining the '048 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.



**TWO-HUNDRED-AND-EIGHTY-NINTH CLAIM FOR RELIEF**  
**Conversion ('505 Patent)**

1636. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1637. SUNY RF invented the intellectual property claimed in the '505 Patent.

1638. Independently, SUNY RF owns the intellectual property claimed in the '505 Patent.

1639. By obtaining the '505 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETIETH CLAIM FOR RELIEF**  
**Conversion ('924 Patent)**

1640. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1641. SUNY RF invented the intellectual property claimed in the '924 Patent.

1642. Independently, SUNY RF owns the intellectual property claimed in the '924 Patent.

1643. By obtaining the '924 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-FIRST CLAIM FOR RELIEF**  
**Conversion ('719 Patent)**

1644. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1645. SUNY RF invented the intellectual property claimed in the '719 Patent.

1646. Independently, SUNY RF owns the intellectual property claimed in the '719 Patent.

1647. By obtaining the '719 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-SECOND CLAIM FOR RELIEF**  
**Conversion ('986 Patent)**

1648. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1649. SUNY RF invented the intellectual property claimed in the '986 Patent.

1650. Independently, SUNY RF owns the intellectual property claimed in the '986 Patent.

1651. By obtaining the '986 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-THIRD CLAIM FOR RELIEF**  
**Conversion ('559 Patent)**

1652. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1653. SUNY RF invented the intellectual property claimed in the '559 Patent.

1654. Independently, SUNY RF owns the intellectual property claimed in the '559 Patent.

1655. By obtaining the '559 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-FOURTH CLAIM FOR RELIEF**  
**Conversion ('874 Patent)**

1656. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1657. SUNY RF invented the intellectual property claimed in the '874 Patent.

1658. Independently, SUNY RF owns the intellectual property claimed in the '874 Patent.

1659. By obtaining the '874 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-FIFTH CLAIM FOR RELIEF**  
**Conversion ('564 Patent)**

1660. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1661. SUNY RF invented the intellectual property claimed in the '564 Patent.

1662. Independently, SUNY RF owns the intellectual property claimed in the '564 Patent.

1663. By obtaining the '564 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-SIXTH CLAIM FOR RELIEF**  
**Conversion ('081 Patent)**

1664. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1665. SUNY RF invented the intellectual property claimed in the '081 Patent.

1666. Independently, SUNY RF owns the intellectual property claimed in the '081 Patent.

1667. By obtaining the '081 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-SEVENTH CLAIM FOR RELIEF**  
**Conversion ('312 Patent)**

1668. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1669. SUNY RF invented the intellectual property claimed in the '312 Patent.

1670. Independently, SUNY RF owns the intellectual property claimed in the '312 Patent.

1671. By obtaining the '312 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-AND-NINETY-EIGHTH CLAIM FOR RELIEF**  
**Conversion ('903 Patent)**

1672. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1673. SUNY RF invented the intellectual property claimed in the '903 Patent.

1674. Independently, SUNY RF owns the intellectual property claimed in the '903 Patent.

1675. By obtaining the '903 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**TWO-HUNDRED-NINETY-NINTH CLAIM FOR RELIEF**  
**Conversion ('153 Patent)**

1676. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1677. SUNY RF invented the intellectual property claimed in the '153 Patent.

1678. Independently, SUNY RF owns the intellectual property claimed in the '153 Patent.

1679. By obtaining the '153 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDREDTH CLAIM FOR RELIEF**  
**Conversion ('466 Patent)**

1680. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1681. SUNY RF invented the intellectual property claimed in the '466 Patent.

1682. Independently, SUNY RF owns the intellectual property claimed in the '466 Patent.

1683. By obtaining the '466 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDRED-AND-FIRST CLAIM FOR RELIEF**  
**Conversion ('109 Patent)**

1684. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1685. SUNY RF invented the intellectual property claimed in the '109 Patent.

1686. Independently, SUNY RF owns the intellectual property claimed in the '109 Patent.

1687. By obtaining the '109 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDRED-AND-SECOND CLAIM FOR RELIEF**  
**Conversion ('029 Patent)**

1688. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1689. SUNY RF invented the intellectual property claimed in the '029 Patent.

1690. Independently, SUNY RF owns the intellectual property claimed in the '029 Patent.

1691. By obtaining the '029 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDRED-AND-THIRD CLAIM FOR RELIEF**  
**Conversion ('284 Patent)**

1692. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1693. SUNY RF invented the intellectual property claimed in the '284 Patent.

1694. Independently, SUNY RF owns the intellectual property claimed in the '284 Patent.

1695. By obtaining the '284 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDRED-AND-FOURTH CLAIM FOR RELIEF**  
**Conversion ('070 Patent)**

1696. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1697. SUNY RF invented the intellectual property claimed in the '070 Patent.

1698. Independently, SUNY RF owns the intellectual property claimed in the '070 Patent.

1699. By obtaining the '070 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDRED-AND-FIFTH CLAIM FOR RELIEF**  
**Conversion ('028 Patent)**

1700. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1701. SUNY RF invented the intellectual property claimed in the '028 Patent.

1702. Independently, SUNY RF owns the intellectual property claimed in the '028 Patent.

1703. By obtaining the '028 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDRED-AND-SIXTH CLAIM FOR RELIEF**  
**Conversion ('876 Patent)**

1704. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1705. SUNY RF invented the intellectual property claimed in the '876 Patent.

1706. Independently, SUNY RF owns the intellectual property claimed in the '876 Patent.

1707. By obtaining the '876 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**THREE-HUNDRED-AND-SEVENTH CLAIM FOR RELIEF**  
**Conversion ('046 Patent)**

1708. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1709. SUNY RF invented the intellectual property claimed in the '046 Patent.

1710. Independently, SUNY RF owns the intellectual property claimed in the '046 Patent.

1711. By obtaining the '046 Patent, Defendants exercised dominion over SUNY RF's intellectual property to the exclusion of SUNY RF's rights.

**Successor Liability**

**THREE-HUNDRED-AND-EIGHTH CLAIM FOR RELIEF**  
**Successor Liability**

1712. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1713. The Research Agreements expressly state that they “shall accrue to the benefit of and be binding upon the successors, assigns, heirs, and personal representatives of the Parties hereto.” 2015 SRA §§ 10(b), 12; 2017 SRA §§ 10(b), 12.

1714. JSR was aware of and assumed Inpria's liabilities when it acquired Inpria as a wholly-owned subsidiary on October 29, 2021. JSR thereby impliedly, if not expressly, agreed to assume Inpria's obligations.

1715. JSR's acquisition of Inpria constituted a merger of JSR and Inpria, as JSR's wholly-owned subsidiary.

1716. JSR is thus liable for Inpria's liabilities, including for Inpria's acts against SUNY RF as alleged in this Complaint.

**Alter Ego Liability**

**THREE-HUNDRED-AND-NINTH CLAIM FOR RELIEF**

**Alter Ego Liability**

1717. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1718. JSR acquired Inpria as a wholly-owned subsidiary on October 29, 2021, acquiring all shares and voting rights of Inpria, and on that date began exercising complete domination over Inpria.

1719. After JSR acquired Inpria, it began implementing its goals of expanding Inpria's business scale in 2021 and turning Inpria profitable in 2022.

1720. JSR incorporated metal oxide resists sold by Inpria into its own product line.

1721. According to JSR, the acquisition of Inpria was "expected to secure JSR Corporation's long-term technical leadership and market share in photoresist chemicals for semiconductors, and is expected to drive value creation for shareholders and society."

1722. JSR also embarked on the construction of a new plant for manufacturing lithography materials, including EUV resists, at the main Yokkaichi Plant complex.

1723. According to a September 17, 2021 press release regarding JSR's acquisition of Inpria, "Inpria's metal oxide photoresist platform enables customers to pattern advanced node device architectures meeting the low defectivity levels required for manufacturing. Inpria material solutions provide the performance to significantly reduce the cost of EUV patterning for the rapidly growing fleet of EUV scanners in the field." Additionally, Grenville stated that JSR and Inpria "would work together to combine Inpria's metal oxide photoresist technology with JSR's unmatched experience in quality, manufacturing, and customer focus to accelerate the full adoption of our platform in high volume semiconductor manufacturing." Grenville also stated that



“JSR’s global operations will also allow us to meet customer needs as we ramp our product introductions in critical markets.” According to the press release, JSR’s planned “to add Inpria’s non-chemically amplified metal-based resist to its photoresist product portfolio to seamlessly provide value as an advanced electronic materials supplier.”

1724. On information and belief, JSR exercises complete domination over Inpria.

1725. For example, on information and belief, JSR and Inpria comingled assets when JSR acquired Inpria and acquired all of Inpria’s assets and liabilities.

1726. As an additional example of JSR’s complete domination over Inpria, there is no separation of leadership between JSR and Inpria. Prior to JSR acquisition of Inpria, Inpria had a board of directors comprised of various investors from other companies, each of whom owned a portion of voting rights in Inpria. After JSR acquired all voting rights in Inpria, on information and belief, Inpria’s board of directors was disbanded, and Inpria is now completely directed by JSR.

1727. Moreover, according to its 2023 Annual Report, JSR’s EUV metal oxide photoresist products are based on and/or incorporate Inpria technology. JSR’s website also offers for sale Inpria’s products.

1728. As a further example, JSR exercises complete control over Inpria’s manufacturing plant in Corvallis, Oregon and, on information and belief, uses it to research, develop, and manufacture JSR’s metal photoresists.

1729. JSR used its domination and control over Inpria to commit the acts alleged in this Complaint, including but not limited to the use of SUNY RF’s intellectual property in breach of the Research Agreements and in contravention to foreign and United States patent laws.

1730. Moreover, in its 2023 Annual Report, JSR has stated that it had “acquired control of Inpria Corporation.”

1731. JSR is thus the alter ego of Inpria and is liable for Inpria's acts against SUNY RF occurring on or after October 29, 2021.

**Principal-Agent Liability**

**THREE-HUNDRED-AND-TENTH CLAIM FOR RELIEF**

**Principal-Agent Liability**

1732. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1733. JSR acquired Inpria as a wholly-owned subsidiary on October 29, 2021. In so doing, JSR acquired all of Inpria's assets, debts, and liabilities.

1734. On information and belief, there is no separation of leadership between JSR and Inpria. Prior to JSR acquisition of Inpria, Inpria had a board of directors comprised of various investors from other companies, each of whom owned a portion of voting rights in Inpria. After JSR's acquisition, however, on information and belief, Inpria's board of directors was disbanded and Inpria is now completely directed by JSR.

1735. On Inpria's website, it holds itself out, multiple times over, as "[a] JSR Company."

1736. In JSR's 2023 Corporate Profile, it lists Inpria as one of its overseas locations, under its Digital Solutions Business.

1737. In JSR's Notice of Acquisition of All Shares of Inpria Corporation, JSR listed Inpria as part of its global R&D and manufacturing network.

1738. JSR's website section regarding product information lists Inpria and Inpria's products as its own "JSR EUV Photoresist" materials.

1739. Inpria is thus an agent of JSR. And JSR is liable for Inpria's actions, including the actions against SUNY RF as alleged in this Complaint.

Attorneys' Fees, Costs, and Expenses

THREE-HUNDRED-AND-ELEVENTH CLAIM FOR RELIEF  
Attorneys' Fees, Costs, and Expenses under the 2015 SRA

1740. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1741. The 2015 SRA contains an “Indemnification” provision that states Defendants “shall indemnify, save, hold harmless and defend” SUNY RF “from and against any and all claims, damages, demands, actions, judgments, lawsuits, proceedings, assessments, liabilities, losses, penalties, **costs and expenses (including, without limitation, reasonable attorneys’ fees, costs and expenses)**” “incurred in connection with, by reason of, or arising out of (a) SPONSOR’s access to or use or misuse of the any facilities, reports or technology which are provided to SPONSOR hereunder, (b) the breach by SPONSOR (or its employees or agents) of this Agreement, (c) any act or omission, fraud or self-dealing of SPONSOR (or its employees or agents) in connection with the performance of this Agreement, (d) any damage or destruction of property, or injury, sickness, disease or death to persons, resulting from SPONSOR's or any of its employees' or agents' negligence or misconduct, or (e) any act or omission or violation of statutory duty or regulation by SPONSOR or any of its employees or agents.” 2015 SRA § 16.

1742. As described throughout this Complaint, the instant action is in connection with, by reason of, or arising out of Defendants’ access to or use or misuse of the reports or technology provided to Defendants under the 2015 SRA, the breach by Defendants of the 2015 SRA, Defendants’ acts and omissions in connection with the performance of the 2015 SRA, and Defendants’ acts or omissions with respect to the statutory duties or regulations under the patent laws, including those relating to inventorship and assignment.

1743. SUNY RF is therefore entitled under the 2015 SRA to recover, without limitation, all of its losses, penalties, costs, and expenses including its reasonable attorneys' fees, costs and expenses, incurred in connection with, by reason of, or arising from this action and/or as necessary to cure and correct the breaches, acts, and omissions of Defendants alleged herein.

**THREE-HUNDRED-AND-TWELFTH CLAIM FOR RELIEF**  
**Attorneys' Fees, Costs, and Expenses under the 2017 SRA**

1744. Plaintiff hereby realleges and incorporates by reference the foregoing paragraphs of the Complaint as if fully set forth herein.

1745. The 2017 SRA contains an "Indemnification" provision that states Defendants "shall indemnify, save, hold harmless and defend" SUNY RF "from and against any and all claims, damages, demands, actions, judgments, lawsuits, proceedings, assessments, liabilities, losses, penalties, **costs and expenses (including, without limitation, reasonable attorneys' fees, costs and expenses)**" "incurred in connection with, by reason of, or arising out of (a) SPONSOR's access to or use or misuse of the any facilities, reports or technology which are provided to SPONSOR hereunder, (b) the breach by SPONSOR (or its employees or agents) of this Agreement, (c) any act or omission, fraud or self-dealing of SPONSOR (or its employees or agents) in connection with the performance of this Agreement, (d) any damage or destruction of property, or injury, sickness, disease or death to persons, resulting from SPONSOR's or any of its employees' or agents' negligence or misconduct, or € any act or omission or violation of statutory duty or regulation by SPONSOR or any of its employees or agents." 2017 SRA § 16.

1746. As described throughout this Complaint, the instant action is in connection with, by reason of, or arising out of Defendants' access to or use or misuse of reports or technology provided to Defendants under the 2017 SRA, the breach by Defendants of the 2017 SRA, Defendants' acts or omissions in connection with the performance of the 2017 SRA, and Defendants' acts or

omissions or violations with respect to the statutory duties or regulations under the patent laws, including those relating to inventorship and assignment.

1747. SUNY RF is therefore entitled under the 2017 SRA to recover, without limitation, all of its losses, penalties, costs, and expenses including its reasonable attorneys' fees, costs and expenses incurred in connection with, by reason of, or arising from this action and/or as necessary to cure and correct the breaches, acts, and omissions of Defendants alleged herein.

### **DEMAND FOR JURY TRIAL**

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, SUNY RF demands a trial by jury as to all issues so triable.

### **COMPLIANCE WITH NOTICE REQUIREMENTS UNDER 35 U.S.C. § 256**

In compliance with 35 U.S.C. § 256(b), SUNY RF has already given, or will promptly give after this action is filed and assigned a case number, notice of this matter and SUNY RF's request to correct inventorship of the Challenged Patents as alleged herein to all interested parties, including all assignees, named inventors, and omitted inventors of the Challenged Patents, so that all interested parties may be afforded an opportunity to be heard on these matters, including at any hearing(s) noticed on the case docket for these matters, or as otherwise ordered by this Court.

### **PRAYER FOR RELIEF**

WHEREFORE, SUNY RF prays for judgment as follows:

1. Entering judgment in Plaintiff's favor on each Claim for Relief;
2. Preliminarily and permanently enjoining Defendants from using SUNY RF's PRIOR PROJECT IP, FOUNDATION Inventions, and JOINT IP in any form, including but not limited to any attempt to commercialize, transfer, patent, or claim as its own, anywhere in the world, SUNY RF's IP;

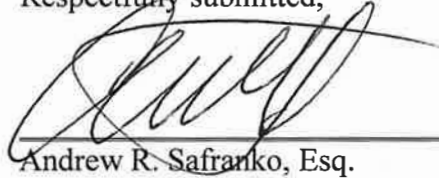
3. Ordering the USPTO to correct the inventorship on the Challenged Patents;
4. Issuing a declaratory judgment requiring Defendants to sign requisite documents to correct the inventorship of any pending patent applications in which one or more claims were invented by SUNY RF;
5. Issuing a declaratory judgment requiring Defendants to sign requisite documents to assign the Challenged Patents, and any pending patent applications in which one or more claims were invented by SUNY RF, to SUNY RF in whole or in part;
6. Ordering Defendants to disgorge to SUNY RF all monies and/or profits from the conduct alleged herein;
7. Ordering a constructive trust over all information, patent applications, patents, technology, products, and other materials in the possession, custody, or control of Defendants that constitute, contain, were based on, and/or derived in whole or in part from the use of SUNY RF's intellectual property, and order that Defendants immediately transfer to SUNY RF all right, title, and interest in such information, patent applications, patents, material, technology, and products;
8. Granting injunctive relief, including preliminary and permanent injunctive relief, prohibiting Defendants from transferring, commercializing, or otherwise dissipating SUNY RF's intellectual property interests; any profits, revenue, or assets deriving therefrom; or any other assets necessary and sufficient to pay all damages, costs, and fees due to SUNY RF;
9. Awarding SUNY RF compensatory damages in an amount to be determined at trial, including but not limited to, for example, licensing royalties and/or fees, reasonable royalties, lost profits, lump sum payments, lower costs of capital, grant awards, preferred lending terms, disgorgement, and any other pecuniary gains realized by Defendants or deprived to SUNY RF;

10. Awarding SUNY RF pre-judgment and post-judgment interest, as well as any costs, expenses, and attorneys' fees allowed by law and/or under the Research Agreements; and

11. Awarding SUNY RF such other relief as this Court may deem just and proper under the circumstances.

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Respectfully submitted,



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