

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LAM RESEARCH CORP.,
Petitioner

v.

INPRIA CORP.,
Patent Owner.

Case IPR2024-00033
Patent 9,823,564

PATENT OWNER'S CONTINGENT MOTION TO AMEND

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LIST OF EXHIBITS

Exhibit No.	Description	Previously Submitted
2001	Declaration of John S. McCloy, PhD	X
2002	CV of John S. McCloy, PhD	X
2003	U.S. Patent No. 5,874,128	X
2004	U.S. Patent No. 5,658,615	X
2005	U.S. Patent No. 6,987,572	X
2006	U.S. Patent No. 7,220,531	X
2007	Seong-Yun Moon, Jong-Man Kim, <i>Chemistry of photolithographic imaging materials based on the chemical amplification concept</i> , Journal of Photochemistry and Photobiology C: Photochemistry Reviews 8 (2007) 157-173	X
2008	Declaration of Jason Stowers, PhD	
2009	Declaration of Sanjay Banerjee, PhD	
2010	CV of Sanjay Banerjee, PhD	
2011	Deposition Transcript of Karey Holland, Ph.D. (July 18, 2023)	

Exhibit No.	Description	Previously Submitted
2012	E-mail with attachments from Cara Key, Digital Repository Librarian, Library Information and Technology, The Valley Library, Oregon State University, to Alan Telecky, Inpria Corporation (Feb. 15, 2024)	

I. Introduction

Patent Owner Inpria Corporation (“Inpria”) submits this Contingent Motion to Amend claims 1-12 of U.S. Patent No. 9,823,564 (“the ’564 patent”). In the event any of those claims are found to be unpatentable, Inpria respectfully requests amendment of such claims. The ’564 patent is directed to radiation-based patterning of inorganic resists. This Motion proposes contingent substitute claims that further patentably distinguish the references underlying the grounds for challenging claims 1-12 of the ’564 patent proposed by Petitioner Lam Research Corporation (“Lam”) by specifying that the average thickness of the coating material of the claims is “about 25 nm.”

This narrower average thickness limitation has express support in the priority application and is not disclosed in any of the references presented by Lam in its unpatentability grounds in Lam’s Petition. Inpria reasonably proposes fewer substitute claims (eleven) than the original claim set (twelve) and the substitute claims do not introduce new matter. Inpria proposes (on a contingent basis) amending claims 1-5 and 7-12 and cancelling claim 6. This Motion details the support for the narrowed average thickness limitation and offers comments on patentability to aid the Board in its analysis.

II. Statement of Relief Requested

Inpria requests preliminary guidance from the Board concerning this Contingent Motion in accordance with the New Pilot Program Concerning Motion to Amend Practice set forth in 84 Fed. Reg. 9497 (Mar. 15, 2019). To the extent the Board finds any of original claims 1-12 unpatentable in this proceeding, Inpria requests that the Board consider this Contingent Motion and grant entry of corresponding substitute claims 13-23. Inpria proposes substituting amended claim 13 for independent claim 1 and dependent claims 14-23 for original dependent claims 2-5 and 7-12. The substitute claims are proposed on a contingent basis, and should only be entered as to any corresponding original claims found to be unpatentable. The proposed amendments are detailed in the claim listing at Appendix A and a table of the proposed amendments is shown below:

Original '564 Patent Claim	Contingent Substitute Claim
1	13
2	14
3	15
4	16
5	17
6	N/A (cancelled)

7	18
8	19
9	20
10	21
11	22
12	23

III. The Procedural Requirements of 37 C.F.R. § 42.121 Are Met

As explained below, the proposed contingent amendments meet the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.

A. Reasonable Number of Substitute Claims

Inpria proposes eleven contingent substitute claims (claims 13-23), each of which corresponds to one challenged claim (original claims 1-5 and 7-12, respectively). Because Inpria proposes fewer substitute claims than the original claims, this is a reasonable number. *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, -01130, Paper 15 at 4-5 (Feb. 25, 2019) (“There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.”); 37 C.F.R. § 42.121(a)(3); *see also* 35 U.S.C. § 316(d)(1)(B).

B. Amendments Are Responsive to the Grounds of Unpatentability

The amendments made in the contingent substitute claims are responsive to the grounds of unpatentability involved in this proceeding. In particular, as a basis for its Ground 1, Lam challenges the written description support of the average thickness range claimed from “5 nm to 30 nm” in independent claim 1 (and in all dependent claims by virtue of dependency). Lam argues that the priority application fails to disclose these endpoints. Pet. at 15. Lam argues that this means the publication of the priority application (U.S. Patent Publication No. 2011/029388 (“the ’888 publication”)) is prior art to the ’564 patent claims.

Lam cannot contest, however, that the proposed amended average thickness limitation of “about 25 nm” is expressly disclosed in the priority application, EX1004, 23:16-26—indeed, Lam seems to admit as much, Pet. at 14-15. As such, the ’888 publication would *not* be prior art to the contingent substitute claims.

The only other references Lam relies on for the average thickness limitation are Stowers 2008 and Trikeriotis, neither of which is prior art, for the reasons described below. *See infra* at 10. And on the merits, neither reference discloses or renders obvious an average thickness of “about 25 nm.”

C. Substitute Claims Have Written Description Support

The proposed substitute claims do not introduce any new subject matter. “[T]he Board requires that a motion to amend set forth written description support

in the originally filed disclosure of the subject patent for each proposed substitute claim.” *Lectrosonics*, Paper 15 at 7 (citing 37 C.F.R. §§ 42.121(b)(1), 42.121(b)(2)). The ’564 patent issued from U.S. Patent Application No. 14/858,612, which claims priority to U.S. Patent Application No. 12/850,867 (“the ’867 application”) (EX1004, 1-51).¹ See EX1001, 1-2. As shown in the table below, each limitation of the substitute claims finds support in the ’867 application. EX1004, 1-51.²

¹ The ’867 application further claims priority to Provisional Application No. 61/350,103 (“the ’103 provisional”) (EX1005), filed on June 1, 2010. But for the substitute claims, none of the issues of patentability presented by Lam is impacted by this priority claim, rendering moot the question of whether Inpria’s claims are also entitled to claim the even-earlier priority date of the ’103 provisional.

² The substitute claims also have sufficient written description support in the ’564 patent specification because the ’564 patent specification is substantively identical to the ’867 application. In other words, by sharing a common specification, the citations provided herein to the ’867 application also demonstrate how the ’564 patent itself provides adequate support for the claims.

Claim of the '564 Patent (as contingently amended)	Support in the '867 Application (EX1004, 2-51)
<u>Claim 13(a)</u> : A structure comprising a substrate and a coating material on a surface of the substrate,	Page 5, ³ lines 5-12 Page 12, lines 15-30 Page 21, line 21 to Page 22, line 7
<u>Claim 13(b)</u> : wherein the coating material comprises metal ions with radiation sensitive ligands and	Page 4, line 30 to Page 5, line 12 Page 9, lines 5-9 Page 9, line 29 to Page 10, line 23 Page 13, lines 1-17 Page 16, line 10 to Page 18, line 29
<u>Claim 13(c)</u> : wherein the coating material has an average thickness <u>of about 25 nm</u> ~~from 5 nm to 30 nm~~ ,	Page 11, lines 18-20 Page 12, lines 20-25 Page 21, lines 3-7 Page 22, lines 21-30 Page 23, lines 1-26 Page 35, lines 14-15 Page 35, lines 29-30
<u>Claim 13(d)</u> : 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.	Page 4, line 30 to Page 5, line 12 Page 7, lines 14-23 Page 11, line 27 to Page 12, line 4 Page 13, lines 1-10 Page 24, line 24 to Page 26, line 31 Page 27, lines 13-19 Page 40, Claims 15, 17, and 18.
<u>Claim 14</u> : The structure of claim ~~131~~ wherein the metal ions comprise metal suboxide ions.	Page 4, line 30 to Page 5, line 3 Page 5, lines 5-15 Page 17, line 14 to Page 18, line 29
<u>Claim 15</u> : The structure of claim ~~131~~ wherein the metal of the metal ions	Page 17, line 14 to Page 18, line 29 Page 39, claim 10

³ Page cites in this table are to EX1004 (rather than the original application's page numbering) for the Board's convenience.

Claim of the '564 Patent (as contingently amended)	Support in the '867 Application (EX1004, 2-51)
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.	
<u>Claim 16</u> : The structure of claim ~~131~~ wherein the radiation sensitive ligands comprise peroxide ligands.	Page 4, line 30 to Page 5, line 3 Page 5, lines 5-15 Page 19, line 23 to Page 20, line 12
<u>Claim 17</u> : The structure of claim ~~131~~ wherein the coating material further comprises polyatomic anions.	Page 4, line 30 to Page 5, line 3 Page 5, lines 5-15 Page 18, line 30 to Page 19, line 17 Page 20, line 18 to Page 21, line 2
<u>Claim 18</u> : The structure of claim ~~131~~ wherein the coating material has high absorption of EUV radiation relative to conventional radiation-based resists.	Page 11, lines 13-25 Page 14, line 16 to Page 15, line 13
<u>Claim 19</u> : The structure of claim ~~131~~ having a molar concentration ratio of radiation sensitive ligands to metal ion to ~~radio-sensitive ligand ratio~~ of at least about 2.	Page 4, line 24 to Page 5, line 4 Page 10, lines 9-12 Page 16, lines 17-19 Page 20, lines 8-12 Page 38, claim 1
<u>Claim 20</u> : The structure of claim ~~131~~ wherein the coating material has been heated to temperatures from 45° C. to 150° C.	Page 24, lines 11-21 Page 26, line 31 to Page 27, line 9
<u>Claim 21</u> : The structure of claim ~~131~~ wherein following exposure an exposed coating region is insoluble in an aqueous solvent.	Page 14, line 16 to Page 15, line 3 Page 27, lines 13-23
<u>Claim 22</u> : The structure of claim ~~131~~ wherein following exposure an exposed coating region is soluble in an organic solvent.	Page 14, line 16 to Page 15, line 3 Page 20, lines 1-3 Page 27, lines 13-15
<u>Claim 23</u> : The structure of claim ~~131~~ wherein the coating material can be	Page 5, lines 22-23 Page 25, lines 24-30

Claim of the '564 Patent (as contingently amended)	Support in the '867 Application (EX1004, 2-51)
effectively patterned with UV radiation or EUV radiation at a dose of no more than 100 mJ/cm ²	Page 42, claim 35

D. Amendments Do Not Enlarge the Scope of the Claims

The substitute claims do not seek to enlarge the scope of the original claims in any respect. Aside from the “5 nm to 30 nm” average thickness limitation of original independent claim 1 and the metal-to-peroxide ratio of original dependent claim 8, every limitation of each original claims is present in the corresponding proposed substitute claims. The amendment to the average thickness limitation in independent claim 1 is strictly narrower, changing “5 nm to 30 nm” to “about 25 nm.” For original claim 8, without conceding the correctness of Petitioner Lam’s positions, Inpria reverses the claimed ratio in a way that Lam seems to concede would be supported by the original application’s written description. *See* Pet., 6-7, 30-31. These amendments are non-broadening because they add novel and nonobvious features that distinguish over the prior art underlying the grounds advanced in this proceeding. *See Lectrosonics*, Paper 15 at 7. Furthermore, because the substitute independent claim is narrower than the original independent claim, the dependent claims are necessarily narrower than the corresponding original dependent claims.

IV. The Substitute Claims Are Patentable Over the Instituted Grounds

Although Inpria, as patent owner, does not bear the burden of proving the patentability of substitute claims 13-23, *see Lectrosonics*, Paper 15 at 3–4; *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1295-96, 1327 (Fed. Cir. 2017) (en banc), Inpria offers the following comments on patentability to aid the Board in evaluating the proposed substitute claims.

A. Level of Ordinary Skill in the Art

For the purposes of this Contingent Motion to Amend, Inpria applies Lam's definition of a POSA as "an individual with at least a graduate degree, such as a masters or Ph.D., in a relevant discipline such as in chemistry, materials science, chemical engineering, physics, or an equivalent field. The POSA would also have 1-3 years of experience in the research, design, development and/or testing of resist materials." Pet. at 5 (citing EX1002, ¶20); *see also* Inst. Dec. at 5-6 (preliminarily adopting this definition).

B. Claim Construction

The added limitation of the substitute claims does not require construction at this time and should be construed in accordance with its ordinary meaning. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc); *see also* Inst. Dec. at 7 (determining no claim term requires express construction to resolve the issue regarding written description support). Inpria reserves the right to advance its own

constructions for any claim term Lam or the Board provides in response to this Contingent Motion.

C. The Substitute Claims Introduce Limitations Not Found in the Prior Art

Because the proposed substitute claims are supported by the written description of the '867 application, they are entitled to a priority date of no later than August 5, 2010—the filing date of the '867 application. As such, the '888 publication, which is the publication of the '867 application, is not prior art. EX1003, 1.

Furthermore, Lam's two other primary references are not prior art to the contingent substitute claims. Stowers 2008 is a thesis that was under embargo at the Oregon State University library and intentionally not publicly accessible until October 2009 at the earliest. EX2008, ¶¶4-9. For Trikeriotis, the evidence shows the reference was only catalogued and available to the public on or after September 21, 2010, which is after the August 5, 2010 filing date of the '867 application. In particular, while Dr. Hall-Ellis alleges a "March 25, 2010, publication date" EX1006, ¶60, she provides no evidence of that and elsewhere recognizes it was only catalogued by the Library of Congress in September 2010 and "publicly available on or shortly after September 21, 2010." EX1006, ¶¶63-64.

For Lam's secondary reference, Stowers 2009, Lam does not even rely on that reference as disclosing the average thickness limitation. This makes sense because Stowers 2009 discloses a photoresist thickness of 35 nm. EX1010, 20.

Finally, even if Trikeriotis were considered prior art, for the average thickness limitation, Trikeriotis only mentions offhand that "film thicknesses ranging from 30 nm to 200 nm can be easily achieved," even though (1) Trikeriotis expected that "40-45 nm thick resists [would] be commonplace;" (2) the measured thicknesses Trikeriotis's spin coating tests was between 60-160 nm, EX1024, 18 (Fig. 3); and (3) the thinnest film disclosed was "30 nm thick," with Trikeriotis indicating a desire to pattern on "thicker films," *id.*, 21, and not mentioning thinner films. Furthermore, Trikeriotis is distinguishable from the proposed substitute claims for reasons other than the average thickness limitation (e.g., regarding the "radiation sensitive ligand"), as described in Inpria's POR, filed contemporaneously with this Contingent Motion. Patent Owner's Response at 50-60.

V. Conclusion

For at least the above reasons, Inpria respectfully requests that the Board grant this Contingent Motion for each of the contingent substitute claims 13-23 to the extent that the corresponding original claims 1-12 are deemed unpatentable.

Respectfully submitted,

Dated: July 31, 2024

By: /Daniel Zeilberger/
Daniel Zeilberger (Reg. No. 65,349)
Counsel for Patent Owner

APPENDIX A

Proposed Amended Claim 13 (substitute for Claim 1)

13. 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 of about 25 nm~~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.

Proposed Amended Claim 14 (substitute for Claim 2)

14. The structure of claim 13~~1~~ wherein the metal ions comprise metal suboxide ions.

Proposed Amended Claim 15 (substitute for Claim 3)

15. The structure of claim 13~~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.

Proposed Amended Claim 16 (substitute for Claim 4)

16. The structure of claim 13~~1~~ wherein the radiation sensitive ligands comprise peroxide ligands.

Proposed Amended Claim 17 (substitute for Claim 5)

17. The structure of claim ~~13~~¹³¹ wherein the coating material further comprises polyatomic anions.

Proposed Amended Claim 18 (substitute for Claim 7)

18. The structure of claim ~~13~~¹³¹ wherein the coating material has high absorption of EUV radiation relative to conventional radiation-based resists.

Proposed Amended Claim 19 (substitute for Claim 8)

19. The structure of claim ~~13~~¹³¹ having a molar concentration ratio of radiation sensitive ligands to metal ion ~~to radio-sensitive ligand ratio~~ of at least about 2.

Proposed Amended Claim 20 (substitute for Claim 9)

20. The structure of claim ~~13~~¹³¹ wherein the coating material has been heated to temperatures from 45° C. to 150° C.

Proposed Amended Claim 21 (substitute for Claim 10)

21. The structure of claim ~~13~~¹³¹ wherein following exposure an exposed coating region is insoluble in an aqueous solvent.

Proposed Amended Claim 22 (substitute for Claim 11)

22. The structure of claim ~~13~~¹³¹ wherein following exposure an exposed coating region is soluble in an organic solvent.

Proposed Amended Claim 23 (substitute for Claim 12)

23. The structure of claim ~~13~~¹⁴ wherein the coating material can be effectively patterned with UV radiation or EUV radiation at a dose of no more than 100 mJ/cm².

CERTIFICATE OF SERVICE

I hereby certify that on July 31, 2024, I caused a true and correct copy of the foregoing Patent Owner's Contingent Motion to Amend to be served via email on Petitioner at the following addresses:

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Dated: July 31, 2024

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