

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 No. 9,823,564

PATENT OWNER'S PRELIMINARY RESPONSE

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LIST OF EXHIBITS

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EX2004	U.S. Patent No. 5,658,615
EX2005	U.S. Patent No. 6,987,572
EX2006	U.S. Patent No. 7,220,531
EX2007	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

I. INTRODUCTION

Patent Owner Inpria, Corp. (“PO” or “Inpria”) respectfully submits this Preliminary Response to the Petition for *inter partes* review (Paper No. 1) (the “Petition” or “Pet.”) filed by Lam Research Corp. (“Petitioner” or “Lam”) against claims 1-12 (“the challenged claims”) of U.S. Patent No. 9,823,564 (“the ’564 patent”). As discussed in detail below, Lam has not met its burden of demonstrating a reasonable likelihood of prevailing with respect to any of the challenged claims.

Ground 1 supports denial of institution under 35 U.S.C. § 325(d), because it revives an issue previously considered by the United States Patent and Trademark Office (“the Office”) during prosecution of the ’564 patent, namely, whether the specification provides written description support for the claimed “average thickness from 5 nm to 30 nm,” as recited in claim 1. The primary difference here is that Lam is arguing that the ’564 patent’s parent application does not disclose this claim limitation in order to break the chain of priority. The written descriptions of the ’564 patent and its parent application, however, are substantively the same. And, during prosecution of the ’564 patent, the Office did not reject the claims reciting a similar limitation, a thickness range “from about 5 nm to about 30 nm,” for lacking written description support or object to the filing of the ’564 patent application as a “continuation” due to the introduction of new matter—despite closely analyzing this

range under 35 U.S.C. § 112 and recognizing that there was not an embodiment reciting this range. Lam has not established that the Office erred in this regard.

Ground 1 is also substantively deficient. A person of ordinary skill in the art would have understood, based on the disclosure of the parent application's specification, that the inventors were in possession of the claimed "average thickness from 5 nm to 30 nm" as of the filing date of that application. Not only does the specification explicitly identify ranges that encompass the claimed range, such as the range "about 1 nm to about 40 nm," it states that "[a] person of ordinary skill in the art will recognize that additional ranges of thicknesses within the explicit ranges above are contemplated and are within the present disclosure." Lam and its expert failed to address what this disclosure would have reasonably conveyed to a person of ordinary skill in the art, as required under the written description standard. Instead, they performed a mechanical comparison of ranges, which is not enough.

Grounds 2-4 further support denial of institution under 35 U.S.C. § 325(d). Lam admits that Stowers 2008 was previously before the Office, and there is no evidence that the Office failed to appreciate its disclosure. Stowers 2008 merely describes "films 30 to 35-nm thick" and "on the order of 30 nm" thick. Lam does not explain how this vague description discloses the claimed "*average* thickness" from 5 nm to 30 nm.

In addition to the “average thickness” limitation, Grounds 2-4 also fail to demonstrate how Stowers 2008 discloses “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 recited in claim 1. Lam argues that Stowers 2008 discloses this limitation because the films in Stowers 2008 are “the same” as the films in the ’564 patent, but Lam’s analysis does not account for significantly different recipes and processing conditions that may result in different film characteristics. Nor has Lam established that exposure of the films in Stowers 2008 necessarily results in chemical instead of physical alterations or that any chemical alternations due to exposure necessarily create differential dissolution rates.

As for Ground 5, Lam’s analysis is conclusory and fails to meet the particularity requirement for an IPR petition. Additionally, Lam’s analysis of the “exposure” limitation recited in claim 1 totals four sentences, which do not explain how Trikeriotis’s process discloses altering chemical properties of a coating material via exposure and that those alterations cause differential dissolution rates.

Accordingly, as discussed in more detail below, institution should be denied.

II. BACKGROUND

The '564 patent issued from U.S. Patent Application No. 14/858,612 (“the '612 application”) filed on September 18, 2015, and claims priority to U.S. Patent Application No. 12/850,867 (“the '867 application”) filed on August 5, 2010, and Provisional Patent Application No. 61/350,103 (“the '103 provisional”).

As described by the '564 patent, as semiconductor-based devices continue to advance, enhanced performance can be achieved by reducing the size of the devices. (EX1001, 1:38-46.) The devices are based on structures that are formed through an iterative process that includes deposition or etching (e.g., removal) of different materials, where the materials are patterned. (*Id.*, 1:38-46, 4:52-60) Such patterning can include the lithographic transfer of a desired image using a thin film of resist material that is radiation sensitive, where exposure of certain regions of the resist material to an energy source results in the exposed regions becoming more or less removable compared to the non-exposed regions. (*Id.*, 1:47-60, 4:60-5:2.) The '564 patent teaches the formation of radiation sensitive inorganic compositions for use as such resists in semiconductor device manufacturing, where the compositions provide significant processing improvements and improved structure of the patterned material. (*Id.*, 5:2-8.)

III. LEVEL OF ORDINARY SKILL

For purposes of this Preliminary Response, Inpria adopts Lam’s definition of a person of ordinary skill in the art (“POSITA”). Inpria reserves the right to propose an alternative definition of a POSITA should the Board grant institution.

IV. CLAIM CONSTRUCTION

The Board need not construe any claim term because no construction is needed to resolve the parties’ dispute. *See Toyota Motor Corp. v. Cellport Sys., Inc.*, IPR2015-00633, Paper 11 at 16 (Aug. 14, 2015) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Under any reasonable construction of the claim terms, Lam has failed to demonstrate that the prior art discloses or suggests the challenged claims.

V. ARGUMENT

A. The Petition Should Be Denied Because Ground 1 Involves Issues Previously Before the Office and Lam Fails to Show Material Error by the Office

The Board may elect not to institute IPR of the ’564 patent under 35 U.S.C. § 325(d) because Ground 1 is based on an argument that was previously before the Office. *See Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (Dec. 15, 2017) (precedential in relevant part) (“*Becton*”); *Advanced Bionics LLC, v. Med-el Elektromedizinische Gerate GmbH*, IPR2019-01469, Paper 6 at 7 (Feb. 13, 2020) (precedential) (“*Advanced Bionics*”). “[U]nder § 325(d), the Board uses the following two-part framework: (1) whether the same or

substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.” *Advanced Bionics* at 8-9. As discussed below, both parts of the framework support denial of institution.

1. The Office Already Considered Whether the Specification Provides Written Description Support for the “5 nm to 30 nm” Average Thickness Range

In Ground 1, Lam contends that the challenged claims “are not entitled to a priority date of earlier than **September 18, 2015**, *i.e.*, the actual filing date of the ’564 patent,” because the ’867 application does not provide written description support under 35 U.S.C. §112. (Pet., 18.) Based on this priority date, Lam argues that the ’888 publication (the publication of the ’564 patent’s parent ’867 application) is prior art. (*Id.*) Lam’s argument challenging the written description support for the ’564 patent claims, however, was already before the Office and should therefore be rejected. Applying the correct priority date, there is no dispute that the ’888 publication is not prior art.

Lam argues that the challenged claims are not entitled to the filing date of the ’867 application because “the specification [of the ’867 application] does not disclose either of the two end values (5 nm and 30 nm) or the range (5 nm to 30

nm),” as recited in claim 1 of the ’564 patent. (*Id.*, 16; *see also id.*, 13-18.) Lam overlooks that this exact issue was previously considered by the Office during prosecution of the ’612 application, which was filed as a “continuation” of the ’867 application, (EX1007, 70), and the Office did not reject the then-pending claims of the ’612 application as lacking written description support or object to the filing of the ’612 application as a continuation due to the introduction of new matter. *See* Manual of Patent Examining Procedure § 201.07 (“The disclosure presented in the continuation must be the same as that of the original application; i.e., the continuation should not include anything which would constitute new matter if inserted in the original application.”).

The 5 nm to 30 nm range was first claimed upon filing of the ’612 application. (EX1007, 65; *see also* Pet., 15.) When that application was filed, Inpria submitted the specification of the ’867 application as the specification of the ’612 application and noted the only two changes made to the ’867 application specification: one “to include the parent application in the cross reference to related applications” and another to “make the specification consistent with original claim 10.” (EX1007, 43.) Inpria also noted that the claims (including claim 1, which recited “about 5 nm to about 30 nm”) were supported by the specification, i.e., that “[n]o new matter is introduced by the claims,” with specific citations to where in the specification support could be found. (*Id.*)

The Office examined the '612 application as a “continuation” of the '867 application, and much of the examination focused on the claimed 5 nm to 30 nm range. (*See generally* EX1007.) In fact, the Examiner expressly recognized that “there is *no mention of an embodiment from about 5 nm to about 30 nm.*” (*Id.*, 497 (emphasis added).) The Examiner, however, did not reject the claims, including the claim reciting the range, under § 112(a), or object to the introduction of new matter. Nor did the Examiner require the Applicant to re-designate the '612 application as a continuation-in-part application due to the introduction of new matter. The Examiner instead rejected the claims under 35 U.S.C. § 112(b) because, according to the Examiner, the term “about” rendered the then-pending claims indefinite. (*Id.*, 489, 496-97.) The Applicant overcame that rejection by removing the “about” term from the claims. (*Id.*, 504, 512, 534-41.)

This prosecution history, which Lam does not address, reflects that the Examiner considered and determined that the specification supported the claimed range, especially because he cited and quoted the following portion of the specification, which explicitly discloses thickness ranges that include the claimed range and states that “additional ranges of thicknesses within the explicit ranges above are contemplated and are within the present disclosure”:

In some embodiments, it can be desirable to use a thin coating to facilitate formation of small and highly resolved features. In some embodiments, the coating materials can

have an average *thickness of no more than about 1 micron*, in further embodiments *no more than about 250 nanometers (nm)*, in additional embodiments *from about 1 nanometers (nm) to about 50 nm*, in other embodiments *from about 1 nm to about 40 nm* and in some embodiments *from about 1 nm to about 25 nm*. *A person of ordinary skill in the art will recognize that additional ranges of thicknesses within the explicit ranges above are contemplated and are within the present disclosure.*

(*Id.*, 496-97 (quoting the pre-grant publication of the '612 application at ¶[0067]) (emphasis added); *see also* EX1004, 23:16-26.)

The Examiner's citation and quotation of the above paragraph, his recognition that "there is no mention of an embodiment from about 5 nm to about 30 nm," and his consideration of Applicant's remarks that "[n]o new matter" had been added in the '612 application confirm that the Examiner considered and determined that the inventor had possession of the claimed range. Thus, part one of the *Advanced Bionics* framework is satisfied because the Office previously considered Lam's argument. *See Universal Imaging Indus. LLC, v. Lexmark Int'l, Inc.*, IPR2019-01387, Paper No. 7 at 17-18 (Feb. 27, 2020) (denying institution under § 325(d) where the challenged patent discussed the prior art in its background section because, *inter alia*, "[i]t is reasonable to assume that the Examiner read the

Specification and understood these statements as part of examining the [challenged] patent” (citing MPEP §§ 608.01(c), 2129)).

2. Lam Has Not Demonstrated that the Office Erred

Regarding the second part of the *Advanced Bionics* framework, Lam failed to “demonstrate[] that the Office erred in a manner material to the patentability of the challenged claims.” *See Advanced Bionics* at 8-9. Lam did not address the fact that the Examiner previously considered the issue of whether the 5 nm to 30 nm range was supported by the as-filed specification, which is substantively the same as the ’867 application specification. Lam’s failure to show that the Office materially erred in allowing the claims of the ’564 patent is dispositive with respect to Ground 1. *See id.* (“If [the same or substantially the same arguments previously were presented to the Office] and the petitioner fails to make a showing of material error, the Director generally will exercise discretion not to institute *inter partes* review.”).

B. Ground 1 Also Fails Because the ’867 Application Provided Sufficient Support for Claim 1

The written description requirement does not require the disclosure of a specific example embodying all of the claim limitations, so long as a POSITA would understand, based on what is disclosed within the four corners of the specification, that the inventors were in possession of what they claimed. *See Gen. Hosp. Corp. v. Sienna Biopharmaceuticals, Inc.*, 888 F.3d 1368, 1372 (Fed. Cir. 2018). Here, the ’867 application specification would have allowed a POSITA to immediately discern

that the inventors possessed the average thickness range of “from 5 nm to 30 nm,” as recited in claim 1. (EX2001, ¶¶21-27.)¹

The '867 application discloses average thickness ranges of “no more than about 1 micron” and “no more than about 250 nanometers (nm),” as well as narrow ranges from “about 1 nanometers (nm) to about 50 nm” and “about 1 nm to about 40 nm.” (EX1004, 23:14-22.) Each of these ranges includes the claimed average thickness range from 5 nm to 30 nm. The '867 application also discloses an example where the “coating material was deposited at a thickness [from] 10-50 nm,” (*id.*, 35:14-15), which overlaps the claimed range, and an example where the “resist was applied with a thickness of 20nm,” (*id.*, 36:29-30), which is within the claimed range. Based on this description, a POSITA would have immediately discerned that the inventors possessed the claimed range. (EX2001, ¶¶25-27.) This is especially true because the application further states that “[a] person of ordinary skill in the art will recognize that *additional ranges of thicknesses within the explicit ranges above are contemplated and are within the present disclosure.*” (EX1004, 23:22-24 (emphasis added); EX2001, ¶27.) Thus, persons of ordinary skill were expressly notified that the subranges were presented in the four corners of the specification,

¹ Inpria submits the declaration of John S. McCloy, Ph.D. (EX2001), an expert in the field of the '564 patent. (EX2001, ¶¶1-20; EX2003.)

conceived as part of the invention, and therefore possessed by the inventors at the original filing date of the '867 application. (EX2001, ¶27.)

These facts are analogous to those in *BioDelivery Sci. Int'l, Inc. v. Alvogen PB Research & Dev. LLC*, where the court determined that the following paragraph provided written description support for “the pH ranges of about 4-6, about 4.5-5.5, and about 4.5-5”:

In one embodiment, e.g., when the medicament is buprenorphine, the pH of the mucoadhesive polymeric diffusion environment in the devices of the present invention is between about 4.0 and about 7.5. In another embodiment, the pH of the mucoadhesive polymeric diffusion environment is about 6.0. In one embodiment, the pH of the mucoadhesive polymeric diffusion environment is about 5.5 to about 6.5, or between about 6.0 and 6.5. In yet another embodiment, the pH of the mucoadhesive polymeric diffusion environment is about 7.25. In another embodiment, the pH is between about 7.0 and 7.5, or between about 7.25 and 7.5. In other embodiments, the pH of the device may be about 4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, or 7.5, or any incremental value thereof. It is to be understood that all values and ranges between these values and ranges are meant to be encompassed by the present invention.

576 F. Supp. 3d 184, 210-11 (D. Del. 2021), *vacated and remanded on other grounds*, 2022 WL 17828352 (Fed. Cir. Dec. 21, 2022). The court concluded that the above paragraph “allowed an artisan of ordinary skill to ‘immediately discern’ that the inventors possessed the [claimed] pH ranges,” because the “application discloses a pH range for the mucoadhesive layer of about 4.0 to about 7.5, which includes the pH ranges in the relevant asserted claims,” and because the “application explicitly tells the reader ‘all values and ranges between these values and ranges are meant to be encompassed by the present invention.’” *Id.*

Like in *BioDelivery*, the specification here discloses thickness ranges, such as “about 1 nm to about 40 nm,” which include the claimed range of from 5 nm to 30 nm. (EX1004, 23:14-22.) Also like in *BioDelivery*, the specification tells the reader that “[a] person of ordinary skill in the art will recognize that additional ranges of thicknesses within the explicit ranges above are contemplated and are within the present disclosure.” (*Id.*, 23:22-24.) Thus, the specification allows a POSITA to immediately discern that the inventors possessed the claimed range.² (EX2001, ¶¶25-27.)

² There is also no requirement to demonstrate “importance” with respect to a claimed range, as Lam contends, (Pet., 15). *In re Eickmeyer*, 602 F.2d 974, 981 (CCPA

This conclusion is further supported by the '867 application's guidance on how to achieve any thickness within the disclosed ranges, including the claimed range. (*Id.*, ¶¶22-24.) For example, the '867 application explains that “it can be desirable to use a thin coating,” consistent with the claimed average thickness range, “to facilitate formation of small and highly resolved features.” (EX1004, 23:16-18.) The application then explains how to achieve such a thin coating by adjusting three different parameters: “The thickness of the coating generally can be a function of the precursor solution concentration, viscosity and the spin speed.” (*Id.*, 23:14-15; EX2001, ¶23.) Similarly, the '867 application explains that, “[f]or other coating processes, the thickness can generally also be adjusted through the selection of the coating parameters.” (EX1004, 23:15-16; EX2001, ¶24.) The '867 application even explains that “thickness can be evaluated using non-contact methods of x-ray reflectivity and/or ellipsometry based on the optical properties of the film.” (EX1004, 23:24-26; EX2001, ¶24.)

Lam and its expert, Dr. Karey Holland, for their part, focus on what the '867 application explicitly states, which, as discussed above, is not the test for written description. It is not necessary “that the specification recite the claimed invention

1979) (“We are not persuaded that there is any requirement for appellant to demonstrate the Criticality of a lower limit to meet the description requirement.”).

in haec verba.” *Ariad Pharm., Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010). The test is whether the disclosure of the application reasonably conveys to a POSITA that the inventors had possession of the claimed subject matter. But, in contrast to Inpria and its expert (EX2001, ¶¶21-27), neither Lam nor Dr. Holland address what the disclosure of the ’867 application reasonably conveys or does not convey to a POSITA.

Additionally, Lam argues that Inpria should be estopped from arguing that the ’867 application discloses the claimed range because, when distinguishing prior art during prosecution of the application that issued as the ’564 patent, Inpria stated that “30 nm and 35 nm ‘are not close enough that one would expect them to have the same properties.’” (Pet., 17 (quoting EX1007, 508).) Lam, however, ignores that the ’867 application, unlike the distinguished prior art, recites ranges that encompass the claimed range. (EX1004, 23:16-22.) Also unlike the distinguished prior art, the ’867 application states that “additional ranges of thicknesses within the explicit ranges above are contemplated and are within the present disclosure.” (*Id.*, 23:22-24.) The distinguished prior art only disclosed “a thickness of 35 nm or greater,” which is entirely outside of the claimed range. (EX1007, 508.) Moreover, the standards for obviousness and written description support, which, as discussed above, was considered for the claimed range, are not the same.

Lam also cites case law that purportedly supports its position, but each case is factually distinguishable. (*See* Pet., 15-18.) In *Gen. Hosp.*, 888 F.3d at 1372-73, the Federal Circuit held that “[t]he disclosure of a range of concentrations from less than 1×10^{11} particles per ml to some unidentified maximum, does not provide written description support for the claimed concentration of ‘about 6.6×10^{11} particles per ml,’” and that “a disclosed range that minimally overlaps with the claimed range does not provide written description support for the claimed range.” Here, unlike in *Gen. Hosp.*, the ’867 application specification specifies several ranges, including narrow ranges, with clearly defined minimum and maximum bounds, that encompass the claimed range. (*See* EX1004, 23:14-26.)

In *Indivior UK Ltd. v. Dr. Reddy’s Labs. S.A.*, 18 F.4th 1323, 1328-30 (Fed. Cir. 2021), the Federal Circuit determined that a skilled artisan would not have been able to reasonably discern a disclosure of the claimed range of “about 40 wt % to about 60 wt %,” because the specification merely identified “specific, particular examples” and did not specify any “range” of percentages whatsoever. Here, unlike in *Indivior*, the ’867 application specification specifies several ranges, including narrow ranges, that encompass the claimed range. (*See* EX1004, 23:14-26.)

In *Pioneer Pet Prod., LLC v. Oil-Dri Corp. of Am.*, IPR2022-01138, Paper 21, 7-9 (Jul. 21, 2023), the Board determined that “an example having a sodium bentonite content of 65% and an example having a sodium bentonite content of 70%

[did not] support the amended range of 60% to 80%.” Unlike in *Pioneer*, the ’867 application specification here discloses much more than a couple of specific examples that fall within the claimed range. Again, the ’867 application specification specifies several ranges, including narrow ranges, that encompass the claimed range. (See EX1004, 23:14-26.)

Regarding *Philip Morris Prod., S.A. v. Rai Strategic Holdings, Inc.*, PGR2020-00071, Paper 29 (Jan. 10, 2022), Lam states that the Board determined that the “disclosure of two endpoints of ‘about 75%’ and ‘about 85%’ did not provide written description for the claimed range of ‘about 75% to about 85%.’” (Pet., 16.) The specification at issue in *Philip Morris* disclosed broad ranges with upper limits well beyond the claimed upper limit. Paper 29 at 39-41. Here, unlike in *Philip Morris*, the ’867 application specification specifies several narrow ranges that encompass the claimed range. (See EX1004, 23:14-26.)

In *Grünethal GmbH v. Antecip Bioventures II LLC*, PGR2017-00008, Paper 43, 15-20 (June 22, 2018), the Board determined that the specification did not provide written description support for the claimed range of “about 80 to about 500 mg.” According to the Board, at most, the specification disclosed “a range of ‘about 10 mg to about 100 mg’ administered over the course of 5 to 10 consecutive days, thereby essentially disclosing a list [*sic*] six different ranges that includes the ranges of about 50 mg to about 500 mg and about 80 mg to about 800 mg.” *Id.* (citations

omitted). The Board further noted that the claims “also require that dose to be administered ‘within a six month period,’” “thereby further complicating the process necessary to derive the recited dosing regimen from the . . . patent specification.” *Id.* at 19-20. In contrast, here, explicitly disclosed ranges in the ’867 application specification, including the narrow ranges, encompass the claimed range. (EX1004, 23:14-26.)

The above cases cited by Lam are also distinguishable because, unlike the specifications at issue in those cases, the ’867 application specification here explicitly states that a POSITA “will recognize that additional ranges of thicknesses within the explicit ranges above are contemplated and are within the present disclosure” and explains how to achieve such ranges. (*Id.*) Neither Lam nor Dr. Holland refute this disclosure about what a POSITA “will recognize.” Lam’s only response is that the written description requirement is not satisfied if the subject matter is merely obvious over what is expressly disclosed. (*See* Pet., 17-18 (citing cases).) But the claimed range is not merely obvious from the disclosure. As discussed above, a POSITA would have understood from the disclosure that the claimed range is actually disclosed. (EX2001, ¶¶21-27.)

C. The Petition Should Be Denied Because Grounds 2-4 Involve Issues Previously Before the Office and Lam Fails to Show Material Error by the Office

There is no dispute that Stowers 2008 and Stowers 2009 were before the Office. As Lam admits, Inpria submitted Stowers 2009 in an information disclosure statement (IDS) and the Examiner rejected pending claims based on Stowers 2009. (Pet., 22 n.9; EX1007, 53 (entry 8), 126-27.) Lam further admits that Inpria submitted Stowers 2008 in the same IDS. (Pet., 64; EX1007, 53 (entry 7).) Both references also appear on the face of the '564 patent. (EX1001, code (56).) Moreover, the Examiner certified that he considered all references listed in the IDS “except where lined through,” and Stowers 2008 and Stowers 2009 were not lined through. (EX1007, 136.) Accordingly, Stowers 2008 and 2009 are previously presented art, and thus the first part of the *Advanced Bionics* framework is satisfied. *See Advanced Bionics* at 7-8 (indicating that “previously presented art” includes “art made of record by the Examiner”); *Vital Connect, Inc. v. Bardy Diagnostics, Inc.*, IPR2023-00381, Paper 7 at 14 (July 11, 2023) (concluding that a reference cited in an IDS was previously presented art).

The second part of the *Advanced Bionics* framework is also satisfied. With respect to Stowers 2009, which Inpria overcame during prosecution, Lam does not argue that the Office erred in a manner material to the patentability of challenged claims. Instead, Lam argues that the Office materially erred with respect to Stowers

2008, because the Office “fail[ed] to appreciate that Stowers 2008 discloses HafSO_x/ZircSO_x resist films that are ‘30 to 35-nm thick.’” (Pet., 64-66.)

There is no evidence the Examiner failed to appreciate the disclosure of Stowers 2008. If anything, the Examiner understood the alleged relevance of Stowers 2008 but did not believe it disclosed the limitation “the coating material has an average thickness from about 5 nm to about 30 nm,” as recited in the then-pending claims. (EX1007, 36.) As noted above, Stowers 2008 was identified next to Stowers 2009 in the same IDS. (*Id.*, 53 (entries 7 and 8).) And, as Lam admits, “Stowers 2008 discloses the same HafSO_x/ZircSO_x films as Stowers 2009” (Pet., 64.) The Examiner nevertheless did not reject the claims based on Stowers 2008.

Lam only identifies one difference between Stowers 2008 and Stowers 2009, which is that Stowers 2008 allegedly discloses “30-nm thick films.” (*Id.*) However, as explained below in Section V.D, Lam has failed to explain how Stowers 2008 discloses a film that is actually 30 nm thick or how Stowers 2008’s statements regarding “films 30 to 35-nm thick” and “on the order of 30 nm,” (EX1008, 68, 71), disclose the claimed “*average* thickness” from 5 nm to 30 nm. Lam therefore has not “pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art” and the Petition does not include “additional evidence and facts . . . [that] warrant reconsideration of the prior art arguments.” *Becton* at 17-18 (describing the *Becton* factors, including factors (c), (e), and (f), which relate to whether the

petitioner has demonstrated a material error by the Office); *Advanced Bionics* at 10-11.

D. Ground 2 Fails Because Lam Has Not Demonstrated that Stowers 2008 Discloses “Wherein the Coating Material Has an Average Thickness From 5 nm to 30 nm”

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). Claim 1 recites a coating material with “an *average* thickness from 5 nm to 30 nm.” Lam has not established that the thicknesses identified in Stowers 2008 expressly or inherently discloses this limitation.

Lam argues that Stowers 2008 discloses this limitation because it describes “[w]orking solutions [that] were spin coated at 3000 rpm for 30 seconds resulting in films 30 to 35-nm thick” and refers to films “on the order of 30 nm.” (Pet., 38-39.) Lam, however, fails to explain how these portions of Stowers 2008 disclose a coating material that has “an *average* thickness from 5 nm to 30 nm,” as claimed. For example, Lam does not address the possibility that “films 30 to 35-nm thick” may refer to films with a thickness varying between 30 nm to 35 nm. Indeed, Stowers 2008 does not describe its films as having a uniform thickness, and it was well known to a POSITA that spin coating a resist film may result in varying thicknesses. (See EX2003, 2:55-3:15 (explaining how spin coating resist films involves

centrifugal forces that can “result in differences in the thickness of the photoresist layer”); EX2004, 1:17-38 (explaining that “uniform coating can not be obtained” due to variations in “viscosity . . . in a diffusion direction” and “velocity”); EX2001, ¶¶28-31.) Moreover, Stowers 2008’s reference to films “on the order of 30 nm” is part of a general discussion about the difficulties that arise when attempting to detect film changes induced by exposure rather than a teaching of an actual average thickness of the HafSOx and ZircSOx films described in Stowers 2008. (EX1008, 71 (“Films on the order of 30-nm thick do not have sufficient volume per unit area to generate a signal large enough to be measured under most analyses.”).)

Lam’s expert, Dr. Holland, opines that “Stowers does not merely describe a range of possible thickness from about 30 nm to 35 nm, but rather it expressly discloses films with thickness from 30 nm to 35 nm, including films that were actually 30 nm thick.” (EX1002, ¶105.) Dr. Holland’s analysis likewise fails to explain how a film with a thickness of 30 nm to 35 nm discloses a coating material with “an *average* thickness from 5 nm to 30 nm,” as claimed. Dr. Holland’s opinion that Stowers 2008 discloses a film that is “actually 30 nm thick” is also unsupported. As explained above, Stowers 2008 does not describe its films as having a uniform thickness. It is therefore possible that the films have varying thicknesses between 30 nm to 35 nm. (See EX2003, 2:55-3:15; EX2004, 1:17-38.)

Finally, Lam and Dr. Holland fail to address the “average thickness” claim language when arguing that Stowers 2008 discloses a range that overlaps with the claimed range of 5 nm to 30 nm. That is, for reasons similar to those discussed above, Lam and Dr. Holland have not established that films “30 to 35 nm thick” disclose a range of average thicknesses that overlap with the claimed range having “an *average* thickness from 5 nm to 30 nm.”

E. Ground 2 Also Fails Because Lam Has Not Demonstrated that Stowers 2008 Discloses “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 Unexposed Regions of the Coating Material”

Lam fails to demonstrate that Stowers 2008 discloses “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 recited in claim 1. (EX1001, 24:12-17.) First, Lam fails to demonstrate that the coating materials described in Stowers 2008 and the ’564 patent are necessarily “*the same*,” as Lam contends, such that they react to exposure in the same way. (See Pet., 39-40 (emphasis added).) Second, Lam fails to demonstrate that “*exposure*” of Stowers 2008’s coating materials alters the “*chemical properties*” of the coating material or, even assuming exposure of the coating materials alters chemical properties, that such chemical alterations “*creat[e]* an exposed coating material with

differential dissolution rates,” as claimed. These deficiencies are fatal to Ground 2.

1. Lam Has Not Established That the Coating Materials in Stowers 2008 and the ’564 Patent Are the Same

Lam contends “the above limitation is an inherent property of the claimed coating material . . . since *Stowers 2008 discloses the same films as the ’564 patent*.” (*Id.*) Lam, however, fails to cite any evidence to support this assertion. Indeed, with respect to this limitation, Lam’s own expert, Dr. Holland, does not opine that the films described in Stowers 2008 and the ’564 patent are “the same.”³ (*See* EX1002, ¶¶108-110.)

With respect to a different claim limitation, Lam argues that “the precursor solutions in Stowers 2008 and the ’564 patent combine the exact same components.” (*Pet.*, 37.) Even if the *precursor* components are the same, however, this does not establish that the Stowers 2008 and ’564 patent *films* are “the same” such that they have the same properties and react to UV, EUV, and/or electron-beam radiation exposure in the same way, as relevant to this claim limitation. (EX2001, ¶¶32-41.)

³ While Dr. Holland does opine that the films are the same in other contexts, such as with respect to claims 7 and 8, as demonstrated below, that testimony is based on the incorrect assertion that the precursor solutions of Stowers 2008 and the ’564 patent are “the same in all material respects.” (EX1002, ¶116.)

For example, Lam does not address the different recipes and processing conditions described in Stowers 2008 and the '564 patent for depositing the films (e.g., quantities and concentrations of components, process and timing of mixing and forming the film, temperature), which Stowers 2008 admits influence film characteristics and therefore film quality for lithography. (See EX1008, 32 (explaining that “contrast,” which “is a measure of the range of exposure dose that is necessary to transition from unexposed to fully exposed,” is a “resist characteristic [that] is *heavily influenced by the processing conditions*” (emphasis added)), 33-34 (explaining that “resolution,” another characteristic relating to “the packing density of transistors on a chip,” “is a function of the contrast of the resist”), 31-35 (discussing the “three main characteristics” of resists and their interrelation).) Accordingly, Lam’s contention that the Stowers 2008 and '564 patent films are “the same” is unfounded and should be rejected.

For example, the ratio of metal to peroxide in the precursor solutions of Stowers 2008 is 1 to 0.75 (0.75 peroxide for each metal), (EX1008, 68), whereas the '564 patent discloses ratios with much higher relative peroxide content and explains the advantages obtained with such high ratios. (EX2001, ¶33.) For example, the '564 patent discloses a “molar concentration ratio of radiation sensitive ligands to metal suboxide cations of at least about 2 and in some embodiments at least about

5,” where the “higher peroxide-based ligand concentrations provide for a ***surprisingly large improvement in the precursor stability***”:

The precursor solutions have been formulated with improved stability and control of the precipitation so that radiation can be used to induce a change in the material. In particular, peroxide-based ligands stabilize the precursor solutions while also providing control over the processing of the materials.

Specifically, the precursor solution can comprise sufficient radiation sensitive ligands such that the solution has ***a molar concentration ratio of radiation sensitive ligands to metal suboxide cations of at least about 2 and in some embodiments at least about 5***. In particular, ***the higher peroxide-based ligand concentrations provide for a surprisingly large improvement in the precursor stability***. While not wanting to be limited by theory, ***the increase in the radiation sensitive ligand concentration evidently reduces agglomeration of the metal cations to stabilize the solution***. Thus the precursor solution can be stable relative to settling of solids without further stirring for at least two hours and possibly for significant longer periods of time, such as greater than a month. Due to the long stability times, the improved precursors have increased versatility with respect to potential commercial uses. Hydrogen peroxide provides a desirable radiation

sensitive ligand, although other inorganic peroxides can be suitable.

(EX1001, 5:55-6:11 (emphasis added); *see also id.*, 12:33-39 (“The precursor composition generally comprises a ligand concentration of at least a factor of about 2 times the metal cation concentration, in further embodiments, at least a factor of about 3, in other embodiments at least a factor of about 4 and in additional embodiments a factor from about 5 to about 25 times the metal cation concentration.”), 13:11-14 (“As noted above, a relatively large ratio of peroxide-based ligand relative to the metal cations can be used to greatly stabilize the precursor solutions.”); EX2001, ¶¶33-34.)

The '564 patent further discloses that more stable solutions with higher concentrations of peroxide provide “an added advantage of *greater contrast* between the ultimate irradiated coating material and un-irradiated coating material”:

The precursor solutions have been formulated to achieve very high levels of stability such that the precursor solutions have appropriate shelf lives for commercial products. Also, it has been discovered that the formulation of the precursor solutions can be designed to achieve desired levels of radiation absorption for a selected radiation based on the selection of the metal cations. ...
The control of the precursor solution is based on high concentrations of radiation sensitive ligands to the metal cations, specifically peroxide-based ligands. In

particular, if the mole ratio of peroxide groups to the metal cations is at least 2, more stable solutions can be formed. The more stable precursor solutions provide an added advantage of ***greater contrast*** between the ultimate irradiated coating material and un-irradiated coating material.

(EX1001, 9:55-10:7 (emphasis added); *see also id.*, 6:26-35 (“As described herein, ***significant improvements*** in the precursor solutions have been accomplished through the use of ***significantly higher radiation sensitive ligand concentrations***. ***Even more surprisingly, significantly increasing the radiation sensitive ligand concentration*** in the precursor solutions results in a coating material that has ***greater contrast*** following radiation exposure so that there are ***surprising added benefits*** where precursor solution stabilization further accomplishes ***improved patterning and shorter development times.***” (emphasis added)), 12:3-21 (explaining that, “at high relative concentration of peroxide-based ligands, significant amounts of water can be removed from the composition without forming a condensed metal oxide or metal hydroxide”); EX2001, ¶¶35-36.)

Consistent with the above-discussed disclosure, in Examples 1 and 2 of the '564 patent, the metal to peroxide ratio for the Hf-based coating material is 1 to 0.11 or 0.15 (8.81 or 6.62 peroxide groups for each metal), (*see* EX1001, 21:18-22:28;

EX1002, ¶38),⁴ which is significantly higher than the 0.75 peroxide-to-metal ratio described in Stowers 2008. Therefore, even assuming the precursor solutions in Stowers 2008 and the '564 patent have the same components (e.g., Hf and peroxide), the ratio of those components is very different, which may result in films with different properties.

In addressing claim 7, Dr. Holland acknowledges that the ratio of peroxide to metal in the precursor solution of the '564 patent is “6.25 – 8.33,”⁵ but alleges that that ratio “saturates at 0.5 peroxide to 1 Hf.” (EX1002, ¶116.) Based on this allegation, Dr. Holland concludes that the precursor solutions of Stowers 2008 and the '564 patent are “the same in all material respects” and therefore “the resulting films are also the same”:

As explained below with respect to claim 8, the ratio of Hf ion to peroxide saturates at 1 Hf:0.5 peroxide. Therefore,

⁴ Dr. Holland’s calculations that produce “6.25 – 8.33 peroxide per one Hf” include an error, as he uses 4.8 mmol for the Hf concentration in his “Hf to Peroxide” calculation instead of the 4.5 mmole concentration he calculates for the Hf concentration in the “Mixture.” (See EX1002, ¶38.) Fixing the error results in 8.81 or 6.62 peroxide groups for each metal, but this difference does not affect Inpria’s position.

⁵ See *supra* n.4.

even though the precursor solutions of Stowers 2008 contains 0.75 peroxide per Hf ion, the ratio saturates 0.5 peroxide to 1 Hf. Similarly, even though the ratio of peroxide to Hf ion in the HafSO_x precursor solution exemplified in the '564 patent is 6.25 – 8.33, the ratio saturates at 0.5 peroxide to 1 Hf. **Therefore, the HafSO_x precursor solutions of Stowers 2008 and the '564 patent are therefore the same in all material respects. It therefore follows that the resulting films are also the same.**

(*Id.*, ¶116 (emphasis added).)

As an initial matter, neither Lam nor Dr. Holland rely on this “saturation” theory for claim 1. Moreover, Dr. Holland has not established that the solutions and films in the later-published articles cited in support of this theory (EX1016-1018) are the same as those described in Stowers 2008 or the '564 patent, that the recipe and processing conditions used to form the films in those papers are the same as those in Stowers 2008 or the '564 patent, or that the purported findings of those later-published articles are necessarily true with respect to the films in Stowers 2008 or the '564 patent. But more importantly, in its analysis of Stowers 2008, which describes films with “very poor resist performance,” (EX1008, 72), Lam fails to account for the explicit teachings in the '564 patent that higher concentrations of

peroxide provide more stable precursor solutions and better control over the film formation process, as discussed above.

In addition to the different peroxide concentrations, Lam also fails to account for other recipe and processing condition differences between the Stowers 2008 and '564 patent films. For example, Stowers 2008 describes forming working solutions by first combining ZrOCl_2 or HfOCl_2 with H_2O_2 “to give a metal to peroxide ratio of 1 to 0.75” and then letting the solution “rest for 15 min. to enable ligand exchange to approach equilibrium.” (*Id.*, 68.) After this, H_2SO_4 is “added to give a metal to sulfate ratio of 1 to 0.5-0.7” and then the solution is again allowed to “rest for 15 min. to enable ligand exchange to reach equilibrium.” (*Id.*) After the second 15-minute resting period, the solutions were diluted with purified water to give a final metal concentration of 0.5 M. (*Id.*) A POSITA would have understood that the final dilution step using purified water both provides a solution with a desired metal concentration as well as slows down any further “ligand exchange” or other reaction between the constituent materials combined in the first two mixing steps. (EX2001, ¶38 n.3.)

In contrast, Example 1 of the '564 patent teaches that after mixing ZrOCl_2 or HfOCl_2 with H_2O_2 in the first step, the resulting solution is allowed to rest for only “5 minutes.” (EX1001, 21:23-55.) Similarly, after adding H_2SO_4 in the next step, the solution is again allowed to rest for only “5 minutes.” (*Id.*) The '564 patent

discloses that “[t]his particular mixing sequence has been found to limit particle growth.” (*Id.*, 21:55-56.) Thus, even assuming the concentrations of components in Stowers 2008 and the ’564 patent were the same (which, as demonstrated above, they are not), Stowers 2008 and the ’564 patent describe different resting periods, where the significantly shorter resting periods in the mixing sequence of the ’564 patent provide a benefit in terms of limited particle growth.⁶ (See EX1001, 13:14-27 (explaining that “a solution has lost stability if a phase separation occurs with the production of large sol particles”); EX2001, ¶¶37-39.)

Another unaccounted-for difference is that Stowers 2008 and the ’564 patent describe spin-coated solutions with significantly different final metal concentrations. Stowers discloses that, after the second 15 minute rest, “[s]olutions were diluted with 18 MΩ purified water to give a *final metal concentration of 0.5 M*” before spincoating. (EX1009, 87 (emphasis added).) In contrast, the solutions in the ’564 patent that are used for spincoating have “a *final zirconium concentration of*

⁶ The nanometer-sized original sol/particle size, described in the scientific literature as “radius of gyration,” is a size-related value collected by techniques such as small-angle X-ray scattering, which contains information about size, shape, symmetry, and homogeneity.

0.16M” and “a *final hafnium concentration of 0.15 M.*” (EX1001, 21:57-22:6 (emphasis added).)

This difference is significant. For example, the '564 patent explains that having “a relatively low concentration of metal ions such that the rheology of the coating composition, e.g., the viscosity, allows the formation of a thin coating on the substrate,” and that “use of a thinner coating is consistent with the formation of higher resolution structures upon exposure to radiation and development of the pattern.” (*Id.*, 5:11-17; *see also id.*, 6:50-54 (“The metal ion concentration can be selected to provide desired properties for the precursor solution, with more dilute solutions generally consistent with the formation of thinner coating materials.”), 13:4-9 (“The concentrations of the species in the precursor solutions can be selected to achieve desired properties of the solution. In particular, lower concentrations overall can result in a desirable properties of the solution for certain coating approaches, such as spin coating, can achieve thinner coatings using reasonable coating parameters.”); EX2001, ¶40.)

Neither Lam nor Dr. Holland acknowledges or attempts to address these differences in the recipe and processing conditions of the films in Stowers 2008 and the '564 patent, which, as discussed above, may result in different film properties. (EX2001, ¶41.) Moreover, Lam provides no explanation or evidence that such differences do not result in different films that react to exposure in different ways,

as relevant to this claim limitation, and therefore has not established that “the HafSOx and ZircSOx coating materials of Stowers 2008 and ’564 patent are the same in all material respects,” (Pet., 22). As such, Lam’s analysis does not establish that Stowers 2008’s films disclose this limitation.

2. Lam Has Not Demonstrated that Stowers 2008 Discloses Exposing a Film to Alter “Chemical Properties” to Create a Film With “Differential Dissolution Rates”

Lam argues that Stowers 2008 discloses HafSOx and ZircSOx films having “chemical properties” that are “alter[ed]” by UV or EUV radiation to “creat[e] an exposed coating material with differential dissolution rates,” as claimed. (Pet., 39-42.) But Lam has not sufficiently explained how Stowers 2008 discloses (i) chemical properties of those films, (ii) that UV or EUV exposure alters such chemical properties, or (iii) that such alterations cause differential dissolution rates. Lam merely contends that these limitations are inherently disclosed based on Stowers 2008’s explanation that (i) exposed regions of the films purportedly have a different dissolution rate than the un-exposed regions of the films, and (ii) the films could be patterned by EUV. (*Id.* at 40-41 (“Stowers 2008 discloses that exposure of a ZircSOx film to UV radiation altered the chemical properties of the film such that the exposed regions have a different dissolution rate than the un-exposed regions of the film.”), 41 (“That HafSOx films could be patterned by EUV indicates that exposure to EUV altered the chemical properties of the film such that the exposed

regions have a different dissolution rate than the un-exposed regions of the film.” (emphasis removed)). Lam, however, has not proven inherency.⁷

“To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.’” *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (quoting *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991)). “Inherency . . . may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Continental Can*, 948 F.2d at 1269 (quotation omitted).

Lam offers no evidence to prove that differential dissolution rates and/or patternability by UV or EUV ***necessarily*** means that “chemical properties” of those films were “alter[ed]” by exposure to UV or EUV to “creat[e] an exposed coating material with differential dissolution rates,” as claimed. And the conclusory assertions of Dr. Holland are not evidence and therefore not entitled to weight. 37

⁷ Applicant’s purported lack of argument against Stowers 2009 during prosecution (see Pet., 41, n.13) is not an acknowledgment by Applicant that Stowers 2009, let alone Stowers 2008, discloses the limitation at issue.

C.F.R. § 42.56(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

For example, it was well known that “[t]he chemical *or physical* properties of the photoresist can be changed by being exposed to light.” (EX2006, 1:18-20 (emphasis added); EX2001, ¶¶42-43.) Yet, Lam has not demonstrated that differential dissolution rates and/or patternability by UV or EUV in Stowers 2008 are not the result of altered *physical* properties that do not alter the chemical identities or compositions of the films.⁸ Lam instead assumes without sufficient explanation that the lithography process in Stowers 2008 alters the *chemical* properties instead of the *physical* properties of the films.

It was also well known that chemical properties may be altered by post-exposure processes. (EX2001, ¶44.) For example, a “*post exposure bake process* may be used to drive a *chemical reaction* in exposed portions of the resist *such that portions of the resist may be removed in subsequent processing.*” (EX2005, 8:21-24 (emphasis added); EX2001, ¶44.) This is acknowledged by

⁸ A simple real-life example demonstrates the fallacy in the assumption underlying Lam’s theory. A tablet may dissolve faster if it crushed into powder form. Crushing the tablet does not change the tablet’s chemical composition or property; instead, it changes the physical property in a way that allows for a faster dissolution rate.

Stowers 2008, which states that the “post-exposure bake (PEB) is where all of the significant chemical changes occur.” (EX1008, 26.) Stowers 2008 also states that “a significant amount of chemical modification of the film occurs” “[d]uring the development process,” (*id.*, 92), which is also a post-exposure process, (*id.*, 20). (*See also id.*, 95 (“there are chemical modifications taking place during development that are unique to this system”).) Yet, to the extent Stowers 2008 discloses altered chemical properties, Lam has not demonstrated that the altered chemical properties are not the result of post-exposure processes (e.g., a post-bake process and/or development) instead of UV or EUV exposure. Lam instead assumes without sufficient explanation that the UV or EUV exposure in Stowers 2008, instead of post-exposure processes, alters the chemical properties of the films.

Additionally, to the extent Stowers 2008 discloses that UV or EUV alters chemical properties, Lam has not established that such alterations cause differential dissolution rates. Indeed, Stowers 2008 expressly states that “a post-exposure bake is performed to initiate the necessary chemistries that lead to high differential solubilities between exposed and unexposed regions.” (EX1008 at 20; *see also id.*, 26 (“post-exposure bake (PEB) is where all of the significant chemical changes occur”); EX2007, 7 (“Upon irradiation, acids photogenerated from a PAG catalytically cleaves t-BOC groups during postexposure bake (PEB) at high temperature as shown in FIG. 9”).) Lam fails to consider or address the possibility

that any chemical property alterations that result in differential dissolution rates may be due to post-exposure processing (e.g., a post-exposure bake) and not the exposure itself. (EX2001, ¶45.) Lam again assumes without sufficient explanation that the exposure of the film to UV or EUV in Stowers 2008, instead of post-exposure processing, alters the chemical properties of the film such that differential dissolution rates result.

In other words, Lam has not established that Stowers 2008 discloses chemical properties that are allegedly altered, how those chemical properties are altered by exposure to UV or EUV, or how those altered chemical properties create differential dissolution rates. Therefore, Lam has not demonstrated that exposure of the films to UV or EUV necessarily results in alterations to chemical properties that create differential dissolution rates between exposed and unexposed regions of the films. Accordingly, Lam has not established that the missing claim limitations are necessarily present in Stowers 2008. Lam's inherency argument therefore fails.

For at least the above reasons, Lam has failed to establish a reasonable likelihood of prevailing with respect to claim 1 in Ground 2. Because claim 1 is the sole independent claim, this deficiency also infects the other claims challenged in Ground 2.

F. Grounds 3 and 4 Fail for the Same Reasons as Ground 2

Ground 3 is an obviousness ground based on Stowers 2008. Lam’s analysis for claim 1 in Ground 3 differs from Ground 2 only in its analysis of the limitation “the coating material has an average thickness from 5 nm to 30 nm.” (Pet., 48-51.) But, with respect to this limitation, Lam again ignores the requirement of an “*average* thickness.” That is, Lam has not established that Stowers 2008’s statement regarding “films 30 to 35-nm thick” or “on the order of 30 nm,” (EX1008, 68, 71), discloses a coating material having “an *average* thickness from 5 nm to 30 nm,” as claimed. *See* Section V.D. Nor has Lam establish that a film with such “average” thickness would have been obvious. The term “average” does not even appear in Lam’s analysis.

Additionally, Lam’s analysis in Ground 3 is the same as its analysis in Ground 2 for the claim limitation “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.” (EX1001, 24:12-17.) As discussed above in Section V.E.2, such analysis is deficient and cannot support a reasonable likelihood that Lam will prevail with respect to claim 1.

These deficiencies infect every claim in Ground 3 because claim 1 is the sole independent claim. It also infects Ground 4, which involves claim 8, because claim 8 depends from claim 1.

G. Ground 5 Fails Because It Lacks Particularity and Sufficient Explanation

In Ground 5, Lam alleges that “Trikeriotis anticipates *and/or renders obvious* claims 1, 3, 6-7, 9, and 11-12,” (Pet., 58 (emphasis added)), telegraphing the weakness of its anticipation position. Lam, however, completely fails to provide any analysis as to why the claims are obvious in view of Trikeriotis. Lam does not identify any differences between the claimed subject matter and Trikeriotis or provide any analysis as to why those differences would have been obvious. As for the analysis that Lam does provide for Ground 5, it falls far short for at least two reasons.

First, Lam’s analysis for Ground 5 is conclusory in virtually all aspects and fails to meet the particularity requirement for an IPR petition. *See* 35 U.S.C. § 312(a)(3); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (“In an IPR, the petitioner has the burden *from the onset* to show *with particularity* why the patent it challenges is unpatentable.” (emphases added) (citing 35 U.S.C. § 312(a)(3))); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (requiring “the *initial petition* identify ‘*with particularity*’ the

‘evidence that supports the grounds for the challenge to each claim’” (emphases added)).

The Board has consistently denied institution where petitioner’s mapping of the prior art to particular claim elements is unclear. *See, e.g., Cisco Sys., Inc. v. C-Cation Tech., LLC*, IPR2014-00454, Paper 12 at 10-12 (Aug. 29, 2014) (informative) (denying petition because it failed to sufficiently specify the mapping of each claim element to the applied prior art, did not include a detailed explanation of the prior art citations, and improperly incorporated expert testimony into the petition); *Amazon Web Servs., Inc. v. Saint Regis Mohawk Tribe*, IPR2019-00103, Paper 22 at 15-19 (May 10, 2019) (denying petition because petitioner failed to address where the prior art supposedly disclosed claim elements and instead “**placed the burden on the Board to ascertain how the prior art allegedly reads on the challenged claims**—a task [the Board does] not undertake”) (emphasis added); *Daihen Corp. v. Reno Techs., Inc.*, IPR2019-00248, Paper 11 at 12-13 (May 22, 2019) (denying institution because “Petitioner’s . . . **unexplained quotations** from [the prior art] **in its claim chart** fail to meet [the] requirements of [37 C.F.R. §§ 42.22(a)(2), 42.104(b)(4)–(5)]” involving identification and explanation of petitioner’s mapping (emphasis added)).

For example, claim 1 recites the term “coating material” in the preamble and in claim element 1(b). In its analysis for the preamble, Lam contends that “uniform

thin films” are spin-coated. (Pet., 58.) While not expressly stated, it appears Lam is mapping the “uniform thin films” to the “coating material” recited in the preamble. But for claim element 1(b), Lam references “hafnium oxide nanoparticles” and “organic ligands” without any explanation as to how each relates to the “uniform thin films” that Lam appears to contend is the “coating material” in the preamble. (*Id.*) Even worse, for claim element 1(b), Lam does not explain what the “coating material” is and completely omits any explanation as to how the supposed “coating material” has “metal ions.” (*Id.*) The Holland declaration suffers from the same deficiencies. (*See* EX1002, ¶¶151-152.) These deficiencies confirm that Ground 5 cannot support a reasonable likelihood that Lam will prevail with respect to claim 1 or any of the dependent claims in Ground 5.

Second, claim element 1(d) recites that “***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.” Lam’s analysis for this claim element fails for reasons similar to those discussed above for Ground 2. The totality of Lam’s analysis is three sentences with a fourth sentence repeating the claim language. (Pet., 59-60.) In the three sentences, Lam merely reproduces a statement from Trikeriotis that light exposure creates positive and negative images. (*Id.*) There is no explanation whatsoever as to how the images

establish that the light exposure alters chemical properties of the alleged coating material and that those alterations cause differential dissolution rates. Lam's conclusory allegations are insufficient to establish a reasonable likelihood that Lam will prevail with respect to claim 1 or any dependent claim in Ground 5.

VI. CONCLUSION

For these reasons, Inpria respectfully requests that the Board deny the Petition for *inter partes* review of the '564 patent.⁹

Respectfully submitted,

Dated: January 26, 2024

By: /Naveen Modi/
Naveen Modi (Registration No. 46,224)
Counsel for Patent Owner

⁹ If trial is instituted, Inpria reserves the right to raise additional arguments as to why Lam has failed to carry its burden and why the challenged claims should be confirmed.

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Patent Owner's Preliminary Response contains, as measured by the word-processing system used to prepare this paper, 9,805 words. This word count does not include the items excluded by 37 C.F.R. § 42.24.

Respectfully submitted,

Dated: January 26, 2024

By: /Naveen Modi/
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CERTIFICATE OF SERVICE

I hereby certify that on January 26, 2024, I caused a true and correct copy of the foregoing Patent Owner's Preliminary Response to be served via email on Petitioner at the following addresses:

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