

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.,
SAMSUNG ELECTRONICS AMERICA, INC.,
SAMSUNG SEMICONDUCTOR, INC., and
SAMSUNG AUSTIN SEMICONDUCTOR, LLC,

Petitioners

v.

CHIEN-MIN SUNG,

Patent Owner

IPR2024-00535
U.S. Patent No. 9,724,802

PATENT OWNER'S SUR-REPLY

Mail Stop PATENT BOARD
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Submitted Electronically via PTACTS

TABLE OF EXHIBITS

Exhibit	Description
2001	U.S. Patent Application No. 11/560,817 ("Sung '817")
2002	U.S. Provisional Application No. 61/489,074
2003	<i>Kinik Co. v. Chien-Min Sung</i> , IPR2021-00638, Patent Owner's Preliminary Response (June 10, 2021)
2004	Volume 2 of Deposition Transcript of Stanley Shanfield in <i>Chien-Min Sung v. Samsung Electronics Co. Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC</i> (E.D. Tex.), held on May 28, 2024.
2005	Data on EDTX Motions to Stay Pending Inter Partes Review compiled by www.docketnavigator.com
2006	Plaintiff Dr. Chien Min-Sung's Preliminary Disclosure of Asserted Claims and Infringement Contentions from <i>Chien-Min Sung v. Samsung Electronics Co. Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC</i> (E.D. Tex.).
2007	Defendants' P.R. 3-3 Invalidity Contentions from <i>Chien-Min Sung v. Samsung Electronics Co. Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC</i> (E.D. Tex.).
2008	Declaration of Stanley Shanfield, Ph.D. in Support Of Defendants' Proposed Claim Constructions from <i>Chien-Min Sung v. Samsung Electronics Co. Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC</i> (E.D. Tex.).
2009	U.S. Application No. 11/223,786 ("Sung '786")
2010	M.Y. Tsai and Y.S. Liao, <u>Dressing Characteristics of Oriented Single Diamond on CMP Polyurethane Pad</u> , <i>Machining Science and Technology</i> , 13:92-105 (2009).
2011	Declaration of Ming-Yi Tsai
2012	IPR2024-0534, Petition for <i>Inter Partes</i> Review of U.S. Patent No. 9,138,862
2013	Exhibit 2013 from the Deposition of Ming-Yi Tsai held on Feb. 20, 2025
2014	Exhibit 2014 from the Deposition of Ming-Yi Tsai held on Feb. 20, 2025
2015	Exhibit 2015 from the Deposition of Ming-Yi Tsai held on Feb. 20, 2025

2016	Exhibit 2016 from the Deposition of Ming-Yi Tsai held on Feb. 20, 2025
2017	Exhibit 2017 from the Deposition of Ming-Yi Tsai held on Feb. 20, 2025
2018	Exhibit 2018 from the Deposition of Ming-Yi Tsai held on Feb. 20, 2025

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	THE PRIORITY DATE OF THE ’802 PATENT.....	2
	A. Petitioners Have Not Rebutted that Sung ’786/’026 and Sung ’817/’298 Provide Written Description in Support of ’802 Patent’s Claim Priority	2
	B. The ’802 Patent Claims Priority All the Way Back to the ’786 Application, and that All Intervening Applications, Including the ’704 Application, Were Timely Filed in Compliance with Section 120.....	9
	C. Petitioners’ Cases are Inapposite.....	11
	D. Petitioners Fail to Establish Disclaimer	11
III.	GROUND S I, II, AND III OF THE PETITION	13
	A. Tsai Does Not Teach the Claimed Designated Profile Recited in Claims 1-5, 13-15 and 19	13
	B. Tsai Does Not Teach Any Specific Numbers of Superabrasive Particles or Their Spacing and Pattern in Claims 8-12 and 20-21	18
IV.	PETITIONERS FAIL TO REHABILITATE THEIR EXPERT’S QUALIFICATIONS	22
V.	PETITIONERS’ ATTACKS ON DR. TSAI’S PURPORTED LACK OF LEGAL EXPERTISE ARE UNWARRANTED	23
VI.	CONCLUSION.....	25

TABLE OF AUTHORITIES

	Page(s)
Cases	
<i>Allergan USA, Inc. v. MSN Labs. Priv. Ltd.</i> , 111 F.4th 1358 (Fed. Cir. 2024)	8
<i>Ariad Pharm., Inc. v. Eli Lilly and Co.</i> , 598 F.3d 1336 (Fed. Cir. 2010)	8
<i>GlaxoSmithKline LLC v. Banner Pharmacaps, Inc.</i> , 744 F.3d 725 (Fed. Cir. 2014)	9
<i>Hologic, Inc. v. Smith & Nephew, Inc.</i> , 884 F.3d 1357 (Fed. Cir. 2018)	13
<i>Nat. Alts. Int’l, Inc. v. Iancu</i> , 904 F.3d 1375 (Fed. Cir. 2018)	11
<i>Sirona Dental Sys. GMBH v. Institut Straumann AG</i> , 892 F.3d 1349 (Fed. Cir. 2018)	10
<i>Waldemar Link v. Osteonics Corp.</i> , 32 F.3d 556 (Fed. Cir. 1994)	12

I. INTRODUCTION

The Reply (Paper 23) filed by Petitioners Samsung Electronics Co. Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC (collectively, “Petitioners” or “Samsung”) fails to rebut the technical evidence presented in the POR (not the least that Petitioners did *not* submit any rebuttal opinion or testimony from their own expert) because, *inter alia*:

- Dr. Tsai illustratively showed how the challenged claims of the '802 patent are fully supported by Sung '786 and Sung '817, including how their disclosures fully inform a POSA that Patent Owner had possession of all of the claim elements the '802 patent; and
- Dr. Tsai testified that the Tsai reference (Ex. 1004) does not teach or disclose the claimed designated profile or any specific numbers/pattern of, or spacing between, the diamond particles; instead, his experiment reflected in Ex. 1004 used a “baseline” approach that is vastly distinct from the claimed designated profile; and
- Dr. Shanfield is also not qualified as a POSA because he lacks any experience in designing or developing CMP pad conditioners. Under Dr. Shanfield's POSA definition, even the undersigned (who has used and

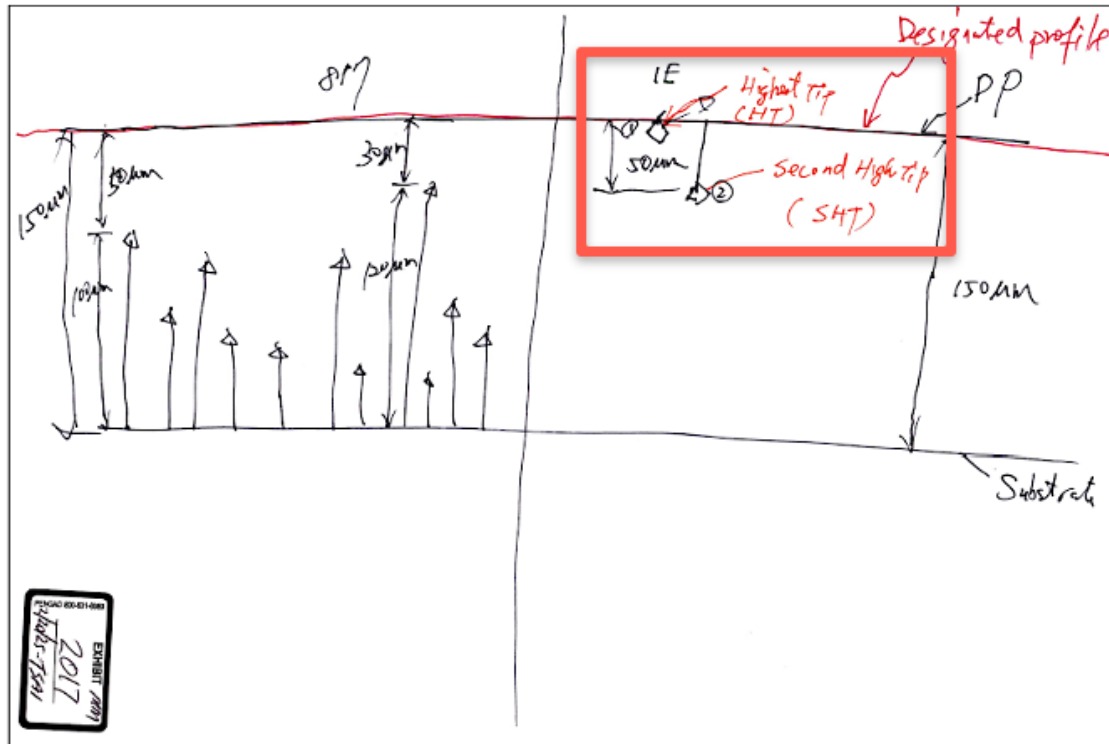
operated numerous CMP equipment as part of his bachelor and master degrees specializing in semiconductor manufacturing and fabrication during the relevant time frame) would qualify as a POSA in the context of the '802 patent. As Dr. Tsai has testified, a POSA would not have used the methods employed by Dr. Shanfield to determine the numbers of diamond particles and working particles in Tsai.

For at least these reasons, the Board should find that all of the challenged claims of the '802 patent are patentable.

II. THE PRIORITY DATE OF THE '802 PATENT

A. **Petitioners Have Not Rebutted that Sung '786/'026 and Sung '817/'298 Provide Written Description in Support of '802 Patent's Claim Priority**

During his deposition, Dr. Tsai shows how these applications demonstratively support claim limitations [1E] and [1F] of claim 1 of the '802 patent—***testimony that Petitioners did not rebut by way of rebuttal expert opinion.*** (Ex. 2011 at ¶ 57.) For example, for limitation [1E], Dr. Tsai testified that “[i]t’s obvious for '817, the range is from 1 micron to 150 micron, so 50 micron is in this range.” (Ex. 1055 at 181:10-12.) Dr. Tsai also drew the following diagram to show how the '817 application supports a difference in protrusion distance between the highest tip (“HT”) and second highest tip (“SHT”) in the range of less than or equal to about 50 microns based on the Sung '817 disclosure of a designated profile:



(Ex. 2017 (annotated); see also Ex. 1055 at 182:9-12.) Specifically, Dr. Tsai explained that Sung '817's disclosure of "the tips vary from the designated profile by from about 1 micron to about 150 microns" would necessarily encompass a HT and a SHT within the claimed range as disclosed in claim 1 of the '802 patent because:

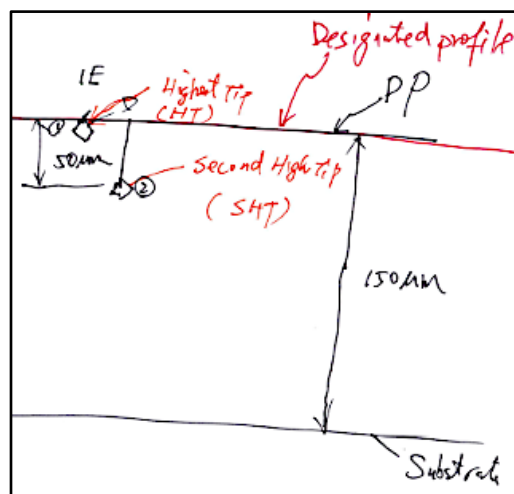
1. "The tips" as disclosed in Sung '817 refers to "all tips" of the pad conditioner, which necessarily include the HT and SHT as is generally and reasonably understood by a POSA because pad conditioning and pad design entail the use of all tips (see Ex. 1055 at 182:17-183:16 ("Q. Where does the phrase 'The tips vary from the designated profile' say anything about the highest or the second

highest tip? A. It says 'their tips.' That means all tip heights on this diamond disk.

Q. Why do you believe that 'their tips' refers to all tip heights? A. Because for a diamond disk, you will place either 10,000 or maybe 20,000 diamond particles on that, and you want to do the dressing pad. Therefore, that you need to measure all those tip heights. . . . Q. So would a POSITA view the phrase 'the tips' as referring to all tips? Or is it just your opinion that 'the tips' refers to all tips? A. Well, if this person is a diamond disk expert, then this person would know that when he sees the word 'the tips,' that would refer to all tips. And because if you want to do the conditioning to a pad, you are doing to all diamond particles on the CMP dresser."); *see also id.* at 185:22-24 ("A. What I'm saying is that if it represents all tips, then, of course, it would also include the highest protruding tip and the second highest protruding tip.")). That "the tips" must refer to all tips on the pad conditioner is consistent with the fundamental design objective in developing optimal pad conditioners. The industry standard and engineering goal in CMP pad conditioner design is to maximize the effectiveness of pad conditioning by engaging all abrasive tips or particles—rather than just a subset—in active contact with the polishing pad surface. This objective is rooted in the need to maintain uniform pad surface texture and prolong pad life, both of which are critical to CMP performance. Conditioning with only some of the tips would undermine these

performance targets by creating uneven pad wear, leading to non-uniform material removal rates and degraded process control. Accordingly, a POSA would naturally understand a reference to “the tips” in the context of pad conditioners not as referring to a random or partial subset of tips, but as encompassing the entire array of conditioning elements.

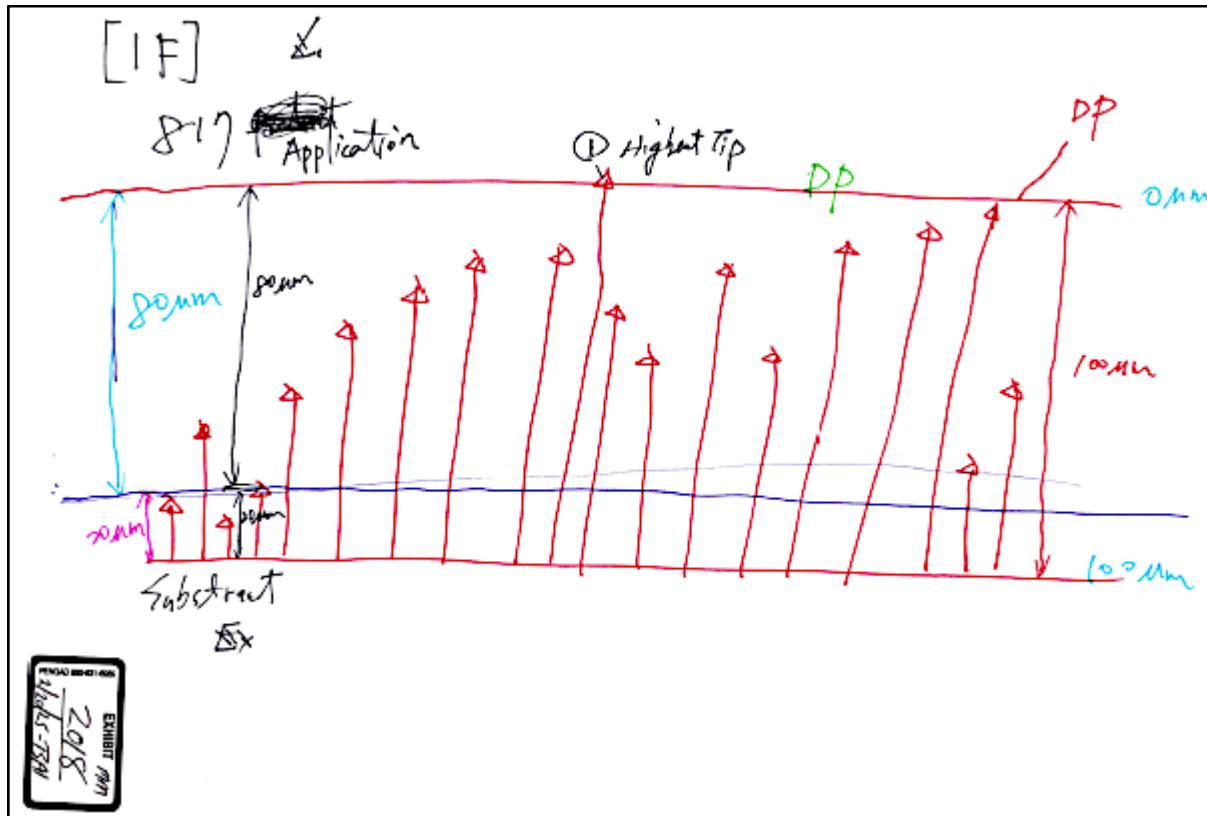
2. The difference in protrusion distance of “less than or equal to about 50 microns” is disclosed in Sung '817 because the HT aligns with the designated profile ('802 patent (Ex. 1001) at 11:33-35 (“the highest protruding tip . . . align[s] along a designated profile”); '817 application (Ex. 2001) at 14:10-13 (“the term ‘tip’ is intended to include the highest protruding point”)) from which the SHT is then measured (e.g., 50 microns from the HT):



A logical, mathematical reading also supports that Sung '817's disclosure of all tips that “vary from the designated profile by from about 1 micron to about 150

microns” **must** include the HT (since HT aligns with the designated profile), the SHT (since Sung ’817 focuses on a tip variation range for all tips, which must include the SHT) and the claimed range of “less than or equal to 50 microns” (e.g., a designated profile of “about 1 microns to about 150 microns” must include a HT of 150 microns and a SHT of 100 microns). Thus, Sung ’817 amply supports the claimed range of “less than or equal to 50 microns” because Sung ’817 discloses the same range up to 150 microns. That Sung ’817 refers to the “designated profile” as opposed to “the difference in protrusion distance” is of no consequence since Dr. Tsai testified that a POSA would know that Sung ’817’s designated profile refers to the same point of reference recited in Limitation [1E]/[1F] (i.e., “highest protruding tip”) of claim 1 of the ’802 patent.

Similarly, for claim limitation [1F], Dr. Tsai testified that Sung ’817 discloses “the highest 1% of the protruding tips . . . within about 80 microns or less” based on the disclosure of zero to 100 microns for all tip heights in Sung ’817. (*See* Ex. 1055 at 183:22-184:6 (“A. The range here says from zero to 100 micron, so this is the range. From this top, from this tip, go down 80 micron and covering all these tips, these are all the working particles, because they are within the 100 micron. Therefore, [] these are all the working particles.”)). *See also* Ex. 2018:



That Sung '817 supports the “the highest 1% of the protruding tips . . . within about 80 microns or less” limitation is also drawn from the fact that Sung '817 refers to all diamond tips (as alluded to above), which necessarily includes the highest 1% of such tips. (See Ex. 1055 at 185:11-19 (“A. Usually, we will look at all tips. So their tips stated in there refers to all tips. So a true POSITA person will know the number of all tips and then do the measurement of all heights in order to determine the percentage of working particles, then to determine the number of working particles.”).) A tip range for all tips that is “less than about 1 micron” to “about 100 microns” as disclosed in Sung '817 (see Ex. 2001 at 14:27-15:4) thus

both mathematically and logically covers the claimed range of “about 80 microns or less.” (*See also* Ex. 1055 at 185:25-186:6.) Dr. Tsai testified that these opinions applied equally to Sung ’786 such that Sung ’786 also provides written support for the ’802 patent based on the same reasoning as Sung ’817. (Ex. 1055 at 186:13-17.)

Indeed, the only difference between Sung ’817, Sung ’786 and claim 1 of the ’802 patent is that by teaching a difference from a designated profile, those applications teach the same values in different terms, which Petitioners never once disputed.

That the “highest 1 percent” claim language is absent in Sung ’817 is immaterial because the written description requirement does not require claim language appear in *ipsis verbis* in the specification. *See Ariad Pharm., Inc. v. Eli Lilly and Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (en banc). Instead, the question is whether a POSA would have reasonably understood the inventor’s possession of the claimed subject matter in the ’802 patent as of the filing date of Sung ’817 and Sung ’786, which Dr. Tsai has twice affirmed, both in his declaration and his deposition testimony. *See Allergan USA, Inc. v. MSN Labs. Priv. Ltd.*, 111 F.4th 1358, 1372 (Fed. Cir. 2024).

Petitioners also cite to *Purdue Pharma* but that case is inapplicable where

neither party here disputes that the disclosed distances from a designated profile in Sung '817 and Sung '786 encompass the claimed ranges recited in the '802 patent. *See GlaxoSmithKline LLC v. Banner Pharmacaps, Inc.*, 744 F.3d 725, 731 (Fed. Cir. 2014) (“The claim term and its corresponding description, however broad, identify certain structures produced by certain processes. We have not required more for an adequate written description that matches claim scope.”).

Similarly, *Gilead* is inapplicable here because Dr. Tsai testified that a POSA would understand the heights recited in claim limitations [1E] and [1F] of claim 1 based on the distances from a designated profile disclosed in Sung '817 and Sung '786—testimony that remains unrebutted.

B. The '802 Patent Claims Priority All the Way Back to the '786 Application, and that All Intervening Applications, Including the '704 Application, Were Timely Filed in Compliance with Section 120

Seeing weakness in their disclaimer argument, Petitioners have now shifted course and argue that the “co-pending application requirement” was not met. Specifically, Petitioners argue that because U.S. Patent Application 12/726,786 (Ex. 1058 (the “'6786 Application”) issued (1/7/14) before the filing date of the '802 Patent (10/3/14) (Reply at 6-9), the priority claim of the '802 patent is defective. But these new arguments are inappropriate because *they were not included in the*

Petition and are thus waived. See *Sirona Dental Sys. GMBH v. Institut Straumann AG*, 892 F.3d 1349 (Fed. Cir. 2018).

Petitioners' new argument also holds no water. For example, the '476 application from which the '802 patent issued was filed (10/3/14) is a CIP of the '704 application. The '476 application was filed (3/6/14) before the '704 application was abandoned (3/6/17). Also, the '704 application—a CIP of the '6786 application—was filed (3/12/13) before the '6786 application issued as the '787 patent (1/7/14). In addition, the '6786 application—a CIP of the '817 application—was filed (3/18/10) before the '817 application issued as the '872 patent (7/27/10), and that the '817 application—a CIP of the '786 application—was filed (11/16/06) before the '786 application was abandoned (10/23/11). Thus, all intervening applications between the '802 patent and the '786 application were timely filed in compliance with Section 120.

Petitioners assert that “the '704 Application does not have a continuous chain of priority back to the '786 Application” because “the '704 Application's priority claim stops at the '817 Application and does not extend back to the '786 Application.” (Reply at 8.) This is incorrect because the '704 Application, which published as US Pub. No. 2014/0120724 (“'724 Pub”), **does** claim priority to the '786 application on its face with an explicit reference to this claim priority in the

specification, among others, as required under Section 120. (*See, e.g.*, '724 Pub, "Related U.S. Application Data" ("[C]ontinuation-in-part of U.S. patent application Ser. No. 12/726,786 . . . which is also a continuation-in-part of U.S. patent application Ser. No. 11/560,817, . . . which is a continuation of U.S. patent application Ser. No. 11/223,786.").)

C. Petitioners' Cases are Inapposite

Natural Alternatives—a new case Petitioners also cite for the first time in their Reply (and is thus waived)—is also inapplicable. In *Natural Alternatives*, the patentee amended the fifth application that "deliberately and expressly terminated [its] claim to the priority of the first four applications[,]" which thus "broke[] the chain of priority between" the fourth and fifth applications. *Nat. Alts. Int'l, Inc. v. Iancu*, 904 F.3d 1375, 1381 (Fed. Cir. 2018). Unlike the patentee there, Patent Owner here never deleted, terminated or waived the priority claim of **any** application to which the '802 patent claims priority. Instead, the '802 patent properly claims priority back to the '786 application through the '704 application, the '6786 application and the '817 application, with **no amendment** to the priority claim in any of these applications or any applications in that entire priority chain.

D. Petitioners Fail to Establish Disclaimer

Petitioners argue that "Dr. Sung never stated that 'this invention' is limited solely to that claimed in claims 8-12" (Reply at 14) but the converse is equally

true—Dr. Sung never represented, and Petitioners do not dispute otherwise, that claims 1-7 and 13-21 are **not** entitled to earlier priority dates. Petitioners seem to suggest that all claims in the '802 patent are entitled to only a single priority date but this is not legally sound. *See Waldemar Link v. Osteonics Corp.*, 32 F.3d 556, 558 (Fed. Cir. 1994) (holding that “[a] CIP application can be entitled to different priority dates for different claims” and that “[c]laims containing any matter introduced in the CIP are accorded the filing date of the CIP application,” while “matter disclosed in the parent application is entitled to the [earlier] filing date”).

Undeterred, Petitioners have submitted another declaration from Patent Owner's outside counsel as a new exhibit (Ex. 1060) in support of their disclaimer argument. Setting aside that “Petitioner[s] may not submit new evidence or argument in reply that it could have presented earlier” (*see* P.T.A.B Consolidated Trial Practice Guide November 2019 at 73), this declaration merely provides a redline comparison of the specifications of the '802 patent and several related patents. This comparison is, at most, a textual exercise but otherwise does not speak to whether Patent Owner disclaimed priority as a legal matter, nor does it analyze the issue of priority claim from the standpoint of a POSA. A textual comparison between specifications is insufficient to show a disclaimer of a priority claim because disclaiming priority must be clear and unmistakable, which this

declaration does not even attempt to do.

More critically, the adequacy of a priority claim *is not determined by whether new matter exists in the later application but by whether the earlier application provides written description support for the claimed subject matter.*

As alluded to above, such an analysis is conducted from the perspective of a POSA in view of the priority disclosures. *See Hologic, Inc. v. Smith & Nephew, Inc.*, 884 F.3d 1357, 1364 (Fed. Cir. 2018) (“The Board simply considered what the specification reasonably conveys to the skilled artisan who has knowledge of the prior art. . . . The Board did not err in this regard.”)

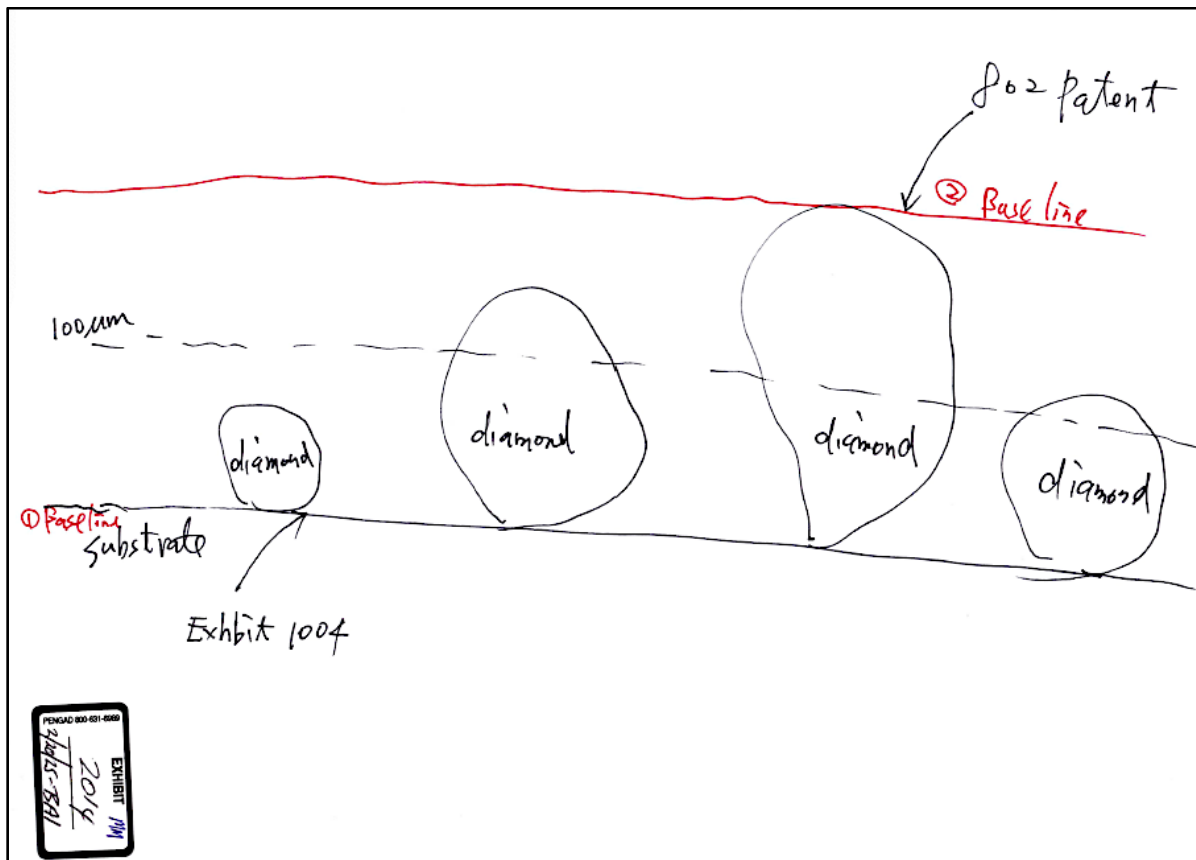
Petitioners’ argument collapses this nuanced legal inquiry into a superficial textual comparison, devoid of any analysis of how a POSA would interpret Sung ’786 and Sung ’817. That is not the standard for evaluating written description, and it certainly is not the standard for determining whether a priority claim has been disclaimed. Petitioners offer no authority suggesting that a side-by-side redline comparison—especially one *not accompanied by any express disclaimer language*—constitutes a clear and unequivocal abandonment of a priority claim.

III. GROUNDS I, II, AND III OF THE PETITION

A. Tsai Does Not Teach the Claimed Designated Profile Recited in Claims 1-5, 13-15 and 19

Dr. Tsai, the author of the Tsai article (Ex. 1004), is unequivocal that his experiment as reflected in this article does not disclose or use the claimed “designated profile,” which this Board recognizes to be a profile along which tips align (Institution Decision at 58, 63). This is because in Dr. Tsai’s experiment, he measured the tip height using a baseline along which the **substrate** aligns. This critical difference between the claimed designated profile and the “baseline” used in Dr. Tsai’s experiment is illustratively shown in his drawings (Exs. 2013 and 2014) below:



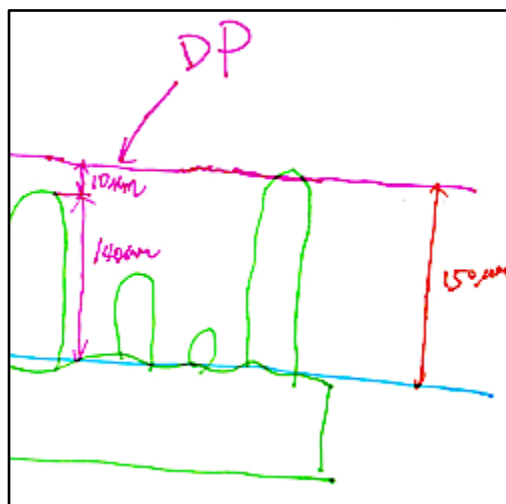


As shown above, the claimed designated profile (labeled “DP” or “802 Patent”) as reflected by the “red line” aligns with the tips whereas the baseline (labeled “Exhibit 1004” or “substrate”) disclosed in Dr. Tsai’s experiment in Ex. 1004 and as reflected by the “blue line” aligns along the substrate. (Ex. 1055 at 151:4-14 (“Q. . . . So looking at what you have labeled as Exhibit 1004, ***can that line correspond to the designated profile described in Claim 1 of the ’802 patent?*** A. No.”); see also *id.* at 152:1-25; 155:5-156:19.)

According to Dr. Tsai, the claimed designated profile is used “to define the highest point as a starting, and then downwards to find out the number of working

particles,” which is “the most direct and the most effective.” (Ex. 1055 at 152:16-19 and 153:7-10.) By contrast, the baseline that he used in Ex. 1004 is “not so leveled, not so flat, so therefore, if you want to use that line to define the number of working particles, it’s rather difficult and it won’t be very accurate to do so.” (*Id.* at 153:1-6.)

Critically, Dr. Tsai testified that the designated profile disclosed in the ’802 patent was **never** a design consideration for the ODD at the time when he conducted the experiment in Ex. 1004. (*See id.* at 158:15-18 (“Q. Was the designated profile a design consideration for ODD at the time of publishing this paper? . . . THE WITNESS: We did not consider it.”).) This is because “we use ODD, which uses **reverse technology**” where “you reverse it, then the surface will become very flat, and therefore, you can use that leveled line as the baseline.” (*Id.* at 153:22-25.)



Dr. Tsai also illustrated their mathematical differences, testifying to how “measurement of the heights” would be different between the “designated profile” approach and his “baseline” approach. (*Id.* at 154:2-17.)

Petitioners’ statement that “Dr. Sung had possession of the concept of “designated profile” long before Tsai was published” (Reply at 23) supports Patent Owner’s contention regarding the priority date of the claims of the ’802 patent but otherwise says nothing about the substance of the Tsai article (Ex. 1004). As Dr. Tsai testified repeatedly, the research and drafting of his article were undertaken ***without Patent Owner’s participation or knowledge*** and that Dr. Tsai did not receive any input from Dr. Sung. (See Ex. 1055 at 53:18-23 (“THE WITNESS: No. Actually, ***I did not work with Dr. Sung.*** I was working with Kinik.”); see also *id.* at 193:22-194:9, 195:1-196:3.) Dr. Tsai only named Dr. Sung as a co-author as a typical Taiwanese cultural way of thanking Kinik for providing funding and equipment for his research. (Ex. 1055 at 44:7-17). Coupled with Dr. Tsai’s testimony that he has had no professional relationship with Dr. Sung, there is no evidence that Dr. Sung could have inserted his already-invented “designated profile” in Dr. Tsai’s ODD research and the resulting publication. Petitioners acknowledge as much. (See Reply at 23 (“Dr. Tsai admits that he did not speak with Dr. Sung in writing/publishing Tsai.”).)

Petitioners' final argument that Dr. Tsai has "admitted" that the "goal of Tsai was to obtain a dresser that mimics the ADD CMP pad dresser" with "equal heights and identically shaped tips" (Reply at 24) is also unavailing because the actual results are unequivocal that the tips were not equal in height—a point Dr. Tsai explained in the form of an "error bar" that reflects the statistical differences in tip height. (Ex. 1055 at 164:7-165:21 ("A. Here, the way to do the measurement is that I use a substrate as a baseline and I will then measure maybe 100 points or 200 points. Then I will obtain a lot of data. Then I use the statistics to find the average protrusion height, as well as the **error bar**. Therefore, 15 micron is an average. . . . Like I said, I use a substrate as a baseline, and **I then have a variation of the tip heights**. I record -- measure and record how many points, then **use the statistics approach to calculate the average value of those**. Then I obtain that 15 micron. . . . Use the statistics to obtain error bar. . . . **Error bar is the differences of the heights**"); see also 75:6-9; 76:6-7.) That is, the error bar reflects the differences in tip heights. (*Id.* at 166:3-9.) As Dr. Tsai also testified that he did **not** measure the height for **all** tips, Petitioners also lack evidence that **all** tips on the ADD are equal in height.

B. Tsai Does Not Teach Any Specific Numbers of Superabrasive Particles or Their Spacing and Pattern in Claims 8-12 and 20-21

Dr. Tsai testified that he did not determine the number of working particles in his experiment reflected in Ex. 1004 because "[i]n order to know the actual detail

quantity . . . we need to do many, many experiments . . . in order to define the number of working particles.” (Ex. 1055 at 169:8-14.) What’s more, “the purpose for [his] research was to determine the protrusion differences between different tips [a]nd we were not thinking of researching or studying the distribution of all the diamonds on the disk because we did not want to analyze the number of working particles.” (*Id.* at 209:12-20.) This is not surprising since Dr. Tsai testified that the **only** way to accurately determine the number of working diamonds is through the use of the claimed designated profile (which he did not use), and that if he were to use his baseline approach for this purpose, it would be “time consuming” and introduce “a lot of errors,” rendering it “not possible to do.” (*Id.* at 120:17-121:2 and 115:25-116:6; *see also* 153:7-10 and 208:11-19.)

Nor is it possible to determine the number of total particles in Ex. 1004 because Dr. Tsai used a “probing” approach where “you can only measure a portion” of the conditioner. (*Id.* at 208:11-19.) Specifically, Dr. Tsai used a probe—a “stylus-type 2D surface roughness instrument”—where “[w]hen it goes down, when it bumps into a diamond, it would go up and down and up” in order to manually measure a portion of the diamonds in a small area on the pad conditioner. (*Id.* at 73:11-17 and 171:21-172:14; *see also* 207:3-7 (“[U]sing the probing approach, I can

only measure a portion of the entire[] [conditioner]”) and 208:11-19 (“us[ing] the probe, you can only measure a portion of that.”).)

While the Tsai article generically describes that “a typical diamond disk contains over 10,000 grits,” Dr. Tsai qualified that statement by stating that this is a “general description” and not a reference to the actual number as “it may be 20,000” or “may be 30,000” or “less than” that and “you need to actually do the measurements” to determine the number of total or working particles—measurements Dr. Tsai repeatedly said he did **not** perform. (*Id.* at 58:8-16 and 60:5-9; *see also* 60:12-13 (“That was why I put in ‘less than.’ It was anywhere from zero to 10.”).). To determine the total number of particles or working particles, Dr. Tsai testified that it would be necessary to undertake numerous experiments to measure the total number of particles and then isolate the working particles. (*Id.* at 169:8-17.)

Thus, the Tsai article would not anticipate nor render obvious claims 8-12 because no number of working particles could be imputed by the qualifier “less than 10%,” particularly where, as here, the number of total particles on the conditioner is **unknown**. Since Dr. Tsai did not measure the number of superabrasive particles or the number of working particles therefrom (*id.* at 166:18-24 (“Q. Did you perform any measurement to determine the number of

diamond grits in relation to this research reflected in Exhibit 1004? A. No.”) and 59:10-12 and 61:19-21 (“[W]e actually did not do any experiments so we cannot definitely or clearly say the exact number” of working diamonds)), it follows that the Tsai article does not disclose the subject matter in claims 8-12.

The same is true for particle spacing and pattern as recited in claims 20-21—Dr. Tsai testified that neither the Tsai article nor his experiment could possibly convey information on spacing or any particular pattern between particles across the conditioner. (*Id.* at 174:6-15 (“A. Well, just like I said, in order to publish this paper, we measured quite a lot of small boxes on the disk, and then we selected the best one and put onto the paper. However, of course, **one small area cannot represent the entire disk.**”).) The spacing between the particles (and their pattern by extension) would also necessarily be different because the particles are simply sprinkled manually onto the pad conditioner through a mesh in a “shaking” motion. (*Id.* at 173:18-174:5 (explaining the use of a mesh to “shake it back and forth” so “the diamonds will fall down to the glue”); *id.* at 177:3-6 (“Q. So would the spacing between the diamonds, as reflected in Figure 5, be the same or different, all the diamonds? A. They would be different.”).) That the spacing reflected in the Tsai article is necessarily different across the disk is further reinforced by the fact that the “mesh itself has a tolerance, and the diamond sizes” also “are different.” *Id.* at

177:8-14. Indeed, the spacing of the holes in the mesh was not equal. (*See id.* at 175:25-176:4 (“Q. Now, going back to [Ex.] 1051, where you drew a bunch of circles, is the spacing between those circles the same across the entire mesh? . . . THE WITNESS: (In English) **No.**”). Even under Petitioners’ imagined scenario where all holes in the mesh have identical spacing (and they do not), Dr. Tsai testified that it is not possible for the particles to land on the conditioner in precisely the same pattern as the mesh because “we shake the mesh a little bit” and “when we shake it, *they may not drop at exactly the same place.*” (*See id.* at 176:21-177:2.)

IV. PETITIONERS FAIL TO REHABILITATE THEIR EXPERT’S QUALIFICATIONS

Instead of addressing their expert’s qualifications, Petitioners focus on Dr. Tsai’s testimony regarding what the adequate level of experience for a POSA should be. (Reply at 2-4.) But Petitioners’ quibbling on this aspect misses the point; Dr. Tsai identified numerous reasons why Dr. Shanfield’s opinions are not informed and why he is unqualified as a POSA, all of which are reflective of his lack of experience in the field of CMP pad conditioning. Indeed, under Dr. Shanfield’s POSA definition, even Patent Owner’s lead counsel of record (who has used and operated numerous CMP equipment as part of his bachelor and master degrees specializing in semiconductor manufacturing and fabrication during the relevant time frame) would qualify as a POSA in the context of the ’802 patent.

Dr. Tsai took issue with the kind of approximate, back-of-the-envelope calculations that Dr. Shanfield engages in throughout his declaration. (*See* Ex. 1055 at 64:6-23 (“THE WITNESS: If this POSITA is a true actual professional POSITA, then he should know that where it says over 10,000, and this person should know or try to understand how many total grits there are. This person should know this first. And then regarding the working grits, it could be anywhere from zero to 10 percent. Then if this POSITA is very sharp, very smart, then he can actually precisely to quantify this percentage.”).) Dr. Tsai also repeatedly stated that it would be difficult to determine “the number of cutters” based “on the number of diamond grits” under any circumstances “[b]ecause it would take a lot of experience and measurements in order to get the precise value.” (*See id.* at 167:23-168:4.) Finally, Dr. Tsai explained that a POSA would never rely on this general description to determine the total number of particles on a particular disk. (*See id.* at 169:15-17.)

V. PETITIONERS’ ATTACKS ON DR. TSAI’S PURPORTED LACK OF LEGAL EXPERTISE ARE UNWARRANTED

Petitioners dedicate a lengthy section of their Reply on Dr. Tsai’s alleged lack of credibility based on his lack of legal expertise. But Dr. Tsai’s knowledge of enablement (Reply at 27) has no relevance in this proceeding, as this is not an issue in dispute. And contrary to the Reply (*id.* at 27), he is familiar with the principle of a continuation-in-part, as reflected in his declaration (Ex. 2011 at ¶¶ 10-11).

Regarding other legal principles, he was appropriately circumspect. His statement that “I don’t have ***much*** understanding about them” (Reply at 27 (quoting Ex. 1055 at 97:14-99:5)) does not mean that he was uninformed; only that his understanding of those legal concepts was appropriately limited to what had been provided to him by counsel and is explicitly set forth in his declaration. (See Ex. 2011 at § II.) Tellingly, Petitioners ***do not argue*** that any of the legal principles on which Dr. Tsai relied was in fact incorrect.

Critically, Dr. Tsai clearly stated that he ***had*** been informed of some of the arguments in Petitioners’ petition in rendering his opinion on the ’802 declaration, and explained that his unqualified answer of “no” was a simple mistake resulting from his exhaustion after three consecutive days of deposition. (See *id.* at 188:4-20 (“Q. Let me just ask the question again. Were you informed about the arguments in Samsung’s petition? . . . THE WITNESS: A portion of it. . . . Q. So why did you say ‘No’? A. Sorry, I’m very tired. I am not able to reasonably do my thinking.”)). Similarly, his statement that he “generally” reviewed the claims of the ’802 patent (Reply at 28) is unsurprising given that his declaration does not address every claim.

Finally, Petitioners grossly mischaracterize Dr. Tsai’s relationship with Kinik and Dr. Sung. It should not be cause for scandal that Dr. Tsai, as a well-renowned professor having published over one hundred technical papers (Ex. 1053

at 194:15-195:3), collaborated with other scientists and engineers in the highly specialized field in which he works, or that he received financial and material support for his research from a company involved in developing pad conditioners. Such an entirely ordinary type of exchange does not support Petitioners' argument that Dr. Tsai's opinions "should be afforded no weight." (Reply at 29.)

VI. CONCLUSION

For at least these reasons, the Board should find that all of the challenged claims of the '802 patent are patentable.

Dated: April 16, 2025

/ Alex Chan /

Alex Chan (Reg. No. 52,713)
DEVLIN LAW FIRM LLC
1526 Gilpin Avenue
Wilmington, DE 19806
Tel: (302) 449-9010
achan@devlinlawfirm.com

*Counsel for Patent Owner
Dr. Chien-Min Sung*

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that there are 5,219 words in this paper, excluding any table of contents, table of authorities, mandatory notices under 37 C.F.R. § 42.8, certificate of word count, certificate of service, or appendix of exhibits. This certification relies on the word count of the word-processing system used to prepare this paper.

Respectfully submitted,

/ Alex Chan /

Alex Chan
Reg. No. 52,713
DEVLIN LAW FIRM LLC
1526 Gilpin Avenue
Wilmington, DE 19806
Telephone: (302) 449-9010
Facsimile: (302) 353-4251
achan@devlinlawfirm.com

Attorneys for Patent Owner
Chien-Min Sung

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on April 16, 2025, the foregoing document is being served via electronic mail upon the following counsel of record for Petitioner:

LEAD COUNSEL	BACKUP COUNSEL
Yung-Hoon Ha (Reg. No. 56,368) Desmarais LLP 230 Park Ave New York, NY 10169 Telephone: (212) 351-3400 Email: yha@desmaraisllp.com	Laura Avena (Reg. No. 78,920) Desmarais LLP 230 Park Ave New York, NY 10169 Telephone: (212) 351-3400 Email: lavena@desmaraisllp.com Taeg Sang Cho (Reg. No. 69,618) Desmarais LLP 230 Park Ave New York, NY 10169 Telephone: (212) 351-3400 Email: tcho@desmaraisllp.com Bridget Belcher (Reg. No. 82,861) Desmarais LLP 101 California Street San Francisco, CA 94111 Telephone: (415) 573-1900 Email: bbelcher@desmaraisllp.com
Additional email for service: SamsungSungIPRService@desmaraisllp.com	

/ Alex Chan /
Alex Chan
Reg. No. 52,713