UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SOLUS ADVANCED MATERIALS CO., LTD.,
Petitioner

v.

SK NEXILIS CO., LTD.,
Patent Owner

Case IPR2024-01462
U.S. Patent No. 11,346,014

PATENT OWNER PRELIMINARY RESPONSE
UNDER 37 C.F.R. § 42.107(a)

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

TABLE OF CONTENTS

I. Introduction 1
II. Person of Ordinary Skill in the Art (POSA) 4
III. Claim Construction 4
IV. Overview of the '014 Patent 4
A. Overview of the '014 Patent Claims 4
B. Prosecution History of the '014 Patent 9
V. The Board should use its discretion under § 314(a) to deny the Petition in view of the parallel litigation. 10
VI. The petition fails to establish a reasonable likelihood of prevailing on any challenged claim. 18
A. Petitioner incorrectly interprets Rz in Hanafusa in an attempt to show Hanafusa inherently discloses a peak height (Rp) value used to calculate the claimed binding coefficient (BC) for Ground 1A. 20
B. Petitioner fails to demonstrate that Dobashi discloses or suggests a peak density value for Ground 1A. 25
1. Petitioner's "straightforward" calculations do not consider differences in how RSm and peak density are calculated. 26
2. Dobashi does not disclose a surface with peak heights large enough to count toward the claimed peak density limitation. 31
C. Petitioner fails to demonstrate that a POSA would have had motivation to combine Dobashi with Hanafusa. 36
D. Petitioner fails to demonstrate a reasonable expectation of success in combining Hanafusa and Dobashi, particularly given that Petitioner mixes and matches various surface properties of these two references. 39
1. Petitioner fails to meet its burden of establishing a reasonable expectation of success in combining Hanafusa and Dobashi. 40
2. Petitioner assumes a reasonable expectation of success in mixing and matching surface properties from Hanafusa

and Dobashi without any consideration of the interplay of those properties. 42

E. Petitioner fails to demonstrate that the cited art discloses the claimed requirement that the concentration of total carbon (TC) and Co^{2+} is "maintained" during electroplating for Ground 1D. 46

VII. Conclusion 50

PATENT OWNER'S EXHIBIT LIST

Exhibit No.	Description
2001	Defendants' Motion to Stay, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Oct. 24, 2024)
2002	Plaintiff's Opposition to Defendants' Motion to Stay, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Nov. 7, 2024)
2003	Defendants' Reply in Support of Motion to Stay, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Nov. 14, 2024)
2004	Plaintiff's Sur-Reply in Opposition to Defendants' Motion to Stay, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Nov. 21, 2024)
2005	Amended Docket Control Order, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Jan. 2, 2025)
2006	Federal Court Management Statistics (Sept. 30, 2024)
2007	Complaint, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Nov. 21, 2023)
2008	Results charted from DocketNavigator.com, run on January 5, 2025, for Success of Motion to Transfer Venue for Convenience Decided by Judge Rodney Gilstrap
2009	Order Granting Service Waiver, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Feb. 23, 2024)
2010	Defendants' P.R. 3-3 Invalidity Contentions, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. Aug. 23, 2024) (including Apps. A1, A3, A5, A10, A12)

Exhibit No.	Description
2011	*Intentionally Left Blank*
2012	Overview of U.S. Pat. No. 8,715,836 to Dobashi *et al.*, accessed January 28, 2025 at: https://worldwide.espacenet.com/patent/search/family/038509458/publication/US8715836B2?q=pn%20%3D%20%228715836%22
2013	Overview of U.S. Pat. Appl. Publ. No. 2010/0136434 to Hanafusa, accessed January 28, 2025 at: https://worldwide.espacenet.com/patent/search/family/039925446/publication/WO2008132987A1?q=pn%3DWO2008132987A1
2014	Overview of U.S. Pat. No. 9,209,485 to Cheng *et al.*, accessed January 27, 2025 at: https://worldwide.espacenet.com/patent/search/family/052390762/publication/US9209485B2?q=pn%3DUS9209485B2
2015	Overview of U.S. Pat. No. 8,349,518 to Kim *et al.*, accessed January 27, 2025 at: https://patentcenter.uspto.gov/applications/13029656/continuity?application=
2016	Overview of U.S. Pat. No. 11,142,838 to Lee *et al.*, accessed January 28, 2025 at: https://worldwide.espacenet.com/patent/search/family/058739641/publication/US11142838B2?q=pn%20%3D%20%2211142838%22
2017	Overview of U.S. Pat. No. 4,981,560 to Kajihara *et al.*, accessed January 28, 2025 at: https://worldwide.espacenet.com/patent/search/family/013497064/publication/US4981560A?q=pn%20%3D%20%224981560%22

I. Introduction

U.S. Patent No. 11,346,014 ("the '014 patent"), claims innovative, non-obvious improvements to electrolytic copper foil for secondary batteries. Specifically, the claims are directed to electrolytic copper foils capable of creating a "high force of adhesion" with a negative electrode active material. The inventors discovered that, by precisely manipulating material and chemical properties within the foil and during the foil production process, certain unexpected and desirable performance characteristics could be achieved. The claims reflect the precision needed to achieve the desired results by including exacting claim limitations, such as the binding coefficient limitation in claim 1.

The claim recites that the binding coefficient (BC) at the first surface protected with the first protective layer or the second surface protected with the second protective layer, as defined by Equation 1 below, is between 1.5 and 9.4.

$$\mathrm{BC} = \mathrm{Rp}\ (\mu\mathrm{m}) + \frac{\mathrm{PD}}{30} + \mathrm{Cr\ attachment}\ (\frac{\mathrm{mg}}{\mathrm{m}^2})$$

The claim specifies that Rp (μm) is the maximum peak height measured according to the JIS B 0601 (2001) standard, peak density (PD) is the number of peaks per 4 mm unit length measured according to the ASME B46.1 (2009) standard with peak count level ± 0.5 μm, and the chromium (Cr) attachment (mg/m^2) is measured by dissolving the chromium in nitric acid and then measuring the concentration using atomic admission spectroscopy.

SK nexilis Co., Ltd. ("Patent Owner"), the '014 patent assignee, has long remained a leader in the battery copper foil industry, with significant investment in the research and development of battery copper foil products. Solus Advanced Materials Co., Ltd.'s ("Solus" or "Petitioner") Petition for review of claims 1-8 should be denied because it fails to demonstrate a reasonable likelihood that any challenged claim will be found unpatentable. But the Board need not even reach the merits, as the facts and circumstances here warrant denying institution under *Fintiv*.

Under Section 314(a), the *Fintiv* factors strongly support discretionary denial. The co-pending litigation trial date is nearly six months before the FWD deadline, significant investment in the co-pending litigation has occurred and will continue to occur prior to institution, the Petition was filed ten months after the complaint was filed, and the Petition's merits are very weak, relying on references that by Petitioner's own admission do not explicitly disclose key claim elements.

Should the Board reach the merits, the Petition is riddled with deficiencies—missing claim limitations, conclusory obviousness rationale, and no reasonable expectation of success. Petitioner relies primarily on two references—Hanafusa and Dobashi—and attempts to derive key limitations, namely Rp and PD, from these references, respectively. But Petitioner's arguments are premised on flawed assumptions and mischaracterization. Hanafusa does not support Petitioner's

attempt to equate Hanafusa's "surface roughness Rz" to the new Rz symbol adopted in the JIS B 0601 (2001) standard. With respect to Dobashi, none of the standards cited by Petitioner show that peak density (PD) can be derived from Dobashi's RSm. RSm measures the average spacing between peaks within a sampling length and thus by definition *cannot* inform how many peaks within a sampling length have a height greater than a set boundary line, a criteria needed to determine PD according to the applicable ASME standard.

In addition to the missing claim elements, Petitioner failed to demonstrate that a person of ordinary skill in the art would have been motivated to combine the references or had a reasonable expectation of success in doing so. Petitioner's arguments with respect to reasonable expectation only include conclusory statements, which are particularly deficient here given the unpredictable nature of the technology. Critically, Petitioner does not address the interplay between numerous related surface characteristics of electrolytic copper foils for lithium secondary batteries and simply assumes that a POSA would have mixed and matched different characteristics to achieve a desired result.

In sum, the Board should apply its discretion to deny institution under *Fintiv*. Alternatively, the Board must deny institution on the merits, as the Petition is fundamentally deficient—failing to show all claim elements and failing to demonstrate a reasonable expectation of success for combining references.

II. Person of Ordinary Skill in the Art (POSA)

For purposes of this Preliminary Response, Patent Owner applies Petitioner's level of skill for a person of ordinary skill in the art (POSA). Pet., 2.

III. Claim Construction

The Board need not construe any term in order to determine that institution should be denied. Patent Owner reserves the right to contest Petitioner's implicit or explicit constructions during the proceeding.

IV. Overview of the '014 Patent

The '014 patent is directed to electrolytic copper foils capable of creating a "high force of adhesion" with a negative electrode active material (e.g., graphite) of a lithium secondary battery. EX1001, 1:66-2:12. The copper foil comprises first and second surfaces, first and second protective layers on the first and second surfaces, respectively, and a copper film between the two protected surfaces. EX1001, 2:13-23. Surface characteristics of the protected first or second surface are designed to optimize adhesion between the copper film and the negative electrode active material at the protected surface. EX1001, 2:13-44.

A. Overview of the '014 Patent Claims

Independent claim 1 of the '014 patent recites an electrolytic copper foil having a first surface and second surface. EX1001, 13:52-53. The foil comprises a first protective layer on the first surface and a second protective layer on the second surface, with a copper film disposed between the protective layers.

EX1001, 13:54-57. The claim recites that the binding coefficient (BC) at the first surface protected with the first protective layer or the second surface protected with the second protective layer, as defined by Equation 1 below, is between 1.5 and 9.4. EX1001, 13:58-63.

$$\mathrm{BC} = \mathrm{Rp}\ (\mu\mathrm{m}) + \frac{\mathrm{PD}}{30} + \mathrm{Cr\ attachment}\ \left(\frac{\mathrm{mg}}{\mathrm{m}^2}\right)$$

Equation 1 (reproduced from EX1001, 13:61-63).

The claim goes on to specify that Rp (μm) is the maximum peak height measured according to the JIS B 0601 (2001) standard, peak density (PD) is the number of peaks per 4 mm unit length measured according to the ASME B46.1 (2009) standard with peak count level ± 0.5 μm, and the chromium (Cr) attachment (mg/m^2) is measured by dissolving the chromium in nitric acid and then measuring the concentration using atomic admission spectroscopy. EX1001, 13:64-67, 14:21-28.

Rp, as measured by the JIS B 0601 (2001) standard, refers to a maximum peak height measured from the mean line for the roughness profile. Figure 6 on page 11 of Exhibit 1010, reproduced below, shows a sample determination of Rp.

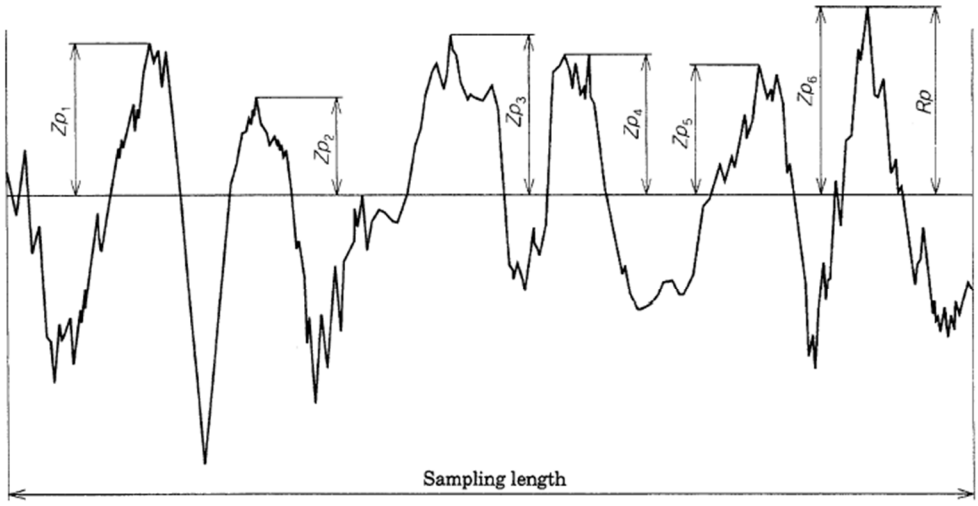
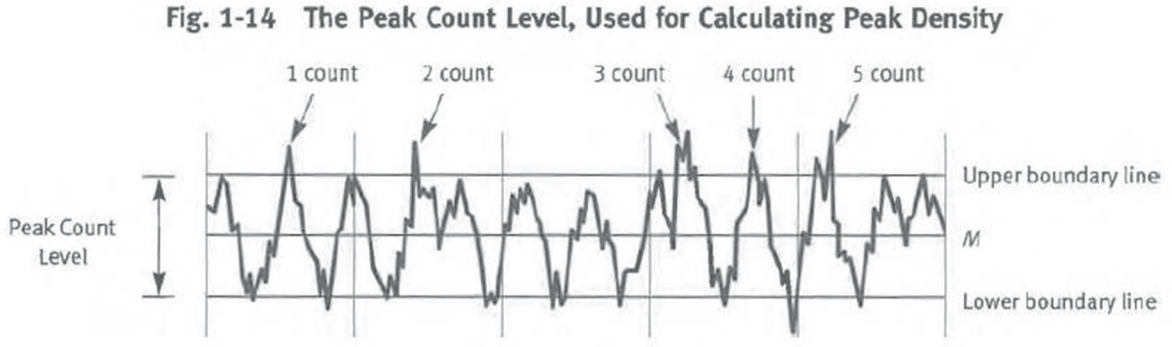


Figure 6 Maximum profile peak height (example of a roughness profile)

EX1010, 11.

PD, measured according to the ASME B46.1 (2009) standard, is defined as the number of SAE (Society of Automotive Engineers) peaks per unit length, measured at a specified peak count level over an evaluation length. EX1011, 21. An SAE peak is defined as "a profile irregularity wherein the profile *intersects consecutively a lower and an upper boundary line*." EX1011, 21 (emphasis added). The ASME B46.1 (2009) standard also requires that lower and upper boundaries for the SAE peak count level be "set by a designer or an instrument operator for each application." EX1011, 21. The '014 patent specifically sets the peak count level at ± 0.5 μm from the mean line, thus requiring a given peak's height (Zp, in Figure 6 above) to be greater than 0.5 μm in order to count as a peak for PD. Figure 1-14 on page 22 of Exhibit 1011, reproduced below, shows a sample

graphical representation of a PD calculation, with five counted peaks meeting the peak count level.



EX1011, 22.

The ’014 patent emphasizes the criticality of the claimed BC range calculated using the specific variables recited in claim 1. The patent teaches that a BC of less than 1.5 reduces adhesion to the negative electrode active material due to a low number of active sites on the copper foil. EX1001, 5:22-25. On the other hand, a BC greater than 9.4 results in excessive foil surface irregularities, non-uniform coating of the negative electrode active material on the foil, and deteriorated affinity between the negative electrode slurry and the foil during manufacturing. EX1001, 5:25-33. The ’014 patent also includes comparative data showing this claimed BC range significantly improves adhesion of the negative electrode active material on the foil and reduces the chance of undesirable wrinkles. EX1001, 12:25-44 (Table 2). Specifically, Table 2, reproduced below, shows that the adhesion force between the copper foil and the negative active material (graphite) increased significantly when BC fell within the claimed range.

"In the case of Examples 1 to 5, the binding coefficient is between 1.5 to 9.4, and in this case, the adhesion force is higher than 25 N/m. In the case of Comparative Examples 1 and 2, however, the binding coefficient deviates from a binding coefficient range (1.5 to 9.4), and in this case, the adhesion force is about 20 N/m or less, which is low." EX1001, 12:45-51.

TABLE 2

	TC (g/L)	Co^{2+} (g/L)	Rp (μm)	PD	Amount of attachment of Cr (mg/m^2)	Binding coefficient (BC)	Adhesion force (N/m)
Example 1	0.05	0.32	0.6	10.0	0.6	1.5	28.8
Example 2	0.11	0.16	1.8	110.0	3.9	9.4	29.5
Example 3	0.05	0.16	0.9	75.0	1.8	5.2	29.7
Example 4	0.05	0.16	0.9	75.0	1.8	5.2	31.2
Example 5	0.05	0.16	0.9	75.0	1.8	5.2	25.4
Comparative Example 1	0.05	0.34	0.5	9.0	0.5	1.3	18.5
Comparative Example 2	0.13	0.16	1.9	111.0	4.0	9.6	20.1
Comparative Example 3	0.05	0.16	0.9	75.0	1.8	5.2	18.8
Comparative Example 4	0.05	0.16	0.9	75.0	1.8	5.2	19.5
Comparative Example 5	0.05	0.16	0.9	75.0	1.8	5.2	19.8

EX1001, Table 2.

The second independent claim of the '014 patent, claim 5, recites a method of manufacturing copper foil, the method comprising electroplating a copper film on a rotary negative electrode drum, winding the electroplated copper film, and immersing the copper film in an anti-corrosion solution for anti-corrosion treatment. EX1001, 14:60-15:2. When electroplating, a concentration of total

carbon (TC) in the electrolytic solution is "maintained at 0.12 g/L or less," and a concentration of Co^{2+} in the electrolytic solution is "maintained at 0.33 g/L or less." EX1001, 15:3-6.

The '014 patent emphasizes the criticality of maintaining concentrations of TC and Co^{2+} at or below the claimed maximum amounts during electroplating. The '014 patent teaches that, when TC and/or Co^{2+} are too high, plating is non-uniform, and Rp and PD increase or decrease to undesirable values. EX1001, 8:3-10. When TC and Co^{2+} exceed 0.12 g/L or 0.33 g/L, respectively, the manufactured foil has local quality deviations, with Rp and PD varying undesirably on the foil. EX1001, 8:10-22. The '014 patent further includes comparative data showing that maintaining TC and Co^{2+} levels at or below 0.12 g/L and 0.33 g/L during electroplating significantly improves adhesion of the negative electrode active material on the foil and reduces the chance of undesirable wrinkles. EX1001, 12:25-44 (Table 2). As shown in Table 2 above, Comparative Examples 1 and 2 had a Co^{2+} concentration of 0.34 g/L, and a TC concentration of 0.13 g/L, respectively. In both of these Comparative Examples, adhesion force was well below the adhesion force for Examples 1–5.

B. Prosecution History of the '014 Patent

In the first Office Action issued during prosecution of the '014 patent, the Examiner rejected all pending claims under Section 112 (indefiniteness) only.

Specifically, the Examiner required that Rp and PD in the claims be defined with units and be more specific as to how the measurements were to be obtained in the binding coefficient calculation. The Examiner also required that units be associated with the variables I, I_0, h, k, l, and n in the X-ray diffraction calculation, and that an antecedent basis error in claim 5 be fixed. EX1002, 374. After one round of amendments (which were made to address the Section 112 rejections), the Examiner allowed the application, explaining that the closest prior art cited did "not teach that the binding coefficient between the foil and the protective layer[,]" as expressed by Equation 1 above. EX1002, 479.

V. The Board should use its discretion under § 314(a) to deny the Petition in view of the parallel litigation.

The facts here fit squarely within the type of cases the Board uses its discretion to deny petitions under § 314(a). In *Apple Inc. v. Fintiv, Inc.*, the Board articulated six nonexclusive factors for determining whether to institute an AIA post-grant proceeding where there is parallel district-court litigation. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (P.T.A.B. Mar. 20, 2020) ("*Fintiv*"). On June 21, 2022, Director Vidal issued a Memorandum re: Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation ("*Fintiv* Memo") clarifying the procedure that the Board should follow when evaluating the six *Fintiv* factors. Here, the Board should exercise its discretion to deny the Petition because (1) *Fintiv* factors two through five support

discretionary denial; and (2) the Petition does not provide a compelling, meritorious challenge (*Fintiv* factor six).

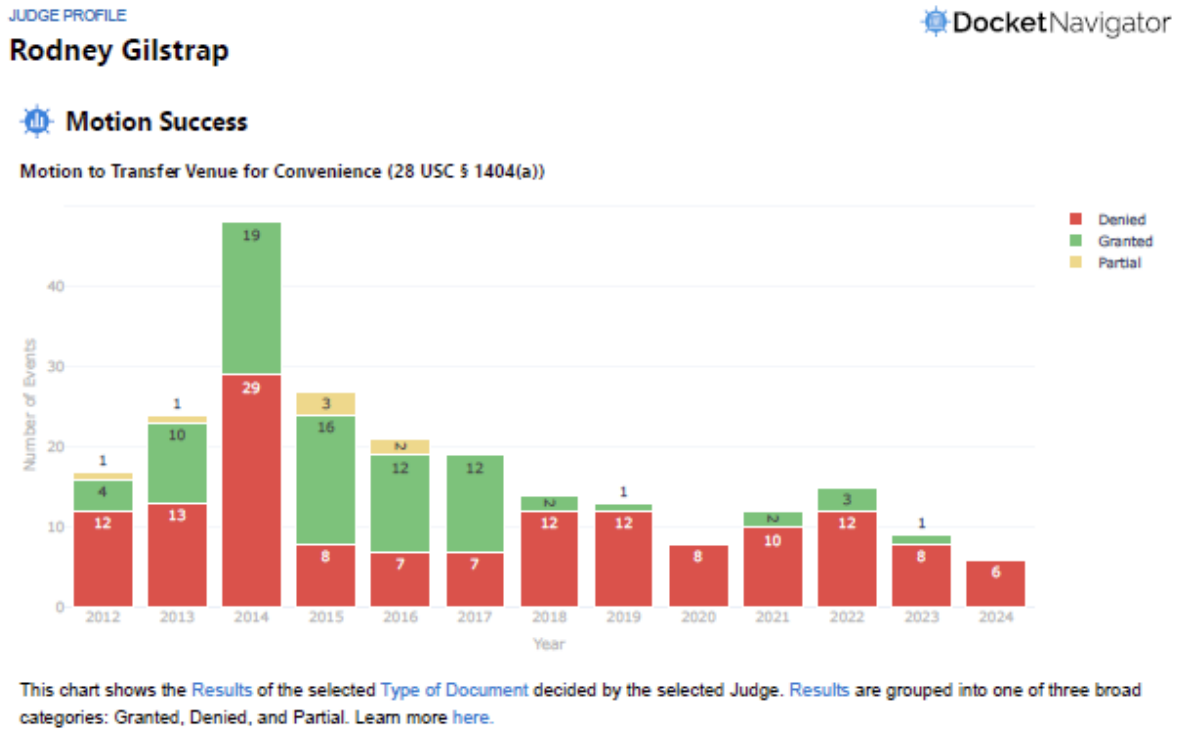
***Fintiv* factor one:** An opposed motion to stay has been filed in the parallel litigation. EX2001-EX2004. But this motion is still pending, and the Board should not speculate whether the court would grant a stay in the event this proceeding were instituted. Factor one, therefore, is neutral. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 12 (P.T.A.B. May 13, 2020) (informative) ("*Fintiv II*") (holding the Board should "decline to infer … how the District Court would rule should a stay be requested by the parties."); *see also Fusion Orthopedics, LLC v. Extremity Medical, LLC*, IPR2023-00894, Paper 15 at 28-29 (P.T.A.B. Nov. 17, 2023) ("[W]e decline to speculate whether the pending motion to stay might be successful.").

***Fintiv* factor two:** Factor two weighs heavily in favor of discretionary denial. The projected statutory deadline for issuing a Final Written Decision (FWD) in this IPR is April 29, 2026. Jury selection in the parallel litigation is scheduled to begin November 3, 2025, nearly six months before the projected FWD deadline. EX2005, 1. The *Fintiv* Memo also authorizes panels to "consider the median time from filing to disposition of the civil trial for the district in which the parallel litigation resides" as reported on the uscourts.gov website. *Fintiv* Memo, 3 n.4. The median time-to-trial for civil actions in the Eastern District of

Texas is 21.9 months. EX2006, 35. The complaint in the parallel litigation was filed November 21, 2023. EX2007. Applying the median time-to-trial, the estimated trial date would be in mid-September 2025, which is even earlier than the scheduled trial date.

Petitioner further asserts that a pending motion to transfer "will help ensure that the FWD outpaces any trial date." Pet., 74-75. But, like a motion for stay, a judge determines whether to grant a motion to transfer "based on the facts of each specific case as presented in the briefs by the parties." *See Fintiv II* at 12. The Board should not speculate on how the court will rule on the pending motion to transfer. *See id*.; *Samsung Display Co., Ltd. v. Pictiva Displays Int'l Ltd.*, IPR2024-00855, Paper 12 at 8-9 (P.T.A.B. Nov. 19, 2024)[1] (declining to speculate how the district court might rule on pending motions). Even if the Board was inclined to speculate, according to Docket Navigator statistics, since 2018 Judge Gilstrap rarely grants such transfer motions:

[1] Acting Director Brent recently issued a *sua sponte* Director Review decision modifying this decision. *Samsung Display Co., Ltd. v. Pictiva Displays Int'l Ltd.*, IPR2024-00855, Paper 13 (Acting Director Brent Jan. 10, 2025). That decision addresses a specific issue related to factor 6, not relevant here, and affirms the panel's exercise of discretion to deny institution.



EX2008.

Under the current facts, trial in EDTX is scheduled to begin nearly six months before the FWD deadline, and thus factor two weighs heavily in favor of denying institution. *See AT&T Services Inc. v. ASUS Tech. Licensing Inc.*, IPR2024-00992, Paper 14 at 10-11 (P.T.A.B. Dec. 16, 2024) (denying institution; finding "the second factor weighs substantially in favor of discretionary denial" where trial was scheduled "four to five months prior" to FWD deadline); *Ericsson Inc. v. Active Wireless Techs. LLC*, IPR2024-00886, Paper 8 at 8-9 (P.T.A.B. Nov. 12, 2024) (denying institution; finding factor 2 weighs in favor of denial with trial date approximately 4 months prior to FWD deadline).

***Fintiv* factor three:** Factor three weighs in favor of denying institution. Here, the Board "consider[s] the amount and type of work already completed in the parallel litigation by the court and the parties *at the time of the institution decision*." *Fintiv*, 9 (emphasis added). The deadline for issuing a Decision on Institution (DI) in this IPR is April 29, 2025. The parties have already exchanged invalidity and infringement contentions and are engaged in fact discovery, with each party already producing over 5,000 documents, and corporate depositions are ongoing. By the April 29, 2025 DI deadline, the parties will have completed claim construction briefing, the Claim Construction Hearing will be imminent (on May 14, 2025), and the parties will be nearing the end of fact discovery. EX2005, 4-5; EX1024, 3-5.

Petitioner contends "the EDTX litigation is still in its early stages and the parties and court have yet to expend significant resources on invalidity," Pet., 75, but Petitioner considers the state of the parallel litigation at the time the Petition was filed, not at the time of the DI, and does not even consider the then-current proposed case schedule, which Petitioner filed as Exhibit 1024.[2] Nor was Petitioner

[2] The current schedule, issued January 2, 2025, and filed as Exhibit 2005 includes only minor differences from the June 12, 2024 proposed schedule Petitioner submitted with the Petition (EX1024). Petitioner should not be granted additional

diligent in filing the Petition. *See* Pet., 78-79. The Petition was filed September 20, 2024, which was ten months after the complaint was filed, and seven months after the February 23, 2024 order noting Petitioner's waiver of foreign service. EX2009. Petitioner's only argument of diligence is that it filed the Petition "months ahead of the one-year time bar." Pet., 75. But this alone is insufficient. *See Ericsson Inc.*, IPR2024-00886, Paper 8 at 9-10 (denying institution; determining that merely "filing the Petition 'in advance of the statutory deadline'" alone does not weigh in favor of institution, noting "Petitioner [did] not explain how it was diligent or even identify the time period during which it contends it was diligent.").

Because the parties and the court will have expended significant resources by the April 29, 2025 DI deadline and because Petitioner was not diligent in filing the Petition, factor three weighs in favor of denying institution.

***Fintiv* factor four:** Factor four weighs in favor of denying institution. "*Fintiv* factor four looks at the overlap between the issues raised in the IPR petition and in the parallel proceeding in order to evaluate 'concerns of inefficiency and the possibility of conflicting decisions.'" *Fintiv* Memo, 7; *Fintiv*, 12. Here, there is significant overlap between the invalidity issues: the Petition challenges the validity of the claims of the '014 patent based on various combinations of

---

briefing to address any alleged updates to the schedule since filing the Petition.

Hanafusa, Dobashi, Cheng, Kim, Lee, and Kajihara, Pet., 1; in the parallel litigation, Petitioner challenges the validity of claims 1-2 and 4 using most of these references[3] in addition to others, EX2010, 21-23, 87-95, Apps. A1, A3, A5, A10, A12.

Petitioner's stipulation—to "not [] seek resolution in the district court of the same grounds presented in [the] Petition"— does not allay the concerns undergirding factor four. Pet., 75. In fact, Petitioner's stipulation is essentially meaningless. All of Petitioner's asserted references has at least one counterpart or related patent/publication that is not included in the stipulation.

Hanafusa was also published as WIPO publication WO 2008/132987. EX2013. Dobashi was also published as US 2009/047539 and as WIPO publication WO 2007/105635. EX2012. Cheng was also published as US 2015/0030873, and JP 2015/021186. EX2014. Kim was also published as US 9,457,541 and US 10,283,778. EX2015. Lee was also published as WIPO publication WO 2018/088645. EX2016. Kajihara was also published as

[3] In the invalidity contentions, Petitioner relies on the U.S. Application Publication and resulting U.S. Patent of a continuation application of Kim. EX2010, 22-23; EX2015. Petitioner relies on Lee and Kajihara only for dependent claims 6 and 7, respectively, which are not currently challenged in the invalidity contentions.

EP0334657. EX2017. But even if Petitioner stipulated not to use these related references, that still does not prevent Petitioner from using other references that have cumulative teachings.

Accordingly, because there is significant overlap in validity issues and Petitioner's stipulation does nothing to reduce this overlap, factor four weighs in favor of denying institution.

***Fintiv* factor five:** Factor five weighs in favor of denying institution because, as Petitioner acknowledges, "parties in the parallel litigation are the same." Pet., 75; *Fintiv II*, 15 ("Because the petitioner and the defendant in the parallel proceeding are the same party, this factor weighs in favor of discretionary denial."); *see also Ericsson Inc.*, IPR2024-00886, Paper 8 at 13-14 (factor five weighs in favor of denial where the district court is likely to precede the FWD).

***Fintiv* factor six:** The *Fintiv* Memo explains that "[c]ompelling, meritorious challenges are those in which the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence." *Fintiv* Memo, 4. Petitioner provides nothing more than a bare statement that "the Petition presents a compelling case of invalidity." Pet., 75. But Petitioner fails to demonstrate: 1) the cited references disclose or suggest an Rp value that could be used to satisfy the claimed BC range of 1.5 to 9.4, 2) the cited references disclose or suggest a peak density value that could be used to satisfy the

claimed BC range, and 3) a motivation to combine and/or a reasonable expectation of success in combining the references for any Ground. *See* Section VI. Petitioner's expert largely repeats the Petition verbatim without providing additional analysis or corroborating evidence. *Id.*; *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (P.T.A.B. Aug. 24, 2022). Therefore, factor six favors denying institution. *Fintiv*, 15.

* * *

At bottom, the scheduled trial date is nearly six months before the projected FWD, the parties will have invested significant resources in the district court, Petitioner's narrow stipulation does nothing to alleviate concerns of inefficiency or the possibility of conflicting decisions, and the merits are not compelling. The Board should exercise its discretion to deny the Petition in view of the parallel litigation.

VI. The petition fails to establish a reasonable likelihood of prevailing on any challenged claim.

None of Petitioner's cited art discloses, explicitly or inherently, an Rp value or a peak density value that could be used to satisfy the claimed BC range. Petitioner relies on flawed theories of inherency to establish that Hanafusa and Dobashi disclose copper foils having Rp and peak density values *calculated by Petitioner*. Moreover, Petitioner fails to articulate a sufficient motivation to

combine the references for any Ground and/or a reasonable expectation of success in combining the cited references to arrive at what is claimed. Indeed, Petitioner's own references and analysis demonstrate there would *not* have been a reasonable expectation of success.

In an IPR, "the burden of proving a proposition of unpatentability" is borne by (and remains at all times with) the petitioner. 35 U.S.C. §§ 314(a), 316(e); *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1375 (Fed. Cir. 2016). To satisfy its burden, a petitioner must "articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness"—"mere conclusory statements" will not suffice. *Magnum Oil*, 829 F.3d at 1380. Indeed, "[i]t is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds for the challenge to each claim.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (quoting 35 U.S.C. § 312(a)(3)).

"An obviousness determination requires finding that [a Skilled Artisan] would have been motivated to combine or modify the teachings in the prior art *and* would have had a reasonable expectation of success in doing so." *Regents of the Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018); *Intelligent Bio-Sys.*, 821 F.3d at 1367-68; *see also, e.g.*, *NJOY, LLC v. JUUL Labs, Inc.*,

IPR2024-00536, Paper 17 (P.T.A.B. Aug. 12, 2024) (denying institution where petitioner did not show a reasonable expectation of success in combining the asserted references); *Honeywell Int'l Inc. v. DSM IP Assets, B.V.*, IPR2024-00493, Paper 7 (P.T.A.B. Aug. 21, 2024) (same).

Petitioner falls far short of carrying its burden here for multiple reasons.

A. Petitioner incorrectly interprets Rz in Hanafusa in an attempt to show Hanafusa inherently discloses a peak height (Rp) value used to calculate the claimed binding coefficient (BC) for Ground 1A.

Petitioner acknowledges that Hanafusa does not explicitly disclose "a peak height [Rp (μm)] measured according to JIS B 0601 (2001)," as required by the claims. Pet., 16. Instead, Petitioner relies on inherency to argue that Hanafusa's "surface roughness (Rz) value" discloses an Rp value of less than 2.0 μm that could satisfy the claimed BC range. Pet., 16, 29-30; EX1003, ¶¶60, 84, 86. But Petitioner's arguments are based on the incorrect premise that Hanafusa's "surface roughness (Rz)" must be given the *new* Rz meaning as set forth in the JIS B 0601 (2001) standard (i.e., Rz being the sum of the largest profile peak height and the largest profile valley depth). Pet., 16-21. Hanafusa does not support such an interpretation. Indeed, the more plausible interpretation is that Hanafusa's Rz value refers to the "ten-point mean roughness" parameter "R_{ZJIS}" that was "widely popularized in Japan." EX1010, 24. Because the surface roughness Rz value described by Hanafusa is not what Petitioner says it is, Hanafusa does not

inherently disclose an Rp value of less than 2.0 μm as argued by Petitioner. It follows that Hanafusa does not inherently disclose surface characteristics that could be used be used to satisfy the claimed BC range as argued by Petitioner.

"[I]nherency may supply a missing claim limitation in an obviousness analysis." *Par Pharm., Inc. v. TWi Pharms. Inc.*, 773 F.3d 1186, 1194–95 (Fed Cir. 2014). However, establishing inherency requires strict evidentiary proof because inherency "may not be established by probabilities or possibilities." *Id*. at 1195. "The *mere fact that a certain thing may result from a given set of circumstances is not sufficient*." *Id.* (emphasis added).

Petitioner mischaracterizes Hanafusa's disclosure to establish that Hanafusa inherently discloses an Rp value of less than 2.0 μm. Pet., 19, 21. Petitioner admits that, despite its heavy reliance on Hanafusa's "surface roughness (Rz)," Hanafusa "offers no definition" of the surface roughness (Rz). Pet., 17. Petitioner attempts to fill this gap by asserting that, under the JIS B 0601 (2001) standard, Hanafusa's Rz should be given the new meaning assigned to the Rz symbol, namely "the sum of height of the largest profile peak height Zp and the largest profile valley depth Zv within a sampling length."[4] Pet., 17-18. Petitioner then argues that, because Rp is

[4]Petitioner makes a similar argument based on the ASME 2009 standard (SOLUS-1011). Pet., 19-21.

the largest peak height from the center line (e.g., Zp_6), Rp is "always smaller" than Hanafusa's Rz. *See* Pet., 18-19. Petitioner's annotated Figure 8 of JIS B 0601 standard, allegedly showing why Rp would always be less than Rz, is reproduced below.

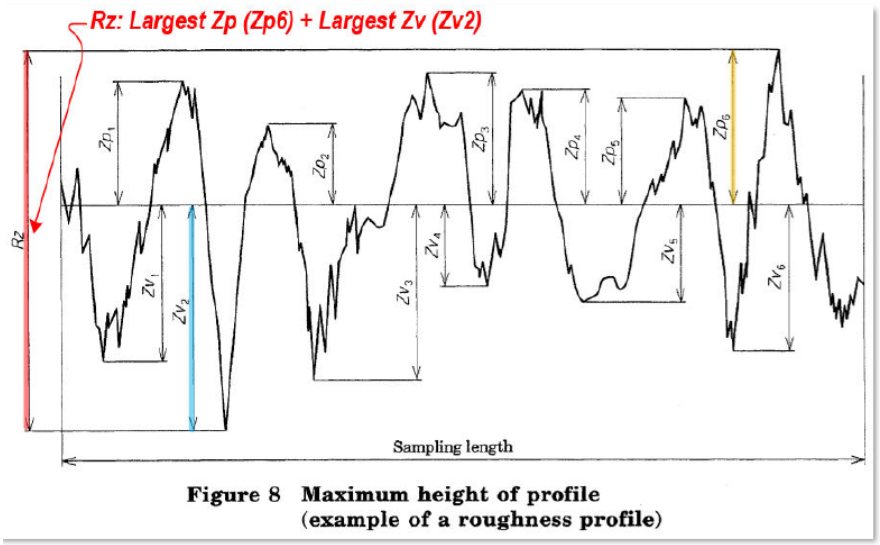


Figure 8 Maximum height of profile (example of a roughness profile)

Pet., 18.

Petitioner's cited references, however, do not support defining Hanafusa's surface roughness (Rz) as "the sum of height of the largest profile peak height Zp and the largest profile valley depth Zv within a sampling length." Hanafusa does not mention the JIS B 0601 (2001) standard and is devoid of any disclosure (and Petitioner does not cite to any) that indicates that its "surface roughness (Rz)" refers to the sum of the largest peak height and largest valley depth, as Petitioner contends.

To the contrary, the more plausible interpretation is that Hanafusa's "surface

roughness (Rz)" is the roughness parameter that was "widely popularized in Japan," namely a ten-point mean roughness R_{ZJIS} defined in JIS B 0601 (2001). EX1010, 24.

The NOTE in Section 4.1.3 of JIS B 0601 (2001) explains that the "Rz symbol" was formerly used to indicate the "ten point height of irregularities" in some countries where "there are surface roughness measuring instruments in use which measure the former Rz parameter." EX1010, 10. Although the 2001 version of JIS B 0601 seeks to change the meaning of Rz, it makes clear that Rz was previously used to indicate "ten point height of irregularities," EX1010, 10, a measure that was "widely popularized in Japan." EX1010, 24. The 2001 version of JIS B 0601 refers to the former Rz symbol as R_{ZJIS}. EX1010, 21, 24. Indeed, Petitioner acknowledges the lack of a single accepted meaning of Rz and admits that it can mean the ten-point roughness. *See* EX1003, ¶49 ("Rz (not to be confused with the ten-point roughness that often shares the same symbol").

Hanafusa claims priority to a Japanese patent application (no. 2007-111266), names a Japanese inventor, and was assigned to a Japanese company. EX1004, 1. All these facts support that Hanafusa's Rz corresponds to a ten point mean height (i.e., the former Rz value, now called R_{ZJIS}) that was widely used in Japan, not the sum of the height and depth of the largest peak and valley (i.e., the new Rz value defined in the 2001 version).

What is more, the language Hanafusa uses to describe Rz supports interpreting Hanafusa's Rz as R_{ZJIS}. Hanafusa refers to Rz as "surface roughness." Hanafusa does not use terms like "peak height" or "maximum height" used in the JIS B 0601 (2001) and ASME 2009 for the new Rz definition. If Hanafusa intended to describe an Rz value related to the sum of the largest peak height and valley depth, Hanafusa would have used terminology like "peak height" or "maximum height" to describe Rz.

Dobashi also supports the interpretation that Hanafusa's Rz refers to ten-point surface roughness R_{ZJIS}. Like Hanafusa, Dobashi claims priority to Japanese patent applications (application nos. 2006-066806 and 2006-272326), names Japanese inventors, and was assigned to a Japanese company. EX1005, 1. And, like Hanafusa, Dobashi uses the terminology "surface roughness" for R_{ZJIS} and Rz[5]. Further, Dobashi distinguishes a maximum peak to valley height (called "PV" by Dobashi) from a "surface roughness (R_{ZJIS})." *Compare* EX1005, 7:59-64 (defining PV), *with* EX1005, 8:8-10 (defining R_{ZJIS}). This further supports that, if a Japanese patent application intended to describe the new Rz value related to the

[5] When discussing Japanese Patent Laid-Open No. 2004-35918 (Patent Document 2), Dobashi states "a 10-point average roughness Rz of about 1.0 μm±0.5 μm is obtained." EX1005, 2:11-16.

sum of the largest peak height and valley depth, the application would have used terminology like "peak height" or "maximum height" to describe Rz, not "surface roughness" which is used to describe R_{ZJIS}.

When considered as a whole, Hanafusa's surface roughness Rz refers to a ten-point roughness R_{ZJIS}, not the new Rz value defined in JIS B 0601 (2001) or ASME 2009. And Petitioner has failed to show why Hanafusa's Rz, a ten-point average roughness, would render the Rp limitation obvious.

Petitioner buried its head in the sand and conveniently interpreted Hanafusa's surface roughness Rz value out of context as the new Rz value in an attempt to show that Hanafusa inherently discloses an Rp value. Due to this incorrect interpretation of Hanafusa's Rz, the premise of Petitioner's argument that Hanafusa discloses an Rp value of less than 2.0 μm is fatally flawed. It follows that Petitioner's argument for why Hanafusa inherently discloses an Rp value that could satisfy the claimed BC range must fail.

* * *

For at least these reasons, Petitioner has not demonstrated a reasonable likelihood of prevailing to show that the Hanafusa-Dobashi combination presented in Ground 1A renders the claim obvious, and Petitioner's Ground 1A should fail.

B. Petitioner fails to demonstrate that Dobashi discloses or suggests a peak density value for Ground 1A.

Petitioner's reliance on Dobashi for the peak density limitation is unavailing.

Pet., 9-10, 21-27. Petitioner incorrectly argues that Dobashi's RSm directly correlates to peak density and, based on that false premise, goes on to calculate the alleged peak density values from Dobashi's RSm values. Because of these missteps, Petitioner's obviousness grounds based on Dobashi cannot succeed.

1. Petitioner's "straightforward" calculations do not consider differences in how RSm and peak density are calculated.

Petitioner incorrectly argues that Dobashi's RSm values directly correlate to peak density values. Petitioner relies on Dobashi's disclosed RSm values measured according to JIS B 0601 (2001) and argues that a POSA "would have performed a straightforward calculation to convert Dobashi's matte side (deposit side) RSm into a matte side peak density." Pet., 22; EX1003, ¶72. In particular, Petitioner argues that a POSA would have divided the sampling length (4 mm in this case) by Dobashi's RSm values to arrive at a peak density that could be used to satisfy the claimed range for BC. Pet., 25; EX1003, ¶¶76-77.

However, dividing the claimed sampling length (4 mm) by Dobashi's RSm values does not result in a peak density value as claimed. The ASME standard does not support Petitioner's assertion that RSm and peak density are in a simple inverse relationship. In ASME B46.1 (2009), peak density is defined as the number of SAE peaks per unit length where an SAE peak is "a profile irregularity wherein the profile intersects consecutively a lower and an upper *boundary line*." EX1011, 21 (emphasis added). The upper and lower boundary lines (i.e., the peak count level)

are set to ± 0.5 μm in the '014 patent. EX1001, 14:21-22. Figure 1-14 of the standard, shown below, shows a sample graphical representation of profile irregularities that consecutively intersect a peak count level, with five counted SAE peaks.

The concept of counting only the SAE peaks that cross lower and upper boundary lines, on the other hand, is wholly missing in RSm. Figure 1-13 of the ASME B46.1 (2009) standard, also shown below, illustrates that RSm measures the average of profile widths Sm_i without regard to any boundary lines. Petitioner relies on the fact that RSm requires height discrimination to measure average spacing between "profile irregularities," the default value of which is 10% of Rz, and argues that this height discrimination directly parallels to upper and lower boundary lines for measuring a peak density. Pet., 10; EX1003, ¶49. But height discrimination is used to determine whether an irregularity that barely crosses the mean line can be considered a peak or a valley and is thus a different concept than counting SAE peaks that cross the lower and upper "boundary lines." Indeed, if "height discrimination" and "lower and upper boundary lines" were the same, the standard would refer to them as such.

Fig. 1-13 The Mean Spacing of Profile Irregularities, *RSm*

[This material is redrawn from ISO Handbook 33 with permission of the American National Standards Institute (ANSI) under an exclusive licensing agreement with the International Organization for Standardization. Not for resale. No part of ISO Handbook 33 may be copied, or reproduced in any form, electronic retrieval system or otherwise without the prior written consent of the Amercian National Standards Institute, 25 West 43rd Street, New York, NY 10036.]

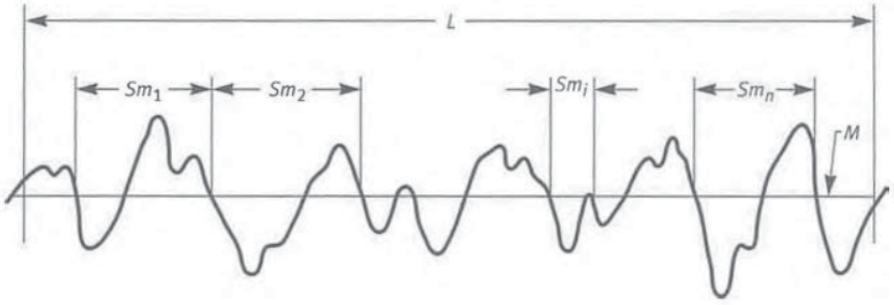
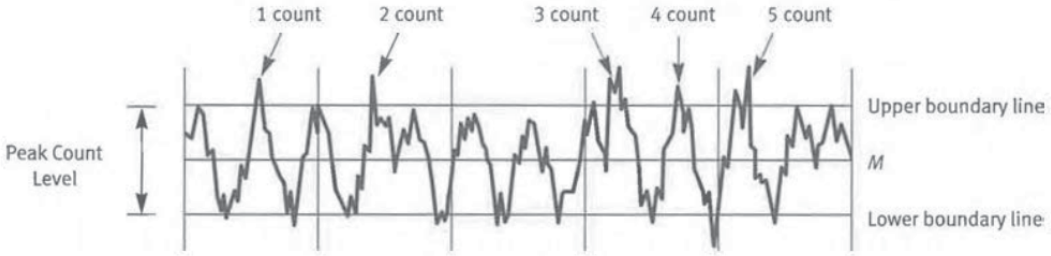


Fig. 1-14 The Peak Count Level, Used for Calculating Peak Density

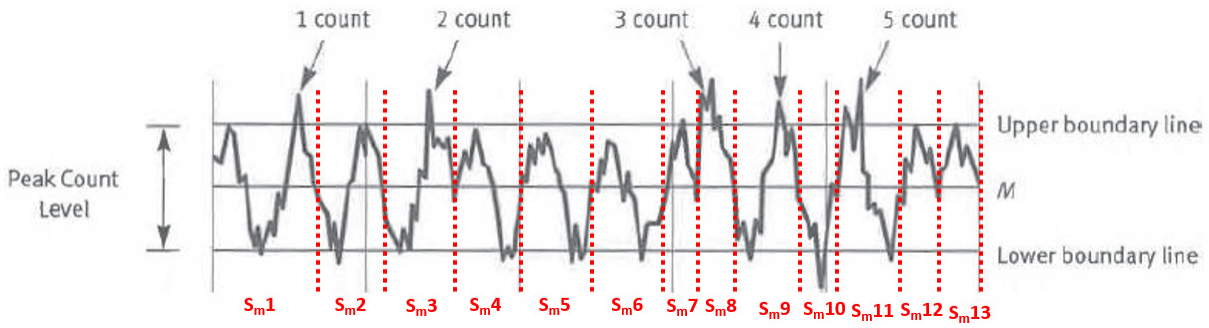


EX1011, FIGs. 1-13, 1-14.

Petitioner incorrectly assumes that RSm, calculated using default "discrimination lines," would give an indication of the number of SAE peaks where the surface profile consecutively intersects lower and upper boundary lines. But RSm does not require consecutive intersections of a lower and upper boundary line. Therefore, the criteria for counting profile irregularities for peak density and RSm are not the same, and the same number of profile irregularities would not be counted for both measurements. For example, a first profile irregularity consecutively intersecting lower and upper boundary lines and meeting the default discrimination criteria for RSm would be considered in ***both*** RSm and peak

density. But a second profile irregularity that only meets the default discrimination criteria for Rsm would be considered for ***only*** RSm.

An annotated version of Exhibit 1011's Figure 1-14 below illustrates the significance of criteria lines in a peak density measurement and how an RSm peak does not directly correlate to a peak density count.



EX1011, FIG. 1-14 (annotated).

The dashed red lines show Sm spacing lengths used to calculate the mean spacing of profile irregularities (RSm). In the annotated figure, the peak count for the peak density measurement is five, while there are 13 profile irregularities (Sm1 through Sm13). There is no way that one could derive peak density from RSm, the mean width of the profile irregularities, using only the "straightforward" calculations proposed by Petitioner. This is because the peak count for peak density would change depending on where the lower and upper boundary lines are set, and RSm does not give that information. Thus, references that merely disclose RSm and not peak density, such as Dobashi, cannot disclose or render obvious a peak density value.

A simple, intuitive figure further illustrates Petitioner's illogical assumptions. Two exemplary surfaces shown below[6] with specified unit-less peak heights (2, 4, 6, or 8 as marked in the figure) have the *same* sample length, *same* Ra, *same* Rz, and *same* Rsm/Sm. Yet, depending on where the criteria line is set, the two samples would have *different* peak density (PD) values along the length shown.

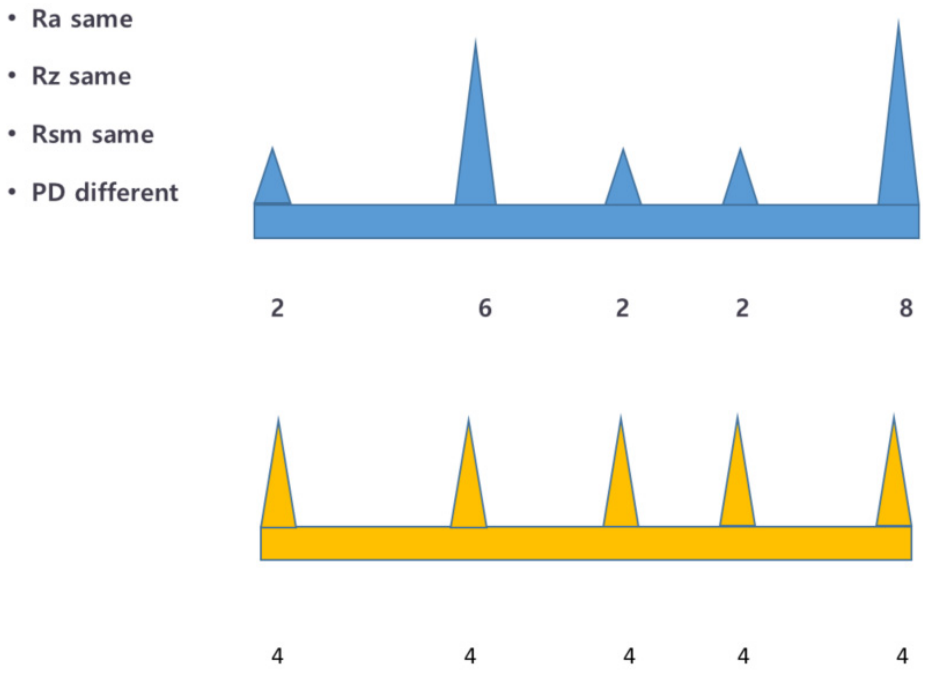


FIG. A.

Because the criteria for evaluating profile irregularities is different for peak density and RSm, RSm values cannot be directly correlated to peak density values

[6] For purposes of illustration, the figures show only the peaks and not the valleys.

by dividing by a sampling length, as assumed by Petitioner. This is fatal to Petitioner's arguments for establishing obviousness of claim 1.

2. Dobashi does not disclose a surface with peak heights large enough to count toward the claimed peak density limitation.

Petitioner's reliance on Dobashi also fails because Petitioner overlooks a critical aspect of the claimed peak density value in its analysis—that Dobashi's example surfaces do not include any peaks that meet the claimed ±0.5 μm peak count value. *See* EX1005, FIGs. 5-6. Petitioner incorrectly assumes that Dobashi would have peaks with a height greater than 0.5 μm in concluding that Dobashi discloses the peak density limitation. This is fatal to Petitioner's arguments for establishing obviousness of claim 1.

Claim 1 of the '014 patent recites that "the peak density is a number of peaks per unit length of 4 mm, wherein the peak density is measured according to ASME B46.1 (2009) standard with a *peak count level of ±0.5 μm*." EX1001, 13:65-67, 14:21-22 (emphasis added). The "peak count level of ±0.5 μm" is an explicit criteria for the peak density measurement—meaning that for a peak to be counted as a peak in the density measurement, it must be at least 0.5 μm in height from the mean line. Petitioner acknowledges that this ±0.5 μm criteria is a distinct claim limitation. Pet., 10 ("[a]lthough Dobashi does not explicitly disclose these discrimination lines, whereas the '014 Patent uses discrimination lines of ±0.5 μm"); EX1003, ¶49.

Therefore, to establish that Dobashi discloses a copper foil having a "peak density" as claimed, Dobashi's foil must have peaks with a height of at least 0.5 µm above the mean line. Petitioner fails to establish this.

Acknowledging that Dobashi does not disclose using any boundary line (let alone boundary lines of ±0.5 µm), Petitioner adds discrimination criteria, i.e., 10% of the PV values, to Dobashi's Table 2 and treats them as the boundary lines for the peak density measurement.[7] Pet., 10; EX1003, ¶49.

TABLE 2

		Deposit side of electro-deposited copper foil								
	Copper foil	Three-dimensional surface structure analysis			Stylus-type roughness meter		Gloss Gs		Deposit Side Peak Density	Default Discrimination Criteria (µm)
	thickness	Wmax	PV	Wmax/PV	Rzjis	RSm	(60°)			
Subject	(µm)	(µm)	(µm)	(-)	(µm)	(mm)	TD	MD		
Example 1	15	0.37	0.39	0.949	0.32	0.19	659	665	21.1	0.039
Example 2	12	0.45	0.48	0.938	0.31	0.16	664	671	25	0.048
Example 3	70	0.065	0.079	0.823	0.17	0.39	691	686	10.3	0.0079
Example 4	15	0.27	0.30	0.904	0.29	0.18	790	790	22.2	0.03
Example 5	15	0.36	0.39	0.943	0.31	0.16	775	773	25	0.039
Example 6	12	0.42	0.44	0.959	0.47	0.22	654	687	18.2	0.044
Example 7	12	0.58	0.66	0.869	0.71	0.14	608	640	28.6	0.066
Comparative Example	12	0.82	1.87	0.439	1.00	0.07	324	383		

Modified Table 2 of Dobashi

Pet., 26.

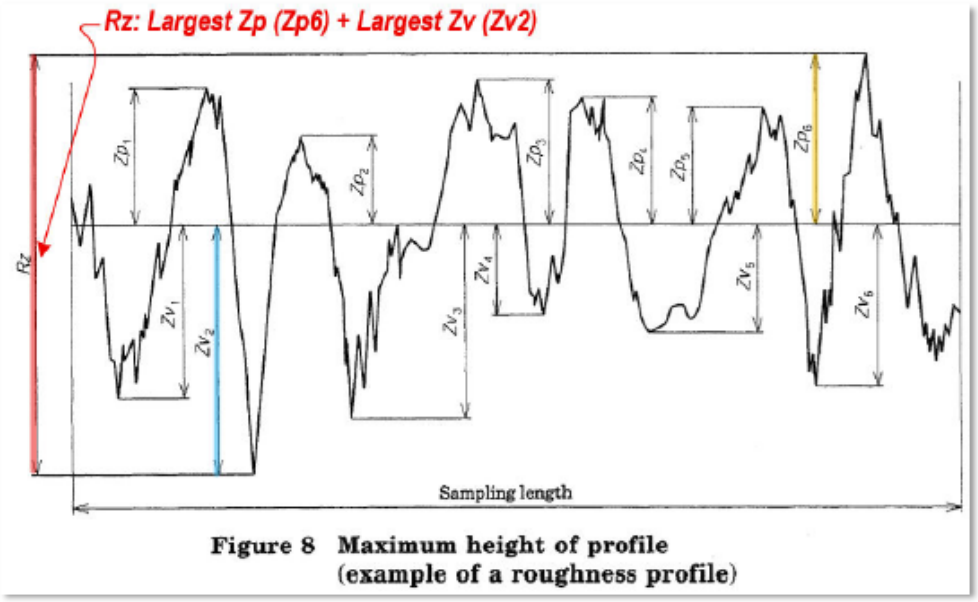
Notably, the default discrimination criteria added by Petitioner are

[7] Petitioner equates Dobashi's PV to Rz, "maximum height of profile."

significantly less than the claimed 0.5 μm upper and lower boundary lines for measuring peak density. Even the largest value—0.066 μm—is almost a factor of 10 less than 0.5 μm. The small values of discrimination criteria corroborate the different purpose for which they are used: discarding negligible irregularities that are too small to be considered a peak or a valley in the determination of RSm.

Indeed, if the claimed peak count level (±0.5 μm) is used for the boundary lines, peak density in Dobashi's Examples would likely be zero, far from the two-digit values calculated by Petitioner. For example, because PV (peak-to-valley height) in Dobashi's Example 1 is 0.39 μm, none of the peaks in Example 1 would have a height greater than 0.5 μm from the mean line, resulting in peak density of zero, not 21.1 as Petitioner asserts. This is exemplified in the following figure from page 18 of the Petition: if Rz[8] is 0.39 μm, no Zp can be greater than 0.5 μm.

[8] Petitioner equates Rz to Dobashi's PV. Pet., 10 (explaining that "Rz" is the "maximum height of profile" and that Dobashi discloses this parameter as PV, "the maximum peak to valley height.").

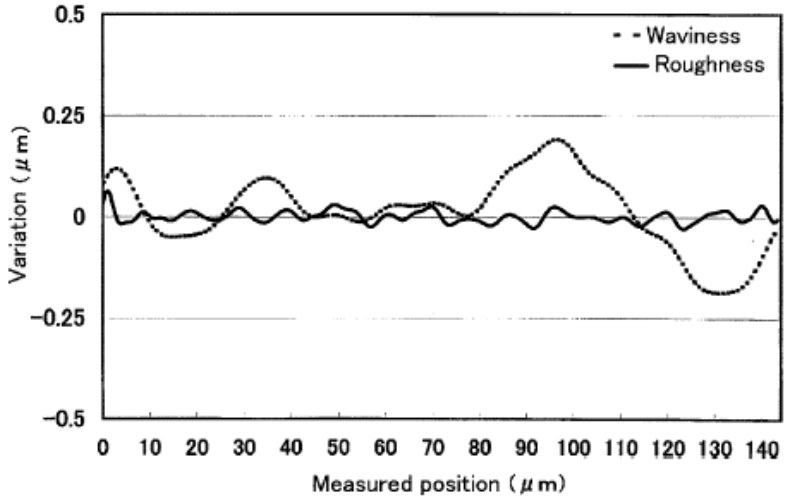


Annotated Figure 8 of SOLUS-1010

Pet., 18.

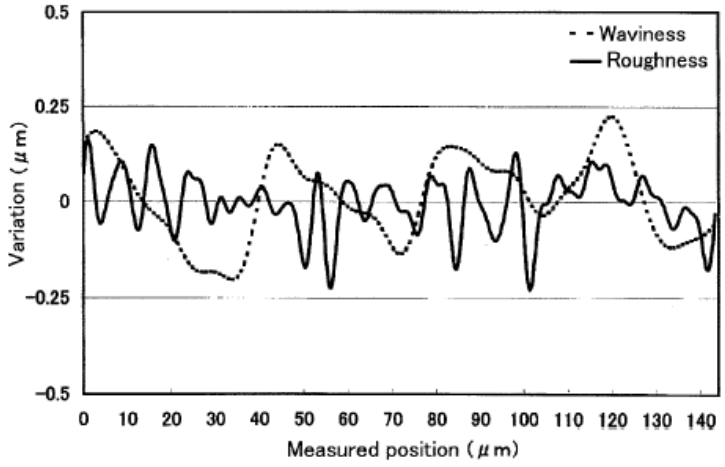
Dobashi's Figures 5 and 6 (reproduced below) are also illustrative. The figures show no peaks with a height of at least 0.5 µm above the mean line (and therefore no SAE peaks that cross upper and lower boundary lines of at least 0.5 µm).

Fig 5



EX1005, FIG. 5.

Fig 6



EX1005, FIG. 6.

In sum, Petitioner's fabricated peak density values fall flat in view of Dobashi's own disclosures. Without establishing that Dobashi's surfaces having the cited RSm values would have peaks with a height of at least 0.5 μm above the

mean line, Petitioner cannot rely on Dobashi as disclosing the missing peak density limitation as claimed. Because of this, Petitioner cannot rely on a theory of inherency for a peak density that could satisfy the claimed BC range, and Petitioner fails to establish that it is reasonably likely to prevail in proving obviousness of the challenged claims based on such a theory.

* * *

For at least this reason, Petitioner has not demonstrated a reasonable likelihood of prevailing to show that the Hanafusa-Dobashi combination presented in Ground 1A renders the claims obvious, and Petitioner's Ground 1A should fail.

C. Petitioner fails to demonstrate that a POSA would have had motivation to combine Dobashi with Hanafusa.

Both Ground 1A (for independent claim 1) and Ground 1D (for independent claim 5) rely on the Hanafusa-Dobashi combination for obviousness. Pet., 9-12, 52-55. Even assuming that Hanafusa and Dobashi disclose the Rp and peak density limitations as Petitioner argues (they do not), the Petition should still be denied because Petitioner has failed to show that a POSA would have had motivation to combine Dobashi with Hanafusa.

Petitioner argues that a POSA would have been motivated to apply Dobashi's disclosure of RSm to achieve Hanafusa's stated purpose—making a rough surface low profile. Pet., 10-11. But Petitioner offers no meaningful rationale for why Dobashi's RSm value would achieve Hanafusa's stated purpose.

The only potential rationale Petitioner provides is that Dobashi discloses RSm as a smoothness indicator "for judgment of the surface." Pet., 11. But the fact that Dobashi discloses RSm values does not mean a POSA would have been motivated to combine Dobashi's RSm values (or any other surface characteristic from Dobashi) with Hanafusa. Indeed, as discussed below in Section VI.D, RSm values and other copper foil surface profile characteristics do not predictably correlate to each other, meaning that changing RSm would not always result in a corresponding, predictable change in other surface profile characteristics.

Simply put, Petitioner's motivation to combine Dobashi and Hanafusa hinges solely on the proposition that, because Dobashi and Hanafusa disclose allegedly similar surface characteristics, it would have been obvious to combine them. *See Securus Techs., Inc. v. Global Tel*Link Corp.*, 701 F. App'x 971, 977 (Fed. Cir. 2017) ("a broad characterization of [prior art references] as both falling within the same alleged field . . . without more, is not enough . . . ."). This kind of cursory analysis falls well short of establishing that a POSA would have been motivated to combine Dobashi and Hanafusa to arrive at what is claimed. Patent Owner does not agree that copper clad laminate applications (such as in Dobashi) are necessarily relevant to lithium secondary battery applications (such as in the '014 patent and Hanafusa). That said, even if Dobashi were analogous art (which Patent Owner does not concede), that alone is not sufficient to establish that one of

ordinary skill would have had reason to combine its teachings with Hanafusa.

Petitioner does not establish that a POSA would have been motivated to combine Dobashi's copper clad manufacturing parameters and methods with Hanafusa to achieve the *same* low profile characteristics desired by Hanafusa for secondary lithium ion batteries. For example, as discussed below in Section VI.D, Petitioner fails to explain how a POSA would have reconciled the different surface characteristics (e.g., the different values for Rz and PV) disclosed by Dobashi and Hanafusa in combining the two references. Petitioner's silence on the interplay between the different surface characteristics described by Dobashi and Hanafusa is fatal to the alleged motivation to combine. Simply arguing that a combination of art would have been obvious, without some articulated rationale, "is inadequate to support a finding that there would have been a motivation to combine." *In re Van Os*, 844 F.3d 1359, 1361 (Fed. Cir. 2017).

Petitioner's cursory arguments fall short of providing a sufficient motivation to combine Dobashi with Hanafusa. "Obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention." *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (emphasis in original). Petitioner's reliance on the position that a POSA "would have looked into other references like Dobashi to identify such a known method to make a

rough surface low-profile," Pet., 11, is a conclusory statement about what could have been achieved at the time of the invention. As discussed in *Belden*, the fact that the combination might have been successful does not mean that a POSA would have been motivated to make the combination. *Belden*, 805 F.3d at 1073. Petitioner's conclusory rationale "tracks the *ex post* reasoning *KSR* warned of and fails to identify any actual reason why a skilled artisan would have combined the elements in the manner claimed." *Van Os*, 844 F.3d at 1361; *KSR Int'l v. Teleflex Inc*., 550 U.S. 398 (2007).

* * *

For at least this reason, Petitioner has not demonstrated a reasonable likelihood of prevailing to show that the Hanafusa-Dobashi (or Hanafusa-Dobashi-Lee) combination presented in Grounds 1A and 1D renders the claims obvious, and Petitioner's Grounds 1A and 1D should fail.

D. Petitioner fails to demonstrate a reasonable expectation of success in combining Hanafusa and Dobashi, particularly given that Petitioner mixes and matches various surface properties of these two references.

Petitioner simply assumes the Hanafusa-Dobashi combination discloses interchangeable surface parameters that can be combined with a reasonable expectation of success. Petitioner does not substantiate why a POSA would have had a reasonable expectation that surface parameters cherry-picked from Hanafusa and Dobashi could be predictably combined to arrive at what is claimed.

The Board properly denies institution where the petitioner does not show a reasonable expectation of success in combining asserted references. *See*, *e.g.*, *NJOY*, IPR2024-00536, Paper 17; *Honeywell*, IPR2024-00493, Paper 7; *see also Eli Lilly & Co. v. Teva Pharms. Int'l GmbH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021) (A finding that a patent challenger in an *inter partes* review had demonstrated a motivation to combine references does not necessarily imply that the challenger had also met its burden of showing a reasonable expectation of success in achieving a claimed method of treatment.). The burden of proof is on Petitioner, not Patent Owner. Further, importantly, the literature need not demonstrate an expectation of *failure* in the claimed features in order for the patent to withstand Petitioner's challenge—it is enough that the prior art supports no expectations one way or the other. *See Honeywell Int'l Inc. v. Mexichem Amanco Holding S.A.*, 865 F.3d 1348, 1355 (Fed. Cir. 2017) (reversing a PTAB obviousness finding for improperly requiring the patentee to show an expectation of failure, instead of properly finding no expectation of success—and thus nonobviousness—where the prior art gave no expectations one way or the other).

Petitioner fails to satisfy this burden here.

1. Petitioner fails to meet its burden of establishing a reasonable expectation of success in combining Hanafusa and Dobashi.

Petitioner's arguments assume there would have been a reasonable expectation of success in combining Hanafusa and Dobashi simply because "both

Hanafusa and Dobashi describe manufacture of electrolytic copper foils with desirable surface roughness properties." Pet., 12. Petitioner also alleges that *pursuing implementation* of Dobashi's RSm values into Hanafusa's foil would merely have been "the application of known techniques (e.g., using additives such as MPS and SPS in electrolytic solution for the manufacture of electrolytic copper foil with desirable characteristics) to a known structure (e.g., electrolytic copper foil prepared through electrodeposition process) to yield predictable results (e.g., electrolytic copper foil with desirable characteristics including improved surface roughness properties)." Pet., 12.

These conclusory assertions are not supported by any explanation as to why a POSA would have reasonably expected the Hanafusa-Dobashi combination to succeed. "Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR* 550 U.S. at 418; *see also Qiagen North American Holdings, Inc. v. HandyLab, Inc.*, 2021 WL 5024387, at *2-4 (Fed. Cir. 2021) (affirming Board's denial of obviousness when "Petitions offered only a single conclusory statement regarding the POSA's alleged reasonable expectation of success"). Here, Petitioner does not provide a single meaningful articulation or rational underpinning to support a finding of a reasonable expectation of success.

For example, not once does Petitioner provide any reason for *why* a POSA would have expected Dobahsi's surface characteristics to improve Hanafusa's foils. Petitioner simply assumes the combination would result in an improvement. Petitioner's cursory assumption cannot support a reasonable expectation of success in combining Hanafusa and Dobashi. Further, Petitioner's argument that reasonable expectation of success comes from a desire to *pursue implementation* of Dobashi's surface properties falls well short of explaining why there would have been a reasonable expectation of success in combining Dobashi and Hanafusa.

2. Petitioner assumes a reasonable expectation of success in mixing and matching surface properties from Hanafusa and Dobashi without any consideration of the interplay of those properties.

Making matters worse, Petitioner's arguments assume that all surface properties (Rp, Rz, PD) are useful in electrolytic copper foils for the different end use applications disclosed in Hanafusa (batteries) and Dobashi (primarily copper clad laminates for printed wiring board), and that all the properties are easily compatible to achieve a desired result. Petitioner provides no support for these assumptions. Silence and assumptions are insufficient for a *prima facie* case of obviousness. *See Orexo AB, v. Actavis Elizabeth LLC*, 903 F.3d 1265, 1273 (Fed. Cir. 2018) (finding that "silence is not a teaching or suggestion," especially where the beneficial results could not be predicted). Indeed, the Board in *Juniper Networks* agreed that the petitioner must "direct us with particularity to …

'specific explanations' of 'expected results.'" *See Juniper Networks, Inc. v. Correct Transmission, LLC*, IPR2021-00682, Paper 26 at 26 (P.T.A.B. Oct. 3, 2022).

Here, Petitioner provides no explanation as to why the cited Rp, Rz, or PD values are compatible—likely because neither Hanafusa nor Dobashi disclose Rp or PD as discussed in Section VI.A and Section VI.B. Petitioner also does not explain why different surface characteristics from Hanafusa and Dobashi could be predictably combined.

In fact, Petitioner does not address a key discrepancy in the teachings of Hanafusa and Dobashi when arguing that there would have been a reasonable expectation of success in combining these two references. Hanafusa and Dobashi show that Hanafusa's Rz values (as interpreted by Petitioner) *cannot* be predictably combined with Dobashi's RSm values to arrive at a copper foil having surface characteristics satisfying both the Rz values and RSm values relied on by Petitioner.

Setting aside Petitioner's misinterpretation of Hanafusa's Rz value, Hanafusa discloses that Rz of the copper foil is 1.0 to 2.0 μm. EX1004, ¶12.

> Large surface roughness is not favorable for prevention of breakage because it could easily cause generation of cracks. Therefore, it is desirable that the surface roughness Rz of the copper foil is 2.0 μm or less. *If the surface roughness Rz of the copper foil is less than 1.0 μm,*

adhesion to a negative-electrode material tends to decrease. Therefore, it is more preferable that the surface roughness Rz is 1.0 μm or more.

EX1004, ¶12 (emphasis added). However, as shown in Petitioner's annotated table below, Dobashi's PV values (equated to Hanafusa's Rz values by Petitioner[9]) are less than 1.0 μm. In the examples cited by Petitioner, the highest value for PV is 0.66 μm—over 30% less than Hanafusa's stated minimum value of 1.0 μm.

TABLE 2

		Deposit side of electro-deposited copper foil								
	Copper foil thickness	Three-dimensional surface structure analysis			Stylus-type roughness meter		Gloss Gs (60°)		Deposit Side Peak Density	Default Discrimination Criteria (μm)
Subject	(μm)	Wmax (μm)	PV (μm)	Wmax/PV (-)	Rzjis (μm)	RSm (mm)	TD	MD		
Example 1	15	0.37	0.39	0.949	0.32	0.19	659	665	21.1	0.039
Example 2	12	0.45	0.48	0.938	0.31	0.16	664	671	25	0.048
Example 3	70	0.065	0.079	0.823	0.17	0.39	691	686	10.3	0.0079
Example 4	15	0.27	0.30	0.904	0.29	0.18	790	790	22.2	0.03
Example 5	15	0.36	0.39	0.943	0.31	0.16	775	773	25	0.039
Example 6	12	0.42	0.44	0.959	0.47	0.22	654	687	18.2	0.044
Example 7	12	0.58	0.66	0.869	0.71	0.14	608	640	28.6	0.066
Comparative Example	12	0.82	1.87	0.439	1.00	0.07	324	383		

Modified Table 2 of Dobashi

[9] Petitioner equates Rz to Dobashi's PV. Pet., 10 (explaining that "Rz" is the "maximum height of profile" and that Dobashi discloses this parameter as PV, "the maximum peak to valley height.")

Pet., 26.

Petitioner does not attempt to explain why Dobashi's low PV (Rz) values could be predictably combined with Hanafusa's higher values to arrive at a peak density calculated by Petitioner. But this discrepancy is relevant because Petitioner calculates peak density values based on Dobashi's RSm and PV (Rz) values. Without an adequate explanation, Petitioner cannot rely on Dobashi's low PV values to calculate peak density while at the same time assuming these values are compatible with disparate values in Hanafusa.

It is Petitioner's burden to demonstrate "that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so." *Intelligent Bio-Sys.*, 821 F.3d at 1367–1368 (citations omitted). Petitioner fails to meet that burden here. Petitioner has not addressed Hanafusa's and Dobashi's conflicting disclosures regarding Rz (PV), or whether there would have been a reasonable expectation that modifying Hanafusa's foil to include Dobashi's RSm values would retain the required Rz values disclosed by Hanafusa. Indeed, there is no readily identifiable correlation between Dobashi's PV and RSm values that would support a finding that the values from Dobashi and Hanafusa could be combined with a reasonable expectation of success. *Compare* EX1005, Examples 4-5 (PV goes up and RSm

goes down), *with* EX1005, Examples 5-6 (PV goes up and RSm goes up).

* * *

For at least these reasons, Petitioner has not demonstrated a reasonable likelihood of prevailing to show that the Hanafusa-Dobashi (or Hanafusa-Dobashi-Lee) combination presented in Grounds 1A and 1D renders the claim obvious, and Petitioner's Grounds 1A and 1D should fail.

E. Petitioner fails to demonstrate that the cited art discloses the claimed requirement that the concentration of total carbon (TC) and Co^{2+} is "maintained" during electroplating for Ground 1D.

In Ground 1D, Petitioner relies on the Hanafusa-Dobashi-Lee combination[10]

[10] Petitioner repeatedly refers to the Hanafusa-Dobashi combination in Ground 1D. However, it is unclear exactly what Petitioner relies on Dobashi for in Ground 1D. Petitioner does not cite Dobashi for any particular feature of claims 5 or 6. Because of this, Petitioner has not identified "with particularity" the evidence relied upon for Ground 1D. A petition must identify "with particularity, each claim challenged, the grounds on which the challenges to each claim are based, and the evidence that supports the grounds for challenge to each claim." 35 U.S.C. § 312(a)(3*)*; *see also Intelligent Bio-Sys.*, 821 F.3d at 1369 ("It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify 'with particularity' the 'evidence that supports the grounds

to argue the method recited in claim 5 would have been obvious. Pet., 51-66. Recognizing that neither Hanafusa nor Dobashi discloses TC and Co^{2+}, Petitioner argues that Lee provides the necessary TC and Co^{2+} concentrations recited in claim 5, which requires a concentration of TC to be "*maintained* at 0.12 g/L or less" and a concentration of Co^{2+} to be "*maintained* at 0.33 g/L or less" during electroplating. Pet., 52-53 ("Hanafusa-Dobashi does not expressly describe specifics of the solution being used"), 61 ("a concentration of total carbon of 0.12 g/L or less based on Lee's teachings"), 64 ("a concentration of Co^{2+} of 0.33 g/L or less based on Lee's teachings").

In particular, Petitioner relies on Lee's disclosure of total organic carbon concentrations between 54 and 110 ppm (equivalent to concentrations between 0.054-0.11 g/L) as falling below the claimed maximum of 0.12 g/L. Pet., 63. Similarly, Petitioner relies on Lee's disclosure that "[t]he cobalt may be contained at 1 mg/L to 50 mg/L" (0.001 g/L to 0.05 g/L) as falling below the claimed maximum of 0.33 g/L. Pet., 65.

Petitioner fails to establish that the Hanafusa-Dobashi-Lee combination renders claim 5 obvious for at least the following reasons.

First, "total organic carbon" disclosed by Lee is a subset of "total carbon" as

---

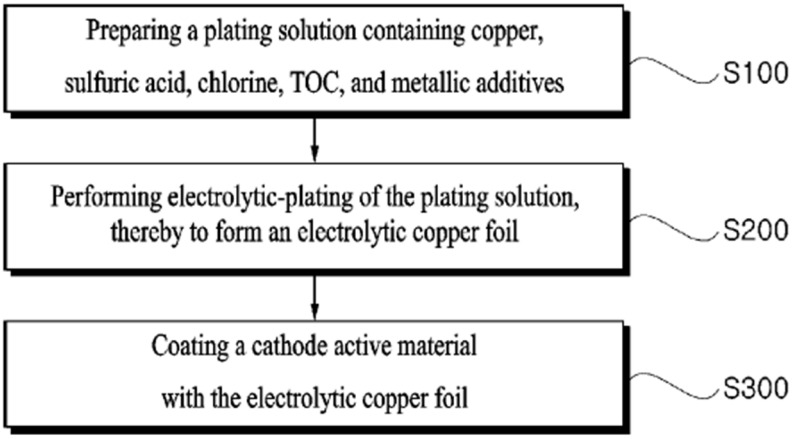
for the challenge to each claim.'" (quoting 35 U.S.C. §312(a)(3))).

claimed. A POSA would understand that "total carbon" includes both inorganic and organic carbon sources. In contrast, "total organic carbon" disclosed by Lee would include only organic carbon. Accordingly, Lee does not disclose maintaining "total carbon" at all, much less maintaining it below the claimed maximum of 0.12 g/L.

Petitioner argues that "[i]t would have been obvious to a POSITA that Lee's 'total organic carbon' ('TOC') is the 'total carbon' ('TC') as claimed by the '014 patent." Pet., 61. Petitioner argues this would be true because Lee and the '014 patent disclose that TOC and TC concentrations are used to control physical properties of the copper foil. Pet., 61. But this conclusory argument by Petitioner does not establish that Lee's "total organic carbon" is the same as "total carbon." It certainly does not establish that Lee inherently discloses "total carbon." Indeed, to establish that a claim limitation is necessarily present, a party must present sufficient evidence to demonstrate that a claimed limitation is necessarily present in a prior art combination. *See Par Pharm.*, 773 F.3d at 1196. Just because two things are used for the same purpose, does not mean those two things are the same.

Second, Petitioner fails to establish the Lee discloses *maintaining* the claimed TOC and Co^{2+} concentrations during electroplating. As explained in Lee's flow chart of Figure 1, reproduced below, the plating solution containing TOC and Co^{2+} is prepared in step S100 before electrolytic plating in step S200. These steps

are explicitly sequential in Lee, which describes a method "comprising: (1) preparing a plating solution containing copper, total organic carbon (TOC), cobalt, and arsenic; (2) performing electrolytic plating of the plating solution using a drum at a temperature of 30° C. to 70° C. by applying a current at a current density 30 ASD to 150 ASD to the drum . . . ." EX1006, 3:8-19.



EX1006, FIG. 1.

Nowhere does Lee suggest any maintenance or adjustment of the TOC or Co^{2+} concentrations during electrolytic plating. Rather, the steps of forming the foil are chronological, with relevant concentrations prepared before foil formation. Lee fails to disclose the claimed element of *maintaining* TOC and Co^{2+} concentrations "when electroplating is performed." EX1001, 15:3-6. And Petitioner fails to address this missing element in the Petition.

For these reasons, Petitioner cannot rely on the Hanafusa-Dobashi-Lee combination to disclose or render obvious every element of claim 5. Thus, Petitioner has not demonstrated a reasonable likelihood of prevailing to show that

the Hanafusa-Dobashi-Lee combination presented in Ground 1D renders the claims obvious, and Petitioner's Ground 1D should fail.

VII. Conclusion

The Petition fails to show a reasonable likelihood that any of the challenged claims is unpatentable as obvious in view of the cited art and, therefore, the Board should deny institution.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX PLLC

/Michael D. Specht/

Michael D. Specht
Registration No. 54,463
Counsel for Patent Owner

Date: January 29, 2025

1101 K Street, NW, 10th Floor
Washington, DC 20005
(202) 371-2600

CERTIFICATE OF WORD COUNT (37 C.F.R. § 42.24(d))

1. This Patent Owner Preliminary Response complies with the type-volume limitation of 14,000 words, comprising 9,779 words, excluding the parts exempted by 37 C.F.R. § 42.24(a)(1).

2. This Patent Owner Preliminary Response complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word 2016 in 14-point Times New Roman font.

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX PLLC

/Michael D. Specht/

Michael D. Specht
Registration No. 54,463
Counsel for Patent Owner

Date: January 29, 2025

1101 K Street, NW, 10th Floor
Washington, DC 20005
(202) 371-2600

CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e))

I certify that the above-captioned **PATENT OWNER PRELIMINARY RESPONSE UNDER 37 C.F.R. § 42.107(a)** and associated Exhibits 2001-2010 and Exhibits 2012-2017 were served in their entireties on January 29, 2025, upon the following parties via electronic mail:

Timothy W. Riffe (Lead Counsel)
Hyun Jin In (Back-up Counsel)
Sangki Park (Back-up Counsel)
FISH & RICHARDSON P.C.
IPR57533-0003IP1@fr.com

Respectfully submitted,

STERNE, KESSLER, GOLDSTEIN & FOX PLLC

/Michael D. Specht/

Michael D. Specht
Registration No. 54,463
Counsel for Patent Owner

Date: January 29, 2025

1101 K Street, NW, 10th Floor
Washington, DC 20005
(202) 371-2600