

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 IPR2025-00005
U.S. Patent No. 9,457,541

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

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

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PATENT OWNER'S EXHIBIT LIST

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2001	Defendants' Motion to Stay, <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , No. 2:23-cv-00539 (E.D. Tex. Oct. 24, 2024)
2002	Plaintiff's Opposition to Defendants' Motion to Stay, <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , No. 2:23-cv-00539 (E.D. Tex. Nov. 7, 2024)
2003	Defendants' Reply in Support of Motion to Stay, <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , No. 2:23-cv-00539 (E.D. Tex. Nov. 14, 2024)
2004	Plaintiff's Sur-Reply in Opposition to Defendants' Motion to Stay, <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , No. 2:23-cv-00539 (E.D. Tex. Nov. 21, 2024)
2005	Amended Docket Control Order, <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , No. 2:23-cv-00539 (E.D. Tex. Jan. 2, 2025)
2006	Federal Court Management Statistics (December 31, 2024)
2007	Complaint, <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , 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	<i>Intentionally Left Blank</i>
2010	Defendants' P.R. 3-3 Invalidity Contentions, <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , No. 2:23-cv-00539 (E.D. Tex. Aug. 23, 2024) (including Apps. A6, A7, A16)
2011	Appendix B – Secondary References Chart

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2012	Overview of U.S. Pat. Appl. Publ. No. 2004/0029006 to Otsuka <i>et al.</i> , accessed February 21, 2025 at: https://worldwide.espacenet.com/patent/search/family/031492129/publication/US2004029006A1?q=pn%3DUS2004029006A1
2013	June 14, 2005 Office Action in U.S. Pat. Appl. No. 10/628,264
2014	U.S. Pat. No. 5,834,140 to Wolski <i>et al.</i>
2015	Overview of U.S. Pat. Appl. Publ. No. 2009/0061326 to Hirose <i>et al.</i> , accessed February 21, 2025 at: https://worldwide.espacenet.com/patent/search/family/040288812/publication/US2009061326A1?q=pn%3DUS2009061326A1
2016	Overview of U.S. Pat. Appl. Publ. No. 2010/0038115 to Matsuda <i>et al.</i> , accessed February 21, 2025 at: https://worldwide.espacenet.com/patent/search/family/037073506/publication/US2010038115A1?q=pn%3DUS2010038115A1

I. Introduction

U.S. Patent No. 9,457,541 (“the ’541 patent”) claims innovative, non-obvious improvements to electrolytic copper foil for secondary batteries. Specifically, the claims are directed to electrolytic copper foils that resist the formation of wrinkles during manufacturing of the foils and subsequent manufacturing of lithium secondary batteries, an issue that can compromise battery safety and reliability. The inventors discovered that, by simultaneously controlling the atomic crystal structure of the foil—defined by four specific texture coefficient ratios—and physical properties of the foil—weight deviation and tensile strength, unexpected and desirable performance characteristics could be achieved.

SK nexilis Co., Ltd. (“Patent Owner”), the ’541 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 1-4 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* and under Section 325(d).

Under Section 314(a), the *Fintiv* factors strongly support discretionary denial. The co-pending litigation trial date is nearly seven months before the FWD

deadline, significant investment in the co-pending litigation has occurred and will continue to occur prior to institution, the Petition relies on the same or substantially the same art and arguments overcome during prosecution, and the Petition's merits are very weak, relying on cursory reasons for combining three or more references to arrive at the claimed copper foil.

As to discretionary denial under Section 325(d), Petitioner asks the Board to rehash prior art disclosure and arguments specifically addressed during prosecution. Petitioner relies on the same, or substantially the same, art and arguments expressly considered and overcome during prosecution. Specifically, Petitioner relies primarily on the same two primary references – Hirose and Matsuda – and presents substantially the same arguments that the examiner relied on during five rounds of prosecution. Ultimately, the Office granted the '541 patent in the face of substantially identical prior art as that cited by Petitioner, and the Office agreed that a combination of art substantially the same as that set forth by Petitioner did not render obvious the claimed combination of foil properties.

Should the Board reach the merits, the Petition is deficient at least because it fails to establish a reasonable expectation of success in combining the cited references to arrive at what is claimed. Petitioner's own cited references evidence that a POSA would not simply have assumed success in combining crystal

structure and physical foil properties from at least three different references, as argued by Petitioner.

In sum, the Board should apply its discretion to deny institution under either or both of *Fintiv* and Section 325(d). Alternatively, the Board must deny institution on the merits, as the Petition is fundamentally deficient for 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., 6.

III. Claim Construction

For purposes of this Preliminary Response, Patent Owner agrees the *Phillips* standard applies. Patent Owner reserves the right to contest Petitioner's implicit or explicit constructions during the proceeding.

IV. Overview of the '541 Patent

The '541 patent is directed to copper foils designed to function as a current collector for lithium secondary batteries. EX1001, Abstract, 1:16-22, 3:3-7. In particular, the claimed copper foils are designed to prevent the formation of wrinkles in the foil. EX1001, 1:65-2:4, 2:31-36, 3:3-7. Such wrinkles are problematic in battery manufacturing because they result in non-uniform coating of active material on the foil, which in turn can cause short circuits or separation of

the active material from the foil during charging and discharging of the battery.

EX1001, 1:53-62, 2:31-36.

The '541 patent achieves this wrinkle prevention by controlling multiple properties of the foil—namely four crystal structure ratio ranges, weight deviation less than 3%, and tensile strength from 30 to 40 kgf/mm². As explained throughout the '541 patent, and as exemplified in the patent's examples, precisely controlling the crystal structure to satisfy four different texture coefficient ratio ranges prevents the formation of wrinkles that have detrimental effects on lithium battery manufacturing. EX1001, 3:23-33, 3:51-4:3, 5:16-20, Table 1. The maximum weight deviation and tensile strength range for the foil are optimized in concert with the texture coefficient ratios to create a foil exhibiting a superior ability to resist the formation of a wrinkle. EX1001, 3:3-7, 5:25-35, Table 1.

A. Overview of the '541 Patent Claims

Independent claim 1 of the '541 patent recites “[a] copper foil for a current collector of a lithium secondary battery.” EX1001, 5:55-56. The crystalline structure of the claimed foil is defined by four different ratios of texture coefficients in planes (111), (200), and (222) of an X-ray diffraction pattern for the foil. The four claimed texture coefficient ratios are as follows:

1. a ratio of a sum of texture coefficients of a (111) surface and a (200) surface to a total sum of texture coefficients of the (111) surface, the

- (200) surface and a (220) surface (i.e., $\frac{(111)+(200)}{(111)+(200)+(220)}$) is 60 to 85%;
2. a ratio of a texture coefficient of the (111) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface (i.e., $\frac{(111)}{(111)+(200)+(220)}$) is 18 to 38%;
3. a ratio of the texture coefficient of the (200) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface (i.e., $\frac{(200)}{(111)+(200)+(220)}$) is 28 to 62%; and
4. a ratio of the texture coefficient of the (220) surface to the total sum of texture coefficients of the (111) surface, the (200) surface and the (220) surface (i.e., $\frac{(220)}{(111)+(200)+(220)}$) is 15 to 40%.

EX1001, 5:57-6:27.

The texture coefficient of each plane is defined by the following equation.

$$TC(hkl) = \frac{\frac{I(hkl)}{I_0(hkl)}}{\frac{1}{n} \sum \frac{I(hkl)}{I_0(hkl)}}$$

Equation 1 (reproduced from EX1001, 6:30-35).

With respect to physical properties of the foil, the claim specifies that the copper foil “has a weight deviation of 3% or less” and “has a tensile strength of 30 to 40 kgf/mm².” EX1001, 6:42-45. This claimed combination of crystal structure,

weight deviation, and tensile strength “prevent[s] the generation of wrinkles at a surface of the copper foil.” EX1001, 6:46-47.

The criticality of the recited ranges for the texture coefficient ratios, weight deviation, and tensile strength is emphasized in the ’541 patent’s specification. The specification explains that this combination of targeted foil properties reduces the possibility of the foil being wrinkled during its manufacture, or in the subsequent manufacture of a secondary battery. EX1001, 3:3-7, 3:23-33, 3:51-4:3, 5:16-35.

Further, the data reported in Table 1 of the ’541 patent substantiates the criticality of the claimed texture coefficient ratios, weight deviation, and tensile strength. Each of Examples 1-7 satisfied all the claimed conditions for the texture coefficient ratio, tensile strength, and weight deviation, and exhibited no wrinkles. EX1001, 5:16-20. In contrast, Comparative Examples 1-9—all of which had at least one foil property outside the claimed ranges—exhibited significant wrinkles. EX1001, 5:20-24.

B. Prosecution History of the ’541 Patent

The application that resulted in the ’541 patent went through an extensive examination at the Office. A total of five substantive office actions were mailed. After three office actions issued by a first examiner (Examiner Lam) were overcome, a new examiner was assigned (Examiner Wang) and that examiner issued a non-final Office Action on July 21, 2015. EX1002, 89-95.

In the July 21st Office Action, pending claim 1 was rejected as obvious over U.S. Pat. Pub. No. 2009/0061326 to Hirose (EX1007) alone, and pending dependent claims 2-6 were rejected as obvious over Hirose in view of U.S. Pat. No. 6,451,441 to Nishimoto. EX1002, 91-93. With respect to claim 1, the examiner argued that Hirose discloses “crystal planes are important characteristics for a copper foil in a battery, and thus ... any measure of the intensity of these planes in the copper foil, are result effective variables.” EX1002, 92. And the examiner concluded that a POSA “would have been motivated, based on the teachings of Hirose, to obtain the ideal amounts of these crystal planes in a copper foil through routine optimization and thereby arrive at the claimed ratios of texture coefficients.” EX1002, 92. Separately, claim 1 was also rejected as obvious over U.S. Pat. No. 4,695,348 to Battey alone, and pending dependent claims 2-6 were rejected as obvious over Battey in view of Nishimoto. EX1002, 93-94. The examiner’s rationale for this second set of rejections was essentially the same as that for the rejections based on Hirose. EX1002, 93-94.

In response to the July 21st Office Action, the applicant amended claim 1 to recite “wherein the copper foil has a weight deviation of 3% or less, and wherein the copper foil has a tensile strength of 30 to 40 kgf/mm².” EX1002, 71-72. With these amendments, the applicant argued “Hirose does not recognize that the texture coefficient ratio is an important factor in relation to the generation of wrinkles at

the surface of the copper foil,” and therefore should not be cited as rendering the claimed texture coefficient ratios obvious. EX1002, 79. The applicant presented similar arguments for the Battey rejection. EX1002, 81. With respect to the claimed weight deviation and tensile strength properties, the applicant argued that the “adhesive force” disclosed by Nishimoto is not the same as the claimed tensile strength. EX1002, 81-82.

On October 29, 2015, the examiner issued another Office Action with updated obviousness rejections. EX1002, 58-66. The examiner agreed the previous rejections were overcome by the applicant’s arguments and amendments. EX1002, 60. However, the examiner rejected the claims in view of Hirose and U.S. Pat. Pub. No. 2010/0038115 to Matsuda (EX1012). EX1002, 60. The examiner stressed that “features upon which applicant relies (i.e., the lack of wrinkles on the surface of the copper foil) are not recited in the rejected claims” and therefore the “arguments regarding the prior art and the lack of recognition between the texture coefficients and the lack of wrinkles are not persuasive.” EX1002, 60.

The examiner rejected claims 1 and 5 as obvious over Hirose in view of Matsuda, and similarly as obvious over Battey and Matsuda. EX1002, 61-64. In the Hirose rejection, the examiner addressed the claim limitations as follows. First, the examiner reasserted that a POSA “would have been motivated, based on the teachings of Hirose, to obtain the ideal amounts of [claimed] crystal planes in a

copper foil through routine optimization and thereby also arrive at the claimed ratios of texture coefficients (i.e., a ratio of crystal planes).” EX1002, 62. Second, the examiner presumed the weight deviation in Hirose’s foil was 0%. EX1002, 62. Third, the examiner argued that it would have been obvious to create Hirose’s copper foil to have a tensile strength as claimed in view of Matsuda’s disclosure of copper foils having a tensile strength of more than 30 kgf/mm². EX1002, 62.

In response to the October 29th Office Action, the applicant requested an interview with the examiner, which was held on February 4, 2016. EX1002, 55-56. During the interview, the examiner suggested that “the use of language such as ‘prevent wrinkle generation’ to more clearly delineate what was meant by the wording, and more accurately reflect [the] data presented in Table 1 of the Specification” would advance prosecution. EX1002, 56.

The applicant’s subsequent response followed the examiner’s suggestion by amending claim 1 to recite that the copper foil has the claimed properties “so as to prevent the generation of wrinkles at a surface of the copper foil.” EX1002, 33. With these amendments, the applicant again argued that “Hirose does not recognize that the texture coefficient ratio is an important factor in relation to the generation of wrinkles at the surface of the copper foil.” EX1002, 34, 42. The applicant further argued that neither Hirose nor Matsuda disclose or suggest that tensile strength or weight deviation is an important factor in relation to the

generation of wrinkles at the surface of a copper foil. EX1002, 41-42. The applicant concluded that:

though one of ordinary skill in the art considers the texture coefficient ratio taught by Hirose and the tensile strength taught by Matsuda together, the numerical ranges of four texture coefficient ratios, the tensile strength and the weight deviation, defined in Claim 1 of this application, cannot be easily derived and is not shown in the cited prior art.

EX1002, 42-43. The applicant presented similar arguments for the Battey rejection. EX1002, 43-44.

After considering applicant's amendment and arguments, the examiner mailed a Notice of Allowance on June 3, 2016. EX1002, 16-22. In the Notice, the examiner reasoned the claims were allowable because the cited art "does not teach or suggest a copper foil having the claimed texture coefficients so as to prevent wrinkle generation." EX1002, 21. The '541 patent subsequently granted on October 4, 2016. EX1001, 1.

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.”).

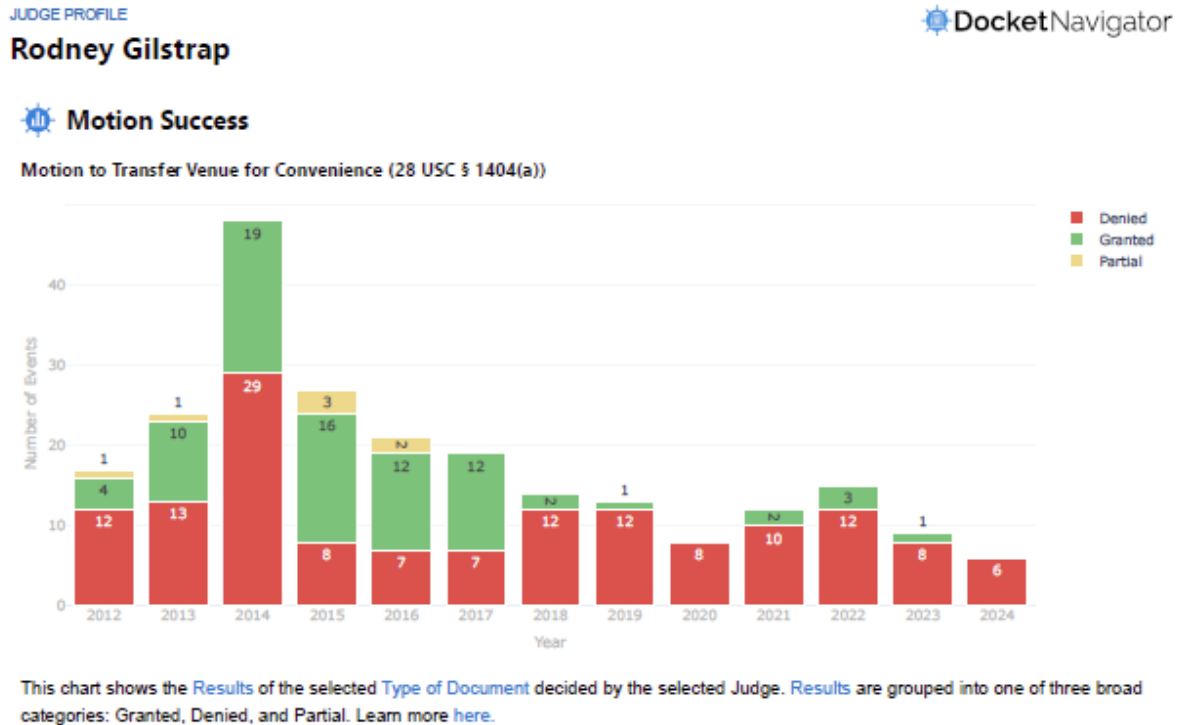
Fintiv factor two: Factor two weighs heavily in favor of discretionary denial. The projected statutory deadline for issuing a Final Written Decision

(FWD) in this IPR is May 25, 2026. Jury selection in the parallel litigation is scheduled to begin November 3, 2025, nearly seven 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 23 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-October 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., 69. 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

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.*,

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:



EX2008.

Under the current facts, trial in EDTX is scheduled to begin nearly seven months before the FWD deadline, and thus factor two weighs heavily in favor of

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.

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 May 25, 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 May 25, 2025 DI deadline, the parties will have completed claim construction briefing, the Claim Construction Hearing will have occurred (on May 14, 2025), and the parties will be nearing the end of fact discovery. EX2005, 4-5; EX1038, 3-5.

Petitioner contends “the EDTX litigation is still in its early stages and the parties and the court have yet to expend significant resources on invalidity,” Pet.,

69-70, 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 1038.² Nor was Petitioner diligent in filing the Petition. *See* Pet., 69. Petitioner’s only argument of diligence is that it “diligently filed this Petition just over four months after the ’541 Patent was asserted by Patent Owner.” Pet., 69. But this alone is insufficient; Petitioner has provided no explanation of *how* it was diligent. *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.” (emphasis added)).

Because the parties and the court will have expended significant resources by the May 25, 2025 DI deadline and because Petitioner has not shown it was diligent in filing the Petition, factor three weighs in favor of denying institution.

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 (EX1038). Petitioner should not be granted additional briefing to address any alleged updates to the schedule since filing the Petition.

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. Both the Petition and Petitioner’s invalidity contentions challenge all claims of the ’541 patent (claims 1-4). Pet., 1; EX2010, 21-34. Four of Petitioner’s asserted references (Hara, Otsuka, Hirose, and Matsuda) are applied against the claims of the ’541 patent in the invalidity contentions. EX2010, 21-34, Apps. A6, A7, A16; EX2011, 6, 20-21, 28, 30-31, 33-34 (discussing Matsuda).

Further, 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., 70. In fact, Petitioner’s stipulation is essentially meaningless. Nothing prevents Petitioner from using other references that have cumulative teachings to the asserted references. And, in fact, several of Petitioner’s asserted references identified above have at least one counterpart or related patent/publication that is not included in the stipulation. Otsuka was also published as CN1480563, KR20040012601, TW200403358.³ EX2012. Hirose was also

³ Further, Otsuka’s claims were rejected in view of Wolski (U.S. Patent No.

published as US Patent No. 8,932,744. EX2015. Matsuda was also published as WIPO publication WO 2006/106956. EX2016.

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., 70; *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," pointing to its incorrect assertion that the "wrinkle prevention limitation of claim 1 ... should

5,834,140, EX2014), *see* EX2013, confirming the similarity of the teachings. And Wolski is already included in Petitioner's invalidity contentions. *See* EX2011, 4.

not be given patentable weight.” Pet., 70. Further, Petitioner fails to demonstrate a reasonable expectation of success in combining the three or more references in each of Grounds 1-3. Finally, Petitioner’s expert largely repeats the Petition verbatim without providing additional analysis or corroborating evidence. *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 seven 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 Board should exercise its discretion to deny the Petition under Section 325(d).

The facts here support denial under § 325(d) because Petitioner relies on art and arguments that are the same or cumulative of those expressly considered and overcame during prosecution. Not only did the Office grant the ’541 patent in the face of substantially identical prior art as that cited by Petitioner, the Office agreed that substantially the same combinations of art did not render obvious the claimed

combination of foil properties to prevent wrinkle generation—namely the four claimed crystal structure ratio ranges, the claimed maximum weight deviation, and the claimed tensile strength range. Petitioner simply rehashes prior art disclosure and arguments addressed during prosecution.

The Board has discretion to deny review where “the same or substantially the same prior art or arguments previously were presented to the Office.” 35

U.S.C. § 325(d). The Board’s two-part framework considers:

- (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and
- (2) if either condition of [the] first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH, IPR2019-01469, Paper 6 at 8 (P.T.A.B. Feb. 13, 2020) (precedential March 24, 2020). The Board considers the *Becton, Dickinson* factors when applying the framework. *Advanced Bionics*, Paper 6 at 9; *see also Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-18 (P.T.A.B. Dec. 15, 2017) (informative).

Under the second part of the *Advanced Bionics* framework, Petitioner carries the burden of demonstrating material error: “If a condition in the first part of the framework is satisfied and the petitioner fails to make a showing of material error,

the Director generally will exercise discretion not to institute *inter partes* review.”

Advanced Bionics, IPR2019-01469, Paper 6 at 8–9; *see also Becton, Dickinson*, IPR2017-01586, Paper 8 at 17–18 (explaining that factor (e) asks “whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art”); *Microsoft Corp. v. AlmondNet, Inc.*, IPR2022-01319, Paper 9 at 11 (P.T.A.B. Jan. 30, 2023) (denying institution under § 325(d) where Petitioner did not sufficiently address whether the Office materially erred); *Microsoft Corp.*, IPR2022-01319, Paper 14 (P.T.A.B. Apr. 23, 2023) (denying Petitioner’s rehearing request of decision denying institution). Notably, “[i]f reasonable minds can disagree regarding the purported treatment of the art or arguments, it cannot be said that the Office erred in a manner material to patentability. At bottom, this framework reflects a commitment to defer to previous Office evaluations of the evidence of record unless material error is shown.” *Advanced Bionics*, IPR2019-01469, Paper 6 at 9.

A. Petitioner’s combination of references for Ground 3 is substantially the same as the combination of references applied and overcame during examination.

Petitioner cites the same primary reference (Hirose) that was cited by the examiner during prosecution of the ’541 patent. After multiple rounds of arguments, the examiner agreed that Hirose does not disclose or suggest a copper foil having the claimed texture coefficients designed to prevent wrinkle generation.

EX1002, 21. Petitioner also cites a secondary reference (Matsuda) that was cited by the examiner during prosecution of the '541 patent. This combination of Hirose and Matsuda was specifically applied by the examiner, and the examiner ultimately agreed it was insufficient to render the claims obvious.

Petitioner cites two additional references (Hara and Otsuka) in an attempt to establish that claim 1 is obvious. But both of these references are cumulative to Hirose and/or Matsuda. Hara simply states that copper foils with a weight deviation of 2% or less were available as of the '541 patent's filing date—substantially the statement made with respect to weight deviation in Hirose by the examiner. And by referencing Otsuka and Matsuda as alternatives in Ground 3, Petitioner specifically acknowledges that these two references are cumulative.

1. Hirose—the primary reference in Ground 3—was applied by the Office in multiple rejections that were overcome during prosecution.

Hirose was previously considered, applied in multiple rejections by the Office, and overcome via the applicant's arguments and amendments. *See generally* EX1002, 16-95. Indeed, following the applicant's amendment specifying that the copper foil has the claimed properties “so as to prevent the generation of wrinkles at a surface of the copper foil,” and applicant's related arguments, the Office agreed that the art of record—Hirose in combination with Matsuda—does not render obvious a copper foil having the claimed texture coefficients so as to

prevent wrinkle generation. EX1002, 21, 31. In this statement made by the Office, the Office agreed that the Hirose-Matsuda combination does not render obvious a copper foil comprising the claimed crystal structure ratios, weight deviation, and tensile strength designed to prevent wrinkle generation.

Like the examiner, Petitioner cites Hirose as a primary reference and argues Hirose's disclosure of crystal structure ratios in combination with secondary references renders the claimed foil obvious. Pet., 50-57. Petitioner's position on Hirose in Ground 3 is therefore substantially the same as the rejection overcame during examination of the '541 patent.

Accordingly, Hirose satisfies *Becton* factors (a), (b), and (d), under the first part of the *Advanced Bionics* framework.

2. Hara, Otsuka, and Matsuda—Petitioner's secondary references—are the same or substantially the same as the secondary references applied during prosecution.

a. Matsuda

Petitioner cites Matsuda as disclosing a copper foil having a tensile strength of not less than 33 kgf/mm². Pet., 63; EX1003, ¶169. And Petitioner argues that this disclosure in Matsuda would have motivated a POSA to optimize the tensile strength of Hirose's foil. Pet., 55; EX1003, ¶197.

Matsuda was previously considered, applied in an obviousness rejection with Hirose by the Office, and overcome via the applicant's arguments and

amendments. *See generally* EX1002, 16-95. Indeed, following the applicant's amendment specifying that the copper foil has the claimed properties "so as to prevent the generation of wrinkles at a surface of the copper foil," the Office agreed that the combination Matsuda with Hirose does not render obvious a copper foil having the claimed texture coefficients so as to prevent wrinkle generation. EX1002, 21, 31. Accordingly, Matsuda satisfies *Becton* factors (a), (b), and (d), under the first part of the *Advanced Bionics* framework.

b. Otsuka

In a cumulative fashion to Matsuda, Petitioner cites Otsuka as disclosing a copper foil having a tensile strength of not more than 40 kgf/mm². Pet., 62; EX1003, ¶174. And Petitioner argues that this disclosure in Otsuka would have motivated a POSA to optimize the tensile strength of Hirose's foil for the same reasons as argued for Matsuda. Pet., 55; EX1003, ¶195. Petitioner's alternative reliance on Otsuka and Matsuda in Ground 3 expressly acknowledges that Matsuda's and Otsuka's disclosures are cumulative. Pet., 52 (arguing that "[i]t would have been obvious to a POSITA to combine the teachings of Hirose, Hara, and Otsuka *or* Matsuda") (emphasis added); Pet., 53 (arguing that "Otsuka *or* Matsuda provides teachings of tensile strength values, which fall within the claimed ranges of the '541 Patent") (emphasis added).

It follows that, for purposes of Ground 3, Otsuka's disclosure is the same, or at least substantially the same, as Matsuda's disclosure, which was previously considered, applied in an obviousness rejection by the Office, and overcome with the applicant's arguments and amendments. Accordingly, Otsuka, as relied on by Petitioner, satisfies *Becton* factors (a), (b), and (d), under the first part of the *Advanced Bionics* framework.

c. Hara

With respect to claim 1, Petitioner cites Hara as disclosing an electrolytic copper foil having a variation in weight per unit area of 2% or less. Pet., 61; EX1003, ¶191. Hara does not disclose details related to making or optimizing properties of electrolytic copper foils. Rather, Hara simply selects preferred positive and negative electrodes, and assembles these electrodes to make a secondary lithium battery. EX1009, ¶¶1, 11, 48. With respect to the copper foil for the negative electrode, Hara simply obtained known copper foils and used them to make a battery. EX1009, ¶27 (explaining “an electrolytic copper foil (e.g., WS foil manufactured by Furukawa Circuit Foil Co., Ltd.)” was used for Example 1.)

Petitioner's citation to Hara boils down to the same simple proposition made by the examiner during prosecution—there were copper foils having a weight deviation of less than 3%, as claimed. The examiner assumed that Hirose's foils have a weight deviation of 0%. EX1002, 62. Hara mentioning that foils were

known to have a weight deviation of 2% or less adds nothing meaningful relative to how the examiner interpreted Hirose as disclosing a foil having a weight deviation of less than 2%.

Accordingly, Hara, as relied on by Petitioner, satisfies *Becton* factors (a), (b), and (d), under the first part of the framework.

* * *

Because the combination of Hirose, Hara, and Otsuka/Matsuda is the same as, or at least entirely cumulative to, art considered by the examiner during prosecution of the '541 patent, the Board should deny institution of Ground 3 under § 325(d).

B. Petitioner's combination of references for Ground 1 is substantially the same as the combination of references applied during examination.

Petitioner's Ground 1 is essentially the same as Ground 3, with one exception. Petitioner uses Kim as a primary reference in place of Hirose. However, Kim as applied in Ground 1 is cumulative to Hirose as applied in Ground 3.

In Ground 3, Petitioner cites the X-ray diffraction (XRD) data for two of Hirose's examples—Examples 1-2 and 1-4—shown in Figures 11A and 11B, respectively. Pet., 58-61; EX1003, ¶¶184-190. Using the XRD data, Petitioner derives percentages for the four claimed texture coefficient ratios. Pet., 59-60; EX1003, ¶¶185-189. Petitioner's annotated tables showing the derived ratios for

Examples 1-2 and 1-4 are reproduced below. Petitioner then argues that Hirose discloses a copper foil with a crystal structure that satisfies each of the four claimed ratios. Pet., 61; EX1003, ¶190.

Table 6 Hirose Example 1-2 TC ratio check

Ratio	Claimed Lower Limit	Value	Claimed Upper Limit
1 st ratio = (111) + (200)	60%	78.5%	85%
2 nd ratio = (111)	18%	28.7%	38%
3 rd ratio = (200)	28%	49.8%	62%
4 th ratio = (220)	15%	21.5%	40%

Pet., 59.

Table 8 Hirose Example 1-4 TC ratio check

Ratio	Claimed Lower Limit	Value	Claimed Upper Limit
1 st ratio = (111) + (200)	60%	81.4%	85%
2 nd ratio = (111)	18%	23.3%	38%
3 rd ratio = (200)	28%	58.1%	62%
4 th ratio = (220)	15%	18.6%	40%

Pet., 60.

In Ground 1, Petitioner relies on Kim in the exact same way as Petitioner relies on Hirose in Ground 3. Petitioner cites the XRD data for a single example shown in Kim's Table 1. Pet., 17-19; EX1003, ¶¶66-71. Using the XRD data, Petitioner calculates percentages for the four claimed texture coefficient ratios. Pet., 19; EX1003, ¶¶70-71. Petitioner's annotated table showing the calculated ratios for Kim's example is reproduced below. Petitioner then argues that Kim discloses a copper foil with a crystal structure that satisfies each of the four

claimed ratios. Pet., 19; EX1003, ¶71.

Table 2. Kim ratio check

Ratio	Claimed Lower Limit	Ratio Value	Claimed Upper Limit
1 st ratio = (111) + (200)	60%	67.7%	85%
2 nd ratio = (111)	18%	29.3%	38%
3 rd ratio = (200)	28%	38.3%	62%
4 th ratio = (222)	15%	32.3%	40%

Pet., 19.

Kim discloses nothing more in Petitioner's Ground 1 compared to what Hirose discloses for Ground 3. Petitioner relies on specific, cumulative examples of XRD data from both references. Because Kim is cumulative to Hirose for purposes of Petitioner's arguments for Ground 1, the combination of Kim, Hara, and Otsuka is the same as, or at least entirely cumulative to, art considered by the examiner during prosecution of the '541 patent. The Office already agreed that the cumulative combination of Hirose and Matsuda does not render obvious a copper foil having the claimed crystal structure ratios, weight deviation, and tensile strength designed to prevent wrinkle generation. Thus, Petitioner's combination of references in Ground 1 satisfies *Becton* factors (a), (b), and (d), under the first part of the *Advanced Bionics* framework for at least the same reasons as the combination of references in Ground 3.

C. Petitioner’s combination of references for Ground 2 is substantially the same as the combination of references applied during examination.

Petitioner’s Ground 2 is essentially the same as Ground 3, with one exception. Petitioner uses Ye as a primary reference in place of Hirose. However, Ye as applied in Ground 2 is cumulative to Hirose as applied in Ground 3.

As discussed above in Section VI.B, in Ground 3, Petitioner cites the XRD data for two of Hirose’s examples, derives percentages for the four claimed texture coefficient ratios from that data, and argues that Hirose discloses a copper foil with a crystal structure that satisfies each of the claimed ratios. Pet., 58-61; EX1003, ¶¶184-190.

In Ground 2, Petitioner relies on Ye in the exact same way as Petitioner relies on Hirose in Ground 3. Petitioner cites the XRD data for a single example—Specimen 15—shown in Ye’s Table II. Pet., 39-42; EX1003, ¶¶126-132. Using the XRD data, Petitioner derives percentages for the four claimed texture coefficient ratios. Pet., 41; EX1003, ¶¶128-130. Petitioner’s annotated table showing the calculated ratios for Ye’s Specimen 15 is reproduced below. Petitioner then argues that Ye discloses a copper foil with a crystal structure that satisfies each of the four claimed ratios. Pet., 41-42; EX1003, ¶¶131-132.

Table 4 Ye TC ratio check

Ratio	Claimed Lower Limit	Value	Claimed Upper Limit
1 st ratio = (111) + (200)	60%	67.0%	85%
2 nd ratio = (111)	18%	31.3%	38%
3 rd ratio = (200)	28%	35.8%	62%
4 th ratio = (220)	15%	33.0%	40%

Pet., 41.

Like Kim in Ground 1, Ye discloses nothing more in Petitioner's Ground 2 compared to what Hirose discloses for Ground 3. Petitioner relies on specific, cumulative examples of XRD data from both references. Because Ye is cumulative to Hirose for purposes of Petitioner's arguments for Ground 2, the combination of Ye, Hara, and Otsuka is the same as, or at least entirely cumulative to, art considered by the examiner during prosecution of the '541 patent. The Office already agreed that the cumulative combination of Hirose and Matsuda does not render obvious a copper foil having the claimed crystal structure ratios, weight deviation, and tensile strength designed to prevent wrinkle generation. Thus, Petitioner's combination of references in Ground 2 satisfies *Becton* factors (a), (b), and (d), under the first part of the *Advanced Bionics* framework for at least the same reasons as the combination of references in Ground 3.

D. Petitioner fails to identify material error in the Office's previous evaluation of the art and arguments.

The '541 patent was allowed because the examiner agreed art cited for obviousness "does not teach or suggest a copper foil having the claimed texture

coefficients so as to prevent wrinkle generation.” EX1002, 21. Petitioner would have the Board reconsider the examiner’s determination without showing error in the examiner’s determination that optimizing multiple properties of the foil—crystal structure ratios, weight deviation, and tensile strength—to “prevent wrinkle generation” was nonobvious. Rather than establish material error in the examiner’s decision, Petitioner glosses over the claim language the examiner specifically indicated as allowable, and assumes that claim language is inherent in its allegedly new combinations of art.

“[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). Indeed, “the use of inherency in the context of obviousness must be carefully circumscribed because ‘[t]hat which may be inherent is not necessarily known’ and that which is unknown cannot be obvious.” *Honeywell Int’l Inc. v. Mexichem Amanco Holding S.A.*, 865 F.3d 1348, 1354 (Fed. Cir. 2017).

Petitioner argues that the examiner’s allowance was “based in part on the Patentee’s incorrect assertion that the prior art must somehow expressly recognize

the texture coefficient ratio to be ‘an important factor in relation to the generation of wrinkles’ to satisfy the limitations of claim 1.” Pet., 72. Petitioner alludes that preventing wrinkles was somehow an inherent property of the examiner’s combination of references. Pet., 72-73 (citing *Endo Pharm. Sols., Inc. v. Custopharm Inc.*, 894 F.3d 1374 (Fed. Cir. 2018)).

That said, Petitioner fails to meet its burden with respect to inherency and does not establish any error in the examiner’s reasoning that the claimed combination of foil properties to “prevent wrinkle generation” was not an inherent feature of the examiner’s prior art combination, and therefore not obvious. At best, and as discussed below in Section VII, Petitioner simply assumes that, by varying a myriad of different process parameters and conditions, a POSA would have arrived at a copper foil inherently having the claimed wrinkle prevention properties. This falls short of establishing examiner error.

A simple assertion that a POSA would have engaged in routine testing of all possibilities to arrive at a specific mixture and that the claimed properties would have been inherent is not enough. *See Honeywell*, 865 F.3d at 1356. “[D]ismissing properties of the claimed invention as merely inherent, without further consideration as to unpredictability and unexpectedness” is legal error. *Honeywell*, 865 F.3d at 1355. Further, the *Endo Pharm* case cited by Petitioner does not support Petitioner’s argument that preventing wrinkles in the examiner’s

combination was somehow an inherent property of the combination. In *Endo Pharm*, the question was whether a testosterone formulation disclosed in scientific articles inherently included certain percentages of castor oil and benzyl benzoate. *See Endo Pharm*, 894 F.3d at 1381. A similar question is not at issue in the present case. The court in *Endo Pharm* did not consider whether a combination of references cited for obviousness inherently discloses a claimed property.

Without a substantiated reason why the examiner's decision was in error, Petitioner's Grounds 1-3 amount to nothing more than a rehash of the obviousness rejections raised during examination.

* * *

Because Petitioner (1) relies on art and arguments that are the same or substantially similar to the art and arguments expressly considered and overcame during prosecution—including leading with a primary reference that was *overcome through amendment and argument during prosecution*—and (2) fails to demonstrate that the Office erred in a manner material to the patentability of challenged claims, the Board should exercise its discretion and deny institution under Section 325(d).

VII. The Petition fails to establish a reasonable likelihood of prevailing on any challenged claim because the Petition fails to demonstrate a reasonable expectation of success in combining at least three references to arrive at what is claimed.

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. Rather, Petitioner relies on conclusory reasoning for why a POSA would have reasonably expected success in combining very different foil properties from three or more references to arrive at what is claimed. In fact, Petitioner's own cited art demonstrates that a POSA would not have simply expected success in combining the properties as alleged by Petitioner.

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. *Id.* 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) (emphasis

added); *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).

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’s failure to meet its burden to show a reasonable expectation of success warrants denial of institution.

A. Petitioner provides only a cursory and insufficient analysis regarding a reasonable expectation of success.

For each of Grounds 1-3, Petitioner asserts combinations of at least three references. For Ground 1, Petitioner cherry-picks foil properties from Kim, Hara, and Otsuka to argue that a combination of these properties would have been obvious. Pet., 11-17; EX1003, ¶¶52-64. In particular, Petitioner relies on Kim (the

primary reference) as disclosing texture coefficient ratios that fall within the claimed ranges. Pet., 17-19; EX1003, ¶¶66-71. Petitioner recognizes that Kim does not disclose (1) a weight deviation as claimed or (2) a tensile strength as claimed, and relies on Hara and Otsuka for these limitations, respectively. Pet., 20-24; EX1003, ¶¶75-85.

Similarly, for Ground 2, Petitioner cherry-picks foil properties from each reference. Petitioner relies on Ye (the primary reference) as disclosing texture coefficient ratios that fall within the claimed ranges. Pet., 39-42; EX1003, ¶¶126-132. Petitioner recognizes that Ye does not disclose (1) a weight deviation as claimed or (2) a tensile strength as claimed, and relies on Hara and Otsuka for these limitations, respectively. Pet., 42-44; EX1003, ¶¶133-141.

And finally for Ground 3, Petitioner cherry-picks foil properties from four different references in the same manner as Grounds 1 and 2. Petitioner relies on Hirose (the primary reference) as disclosing texture coefficient ratios that fall within the claimed ranges. Pet., 58-61; EX1003, ¶¶183-190. Petitioner recognizes that Hirose does not disclose (1) a weight deviation as claimed or (2) a tensile strength as claimed, and relies on Hara and Otsuka/Matsuda for these limitations, respectively. Pet., 61-63; EX1003, ¶¶191-197.

For all three Grounds, Petitioner's arguments assume that the different foil properties selected from each reference are all interchangeable. But Petitioner does

not substantiate a reasonable expectation that the foil properties cherry-picked from at least three different references could be predictably combined to arrive at what is claimed. Instead, Petitioner asserts that there would have been a reasonable expectation of success because each reference discloses similar process parameters for making an electrolytic copper foil. *See, e.g.*, Pet., 15-16 (“the optimization of weight deviation, elongation, and tensile strength values in copper foil would have involved a mere routine optimization of electrodeposition conditions, such as varying concentrations of additives (e.g., organic additives), electrolysis solution chemistry, which includes copper sulfate and sulfuric acid, treatment time, and/or current density and other plating parameters such as solution agitation and temperature”). With respect to Hara in particular, Petitioner also surmises that a POSA “would have known that electrolytic copper foils with weight deviation in the claimed range were commercially available and therefore would have recognized the ease of applying such teachings.” Pet., 15.

In essence, Petitioner argues that because each reference discloses electroplated copper foils, there would have been a reasonable expectation of success in combining them.

Obviousness, however, requires “a reason that would have prompted a person of ordinary skill in the relevant field *to combine the elements in the way the claimed new invention does.*” *KSR*, 550 U.S. at 418 (emphasis added). 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).

Here, Petitioner merely asserts a reasonable expectation of success, without the requisite analysis. Petitioner makes no comparison between the processing conditions and parameters from the different references, nor does Petitioner explain why the foil properties from one reference would be compatible with the properties from another reference. For example, Petitioner surmises that “it was conventional to vary the electrolyte concentration, electrolysis plating parameters, temperature, and the use of organic and inorganic additives, in order to obtain a copper foil with tensile strength” as claimed. Pet., 16. However, that there is allegedly some overlap in process conditions alone does not support that properties of foils from three different references could be predictably combined with a reasonable expectation of success.

Indeed, with respect to tensile strength, the table from Exhibit 1025 cited on page 16 of the Petition (reproduced and annotated below) contradicts Petitioner’s argument. The table shows that varying process conditions and parameters can

result in tensile strengths ranging from of 45 to 63.5 kg/mm²—at least 12.5% greater than the upper end of the claimed range, 40 kg/mm².

Table 2. PROPERTIES OF COPPER ELECTRODEPOSITS USEFUL FOR DIVERSE APPLICATIONS

Outstanding Characteristic	Tensile Strength, kg/mm ²	Elongation, % (5cm)	Internal Stress, ^c kg/mm ²	Hardness (VHN ₂₀₀), kg/mm ²	Electrical Resistivity, microhm-cm
High strength	45-63.5	4-18	-4.2 or 3.6 to 5.5	131-159	1.75-2.02
Hardness	3.5-55.5	0-10	-4.2 or 3.0	103-350	1.06-4.00
Low electrical resistivity	18.5-27	15-41	-0.5 to -1.6	48-64	1.70-1.73
Near zero stress	14-16	8-24	-0.06-0.06	56-57	1.71-1.72
Good leveling	36-36.5	14-19	2.0	125-137	1.82
Thermal stability ^b	22.5-30	26-39	0.5-2.9	55-106	1.73-1.76

^aNegative values indicate a compressive stress.
^bDeposits that changed less than 0.02% in length after heating to 40°C.

Pet., 16 (annotated).

What is more, with respect to weight deviation, Petitioner surmises that “it would have been obvious to a POSITA to *use* an electrolytic copper foil with minimal weight variance across the foil, but that such recognition likely was not expressly stated due to the overwhelming obviousness of the fact.” Pet., 15 (emphasis added). Petitioner does not explain why the process conditions that achieve the crystal structure ratios and tensile strength in other cited references would have reasonably been expected to achieve a weight deviation of 3% or less as claimed. Indeed, Hara (the only reference relied on by Petitioner as disclosing weight deviation) does not support Petitioner’s argument because Hara does not say anything about electrolytic process conditions for making a copper foil.

The simple fact the references disclose electroplated copper foils does not establish that there would have been a reasonable expectation of success in combining foil properties from three different references to arrive at what is claimed. 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); *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1379 (Fed. Cir. 2005) (finding that silence on a particular use for a known compound did not disclose that use for inherent anticipation or obviousness purposes). Petitioner’s failure to present a reasonable expectation of success, beyond the simple assertion that the references relate to electroplated copper foils, is fatal to all Grounds.

B. Petitioner assumes a reasonable expectation of success in mixing and matching foil properties from three different references without any consideration of the interplay of those properties.

Making matters worse, Petitioner’s arguments assume that a POSA would have recognized all foil properties (specific texture coefficient ratios, weight deviation, and tensile strength) are relevant properties for electrolytic copper foils designed for the different end use applications disclosed in Kim and Ye (printed circuit boards) and Hara, Otsuka, Matsuda, and Hirose (batteries) and that properties from materially different foils can be combined with each other.

Petitioner provides no support for this assumption. Petitioner fails to provide any support for arguing that crystal structure ratios and physical foil properties from at least three different references could be predictably combined.

For example, Dr. Josefowicz does not explain how a POSA would have adjusted any of numerous process conditions (additive concentrations, solution chemistry, treatment time, current density, etc.) to arrive at a foil with the claimed properties. Petitioner and Dr. Josefowicz's silence on this compels denial of the Petition. *See Juniper Networks, Inc. v Correct Transmission, LLC*, IPR2021-00682, Paper 26 at 24 (P.T.A.B Oct. 3, 2022) ("Petitioner does not explain sufficiently *why* such contentions (and any underlying cited evidence), even if undisputed, show that the skilled artisan would have had a reasonable expectation of success").

At best, Petitioner's arguments amount to the proposition that a POSA would have varied the myriad of different process parameters and conditions until a copper foil as claimed resulted. This falls short of establishing a reasonable expectation of success. "[T]o have a reasonable expectation of success, one must be motivated to do more than merely to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no

direction as to which of many possible choices is likely to be successful.”

Medichem, S.A. v. Rolabo, S.L., 437 F.3d 1157, 1165 (Fed. Cir. 2006) (cleaned up).

Not once does Petitioner substantiate the proposition that a POSA would have been motivated to combine the primary reference—Kim, Ye, or Hirose—with the secondary references while maintaining the same texture coefficient values (and therefore ratios) disclosed by isolated examples in the primary references. None of the primary references recognize the significance of the claimed texture coefficient ratios, so a POSA would have had no reason to try to retain the same texture coefficient ratios, let alone expect that doing so would help prevent wrinkles. “The mere fact that a certain thing may result from a given set of circumstances is not sufficient” to establish obviousness. *Par Pharm.*, 773 F.3d at 1195.

In fact, Petitioner’s cited references underscore the unpredictability and difficulty in controlling crystal structure and physical foil properties during electroplating for at least the following reasons.

- 1. The vast majority of Ye’s examples that fail to meet the claimed texture coefficient ratio ranges show that texture coefficient ratios and physical properties such as tensile strength are not predictably compatible.**

It is telling that Petitioner cited only a *single* specimen from Ye to support its argument that the claimed foil would have been obvious. Petitioner cited only a single specimen because, of the 44 specimens disclosed by Ye, Specimen 15 is the

only specimen for which Petitioner could derive texture coefficient ratios that allegedly satisfy claim 1.

Patent Owner derived texture coefficient ratios for all 44 specimens in Ye using the same methodology used by Petitioner and Dr. Josefowicz. Table A below shows the derived ratios for each specimen. Ratios highlighted orange satisfy the claimed range. Ratios not highlighted fall outside the claimed range. All the specimens except for Specimen 15 (highlighted darker orange) have at least one texture coefficient ratio that falls outside the claimed range.

	TC (111) + TC (200) ratio	TC (111) ratio	TC (200) ratio	TC (220) ratio
Claim 1	0.60 to 0.85	0.18 to 0.38	0.28 to 0.62	0.15 to 0.40
Specimens from Ye				
1	0.312	0.159	0.153	0.688
2	0.672	0.398	0.273	0.328
3	0.363	0.183	0.181	0.637
4	0.665	0.409	0.256	0.335
5	0.398	0.224	0.175	0.602
6	0.551	0.317	0.234	0.449
7	0.692	0.400	0.293	0.308
8	0.528	0.349	0.179	0.472
9	0.319	0.191	0.129	0.681
10	0.572	0.386	0.186	0.428
11	0.271	0.165	0.106	0.729
12	0.363	0.238	0.125	0.637
13	0.651	0.378	0.273	0.349
14	0.794	0.396	0.398	0.206
15	0.670	0.313	0.358	0.330
16	0.509	0.327	0.181	0.491
17	0.465	0.246	0.219	0.535
18	0.293	0.139	0.154	0.707
19	0.639	0.391	0.248	0.361

20	0.518	0.308	0.210	0.482
21	0.271	0.119	0.152	0.729
22	0.497	0.291	0.207	0.503
23	0.216	0.106	0.111	0.784
24	0.243	0.107	0.136	0.757
25	0.284	0.151	0.133	0.716
26	0.653	0.503	0.151	0.347
27	0.301	0.185	0.116	0.699
28	0.636	0.403	0.233	0.364
29	0.299	0.187	0.112	0.701
30	0.631	0.401	0.230	0.369
31	0.242	0.128	0.114	0.758
32	0.688	0.416	0.271	0.312
33	0.710	0.457	0.253	0.290
34	0.729	0.475	0.254	0.271
35	0.038	0.018	0.020	0.962
36	0.086	0.053	0.033	0.914
37	0.421	0.270	0.151	0.579
38	0.270	0.175	0.095	0.730
39	0.054	0.031	0.023	0.946
40	0.017	0.008	0.009	0.983
41	0.746	0.507	0.239	0.254
42	0.614	0.378	0.236	0.386
43	0.677	0.396	0.281	0.323
44	0.022	0.011	0.011	0.978

Table A.

Ye's data and the processing conditions summarized in Ye's Table I show that "the crystallographic texture of metal deposits depends on the processing parameters, such as bath composition, pH, overpotential, deposition rate (current density), substrate, mass-transport condition, etc." EX1013, 3. Ye's data is consistent with Kim's data in Table 1 (reproduced below) showing that the

addition of 5 ppm of an accelerator had a noticeable effect on crystal plane texture coefficients.

Table 1. Relation between residual stress and preferred plane formed during plating (I: inhibitor, L: leveler, A: accelerator).

Electrolyte	Texture coefficient			Residual stress (MPa)	Preferred plane
	(111)	(200)	(220)		
300ppm I + 20ppm L	0.23	0.30	2.47	6.92	(220)
300ppm I + 20ppm L + 5ppm A	0.88	1.15	0.97	0	(200)

EX1018, 5.

Ye goes on to explain that crystal grain size of the electrolytic copper foils is also noticeably affected by electroplating conditions. EX1013, 6-7. As an example, Ye notes that “at an overpotential of 113 mV a grain size of 2 μm is noticed (specimen No. 17) [but] at an overpotential of 250 mV the grain size was 1 μm (specimen No. 32) (Fig. 12).” EX1013, 6.

Seemingly ignoring Ye’s disclosure about how processing conditions affect crystal texture and grain size, Petitioner makes the conclusory argument that a POSA would reasonably have expected that applying Otsuka’s processing techniques to Kim, Ye, or Hirose would create a foil having a tensile strength of 30 to 40 kgf/mm², while also retaining specific texture coefficient ratios disclosed in isolated examples from Kim, Ye, or Hirose. This proposition is not supported by the cited art.

Otsuka specifies that the copper foils must have “an extremely fine crystal structure, so the copper foil itself is soft” to achieve the desired tensile strength.

EX1010, ¶29. In Otsuka’s Examples 1-3—having a tensile strength between 30 to 40 kgf/mm²—the foil “had fine crystal structures at ordinary temperature yet had ordinary temperature tensile strengths of not more than 40 kg/mm².” EX1010, ¶46. Otsuka quantifies the required “fine crystal structures” as a lack of fine crystal grains of “an average particle size of several tenths of a micron . . . at the deposition surface” of the copper foil. EX1010, ¶¶26, 28, 47.

This interplay between crystal structure texture coefficients, crystal structure grain size, and tensile strength is wholly overlooked by Petitioner and Dr. Josefowicz. Petitioner’s own art explains that these foil properties cannot be simply mixed and matched to achieve a desired foil. Ye in particular evidences that texture coefficients and grain size cannot be simply combined. As shown below in Table B, Ye’s Specimen 17, which had a grain size of 2 µm, satisfies only one of the claimed texture coefficient ratios. In stark contrast, Ye’s Specimen 32, which had a grain size of 1 µm, satisfies only two different claimed ratios.

	TC (111) + TC (200) ratio	TC (111) ratio	TC (200) ratio	TC (220) ratio
Claim 1	0.60 to 0.85	0.18 to 0.38	0.28 to 0.62	0.15 to 0.40
Specimens from Ye				
17	0.465	0.246	0.219	0.535
32	0.688	0.416	0.271	0.312

Table B (extract from Table A above).

Petitioner simply assumes that modifying Kim, Ye, or Hirose with processing conditions and the fine crystal grain size disclosed in Otsuka would necessarily retain the claimed texture coefficient ratios. Petitioner does not offer any evidence or rationale to establish *why* these references disclosing a myriad of different, significant process conditions would have directed a POSA to a copper foil having the claimed texture coefficient ratios, weight deviation, and tensile strength with a reasonable expectation of success. Without adequate evidence or rationale, all of Petitioner's Grounds must fail.

2. Hara and Otsuka disclose conflicting copper foil elongation rates and thicknesses.

In each of Grounds 1–3, Petitioner argues it would have been obvious to combine Hara's disclosure related to copper foils having a weight variation of 2% or less with Otsuka's disclosure related to copper foils having a tensile strength of no more than 40 kgf/mm² to arrive at a copper foil as claimed. However, Hara and Otsuka instruct a POSA to arrive at copper foils with conflicting differences in elongation rate and thickness.

Hara discloses that copper foils having a weight variation of 2% or less should be selected to have an elongation rate of 5% or less and a thickness ranging from 7 microns to 25 microns. EX1009, ¶¶11-13. In contrast, Otsuka discloses that copper foils having a tensile strength of no more than 40 kgf/mm² should have an

elongation rate of at least 14% and a thickness of 35 microns. EX1010, ¶¶22, 32, 46.

Petitioner provides no explanation as to why the cited weight deviation value from Hara's relatively rigid and thin foils is compatible with the tensile strength range from Otsuka's thicker and more flexible foils. If anything, the cited art teaches that the weight deviation and tensile strength would not have been predictably combined because Hara and Otsuka disclose very different foils. Petitioner does not address the conflicting differences between Hara's and Otsuka's elongation rate and foil thicknesses when arguing that there would have been a reasonable expectation of success in combining these two references. This discrepancy is relevant because Petitioner modifies the primary reference (Kim, Ye, or Hirose) in view of both Hara and Otsuka.

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 simply assumes that modifying Kim, Ye, or Hirose with Hara and Otsuka would simultaneously achieve the claimed weight deviation and tensile strength. Petitioner does not offer any evidence or rationale to establish *why* Hara

and Otsuka, which disclose foils having very different elongation rates and thickness, would have directed a POSA to a copper foil having the claimed texture coefficient ratios, weight deviation, and tensile strength with a reasonable expectation of success. Without adequate evidence or rationale, all of Petitioner's Grounds must fail.

* * *

For at least these reasons, Petitioner has not demonstrated a reasonable likelihood of prevailing to show that the Kim-Hara-Otsuka combination presented in Ground 1, the Ye-Hara-Otsuka combination presented in Ground 2, or the Hirose-Hara-Otsuka/Matsuda combination presented in Ground 3 renders claim 1 obvious, and all of Petitioner's Grounds should fail.

VIII. 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. Alternatively, the Board should use its discretion to deny institution under either or both of Section 314(a) applying the *Fintiv* factors or Section 325(d).

Respectfully submitted,

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