

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.

IPR2025-00005
Patent 9,457,541

PETITIONER'S REQUEST FOR REHEARING

I. INTRODUCTION

Petitioner respectfully requests rehearing pursuant to 37 C.F.R. § 42.71(d) for claims 1-4 of U.S. Patent No. 9,457,541 (the “541 Patent”). In its Decision on Institution (“DI” or “Decision”), the Board misapprehended or overlooked: (1) Lowenheim’s disclosure, as well as Dr. Josefowicz’s explanation in the Hirose-Hara-Otsuka/Matsuda combination, as they relate to a reasonable expectation of success in achieving the claimed copper foil properties through routine optimization of known electrodeposition parameters; and (2) the teachings of Ye, along with Petitioner’s evidence and explanation thereof, as they relate to the Ye-Hara-Otsuka ground.

First, relevant to Grounds 2 and 3, while the Decision acknowledged that the underlying rationale “provides us with a somewhat closer call,” the Board ultimately concluded that Petitioner failed to articulate a sufficient reason why a person of ordinary skill in the art (“POSITA”) would have had a reasonable expectation of success in combining Hirose, Hara, and Otsuka/Matsuda to arrive at the claimed copper foil. DI, 56-58. In doing so, the Decision relied on Patent Owner’s selective reading of Lowenheim’s Table 2 and overlooked Lowenheim’s full disclosure and Dr. Josefowicz’s testimony. DI, 56-57; Petition, 56-57; SOLUS-1003, ¶180.

Indeed, as the Petition notes, the prosecution history supports Dr. Josefowicz’s testimony that the claimed foil parameters, such as tensile strength, and

weight deviation, were already known in the art. Petition, 5-6; SOLUS-1002, 21. The Examiner ultimately allowed the claims only after the Patent Owner (then-applicant) added the intended wrinkle-prevention limitation, explaining that “the prior art of record does not teach or suggest a copper foil having the claimed texture coefficients so as to prevent wrinkle generation.” Petition, 5-6; SOLUS-1002, 21. Thus, the record reflects that both the Examiner and Patent Owner (then-applicant) acknowledged that the claimed tensile strength and weight deviation of the copper foil and the methods of achieving the claimed parameters were already known in the art.

Nevertheless, by relying on Patent Owner’s cherry-picked reading of Lowenheim and ignoring both the full disclosure of Lowenheim and Dr. Josefowicz’s analysis, the Decision misapprehended the full scope of the prior art and improperly discounted the evidence supporting the reasonable expectation of success analysis.

Second, for Ground 2, the Decision acknowledges that Ye discloses the claimed texture coefficient ratios but wrongly concludes that “Petitioner’s argument appears to be based upon impermissible hindsight reconstruction” because “Petitioner provides no convincing argument as to why a skilled artisan would have selected sample 15 for combination with Hara and Otsuka.” DI, 47. This misapprehends Ye’s overall disclosure, the routine nature by which a POSITA

would select a sample falling within Ye's disclosed limited number of samples, and related arguments made in the Petition, which explained why a POSITA could and would have incorporated Hara's and Otsuka's teachings into Ye's copper foil (which is a starting point), corroborated by the expert testimony. Petition, 32-38; SOLUS-1003, ¶¶106-124.

II. LEGAL STANDARD

“A party dissatisfied with a decision may file a single request for rehearing without prior authorization from the Board” and “must specifically identify all matters the party believes the Board misapprehended or overlooked, and the place where each matter was previously addressed in a motion, an opposition, or a reply.” 37 C.F.R. § 42.71(d). When reconsidering a decision on institution, the Board reviews the decision for an abuse of discretion. 37 C.F.R. § 42.71(c). “An abuse of discretion occurs if the decision (1) is clearly unreasonable, arbitrary, or fanciful; (2) is based on an erroneous conclusion of law; (3) rests on clearly erroneous fact findings; or (4) involves a record that contains no evidence on which the Board could rationally base its decision.” *Redline Detection, LLC v. Star Envirotech, Inc.*, 811 F.3d 435, 442 (Fed. Cir. 2015).

III. ARGUMENT

A. The Decision Misapprehended or Overlooked Petitioner's Arguments Regarding Lowenheim and Reasonable Expectation of Success

The Decision misapprehended the overall interpretation of the evidence, including Lowenheim and Dr. Josefowicz's testimony regarding same, in concluding that Petitioner failed to establish a reasonable expectation of success in achieving the claimed copper foil properties.¹ DI, 56-58. In rejecting Dr. Josefowicz's analysis, the Board found it "largely unsupported by evidence of record," adopting Patent Owner's selective reading that Lowenheim's Table 2 disclosed tensile strengths "well outside the claimed range." DI, 56-57. However, this analysis reflects a selectively distorted view of Lowenheim and fails to consider the full context and supporting disclosure.

In particular, Lowenheim's Table 2 clearly discloses multiple tensile strength ranges that fall within or overlap the claimed range of 30 to 40 kgf/mm², including under "*Hardness*" (3.5-55.5 kgf/mm²), "*Good leveling*" (36-36.5 kgf/mm²), and "*Thermal stability*" (22.5-30 kgf/mm²) categories. See Petition, 15-17, 46, 56-57; SOLUS-1003, ¶¶63-64, 123-124, 180-181 (citing SOLUS-1025, Table 2 (reproduced below, annotated)). Patent Owner solely focused on the "*High strength*" range (45–63.5 kgf/mm²), omitting discussion of these other relevant categories. The Board adopted Patent Owner's selectively myopic view without addressing the

¹ Lowenheim was cited in the Petition and Declaration to provide (1) context regarding the state of the art at the time of the earliest possible priority date of the '541 patent and (2) support for the reasonable expectation of success.

broader disclosure that aligns with Dr. Josefowicz's testimony.

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	1.06-4.60
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	-0.08-0.06	56-57	1.71-1.72
Good leveling	36-36.5	14-19	2.0	128-137	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 403°C.

SOLUS-1025 (Lowenheim), Table 2

More importantly, Lowenheim's Table 2 and its accompanying discussion—together with its 1974 publication date—reflect a POSITA's understanding at the time that achieving various tensile strength values was a matter of routine optimization. *See* Petition, 15-17, 46, 56-57; SOLUS-1003, ¶¶63-64, 123-124, 180-181; SOLUS-1025, 17-18, Table 2. The accompanying discussion to Table 2 describes how process variables—such as electrolyte type, additive composition, bath temperature, and use of reverse current—were used to tune the copper foil properties, as of 1974. *See* Petition, 15-17, 46, 56-57; SOLUS-1003, ¶¶63-64, 123-124, 180-181; SOLUS-1025, 18, Table 2, 17 (discussing and explaining the underlying data in Table 2).

Contrary to the Board's finding that Lowenheim disclosed tensile strengths

“well outside the claimed range” (DI, 56-57), a full and accurate reading of Lowenheim supports Dr. Josefowicz’s testimony: “[A]t least since 1974,” “it was conventional” in the art to tune copper foil properties by varying the electrolyte concentration, electrolysis conditions, and/or the deposition conditions. *See* Petition, 15-17, 46, 56-57; SOLUS-1003, ¶¶63-64, 123-124, 180-181. Accordingly, “the optimization of weight deviation, elongation, tensile strength, and RZ 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.” *See* Petition, 15-17, 46, 56-57; SOLUS-1003, ¶¶63-64, 123-124, 180-181.

Thus, Petitioner respectfully submits that at least the combinations in Grounds 2 and 3 (Ye-Hara-Otsuka and Hirose-Hara-Otsuka/Matsuda) meet the reasonable expectation of success, where “the expectation of success need only be reasonable, not absolute.” *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007) (citing *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d at 809 (Fed. Cir. 1989); *In re O'Farrell*, 853 F.2d 894, 903 (Fed.Cir.1988)).

B. The Decision Misapprehended or Overlooked Petitioner's Evidence Regarding Ye

The Decision that Petitioner engaged in impermissible hindsight by selecting Ye's Sample No. 15 from among 44 samples misapprehended the nature of the asserted combination (Ye-Hara-Otsuka) and the applicable legal standard. DI, 47-48.

As explained in the Petition and accompanying declaration from Dr. Josefowicz, Ye discloses a set of electrolytic copper foils associated with “understanding how different factors affect the quality of electrolytic copper foils and how the ‘overpotential’ . . . and other parameters . . . influence the texture, surface roughness, and flexibility.” Petition, 32-34, 39-42; SOLUS-1003, ¶¶106-109, 126-132. Ye's Sample No. 15 is one of this set of electrolytic copper foils that falls within Ye's teachings and disclosed embodiments, which do not constitute any teaching away. *See* Petition, 32-34, 39-42; SOLUS-1003, ¶¶106-109, 126-132; *see also* MPEP §2123 (citing *In re Susi*, 440 F.2d 442 (CCPA 1971) (“Disclosed examples and preferred embodiments do not constitute a teaching away from a broader disclosure or nonpreferred embodiments.”)).

Further, Ye is the primary reference in the Ye-Hara-Otsuka combination, and a POSITA could and would have reasonably considered any of its disclosed

samples—which fall within the teachings and disclosed embodiments of Ye—as a viable starting point. Doing so would have reflected the “normal desire of scientists or artisans to improve upon what is already generally known.” *Pfizer, Inc. v. Apotex, Inc.*, 480 F. 3d 1348, 1368 (Fed. Cir. 2007). Thus, Ground 2 combination’s reliance on Ye’s Sample No. 15 is not based on hindsight, but rather reflects the straightforward selection of a disclosed sample that falls within Ye’s embodiments and teachings, consistent with the principle that “[a] reference must be considered for everything that it teaches, not simply the described invention or a preferred embodiment.” *See In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012); Petition, 32-34, 39-42; SOLUS-1003, ¶¶106-109, 126-132.

Accordingly, a POSITA would have recognized Ye’s Sample No. 15 as a viable starting point for applying further known modifications—such as those taught by Hara and Otsuka—to optimize copper foil properties, as detailed in the Petition and corroborated by Dr. Josefowicz. Petition, 32-38; SOLUS-1003, ¶¶106-124.

The Petition’s reliance on Dr. Josefowicz’s testimony and related corroborating evidence to support the combination based on Ye’s Sample No. 15 as a base system is thus entirely proper, as that testimony “takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure.” *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971).

Obviousness arguments that consider the knowledge of a POSITA are certainly permissible. *See id.*

Moreover, even if only a subset of Ye's samples satisfies the claims, that is sufficient to support obviousness. *See Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1002 (Fed. Cir. 2016) (“[C]ombinations of prior art that sometimes meet the claim elements are sufficient to show obviousness.”); *see also Hewlett-Packard Co. v. Mustek Sys., Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003) (“[A] prior art product that sometimes, but not always, embodies a claimed method nonetheless teaches that aspect of the invention.”).

IV. CONCLUSION

For the foregoing reasons, and those discussed in the Petition, Petitioner respectfully requests the Board reconsider its Decision and institute *inter partes* review of the challenged claims of the '541 Patent.

Dated: June 18, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e), the undersigned certifies that on June 18, 2025, a complete and entire copy of this Petitioner's Request for Rehearing by the Director was provided by email, to the Patent Owner, by serving the correspondence address of record as follows:

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