

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 IPR2024-01461
Patent 10,811,689

**PETITIONER'S REPLY TO
PATENT OWNER'S PRELIMINARY RESPONSE**

LIST OF EXHIBITS

- SOLUS-1001 U.S. Patent No. 10,811,689 (“the ’689 Patent”)
- SOLUS-1002 Excerpts from Prosecution History of the ’689 Patent (“the Prosecution History”)
- SOLUS-1003 Declaration of Dr. Michael Randall
- SOLUS-1004 U.S. Patent Pub. No. 2013/0108922 (“Shinozaki”)
- SOLUS-1005 C. P. Fabian et al., *Assessment of activated polyacrylamide and guar as organic additives in copper electrodeposition*,” Hydrometallurgy 86 (2007) 44-55 (“Fabian”)
- SOLUS-1006 G. Khatibi et al., *Temperature Dependent Elastic and Thermal Properties of Thin Copper Foil*, Copper; Proceedings of the International Conference Copper '06 (2006) (“Khatibi”)
- SOLUS-1007 U.S. Patent Pub. No. 2009/0047539 (“Dobashi”)
- SOLUS-1008 U.S. Patent Pub. No. 2006/0191798 (“Sano”)
- SOLUS-1009 U.S. Patent Pub. No. 5834140 (“Wolski”)
- SOLUS-1010 WO Patent Pub. No. WO2015/102323 (“Choi”)
- SOLUS-1011 Certified English Translation of WO2015/102323 and Translator’s Declaration (“Choi”)
- SOLUS-1012 U.S. Patent Pub. No. 2013/0108887 (“Kim”)
- SOLUS-1013 Korean Patent Pub. No. 2012/0003485A (“Toshio”)
- SOLUS-1014 Certified English Translation of KR 2012/0003485A and Translator’s Declaration (“Toshio”)
- SOLUS-1015 Michael B. Griesi, *Characterization of Electrodeposited Copper Foil Surface Roughness for Accurate Conductor Power Loss Modeling*, UNIV. S.C., Dec. 2014 (“Griesi”)
- SOLUS-1016 Gadelmawla, *Roughness parameters*, Journals of Materials Processing Technology 123 (2002) 133-145 (“Gadelmawla”)

- SOLUS-1017 *Surface roughness – Definitions and designation*, Japanese Industrial Standard (JIS) B 0601-1994 (“JIS Standard 1994”)
- SOLUS-1018 *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters* (“JIS Standard 2001”)
- SOLUS-1019 *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters*, DIN EN ISO 4287 (“DIN Standard”)
- SOLUS-1020 *Operating Instructions MarSurf M 300 + RD 18*, Mahr GmbH, 2008 (“MarSurf M300 instruction manual”)
- SOLUS-1021 *Surface Texture (Surface Roughness, Waviness, And Lay)*, ASME B 46.1 (2009) (“ASME Standard”)
- SOLUS-1022 Reserved
- SOLUS-1023 *Surface Roughness Measurement-Parameters*, Olympus, <https://www.olympus-ims.com/en/metrology/surface-roughness-measurement-portal/parameters/> (“Olympus”)
- SOLUS-1024 B. Bhushan, *Surface roughness analysis and measurement techniques* (2000) (“Bhushan”)
- SOLUS-1025 U.S. Patent Pub. No. 2014/0302281 (“Yacovone”)
- SOLUS-1026 Reserved
- SOLUS-1027 U.S. Patent No. 10,480,090 (“the ’090 Patent”)
- SOLUS-1028 Japanese Patent Pub. No. 2003/051340A (“Hara”)
- SOLUS-1029 Certified English Translation of JP 2003/051340A and Translator’s Declaration (“Hara”)
- SOLUS-1030 U.S. Patent Pub. No. US20140342178A1 (“Saito”)
- SOLUS-1031 U.S. Patent Pub. No. US20100038115A1 (“Matsuda 115”)
- SOLUS-1032 Japanese Patent Pub. No. JP 2010/103061A (“Kodaira”)

- SOLUS-1033 Japanese Patent Pub. No. JP 2014/065933A (“Yoshiki”)
- SOLUS-1034 Korean Patent Pub. No. KR 2014/0078883A and Certified English Translation of Korean Patent Pub. No. KR 2014/0078883A (“Lee”)
- SOLUS-1035 *Thermal Expansion - Linear Expansion Coefficients*, The Engineering ToolBox, https://www.engineeringtoolbox.com/linear-expansion-coefficients-d_95.html.
- SOLUS-1036 *Linear Thermal Expansion Coefficients of Metals and Alloys*, Laser and Optics User's Manual, https://psec.uchicago.edu/thermal_coefficients/cte_metals_05517-90143.pdf.
- SOLUS-1037 Reserved
- SOLUS-1038 *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, Case 2-23-cv-00539 (EDTX), Proposed Scheduling Order
- SOLUS-1039 *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, Case 2-23-cv-00539 (EDTX), Motion to Transfer Venue
- SOLUS-1040 Declaration of June Ann Munford
- SOLUS-1041 Board Email of February 24, 2025 authorizing Petitioner’s Reply
- SOLUS-1042 Federal Court Management Statistics (Dec. 31, 2024)
- SOLUS-1043 Amended Complaint, *SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.*, No. 2:23-cv-00539 (E.D. Tex. May 15, 2024)
- SOLUS-1044 Stipulation Letter

On February 24, 2025, the Board authorized a 5-page reply addressing issues of discretionary denial addressed in the Preliminary Response (“POPR”). Ex. 1041. Consistent with *Fintiv* and *Sotera*, discretionary denial is not warranted.

Fintiv Factor 1 is neutral: As Patent Owner (“PO”) acknowledges, this factor is at best neutral as the motion to stay remains pending. Moreover, in EDTX, motions for stays are routinely granted where all asserted claims are under PTAB review. *See AGIS Software Dev. LLC v. Google LLC*, No. 2:19-cv-361, 2021 WL 465424, at *3 (E.D. Tex. Feb. 9, 2021) (“[W]here the PTAB has instituted IPR proceedings ... this Court has likewise routinely stayed cases[.]”).

Fintiv Factor 2 is neutral: In view of EDTX’s growing backlog of cases and Petitioner’s offered *Sotera* stipulation, *infra*, the potential for conflict between the district court case and the instant IPR proceeding is minimal. *See* Ex. 1042 (showing median time-to-trial having increased further from 21.9 to 23.0 months).

Fintiv Factor 3 favors institution: As PO acknowledges, there will have been no court-issued substantive orders related to the ’689 Patent by the institution deadline, and fact discovery will also remain open. Moreover, the instant Petition was filed within four months of PO’s amended complaint of May 15, 2024, in which SKN asserted an additional patent, thereby impacting Petitioner’s preparation efforts and timeline. *See* Ex. 1043 (amended complaint).

Fintiv Factor 4 favors institution: Petitioner hereby stipulates that, should the

Petition be granted, Petitioner will not pursue in the parallel district court proceeding the same grounds as in this Petition or any grounds that could have reasonably been raised in this Petition pursuant to *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020). *See* Ex. 1044.

Fintiv Factor 5 is neutral: As noted, parties in the litigation are the same.

Fintiv Factor 6 favors institution: PO's Factor 6 assertion that "Petitioner provides nothing more than a bare statement that 'the Petition presents a compelling case of invalidity'" (POPR, 15) ignores the robust disclosures of the references in the Petition's two advanced obviousness grounds. Indeed, the strength of the cited references, and the Petition's explanation of their applicability to the Challenged Claims, belies PO's position.

First, PO's assertion that the "Petition fails to demonstrate: ... that peak count (P_c) is disclosed or suggested by any combination" (POPR, 15-16) is false. Rather, as explained in the Petition, the cited references—including DIN EN ISO 4287 standard and the MahrSurf M300 equipment manual—explicitly show that P_c (R_{pc}) can be calculated as a *sampling length L* (reference length) *divided by R_{sm}* (see SOLUS-1019, 20), *specifically noting that* "[w]hen *calculating* the peak count number [P_c], *a height discrimination threshold of R_{sm} being $\pm 0.5 \mu m$ is recommended*" (see SOLUS-1019, 21 "NOTE 2"). *See* Petition, 24-25 (citing SOLUS-1019, 20-21, SOLUS-1020, 41, and SOLUS-1003 ¶¶76-78). Indeed, the

established correlation between Pc and Rsm within a defined sampling length L, with “*a height discrimination threshold [of] $\pm 0.5 \mu\text{m}$* ,” grounded in standard industry references, directly contradicts PO’s assertions.

Second, PO’s assertion that the “Petition fails to demonstrate: ... why the claimed features would be applied on both sides of the foil” (POPR, 15-16) disregards the extensive, corroborated explanations provided in the Petition. For example, as detailed in the Petition, Shinozaki teaches that both surfaces (shiny and matte surfaces) of electrolytic copper foil exhibit similar roughness characteristics, a well-established industry practice corroborated by additional references and expert declaration. *See* Petition, 34, 44, 68-69 (citing e.g., SOLUS-1004, [0122], [0074] and SOLUS-1008, [0005], [0008] (“It is within the *conventional knowledge* that in a process for producing an electrodeposited copper foil ... the difference in roughness between gloss surface and roughness surface can be made as small as possible”). These disclosures, along with other cited art, clearly demonstrate that a POSITA would spontaneously apply similar surface profile and roughness characteristics, including Pc, to both sides, directly refuting the PO’s assertion. Additionally, the Petition provides corroborated explanations for applying protective layers on both surfaces, supported by cited references and expert declaration. *See* Petition, 14-15, 62-63; *see also* SOLUS-1003, ¶¶53-55, 172-173. As explained in the Petition (*see, e.g.*, Petition, 14-15) and expert

declaration (*see, e.g.*, SOLUS 1003, ¶¶53-55), the active material is typically formed on both surfaces of the current collector substrate in secondary batteries, and each side can require a protective layer (e.g., for rust prevention, corrosion prevention, or adhesion promotion), as supported by Toshio, Kim, and Dr. Randall. *See id.* This is far from a conclusory assertion, and the PO's assertion disregards the corroborated explanations provided in the Petition.

Third, PO's assertion that the "Petition fails to demonstrate: 1) any motivation to combine Khatibi with either primary reference, 2) that any of the combinations disclose the specific CTE and tensile strength measurement conditions of the independent claims" (POPR, 15) mischaracterizes the Petition's approach and disregards the extensive explanations provided in the Petition.

Specifically, the Petition includes dedicated sections demonstrating how Khatibi discloses coefficient of thermal expansion (CTE) values for electrodeposited (ED) copper foils as a function of temperature and thickness. *See* Petition, 8-9, 13, 53-55, 61. Moreover, the Petition provides extensive corroborated explanation that the claimed CTE and tensile strength conditions are obvious. *See id.*, 15-19, 63-66. For instance, the Petition explains that the broad claimed tensile strength range (21-36 kgf/mm²) is minimally affected by heating at 190°C for 1 hour—a conclusion corroborated by prior art such as Sano, which shows that most tensile values at 180°C fall within or bracket that range. *See id.*, 66.

Ultimately, the strength of the two independent, detailed obviousness grounds, bolstered by extensive argument, expert testimony, and evidentiary support, weighs in favor of institution and the benefit of a full record and briefing by the parties.

§325(d) – Advanced Bionics Test Favors Institution: There is no dispute that Shinozaki, Khatibi, and Toshio, on which Ground 1 is based, as well as Khatibi and Griesi, which are used to modify Kim in Ground 2, were not presented to the Office during prosecution. As for Kim, whose Japanese counterpart PO argues was “previously before the office” (POPR, 17), there is no dispute that the examiner did not substantively evaluate, or base any rejections on, Kim or any of its alleged counterparts during prosecution of the ’689 Patent. Thus, “there is no evidence that any of the combinations asserted in the [p]etition were previously considered by the Office at all, let alone for the challenged claims.” *Bowtech Inc. v. MCP IP, LLC*, IPR2019-00383, Paper 14 at 4–5 (PTAB Aug. 6, 2019) (declining to deny institution under § 325(d)); *see also Edwards Lifesciences Corp. v. Boston Sci. SciMed, Inc.*, IPR2017-01295, Paper 9 at 25–27 (PTAB Oct. 25, 2017).

Ultimately, the invalidity grounds presented in the Petition are substantively distinct from those considered by the Examiner during prosecution and demand different factual determinations that were neither asked nor answered during prosecution.

Dated: March 3, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e), the undersigned certifies that on March 3, 2025, a complete and entire copy of this Petitioner's Reply to Patent Owner's Preliminary Response was provided by email, to the Patent Owner, by serving the correspondence address of record as follows:

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