

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SOLUS ADVANCED MATERIALS CO., LTD.,  
Petitioner,

v.

SK NEXILIS CO., LTD.,  
Patent Owner.

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

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

**LIST OF EXHIBITS**

|            |                                                                                                                                                                                                |
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| SOLUS-1001 | U.S. Patent No. 11,346,014 (“’014 Patent”)                                                                                                                                                     |
| SOLUS-1002 | Excerpt of File History of the ’014 Patent                                                                                                                                                     |
| SOLUS-1003 | Declaration of Dr. Jack Josefowicz                                                                                                                                                             |
| SOLUS-1004 | U.S. Patent Application Publication No. 2010/0136434 (“Hanafusa”)                                                                                                                              |
| SOLUS-1005 | U.S. Patent No. 8,715,836 (“Dobashi”)                                                                                                                                                          |
| SOLUS-1006 | U.S. Patent No. 11,142,838 (“Lee”)                                                                                                                                                             |
| SOLUS-1007 | U.S. Patent No. 9,209,485 (“Cheng”)                                                                                                                                                            |
| SOLUS-1008 | U.S. Patent No. 8,349,518 (“Kim”)                                                                                                                                                              |
| SOLUS-1009 | Song, Jenn-Ming et al., <i>Texture and temperature dependence on the mechanical characteristics of copper electrodeposits</i> , Materials Science & Engineering A 559, 655-664 (2013) (“Song”) |
| SOLUS-1010 | Geometrical Product Specifications (GPS)—Surface texture: Profile method—Terms, definitions and surface texture parameters, JIS B 0601:(2001) (“JIS B 0601 (2001)”)                            |
| SOLUS-1011 | Surface Texture (Surface Roughness, Waviness, and Lay), ASME B46.1-2009, August 20, 2010 (“ASME 2009”)                                                                                         |
| SOLUS-1012 | U.S. Patent No. 4,981,560 (“Kajihara”)                                                                                                                                                         |
| SOLUS-1013 | U.S. Patent Application Publication No. 2012/0205146 (“Oguro”)                                                                                                                                 |
| SOLUS-1014 | [RESERVED]                                                                                                                                                                                     |

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| SOLUS-1015 | [RESERVED]                                                                                                                                                                                                                                                 |
| SOLUS-1016 | [RESERVED]                                                                                                                                                                                                                                                 |
| SOLUS-1017 | <i>The ABC's of Arc Welding</i> , KOBELCO, available at <a href="https://www.kobelco-welding.jp/education-center/abc/ABC_2005-04.html">https://www.kobelco-welding.jp/education-center/abc/ABC_2005-04.html</a> , retrieved on August 22, 2024 (“KOBELCO”) |
| SOLUS-1018 | [RESERVED]                                                                                                                                                                                                                                                 |
| SOLUS-1019 | Barclay, William R. et al., <i>Electroplating—A Treatise on the Electro-Deposition of Metals with a Chapter on Metal-Colouring and Bronzing</i> , London-Edward-Arnold, 1912                                                                               |
| SOLUS-1020 | Kim, Jongsoo, et al., Effects of Organic Additives on Residual Stress and Surface Roughness of Electroplated Copper for Flexible PCB, <i>Corrosion Science and Technology</i> , Vol. 6, No. 4 (2007), pp.154-158                                           |
| SOLUS-1021 | ISO-6892-1, Metallic materials—Tensile testing—Part 1: Method of test at room temperature, International Standard, 2009                                                                                                                                    |
| SOLUS-1022 | IPC-TM-650, Test Methods Manual, Tensile Strength and Elongation, In-House Plating, No. 2.4.18.1, 05/04                                                                                                                                                    |
| SOLUS-1023 | Zhu, Jianyu, et al., <i>Mechanical properties of commercial copper current collector foils</i> , The Royal Society of Chemistry, 2013                                                                                                                      |
| SOLUS-1024 | <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , Case 2-23-cv-00539 (EDTX), Proposed Scheduling Order                                                                                                                            |
| SOLUS-1025 | <i>SK nexilis Co., Ltd. v. Solus Advanced Materials Co., Ltd. et al.</i> , Case 2-23-cv-00539 (EDTX), Motion to Transfer Venue                                                                                                                             |

- SOLUS-1026 Board Email of February 24, 2025 authorizing Petitioner's Reply
- SOLUS-1027 Federal Court Management Statistics (Dec. 31, 2024)
- SOLUS-1028 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-1029 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. 1026. 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. 1027 (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 ’014 Patent by the DI 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 the list of asserted patents was expanded, thereby adding further strain and uncertainty to Petitioner’s preparation efforts. *See* Ex. 1028 (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. 1029 (stipulation letter).

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

**Fintiv Factor 6 favors institution:** PO's assertion that "the Petition does not provide a compelling, meritorious challenge" ignores the robust disclosures of the references in the Petition's advanced obviousness grounds. POPR, 11. The strength of the cited art and the Petition's explanation of its applicability to the Challenged Claims provide a case of invalidity that is sufficient to warrant institution.

Specifically, PO argues that "Petitioner fails to demonstrate: 1) the cited references disclose or suggest an Rp value that could be used to satisfy the claimed BC range of 1.5 to 9.4, 2) the cited references disclose or suggest a peak density value that could be used to satisfy the claimed BC range, and 3) a motivation to combine and/or a reasonable expectation of success in combining the references for any Ground." POPR, 17-18 (citing Section VI). This assertion—based solely on attorney argument—disregards the extensive, corroborated explanations for the Hanafusa-Dobashi combinations that are provided in the Petition.

First, the Petition precisely articulates how the Rp value, as one of three

variables for the claimed Binding Coefficient (BC) range, is disclosed by Hanafusa's Rz value, ultimately showing that the Hanafusa-Dobashi electrolytic copper foil satisfies the claimed BC range. *See* Petition, 9, 16-21, 28-32; *see also* SOLUS-1003, ¶¶60-70, 82-88. Specifically, the Petition discusses at length how "Rz" as disclosed in Hanafusa is expressly defined in the JIS B 0601 (2001) standard referenced in the Challenged Claims as well as another known and applicable standard. Petition, 17-21; SOLUS-1003, ¶¶64-70. The Petition further demonstrates how Hanafusa's Rz is translated to disclose the Rp value, which is clearly smaller than Rz, and how Rz contributes to the claimed BC range. *See* Petition, 16-21, 28-32; *see also* SOLUS-1003, ¶¶60-70, 82-88.

Second, contrary to PO's argument as to the peak density (POPR, 17), the Petition demonstrates how the claimed peak density is derived from RSm in the Hanafusa-Dobashi combination, although RSm is not necessarily a value identical to the claimed peak density. Petition, 21-27; SOLUS-1003, ¶¶71-80. Indeed, the Petition demonstrates that Dobashi reveals a ceiling as to the peak density possible in the Hanafusa-Dobashi combination copper foil. *See* Petition, 10 ("As Dr. Josefowicz demonstrates, the disclosed PV is used to put upper limits on the peak density values corresponding to Dobashi's RSm values[.]"), 26-27 ("As such, a POSITA would have treated the calculated matte side Peak Density as upper bounds on the matte side Peak Density obtained using the cited standard  $\pm 0.5 \mu\text{m}$

discrimination lines.”), 29; *see also* SOLUS-1003, ¶¶48-49, 71-80, 83, 85-88.

Specifically, the Petition discussed that most (if not all) of Dobashi’s peaks will fail to be counted as SAE peaks, thus setting upper bounds to the peak density possible in the Hanafusa-Dobashi combination copper foil, ultimately showing that the combination satisfies the claimed BC range. *Id.*

Third, PO’s argument as to “a motivation to combine and/or a reasonable expectation of success” (POPR, 18) simply attempts to downplay the Petition’s multiple arguments for the Hanafusa-Dobashi combination supported by expert testimony and evidence. Petition, 9-12, 52-53; SOLUS-1003, ¶¶27-52, 124.

Contrary to PO’s argument (POPR, 38 (“Simply arguing that a combination of art would have been obvious, without some articulated rationale, ‘is inadequate to support a finding that there would have been a motivation to combine.”)), the Petition clearly articulated how a POSITA would have been motivated to apply Dobashi’s disclosure of surface roughness in its “surface-treated electro-deposited copper foil” (Petition, 8 (citing SOLUS-1005, Abstract)) to a similar electrolytic copper foil in Hanafusa. Petition, 10-12; SOLUS-1003, ¶¶50-52. As one example, the Petition discussed how a POSITA would have turned to Dobashi to fulfill Hanafusa’s intended purpose (e.g., a smooth surface in the electrolytic copper foil), and this reason alone should be sufficient to show the motivation to combine two references. Indeed, Hanafusa identifies the need for a smooth surface in the field of

electrolytic copper foils and this need is addressed by Dobashi's surface roughness disclosure. *See Auris Health, Inc. v. Intuitive Surgical Operations, Inc.*, 32 F.4th 1154, 1158-59 (Fed. Cir. 2022) ("As to the 'would have' question, 'any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.'" (quoting *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 420 (2007))).

Further, PO's assertion that the Petition fails to demonstrate a reasonable expectation of success for the combination disregards the explicit discussion on the compatible technical areas in both references and how the combination amounts to the application of known techniques to a known structure to yield predictable results of surface properties in the electrolytic copper foil. Petition, 9-11. Indeed, the Petition presents extensive argument, expert testimony, and evidentiary support as to how Hanafusa would have led a POSITA to turn to Dobashi for improvement (*see* Petition, 7 (citing SOLUS-1004, [0029], [0030], [0023])), and how various surface properties (e.g., Rp, Rz, PD, RSm) disclosed in Hanafusa and Dobashi are closely linked to each other in the combined system (*see* Petition, 9-10, 16-27).

Overall, PO's assertions, based merely on attorney arguments, that "the Petition does not provide a compelling, meritorious challenge" fails to withstand scrutiny. POPR, 11. The strength of the asserted grounds, bolstered by extensive argument, expert testimony, and evidentiary support, weighs in favor of institution.

Date: 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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