

FILED ON BEHALF OF:  
SHANGHAI JINKO GREEN ENERGY ENTERPRISE MANAGEMENT  
Co., LTD. AND ZHEJIANG JINKO SOLAR Co., LTD.

IPR2026-00230  
U.S. Patent 11,824,136

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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SEG MANUFACTURING INC., NEW ENERGY IMPORTS INC., SEG SOLAR  
INC., PT. SEG SOLAR MANUFAKTUR INDONESIA, and SEG ENERGY  
SINGAPORE PTE. LTD.

Petitioners,

v.

SHANGHAI JINKO GREEN ENERGY ENTERPRISE MANAGEMENT CO.,  
LTD. and ZHEJIANG JINKO SOLAR CO., LTD.

Patent Owners.

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Case No. IPR2026-00230

U.S. Patent No. 11,824,136

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**PATENT OWNERS' PRELIMINARY RESPONSE**

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**EXHIBIT LIST**

| <b>Exhibit No.</b> | <b>Description</b>                                                                                                                                                                                                                                          |
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| 2001               | Non-Final Office Action mailed Aug. 19, 2025, in U.S. Patent Application No. 18/888,868.                                                                                                                                                                    |
| 2002               | Non-Final Office Action mailed Apr. 10, 2024, in U.S. Patent Application No. 18/367,235.                                                                                                                                                                    |
| 2003               | Non-Final Office Action mailed Nov. 13, 2023, in U.S. Patent Application No. 18/132,796.                                                                                                                                                                    |
| 2004               | Non-Final Office Action mailed June 30, 2023, in U.S. Patent Application No. 18/071,430.                                                                                                                                                                    |
| 2005               | Non-Final Office Action mailed May 12, 2023, in U.S. Patent Application No. 17/964,190.                                                                                                                                                                     |
| 2006               | PDF printout of SunHub, “HJT Vs. TOPCon Solar Panels: Key Differences Explained,” <a href="https://www.sunhub.com/blog/hjt-vs-topcon-solar-panels-whats-the-difference/">https://www.sunhub.com/blog/hjt-vs-topcon-solar-panels-whats-the-difference/</a> . |
| 2007               | Order, Arc Medical Design Ltd. v. Medivators Inc., No. 4:21-CV-929, Dkt. 36 (S.D. Tex. June 24, 2021) (Bennett, J.).                                                                                                                                        |
| 2008               | Order, Sandbox Logistics LLC v. Grit Energy Solutions LLC, No. 3:16-CV-012, Dkt. 147 (S.D. Tex. Feb. 23, 2018) (Hanks, J.).                                                                                                                                 |
| 2009               | Joint Stipulation of Dismissal, Shanghai Jinko Green Energy Enterprise Management Co. v. Vietnam Sunergy Joint Stock Co., No. 3:24-cv-08828, Dkt. 81 (N.D. Cal.).                                                                                           |
| 2010               | JinkoSolar (U.S.) Industries Inc., “Jacksonville,” <a href="https://jinkosolar.us/jax">https://jinkosolar.us/jax</a> .                                                                                                                                      |
| 2011               | JinkoSolar Holding Co., Ltd., First Quarter 2024 Financial Results (Apr. 2024).                                                                                                                                                                             |

| Exhibit No. | Description                                                                                                                                                                                                                                                                                     |
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| 2013        | Declaration attaching complaint in RG19022089.                                                                                                                                                                                                                                                  |
| 2014        | Declaration of Dr. Miltiadis Hatalis in Support of Patent Owner's Preliminary Response.                                                                                                                                                                                                         |
| 2015        | Choi et al., Structural evolution of tunneling oxide passivating contact upon thermal annealing, Sci. Rep. 7:12853 (2017).                                                                                                                                                                      |
| 2016        | Glunz et al., Silicon-based passivating contacts: The TOPCon route, Prog. Photovolt. Res. Appl. 31:341-359 (2023).                                                                                                                                                                              |
| 2017        | Tan, Boudreau & Reed, Anisotropic Etching of Silicon on {111} and Near {111} Planes, Sensors & Materials 13(5):303-313 (2001).                                                                                                                                                                  |
| 2018        | Fields, Ahmad et al., The formation mechanism for printed silver-contacts for silicon solar cells, Nat. Commun. 7:11143 (2016).                                                                                                                                                                 |

## **I. Introduction**

The '136 Patent is directed to a type of solar cell technology, referred to as TOPCon (Tunnel Oxide Passivated Contact). Petitioner would have the Board believe that any TOPCon reference invalidates the '136 Patent. Petitioner's real challenge (Ground 1/1A) takes a generic TOPCon reference (Ye) and states that all of the '136 Patent's structural limitations that exist above and beyond TOPCon are inherently in every single device. This, however, is not the case.

The '136 Patent does not describe TOPCon, generally. It claims a TOPCon solar cell structure, that has a very specific morphology. It requires, among other items, that certain layers have substructures that are "partially stacked" have sizing requirements where the "first substructure is less than or equal to 45  $\mu\text{m}$ " and a "pyramid-shaped microstructure is less than or equal to 5  $\mu\text{m}$ ." These are structural limitations that cannot simply be ignored as Petitioner has done.

Before introducing the per-ground merits, as a threshold issue, every ground rests on prior art that omits those above-mentioned structural claim limitations. The Petition takes a generic TOPCon reference (Ye) and fills each structural gap with Dr. Schubert's declaration, where he admits that he does exactly what the July 31, 2025 USPTO Guidance forbids: supplying missing claim elements from what he purports to be a POSITA's general knowledge or common sense. This is a threshold issue that warrants denial on merits; Petitioner's art, unambiguously,

lacks certain structural claim limitations that cannot be gap-filled by expert testimony.

Petitioner's grounds have further deficiencies. For Ground 1, Ye and Basu say nothing about several claim limitations, including the rear-substructure size, partial stacking, or the claim 13 module. Petitioner supplies these structural limitations with expert testimony. Worse still, Petitioner, via relying upon its expert for one limitation, reads it out of the claims entirely. The claim limitation "first substructure is less than or equal to 45  $\mu\text{m}$ ," which is lacking in Ye, is gap filled by Petitioner's expert. But, Petitioner's expert interprets this structural limitation as "non-zero," reading it out entirely. Petitioner also fails to properly articulate a challenge to 1[e]'s requirement that the "first passivation layer [is] located on the second texture structure."

Ground 1 further lacks a motivation to combine because Ye and Basu are different architectures, and Petitioner's stated benefit of Basu (decreased pyramid height) does not match with Basu's actual teachings. Basu is not about height, generally, but pyramid density as the benefit. When dealing with height specifically, Basu does not ascribe benefit to it. Petitioner's motivation for Basu falls short. Petitioner's combination also disregards Ye's own expressly preferred, higher-efficiency cell architecture.

For Ground 1A, Petitioner adds Yun to Ye and Basu but it has serious motivational defects. First, the whole premise its motivation relies upon is faulty. Petitioner misstates Ye as teaching mechanical polishing, where a POSITA would be motivated to use Yun's chemical processing instead. This is wrong; Ye teaches chemical processing and, as a consequence, Petitioner's premise is wholly wrong. The combination is also defective because it smashes together three different devices, without describing which features from which device are being used. Finally, using Yun's geometry into Ye would not be feasible. Further still, this combination, even if motivation is assumed, still lacks teachings for 1[e].

Petitioner's other independent claim analysis is based on Sakai in Grounds 6 and 6A. These grounds are defective on their face; Sakai was already examined and the Examiner found the very same limitation lacking in Sakai that the Patent Owner Preliminary Response now argues. The claim requires a "non-pyramid-shaped" structure for 1[b], and Sakai very explicitly has "pyramid-shaped." The exact quote Petitioner relies upon in Sakai's [0045] states "[a] specific example of the texture is a pyramid-shaped (quadrangular pyramid-shaped or truncated quadrangular pyramid shaped)." Even assuming [0045] taught non-pyramid shaped, 1[b] and 1[c] requires non-pyramid and pyramid shaped structures, respectively. Sakai teaches symmetrical structures and cannot teach the asymmetric structure described in claim 1.

Ground 6A does not cure these deficiencies and suffers from more motivational arguments. Specifically, Petitioner still relies on Ground 6's teachings for 1[b] and 1[c], and the structural asymmetry of the non-pyramid/pyramid still fails. Ground 6A further fails on a motivation to combine because the combination of Yun defeats Sakai's purpose and they present an architectural mismatch.

Finally, the Petition has further defects. Namely, for nearly all substantive limitations, the expert declaration is a verbatim copy of the Petition. This is very problematic here, where Petitioner relies exclusively on expert testimony to supply limitations that are wholly absent from the art.

Petitioner's other grounds are all directed to dependent claims, and rise and fall with Grounds 1, 1A, 6, and 6A.

The Petition should be denied because it fails to present a reasonable likelihood of success under 35 U.S.C. § 314. The above, and more, is described herein.

## II. The Petition Fails at a Threshold Level

Every ground rests on prior art that fails to disclose required claim limitations, and Petitioner uses Dr. Schubert's declaration to fill those gaps. That is precisely the methodology the July 31, 2025 USPTO Guidance<sup>1</sup> forbids:

“enforcement of Rule 104(b)(4) means that applicant admitted prior art (AAPA), *expert testimony*, common sense, and other evidence that is not ‘prior art consisting of patents or printed publications’ (collectively, “general knowledge”) *may not be used to supply a missing claim limitation.*” (emphasis added.)

Dr. Schubert acknowledges he applies the methodology the Guidance forbids. In the Legal Standards section of his declaration, he states:

“I understand that obviousness may be established based on a single prior art reference where *any missing claim elements would have been supplied by the general knowledge or common sense of a POSITA*, including the routine ability to optimize a known result-effective variable.” (EX1003 at ¶ 42 (emphasis added).)

“I understand that a claim may be deemed invalid for obviousness in light of a single prior art reference, without the need to combine references, *if the elements of the claim that are not found in the reference can be supplied by the knowledge or common sense of one of*

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<sup>1</sup> Available at

[https://www.uspto.gov/sites/default/files/documents/aapa\\_memo\\_final\\_signed.pdf](https://www.uspto.gov/sites/default/files/documents/aapa_memo_final_signed.pdf)

*ordinary skill in the relevant art.*” (EX1003 ¶ 43 (emphasis added).)

These are not isolated remarks. They state the legal-standards framework Dr. Schubert applies throughout his declaration. Each ground follows the same pattern: the prior art does not disclose a required element, and Dr. Schubert’s declaration is relied upon to teach it. The Preliminary Response addresses each instance in detail; the summary below identifies them:

- For Ground 1, (Ye and Basu) that lacks several limitations: 1[b] “first substructure is less than or equal to 45  $\mu\text{m}$ ” (Pet. at 24); 1[b] the “partially stacked” requirement (Pet. at 25 n.5); and the same cell-structure limitations re-recited in claim 13 (Pet. at 84). The Petition relies on Dr. Schubert to supply each. EX1003 ¶ 90 (size); ¶¶ 89, 92 (stacking). Petitioner’s claim-13 “module/strings” showing (Pet. at 37; EX1003 ¶¶ 114-115; EX1015 at 133) does not cure those cell-level failures, which claim 13 re-recites verbatim. *See* §§ IV.A.1(a)(1), IV.A.1(a)(2), V.
- Ground 1A (Ye, Basu, and Yun) carries forward the same gaps for the 45  $\mu\text{m}$  and claim 13 module limitations and adds Yun for the “partially stacked” requirement of claim 1[b]. Pet. at 25 n.5; 86-87. It relies on the same Dr. Schubert testimony for size (EX1003 ¶ 90) and on EX1003 ¶ 92 (cross-referencing Yun) for stacking. Petitioner’s module/strings showing

for claim 13 (EX1003 ¶¶ 114-115, 165) does not cure those same cell-structure failures, which claim 13 re-recites. *See* §§ IV.A.1(a)(1), IV.A.1(a)(2), IV.A.2(a), V.

- For Ground 6, the Petition relies on art (Sakai) that lacks: 1[b] the “non-pyramid-shaped” requirement and 1[c] “pyramid-shaped” requirement on the either end (Pet. at 71-73; EX1003 ¶¶ 262-263); and the same cell-structure limitations re-recited in claim 13 (Pet. at 84). The Petition relies on Dr. Schubert to supply each. EX1003 ¶ 263 (non-pyramid); Pet. at 71-72. Petitioner’s claim-13 module/strings showing (EX1003 ¶ 288; Sakai’s passing mention of a “solar cell module,” EX1009 [0038]) does not cure the cell-structure failures, which claim 13 re-recites. *See* §§ IV.B.2, V.
- Ground 6A (Sakai and Yun) carries forward Ground 6’s gaps and adds Yun for the partial-stacking requirement of claim 1[b]. Pet. at 86-87. It relies on the same Dr. Schubert testimony for the non-pyramid limitation (EX1003 ¶ 263) and on EX1003 ¶ 92 (cross-referencing Yun) for stacking. Petitioner’s claim-13 module/strings showing (EX1003 ¶ 288) does not cure those cell-structure failures, which claim 13 re-recites. *See* §§ IV.B.2, IV.B.4(b)(1), IV.B.4(b)(2), V.

The Petition violates 35 U.S.C. § 311(b) (limiting IPR challenges to grounds “only on the basis of prior art consisting of patents or printed publications”), 37

C.F.R. § 42.104(b)(4) (requiring the petition to “specify where each element of the claim is found in the prior art patents or printed publications relied upon”), and the July 31, 2025 USPTO Guidance implementing that regulation. *See also Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367, 1376-77 (Fed. Cir. 2022) (general knowledge may not substitute for printed-publication disclosure of a missing limitation under § 311(b)); *Qualcomm Inc. v. Apple Inc.*, 134 F.4th 1355, 1364-65 (Fed. Cir. 2025) (material outside “prior art consisting of patents or printed publications” cannot form the “basis” of an IPR ground).)

Petitioner’s violations are repeated and express, warranting denial.

### **III. Technology Background**

#### **A. The ‘136 Patent and Background**

The ’136 Patent solves a problem for TOPCon solar cells: non-uniform tunnel-oxide growth on the flat-polished rear. (EX1001 at 1:21-37; *id.* at 5:1-19; EX2014 at ¶¶ 66, 80, 88-90.) The rear microstructure controls rear roughness so the tunnel oxide grows uniformly. (*Id.* at 7:15-29, 7:62-8:9, 9:30-40; EX2014 at ¶¶ 80, 90.)

TOPCon achieves passivated rear contact through a tunnel effect that requires an extremely thin tunnel oxide, which cannot tolerate an uneven surface beneath it. (EX1001 at 7:62-8:9; EX2014 at ¶¶ 52, 54, 74, 77.) The oxide layer

conforms to whatever surface lies beneath it, so rear topography dictates how uniformly the oxide grows. (EX1001 at 7:62-8:9, 9:30-40; EX2014 at ¶¶ 76-79.)

The prior-art baseline of a flat-polished rear produces a topography that “may directly affect the manufacturing of the tunnel oxide layer and the polycrystalline silicon layer, and then affect passivation performance and conversion efficiency.” (EX1001 at 1:30-37.) Non-uniform oxide growth drives local doping spikes in the overlying polysilicon and increases contact resistivity. (EX2014 at ¶¶ 75, 89.) (*Id.* at 7:15-29; *see also* EX2015 at 1 (Abstract), 8 (Results & Discussion) (locally reduced tunnel oxide “deteriorates the carrier selectivity of the TOPCon passivating contact”).)

The claimed solution eliminates inefficiencies by changing rear geometry. Specifically, the '136 Patent claims a non-pyramid rear microstructure of polygonal-topped first substructures, partially stacked, with one-dimensional top-surface size  $\leq 45 \mu\text{m}$ . (EX1001 claim 1[b]; *id.* at 5:55-7:29.) Each polygonal-topped substructure presents a flat top surface on which the tunnel oxide and doped polycrystalline silicon are uniformly deposited. (*Id.* at 8:62-9:1; EX2014 at ¶¶ 80, 86, 90.) Uniform deposition holds while the top surfaces remain small enough to control rear roughness; the claimed cap is  $45 \mu\text{m}$ . (*Id.* at 8:41-50; EX2014 at ¶¶ 80, 86, 90.)

Annotated Figure 1 maps each claim 1 element to the physical structure of the claimed cell.

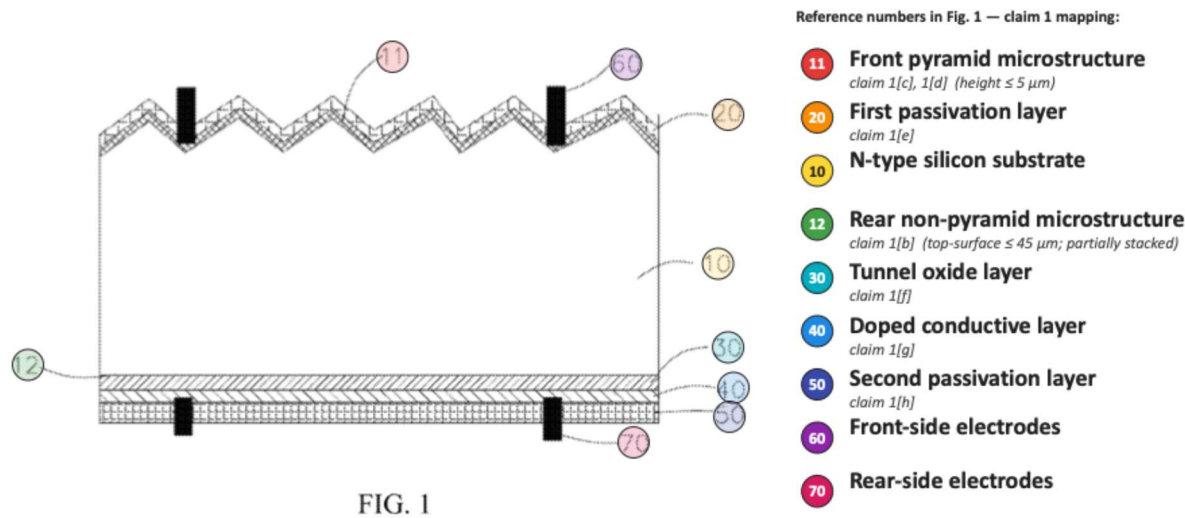
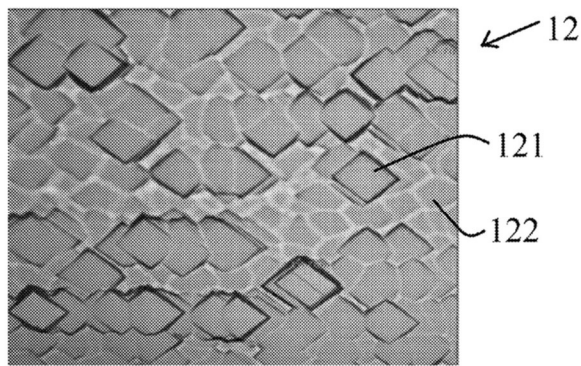
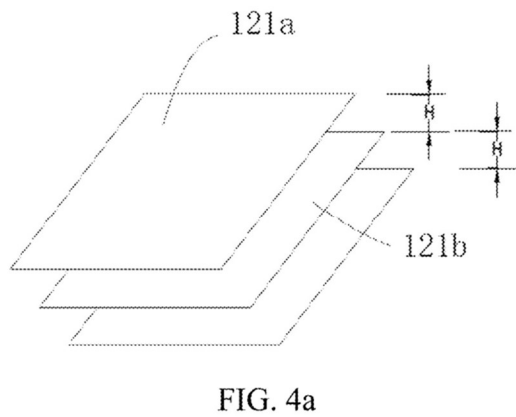


Figure 2 shows the rear-stacking geometry. The outermost first substructure (121a) sits on the adjacent substructure (121b), separated by perpendicular-direction distance H. (EX1001 at Figs. 4a, 4b.)



Claim 1 is excerpted below using the same color coding.

**Claim 1. A solar cell, comprising:**

- 1[a]  a semiconductor substrate, wherein a rear surface of the semiconductor substrate has a first texture structure;
- 1[b]  the first texture structure has a non-pyramid-shaped microstructure and includes two or more first substructures at least partially stacked on one another, a top surface of the first substructure is a polygonal plane, and a one-dimensional size of the top surface of the outermost first substructure is less than or equal to 45  $\mu\text{m}$ ;
- 1[c]  wherein a front surface of the semiconductor substrate has a second texture structure, the second texture structure includes a pyramid-shaped microstructure,
- 1[d]  in a direction away from the front surface and perpendicular to the front surface, a distance between the top portion and the bottom portion of the pyramid-shaped microstructure is less than or equal to 5  $\mu\text{m}$ ;
- 1[e]  a first passivation layer located on the second texture structure of the front surface of the semiconductor substrate;
- 1[f]  a tunnel oxide layer located on the first texture structure of the rear surface of the semiconductor substrate;
- 1[g]  a doped conductive layer located on a surface of the tunnel oxide layer; and
- 1[h]  a second passivation layer located on a surface of the doped conductive layer.

**B. Petitioner's References Span Four Distinct Cell Architectures**

The '136 Patent claims a TOPCon solar cell. A TOPCon cell is a crystalline-silicon cell whose rear contact is passivated by a stack of an ultra-thin tunnel oxide topped with a doped polycrystalline-silicon layer. (EX2014 at ¶¶ 52, 53.) That stack lets majority carriers tunnel to the metal contact while suppressing interface recombination. (EX1015 § 5.5.2.; EX2014 at ¶¶ 52, 54, 74.)

Petitioner's four references span four distinct cell architectures, only one of which (Ye) is TOPCon. (EX2014 at ¶¶ 49, 68.) Yun is PERT (passivated emitter, rear totally-diffused): a monocrystalline bifacial cell with platform-shaped (truncated-pyramid) rear texture and a *diffused* back-surface field (boron-doped for

p-type, phosphorus-doped for n-type), passivated front and rear by dielectric stacks. (EX1005 at [0007], [0029]-[0030], [0044]-[0047]; EX2014 at ¶¶ 51, 68, 130, 132.) Basu is Al-BSF (aluminum back-surface field): a monocrystalline cell with an N<sup>+</sup> phosphorus emitter, screen-printed silver front contacts, and an aluminum-paste rear that forms a p<sup>+</sup> back-surface field on firing. (EX1012 at 590, 594, 597; EX2014 at ¶¶ 50, 68, 106-107.) Sakai is heterojunction-IBC (interdigitated back contact): alternating amorphous-silicon n-type and p-type stripes patterned by shadow mask on the rear of a crystalline-silicon substrate. (EX1009 at [0004], [0032]-[0033], [0043]-[0044]; EX2014 at ¶¶ 55-56, 68, 158, 160-161.)

These architectures are different. The rear-contact schemes are not interchangeable. (EX2014 at ¶¶ 49, 54, 68, 81-82.) In PERT and Al-BSF, dopants are diffused into the silicon substrate and the metal electrode is fired through the rear passivation to contact the substrate itself. (EX2014 at ¶¶ 50-51, 62, 131, 130.) In TOPCon, the rear consists of an ultra-thin tunnel oxide capped by doped polysilicon; the electrode terminates at the polysilicon and never touches the substrate. (EX2014 at ¶¶ 52-54, 162, 132.) In heterojunction-IBC, both polarity contacts sit on the rear, separated laterally between adjacent a-Si stripes. (EX2014 at ¶¶ 55-56, 161, 163-164.) A POSITA solving TOPCon's rear-side tunnel-oxide-uniformity problem would not borrow geometry from a cell whose contact mechanism does not exist at TOPCon's rear. (EX2014 at ¶¶ 54, 66-67, 80, 82.)

Patent Owner has identified these architectural differences from the references themselves, as discussed throughout this section.

These architectural differences matter because Petitioner's mappings transplant features across cells with different carrier-selectivity mechanisms, different contact schemes, and different rear stacks, without addressing whether the borrowed features can function in their new home. (EX2014 at ¶¶ 49, 68, 81-82.) Petitioner mixes layers and features across these four architectures without demonstrating motivation to combine. (EX2014 at ¶¶ 68, 81-82.) (*See infra* §§ IV.A.1(b), IV.A.2(b), IV.B.4(b); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007); *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017).) These differences defeat the proposed combinations. (*See* EX1015 §§ 5.5.2, 5.5.3, Ch. 7 (textbook treating TOPCon (§ 5.5.2) and heterojunction-IBC (§ 5.5.3 / Ch. 7) as separate categories); EX1035 § 1 (TOPCon-vs-heterojunction architectural distinction); (EX2016) (describing distinctions); EX2014 at ¶¶ 49, 54, 68, 81-82.)

#### **IV. Grounds 1, 1A, 6, AND 6A FAIL**

##### **A. Grounds 1, 1A: Ye-Based Grounds**

Grounds 1 (Ye + Basu) and 1A (Ye + Yun + Basu) fail for two independent reasons.

First, the prior art fails to teach several structural limitations, and Petitioner attempts to bridge the gaps through expert testimony.

Second, a POSITA would not have been motivated to make the proposed combinations because Petitioner combines incompatible solar cell architectures and misattributes Basu's benefit to Ye.

**1. Ground 1 (Ye + Basu)**

**(a) Ground 1 (Ye + Basu) fails to teach limitations**

Ground 1 fails to teach several limitations.

*First*, Ye does not teach claim 1[b]'s requirement that the "first substructure is less than or equal to 45  $\mu\text{m}$ ." Ye is silent on rear-substructure size. Petitioner fills the gap through its expert's express assumption that the term means "non-zero size," reading the limitation out of the claim.

*Second*, Ye does not disclose claim 1[b]'s "partially stacked" requirement, and Petitioner relies on attorney-annotated litigation exhibits and a conditional, "to-the-extent" expert formulation to supply it.

*Third*, Petitioner fails to arrive at the "located on" positional gap in claim 1[e].

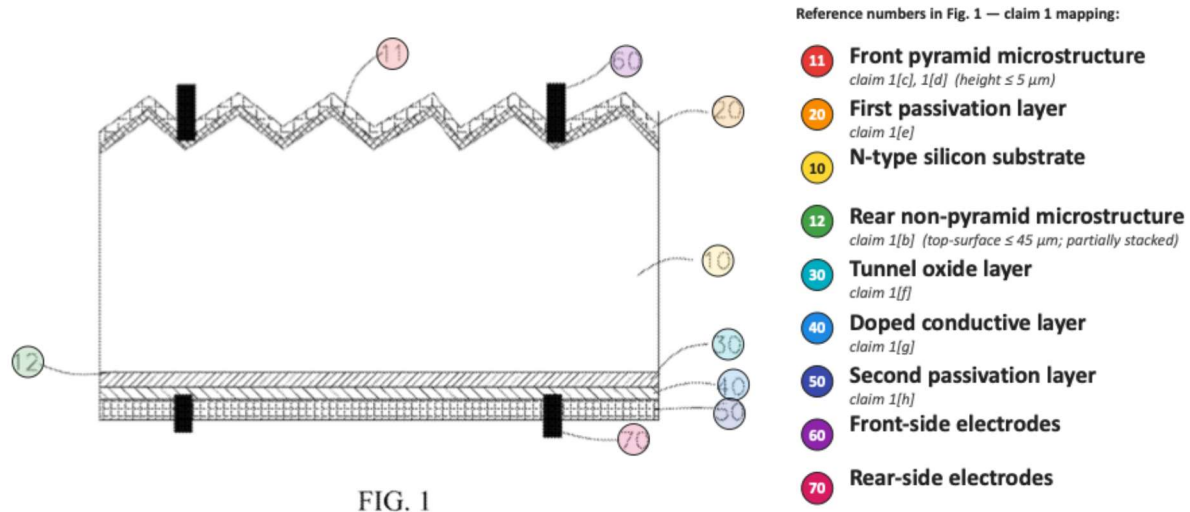
*Fourth*, the Petition's pervasive refusal to commit to any construction of claim 1[b] or 1[e] independently violates 37 C.F.R. § 42.104(b)(3)-(4).

Fifth, claim 13's photovoltaic-module limitation is absent from both Ye and Basu and is supplied only by expert.

Each defect is addressed in turn below.

**(1) 1[b] Ye does not teach “first substructure is less than or equal to 45  $\mu\text{m}$ ”**

Claim 1[b] requires that the first substructure “is less than or equal to 45  $\mu\text{m}$ .” Annotations to FIG. 1 below identify that location (green, 12).



Ye does not describe rear-microstructure size at all. Petitioner does not contend otherwise; the Petition reproduces only a figure. (Pet. at 24.) Petitioner then turns to its expert (Dr. Schubert) to supply the limitation, stating: “POSITAs would have recognized that the top surfaces of these substructures are smaller than 45  $\mu\text{m}$  in any dimensional size. EX1003, ¶¶89-90.” (Pet. at 23-24.) In effect,

Petitioner assumes every rear-surface feature satisfies the limitation. (EX2014 at ¶ 97.)

This is plain in Dr. Schubert's declaration where he states that "I assume for purposes of this proceeding that the claimed size limitation of 'less than or equal to 45  $\mu\text{m}$ ' refers to a non-zero size." (EX1003 at ¶90.) Under that assumption, any rear-microstructure satisfies the limitation because it has "a non-zero size." That construction reads the  $\leq 45 \mu\text{m}$  upper bound out of the claim and cannot be reconciled with the specification's enumerated embodiments (EX1001 at 7:10-18 (listing sub 45  $\mu\text{m}$  sizings); EX2014 at ¶ 97.). *Phillips*, 415 F.3d at 1315. Petitioner reads the limitation out of the claim through an unsupported construction buried in the expert declaration, contrary to Petitioner's obligation to set forth its construction in the Petition itself. 37 C.F.R. § 42.104(b)(3); *Revvo Techs., Inc. v. CerebrumSensor Techs., Inc.*, IPR2025-00632, Paper 20 at 3-5 (PTAB Nov. 3, 2025) (precedential); *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 at 9-10 (PTAB Aug. 29, 2014) (informative) (petitioner's obligation to articulate its position in the petition itself cannot be satisfied by incorporation of expert testimony).

Even setting that failure aside, the declaration supplies no evidence that Ye teaches a "first substructure...less than or equal to 45  $\mu\text{m}$ ." Paragraph 90 offers two rationales; neither holds.

First, Dr. Schubert imports the dimension of one layer to another by invoking “crystallographic equivalence.” Inversion symmetry of the bulk silicon lattice does not force rear topography to mirror front topography when the two surfaces undergo different processing. Petitioner offers no evidence that it does. (EX2014 at ¶ 98.) Ye’s front is anisotropically etched to form pyramids, while its rear is alkaline-polished. Alkaline polishing is a mass-removal planarization step that produces smooth, planar surfaces, the opposite of pyramidal texture. (EX2014 at ¶¶ 20, 21.) (EX1004 at ¶¶ 30, 38; EX2017 (anisotropic-etch topography on silicon is processing-dependent).)

Second, paragraph 90 imports Basu’s (and another reference, Shah’s) front-pyramid dimensions to infer Ye’s rear-polygon dimensions, but Basu reports no rear dimensions and Basu’s cells use Al-BSF rear contacts, which are not a textured rear. (EX2014 at ¶¶ 99, 105.) (EX1012 at 590, 592.) The inference assumes Ye has particular dimensions because one of Basu’s layers does. This nested inference, via expert, is precisely the type of gap-filling the rules prohibit. (EX2014 at ¶ 99.) *See, e.g., Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15-16 (PTAB Aug. 24, 2022) (precedential); USPTO July 31, 2025 Memorandum; *Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367, 1376-77 (Fed. Cir. 2022) (expert testimony cannot supply a missing claim limitation).

Paragraph 90 underscores the gap: it identifies no feature of Ye.

Ye's text confirms the silence. Ye's only references to rear processing are "double-sided alkaline polishing" (EX1004 at ¶ 30) and "backside alkaline polishing" (*id.* at ¶ 38). Ye says nothing about rear-texture dimensions, polygonal top surfaces, partial stacking, or the  $\leq 45\ \mu\text{m}$  limit. (EX2014 at ¶¶ 100, 103.)

Petitioner's reading of Ye's Figure 3—that it "shows a top view of the top surface of those substructures, which appear as four-sided polygonal planar surfaces located on the rear surface" (Pet. at 23)—ignores Ye's caption: "FIG. 3 is an optical microscope image showing a silicon-carbon thin film/silicon thin-film laminated structure without film blistering or delamination." (EX1004 at ¶ 27) Figure 3 depicts the SiCx/Si laminated stack to show the absence of blistering, not rear texture. (EX2014 at ¶¶ 104-105.)

Petitioner has accordingly failed to demonstrate that Ye teaches "first substructure is less than or equal to  $45\ \mu\text{m}$ ." (EX2014 at ¶¶ 99-102.)

**(2) 1[b] "two or more first substructures at least partially stacked on one another"**

Claim 1[b] requires "two or more first substructures at least partially stacked on one another." The specification depicts this in Fig. 3 (an electron-microscope image of first substructures 121 at least partially stacked) and in Figs. 4a and 4b (schematics of three-layer and two-layer stacks of substructures 121a/121b). (EX1001 at 5:43-6:13.)

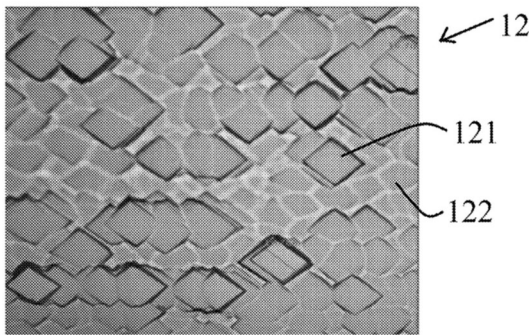


FIG. 3

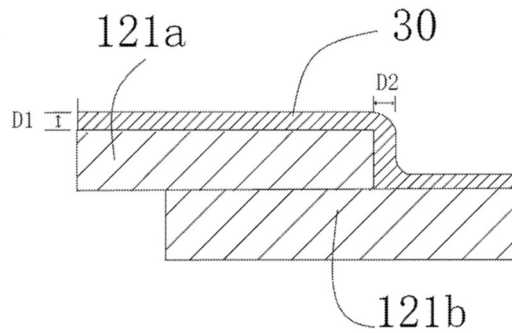


FIG. 6

Ye does not disclose “partially stacked on one another.” Petitioner’s mapping rests on a conditional claim-construction assertion supported only by side-by-side images drawn from a litigation complaint. It fails for two independent reasons.

First, Petitioner constructs a false equivalence between Ye’s Figure 3 and screenshots from Patent Owner’s litigation complaint. Petitioner relies solely on Ye’s Figure 3, pointing to two structures it labels “Y” and “Z.” (Pet. 25.) Ye’s specification says nothing about the dimensions, height differences, or orientations of those structures. (EX2014 at ¶¶ 105, 103.) Petitioner draws those inferences from the image alone. Petitioner then equates its identified structures (Y and Z) to entirely different structures (A and B) annotated in Patent Owner’s complaint, which were derived from 3D measurements of accused products. (Pet. 25; EX1021 at 8.) Petitioner’s record contains no height-difference data, dimensional data, or

other textual support from Ye that would make Y and Z analogous to A and B.

(EX2014 at ¶¶ 104-105.)

Second, Petitioner offers no construction of “at least partially stacked on one another.” It presents its Ye-based mapping “based on Patent Owner’s interpretation” (Pet. 25), and its expert echoes the same conditional formulation. (EX1003 ¶92 (“To the extent the structures labeled A and B in Patent Owner’s complaint are ‘at least partially stacked on one another’, then structures in Figure 3 of Ye labeled as Y and Z below also would be ‘at least partially stacked on one another.’”)).) Petitioner never states its own construction, never identifies what it believes Patent Owner’s construction is, and offers only a side-by-side of pictures in its place. That approach violates the Board’s rules. *See* 37 C.F.R. § 42.104(b)(3); *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 at 3-5 (PTAB Nov. 3, 2025) (precedential) (petitioner’s reservation of the right to seek different constructions elsewhere ordinarily warrants denial of institution); USPTO, Patent Trial Practice Guide (Nov. 2019) at 36-37; *Hockerson-Halberstadt, Inc. v. Avia Group Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000) (patent drawings cannot establish dimensional limitations absent textual support).

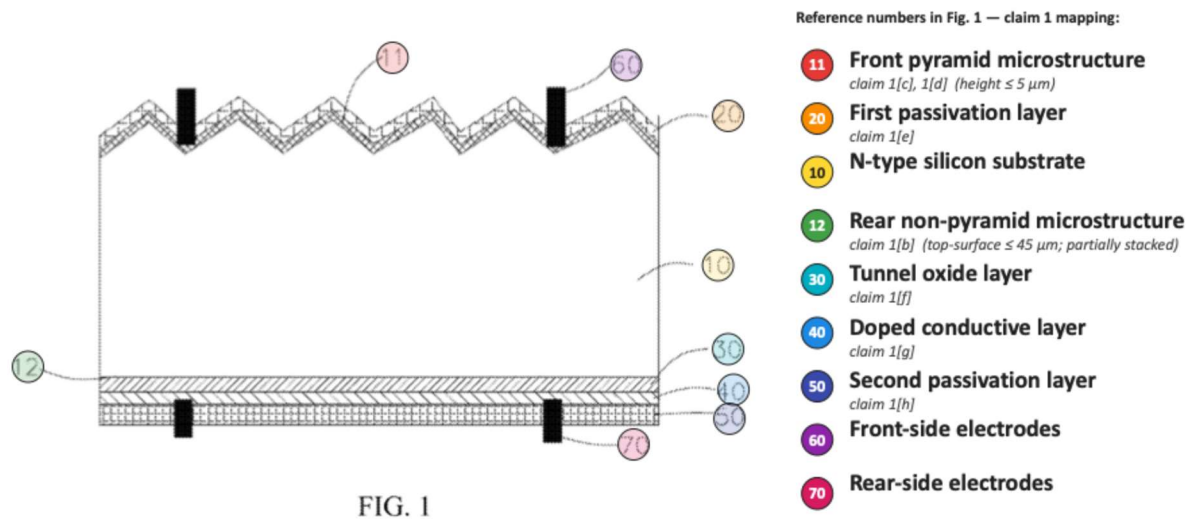
Independently, Ye’s Figure 3 is not a depiction of substrate texture at all. Ye’s specification describes Figure 3 as “an optical microscope image showing a silicon-carbon thin film/silicon thin-film laminated structure without film blistering

or delamination.” (EX1004 at [0027]; EX2014 at ¶¶ 104-105.) The figure shows a deposited passivation laminate, not the rear-surface texture topology that claim 1[b] requires. (EX2014 at ¶¶ 103, 105.)

**(3) 1[e]: “a first passivation layer located on the second texture structure.”**

Claim 1[e] requires “a first passivation layer located on the second texture structure.” The Petition does not commit to a Ye structure that satisfies this limitation. Petitioner instead offers a conditional mapping, tied to a construction it attributes to Patent Owner. Petitioner, however, has the burden to identify where the prior art is, articulate a proper interpretation. Petitioner failed to do this, and its hedged framing violates PTAB rules.

Figure 1 of the ’136 Patent depicts the claimed orientation: element 20 (first passivation layer) is located on the front pyramid microstructure (second texture structure 11). (EX1001 at FIG. 1; 5:21-31; EX2014 at ¶ 85.)

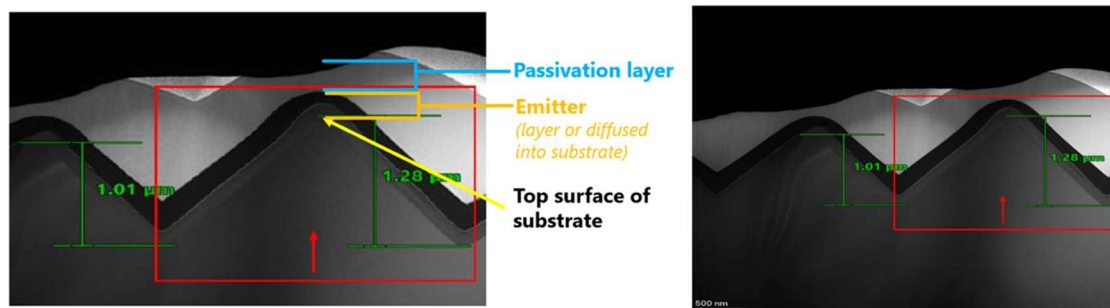


Petitioner concedes that Ye places an emitter layer between the front substrate surface and the passivation layer. (Pet. at 28 (“Ye discloses the solar cell’s front side has a passivation layer located on an emitter layer, which in turn is located on the front surface texture structure.”).)

Petitioner does not commit to a construction of “located on” that permits that intervening emitter layer. Petitioner instead defers the question, mapping Ye only “to the extent” Patent Owner reads the limitation to allow an emitter between the passivation and the substrate surface. (Pet. at 28.) Petitioner cannot have it both ways. If “located on” permits an intervening emitter, Petitioner owed the Board a construction and a corresponding analysis. Petitioner did not do this.

Instead, Petitioner presented evidence, including its own annotations, to ascribe positions to Patent Owner. Below-left are Petitioner’s annotations to the litigation figure; below-right is the underlying figure from EX1021 at 11. The

“Emitter” and “Passivation Layer” labels are Petitioner’s, not Patent Owner’s. (Pet. at 28 (“[t]he following figure from Patent Owner’s complaint more clearly illustrates what Patent Owner regards as the top of the front surface of the substrate”). Patent Owner never annotated the figure with “Emitter” or “Passivation Layer.” This is Petitioner’s fiction.



Petitioner repeats the maneuver with EX1021 at 12, attributing to Patent Owner an emitter call-out that the cited complaint figure does not make. (Pet. at 28-29.)

Petitioner’s failure is two-fold, it relies on its own characterization of Patent Owner’s litigation position and also hedges while not committing to any construction. The mapping Petitioner does present is conditional; Petitioner argues only that “to the extent” Patent Owner’s reading allows a passivation layer to sit above an emitter, “then Ye’s passivation layer, either alone or in combination with the emitter layer, also would meet that limitation.” (Pet. at 28.) This lack of commitment to any construction does not comply with the rules.

Section 42.104(b)(4) requires Petitioner to specify where each limitation is found in the prior art and to commit to a reading of the claim that makes the mapping work. Petitioner's strategy is purposely vague, and it shifts to the Board and Patent Owner the burden of resolving a construction question Petitioner itself refused to commit to or otherwise brief. *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 at 3-5 (PTAB Nov. 3, 2025) (precedential); *Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367, 1376-77 (Fed. Cir. 2022) (AAPA cannot form the basis of a § 311(b) ground); *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 at 9-10 (PTAB Aug. 29, 2014) (informative).

Petitioner's hedging denies the Board the ability to analyze Ye under the Petition's presentation of a construction of 1[e]. As a result, the Petition fails to present a reasonable likelihood of success and denial is warranted.

#### **(4) Claim 13 fails for this and additional reasons**

Claim 13 contains the same limitations as described above and fails for the same reasons. (EX1001 at claim 13; *see supra* §§ IV.A.1(a)(1)-IV.A.1(a)(3) (claim 1 limitation analyses).)

Claim 13 re-recites the cell-structure limitations of claim 1 verbatim. (EX1001 at claim 13 (a "solar cell" comprising the same rear non-pyramid microstructure, two or more partially stacked first substructures with a top surface  $\leq 45 \mu\text{m}$ , a front pyramid microstructure, a first passivation layer "located on" the

second texture, and the same rear stack).) Those limitations fail in Ye and Basu for the reasons set out in §§ IV.A.1(a)(1)-IV.A.1(a)(3), and claim 13 falls with them. Petitioner’s separate claim-13 showing for the module/strings preamble (Pet. at 37; EX1003 at ¶¶ 114-115; EX1015 at 133) addresses none of those cell-level gaps and fails for the same reasons. (EX2014 at ¶ 128.)

Claim 13 fails for an independent reason, Petitioner relies entirely on expert testimony for structural features. Claim 13 further requires, “a photovoltaic module” and “solar cell strings.” Petitioner relies exclusively on its expert to supply these structural limitations. This violates the PTAB’s rules. *See* July 31, 2025 USPTO Guidance; 35 U.S.C. § 311(b); 37 C.F.R. § 42.104(b)(4); *Qualcomm*, 24 F.4th at 1376-77; *Qualcomm*, 134 F.4th at 1364-65.

**(i) Petitioner’s Repeated Construction Failures**

The Petition’s refusal to commit to a construction is a threshold ground for denial. Section 42.104(b)(3) requires the petitioner to identify “[h]ow the challenged claim is to be construed,” and § 42.104(b)(4) requires the petitioner to “specify where each element of the claim is found in the prior art.” 37 C.F.R. § 42.104(b)(3)-(4). A petitioner cannot satisfy these duties by characterizing patent owner’s district-court positions on a contingent basis while reserving the right to advocate different constructions elsewhere. *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 at 3-5 (PTAB Nov. 3, 2025) (precedential).

The July 31, 2025 USPTO Guidance confirms this: a petition that hedges between constructions, or that depends on the patent owner’s litigation positions to map the prior art, fails to carry its affirmative burden at institution.

The Petition violates these rules in three places, each addressed on the merits above. (*See supra* § IV.A.1(a)(1) (construing “less than or equal to 45  $\mu\text{m}$ ” to be “non-zero”), § IV.A.1(a)(2) (advancing a conditional “to-the-extent” mapping tethered to its own interpretation of Patent Owner’s positions), § IV.A.1(a)(3) (invoking annotated litigation exhibits as a stand-in for analysis).) Petition footnote 4 makes the strategy explicit: Petitioner reserves “all rights to challenge claims under § 112 and/or seek additional or different constructions of terms in other proceedings.” (Pet. at 20 n.4.) Petitioner fails under § 42.104(b)(3)-(4). *Revvo*, IPR2025-00632, Paper 20 at 3-5; *see also Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 36 at 4 (Director Squires Jan. 26, 2026) (rejecting “wait and see” approach: “My precedential decision does not provide for conditional future outcomes ... The appropriate course of action under these circumstances is to deny institution.”); *Generac Power Systems, Inc. v. Champion Power Equipment, Inc.*, IPR2025-00805, -00951, Paper 40 (Director Squires Feb. 3, 2026) (extending *Revvo*); *Infineon Tech. Americas Corp. v. MOSAID Tech. Inc.*, IPR2025-01171, Paper 27 (Director Squires Feb. 19, 2026) (vacating institution on materially parallel facts).

**(b) Ground 1 (Ye + Basu): No Motivation to Combine**

Ground 1 fails on motivation to combine for two independent reasons. First, Ye and Basu describe architecturally different cells: Ye is a TOPCon cell, Basu is an Al-BSF cell. A POSITA solving the '136 Patent's rear-side tunnel-oxide-uniformity problem would not consult a study of front-side screen-printed-silver contact resistance on an Al-BSF cell. (EX2014 at ¶¶ 120, 123-124.) Second, the benefit Basu reports is not a pyramid-height benefit at all. Basu traces its efficiency variation to contact resistance, and traces the contact-resistance variation to pyramid count density at a screen-printed-silver/phosphorus-diffused contact interface. (EX2014 at ¶¶ 113-115.) That mechanism does not exist at Ye's boron-doped P+ TOPCon front. (EX2014 at ¶¶ 120, 117, 127.)

Either reason independently defeats the combination; together they confirm the Petition relies on hindsight. *Otsuka Pharm. Co. v. Sandoz, Inc.*, 678 F.3d 1280, 1296 (Fed. Cir. 2012) (“The inventor’s own path itself never leads to a conclusion of obviousness; that is hindsight.”); *In re NuVasive, Inc.*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (vacating obviousness finding for failure to articulate reasoned motivation to combine grounded in the prior art); *Virtek Vision Int’l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 888-89 (Fed. Cir. 2024) (“It does not suffice to simply be known. A reason for combining must exist.”) (reversing Board’s motivation-to-combine finding).

**(1) Ye and Basu Are Architecturally Different Cells**

A POSITA would not look to Ye (TOPCon) and combine it with Basu (Al-BSF) given their architectural dissimilarities. (EX2014 at ¶¶ 109-110, 123.) The Petition asks a POSITA to import Basu's front-side pyramid-height optimization into Ye's TOPCon architecture. The Petition supplies no reasoned explanation why a POSITA would look to an Al-BSF reference and import its features into TOPCon. (EX2014 at ¶¶ 120, 123-124.)

Ye and Basu are different architectures. Ye is a TOPCon cell. Its rear is a tunnel-oxide / doped-polysilicon stack; its front is a P<sup>+</sup> boron-diffused emitter passivated by Al<sub>2</sub>O<sub>3</sub>/SiN. (EX1004 at ¶¶ 30-32, 38; EX2014 at ¶ 94.) The rear tunnel oxide must be deposited on a sufficiently uniform silicon surface to passivate the rear contact without blistering. (EX2014 at ¶¶ 76-77, 80, 89.) (EX1004 at ¶¶ 8-9, 38.)

Basu studies an Al-BSF cell. Basu uses a p-type boron-doped wafer, an N<sup>+</sup> phosphorus-diffused emitter, a screen-printed silver front contact (DuPont PV17F co-fired at the pyramid tips), and an aluminum back-surface field. (EX1012 at 590-591.) Basu studies how front-pyramid geometry affects screen-printed-silver contact resistance on a phosphorus emitter. (EX2014 at ¶¶ 109-110.) (EX1012 at 590, 597.)

A POSITA designing a TOPCon cell would not turn to Basu's study of front-side screen-printed-silver contact resistance on an Al-BSF cell. (EX2014 at ¶¶ 122-124.) The cells operate on different principles: different dopant polarities at the relevant surface, different passivation chemistries, and different loss mechanisms. (EX2014 at ¶¶ 110, 120, 122.)

**(2) A POSITA Would Not Have Been Motivated to Combine Basu and Ye**

Basu does not supply the motivation Petitioner attributes to it. Petitioner asserts a POSITA would adopt Basu's "optimal height range (~5  $\mu\text{m}$  maximum, or 2-5  $\mu\text{m}$ )" at Ye's front because doing so "merely optimizes the size of a known texture structure (pyramids) within a known range of pyramid heights using a known method (Basu's optimal height) to obtain predictable results (improved efficiency)." (Pet. at 21; *see also* Pet. at 26; EX1003 ¶¶ 85, 96.) That theory collapses because the mechanism that makes height result-effective in Basu does not exist at Ye's front. (EX2014 at ¶¶ 126-127.)

Petitioner's theory also collides with Basu's own data. Basu reports that across the entire 5-8  $\mu\text{m}$  pyramid-height range it studied, there is "no significant variation in effective minority carrier lifetime, reflectance, open-circuit voltage or short-circuit current." (EX1012 at 590 (Abstract); *see also id.* at 595 ("No significant variation is observed" in  $\tau_{\text{eff}}$ ,  $iV_{\text{oc}}$ , and  $J_{\text{sc}}$ ); *id.* at 595 ("negligible

variation of  $J_{sc}$  and  $V_{oc}$  between the groups”).) Basu’s conclusion is the same:  $W_{AR}$ ,  $\tau_{eff}$ ,  $iV_{oc}$ , and  $J_{sc}$  are “nearly identical for all the three groups.” (*Id.* at 597.) Pyramid height was result-effective in Basu’s experiment for one parameter only, fill factor, and only through the screen-printed-Ag /  $N^+$  contact-formation mechanism addressed below. (EX2014 at ¶¶ 111-112, 115.) Petitioner cannot extract from Basu a general teaching that pyramid height up to 45  $\mu m$  is a result-effective variable when Basu’s own measurements show it is not, even within the small range Basu actually tested. (EX2014 at ¶¶ 111-112, 125.)

Basu states “smaller pyramids were found to give the highest FF and hence efficiency.” (EX1012 at 597.) Ye is TOPCon, and the issue is whether a POSITA would have applied Basu’s finding to TOPCon. Petitioner fails here. (EX2014 at ¶¶ 122-124.)

Basu identifies “a variation in specific contact resistance” as “the most likely cause for this FF variation” (EX1012 at 597) and traces that variation to a single, architecture-specific mechanism: “the difference in contact resistance for the three pyramid groups is linked to the *difference in the pyramid count density* (number of pyramids per unit area). Pyramid tips represent favourable sites for screen printed silver–silicon contact formation, and increasing average pyramid height reduces the pyramid count density and hence the number of potential sites for contact formation.” (*Id.* at 597 (emphasis added).)

Basu correlates pyramid density with height, but height is not the feature that drives contact density. Height is the controllable variable; the contact-formation chemistry between screen-printed silver paste and the underlying N<sup>+</sup> phosphorus-doped silicon is the mechanism that makes height result-effective in the first place. (EX2014 at ¶¶ 71, 115.) (EX1012 at 597.) Basu confirms this is the only causal pathway it identifies for the height-FF relationship by ruling out the alternatives. Optically, Basu concludes that “the investigated homogeneous pyramidal surfaces are optically similar, irrespective of the pyramid heights.” (*Id.* at 594.) On passivation, Basu concludes that “the surface passivation quality offered by the SiN<sub>x</sub> layer is not significantly affected by the pyramid height.” (*Id.* at 595.) Basu thus narrows the causal explanation for its FF/efficiency data to one mechanism: Ag-paste contact formation at pyramid tips on a phosphorus-doped emitter. (EX2014 at ¶¶ 115, 125.)

That mechanism of Basu also does not occur at Ye’s front, and transferring Basu’s teachings to Ye is not apt. (EX2014 at ¶¶ 120, 127.) Ye’s front is a boron-doped P<sup>+</sup> emitter passivated by Al<sub>2</sub>O<sub>3</sub>/SiN. (EX1004 at ¶ 38.) There is no screen-printed silver/phosphorus-silicon contact interface there for Basu’s count-density mechanism to operate on. (EX2014 at ¶¶ 120, 122.) Without that interface, pyramid count density carries no FF or efficiency consequence at Ye’s front, and

the height-as-upstream-proxy relationship Basu identified has no analogue.

(EX2014 at ¶¶ 122, 127.)

Basu's architecture does not transfer to Ye. Screen-printed Ag electrodes, like those in Basu, are made by glass frit etching the  $\text{SiN}_x$  antireflective coating to expose the silicon surface, after which Ag dissolves into the molten frit and precipitates as metallic Ag on the underlying phosphorus-diffused  $n^+$  emitter. (EX2018.; EX2014 at ¶¶ 70-71, 116-119) That paste/frit/ $\text{SiN}_x$ / $n^+$  chemistry is the architecture-specific machinery that makes pyramid count density a result-effective variable in Basu's Al-BSF cell; it has no counterpart at Ye's  $\text{Al}_2\text{O}_3$ / $\text{SiN}$ -passivated boron-doped  $P^+$  TOPCon front. (EX2014 at ¶¶ 72, 120-122.) (EX2018 at 1 (Abstract) (mechanism specifically requires PbO etching  $\text{SiN}_x$  to expose silicon and Ag deposition on a phosphorus-diffused emitter); EX2016 at 345-46.) Ye's front uses an  $\text{Al}_2\text{O}_3$ / $\text{SiN}$  dielectric stack over a boron-doped  $P^+$  emitter, which requires Ag/Al hybrid pastes with a fundamentally different fire-through chemistry than those Basu studied. (EX2014 at ¶¶ 72, 121-122; EX2016 at 345 (“[T]he front side boron emitter is passivated by an  $\text{Al}_2\text{O}_3$ / $\text{SiN}_x$  stack. ... [T]he technology of choice here would be screen-printing of silver or aluminum-silver pastes.”).) It therefore does not follow that pyramid-tip count density is the dominant determinant of contact formation at Ye's front. (EX2014 at ¶¶ 72, 122.)

Petitioner improperly asks the Board to import Basu's height number into Ye while discarding the mechanism and structure Basu identifies as the reason that number matters. That is hindsight reconstruction. *See ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327-28 (Fed. Cir. 2012); *In re NuVasive, Inc.*, 842 F.3d 1376, 1383-84 (Fed. Cir. 2016); *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017).

Basu establishes that pyramid height is result-effective for FF and efficiency because of, and only through, the screen-printed Ag/N<sup>+</sup> contact-formation mechanism it identifies. (EX2014 at ¶¶ 115, 112, 125.) Strip that mechanism away, because Ye's boron-doped P<sup>+</sup> front lacks it, and pyramid density is no longer a recognized effective variable in the host architecture. (EX2014 at ¶¶ 120, 122, 127.) Petitioner's theory has no premise to operate on.

Petitioner's motivation rests on a mechanism that cannot survive translation from Basu's architecture to Ye's. A POSITA reading both references would not have combined them as Petitioner proposes. (EX2014 at ¶¶ 122-124, 127, 120.) Ground 1 fails for this independent reason.

Petitioner's combination disregards Ye's express architectural preference. Even setting aside the architectural and mechanistic mismatches above, Ye itself directs a POSITA away from the configuration Petitioner's combination would produce. Ye discloses two stack architectures and reports that the architecture

incorporating an interlayer (intrinsic poly-SiCx (5 nm) interlayer between the tunnel SiOx and the doped poly-Si) yields more than 22% efficiency, while the architecture without the interlayer yields only ~17.5% — a >4.5% absolute efficiency improvement. (EX1004 at ¶¶ [0039]-[0040]; EX2014 at ¶¶ 97, 125, 122.)

Petitioner's proposed Ye+Basu combination is silent about whether to retain Ye's preferred interlayer architecture, and Basu—directed to front-side pyramid height on an Al-BSF cell—supplies no reason to depart from it. A POSITA reading Ye and Basu together would not abandon Ye's expressly preferred, >22%-efficient architecture to chase a front-side optimization that, as explained above, has no mechanistic purchase at Ye's boron-doped P+ front. (EX2014 at ¶¶ 122-124, 127.)

A POSITA would subsequently not have had a motivation to combine, and Petitioner's rationale is hindsight.

## **2. Ground 1A (Ye + Basu + Yun)**

### **(a) Ground 1A: Same Missing Limitations**

Ground 1A uses Yun across the full set of claim 1[b] subparts. Petitioner does not address the gap of 1[e] described above, and it still fails even assuming a motivation to combine exists (which it does not).

**(b) Ground 1A: Motivation to Combine Failures**

Even taking Yun’s broader role at face value, Ground 1A still fails on motivation and reasonable expectation of success. Ground 1A also inherits each of Ground 1’s motivation-to-combine defects. (*See supra* § IV.A.1(b); EX2014 at ¶¶ 125, 129.)

First, the Petition at 40 rationale rests on a false premise that Ye uses “mechanical polishing,” an assertion Petitioner manufactures by recasting Ye’s alkaline polishing as “chemical mechanical polishing (CMP)” through an “in other words” rephrase at Petition at 39. Ye does not say CMP. The Petition at 39 hedge is Petitioner’s admission that the “CMP” label is its own gloss, not Ye’s actual teaching. Lacking the premise for combination, Petitioner’s motivation fails.

Second, Petitioner offers no real expectation-of-success analysis tied to what Yun actually is. Yun is a bifacial, diffused-junction cell whose platform morphology is engineered to reduce rear surface area on a non-TOPCon device (EX1005 at [0022]; EX2014 at ¶¶ 132-134.) Ye is a TOPCon cell whose rear surface serves the opposite function. (EX2014 at ¶¶ 133-134, 152.) Petitioner never explains why a POSITA would have expected Yun’s platform geometry to deliver “predictable results” when transplanted into Ye’s tunnel-oxide / polysilicon stack (EX2014 at ¶¶ 153-156.), and the bare invocation of “known method / predictable

results” cannot supply that analysis where the two architectures rely on different rear-side design objectives. (EX2014 at ¶¶ 152, 155-156.)

The failures are addressed in turn below.

**(1) Petitioner’s motivation rests on a recast of Ye that Ye does not support.**

Petitioner’s Ground 1A motivation is that “POSITAs would have adopted the wet chemical methods in Yun to remove material from the rear side of the substrate in Ye instead of mechanical polishing, for example, to reduce the risk of damage to rear side of the solar cell.” (Pet. at 40.) That motivation rests on the premise that Ye uses mechanical polishing. The premise is wrong.

Petitioner manufactures the premise by recasting Ye’s alkaline polishing as “chemical mechanical polishing (CMP)” through an “in other words” rephrase at Petition at 39:

“Ye states that, to create non-pyramid texture on the rear surface, the ‘backside alkaline polishing is carried out’ after ‘boron diffusion is performed on the front surface.’ EX1004, [0038]. In other words, Ye teaches removal of material on the rear side of a TOPCon cell with chemical mechanical polishing (CMP) as an additional polishing step.” (Pet. at 39 (emphasis added); EX1003 at ¶¶ 132-134.)

Ye supports no such recast. Ye describes “double-sided alkaline polishing” (EX1004 at ¶ 30) and “backside alkaline polishing” (*id.* at ¶ 38), wet chemical etch processes. (EX2014 at ¶¶ 134, 136.) Ye contains no description of any CMP

apparatus, slurry, polishing pad, or mechanical pressure. (EX2014 at ¶¶ 135-136.)

The “in other words” rephrase substitutes Petitioner’s preferred label for Ye’s actual disclosure.

Petitioner’s briefing in other Grounds confirms the inconsistency. In the Ground 3 Xia analysis, Petitioner describes Xia as “improving existing alkaline-based methods for polishing crystalline silicon surfaces.” (Pet. at 54.) In the Ground 6 Sakai analysis, Petitioner describes Sakai as “forming the texture surfaces with ‘wet etching using an alkaline’” solution. (Pet. at 85.) Alkaline polishing is wet chemistry everywhere in the Petition except Ground 1A, where it becomes “CMP” so Yun’s wet chemistry can be presented as the improvement. (EX2014 at ¶ 138.)

The motivation collapses on Ye’s text. Ye is already wet chemistry. No CMP problem exists in Ye for Yun’s wet chemistry to solve. (EX2014 at ¶ 137.) The Federal Circuit rejects motivation rationales built on a misapplication of the asserted prior art’s teachings. *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017) (vacating for inadequate factual findings and unexplained reliance on expert testimony); *Honeywell Int’l Inc. v. 3G Licensing S.A.*, 124 F.4th 1345 (Fed. Cir. Jan. 2, 2025) (“conclusory expert testimony does not qualify as substantial evidence” and the Board cannot “uncritically accept expert testimony that is flatly contradicted by the record”).

**(2) Petitioner does not articulate the combined device.**

Petitioner assembles features from three separate device structures without identifying which element combines with which to form a final device. (Pet. at 39-40 (Ground 1A “Rationale for Combining Ye, Yun, and Basu”).) A device claim is not obvious when the Petition cannot articulate the proposed combination.

*Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017);

*In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380-81 (Fed. Cir. 2016).

Ground 1A combines three different cell architectures: Ye’s TOPCon, Basu’s Al-BSF cell, and Yun’s bifacial cell with platform-shaped rear texture. (EX2014 at ¶¶ 131-134, 139.) The Petition does not identify which features of Ye it keeps, which it replaces with Yun, or how Yun’s platform-shaped rear geometry coexists with Ye’s tunnel-oxide and polysilicon stack. It does not say whether the combined cell uses Ye’s P<sup>+</sup> boron emitter or Basu’s N<sup>+</sup> phosphorus emitter. (EX2014 at ¶ 140.) It does not say whether the front contacts are screen-printed silver on a phosphorus-diffused N<sup>+</sup> emitter (Basu) or screen-printed on Al<sub>2</sub>O<sub>3</sub>/SiN-passivated boron (Ye). (EX1004 at ¶ 38; EX1012 at 591; EX2014 at ¶ 141.) It does not say whether Yun’s platform geometry, designed to reduce rear surface area and suppress minority-carrier recombination (EX1005 at [0022]), replaces or supplements Ye’s controlled-roughness rear surface for tunnel-oxide uniformity.

(EX2014 at ¶ 142.) (Pet. at 39-40.) The Petition assembles features without explaining the resulting device. (EX2014 at ¶ 143.)

Mixing three architectures without articulation uses the patent as the blueprint for the combination, the textbook definition of hindsight. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“A factfinder should be aware ... of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.”); *In re NuVasive, Inc.*, 842 F.3d 1376, 1383-84 (Fed. Cir. 2016) (vacating obviousness finding for failure to articulate reasoned motivation to combine grounded in the prior art). Petitioner’s burden is to articulate a combination, not to assemble a parts list and ask the Board to imagine the rest. *Personal Web*, 848 F.3d at 993-94. Ground 1A does neither. The combination fails on motivation independent of every other defect identified above.

**(3) Importing Yun’s platform geometry into Ye’s TOPCon stack destroys Ye’s principle of operation.**

Yun’s platforms are designed to shrink the rear surface area to suppress minority-carrier recombination on a bifacial cell. (EX1005 at [0022]; EX2014 at ¶¶ 132, 152.) Ye and the ’136 Patent do the opposite. The ’136 Patent specifies a controlled rear roughness so the tunnel oxide grows with high uniformity on a TOPCon cell. (EX2014 at ¶¶ 80, 89-90, 152.) (EX1001 at 7:62 - 8:18 (excessive roughness brings “adverse effects to the formation of the tunnel oxide layer with

high density and high uniformity”).) Ye implements the same TOPCon architecture, polishing the rear surface before depositing the tunnel oxide. (EX1004 at ¶¶ 30, 38; EX2014 at ¶ 94.)

The conflict is not just one of design objectives; it is geometric. TOPCon tunnel oxides are nanometer-scale. (EX2014 at ¶¶ 74, 146, 148.) Ye discloses a tunnel oxide of 1.0-3.5 nm (EX1004 claim 3; *id.* at ¶ 13). The ’136 Patent specifies 0.8-2 nm (EX1001 at claim 7; *id.* at 8:43-46). The oxide must conform across the underlying surface. (EX1001 at col. 7:62 - 8:18; EX2014 at ¶¶ 76, 78.) Yun’s platforms stand 1-8  $\mu\text{m}$  tall (1,000-8,000 nm), with upper-plane widths of 2-10  $\mu\text{m}$  and larger bases. (EX1005 at claim 1; EX2014 at ¶ 147.) A nanometer-scale conformal oxide cannot cover topographic steps three orders of magnitude larger than its own thickness. (EX2014 at ¶¶ 79, 146, 149.) Local thinning becomes pinholes. Tunnel-oxide uniformity, on which TOPCon function depends, collapses. (EX2014 at ¶¶ 75, 151, 153.) (EX2015 at 8 (Results & Discussion) (locally reduced tunnel oxide “deteriorates the carrier selectivity of the TOPCon passivating contact”); *see also id.* at 1 (Abstract).)

The Federal Circuit rejects motivation rationales whose modifications destroy the primary reference’s principle of operation. *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009) (no motivation where the modified combination “would not have worked for its

intended purpose”); *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (modification “rendered inoperable for its intended purpose” cannot support obviousness); *see also Cook Group Inc. v. Boston Scientific Scimed, Inc.*, 809 F. App’x 990 (Fed. Cir. 2020) (affirming no-motivation where the proposed modification would frustrate the primary reference’s principle of operation).

Grafting Yun onto Ye and Basu cannot support obviousness because Ground 1A supplies no valid motivation. (EX2014 at ¶¶ 153, 155-156.)

## **B. Grounds 6, 6A: The Sakai-Based Grounds Fail**

The Sakai-based grounds fail. First, Sakai’s rear texture is described as “pyramid-shaped” not “non-pyramid-shaped.” This is plain in Sakai’s text. Second, Sakai uses the same etched pyramid texture on both faces, so Petitioner’s mapping cannot satisfy claim 1[b] and claim 1[c] which require non-pyramid / pyramid structures simultaneously. Third, Sakai is a back-contact heterojunction cell. Fourth, Ground 6A’s motivation to add Yun collapses on Sakai’s own data, which shows that Yun’s larger-scale platforms would degrade the very alignment-mark uniformity Sakai depends on.

### **1. Sakai is Already-Examined Art**

Petitioner seeks a do-over of the USPTO’s examination of Sakai without identifying where the Examiner erred. It glosses over the features the Examiner found novel.

During prosecution, the Examiner (Golam Mowla) identified Sakai as the closest prior art, analyzed it across more than a dozen paragraphs, and distinguished it in the Notice of Allowance. (EX1018 at 15-16 (Reasons for Allowance); EX1007 (same in parent App. No. 17/459,689).) The same Examiner provided this consistent analysis in family applications as well. (EX2001-2005.)

The Examiner examined the same disclosures Petitioner relies on. (*Compare* Pet. at 71 (citing EX1009 at [0045]-[0047] for Sakai’s texture) *with* EX1018 at 15-16 (Examiner citing Sakai at [0045]-[0047] describing it as “pyramid form and truncated four-sided pyramidal rugged structure”).)

Petitioner offers two reasons the Examiner allegedly erred: (i) the Examiner distinguished Sakai on a feature not recited in the issued claims, and (ii) the Examiner saw only the English abstract of a Japanese-language reference. Neither holds up.

First, Petitioner’s argument that the Examiner distinguished Sakai on an unclaimed feature mischaracterizes the prosecution record. The Reasons for Allowance walked through the substantive limitations of Claim 1 (substrate, antireflection layer, passivation film, doped semiconductor layer, protective film, and texture structure) and concluded that “Sakai does not clearly show among the overlapping unevenness about the distance of the top face of an outermost protruding part, and the top face of the protruding part which adjoins it.” (EX1018 at 15-16.)

That is the partial-stacking architecture in Claim 1[b], which Sakai's "pyramid form and truncated four-sided pyramidal rugged structure" does not satisfy. (EX1018 at 15-16.) The continuation Examiner reached the same result and added a second express finding: "Sakai does not clearly show non-pyramid-shaped microstructures." (EX2014 at ¶ 169; EX2001 at 5.) Across six examinations of this patent family (EX1018, EX1007, EX2001-2005), the same Examiner repeatedly found Sakai deficient on Claim 1[b] morphology. (EX2014 at ¶¶ 169-172.)

Any doubt about the Examiner's understanding of this limitation is resolved by the examination of the '136 Patent's continuation. In the August 2025 Office Action for App. No. 18/888,868, the same Examiner again described Sakai's texture as "pyramid form and truncated four-sided pyramidal rugged structure" (EX2001 at 5) and then found that "Sakai does not clearly show non-pyramid-shaped microstructures." (*Id.* at 5.) These are the same features Patent Owner distinguishes here. (EX2014 at ¶¶ 171-172.)

Second, Petitioner's translation argument fails. Petitioner makes the argument generically, without identifying a single passage the Examiner misread. The Examiner's analysis contradicts the argument: he provided substantive review of Sakai, accurately describing its features. (EX1018 at 15-16 (Examiner citing Sakai at [0025]-[0112], [0224], [0028]-[0029], [0039], [0030], [0041]-[0042], [0031], [0043], [0038], [0078], and [0045]-[0047])).) This is not a case where an abstract was

merely viewed and the reference discarded; the Examiner engaged with Sakai's substance across numerous paragraphs, providing substantive analysis and emphasizing missing limitations.

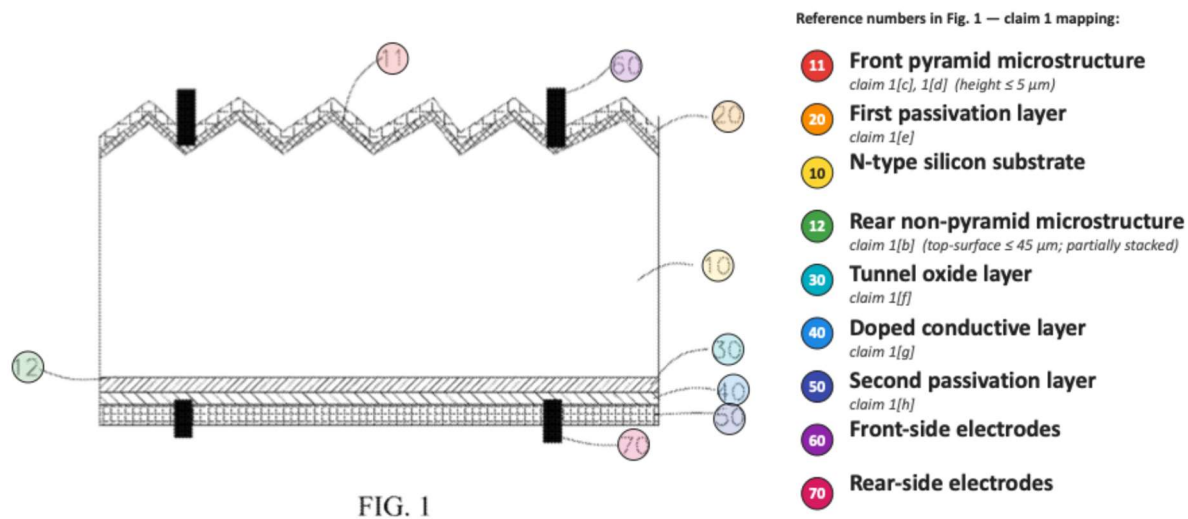
The certified translation Petitioner submitted (EX1009) reaches the same result. Petitioner cannot show where the Examiner erred in his technical analysis or where a translation would make any difference. At most, Petitioner disagrees with the Examiner. That is facially deficient. *Ecto World v. RAI Strategic Holdings*, IPR2024-01280, Paper 13 at 5 6 (quoting *Advanced Bionics*, Paper 6 at 9) (PTAB May 19, 2025) (precedential as to Section A) (“[i]f reasonable minds can disagree ... it cannot be said that the Office erred in a manner material to patentability”).

The full translation confirms what the Examiner found: Sakai lacks “non-pyramid-shaped microstructures.” (EX2001 at 5.) And a translation reveals additional structural mismatches that further undermine the Petition: Sakai is a heterojunction back contact (HBC) cell, not a TOPCon cell (EX1009 at [0004], [0032]-[0033], [0171]-[0172]; EX2014 at ¶¶ 160-168.) The Examiner was not confused by a lack of an official translation. Petitioner's Sakai grounds rely on already-examined art that lacks essential features (EX2014 at ¶¶ 160-168, 171) of the challenged claims. This independently warrants denial.

## 2. Ground 6 Fails to Teach Limitations

### (a) Claim 1[b]: “the first texture structure has a non-pyramid-shaped microstructure”

Claim 1[b] requires that “the first texture structure has a non-pyramid-shaped microstructure.” Sakai does not teach this; its structures are described as “pyramid-shaped.” (EX2014 at ¶¶ 169-171.) This is annotated below in green (element 12).



Petitioner relies on Sakai’s description of the rear structures as Petitioner puts it, “quadrangle pyramid-shaped or truncated quadrangular pyramid-shaped” (Pet. at 71). (See EX1009 at [0045].) Both are, by Sakai’s own words, “pyramid-shaped.” Sakai self-characterizes its rear texture using the former; claim 1[b] (EX2014 at ¶¶ 169-170) requires the latter. That mismatch alone disposes of the limitation. (EX2014 at ¶ 171.)

Sakai's specification places the "truncated quadrangular pyramid-shaped" variant within the pyramid designation: "A specific example of the texture is a pyramid-shaped (quadrangular pyramid-shaped or truncated quadrangular pyramid-shaped) uneven structure." (EX1009 at [0045].) The subject is "A specific example of the texture." The predicate designates that example as a "pyramid-shaped ... uneven structure." The parenthetical enumerates two variants ("quadrangular pyramid-shaped" and "truncated quadrangular pyramid-shaped"), both within the "pyramid-shaped" designation. The next sentence confirms: "the actual texture has pyramid-shaped unevenness of various sizes and shapes formed in plurality." *Id.*; EX2014 at ¶ 167.)

The USPTO reviewed this limitation and found the claims novel in both the instant and the parent applications over Sakai. The Examiner's most recent continuation finding is dispositive: "Sakai does not clearly show non-pyramid-shaped microstructures." (EX2001 at 5.) The Board should find consistent with the USPTO's repeated treatment of Sakai.

Petitioner has given the Board zero reason to depart from the USPTO's previous findings (EX2014 at ¶¶ 168-172), and Ground 6 fails.

**(b) Claim 1 Requires a Non-Pyramid Rear and a Pyramid Front from the Same Disclosure**

Claim 1 requires two distinct microstructures from a single reference: a “non-pyramid-shaped microstructure” on the rear (1[b]) and a “pyramid-shaped microstructure” on the front (1[c]). Sakai cannot supply both. Sakai discloses one texture, “pyramid-shaped (EX2014 at ¶¶ 173-178) (quadrangular pyramid-shaped or truncated quadrangular pyramid-shaped),” formed on both surfaces by the same anisotropic etch. (EX1009 [0028], [0045], [0121].) Petitioner relabels one variant the “rear” and the other the “front” without identifying any Sakai embodiment that makes that assignment. (EX2014 at ¶ 175.)

The claim terms are depicted below with reference to Figure 1, e.g., elements 11 (red) and 12 (green), showing a pyramidal shape (11) and a non-pyramidal shape (12). The '136 specification confirms that the claim requires different microstructure shapes on the two surfaces. (EX1001 at 9:21-29 (“texture structures with different profiles are arranged on the front and rear surfaces of the semiconductor substrate, a pyramidal texture structure is formed on the front surface, and a non-pyramidal texture structure is formed on the rear surface, so that the solar cell formed has a light trap structure at different levels”).)

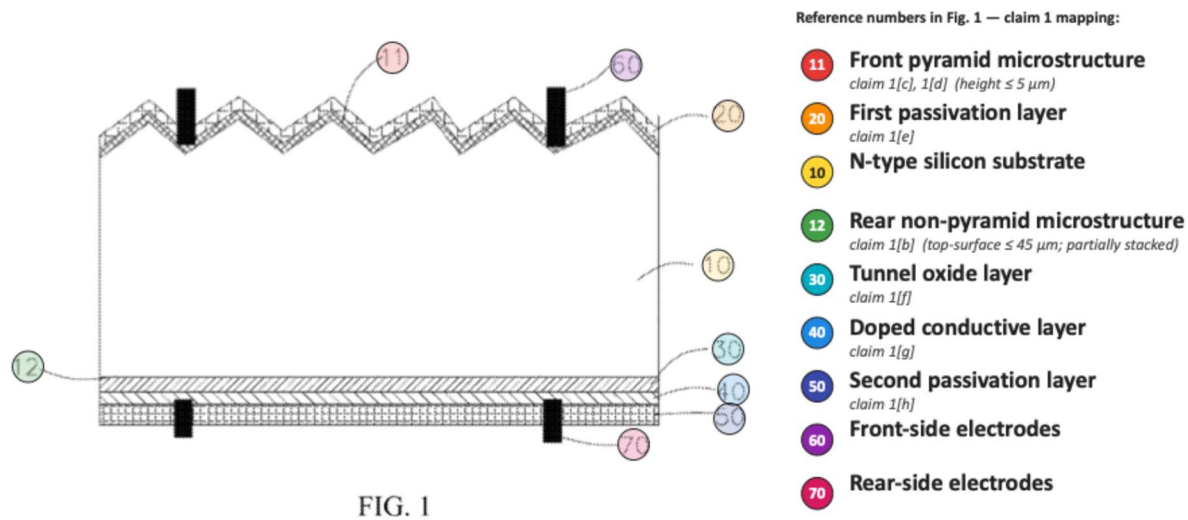


FIG. 1

Petitioner cites the same paragraph for both limitations and asks the Board to read it two different ways. (Pet. at 71, 74 (both citing FIG. 1B and [0045] for “quadrangle pyramid-shaped or truncated quadrangular pyramid-shaped”).) Paragraph [0045] does not distinguish front from rear. It lists two variants of one “pyramid-shaped ... uneven structure” formed by anisotropic etching. (EX1009 at [0045]. Sakai applies that same etch to both faces: “the semiconductor substrate 1 has a texture structure formed on both surfaces of the substrate.” (EX1009 at [0028]; *see id.* [0121] (“Both surfaces of the semiconductor substrate 1’ are thus anisotropically etched to form a texture structure where the size of the texture is 15  $\mu\text{m}$  or less.”) Petitioner identifies no Sakai embodiment that puts the truncated variant on one face and the non-truncated variant on the other, and supplies no POSITA reason to split the two variants by surface. (EX2014 at ¶¶ 174-175, 177.) The mapping is post-hoc relabeling, not a Sakai disclosure.

Sakai's figures further confirm symmetry. *See* EX1009 Figs. 6-10, 14, 17-21. (EX2014 at ¶ 173.)

Even if [0045] could supply a “non-pyramid-shaped microstructure” for 1[b] (it cannot), the same paragraph cannot simultaneously supply a “pyramid-shaped microstructure” for 1[c] on the opposite face. (EX2014 at ¶¶ 174, 177.) Ground 6 fails at 1[b] and 1[c].

**(c) Claim 13 Fails**

Claim 13 is the photovoltaic-module counterpart to claim 1 and falls with it.

Claim 13 re-recites every cell-structure limitation of claim 1 (rear non-pyramid microstructure, partial stacking,  $\leq 45 \mu\text{m}$  top-surface size, front pyramid microstructure, first passivation “located on” the second texture, and the rear stack). (EX1001 at claim 13.) Petitioner's claim-13 treatment is back-references and bare conclusions. (Pet. at 84-87.) Every claim-1 defect identified in §§ IV.B.1-IV.B.3 flows through unchanged.

Petitioner's separate showing for the module/strings preamble does not cure those cell-level failures. Petitioner relies on Sakai's passing reference to a “solar cell module” (EX1009 [0038]) and on Dr. Schubert and EX1015 at 133 to bridge to a module of strings. (Pet. at 84; EX1003 ¶ 288.) Even crediting that bridge, the module of claim 13 must be built from solar cells that satisfy every cell-level limitation of claim 1, including the rear non-pyramid microstructure, partial

stacking, the  $\leq 45 \mu\text{m}$  top-surface size, and the first passivation layer “located on” the second texture. Sakai does not disclose those limitations for the reasons set out in §§ IV.B.1-IV.B.3, and assembling Sakai’s cells into a module does not give those cells limitations they do not have. (EX2014 at ¶¶ 169-178.)

Petitioner’s Sakai-based grounds (Ground 6 and 6A) accordingly fail as to claim 13.

### **3. Sakai Is Not TOPCon**

Dr. Schubert repeatedly characterizes Sakai as a TOPCon cell. (EX1003 at ¶ 75 (“Sakai relates to a TOPCon solar cell”); *id.* ¶¶ 308, 348, 353; (EX2014 at ¶ 164; *see also* Pet. at 15, 70, 86 (Petition adopting the same TOPCon characterization); EX2014 at ¶ 164.) That characterization is wrong. (EX2014 at ¶¶ 163-164, 161.) Sakai discloses a back-contact heterojunction cell with interdigitated doped amorphous-silicon (a-Si) emitter and back-surface-field regions on the rear of a crystalline-silicon substrate. (EX1009 at ¶¶ 33, 36-38, 40-42, 78; EX2014 at ¶¶ 160-163, 164.) The two architectures are distinct categories of carrier-selective contact: (EX2014 at ¶¶ 49, 164, 161) TOPCon collects carriers vertically through a blanket tunnel-oxide / doped-polysilicon rear stack. (EX2014 at ¶¶ 52, 162) Sakai’s back-contact heterojunction separates carrier collection laterally between adjacent n-type and p-type a-Si regions, each with its own electrode. (EX1009 at ¶¶ 36-38, 41; EX2014 at ¶¶ 56, 163-164.) Petitioner’s own

textbook treats them as separate device classes. (EX1015 at §§ 5.5.2, 5.5.3, Ch. 7; EX2014 at ¶¶ 49, 176.) The misidentification is not a stray label. It recurs across the Petition's Sakai grounds and supplies the architectural premise for Dr. Schubert's effort to map Sakai's discrete a-Si regions to claim 1's integrated tunnel-oxide / doped-polysilicon rear stack. (EX2014 at ¶ 165.)

The mischaracterization matters. An expert opinion built on a mistaken understanding of what the prior art is cannot reliably opine whether that art's features satisfy claim limitations directed to a different architecture. The Federal Circuit and the Board discount expert testimony resting on a factually incorrect characterization of the reference. *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017) (vacating obviousness determination where PTAB failed to make adequate factual findings and properly explain its reliance on expert testimony); *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15-16 (PTAB Aug. 24, 2022) (precedential) (verbatim or conclusory declaration entitled to little weight); *cf. TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1358-59 (Fed. Cir. 2019) (reversing Board decision crediting expert testimony that did not adequately tie the asserted combination to the references).

The Board need not credit the expert testimony at face value when the foundational characterization is demonstrably wrong on the reference itself. *Icon Health*, 849 F.3d at 1043.

#### **4. Ground 6A: Sakai and Yun**

##### **(a) Ground 6A: Missing Limitations**

Petitioner's combination supplies Yun solely for the rear texture of 1[b].

This combination does not address having asymmetric textures, i.e., a rear texture having non-pyramid shaped while the front 1[c] having pyramid shaped. The combination still suffers from the same deficiencies as described above for Sakai. Nonetheless, there is no motivation to combine the two, as described below.

##### **(b) Ground 6A: No Motivation to Combine Sakai and Yun**

Ground 6A's motivation to combine Sakai and Yun fails for two independent reasons. First, the combination defeats the very purpose Petitioner identifies: Sakai's small rear texture exists to make alignment marks visible during shadow-mask deposition, and Yun's disclosed platform dimensions span and exceed the size regime Sakai identifies as conducive to that visibility. Second, Sakai (back-contact heterojunction-IBC) and Yun (bifacial diffused-BSF) are architecturally incompatible, and a POSITA would have had no reasonable expectation of success in combining them.

##### **(1) The Combination Defeats Sakai's Own Purpose**

Petitioner's motivation rests on a false premise that Sakai discloses a "TOPCon cell." (Pet. 86; EX1003 at ¶308.) Sakai is a back-junction heterojunction cell in which intrinsic, n-type, and p-type amorphous silicon layers are patterned

on the rear through a shadow mask. (EX1009, [0004]-[0006], [0033], [0036]-[0037]; EX2014 at ¶¶ 160-162, 159.) There is no tunnel oxide and no doped polysilicon contact. (EX2014 at ¶¶ 164.) *Sakai*'s rear texture exists for one purpose: to make alignment marks optically recognizable during that shadow-mask patterning. (*Id.* at [0010], [0160]; EX2014 at ¶¶ 182-185.) *Sakai* requires a texture size below 15  $\mu\text{m}$ , presents 1  $\mu\text{m}$  as an example yielding easy recognition, (*id.* at [0162], [0166]) and teaches that at 15  $\mu\text{m}$  or more "the boundary portion of the alignment mark is difficult to recognize." (*id.* at [0167].)

Yun's 2 to 10  $\mu\text{m}$  upper-plane side length, EX1005, claim 1, spans *Sakai*'s preferred regime and approaches the failure threshold *Sakai* identifies. (EX2014 at ¶¶ 186, 188-189.) Grafting Yun's platforms onto *Sakai*'s rear pushes the texture toward the size at which *Sakai*'s alignment scheme breaks down. (EX2014 at ¶¶ 189-190, 184.) A modification that compromises the reference's stated purpose negates motivation to combine. *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009); *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984).

Petitioner's rationale also conflates method with morphology. (EX2014 at ¶¶ 188, 191-193.) *Sakai* already teaches alkaline etching with isopropyl alcohol and instructs that texture size is controlled by varying etching conditions, including the type of etching inhibitor. (EX1009, [0116], [0120]-[0121].) Yun's wet chemistry

adds nothing Sakai does not already disclose. (EX2014 at ¶¶ 188-189.) A POSITA sizing Sakai's rear for alignment would adjust Sakai's own parameters, not graft Yun's geometry. (EX2014 at ¶ 190.) Yet Petitioner's claim 1[b] and 13[b] mapping demands precisely that geometry: polygonal upper planes, partial overlap, and a 2 to 10  $\mu\text{m}$  side length. Pet. 86-87. A method-only rationale cannot smuggle morphology into Sakai. (EX2014 at ¶ 188.)

Petitioner's reasonable-expectation-of-success theory is conclusory. Pet. 86 ("known method," "predictable results"). Obviousness requires "articulated reasoning with some rational underpinning." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Conclusory expert assertion is insufficient. *InTouch Techs., Inc. v. VGo Commc'ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014). Petitioner offers no analysis of how Yun's chemistry would yield Yun's platform geometry on Sakai's rear without degrading alignment-mark recognition. (EX2014 at ¶¶ 197-198.)

## **(2) Architectural Mismatch Independently Defeats Motivation**

Sakai and Yun describe different cells solving different problems. (EX2014 at ¶¶ 195-199.) Sakai's back-junction heterojunction cell uses a shadow mask to pattern intrinsic, n-type, and p-type amorphous silicon on the rear, and the rear texture exists to render those alignment marks optically recognizable. (EX1009 at

[0004]-[0006], [0033], [0010], [0160].) Yun’s bifacial diffused-BSF cell has no shadow mask and no rear amorphous-silicon patterning, and its platforms exist to reduce minority-carrier recombination and manage absorption on a bifacial rear. (EX1005 at [0002], [0022], [0029]-[0030], claim 1; EX2014 at ¶¶ 132, 194.)

A POSITA designing Sakai’s rear would not import a morphology engineered for a different architecture solving a different problem. (EX2014 at ¶ 199.) Yun’s recombination-and-absorption rationale has no purchase on Sakai’s rear, which is covered by amorphous-silicon stacks rather than exposed for bifacial light capture. (EX2014 at ¶¶ 196, 198.) The substitution trades a texture optimized for alignment visibility for one optimized for an objective Sakai does not pursue. (EX2014 at ¶¶ 198-199, 195.) That is hindsight, not articulated reasoning. *KSR*, 550 U.S. at 418.

## **V. Dr. Schubert’s Declaration Parrots the Petition**

Dr. Schubert’s declaration recites the Petition’s text and adds, at most, a generic KSR sentence or a declared assumption. 37 C.F.R. § 42.65(a) (expert testimony that “does not disclose the underlying facts or data on which the opinion is based” is entitled to “little or no weight”). Under *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15-16 (PTAB Aug. 24, 2022) (precedential), expert testimony that “merely repeats, verbatim, the conclusory assertion” of the Petition “does not cite to any additional supporting evidence or provide any technical

reasoning” is entitled to little or no weight. *See also Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017); *Honeywell Int’l Inc. v. 3G Licensing S.A.*, 124 F.4th 1345 (Fed. Cir. Jan. 2, 2025) (“conclusory expert testimony does not qualify as substantial evidence”; Board cannot “uncritically accept expert testimony that is flatly contradicted by the record”)

The pattern is systemic, reaching every dispositive limitation and motivation in the Petition. The instances are: (1) Schubert ¶ 75 (and ¶¶ 308, 348, 353) (Pet. at 15), characterizing Sakai as TOPCon; (2) ¶ 85 (Pet. at 23), front-pyramid motivation; (3) ¶ 89 (Pet. at 24), the Ye-rear acknowledgment; (4) ¶ 90 (Pet. at 24), the “non-zero size” assumption for the “ $\leq 45 \mu\text{m}$ ” limitation; (5) ¶ 92 (and ¶ 99) (Pet. at 25, 29), the “to-the-extent” partial-stacking and “located on” conditionals (which import Patent Owner’s infringement reads instead of mapping the references); (6) ¶¶ 114-115 (and ¶ 165) (Pet. at 37), the claim 13 module/strings inference layered on the same defective cell-structure mapping; (7) ¶ 134 (and ¶¶ 132-136) (Pet. at 39), the CMP recasting of Ye; (8) ¶ 263 (Pet. at 71-72), the truncated-pyramid relabeling; (9) ¶ 272 (Pet. at 78), the either-of-layers conditional; (10) ¶¶ 282-283 (Pet. at 80), the 130 nm second-passivation; (11) ¶ 288 (Pet. at 84), the claim 13 module/strings inference layered on the same defective Sakai cell-structure mapping; and (12) ¶ 308 (and ¶¶ 311, 332) (Pet. at

86), the Ground 6A motivation and the 1[b]/13[b] cross-references. The merits sections of this Response address the substantive defects in each.

Stripped of the verbatim recitations, what remains is conclusory ipse dixit that *Xerox*, *Icon Health*, and *Personal Web* squarely reject, and that § 42.65(a) disregards. The Petition cannot rise above its expert; the expert merely echoes the Petition. Institution should be denied.

## **VI. Petitioner's Other Grounds Fail**

Grounds 2, 3, 3A, 4, 4A, 5, and 5A challenge only dependent claims and rely on Ye and Basu for the independent-claim limitations. They inherit the Ye-and-Basu failures shown above for each claim's parent. Claims 10 and 11 (Grounds 4, 4A, 5, 5A) depend from claim 1 and fall with the claim 1 failures. Claims 7 and 9 (Grounds 3, 3A) and claims 2, 5, and 6 (Ground 2) likewise depend from claim 1. Claims 14, 17, 18 (Ground 2) and claim 19 (Grounds 3, 3A) depend from claim 13 and fall with the claim 13 failures. Grounds 7, 7A, 8, and 8A challenge claims 10 and 11 and rely on Sakai for the independent-claim limitations; they inherit the Sakai-based claim 1 failures. The added references (Xia, Chang, Yu, Fang) address narrow dependent limitations and do not cure the base failures. A dependent claim cannot be unpatentable when the claim from which it depends is not. *Ortho-McNeil Pharm., Inc. v. Mylan Labs., Inc.*, 520 F.3d

1358, 1365 (Fed. Cir. 2008) (citing *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992)).

## **VII. Claim Construction**

Claims are construed according to their plain and ordinary meaning. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc); 37 C.F.R. § 42.100(b) (applying the Phillips standard in inter partes review). Patent Owner applies the plain and ordinary meaning as understood by a POSITA. Because this response is preliminary, Patent Owner offers no formal construction and reserves the right to propose constructions if trial is instituted.

## **VIII. Conclusion**

No reference, alone or in combination, discloses the the claims of the '136 Patent. The Board should deny institution.

Dated: May 26, 2026

Respectfully submitted,

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**CERTIFICATE OF COMPLIANCE**

The undersigned certifies that Patent Owners' Preliminary Response, excluding the portions exempted under 37 C.F.R. § 42.24(a), has 11,496 words as counted by Microsoft Word 365 and complies with the type-volume limits established by 37 C.F.R. § 42.24(b)(1).

Dated: May 26, 2026

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**CERTIFICATE OF SERVICE**

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that a true copy of the foregoing Patent Owners' Preliminary Response and Exhibits 2012-20018 pursuant to 37 C.F.R. § 42.8 have been served electronically via email on counsel for Petitioner at the following addresses:

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