UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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INNOSCIENCE AMERICA, INC.,
Petitioner,

v.

INFINEON TECHNOLOGIES AMERICAS CORP.,
Patent Owner.

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Case IPR2025-00175
U.S. Patent 8,686,562

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**PETITIONER'S REQUEST FOR DIRECTOR REVIEW**

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## I. Introduction: The Final Written Decision Adopted a New, Overly Narrow Construction and Misapplied It to the References

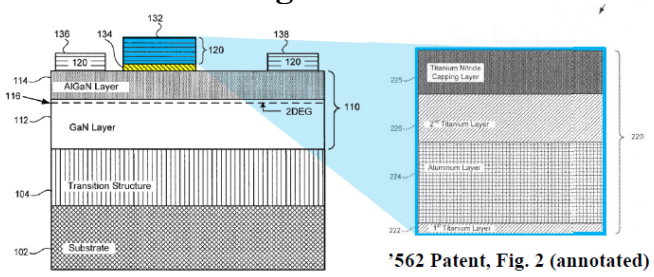
To decide whether "electrode stack" covers Usui's interconnect structure, the Board adopted a narrow construction no party advocated: "a conductor that provides a path for current entering or leaving a medium such as a semiconductor device." Paper No. 30 (FWD), 13. The Board extracted this construction from Petitioner's technical dictionary definition but omitted the definition's broader clause that an electrode "serves to deliver, receive, collect, emit, deflect or control electric charge carriers." Paper No. 18 (Reply), 8; Ex. 1046, 237. That omission caused three errors.

First, the Board's after-arising construction violates the Administrative Procedure Act (APA) and should be vacated: "the Board cannot adopt a new claim construction without giving the petitioner an opportunity to respond." *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1382 (Fed. Cir. 2023).

Second, the Board's construction erroneously excluded a disclosed embodiment expressly required in dependent claims 12 and 17—the insulated gate electrode. The Board found that Yu's "metal gate stacks 230, 231" did not disclose an "electrode stack" because dielectrics prevent current from flowing through the gate itself. FWD, 30–31. But the '562 patent's insulated gate electrode operates the same way, and Patent Owner conceded in its illustrations reproduced below that Yu's gate electrode has the same metal-over-dielectric structure. Because the Board's construction excludes an insulated gate, reversal is warranted. *Wright Med.*

*Tech., Inc. v. Osteonics Corp.*, 122 F.3d 1440, 1445 (Fed. Cir. 1997) (a construction "must not" exclude a dependent claim); *Owens Corning v. Fast Felt Corp.*, 873 F.3d 896, 901 (Fed. Cir. 2017) ("only one possible evidence-supported finding").

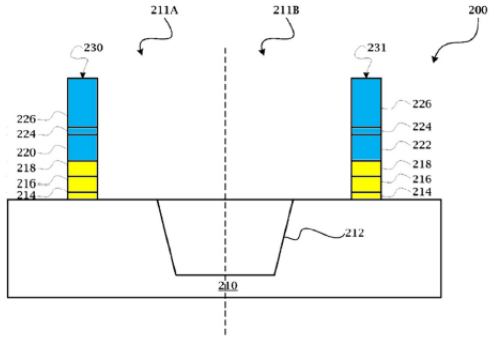
**Challenged '562 Patent**




'562 Patent, Fig. 1 (annotated)

'562 Patent, Fig. 2 (annotated)

**Yu Prior Art**




Yu, Fig. 2E (annotated)

Key: Blue = Metal Layers; Yellow = Dielectric Layers[1]

Paper No. 17 (POR), 46.

Third, the Board erred by finding Usui failed to satisfy its new construction contrary to all record evidence. The Board's decision relied on Patent Owner's expert's statements that actually show Usui meets the new construction because Usui's interconnect "form[s] electrical connections" between devices and "carr[ies] very high current densities." FWD, 22–23; Ex. 2024, ¶¶ 71, 148. And Patent Owner

[1] Patent Owner colored Yu's dielectric layers and metal diffusion barrier layer 218 yellow, contending the barrier layer cannot be the bottommost metal layer because it separates the other metal layers from the dielectric. POR, 46, 48.

only contended that Usui's interconnect failed to satisfy Patent Owner's proposed construction, a construction the Board rejected. FWD, 13. No evidence supports the Board's conclusion.

## II. Background

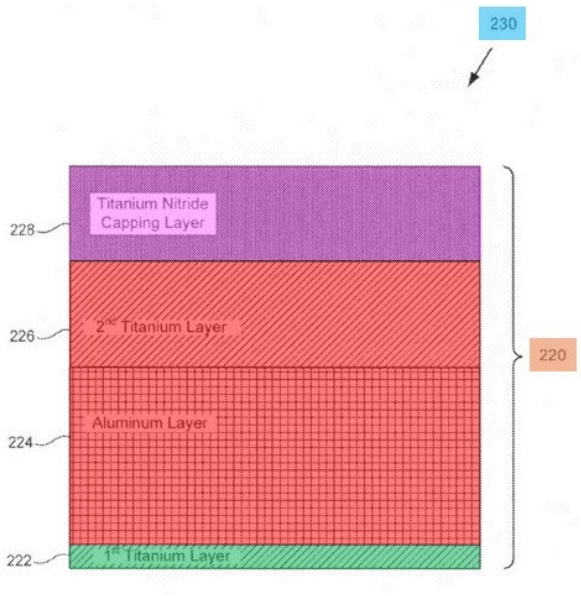
### a. Patent Owner construed "electrode stack" to exclude Usui's interconnect but raised no other dispute for claims 1, 2, and 4–7

The '562 patent claims an "electrical contact" with an "electrode stack" having metal layers, where its top layer is thicker than the bottommost metal layer.

1. An **electrical contact** for use on a semiconductor device, said **electrical contact** comprising:

an **electrode stack** including a plurality of **metal layers** and a **capping layer** formed over said plurality of **metal layers**;

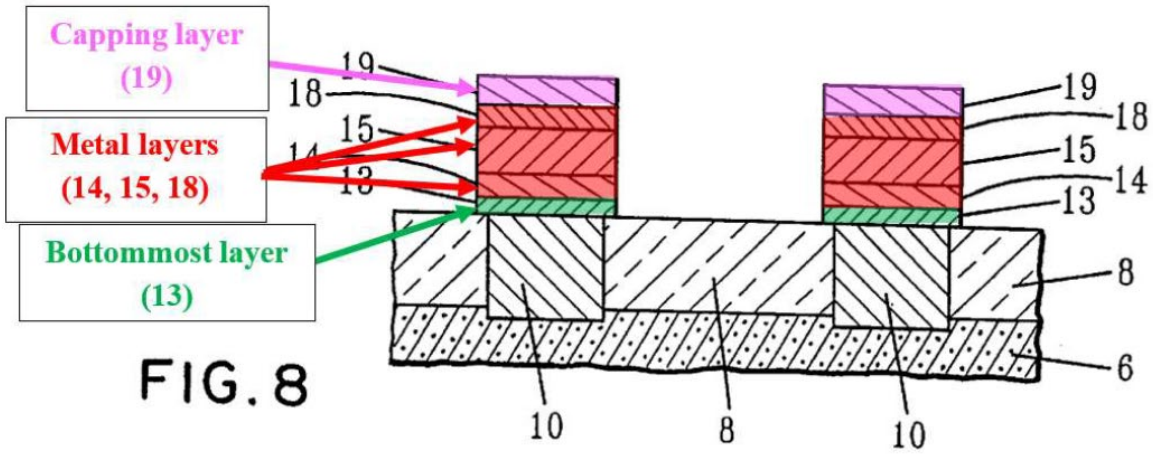
said **capping layer** consisting only of a refractory metal nitride, said refractory metal nitride forming a top of said **electrical contact** and having a thickness greater than that of a **bottommost layer** of said plurality of **metal layers**.




'562 patent, Fig. 2 (annotated); Petition, 6.

Ground 1 asserted that Usui's interconnect anticipated claims 1, 2, and 4–7. Petition, 8–17. Grounds 2-4 present combinations of Usui with other references that render obvious the remaining claims. *Id.* at 17–34.

Patent Owner's only defense to Ground 1 was to argue an interconnect is not an electrode. *Id.*; Paper No. 20, 1–3; *see* Reply, 2, 5–9; Paper No. 26 (Tr.), 10:14–11:5, 35:8–36:16, 44:23–45:16. The parties agreed that Usui's interconnect provides a current flow path between devices. *See, e.g.*, Ex. 1004 (Usui), 1:5-14; Petition, 19; POR, 19 (interconnects connect devices), 27 n.10 (interconnects carry high current density); Ex. 2024 ¶¶ 71, 148. Reply, 9–13. Patent Owner did not dispute that Usui's interconnect (below) discloses the claimed metal layers or that its top layer is thicker than its bottom. POR, 11–12, 16–18, 21–22. Instead, to exclude Usui's interconnect from claim scope, Patent Owner proposed to limit "electrode stack" to three examples: an insulated gate, a Schottky contact, and an ohmic contact. POR, 4–9.




Usui, Fig. 8 (annotated); Petition, 9.

Petitioner countered that (i) those examples do not limit the claims and (ii) the intrinsic record contains no disclaimer or lexicography, so the ordinary meaning of "electrode stack" applies. Reply, 2, 5–8. Petitioner also offered a technical dictionary definition of "electrode" to illuminate the plain meaning:

> A conductor which serves to **deliver, receive, collect, emit, deflect or control electric charge carriers**. An electrode **provides the path for current entering or leaving a medium** such as a dielectric, electrolytic solution, semiconductor, gas, or vacuum.

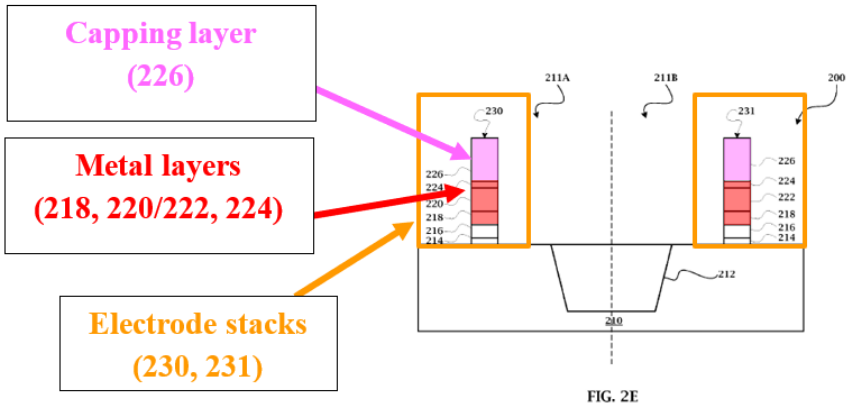
Ex. 1046, 237 (emphasis added); Reply, 8; Ex. 1047, ¶¶ 38-39. When the Board inquired at the oral hearing, Petitioner reconfirmed the full definition matches the plain meaning of "electrode." Tr., 8:26–9:15.

**b. Patent Owner conceded that Yu disclosed a "gate electrode" with a stack of metals, just like the '562 patent's "electrode stack"**

For Grounds 5–7, the Petition showed that Yu's metal gate stacks disclosed or rendered obvious every feature of independent claim 1, including a capping layer thicker than the bottom metal layer. Petition, 34–56. Alternatively, this thickness relationship was obvious over Yu and Usui. Petition, 38–39; Reply, 24, 27–28.

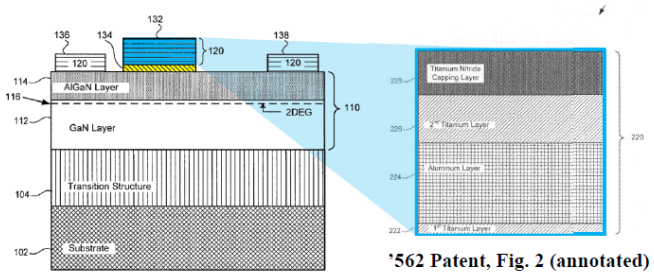
Limitation [1a] of the '562 patent recites "an electrode stack including a plurality of metal layers and a capping layer formed over said plurality of metal layers." Petition, 42; Ex. 1001, claim 1. This language is open-ended: it requires a

capping layer and metal layers in the "electrode stack," but allows other layers. The Petition showed Yu discloses [1a] because Yu's metal gate stacks 230, 231 each include metal layers (a diffusion barrier/protection layer 218, metal layers 220 and 222, and a diffusion barrier layer 224) and a capping layer 226 formed over those metal layers. Petition, 42; Ex. 1005, ¶¶ 29, 35–36, 40.



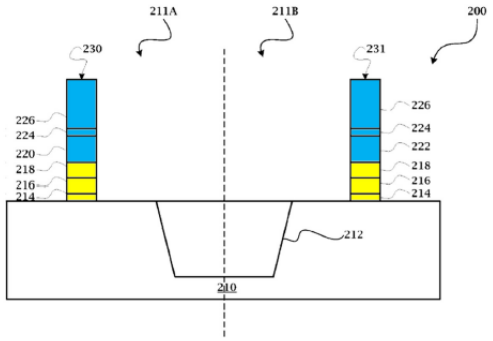

The Petition mapped Yu's metal gate stacks to the claimed "electrode stack" because they contain capping and metal layers, and Yu itself explains that the "metal gate stack" contains a "metal gate *electrode*." Ex. 1005, ¶ 40.

Patent Owner conceded Yu's power transistor gate stacks have the same metal-over-dielectric arrangement as the insulated gate in the '562 patent's power transistor. "Like the '562 Patent's insulated gate electrode (blue [below left]) is stacked with another layer (yellow [left]), Yu's gate electrodes (blue below [right]) are stacked with other layers (yellow below [right])." POR, 46.




'562 Patent, Fig. 1 (annotated)

'562 Patent, Fig. 2 (annotated)




Yu, Fig. 2E (annotated)

POR, 46.

Patent Owner nevertheless argued that Yu's "entire metal gate stack" cannot be an "electrode stack" because it contains non-conducting dielectric layers (yellow, above). POR, 52–53. But the Reply explained that "Patent Owner's semantic critique that 'Yu ***calls*** the entire stack a "metal gate stack,"' fails" because the "claims open-ended use of 'including' does not preclude other structures in the stack." Reply, 26–27 (emphasis original) (quoting POR, 47). "[T]he analysis as presented in the declaration and the Petition focused on the claimed features—the metal layers and capping layers." *Id.* The Reply emphasized that Patent Owner conceded Yu's gate electrodes have all claimed features of the '562 patent's gate electrode. *Id.* As explained below, the Petition's mapping of "electrode stack" never extended to the non-conducting dielectric layers within Yu's broader gate metal stacks. *Infra* § IV.

### c. The Board adopted a narrow construction of "electrode stack" that neither party advocated

The Final Written Decision rejected Patent Owner's proposal to limit the claims to the patent's three example electrodes—a Schottky contact, ohmic contact, or insulated gate. FWD, 17. Instead, the Board adopted a narrow construction of "electrode stack" isolated from Petitioner's broader definition:

> "a conductor that provides a path for current entering or leaving a medium such as a semiconductor device."

FWD, 13. No party had advocated this construction. The Board then applied its new construction to Usui and Yu and concluded neither satisfied it.

## III. The Board Violated the APA by Proposing a New Construction in the Final Written Decision

The Board first stated its construction of "electrode stack" in the Final Written Decision, then faulted Petitioner for not proving Yu and Usui satisfy it. FWD, 13, 21–24, 30–31. While Petitioner had proposed the dictionary definition underlying the Board's construction, the Board truncated it to omit that an electrode "serves to deliver, receive, collect, emit, deflect or control electric charge carriers." FWD, 13–18; Ex. 1046, 237; Reply, 9. At oral hearing, the Board asked Petitioner to state the plain meaning of "electrode stack"; Petitioner explained that only the full definition matches "electrode." Tr., 8:26–9:15. The Board's truncated construction became

materially different from Petitioner's definition because it excluded a claimed embodiment—the insulated gate electrode. *Infra* § IV.

The Board's after-arising construction violates the APA. In *Axonics*, the Board adopted a new construction after institution and denied petitioner a fair opportunity to present argument and evidence under it. *Axonics,* 75 F.4th at 1384. The Federal Circuit held this violated the APA and vacated the construction. *Id.* Here, the Board went further—it first announced the construction in the Final Written Decision, after briefing had closed. "[T]he Board may not change theories midstream by adopting a construction in its final written decision that neither party requested nor anticipated." *SAS Inst., Inc. v. ComplementSoft, LLC*, 825 F.3d 1341, 1351 (Fed. Cir. 2016), as recognized in *Hamilton Beach Brands, Inc. v. f'real Foods, LLC*, 908 F.3d 1328, 1338 (Fed. Cir. 2018). The Director should vacate the Board's sua-sponte construction. *Qualcomm Inc. v. Intel Corp.*, 6 F.4th 1256, 1263 (Fed. Cir. 2021).

## IV. The Board's Construction Excludes the Claimed Insulated Gate and Overlooks the Undisputed Evidence Showing Yu Discloses an "Electrode Stack"

The Board's construction excluded a disclosed embodiment—the insulated gate electrode—required in dependent claims 12 and 17. This is reversible error. The Federal Circuit has held that a construction "must not" exclude a dependent claim, *Wright*, 122 F.3d at 1445, and, more generally, that a claim interpretation excluding

an embodiment is "rarely, if ever, correct," *Vitronics Corp. v. Conceptronic Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996).

In forming its construction, the Board correctly "disagree[d] with Patent Owner that 'electrode stack' as used in the challenged claims should be limited to the specific electrodes shown in the embodiments described in the Specification." FWD, 17 (citing POR, 4–9). But the Board erred by pruning Petitioner's technical dictionary definition to form its construction. FWD, 13–18. It discarded a controlling portion of the definition without explanation—that an electrode "serves to deliver, receive, collect, emit, deflect or control electric charge carriers." Ex. 1046, 237; Reply, 9.

The Board acknowledged that its construction had to cover the insulated gate embodiment, stating "Figure 1 includes . . . insulated gate electrode 132, . . . which comprises electrode stack 120." FWD, 15–16. The patent's dielectric "gate insulator layer 134 . . . underl[ies] electrode stack 120" in that embodiment. Ex. 1001, 3:28–31; Fig. 1. That dielectric makes it an *insulated* gate: the insulated gate electrode modifies conductivity in the channel by controlling electric charge carriers, and permits current to flow between source and drain without flowing through the gate itself. *See* Ex. 1002, ¶ 60; Ex. 1001, 2:53-60, Fig. 1. This matches the omitted technical dictionary clause: some electrodes "control electric charge carriers." Ex. 1046, 237.

Yet the Board's construction erroneously excludes this embodiment. It found that Yu's "metal gate stack[]" was not an "electrode stack" because dielectric layers blocked current from flowing through the metal layers of the gate. FWD, 30–31 ("Petitioner's acknowledgment that dielectrics are nonconductors undercuts its arguments"). That was wrong: even Patent Owner recognized that Yu's "gate electrode[]" and the '562 patent's "gate electrode" stacks contain dielectrics under gate metal layers. POR, 46; *supra* § II.b. The Board's finding should be reversed because "there is only one possible evidence-supported finding": Yu discloses an "electrode stack." *See Owens Corning*, 873 F.3d at 901. Reversal is warranted regardless of vacatur because the undisputed record evidence satisfies even the Board's narrow construction.

The Board compounded its error with a boundary-drawing mistake Patent Owner raised and Petitioner rebutted on Reply. The Board held "[b]ecause Petitioner identified Yu's metal gate stacks 230, 231 in their *entirety* as the recited 'electrode stack,' Petitioner must show that *all* of the layers in metal gate stacks 230, 231, *including dielectric layers* 214 and 216, together form a conductor that provides a path for current entering or leaving a medium such as a semiconductor device." FWD, 31 (emphases added). In other words, the Board found that the Petition failed to prove Yu disclosed the "electrode stack" because Petitioner's mapping allegedly included dielectrics. *Id.* That analysis mischaracterized the Petition's mapping and

wrongly required a showing that every part of Yu's gate metal stack is the claimed "electrode stack."

Three reasons show this was wrong, all addressed by Petitioner on Reply. First, "[t]he claims[']  open-ended use of 'including' does not preclude other structures in the stack," so nothing excludes dielectric layers from the "electrode stack." Reply, 26. Second, the Petition showed Yu's "metal gate stacks 230, 231" disclose the claimed "electrode stack" because they contain the capping and metal layers—the presence of other features does not negate that disclosure. Petition, 42; Reply, 26–27; *supra* § II.b. The Petition's mapping used Yu's nomenclature but focused entirely on the claimed metal and capping layers, excluding the dielectric, as Dr. Zhao confirmed at deposition. Petition, 42; Reply, 26–27; Ex. 2026, 90:25–91:17. Third, Yu undisputedly has the same metals-over-dielectric arrangement as the '562 patent's insulated gate, so it discloses an "electrode stack" within the larger "gate metal stacks." Reply, 24–27.

The Board improperly ignored those arguments, limiting its analysis to the Petition while also discounting Dr. Zhao for identifying the same disclosures. FWD, 30–31. This was error, for the Petition "was not required to anticipate" Patent Owner's argument. *Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1010 (Fed. Cir. 2023) (holding a petitioner may bolster its position on reply without having anticipated the patent owner's argument). Dr. Zhao identified the relevant

disclosures supporting his theory: Yu's "gate metal stacks, 230, 231" contain the "electrode stack." Ex. 1002, ¶ 162. Petitioner and Dr. Zhao were "permitted" to "bolst[er]" the analysis on Reply while relying on that same theory. *Id.* And the Board should have considered them. *See Oren Techs., LLC v. Proppant Express Invs. LLC*, No. 2019-1778, 2021 WL 3120819, at *7 (Fed. Cir. July 23, 2021) (Board's "failure to address" a party's arguments and evidence "was legal error").

## V. No Record Evidence Supports the Board's Finding That Usui's Interconnect is Not an "Electrode Stack"

In siding with Patent Owner that Usui's interconnect was not an electrode under the Board's narrow construction, the Board did not choose between two reasonable but contradictory conclusions. Instead, the record evidence supported only Petitioner's position: that Usui's interconnect is an "electrode stack," even under the Board's construction. The Board erred by siding with Patent Owner despite all contrary record evidence. *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1366–67 (Fed. Cir. 2016) (reversing where the record supported only one conclusion); *Owens Corning*, 873 F.3d at 901–03 (same); *In re Hodges*, 882 F.3d 1107, 1113–14 & n.7 (Fed. Cir. 2018) (same).

The Board premised its holding on Dr. Piner's testimony that "interconnects (such as Usui's interconnect metallurgy structure) and electrical contacts (such as that claimed in the '562 patent) are not the same thing." FWD, 22–23. But Dr. Piner analyzed only Patent Owner's failed construction—that interconnects lack the

electrical characteristics of a Schottky or ohmic contact—not the Board's construction. Ex. 2024, ¶¶ 63–71, 148. Like Dr. Zhao, he could not have because it first appeared in the Final Written Decision. And the Board should have given it no weight. *See Treehouse Avatar LLC v. Valve Corp.*, 54 F.4th 709, 714–15 (Fed. Cir. 2022) (affirming that expert testimony on different construction is "suspect").

Regardless, even crediting Dr. Piner's testimony, Dr. Piner admitted Usui's interconnect is a conductor that "carr[ies] very high current densities" between devices, in the very passages the Board quotes. FWD, 22–23; Ex. 2024, ¶¶ 71, 148. Petitioner and its expert agreed. Petition, 8; Reply, 12–13; Ex. 1047, ¶¶ 44–51. Both parties' undisputed evidence thus showed Usui's interconnect met the Board's new construction. So "the evidence presented could not reasonably support" the Board's analysis. *See Trend Micro Inc. v. CUPP Computing AS*, No. 2020-2237, 2022 WL 14366176, at *4, *6 (Fed. Cir. Oct. 25, 2022) (concluding reference teaches limitation under Board's construction and remanding to address other issues).

The Board compounded its error by discounting Dr. Zhao's testimony at every stage. It declined to consider his supplemental declaration because it addressed Patent Owner's rejected construction (FWD, 21–23), even though it then considered Dr. Piner's testimony under that same construction (FWD, 22–23). The Board should not have disregarded Dr. Zhao's testimony on that basis. *See Axonics*, 75 F.4th at 1383 ("petitioner must be afforded a reasonable opportunity in reply to

present argument and evidence under [Patent Owner's] new construction"). It also wrongly discounted Dr. Zhao's opening declaration, dismissing it for "merely repeat[ing] the disclosures in Usui." *Id.* But Patent Owner had not yet disputed the meaning of "electrode stack" when Dr. Zhao identified the Usui passages meeting that term, so nothing more was necessary, and Dr. Zhao "was not required to anticipate" Patent Owner's construction or barred from "bolst[ering]" his analysis in reply. *See Corephotonics*, 84 F.4th at 1010.

The Board's refusal to consider Petitioner's responsive claim construction arguments and evidence was material to its decision and at least warrants vacatur and remand. *Provisur Techs., Inc. v. Weber, Inc.*, 50 F.4th 117, 123–24 (Fed. Cir. 2022) (failure to address rebuttal did not fairly contemplate and resolve the opposing arguments). But as in Section IV, *supra*, reversal—not mere vacatur—is warranted because the undisputed evidence shows Usui's interconnect meets even the Board's narrow construction. *Owens Corning*, 873 F.3d at 901; *Arendi*, 832 F.3d at 1366-67.

## VI. Conclusion: The Director Should Vacate the Board's Construction, Reverse the Board's Finding that Yu and Usui do not Disclose an "Electrode Stack," and Remand

The Director should vacate the Board's new, narrow construction, reverse its erroneous findings that Yu and Usui do not disclose "electrode stack," and remand.

Dated: July 30, 2026

/Lionel M. Lavenue/
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Reg. No. 46,859

## CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on July 30, 2026, a true and correct copy of the foregoing was served by electronic mail on the following counsel of record for Patent Owner:

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