

Filed on behalf of: Yangtze Memory Technologies Company, Ltd.

Entered: April 1, 2026

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICRON TECHNOLOGY, INC.,
Petitioner,

v.

YANGTZE MEMORY TECHNOLOGIES COMPANY, LTD.,
Patent Owner.

PGR2025-00021
Patent 12,010,838

PATENT OWNER'S SUR-REPLY

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2002	Civil Minutes, <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc.</i> , No. 3:23-cv-05792-RFL (N.D. Cal. Sept. 18, 2024), ECF No. 141
2003	Order Granting Stipulation to Extend Certain Deadlines Pursuant to Patent L.R. 4-2 and the Scheduling Order (ECF No. 141) Pursuant to Civil Local Rule 6-1(b), <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc.</i> , No. 3:23-cv-05792-RFL (N.D. Cal. Jan. 8, 2025), ECF No. 194
2004	Order Granting Motion to Stay Case Pending <i>Inter Partes</i> Review, <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc.</i> , No. 3:23-cv-05792-RFL (N.D. Cal. Mar. 14, 2025), ECF No. 243
2005	Plaintiff/Counterclaim Defendant Yangtze Memory Technologies Company, Ltd.'s and Counterclaim Defendant Yangtze Memory Technologies, Inc.'s Opposition to Micron's Motion to Stay Case Pending <i>Inter Partes</i> Review and Post-Grant Proceedings, <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc.</i> , No. 3:23-cv-05792-RFL (N.D. Cal. Feb. 3, 2025), ECF No. 221
2006	Declaration of Konstantinos Giapis ("Giapis")
2007	<i>Curriculum Vitae</i> of Konstantinos Giapis
2008-2017	RESERVED

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2018	Order Granting Motion to Consolidate, <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc.</i> , No. 3:23-cv-05792-RFL (N.D. Cal. Aug. 21, 2024), ECF No. 106
2019	Declaration of Konstantinos Giapis in Support of Patent Owner's Response ("Giapis2")
2020	U.S. Patent No. 9,006,884 B2 ("884 Patent")
2021	U.S. Patent No. 11,145,666 B2 ("666 Patent")
2022	Excerpt of File History U.S. Patent Application No. 16/126,956
2023	Counterpoint Tech. Mkt. Rsch., <i>Scaling to 1,000-Layer 3D NAND in the AI Era</i> (July 2024), https://filecache.mediaroom.com/mr5mr_lamresearch/182770/Counterpoint_Research_Paper_Scaling_to_1000-Layer_3D_NAND_in_the_AI_Era.pdf ("Counterpoint")
2024	3D FLASH MEMORIES (Rino Micheloni ed. 2016) ("Micheloni") (excerpt)
2025	EFY Bureau, <i>At 20nm, Chips Have Features Sized Ten Times Smaller Than the Wavelength of Laser Used in Lithography</i> , electronicsforu.com (Dec. 4, 2014), https://www.electronicsforu.com/technology-trends/interviews/20nm-chips-features-sized-ten-times-smaller-wavelength-laser-used-lithography
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2029	Steven S. Zumdahl et al., CHEMISTRY: AN ATOMS FIRST APPROACH (3d ed. 2021) ("Zumdahl") (excerpt)
2030	Transcript of the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , PGR2025-00021 (P.T.A.B. Oct. 30, 2025) ("Lee '838 Dep.")
2031	Transcript of the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) ("Lee '666 Dep.")
2032	Exhibit 1 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) ("Lee '666 Dep. Ex. 1")
2033	Exhibit 2 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) ("Lee '666 Dep. Ex. 2")
2034	Exhibit 3 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) ("Lee '666 Dep. Ex. 3")
2035	Exhibit 4 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) ("Lee '666 Dep. Ex. 4")

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2036	Exhibit 5 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) (“Lee ’666 Dep. Ex. 5”)
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2038	Exhibit 7 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) (“Lee ’666 Dep. Ex. 7”)
2039	Exhibit 8 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) (“Lee ’666 Dep. Ex. 8”)
2040	Exhibit 9 entered in the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Aug. 13, 2025) (Ex. 2031) (“Lee ’666 Dep. Ex. 9”)
2041	U.S. Patent Application Publication No. 2018/0301460 A1 (“Yoo”)
2042	A.E.T. Kuiper et al., <i>Oxidation Behaviour of LPCVD Silicon Oxynitride Films</i> , 33/34 APPLIED SURFACE SCI. 757 (1988) (“Kuiper”)
2043	Yen-Po Lin & Jenn-Gwo Hwu, <i>Quality Improvement in LPCVD Silicon Nitrides by Anodic and Rapid Thermal Oxidations</i> , 7 ELECTROCHEMICAL SOLID-STATE LETTERS G87 (2004) (“Lin”)

Exhibit	Description
2044	X. Y. Chen et al., <i>Annealing and Oxidation of Silicon Oxide Films Prepared By Plasma-Enhanced Chemical Vapor Deposition</i> , 97 J. APPLIED PHYSICS 014913 (2005) (“Chen”)
2045	A. Barranco et al., <i>Electronic State Characterization of SiO_x Thin Films Prepared by Evaporation</i> , 97 J. APPLIED PHYSICS 113714 (2005) (“Barranco”)
2046	Declaration of B. Thomas Watson In Response To Petitioner's Objections to Evidence, with Appendices A-F [<i>served only</i>]
2047	Transcript of the Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , PGR2025-00021 (P.T.A.B. Mar. 25, 2026), including Exhibit 1 (Deposition of Jack C. Lee, Ph.D., <i>Micron Technology, Inc. v. Yangtze Memory Technologies Company, Ltd.</i> , IPR2025-00189 (P.T.A.B. Dec. 23, 2025))

I. Introduction

Patent Owner's ("PO") Response ("POR") exposed fatal flaws in the Petition. The Reply confirms them.

On claim construction, Petitioner's own expert concedes the "first portion" and "second portion" must be "separate and distinct," "different, nonoverlapping regions." Ex.1075 ¶27; Ex.2047, 33:3-13. Yet Petitioner's mappings have the "first material layer" covering the entire second material layer (Lee) or extending to the stair's end (Kim)—rendering "portion" superfluous. Petitioner's "curved side surface" reading fares no better, treating it as any surface curved in any direction, contrary to the intrinsic record.

On Ground 1, Petitioner effectively concedes Kim's Figure 6 lacks the lateral displacement limitation under PO's construction and pivots to Figure 5—never raised in the Petition. Even then, Petitioner fails to show Figure 5 meets the claims.

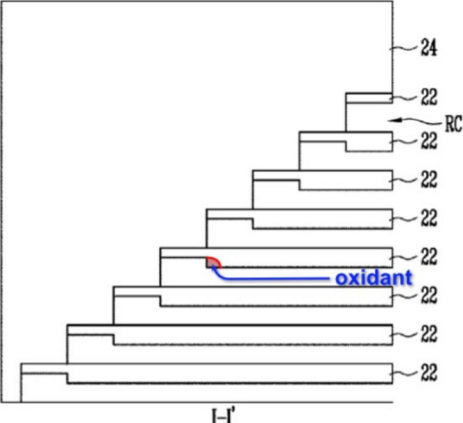
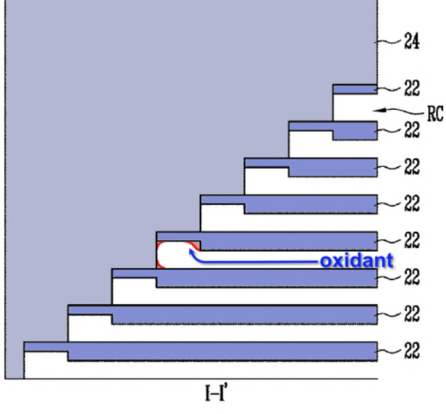
The single-reference Kim obviousness theory for claim 13 collapses after Petitioner's expert conceded Kim lacks a "curved side surface." Ex.2031, 130:8-133:3. Petitioner's pivot to new combinations—Kim with Nam, Park, or Yun—is untimely and meritless.

Grounds 2 and 4 fail because Yang's and Haller's processes are undisputedly incompatible with Kim and Lee, respectively. Petitioner argues this is irrelevant—a

legal error. Prior art must be considered for all it teaches. Neither Yang nor Haller teaches or renders obvious the claimed lateral distance.

Ground 3 fails because Lee's first material layer covers the entire second material layer, causing the portions to overlap rather than be distinct.

On Ground 5, the POR showed that oxidizing Lee's layer 22 as Petitioner proposed was infeasible. In Reply, Petitioner abandons that theory, pivoting to different corners and a nonstoichiometric-oxide approach never previously raised—procedurally improper and meritless. Worse, this new theory increases electrical failure risk, contradicting Petitioner's own motivation to combine.

Petition; Declaration	Reply
FIG. 5B  Ex.1003 ¶474; Pet.82-84	FIG. 5B  Reply 27

The Board should adopt PO's constructions and reject each ground.

II. Claim Construction

Contrary to precedent, Petitioner asks the Board to construe claims “in a vacuum” and “divorced from the context of the written description and prosecution history.” *Eon Corp. IP Holdings LLC v. Silver Spring Networks, Inc.*, 815 F.3d 1314, 1320 (Fed. Cir. 2016). Petitioner’s selective quotation of *Thorner* shows this—omitting that claim terms are construed “**in the context of the specification and prosecution history.**” *Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).¹ Petitioner ignores the context provided by intrinsic evidence.

A. Terms Involving “First” and “Second Portion”

A POSITA would understand “first portion of the second material layer” as “a portion of the second material layer beneath the first material layer that is separate and distinct from the second portion of the second material layer.”² POR 9-10. Alternatively, “wherein the first material layer is disposed over a first portion of the second material layer” means “wherein the first material layer is disposed over a first portion of the second material layer but not a second portion of the second material

¹ Unless noted otherwise, emphases are added and internal quotation marks and citations are omitted.

² Petitioner’s expert never disputes PO’s primary construction. Ex.1075 ¶9; Ex.2047, 19:5-14.

layer” and “a landing pad disposed over a second portion of the second material layer” means “a landing pad disposed over the second portion of the second material layer but not the first portion of the second material layer.” *Id.* Under either formulation, the result is giving effect to the claim language that identifies the structural relationships between the two separate and distinct portions of the second material layer and the structures recited as respectively over them.

Ignoring the claimed structural relationship, Petitioner asserts the claims merely refer to a “‘second material layer’ (a conductive layer) that has ‘a first portion’ and ‘a second portion.’” Reply 4-5 (original emphasis). But any layer could be divided into arbitrary portions. The claims here demand more. The claims define the portions by structural relationships: “the first material layer is disposed over a first portion”; “a landing pad disposed over a second portion”; and “the second side surface is laterally displaced from a side surface of the second portion.” The claims recite distinct, nonoverlapping portions defined by the structures above them. Ex.2047, 33:3-13. These structural limitations also show why Petitioner is wrong to argue the claims “merely specif[y] where the ‘landing pad’ and ‘first material layer’ are located: over ‘portions’ of the same ‘second material layer.’” Reply 5. If the claims merely required the landing pad and first material layer were over any arbitrary portions, the claims would not also recite a specific “side surface of the second portion” that is also part of its structural definition.

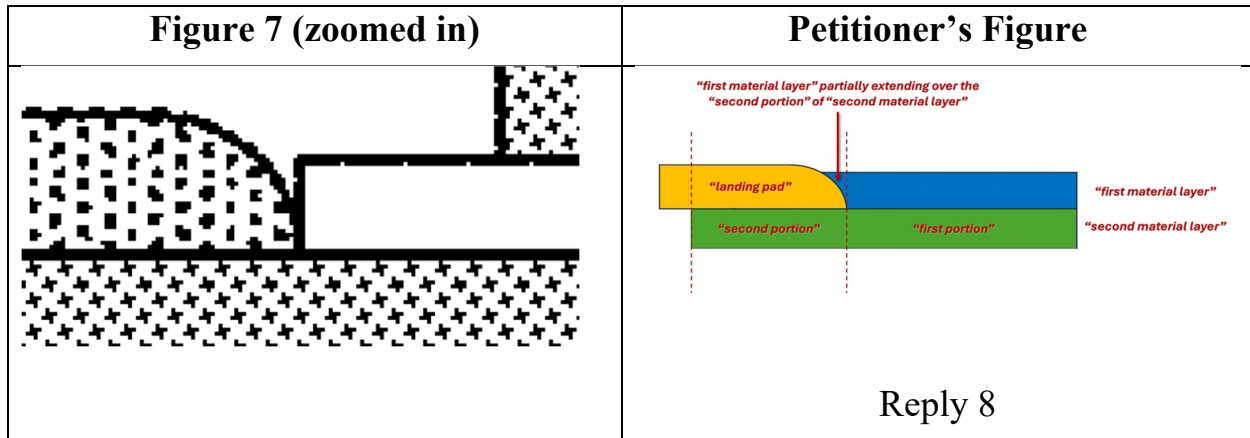
Petitioner's lack of consideration of the claim language leads to other problems—it renders claim language superfluous. If the “first material layer” need only be over any arbitrary portion of the “second material layer,” and the “landing pad” need only be over any arbitrary portion of the “second material layer,” as Petitioner argues, then at least the “first portion” is read out of the claims entirely. There would be no difference between the actual claim language and “a first material layer and a second material layer, wherein the first material layer is disposed over ~~a first portion of~~ the second material layer.” POR 11-12. The Federal Circuit rejects such constructions. *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 801, 809-10 (Fed. Cir. 2021); *SSI Techs., LLC v. Dongguan Zhengyang Elec. Mech. Ltd.*, 59 F.4th 1328, 1335 (Fed. Cir. 2023). Petitioner argues the Board already rejected PO's construction, but ignores that the Institution Decision never addressed how Petitioner's construction reads out at least “a first portion.” Reply 4, 6.

That Petitioner impermissibly reads “first portion” out of the claim is apparent from its invalidity positions. In *Lee*, the first material layer covers ***the whole*** of the second material layer, not a “portion.” Petitioner's own definition of “portion”—“‘part’ of a larger whole”—defeats its *Lee* position. *Id.* 4-5. If the first material layer covers the entire conductive layer, it covers the whole, not a “portion.” Thus, the claim does not allow for the first material layer to cover the whole of the second material layer as Petitioner argues. And in *Kim*, Petitioner fails to define the first

portion as the portion the first material layer is disposed over—again rendering “first portion” meaningless. *Id.* 2. Petitioner’s focus on the prior art for claim construction, rather than the intrinsic evidence, exposes its misguided claim construction position. *Id.* 6. The ’838 patent requires the portions be “separate and distinct” and “nonoverlapping.” Ex.2047, 33:3-13; Ex.1075 ¶¶15-16, 27; Ex.2030, 44:13-19. *Engel Industries, Inc. v. Lockformer Co.*, 96 F.3d 1398, 1405 (Fed. Cir. 1996) and *Liberty Ammunition, Inc. v. United States*, 835 F.3d 1388 (Fed. Cir. 2016), confirm this—and Petitioner distinguishes neither. POR 13-16.

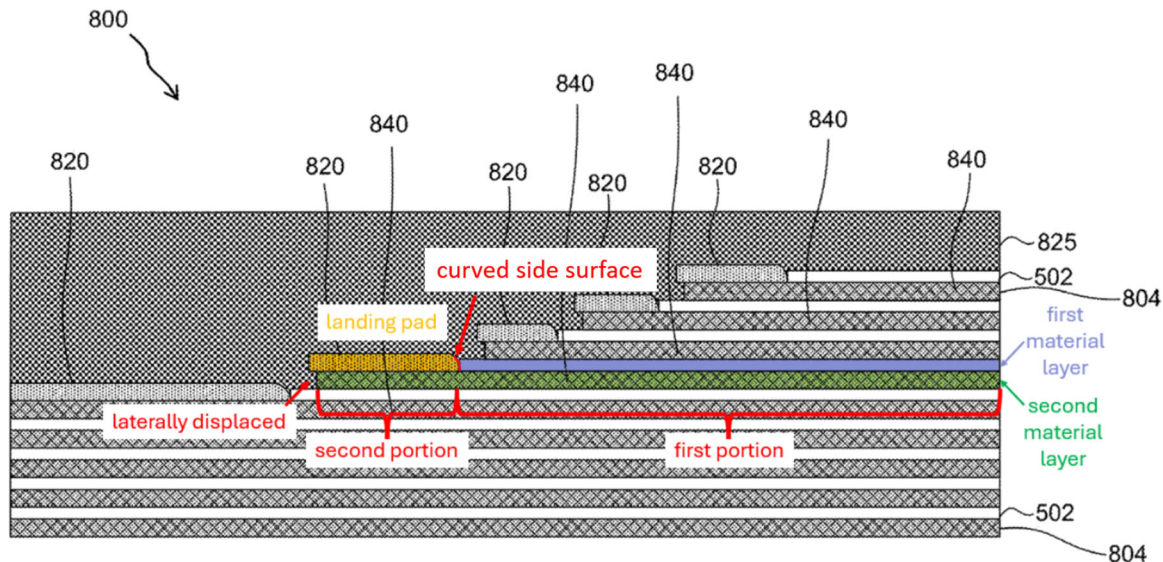
Petitioner argues that PO’s construction somehow limits the claim from having “other structures also being over the ‘second portion.’” Reply 5. Not so. A dielectric layer such as layer 825 could also be disposed over the second portion of the second material layer. Ex.1001, 9:61-62, 10:36-48, Fig.8, cl.19. This would not vitiate the claimed structural relationship as Petitioner does. And while the claims do not restrict the first material layer to being located only over the first portion of the second material layer (Reply 5), the claims *do* restrict the first material layer from also being over the second portion of the second material layer. That is because the first and second portions of the second material layer are defined by the first material layer and the landing pad respectively above them. POR 10-11. PO’s construction simply “giv[es] effect to all terms in the claim.” *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950-51 (Fed. Cir. 2006).

The '838 patent's embodiments confirm PO's construction. Petitioner contends "there is at least some insulation over the 'second portion' in Figure 8" by relying on a made-up figure. Reply 1, 8. That figure contradicts the specification's description of its process steps. As Figure 5 shows, the first material layer's side surface is completely vertical and established *before* the landing pad forms and remains unchanged as the curved side surface is formed. Ex.2019 ¶¶34, 53-54; Ex.1001, 7:37-51 (describing anisotropic etch process for insulating layer 102), 8:34-45 (layer 202 removed "using similar techniques as removing insulating layer 102"). Figures 6-7 illustrate how the curved side surface forms, with layer 620 curving "into the corner by the step sidewall, precisely where layer 620 meets the insulating layer 502." Ex.2019 ¶¶35-37. Dr. Giapis explained that the claimed embodiment achieves contact between the curved side surface and first material layer at the interface without overlapping portions. *Id.* ¶¶34-41. Where Petitioner says there "must" be a first material layer, a gap is visible in Figure 7. Reply 8 (original emphasis). Petitioner's figure is inconsistent with the intrinsic evidence, which never describes forming the insulating layer over the landing pad, or etching into the insulating layer to form the landing pad within.



Ex.1001, Fig.7 (zoomed in). Both experts agree the landing pad (820) and insulating layer (502) contact each other along an “intersection ... in the YZ plane”—i.e., a side surface. Ex.2030, 134:9-135:10, 136:11-14; Ex.1001, 9:66-10:3; Ex.2019 ¶¶76-77. Figure 8 depicts this side surface as curved. Ex.2019 ¶¶76-77. The insulation Petitioner identifies over the second portion is dielectric layer 825³—not part of the “staircase structure”—thus, not the claimed “first material layer.” Ex.2047, 37:16-19; Ex.1001, 9:40-10:48, cls.1, 8; Ex.1076, 90:22-25. Layer 502 is the “first material layer.” Ex.2019 ¶¶54-56. As a result, Figure 8 shows first and second portions of layer 840 (the second material layer) “divided by the intersection of the insulating layer and landing pad above them.” Ex.2030, 141:5-18.

³ Claims 2, 11, and 19 require a “dielectric layer” in addition to a “first material layer.”



Ex.2019 ¶65.

PO does not import embodiments through its construction. PO's construction is based on claim language as understood by a POSITA in view of the specification. That it excludes no preferred embodiment confirms its correctness. And other manufacturing methods existing does not mean resulting structures must be claimed. *AllVoice Computing PLC v. Nuance Commc'ns, Inc.*, 504 F.3d 1236, 1248 (Fed. Cir. 2007).

The prosecution history supports PO's construction.⁴ The absence of "clear and unmistakable disavowal of claim scope" does not render the prosecution history

⁴ Petitioner's citation to *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998) is inapposite. Reply 7-8. PO seeks an ordinary meaning in view of the intrinsic record, not a "special and particular definition." *Id.*

irrelevant. *Iridescent Networks, Inc. v. AT&T Mobility, LLC*, 933 F.3d 1345, 1352 (Fed. Cir. 2019). As the POR explained (undisputed by Petitioner), the cited prior art and Examiner's office actions confirm a POSITA would understand the portions to be "separate and distinct." POR 18-20.

PO's infringement contentions are also consistent with its construction. Petitioner never explains how those contentions show a "second portion" with "first material layer" over it, nor does Petitioner substantiate why PO's construction would conflict with portions outside the landing pad or first material layer being part of the "second portion." This is attorney argument devoid of evidence.

Petitioner's claim that Kim's island embodiment and PO's infringement contentions have "no difference" is wrong. Reply 9-10. In Kim, the first material layer extends beyond the landing pad to the stair's end—eliminating any lateral displacement. POR 46-47. PO's contentions show no such extension.

Dr. Giapis's testimony is also not inconsistent. Petitioner cites testimony where Dr. Giapis was asked—in a vacuum—whether an island shape could meet the claims. Reply 10 (citing Ex.1076, 34:8-36:4). Under PO's construction, an island shape could meet the claims if, for example, a third layer surrounds the island such that portions remain non-overlapping. Kim's specific island embodiments do not meet the claims because they lack this configuration. Ex.2019 ¶108. There is nothing inconsistent with PO's constructions.

Petitioner's reading conflicts with the intrinsic evidence, reads out claim language, and undermines the written description. The Board should adopt PO's construction.

B. “Curved Side Surface”

PO's construction of “curved side surface” is consistent with the claims, specification, and prosecution history.⁵

A POSITA would understand “curved side surface” as a vertical surface curved along a direction (e.g., the z-axis) perpendicular to the top surface of the structure. POR 21-41. Petitioner's expert proposes it includes “[a]ny curved surface” “without limitation to a particular axis or orientation.” Ex.1075 ¶58. But reading “side surface” to mean any surface renders “side” meaningless—an outcome the Federal Circuit “highly disfavor[s].” *Intel*, 21 F.4th at 809-10; *SSI Techs.*, 59 F.4th at 1335. Treating “side” as superfluous, like Petitioner does, ignores the claims' use of “top” and “bottom” modifiers of “surface” in contrast to the “side” modifier.

The claim language confirms this. Claim 2 recites a “bottom surface” distinct from a “side surface.” Petitioner's expert admitted that usage of “top and bottom surface” in related claims shows “the applicant knew how to craft a claim that

⁵ In Reply, Petitioner never substantively addresses the prosecution history supporting PO's construction (POR 39-41).

excludes the top and bottom surfaces of a layer from the scope of the term ‘side surface.’” Ex.2047, 133-140 (65:7-72:6); Ex.1001, cls.1-2. Because claim 2’s “side surface” “exclude[s] the top and bottom surfaces,” there is a “strong presumption” the same is true for claim 13—a presumption Petitioner has not overcome. *In re Varma*, 816 F.3d 1352, 1363 (Fed. Cir. 2016); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313-14 (Fed. Cir. 2005) (en banc).

The absence of “vertical,” “z-axis,” or “perpendicular” in the claims does not preclude PO’s construction. Claim 13’s memory device mirrors the specification’s two horizontal surfaces (x-y plane) and vertical surfaces (z-axis). Ex.1001, 5:47-50. The specification’s “top surface” and “bottom surface” of the “substrate” orients the structures, with horizontal surfaces parallel to the top surface and vertical surfaces perpendicular. *Id.* 4:13-25, 5:6-16. Claims must be construed “in view of the specification” (*Hamilton Beach Brands, Inc. v. F’Real Foods, LLC*, 908 F.3d 1328, 1339 (Fed. Cir. 2018)), not “in a vacuum.” *Eon*, 815 F.3d at 1320-21.

Petitioner argues the specification does not use “curved” and does not explain how such a pad is formed. Reply 13-14. But terms are construed in light of the specification even if they do not appear. *Kaneka Corp. v. Xiamen Kingdomway Grp. Co.*, 790 F.3d 1298, 1305 (Fed. Cir. 2015). The specification discloses a process yielding a side surface curved only along the z-axis. Ex.2019 ¶¶33-44. The only embodiment of the “curved side surface” (Fig.8) is curved along the z-axis. *Id.* ¶¶42-

44, 76. Petitioner's claim (without expert support) that the specification "says nothing about how 'curved' pad sides are to be formed" (Reply 14) is wrong. Ex.2019 ¶¶33-44.

Petitioner argues the patent is "open to the use of 'any suitable deposition techniques.'" Reply 14-15. But Petitioner identifies no such technique consistent with the '838 patent's processes. Forming the "curved side surface" requires "poor step coverage." Ex.2019 ¶¶33-37, 79-83; Ex.1001, 8:46-9:12, 12:37-49, Fig.6. Petitioner's reliance on CVD having "good step coverage"—the opposite of what this embodiment requires—confirms its improper construction. Reply 14-15; Ex.2031, 84:17-86:7. A broader construction risks written description/enablement problems, contradicting the canon of construing claims to preserve validity. *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1335 n.6 (Fed. Cir. 2003).

Petitioner's cases are inapposite. In *Acumed LLC v. Stryker Corp.*, the specification used "transverse" and "perpendicular" such that they could not be the same. 483 F.3d 800, 807 (Fed. Cir. 2007). In *Promptu Systems Corp. v. Comcast Corp.*, the proposed construction would have excluded embodiments. 92 F.4th 1372, 1379 (Fed. Cir. 2024). Here, there is no contradiction—no embodiments are excluded.

Johnson Worldwide Associates, Inc. v. Zebco Corp., is also inapposite. 175 F.3d 985, 989 (Fed. Cir. 1999). *Johnson* does not apply where a patent "does not

involve the “[v]aried use of a disputed term” and instead defines the term by implication through consistent usage. *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Grp., Inc.*, 262 F.3d 1258, 1273 (Fed. Cir. 2001). Here, the ’838 patent uses “side surface” without “top” or “bottom” 60 times to consistently denote vertical surfaces, defining the term by implication. Ex.2019 ¶67.

The patent’s purpose—improving yield and manufacturing cost—guides construction. *Sequoia Tech., LLC v. Dell, Inc.*, 66 F.4th 1317, 1326 (Fed. Cir. 2023). As Dr. Giapis explains, and uncontested by Petitioner, the “curved side surface” can provide some of these improvements if curved vertically. Petitioner’s argument that the patent does not “make such a correlation” (Reply 13-14), reflects Petitioner’s error of construing claims in a vacuum rather than as understood by “the ordinary artisan after reading the entire patent.” *Eon*, 815 F.3d at 1320 (quoting *Phillips*, 415 F.3d at 1321).

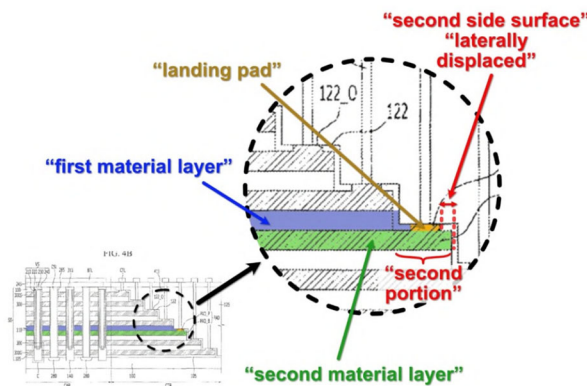
The intrinsic record confirms that “curved side surface” means a vertical surface curved along the z-axis. Petitioner’s reading conflicts with the intrinsic evidence, reads out claim language, and undermines the written description. The Board should adopt PO’s construction.

III. Ground 1: Petitioner Fails To Establish Kim Renders Obvious The Claimed “Lateral Displacement” And “Curved Side Surface”

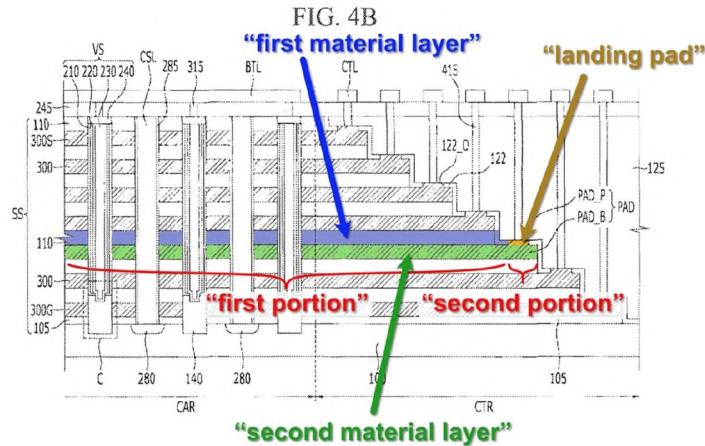
A. Kim Does Not Render Obvious the Claimed “Lateral Displacement”

Petitioner accuses PO of “fabricat[ing] its own, completely different way to characterize Kim.” Reply 3. But PO merely explained how Kim’s structure maps to the claims. Kim’s first material layer—as Petitioner’s expert defines it (“layers 110 and 122 together”)—extends to the step’s end and fails to show the claimed arrangement. Ex.2030, 53:3-20; Ex.1003 ¶187.

Petitioner identifies two different “second portions”: (1) one from layer 122 to the conductive layer’s end, and (2) one from the landing pad’s side surface to the conductive layer’s end. Reply 2, 11. This inconsistency confirms Petitioner’s arbitrary identification.



Reply 2.



Id. 11.

Petitioner ignores Kim's full disclosure—a fatal error. Prior art must be “considered for all it taught.” *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069 (Fed. Cir. 2018). Kim Figure 6 is dispositive: layer 122 surrounds PAD_P, making the “landing pad” and “second portion” coterminous. No lateral displacement exists. POR 42-47; Ex.2019 ¶¶98-109; Ex.2030, 38:8-39:16, 47:2-14, 57:7-22.

Petitioner does not dispute Figure 6 fails under PO's constructions, instead pivoting to Figure 5—a figure absent from the Petition.⁶ Ex.1005, 7:58-67; POR 41-42, 51-55. This belated theory should be rejected. On the merits, Petitioner's expert

⁶ In Reply, Petitioner refers to only Petition page 32. But that generic citation does not show how the Figure 5 embodiment meets the claim.

never opined Figure 5 teaches lateral displacement. Petitioner does not rely on Figure 5 for claims 13-15. POR 47-48. Ground 1 fails for those claims.

B. Kim Does Not Render Obvious the Claimed “Curved Side Surface”

Petitioner contends Kim teaches the claimed “curved side surface.” Reply 15-18. But Petitioner's expert repeatedly conceded that Kim “does not expressly or inherently disclose” that limitation. Ex.2031, 130:8-131:7, 132:17-133:3. These admissions undermine the single-reference obviousness theory. *AIA Eng'g Ltd. v. Magotteaux Int'l S/A*, 657 F.3d 1264, 1278 (Fed. Cir. 2011).

Petitioner does not dispute Kim's cylindrical pads are not curved along the z-axis. It argues the “curved side surface” need not be vertically curved. But Claim 13 requires vertical curvature, which Kim's pads do not provide. *Supra* §II.B.

Petitioner argues Kim's “curved surface based on a virtual rectangular parallel[] shape” encompasses vertically curved pads “routinely” disclosed in the art. Pet.41 (original alteration); Reply 15. But Kim never suggests such a change, and Petitioner identifies no evidence—beyond attorney argument (which ““is not evidence””)—that Kim teaches vertically curved pads. *Elbit Sys. of Am., LLC v. Thales Visionix, Inc.*, 881 F.3d 1354, 1359 (Fed. Cir. 2018).

Ground 1 is a single-reference obviousness theory, yet Petitioner's Reply pivots to combinations—Kim with Park, Nam, or Yun. Reply 16. The Petition claimed Kim “could be readily adapted” without describing how, improperly relying

on a POSITA's purported knowledge. Pet.46-47; POR 51-55. In Reply, Petitioner newly argues a POSITA would follow Park or Nam. The Board cannot consider these new arguments. 37 C.F.R. § 42.23(b); *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016).

On the merits, Petitioner's "readily tailorable" argument fails. Reply 17. The cited art does not show the claimed configuration was "oft taught." Kim does not, as Dr. Lee admitted. Park does not; its pad does not contact insulating layers. Ex.1009, Figs.5, 7. Nam does not; its insulating layer is disposed over the entire second material layer, not a "portion." Ex.1022, Fig.8B; Ex.2031, 240:2-241:21; Exs.2039-2040. Yun does not; there is no curved side surface contacting the insulating layer. Ex.2019 ¶142.

Petitioner argues Kim "allows for use of any method capable of producing the types of contact pads it discusses." Reply 16. The record refutes this. Kim undisputedly uses a shaped mask process that cannot form a vertically curved surface. Ex.2019 ¶¶86-96. And while Kim's depicted embodiments do not foreclose others, Petitioner improperly argues obviousness through "hindsight reconstruction" based on other processes merely being in the prior art, but never explains "*how* or *why*" such processes would be "combined to produced the claimed invention." *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (original

emphases). Petitioner provides no explanation for why a POSITA would abandon Kim's processes wholesale.

Petitioner speculates Park's oxidation would round Kim's pads but identifies no evidence a POSITA could or would know how to further oxidize Kim's silicon oxide layer 122 to induce curvature. Reply 16-18; Ex.2047, 120 (140:14-20), 211 (143:5-14). Fully oxidized silicon oxide will not further oxidize.⁷ Ex.1005, 6:35-36, 12:59-60; Ex.2019 ¶¶187-208. Park oxidizes silicon nitride or polysilicon, not silicon oxide, because if the silicon oxide were to oxidize, it would bridge adjacent layers 40, contrary to Park's teaching to avoid short-circuits. Ex.1009, 6:26-39, 8:38-42; Ex.2019 ¶¶191-194. Oxidizing nonstoichiometric silicon oxide, if used in Kim's layer 122, would increase shorting risk, contrary to Kim's goals. *Infra* §V.

Nam's heat-induced diffusion is incompatible with Kim. Heating as in Nam enlarges pad size and increases short-circuit risk—contrary to Kim's goals. Ex.2019 ¶145. Kim uses lithography and masks to increase spacing. Ex.1005, 8:66-9:11, 12:43-13:11, 13:60-67; Ex.2019 ¶¶125, 130, 146; Ex.2047, 191-193 (123:5-125:2).

⁷ Dr. Giapis' reasons for why a POSITA would not oxidize Lee to form rounded surfaces (Ex.2019 ¶¶187-208), apply equally to Kim, because, as Dr. Lee admits, "there is no difference" in how a POSITA would oxidize the oxide layers in Kim and Lee. Ex.2047, 215-216 (147:15-148:15).

But Nam is “not very precise,” yielding “a range of structures” with pads closer together. Ex.2019 ¶¶145-146. Petitioner ignores this. Reply 17. Petitioner’s “routine design work” argument fails because Nam’s and Park’s processes conflict with Kim’s shaped mask process. Ex.2019 ¶¶94-96, 137-140, 144-147. Petitioner never explains how they could work together or why a POSITA “would” make such modification given the shorting risk. *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020).

Petitioner claims adding a curved side surface was “known” and “suitable.” Reply 17-19. The record shows otherwise. First, no reference shows the specific configuration was known—labeling a feature “well known” cannot substitute for proof. *Juniper Networks, Inc. v. Correct Transmission, LLC*, 2024 WL 3517862, *5 n.3 (Fed. Cir. July 24, 2024). Second, semiconductor processes are not “so simple that a POSITA simply sees a particularly shaped structure and substitutes it.” Ex.2019 ¶135. Third, importing Nam’s diffusion or Park’s oxidation would undermine Kim’s benefits and conflict with its process. POR 61-64; *Apple Inc. v. Smart Mobile Techs. LLC*, 2026 WL 550104, *7 (Fed. Cir. Feb. 27, 2026). Fourth, Nam teaches away by increasing pad size—opposite of Kim’s goals. Ex.2019 ¶¶83-84, 144-147; *Millennium Pharms., Inc. v. Sandoz Inc.*, 862 F.3d 1356, 1366 (Fed. Cir. 2017).

Petitioner argues Kim's recognition of short-circuits would have motivated modification. Reply 18-19. But Kim's process already "effectively prevent[s]" short-circuits. Ex.1005, 9:7-11, 9:50-53. Petitioner never explains why a POSITA would modify a working solution, nor confronts process incompatibility. Prior art must be considered "for all its teachings." *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019). Petitioner cannot import different processes into Kim and still claim Kim's benefits persist while ignoring the necessary modifications. Both experts agree the landing pad's shape is "determined by the manufacturing process." Ex.2047, 210 (142:13-16); Ex.2019 ¶¶114-122, 129-147.

Petitioner's reliance on *E.I. du Pont de Nemours & Co. v. Synvina C.V.*, is inapposite. 904 F.3d 996, 1006 (Fed. Cir. 2018). *E.I. du Pont* concerned routine optimization of overlapping ranges—not structure substitution across incompatible processes.

IV. Ground 2: Petitioner Fails To Establish Kim In View Of Yang Renders Obvious The Claimed "Lateral Distance" In Claims 3 And 18

Ground 2 fails because Ground 1 fails. Further, Kim lacks the claimed lateral distance (POR 64-69) and Yang cannot cure this deficiency.

Petitioner's reliance on Yang is legally defective. Petitioner concedes it is not modifying Kim to use Yang's process and does not dispute the processes are incompatible. Reply 21; Ex.2047, 39:13-40:5. Prior art must be "considered for all it taught." *Polaris*, 882 F.3d at 1069. Petitioner cannot cherry-pick a dimension from

Yang while ignoring that Yang's process cannot produce the claimed lateral distance in Kim.

Yang does not teach the claimed lateral distance. The five measurements Petitioner cites fail to provide the required dimension. Ex.2019 ¶¶148-164. That Yang's laser "could" form a particular contact width does not establish a POSITA would do so. *Adidas*, 963 F.3d at 1359.

Petitioner's new argument that Yang's width ECDs equals double "thickness T3" fails. Reply 21. First, Yang teaches setting thickness T3 based on half the width ECDs, not the reverse. Ex.1007, 8:4-18. Second, Yang teaches thickness T3 "may be greater than"—not equal to—half the width ECDs. *Id.* 8:8-10. Third, even if Yang taught contact pad width, it says nothing about pad position relative to the conductive layer edge—critical for establishing the claimed lateral distance.

Petitioner's assertion that Kim places the pad "in the center" does not establish the claimed lateral distance. Petitioner admits it is not combining Kim's process with Yang's (Reply 20-21), and Yang is silent on pad distance from the center. Ex.2019 ¶¶158-160.

V. Ground 3: Petitioner Fails To Establish Lee Renders Obvious The Claimed "First Portion Of The Second Material Layer"

Petitioner asserts Lee's portions are identical to those in the '838 patent. Reply 23-24. They are not. Unlike claims 1 and 12 of the '838 patent, Lee's first material layer extends over the entire landing pad and the entire second material layer, not

just a portion as claimed. Indeed, Petitioner recognizes that a “portion” is a part of larger whole, but ignores this in its Lee mapping. *Id.* 5. As a result, the portions overlap and are not separate as required. The claims define the portions relative to each other, and they must be separate and distinct. *Supra* §II.A. For example, Figure 8 depicts an embodiment where the first material layer extends next to the landing pad, keeping the first portion beneath separate from the second portion beneath the landing pad. Ex.2019 ¶¶54-56.

Petitioner's reliance on Lee's “unexposed portion” is misplaced. Reply 22-25. The terminology that matters is that of the '838 patent, which defines its “first” and “second” portions relative to each other—not by exposure. That Lee uses the word “portion” does not necessitate it has the claimed “portions”—as explained throughout, Lee does not. Lee's structure cannot satisfy the claims because its first material layer extends over the entire conductive layer, including the “pad portion,” which results in the claimed “portions” impermissibly overlapping rather than remaining structurally distinct. Had Lee's arrangement been like the claimed arrangement, the examiner would have issued a rejection given Lee's structure was before the examiner. That there was no rejection shows the Examiner himself recognized Lee does not render the claims obvious. POR 18-21.

VI. Ground 4: Petitioner Fails To Establish Lee In View Of Haller Renders Obvious The Claimed “Lateral Distance” In Claims 3 And 18

Petitioner argues Haller's manufacturing process is irrelevant. Reply 28. That is legal error. Prior art must be “considered for all it taught.” *Polaris*, 882 F.3d at 1069. Haller's process is undisputedly incompatible with Lee and cannot form a structure with the claimed lateral distance. POR 73-74; Ex.2019 ¶¶178-181; Ex.2047, 41:20-42:7. This alone defeats obviousness. *Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 F. App'x 755, 758-760 (Fed. Cir. 2015).

Even if Haller disclosed the claimed lateral distance (it does not), Petitioner still fails its burden. The law demands more than the claimed dimension existing in prior art; it demands “motivat[ion] to add” Haller's dimensions to Lee. *FanDuel, Inc. v. Interactive Games LLC*, 966 F.3d 1334, 1343-44 (Fed. Cir. 2020). That both involve 3D NAND is insufficient. Pet.79-80; *Microsoft Corp. v. Enfish, LLC*, 662 F. App'x 981, 990 (Fed. Cir. 2016). Haller and Lee's different purposes, incompatible processes, and different structures doom this ground. Ex.2019 ¶¶177-186.

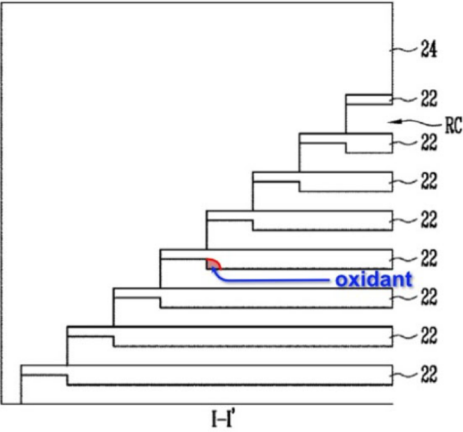
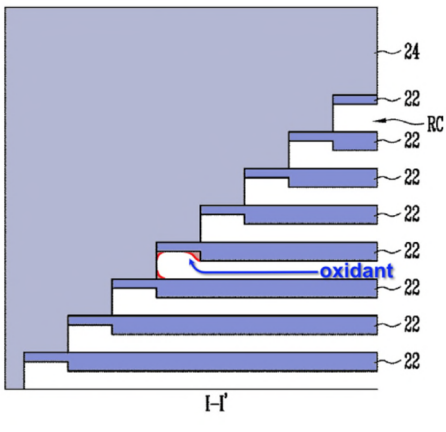
Petitioner also fails to explain how Lee's barrier layer could achieve Haller's spacer thickness. Lee's barrier layer forms through oxidation of the sacrificial layer. *Id.* ¶181. The resulting silicon dioxide acts as a physical barrier, causing oxidation to slow down. Ex.1006 [0048]-[0050]; Ex.2019 ¶181; Ex.2042, Fig.1. When the sacrificial layer is silicon nitride (as Lee teaches), oxidation essentially halts after producing only 1-2 nm—far short of the claimed displacement. Ex.1006 [0030];

Ex.2019 ¶¶178-181; Ex.2043, G88-G89. Petitioner offers no evidence to overcome this, resorting to conclusory assertions that oxygen will “continue to diffuse” to create “as thick an oxide layer *as required*”—hindsight-driven reasoning untethered from technical reality. Reply 28.

Petitioner claims Haller's and Lee's offsets serve the same purpose—“adequate spacing.” But in Haller, spacing prevents wordline contact misalignment; in Lee, it prevents electrical deterioration. Ex.2019 ¶185. Different purposes require different spacing. The different materials—Lee's silicon oxide barrier layer versus Haller's silicon nitride spacer—reflect these distinct purposes. Ex.1008, 4:50-59, 6:6-7; Ex.1006 [0048]-[0050]; Ex.2019 ¶¶177-186. Petitioner offers no reason why Haller's spacing would motivate modification of Lee given their incompatible processes and different materials, structures, and purposes. Ground 4 fails.

VII. Ground 5: Petitioner Fails To Establish Lee In View Of Park Renders Obvious The Claimed “Curved Side Surface”

The Petition and its expert argued a POSITA would oxidize the “exposed” “exterior corner” of Lee's layer 22 (shown below-left), to form a curved side surface. Ex.1003 ¶¶470-475; Pet.82-85. As PO explained—and Petitioner did not dispute—that corner is not exposed; it is a solid oxide region that cannot further oxidize. POR 77-83. Dr. Lee admitted layer 22 is “not designed to be oxidized” and is “deposited as ... a silicon dioxide.” Ex.2047, 253-254 (185:9-186:14).

Petition; Declaration	Reply
FIG. 5B  Ex.1003 ¶474; Pet.82-84	FIG. 5B  Reply 27

With its flawed argument exposed, Petitioner's Reply wholesale changes the combination, pointing to three different corners for rounding (shown above-right), and arguing for the first time this layer is nonstoichiometric silicon oxide. Reply 25-28. These untimely arguments underscore Petitioner's expert's unreliability and should be disregarded. *In re NuVasive, Inc.*, 841 F.3d 966 (Fed. Cir. 2016).

On the merits, Petitioner's new theories fail.

First, Lee identifies no silicon at the relevant locations that could oxidize to form rounded corners as in Park. Ex.2030, 125:13-15; Ex.2019 ¶193. Lee's one reference to oxidation concerns layer 21 (silicon nitride or polysilicon), not layer 22. Ex.2047, 253 (185:6-16); Ex.1006 [0030], [0048]. Park's "oxidation step" likewise

involves “oxidizing” “step sacrificial layer patterns,” not silicon oxide. Ex.2047, 204 (136:14-22), 209 (141:3-8); Ex.1009, 8:1-42.

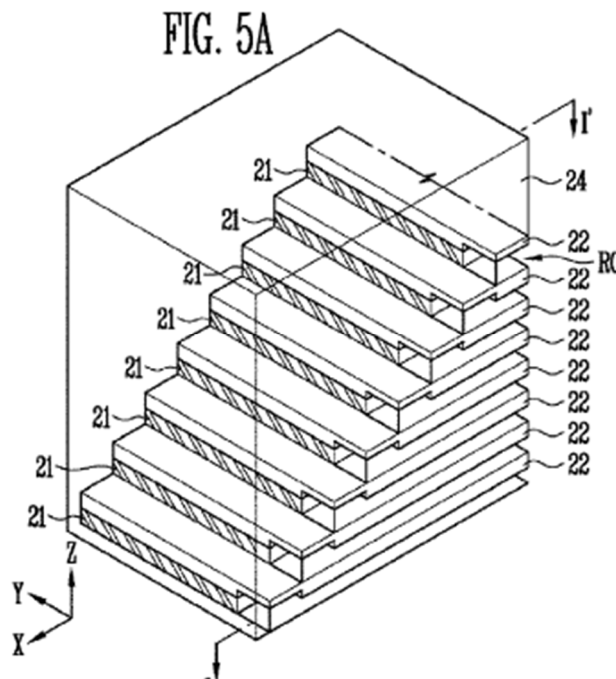
Second, nonstoichiometric oxides are neither taught by Park or Lee nor suitable for 3D NAND. Park teaches oxidizing silicon nitride “to form silicon dioxide”—not nonstoichiometric oxide. Ex.2031, 250:4-8. None of the sixteen prior art references included with the Petition mentions nonstoichiometric oxide, nor does Dr. Lee’s original declaration. Only after PO exposed the Petition’s infeasibility did Dr. Lee introduce this “nonconventional” approach. Ex.1075 ¶¶125-147. Nonstoichiometric oxide is unsuitable for 3D NAND. Ex.2019 ¶¶202-207.

Petitioner’s citations do not refute Dr. Giapis. Exhibits 2028, 1080, and 1081 do not address 3D NAND. Exhibit 1082 expressly defines “silicon oxide” to include nonstoichiometric oxide—confirming that absent an express definition, a POSITA would understand “silicon oxide” to mean silicon dioxide. Ex.1082, 6:48-51. Exhibit 1082’s preference for silicon dioxide supports Dr. Giapis. *Id.* 6:50-51.

Petitioner’s reliance on Dr. Lee is misplaced. Although Petitioner asserts Dr. Lee explained oxidation of “silicon oxide” in his original declaration (Reply 27), he never identified nonstoichiometric oxide or the material being oxidized. Ex.1003 ¶¶460-489. He discussed oxidation generally, without regard to Lee’s actual silicon oxide structures, which he admitted are “not designed to be oxidized.” Ex.2047, 253-254 (185:9-186:14).

Third, Petitioner's proposed modifications would increase short-circuit risk. Oxidation is "additive," such that introducing oxidant into the recess with nonstoichiometric silicon oxide will expand layer 22 in all directions. Ex.1075 ¶138; Ex.2031, 268:20-22; Ex.2047, 220-221 (152:20-153:11). The pad will be thinner, increasing punch-through risk—contrary to Lee's goal of preventing short-circuits. Ex.2019 ¶¶45-46, 191; Ex.2031, 168:17-169:10; Ex.1006 [0049]; POR 83-84.

Fourth, while Park applies oxidant from the top of the staircase, Petitioner's combination introduces oxidant *within* the staircase. Reply 27-28. Petitioner never considers that Lee's exposed layers 21 would also oxidize, or how the resulting structure would satisfy the claims. Oxidizing layers 21 decreases the landing window for contact plugs, increasing electrical failure risk. Ex.2031, 268:20-22.



Ex.1006 [0036]-[0043], [0091], Fig.5A.

Finally, Petitioner fails to demonstrate motivation. Petitioner's sole rationale—reducing short-circuit risk—is self-defeating: Park's oxidation would ***increase*** short-circuit and electrical failure risk in Lee. Lee already prevents short-circuits through other measures. *Id.* [0049]. Adding rounding for the same purpose confers no benefit—especially when it “would destroy the basic objective” of Lee. *Trivascular*, 812 F.3d at 1068; *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1368-69 (Fed. Cir. 2012).

VIII. Conclusion

For the reasons above, the Board should find the Challenged Claims nonobvious.

Respectfully submitted,

Dated: April 1, 2026

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CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. § 42.24

I hereby certify that this Patent Owner's Sur-Reply complies with the word count limitation of 37 C.F.R. § 42.24(c)(4) because the Patent Owner's Sur-Reply contains a total of 5,599 words, which is the sum of 5,575 words calculated by using Microsoft Word's word-count feature and 24 words hand-counted in the figures. This total excludes the cover page, signature block, and the parts of the Patent Owner's Sur-Reply exempted by 37 C.F.R. § 42.24(c).

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 1st day of April, 2026, a true and correct copy of the foregoing **Patent Owner's Sur-Reply and Exhibit 2047** were served by electronic mail on Petitioner's lead and backup counsel at the following email addresses:

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