

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.

Case No. PGR2025-00021
U.S. Patent No. 12,010,838

PETITIONER'S REPLY

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1003	Declaration of Dr. Jack C. Lee
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1005	U.S. Patent No. 10,229,929 to Kim et al. (“Kim”)
1006	U.S. Patent Publication No. 2014/0191389 A1 to Lee et al. (“Lee”)
1007	U.S. Patent No. 9,941,153 to Yang (“Yang”)
1008	U.S. Patent No. 9,520,402 to Haller et al. (“Haller”)
1009	U.S. Patent No. 10,297,543 to Park et al. (“Park”)
1010	U.S. Patent No. 9,589,978 to Yip
1011	Aritome, “NAND Flash Memory Technologies” (2016)
1012	Micheloni et al., “Inside Solid State Drives (SSDs)” (2nd Ed. 2018)
1013	Silvagni, “3D NAND Flash Based on Planar Cells,” Computers 2017
1014	U.S. Patent Publication No. 2016/0218107 A1 to Lee (“Lee 107”)
1015	U.S. Patent Publication No. 2015/255385 to Lee
1016	U.S. Patent No. 9,373,540 to Hyun
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1022	U.S. Patent Publication No. 2018/0026046 A1 to Nam et al. (“Nam”)
1023	Minute Order (case schedule), Dkt. No. 141, dated September 18, 2024 in <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc. and Micron Consumer Products Group, LLC</i> , Case No. 3:23-cv-05792-RFL
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1025	Plaintiff and Counterclaim Defendant Yangtze Memory Technologies Company, LTD.’s Disclosure of YMTC II Asserted Claims and Infringement Contentions, dated October 2, 2024 in <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc. and Micron Consumer Products Group, LLC</i> , Case No. 3:23-cv-05792-RFL
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1027	Declaration of Jared Bobrow in Support of Petitioner’s Motion for Admission <i>Pro Hac Vice</i>
1028	Press Release, Micron, Micron and Intel Unveil New 3D NAND Flash Memory (Mar. 26, 2015) (“Micron ‘3D NAND Flash Memory’ Press Release”)
1029	Press Release, Micron, <i>Micron and WekaIO Win Best of Show Award at the Flash Memory Summit 2019</i> (Aug. 29, 2019) (“Micron ‘Best of Show Award’ Press Release”)

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1030	Micron Technology, Inc., Annual Report (Form 10-K) (Oct. 4, 2024)
1031	Ministry of Industry and Information Technology, <i>The Ministry of Industry and Information Technology Officially Announced the “National Integrated Circuit Industry Development Promotion Outline”</i> (Jun. 26, 2014) (https://www.cac.gov.cn/2014-06/26/c_1111325916.htm) (“National IC Development Promotion Outline”)
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1035	State-Owned Assets Supervision and Administration Commission of the State Council (SASAC), <i>Definition of “State-Owned Enterprise”</i> (July 4, 2019) (https://www.sasac.gov.cn/n2588040/n2590387/n9854212/c11647665/content.html) (“SASAC Definition”)
1036	Certified English Translation of Ex. 1082 (SASAC Definition)
1037	China’s State Council, <i>Notice of the State Council on Issuing “Made in China 2025”</i> (May 19, 2015) (https://www.gov.cn/zhengce/content/2015-05/19/content_9784.htm) (“Made in China 2025”)
1038	Certified English Translation of Ex. 1037 (Made in China 2025)
1039	Karen M. Sutter, Cong. Rsch. Serv., R46767, <i>China’s New Semiconductor Policies: Issues for Congress</i> (2021)

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1040	Liu Yuanchun et al., <i>Accelerating the Realization of High-Level Scientific and Technological Self-Reliance</i> , PEOPLE (July 15, 2024) (http://paper.people.com.cn/zgjjzk/html/2024-07/15/nw.zgjjzk_20240715_1-05.htm) (“ <i>People’s Paper Article</i> ”)
1041	Certified English Translation of Ex. 1040 (<i>People’s Paper Article</i>)
1042	YMTC, <i>Yangtze Memory Technologies Co. Ltd. Officially Established</i> (Aug. 1, 2016) (https://www.ymtc.com/cn/news/28.html) (“YMTC Press Release”)
1043	Certified English Translation of Ex. 1042 (YMTC Press Release)
1044	Testimony of Stephen Ezell (VP, Global Innovation Policy – Information Technology & Innovation Foundation) Before the U.S.-China Economic and Security Review Commission (Apr. 14, 2022)
1045	Yahoo! Finance, South China Morning Post, Tech War: China’s Top Memory Chip Maker YMTC Gets US\$7 Billion From State-Backed Investors (Mar. 2, 2023) (“ <i>Yahoo! Article</i> ”)
1046	Baidu, <i>Yangtze Memory Increases Capital and Expands Capacity to RMB 100 Billion, Big Fund Phase II Forms a Partnership with Local Hubei State-owned Assets</i> (Mar. 2, 2023) (https://baijiahao.baidu.com/s?id=1759256650733024656&wfr=spider&for=pc) (“ <i>Baidu Article</i> ”)
1047	Certified English Translation of Ex. 1046 (<i>Baidu Article</i>)
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1049	Lianhe Credit Rating Co., Ltd., Wuhan Optics Valley Financial Holding Group Co., Ltd., 2024 Tracking Rating Report (Jun. 28, 2024) (“2024 Tracking Rating Report”)
1050	Certified English Translation of Ex. 1049 (2024 Tracking Rating Report)

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1051	State-Owned Assets Supervision and Administration Commission of the State Council (SASAC), <i>Focusing on Key Points and Making Breakthroughs in Innovation, Hubei Solidly Promotes the Deepening and Improvement Actions to Go Deeper and More Concrete</i> (Mar. 25, 2024) (www.sasac.gov.cn/n4470048/n29955503/n30329277/n30329358/c30380577/content.html) (“Statement of China’s State Council”)
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1053	Sina Finance, <i>Yangtze Memory’s “Double 11 Performance” Surpassed Samsung’s for the First Time</i> (Nov. 12, 2024) (https://finance.sina.com.cn/roll/2024-11-12/doc-incvupap6483110.shtml) (“Sina Finance Article”)
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1055	Southeast University, <i>Yangtze Memory Technologies Co., Ltd. 2024 Campus Recruitment</i> (Mar. 13, 2024) (https://seu.91job.org.cn/substation/lectureDetail?xjhid=1000000000301932&xxdm=10756) (“Southeast Univ., YMTC 2024 Campus Recruitment”)
1056	Certified English Translation of Ex. 1055 (Southeast Univ., YMTC 2024 Campus Recruitment)
1057	Wuhan University of Science and Technology, <i>Yangtze Memory Technologies Co., Ltd. 2020 Campus Recruitment Introduction</i> (Sept. 10, 2019) (https://wust.91wllm.cn/teachin/view/id/97310) (“Wuhan Univ. of Sci. and Tech., YMTC 2020 Campus Recruitment Introduction”)
1058	Certified English Translation of Ex. 1057 (Wuhan Univ. of Sci. and Tech., YMTC 2020 Campus Recruitment Introduction)
1059	China University of Petroleum, <i>Yangtze Memory 2025 Campus Recruitment</i> (Feb. 20, 2025) (https://career.cup.edu.cn/job/view/id/618140) (“China Univ. Of Petroleum, YMTC 2025 Campus Recruitment”)

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1060	Certified English Translation of Ex. 1059 (China Univ. Of Petroleum, YMTC 2025 Campus Recruitment)
1061	Yoko Kubota et al., <i>U.S. Chip Equipment Suppliers Suspend Business Activities at Yangtze Memory</i> , WALL STREET JOURNAL CHINA (Oct. 13, 2022) (https://cn.wsj.com/articles/美国供应商暂停在中国长江存储科技的业务活动-11665617406) (“WSJ China Article”)
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1063	Letter from Michael T. McCaul, Member of Congress, and Bill Hagerty, U.S. Senator, to the Honorable Gina Raimondo, U.S. Commerce Secretary (July 12, 2021)
1064	Demetri Sevastopulo, <i>Bipartisan Group Urges US Blacklist for “Beijing-Directed” Chipmaker</i> , FINANCIAL TIMES (Sept. 20, 2022) (https://www.ft.com/content/173eb5b7-c211-4fa8-af8e-93382ed12836) (“Financial Times Article”)
1065	U.S. Senator Charles E. Schumer, <i>With Chinese Chip Companies Threatening National Security And Jobs, Schumer Announces President Has Heeded His Call And Will Add YMTC - One Of China’s Leading Chip Makers - To A Trade Blacklist; Administration Action Will Strengthen National Security And Protect The Domestic Chip Industry</i> (Dec. 16, 2022) (“Schumer Statement”)
1066	U.S. Department of Defense, <i>DOD Releases List of People’s Republic of China (PRC) Military Companies in Accordance with Section 1260H of the National Defense Authorization Act for Fiscal Year 2021</i> (Jan. 31, 2024) (https://www.defense.gov/News/Releases/Release/article/3661985/dod-releases-list-of-peoples-republic-of-china-prc-military-companies-in-accord/)

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1067	U.S. Department of Defense, <i>Entities Identified as Chinese Military Companies Operating in the United States in accordance with Section 1260H of the William M. (“Mac”) Thornberry National Defense Authorization Act for Fiscal Year 2021 (Public Law 116-283)</i> (https://media.defense.gov/2024/Jan/31/2003384819/-1/-1/0/1260H-LIST.PDF)
1068	<i>Oversight of the USPTO: Hearing Before the Subcomm. On Intellectual Property</i> , 118th Cong. (2023) (Testimony of Katherine Vidal, Undersecretary of Commerce for IP and Director of USPTO)
1069	China’s State Council, <i>Notice of the State Council on Issuing Policies to Promote the High-quality Development of the Integrated Circuit Industry and Software Industry in the New Era</i> (Aug. 4, 2020) (https://www.gov.cn/zhengce/content/2020-08/04/content_5532370.htm) (“State Council Notice on Policies to Promote Development of IC”)
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1072	Declaration of Fei-Xue Qian, Translator (Mar. 10, 2025)
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1075	Reply Declaration of Dr. Jack C. Lee
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1077	Excerpt from <u>Merriam-Webster Dictionary</u> (1998)
1078	Confidential Excerpt from Exhibit K-1 to YMTC's October 2, 2024 Infringement Contentions from <i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc. and Micron Consumer Products Group, LLC</i> , Case No. 3:23-cv-05792-RFL [Subject to Motion to Seal]
1079	Transcript of the November 12, 2025 Deposition of Konstantinos Giapis in IPR2025-00189
1080	Falcony, <u>Characterization of Excess Si in Nonstoichiometric SiO₂ Films by Optical and Surface Analysis Techniques</u> , J. Electrochem. Soc., Vol 144, No. 1, 379-383 (Jan 1997)
1081	Bedjaoui et al., <u>Si nanocrystal-containing SiO_x (x<2) produced by thermal annealing of PECVD realized thin films</u> , Materials Science and Engineering B 124-125, 508-512 (2005)
1082	U.S. Patent No. 9,728,547 to Ohsaki et al.

I. INTRODUCTION

Petitioner Micron submits this reply to Patent Owner's Response (Paper 28).

Patent Owner spends most of its response proposing narrow claim constructions that limit the '838 patent's claims to just what is shown in Figure 8. There is no basis in the record to do so. Neither the claims nor the specification "defines" the "first" and "second portion[s]" of the claimed "second material layer" as Patent Owner does. The patent uses "portion" to refer to parts of a larger whole. It does not say that only insulation can be over the "first portion," or that only the landing pad can be over the "second portion." Indeed, accepting Patent Owner's narrow construction would read the '838 patent's only embodiment out of the claims (there is at least some insulation over the "second portion" in Figure 8). Both Kim and Lee teach the very type of "second material layers" with "portion[s]" that the claims require. Kim's conductive layers have a separate "PAD_B" "part" at their ends. Likewise, each of Lee's conductive layers end with a "pad portion PAD." Nor does the patent limit "curved side surface" to just vertical curves in the z-axis direction. In fact, the specification does not even use the word "curved." It certainly does not narrowly define the term. Any type of curved landing pad is sufficient.

Moreover, Patent Owner's technical arguments lack record support. There is no reason why a POSITA would have been unable to employ a curved landing pad with the Petition's prior art given that this type of pad was well known, was

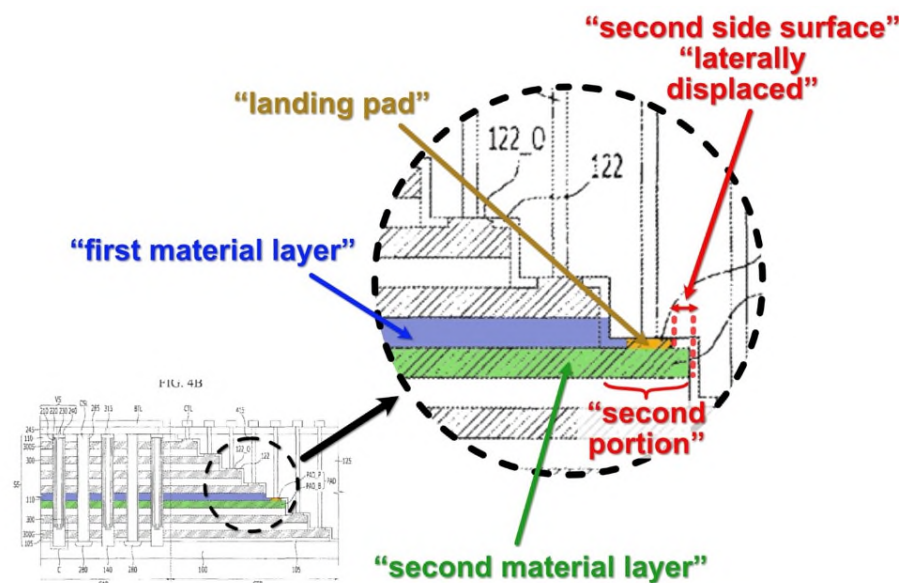
achievable via a variety of different proven and well-known manufacturing methods, and provided recognized benefits (such as the avoidance of short circuits). Likewise, there is no reason why a POSITA would have been unable to form Kim's and Lee's memories using the typical, prior art dimensions set forth in references like Yang and Haller.

The Board already assessed and rejected most of Patent Owner’s arguments when it instituted. Patent Owner’s Response presents nothing that justifies a different conclusion now.

II. ARGUMENT

A. Kim Renders the Claims Obvious

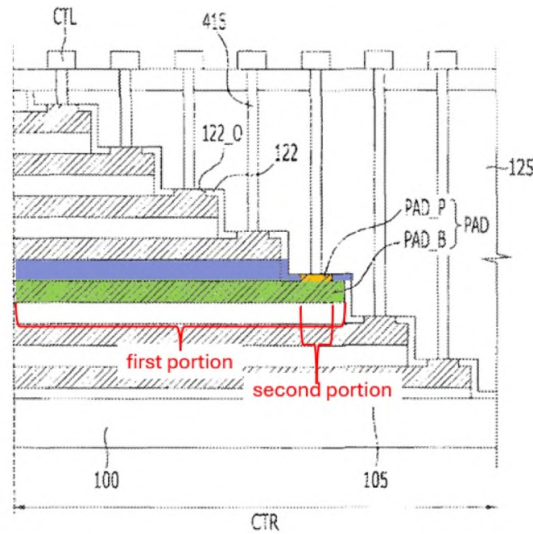
Grounds 1-2 explained why Kim (Ex. 1005) teaches the same type of landing pad located over a “second portion” of a “second material layer” the claims require:



Petition, 37 (annotating Kim, Fig. 4B).

1. *Kim Teaches a Memory with the Claimed “Portions”*

Patent Owner begins by arguing that Kim lacks a “second material layer” with the claimed “first portion” and “second portion.” Response, 42-47. But rather than responding to the Petition’s straightforward argument, Patent Owner fabricated its **own, completely different** way to characterize Kim. *Id.*, 9-20. According to Patent Owner, the ’838 patent requires a very “specific” memory arrangement like that in Figure 8. *Id.*, 1. Based on its assertion that the claims are limited to the figure, Patent Owner argues that the claimed “portions” of the “second material layer” are supposedly “defined” by and can extend only so far as what lies on top of them. So, according to Patent Owner, the “first portion” is only the part of the “second material layer” covered by “first material layer” (but not the landing pad), *id.*, 10, and the “second portion” is only the part of the “second material layer” covered by the “landing pad” (but not the “first material layer”). *Id.* Patent Owner then argues that Kim does not satisfy this narrow definition because its “first portion” and “second portion” supposedly “overlap”:



Response, 3. This is wrong.

a. Patent Owner Relies on an Erroneous Claim Construction

To begin, Patent Owner’s argument is premised on an erroneous claim construction the Board already rejected. When instituting, the Board concluded that it “disagree[s] with Patent Owner’s argument that the first portion of the second material layer is defined by the first material layer and that the second portion of the second material layer is defined by the landing pad.” Institution Decision, 20. The Board went on to explain that “the plain language of the claim merely recites how the” insulation and landing pad are “disposed.” *Id.* It does not “defin[e] first or second portions.” *Id.* Patent Owner points to nothing that requires any different conclusion.

Claim 1 (and claim 12) merely refer to a “second material layer” (a conductive layer) that has “a first portion” and “a second portion.” ’838 patent, claims 1/12.

The term “portion” has a straightforward plain and ordinary meaning: a “part” of a larger whole. *E.g.*, Ex. 1077, 406 (defining “portion” as “a part of a whole”). The ’838 patent itself repeatedly uses the term “portion” this way. ’838 patent, 5:40-43 (discussing both “an upper portion” and “lower portion” of a “staircase”), 5:66-6:1 (referencing “a portion of a top surface of a layer”); *see also* 4:39-40, 7:15-17, 8:20-33, 8:34-65, 11:60-64, 12:38-59. The patent never uses “portion” to require specific, definite dimensions or layout

Nothing else in the claims requires the limits Patent Owner imposes. The claims do specify that the “landing pad” is “disposed over” the “second portion” and the “first material layer” is “disposed over” the “second portion.” *Id.* This does not narrowly define “portion.” Instead, it merely specifies where the “landing pad” and “first material layer” are located: over “portions” of the same “second material layer.” Patent Owner gets the claim backwards. Moreover, Patent Owner’s interpretation would improperly read the word “only” into the claims, thereby improperly imposing a negative limitation. While the “landing pad” must be “disposed over” the “second portion,” the claims **do not** say that the landing pad is the **only** structure so disposed. The claim is open to other structures also being over the “second portion.” Likewise, while the “first material layer” must be “over” the “first portion,” the claims **do not** say that the “first material layer” is **only** located there and nowhere else.

“The words of a claim are generally given their ordinary and customary meaning...” *Thorner v. Sony Comput. Entmt. Am., LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). Here, the claims require only that the “first portion” and “second portion” be parts of a larger conductive layer. Ex. 1075, ¶¶ 8-32. Kim includes such a structure: each of its “gate electrode[s] 300” includes a “PAD_B” at its “end.” Kim, 7:58-67. Indeed, Kim explicitly characterizes this “PAD_B” as the “part of the gate electrode” “exposed through the stepwise structure.” *Id.* (emphasis added). So just as the claims require, Kim teaches a memory with a “second material layer” (gate electrode 300). A “landing pad” (PAD_P) is over a “second portion” (PAD_B) of this layer, and a “first material layer” (dielectric layers 110 and 122) is over a “first portion” (the rest of gate electrode 300 not “exposed” by the stepwise structure to form PAD_B) of the same layer. Petition, 27-31; Ex. 1075, ¶¶ 39-45.

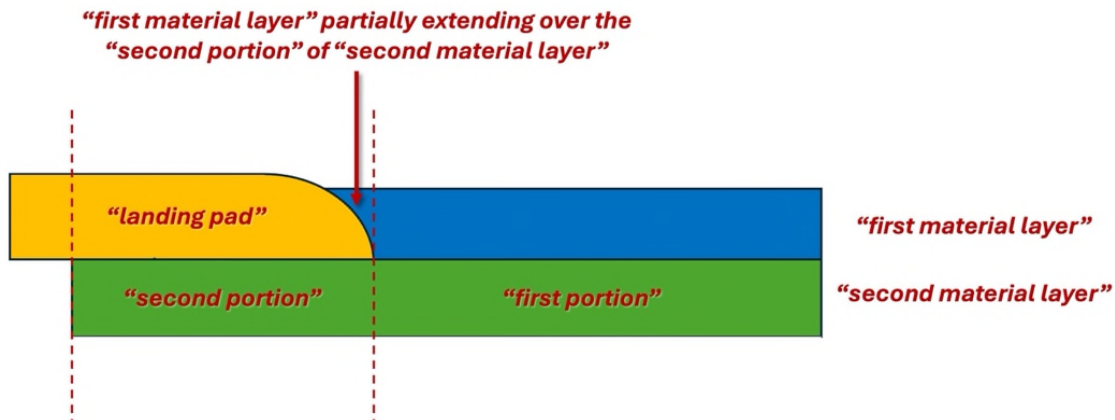
Patent Owner also incorrectly argues that the Petition’s interpretation of “first portion” and “second portion” would somehow render the terms “meaningless.” *E.g.*, Response, 11-16. It does not. Again, Kim’s “first portion” and “second portion” are separate and distinct: PAD_B is the exposed end part of gate electrode 300. Petition, 27-31. It is only Patent Owner’s twisted interpretation—which ignores Kim’s teaching that each conductive layer includes a PAD_B at its end—that produces this result.

Like the claims, the specification does not require Patent Owner’s narrow construction. Patent Owner argues that Figure 8 operates to limit the claims. Response, 16-17. It also alleges that there is only a single “manufacturing process” described in the patent that can only produce what the figure shows. *Id.* But “features recited in the specification merely as aspects of embodiments ... do not narrow a claim term that is otherwise broader in its ordinary meaning.” *Promptu Sys. Corp. v. Comcast Corp.*, 92 F. 4th 1372, 1379 (Fed. Cir. 2024). Here, the specification repeatedly explains that it is **not** limited to the structure of Figure 8. *E.g.*, ’838 patent, 3:36-37 (“specific configurations and arrangements are discussed ... for illustrative purposes only”); 13:14-22 (patent meant to embrace “adaptations and modifications” of depicted embodiments). The patent also makes clear that it is not limited to the specific, example manufacturing methods discussed. Instead, “any suitable deposition methods” may be used. *Id.*, 6:53-65.

Patent Owner also spends pages discussing the prosecution history. Response, 18-21. Neither the Examiner nor the applicant discussed the meaning of either “first portion” or “second portion.” See Ex. 1002. Patent Owner itself appears to recognize this, conceding that the prosecution history “suggests neither an expansion nor disavowal of claim scope....” Response, 9; *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998) (non-standard claim term

definitions must be set forth in intrinsic record with clarity, deliberateness, or precision).

Not only does it lack support in the intrinsic record, but Patent Owner's construction improperly excludes the '838 patent's only embodiment. Per Patent Owner, Figure 8 (the only figure showing a complete staircase structure), depicts "landing pads" with a side surface "curved in the x-z plane...." Response, 8. The '838 patent's claims require that the "side surface" be "in contact" with "the first material layer." *E.g.*, '838 patent, claim 1. For there to be contact with this type of curved "side surface," the "first material layer" must at least partially extend over the "second portion" of the "second material layer":



Ex. 1075, ¶¶ 33-38; Ex. 1076, 69:7-72:14 (Patent Owner's expert recognizing presence of insulation adjacent to curve, but it "is something that [he] did not

consider” in his declaration).¹ By prohibiting any of the “first material layer” from being present over the “second portion,” Patent Owner reads this out of the claims. A “claim interpretation ... exclud[ing] a preferred embodiment from the scope of the claim is rarely, if ever, correct.” *Accent Packaging, Inc. v. Legette & Platt, Inc.*, 707 F.3d 1318, 1326 (Fed. Cir. 2013).

b. Patent Owner’s District Court Position Is Directly Contrary to its IPR Claim Construction Argument

Not only does Patent Owner offer an erroneous construction, but it also contradicts itself. While Patent Owner now argues that the claims exclude memories like that in Kim, in district court it took the opposite position. There, in its infringement contentions in which it set forth its reasons why Micron products allegedly practiced the ’838 patent claims, Patent Owner did not identify a “second portion” of the “second material layer” defined by the “landing pad.” Ex. 1078, 12. Instead, it identified the entire end of a purported “second material layer” (including parts not covered by the landing pad). *Id.* Moreover, Patent Owner’s identified “second portion” included “first material layer” over top of it (the “first material layer” extends over and around the “landing pad”). *Id.* There is no difference

¹ This identification of the “first material layer” is consistent with the ’838 patent’s definition of “layer” as the material between “any set of horizontal planes” (which here would be two adjacent “second material layers”). ’838 patent, 4:38-51.

between the structure Patent Owner accuses of infringement and Kim. Further, Patent Owner’s expert contradicted his own opinion during cross examination and testified that island shaped landing pads (with insulation at all sides) “can ... meet the claim language.” Ex. 1076, 34:8-36:4. The Board can “rely[] on a patent owner’s own submissions in determining unpatentability.” *Rovalma S.A. v. Bohler-Edelstahl GmbH & Co. KG*, 856 F.3d 1019, 1026-28 (Fed. Cir. 2017); *Revvo Techs., Inc. v. Cerebrum Sensor Tech., Inc.*, IPR2025-00623, Paper 20 at 3-4 (Director Nov. 3, 2025) (precedential) (explaining that the Board’s rules “discourage” “inconsistent arguments about claim scope”). Patent Owner’s district court position—and its expert’s contradictory testimony—establishes that its arguments in this proceeding lack credibility. They also operate as a concession that Kim teaches everything the claims require.

c. Kim Satisfies the Claims Even When Patent Owner’s Narrow Understanding of the Claims Is Applied

Finally, even if the claims are determined to exclude memories where the “first material layer” extends around the landing pad, Kim would still render the claims obvious. Each of Kim’s landing pads can be an “island” or a “step with respect to the surface of the base pad.” Kim, 8:23-28. The Petition—and Petitioner’s expert—identified both types of pads as satisfying the claims. Petition, 32; Ex. 1003, ¶ 180. When the landing pad is formed as a step, the “first material layer” **will not**

extend around the pad. Instead, it will end and be interrupted by the step as shown in blue below:

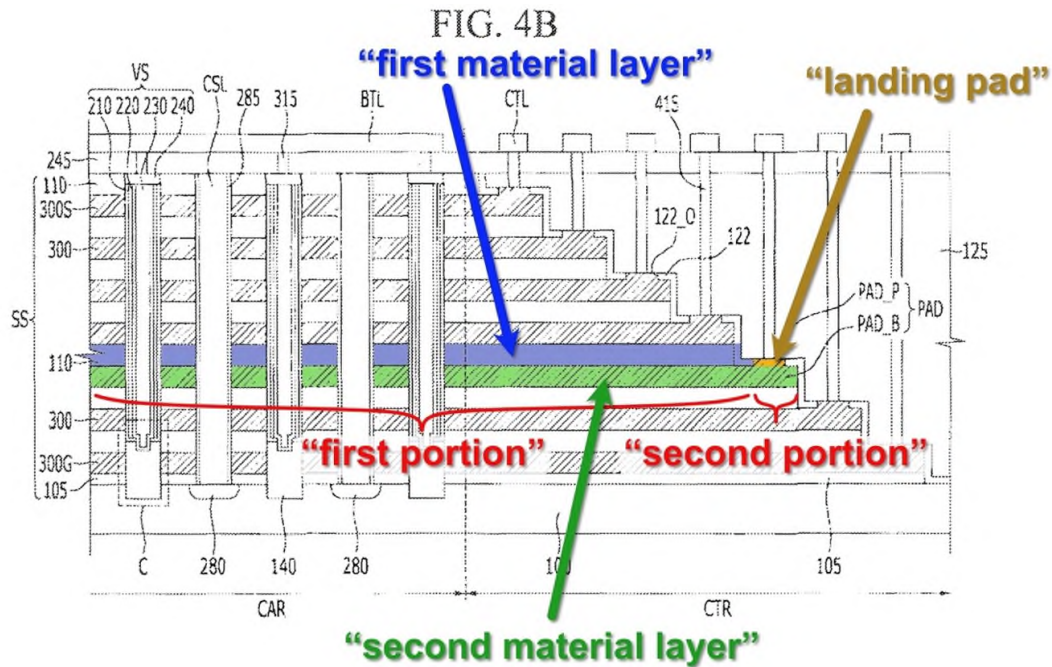
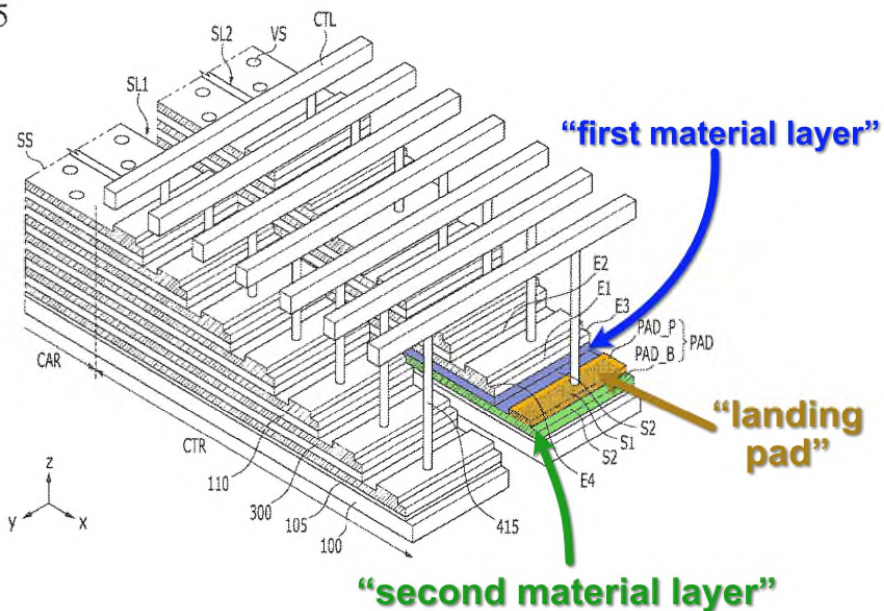


FIG. 5



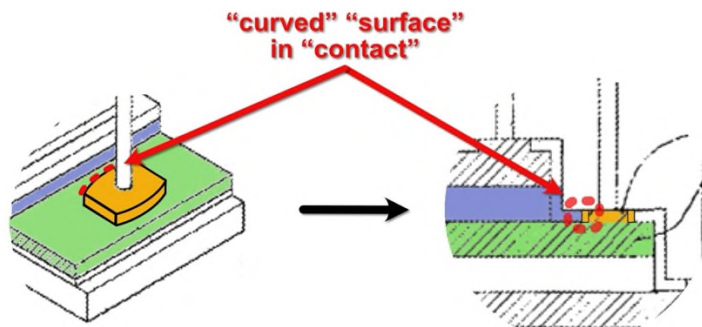
Id., Figs. 4B, Fig. 5. This “first material layer” is only over the “first portion.” Ex. 1075, ¶¶ 46-49.

2. Kim Teaches “Curved” Landing Pads

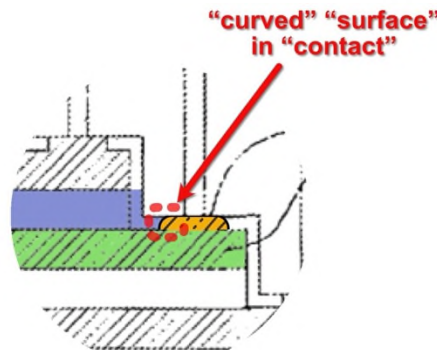
Patent Owner next argues that Kim lacks the “curved side surface” of claims 13-15. This argument is also premised on an erroneous claim construction and fails to account for the prior art’s teachings.

Kim discloses different “curved” landing pads, including pads that are (1) generally cylindrical and curved when viewed from above and (2) curved when viewed in cross section:

Generally cylindrical pad:



Pad curved in cross section:



Petition, 41-53 (citing Kim, 8:29-34). **Both** types of pads satisfy the claims.²

² Patent Owner incorrectly argues that only Kim’s “island” pads can be “curved.” Response, 47-48. The pads are also obviously implementable as a “step.” Ex. 1075, ¶¶ 55-56.

a. Kim's Generally Cylindrical Pads Fall Within the Claim Scope

Patent Owner does not dispute that Kim teaches “cylindrical” pads. *E.g.*, Response, 53-54. It also does not contest that Kim’s existing manufacturing process can produce such a pad. *E.g.*, Ex. 1079, 62:5-63:16, 65:6-12 (cylindrical pads “consistent” with Kim). Instead, it alleges—with unsupported attorney argument—that claims 13-15 exclude this type of pad because they somehow require a “vertical surface curved along a direction (e.g., the z-axis) perpendicular to the top surface of the structure.” Response, 21-24. The claims are not so limited: they are open to any type of “curve[.]”

Patent Owner fails to point to any claim language requiring the narrowing limitations it imposes. The claims do not use the words “vertical,” “z-axis,” or “perpendicular.” All that is required is a landing pad with “a curved side surface.” ’838 patent, claim 13. This alone requires rejection of Patent Owner’s arguments. *Johnson Worldwide Assocs., Inc. v. Zebco Corp.*, 175 F.3d 985, 989 (Fed. Cir. 1999) (“modifiers will not be added to broad terms standing alone”).

Patent Owner’s construction also finds no support in the rest of the intrinsic record. The specification does not even use the word “curved.” No importance is attributed to this claimed feature, and no specific type of “curved side surface” is mentioned. Patent Owner argues that a “curved” surface results in “numerous benefits” such as “yield and manufacturing cost improvements.” Response, 36

(quoting '838 patent, 1:42-47). But the '838 patent does not make such a correlation. Next, the specification includes a lengthy section defining and using terms such as “vertical,” “perpendicular,” and “z-axis.” '838 patent, 5:3-13, 59-51. Language like this plainly could have been included in claim 13 to further characterize the “curved side surface.” It was not, implying that the applicant intended the claims to broadly embrace a variety of curved surfaces. *Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 807 (Fed. Cir. 2007) (claims not limited where “the specification ... suggests that the patentees knew how to” use narrowing language).

Patent Owner also argues that “curved side surface” must be narrowly interpreted because the patent’s “only embodiment”—shown in Figure 8—includes a vertically oriented surface that is purportedly curved in the z-axis direction. Response, 30-31. Patent Owner similarly posits that this “is the only kind of curved side surface that can be formed from the only process disclosed in the '838 patent.” *Id.*, 32. But the '838 patent makes clear that Figure 8 is an “embodiment[.]” '838 patent, 1:41-45, 2:66-3:4, 13:14-40. The claims cannot properly be limited to just this. *Promptu Sys.*, 92 F.4th at 1379. Further, the specification says nothing about how “curved” pad sides are to be formed. It does not mention use of a method with “directional and isotropic flux components” like that discussed by Patent Owner (Response, 32-33). Instead, the patent is expressly open to the use of “any suitable deposition techniques” capable of forming a variety of structures. '838 patent, 2:41-

47, 8:66-9:12; Ex. 1079, 34:3-35:8 (CVD can produce good step coverage); Ex. 1075, ¶¶ 70-75. Nor does the prosecution history re-define “curved side surface” in the same, narrow way Patent Owner does here. *See* Ex. 1002. It follows that the term must have its plain and ordinary meaning: all curved surfaces are claimed (regardless of whether curved in the z-axis, the y-axis, or some other direction). This includes Kim’s cylindrical landing pads. Petition, 47-49; Ex. 1075, ¶¶ 57-76.

b. Kim Also Teaches Pads That Are Curved When Viewed from the Side

Patent Owner’s arguments regarding Kim’s pads that are “curved” in cross section also lack merit. Here, Patent Owner wrongly characterizes the Petition as trying to “alter” Kim by substituting various prior art pad designs into Kim. *E.g.*, Response, 54-55. This, however, is something a POSITA would have understood that Kim already teaches. Kim references not only “cylindrical” pads but also pads that “includ[e] a curved surface....” Kim, 8:29-35. A POSITA would have considered this to be an obvious reference to the types of vertically curved pads routinely disclosed in and used by the art. Petition, 42-45 (Exs. 1009, 1021, and 1022 examples of “curved” pads); Ex. 1076, 77:12-78:5 (Kim open to other pad shapes besides those shown).

According to Patent Owner, this type of pad would not have been obvious because “Kim’s manufacturing process cannot produce” a “vertical” “curved”

“surface.” Response, 50. Patent Owner also argues that a POSITA would not have been motivated to use such a pad even if it could be produced. *Id.*, 55.

Here Patent Owner appears to improperly assume that Kim is limited to just one pad manufacturing method. It is not. Kim repeatedly makes clear that the process it discusses is merely an example. Kim, 12:12-15 (“some embodiments” employ the discussed method); 12:38-42 (“not limited” to its example process); 12:61-13:4 (“ion injection process may be performed”) (all emphasis added). In other words, Kim allows for use of any method capable of producing the types of contact pads it discusses. Park (Ex. 1009), Nam (Ex. 1022), and Yun (Ex. 1021) all provide examples of how “curved” pads would be manufactured. Petition, 32-45; Ex. 1003, ¶¶ 226-240, 251-260.

Next, even if a POSITA did attempt to maintain as much of Kim’s existing manufacturing process as possible, a rounded contact pad would still have been readily achievable. The Petition—and Petitioner’s expert Dr. Lee—already explained in detail how this would occur and why a POSITA would have expected to succeed. To form contact pads, Kim employs a “photosensitive resin pattern M ... on the auxiliary insulating layer...” Kim, 12:61-64. Openings are formed in this pattern M “expos[ing] the region 122_I...” *Id.*, 12:65-67. Then, “[a]n ion injection process” results in the “regions 122_I” being “doped” with impurity having “a different etching ratio” from the surrounding insulating material. *Id.*, 13:5-11. The

doped regions are then etched, resulting in openings 122_O that are later replaced with conductive material producing the pads. *Id.*, 13:51-67.

As explained, a POSITA would have understood that this process is readily tailorable to form the types of curved pads taught in the prior art. Ex. 1003, ¶ 256. Indeed, the prior art discussed in the Petition already teaches how to do so. In Park (Ex. 1009), “curved” contact pads are formed by performing both “ion implantation” and “oxidation” processes. Park, 8:33-49. This same process would result in curved pads in Kim: after performing ion implantation and etching to form the openings 122_O, oxidant would be flowed into the openings to further oxidize the exposed side surfaces, resulting in rounding (and eventually a matching curved contact pad). Ex. 1075, ¶¶ 78-85. In Nam (Ex. 1022), “curved” pads are produced using multiple ion-injection steps targeting different areas in insulating material. Nam, ¶¶ [0099]-[0100]. “[H]eat” is then “applied thereto in a subsequent process,” causing ion-injected impurities to “spread,” resulting in the desired curved shape. *Id.*, ¶¶ [0060], [0090]. This same process would also result in curved contact pads in Kim: ion implantation would occur the same way it currently does. Then, a heating step would cause the impurities to spread or diffuse, resulting in a rounded opening 122_O after etching and a resultant curved pad. Ex. 1075, ¶¶ 86-88; Ex. 1003, ¶¶ 258-260.

These prior art methods for forming curved pads are not “fundamentally different” from that employed by Kim. *E.g.*, Response, 61. Again, Kim **does not**

require use of the exact, exemplary manufacturing method it discusses in its specification. Further, Kim already employs ion implantation and etching steps that are analogous to those discussed in both Park and Nam. *Compare* Kim, 12:61-13:11 *with* Park, 8:33-49 and Nam, ¶¶ [0099]-[0100]. Use of Park’s method requires nothing more than an additional oxidation step after etching. Ex. 1075, ¶¶ 89-95. And use of Nam’s methods requires only an additional heating step after impurity implantation. *Id.* These are not “fundamental” differences: they are the application of known, routinely used process steps as part of ordinary design work. *Id.*

Patent Owner’s motivation to combine arguments also lack merit. Per Patent Owner, Kim “already addresses” the “short-circuit risk.” Response, 55-56. This, according to Patent Owner, makes curved contact pads unnecessary. *Id.* It does not. Kim’s repeated reference to short circuits (*e.g.*, Kim, 9:7-11, 9:46-49, 9:50-55), would have made it clear to a POSITA that Kim not only recognizes short circuiting as a problem, but is open to design modifications addressing this problem. Ex. 1075, ¶¶ 96-100. So, far from leading a POSITA away from the use of a curved landing pad, the discussion of short circuits in Kim motivates use of such a pad. *Id.*; Ex. 1079, 57:12-25 (short-circuit avoidance is “basic” and “absolute requirement”), 59:20-61:10 (“very, very well known” to “optimize ... structure” to avoid short-circuits).

The methods Kim employs to minimize short circuits further emphasizes this. To address short circuits, Kim adjusts the size, shape, and positioning of its pads. Kim, 9:46-49 (Kim's pad is sized and located "inside from the edge surface" of the base pad "to prevent ... short-circuit"). Kim also adds thickened layers of insulation around the pad. *Id.*, 9:7-11, 50-55 (insulation "thickness" is increased to "prevent[] ... short circuit"). A curved shape increases the distance between the landing pad and adjacent conductive structure. Ex. 1075, ¶¶ 98-99. It also increases the thickness of insulation surrounding the landing pad. *Id.* Thus, use of a curved contact/landing pad is nothing more than a straightforward extension of the short-circuit preventing approaches Kim already employs. *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018) (routine optimization obvious). Further, the repeated disclosure of rounded landing pads in the prior art makes clear that a POSITA would have considered this design both usable with Kim and suitable. *Bayer Pharma AG v. Watson Labs., Inc.*, 874 F.3d 1316, 1328 (Fed. Cir. 2017) ("[O]bviousness does not require that the motivation be the *best* option, only that it be a *suitable* option....").

3. Kim and Yang Render Claims 3 and 8 Obvious

Claims 3 and 8 require that the claimed "landing pad" be offset from the side of the underlying "second material layer" by 10-300 nm. '838 patent, claims 3/8. Yang (Ex. 1007) provides an example of typical, routinely used 3D memory staircase

dimensions. Petition, 54-59. When applied to Kim, Kim's landing pad would have obviously been offset by the claimed amount. *Id.*

According to Patent Owner, the Petition's arguments regarding Kim/Yang's landing pad offset are "unfounded" and improperly premised on figures not drawn to scale. Response, 64-65. Patent Owner is wrong. This is not a case where the prior art is completely silent regarding the dimensions of the structures shown in the figures. Instead, Yang identifies in its specification (1) the overall dimension of each depicted staircase step (400-600nm), (2) the thickness of each layer (~50nm), (3) the thickness of its pads (~80nm), (4) the type and specification of the laser employed to form its landing pads, and (5) how much larger its pads are than the associated contacts (~20-40nm). Petition, 55-56. The Petition explained that all this together—and not Yang's figures alone—would have led a POSITA to conclude that the prior art teaches landing pad offsets falling within the claimed range. *Id.*

Patent Owner next argues that the Petition wrongly identifies the offset range taught by the prior art because (1) Kim/Yang's landing pad is not necessarily located in the middle of the step, and (2) Yang's laser can be employed to make pads either larger or smaller than 200nm. This fails to account for totality of art's disclosure. Both Kim and Yang unambiguously depict pads located approximately in the center of each step. *E.g.*, Kim, Fig. 4B; Yang, Fig. 2. And Kim explicitly notes that its landing pad is intended to be situated in the "center" of the underlying PAD_B. Kim,

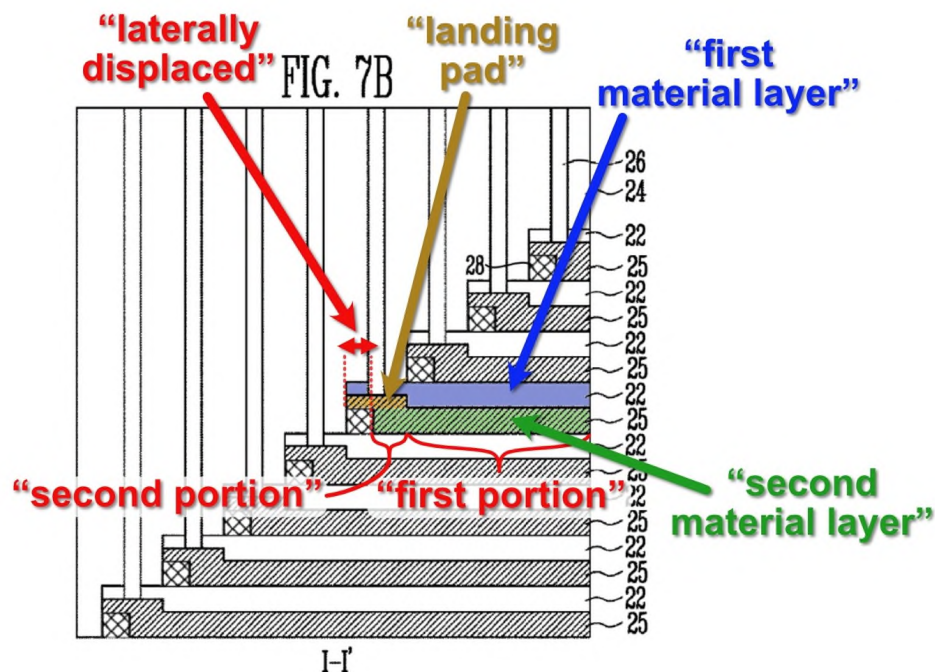
10:40-48; *see also* Ex. 1075, ¶ 108; Ex. 1076, 15:24-17:6 (contacts located to avoid “miss[ing] the landing pad”). Next, while it is true that the laser referenced in Yang can form features either smaller or larger than 200nm, this is not what Yang discloses. In Yang, the landing pads have a “width ECDs.” Yang, 8:7-10; Fig. 2. Per Yang, this “width ECDs” is double the “thickness T3” (the thickness of insulation layer 112 deposited during manufacture). *Id.* And thickness T3 “must be greater than the thickness of the” pairs of conductive and insulating layers. *Id.*, 8:12-13. Since these layers can be up to 100nm thick (*id.*, 6:24-28), Yang’s landing pad will be on the order of 200nm wide, just as noted in the Petition. Ex. 1075, ¶¶ 102-107, 109-111. Patent Owner and its expert do not dispute that Yang’s laser would be able to form a pad of this size. Ex. 1076, 78:12-24. The only way that Kim/Yang’s landing pads would possibly fall outside the claim scope would be if they were made unusually small and located as far from the step edge as possible. Ex. 1075, ¶¶ 111-112. But neither reference discloses a pad even remotely like this. And Patent Owner’s expert conceded that a POSITA would not attempt to form “extremely” small (or large) features using a laser like that in Yang. *E.g.*, Ex. 1076, 79:5-80:16; *see also* 19:1-25 (contacts are not formed “really small”).

Finally, Patent Owner’s contention that Kim’s and Yang’s “processes are incompatible” (Response, 69) misses the point. The Petition did not propose that Kim be modified to employ Yang’s manufacturing process. It cited Yang simply

because its staircase is shaped similarly to Kim's and because it provides an example of typical memory staircase dimensions. See Petition, 58-59.

B. Lee Also Renders the Claims Obvious

As explained in Grounds 3-5, Lee (Ex. 1006) also teaches a memory staircase with a “landing pad” “laterally displaced” from the side of a “second portion” of an underlying “second material layer”:



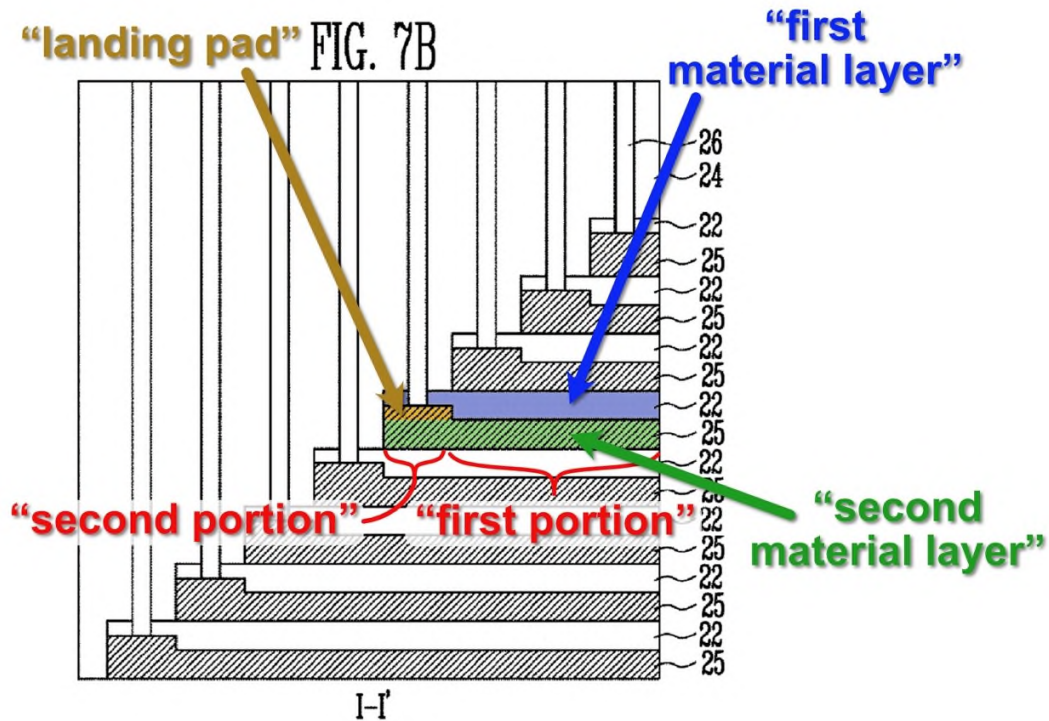
Petition, 63 (modifying and annotating Lee, Fig. 7B).

1. *Lee Teaches a Memory with the Claimed “Portions”*

Here, Patent Owner once again ignored the Petition and fabricated its own, different way to characterize the prior art to argue that Lee lacks a “second material layer” with separate, non-overlapping “portion[s]”:

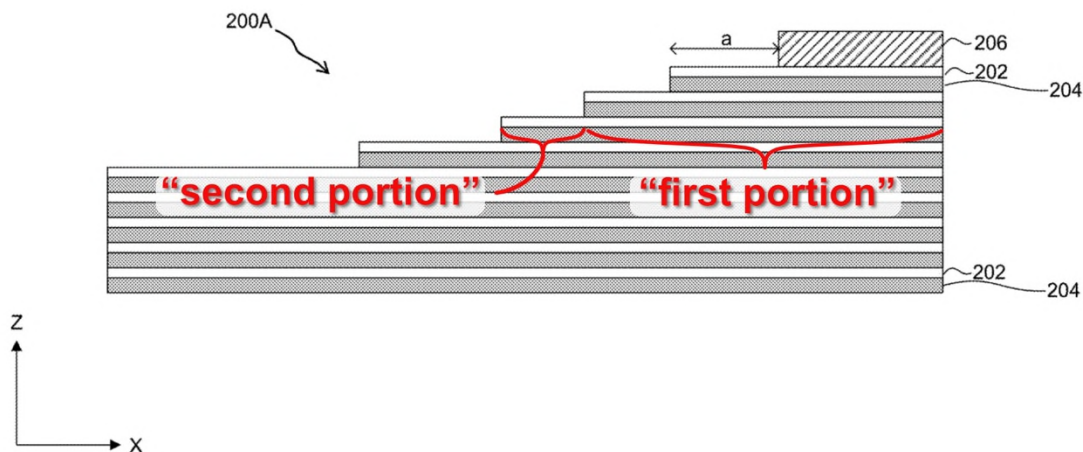
[illegible]

Further, Patent Owner completely ignores that the “portions” of Lee’s “second material layer” identified by the Petition are **the same** as those in the ’838 patent. Lee’s “second portion” corresponds to the part of a conductive layer forming a staircase step:



Lee, Fig. 7A (annotated). Lee expressly identifies this part of its “conductive layer” as a “portion.” *Id.*, [0023] (the “end” of each “conductive layer[] 11” includes a “pad portion[] PAD”). Moreover, Lee also characterizes each conductive layer as including a separate, “unexposed portion.” *Id.*, Abstract, [0009], [0023], [0027]. This is exactly how the ’838 patent uses the term “portion.” Per the patent, each “step” in a memory’s staircase structure “exposes a portion of a top of a surface of an SC layer.” ’838 patent, 7:10-12 (emphasis added); 5:66-6:1 (“[a] step of the staircase structure exposes a portion of a top surface of a layer stack...”). The “SC layer” is later replaced with conductive material to become the “second material layer.” *Id.*, 10:19-24. So, in the ’838 patent, just like Lee, the “second portion” is

simply the exposed part of the “second material layer” corresponding to a step. The “first portion” is the unexposed part of the layer



Id., Fig. 2A (annotated); *see also* Ex. 1075, ¶¶ 115-124; Ex. 1076, 65:14-67:8

2. *Lee and Park Teach “Curved” Landing Pads*

Ground 5 explained why claims 13-15 are obvious over the Lee and Park. Petition, 80-88. Here, Patent Owner argues that “Petitioner does not establish that a POSITA would have been motivated to” employ a rounded pad with Lee, “or have a reasonable expectation of success[.]” *Id.*, 78. It is wrong on both counts.

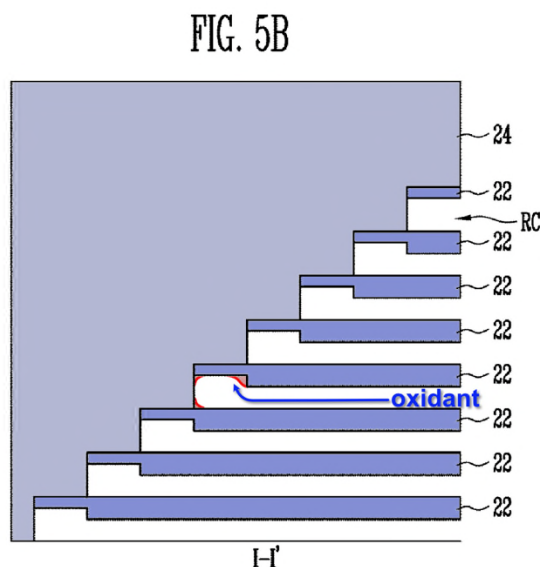
The Petition ***did*** explain why a POSITA would have been motivated to use curved pads. Not only were such pads well known, but use of a curved pad would have reduced the risk of short circuit in Lee. Petition, 83-84. Patent Owner once again argues that “Lee already provides a method” to avoid short circuits and thus purportedly does not require “Park’s teaching.” Response, 67. This does not show non-obviousness. Lee addresses the short circuit problem by ensuring there is

“sufficient distance ... between the stacked conductive layers....” Lee, ¶ [0049]. Use of a rounded pad with “curved” sides like that in Park furthers this goal: curved pad sides increase the distance between Lee’s pad and adjacent layers of conductive material. Ex. 1003, ¶¶ 418-420.

Next, it is not “techn[ologically] infeasible” to make Lee’s pad’s curved. Response, 80. The Petition explained that curved pads would be achieved by following Park’s teachings and further oxidizing Lee’s insulating layers after its sacrificial layers are removed. Petition, 84-85. According to Patent Owner, it is not possible to “further oxidize[]” Lee’s “solid oxide.” Response, 82-83. Lee explains that its insulation layers are formed from, for instance, “silicon oxide.” Lee, ¶ [0030]. When the ’838 patent was filed, silicon oxide films with non-stoichiometric amounts of oxygen (*i.e.*, SiO_x , where $0 < x < 2$) were both known and in routine use. *E.g.*, Ex. 2028, 563-64 (“[s]ilicon dioxide films ... can be nonstoichiometric”); Ex. 1080, 379 (referencing both “stoichiometric SiO_2 ” and “an oxide with about 14 a/o of Si in excess”); Ex. 1081, 508 (discussing “substoichiometric SiO_x ($0 < x < 2$) thin films”); Ex. 1082, 1:9-10, 6:45-51, 7:25-29, 8:5-16 (noting that “non-stoichiometric silicon oxides having more or less than two oxygen atoms for each silicon atoms” can be used as an “insulating layer” in a 3D memory). Because it contains excess silicon, this type of non-stoichiometric oxide layer is further oxidized when it is exposed to oxidant. Ex. 1075, ¶¶ 126-147; Ex. 2031, 261:20-266:1. Moreover, this material is

not “unstable” as Patent Owner argues. Response, 82. Instead, non-stoichiometric silicon oxide is repeatedly referenced in the prior art as common and acceptable for use in microelectronics. *E.g.*, Ex. 2028, 563-64; Ex. 1082, 1:9-10.

As Dr. Lee explains, when a silicon oxide layer is further oxidized, additional silicon oxide forms preferentially in the areas of exposed corners (red below). Ex. 1003, ¶¶ 472-474; Ex. 2031, 267:7-268:22. This includes the corners within the spaces between Lee’s existing oxide layers 22 (blue below):



Ex. 1075, ¶ 138; Ex. 1003, ¶ 474. Park employs an analogous process (just from the top of a memory staircase rather than within it). It first forms an “additional insulating layer 40” by thermally oxidizing “surfaces of the stepped sacrificial layer patterns 14a through 14f.” Park, 8:28-30. Then, it performs a further “oxidation process” on this already formed oxide to produce “rounded” sides. *Id.*, 8:37-38. So,

far from being technologically “infeasible,” a POSITA would have known how to apply Park’s teachings to Lee and have been motivated to do so.

3. *Lee and Haller Render Claims 3 and 8 Obvious*

Ground 4 explained why Lee and Haller render claims 3 and 8 obvious. Petition, 77-80. Everything Patent Owner says about these references is wrong.

First, Patent Owner argues that Haller is inapplicable because “Lee’s barrier layer” purportedly cannot be formed “as thick as Haller’s spacer.” Response, 74. This is because, in Patent Owner’s view, once a thin silicon oxide layer forms, it will act as a “barrier” to further oxide formation. *Id.* This is wrong: silicon oxide does not act as an oxygen diffusion barrier. Oxygen will continue to diffuse, enabling creation of as thick an oxide layer as required. Ex. 1075, ¶¶ 149-154.

Second, any difference between Lee’s and Haller’s processes is irrelevant. The Petition did not propose that Lee be modified to follow Haller’s manufacturing process. It only pointed to Haller as an example of an acceptable prior art landing pad offsets. *See* Petition, 78.

Third, Patent Owner is wrong that the references’ respective offsets serve different purposes. They serve the very same purpose: ensuring adequate spacing between adjacent conductive structures. Lee, [0049] (offset avoids contact between “stacked conductive layers”); Haller, 6:59-63 (offset “prevent[s]” contact with “adjacent wordline”).

III. CONCLUSION

For the reasons explained above—and in the Petition—the '838 patent's claims are obvious.

Respectfully submitted,

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Dated: February 18, 2026

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CERTIFICATE OF WORD COUNT

The undersigned certifies that the foregoing reply complies with the type-volume limitation in 37 C.F.R. § 42.24. According to the utilized word-processing system's word count, the reply includes 5,586 words.

Dated: February 18, 2025

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CERTIFICATE OF SERVICE

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