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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES, INC.,
Petitioner,

v.

GODO KAISHA IP BRIDGE 1,
Patent Owner.

Case No. IPR2024-01493
U.S. Patent No. 10,680,167

PETITIONER'S REPLY TO PATENT OWNER RESPONSE

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All emphasis is added in quoted material unless otherwise indicated.

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1001	U.S. Patent No. 7,884,403 (“403 Patent”)
1002	File History for U.S. Patent No. 7,884,403
1003	U.S. Patent No. 8,319,263 (“263 Patent”)
1004	File History for U.S. Patent No. 8,319,263
1005	U.S. Patent No. 8,405,134 (“134 Patent”)
1006	File History for U.S. Patent No. 8,405,134
1007	U.S. Patent No. 9,123,463 (“463 Patent”)
1008	File History for U.S. Patent No. 9,123,463
1009	U.S. Patent No. 9,608,198 (“198 Patent”)
1010	File History for U.S. Patent No. 9,608,198
1011	U.S. Patent No. 10,367,138 (“138 Patent”)
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1015	U.S. Patent No. 11,737,372 (“372 Patent”)
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1019	Patent Family Tree
1020	Japanese Patent No. JP2004071186
1021	English Translation of Japanese Patent No. JP2004071186, from ‘372 Patent File History (EX1016)
1022	Japanese Patent Application No. JP2004313350
1023	Certified English Translation (with Translator Declaration) of Japanese Patent Application No. JP2004313350
1024	Declaration of Jeffrey Bokor, Ph.D.

Exhibit No.	Description
1025	CV of Jeffrey Bokor, Ph.D.
1026	Bowen et al., <i>Large magnetoresistance in Fe/MgO/FeCo(001) epitaxial tunnel junctions on GaAs(001)</i> , 79 Appl. Phys. Letters 1655-1657 (2001) (“Bowen”)
1027	European Patent Application No. EP1391942A1 to Nagahama et al. (“Nagahama”)
1028	Soukup et al., <i>Voltage-Current Characteristics for Electrical Conduction Through Thin MgO Films</i> , 41 J. Appl. Phys. 3229-3236 (1970) (“Soukup”)
1029	Japanese Patent Application Publication No. JP2002204004A to Sunai et al. (“Sunai”)
1030	Certified English Translation (with Translator Declaration) of Japanese Patent Application Publication No. JP2002204004A to Sunai et al. (“Sunai”)
1031	Simmons, <i>Generalized Formula for the Electric Tunnel Effect between Similar Electrodes Separated by a Thin Insulating Film</i> , 34 J. Appl. Phys. 1793-1803 (1963)
1032	Trasatti, <i>Electronegativity, Work Function, and Heat of Adsorption of Hydrogen on Metals</i> , 67 J. Chem. Soc. 229-236 (1972)
1033	Jullière, <i>Tunneling between ferromagnetic films</i> , 54A Phys. Letters 225-226 (1975)
1034	Miyazaki et al., <i>Giant magnetic tunneling effect in Fe / Al₂O₃ / Fe junction</i> , 139 J. Magnetism & Magnetic Materials L231-L234 (1995)
1035	Moodera et al., <i>Large Magnetoresistance at Room Temperature in Ferromagnetic Thin Film Tunnel Junctions</i> , 74 Phys. Rev. Lett. 3273–3276 (1995)
1036	Wulff et al., <i>Characterization of MgO Layers on Different Alumina and Glass Substrates by Grazing Incidence Diffractometry and Grazing Incidence X-ray Reflectometry</i> , 23 Surface & Interface Analysis 148-154 (1995)

Exhibit No.	Description
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1040	Yoon et al., <i>Growth characteristics and surface roughening of vapor-deposited MgO thin films</i> , 60 Phys. Rev. 2839-2843 (1999)
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1044	Butler et al., <i>Spin-dependent tunneling conductance of Fe MgO Fe sandwiches</i> , 63 Phys. Rev. B 054416 (2001)
1045	Klaauw et al., <i>Growth, structure, electronic, and magnetic properties of MgO/Fe(001) bilayers and Fe/MgO/Fe(001) trilayers</i> , 64 Phys. Rev. B. 134411 (2001)
1046	Mathon et al., <i>Theory of tunneling magnetoresistance of an epitaxial Fe/MgO/Fe(001) junction</i> , 63 Phys. Rev. 220403 (2001)
1047	Wulfhek et al., <i>Single-crystal magnetotunnel junctions</i> , 78 Appl. Phys. Letters 509-511 (2001)
1048	Bogicevic et al., <i>Effect of oxide vacancies on metal island nucleation</i> , 515 Surf. Sci. L481-486 (2002)
1049	Kim et al., <i>MRAM Technology for High Density Memory Application</i> , 2 J. Semicond. Tech. Sci. 185-196 (2002)
1050	Yuasa et al., <i>A large quantum-well oscillation of the TMR effect</i> , 35 J. Phys. D. 2427-2431 (2002)
1051	Meyerheim, et al., <i>Geometrical and Compositional Structure at Metal-Oxide Interfaces: MgO on Fe(001)</i> , 87 Phys. Rev. Letters 076102 (2001)

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1054	Goniakowski et al., <i>Electronic States and Schottky Barrier Height at Metal/MgO(100) Interfaces</i> , 12 Interface Science 93–103 (2004).
1055	Wang et al., <i>70% TMR at Room Temperature for SDT Sandwich Junctions With CoFeB as Free and Reference Layers</i> , 40 IEEE Trans. Magn. 2269-2271 (2004)
1056	U.S. Patent Publication No. 2004/0136232A1 (“Hosomi”)
1057	Dieny et al., <i>Introduction to Magnetic Random-Access Memory</i> (IEEE Press 2017) (excerpts)
1058	Amodeo et al., <i>Dislocations and Plastic Deformation in MgO Crystals: A Review</i> , 8 Crystals 240 (2018)
1059	Matthews et al., <i>Comment: “Generalized formula for the electric tunnel effect between similar electrodes separated by a thin insulating film,”</i> 123 J. Appl. Phys. 136101 (2018)
1060	Jimbo et al., <i>Thermal stability of spin valves using amorphous CoFeB</i> , 165 J. Magnetism & Magnetic Materials 308-311 (1997)
1061	Cardoso et al., <i>Ferromagnetic Coupling Field Reduction in CoFeB Tunnel Junctions Deposited by Ion Beam</i> , 40 IEEE Trans. Magn. 2272-2274 (2004)
1062	U.S. Patent No. 7,270,896 (“Parkin”)
1063	Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. Mar. 15, 2024) (without exhibits)
1064	Claim Chart for ’403 Patent, Exhibit D to Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. Mar. 15, 2024)

Exhibit No.	Description
1065	Claim Chart for '263 Patent, Exhibit E to Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. Mar. 15, 2024)
1066	Claim Chart for '372 Patent, Exhibit F to Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. Mar. 15, 2024)
1067	First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1068	Amended Claim Chart for '403 Patent, Exhibit AA to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1069	Amended Claim Chart for '263 Patent, Exhibit BB to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1070	Amended Claim Chart for '372 Patent, Exhibit CC to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1071	Claim Chart for '909 Patent, Exhibit DD to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1072	Claim Chart for '138 Patent, Exhibit EE to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1073	Claim Chart for '198 Patent, Exhibit FF to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1074	Claim Chart for '463 Patent, Exhibit GG to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1075	Claim Chart for '167 Patent, Exhibit HH to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)

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Exhibit No.	Description
1076	Claim Chart for '134 Patent, Exhibit II to First Amended Complaint, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. July 8, 2024)
1077	Docket, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. Mar. 15, 2024)
1078	U.S. District Courts – Combined Civil and Criminal Federal Court Management Statistics (Dec. 31, 2023), https://www.uscourts.gov/statistics-reports/federal-court-management-statistics-december-2023 (excerpts)
1079	Microsoft Computer Dictionary (5th ed. 2002) (excerpts)
1080	Order Granting Motion to Transfer Venue to Northern District of California, <i>Godo Kaisha IP Bridge I v. Western Digital Corporation</i> , Case No. 24-cv-00342-RGA (D. Del. Sept. 4, 2024)
1081	U.S. Patent No. 7,751,156 ('156 Patent)
1082	U.S. Patent No. 8,427,791 ('791 Patent)
1083	U.S. Patent No. 8,914,970 ('970 Patent)
1084	Boubeta et al., <i>Epitaxial Fe/MgO heterostructures on GaAs(001)</i> , 226 J. of Crystal Growth 223-230 (2001)
1085	Joint Stipulation and Order to Stay Litigation Pending <i>Inter Partes</i> Review, <i>Godo Kaisha IP Bridge I v. Western Digital Technologies</i> , Case No. 24-cv-06555-RS, Dkt. No. 55 (N.D. Cal. Oct. 10, 2024)
1086-1095	RESERVED
1096	Transcript of June 13, 2025 Conference Call with Patent Trial and Appeal Board
1097	Wang et al., <i>Deposition of in-plane textured MgO on amorphous Si₃N₄ substrates by ion-beam-assisted deposition and comparisons with ion-beamassisted deposited yttria-stabilized-zirconia</i> , 71 Appl. Phys. Letters 2955-2957 (1997)
1098	Inaba et al., <i>Magnetic and Crystallographic Properties of Co–Cr–Pt Longitudinal Media Prepared on MgO Seedlayers Deposited by ECR Sputtering</i> , 36 IEEE Trans. Magn. 2372-2374 (2000)

Exhibit No.	Description
1099	Tonouchi et al., <i>Epitaxial growth of NbN on an ultrathin MgO/semiconductor system</i> , 62 J. Appl. Phys. 961-966 (1987)
1100	Plummer et al., <i>Silicon VLSI Technology, Fundamentals, Practice and Modeling</i> (Prentice Hall 1999) (excerpts)
1101	Transcript of Deposition of Caroline A. Ross, Ph.D., taken September 18, 2025
1102	Transcript of Deposition of Caroline A. Ross, Ph.D., taken September 19, 2025
1103	Google Scholar citation count re: Parkin et al., <i>Giant tunnelling magnetoresistance at room temperature with MgO (100) tunnel barriers</i> , 3 Nature Materials 862-867 (2004), https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=Giant+tunnelling+magnetoresistance+at+room+temperature+with+MgO%28100%29&btnG=
1104	Renault et al., <i>Strong <200> and <111> Preferred Orientations of MgO Thin Films Synthesized on Amorphous Substrate by Aerosol Assisted-Metallorganic Chemical Vapor Deposition</i> , 146 J. Electrochem. Soc.3731-3735 (1999)
1105	Reply Declaration of Jeffrey Bokor, Ph.D.

The '167 Patent never should have issued. IP Bridge (“IPB”) does not dispute that the Petition’s prior art taught every claim limitation, or that a skilled artisan would have been motivated to combine them. Confronted with *prima facie* obviousness, IPB opted to start with a strawman. It asserts Bokor’s hypothetical testimony about “uncapped” layers untethered to any Ground defeats obviousness, while pointedly ignoring that Parkin’s “inverted” Figure 3A drives a stake through both IPB’s arguments and the '167 claims.

IPB next argues no reasonable expectation of success in forming polycrystalline MgO above CoFeB, again ignoring Parkin’s teachings showing exactly that. It falsely asserts that the proposed combinations rely on detailed aspects of prior art manufacturing techniques, while omitting that neither the '167 Patent nor its claims recite any specific technique. Even ignoring Ross’ retraction of nexus for dependent claims, IPB offers no objective evidence tied to the alleged novel aspects of the '167 claims.

The Director found evidence of “material error by the Office” during examination of the related '138 Patent. IPR2025-00701, Paper 9, 2. IPB’s latest disclaimers and abandonments within the patent family acknowledge the '167 Patent should never have issued.

**I. IPB’S “UNCAPPED” STRAWMAN DOES NOT DEFEAT GROUNDS
1-2**

IPB opens by refuting a strawman imagined from Bokor’s deposition testimony. POR, 7-13. It pretends that the Petition relied on annealing an “uncapped” crystalline Fe electrode in Bowen/Nagahama, despite the Petition’s express substitution of “Sunai’s [or Parkin’s] CoFeB electrode for either or both of Bowen’s electrodes,” which “would be formed as an amorphous layer.” Pet., 24, 27; *see also id.*, 52-53 (Nagahama ground).

IPB imagines the skilled artisan nonetheless would remain wedded to Bowen’s/Nagahama’s procedure for forming crystalline Fe because, allegedly, “Petitioner never modified the process in Bowen or Nagahama to remove the step of annealing the lower electrode.” POR, 10. But the Claim 1[a] limitation at issue merely requires “forming a first CoFeB layer that is amorphous.” EX1013, 9:57. No specific process is required. *See* EX1013, 9:55-67.

After extensively discussing the prior art related to CoFeB electrodes, the Petition explains: “Because forming electrodes with CoFeB alloys in MTJs was known and had been successfully done, one of skill would have found it to be a straightforward, predictable, and desirable improvement to Bowen’s TMR.” Pet., 23-26, 28; *see also id.*, 51-54 (Nagahama). IPB cannot prevail by arguing the Petition *implicitly* adopted Bowen’s/Nagahama’s procedure for annealing a

crystalline Fe electrode when the Petition *explicitly* substituted it out.

IPB asserts that “Petitioner relies on Bowen and Nagahama annealing the Fe bottom electrode to meet 1[d] (and 11[d]).” POR, 9-10. In fact, the Petition cited those disclosures to support the broader proposition that “[a]nnealing ferromagnetic electrodes and MgO barrier layers was known.” Pet., 30, 57 (Nagahama). The Petition continues: “Annealing CoFeB electrodes to crystallize them was also known,” and cites other references including Parkin, which describes annealing the “tunnel junction.” Pet., 30-31 (citing EX1062, 7:53-59). IPB selectively ignores not only the context but also the Petition’s entire argument for Claim 1[d]. POR, 9-10.

It attacks Bokor for having “no idea what would have happened if a POSA had... annealed an uncapped amorphous CoFeB layer.” POR, 11-12; *id.* 7-8. But the “uncapped” hypothetical was IPB’s, not Bokor’s, proposed method for forming a CoFeB electrode. *E.g.*, EX1024 ¶¶154-55 (“Parkin explained that “[t]he **tunnel junction** may be advantageously annealed to improve its TMR...” (quoting EX1062, 7:53-59, 8:50-67)). IPB cannot be genuinely surprised that Bokor was unsure what would happen in IPB’s imaginary scenario. *See* POR, 7-8, 11-12.

IPB’s eagerness to advance frivolous arguments only betrays the weakness of its position.

II. THE PETITION SHOWED A REASONABLE EXPECTATION OF SUCCESS FOR ANNEALING CoFeB-MgO-CoFeB MTJS

IPB does not seriously dispute that all claim limitations are taught or suggested by the prior art. Instead, it challenges reasonable expectation of success. IPB posits that “a POSA could not have had a reasonable expectation that annealing the bottom CoFeB layer” would have provided a surface for a “polycrystalline MgO” layer. POR, 13; *see also id.* 12-29. In addition to applying an incorrect legal standard, IPB’s argument goes astray by improperly requiring blind adherence to Bowen’s/Nagahama’s fabrication steps while ignoring their modified electrodes.

A. IPB Applies An Incorrect Obviousness Standard

IPB’s premise that one of skill had no “reasonable expectation of success” in forming “a polycrystalline MgO layer” on an “amorphous CoFeB electrode” collapses in view of prior art teaching the opposite. *See* POR, 12-29. IPB misunderstands that “a finding of obviousness does not require a guarantee of success... [because] an expectation of success need only be reasonable, not absolute.” *Pfizer v. Sanofi Pasteur*, 94 F.4th 1341, 1352 (Fed. Cir. 2024).

It is black letter law that “[e]vidence of a reasonable expectation of success... ‘may flow from the prior art references themselves [or] the knowledge of one of ordinary skill in the art.’” *Elekta v. ZAP Surgical Sys.*, 81 F.4th 1368, 1377 (Fed. Cir. 2023) (citation omitted). A “skilled artisan would have had a resoundingly ‘reasonable expectation of success’” where the prior art teaches the specific

combination. *In re Kubin*, 561 F.3d 1351, 1360-61 (Fed. Cir. 2009); *E.I. du Pont v. MacDermid Printing*, 657 F. App'x 1004, 1014-15 (Fed. Cir. 2016).

IPB ignores that a skilled artisan is not an automaton but instead “a person of ordinary creativity,” who “in many cases... will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *KSR Int'l v. Teleflex*, 550 U.S. 398, 420-21 (2007); *ClassCo v. Apple*, 838 F.3d 1214, 1219 (Fed. Cir. 2016) (*KSR* does not dictate only “combinations of a puzzle element A with a perfectly fitting puzzle element B.”).

Obviousness does not require “bodily incorporat[ion].” *Allied Erecting v. Genesis Attachments*, 825 F.3d 1373, 1381 (Fed. Cir. 2016). “It is well-established that a determination of obviousness based on teachings from multiple references *does not require an actual, physical substitution of elements.*” *In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012).

B. Bokor's Testimony Shows A Reasonable Expectation Of Success

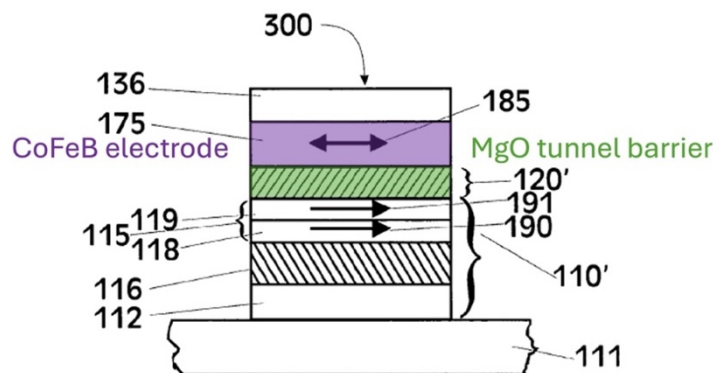
IPB's frivolous argument about Bokor's uncapped testimony, POR, 12-13, does not address the Petition's actual combination, *supra* §I. His testimony instead supports a reasonable expectation of success. EX1024 ¶¶135, 140, 148, 151-57.

C. Parkin Expressly Taught Growing Polycrystalline MgO(100) Atop CoFeB

IPB argues that Parkin's Figure 3A where he “formed a ‘highly (001) textured MgO layer’” provided no reasonable expectation of success. POR, 14; *see also*

POR, 14-17. This latest diversion ignores the Petition’s reliance on Parkin’s “inverted” Figure 3A embodiment. POR, 14-16; Pet., 27. IPB replaying its frivolous uncapped strawman shows that it cannot refute Parkin. POR, 14-16; *supra* §I.

There is no dispute MgO(001) and MgO(100) “are the same.” POR, 10. Parkin plainly disclosed forming MgO(100) atop an amorphous CoFeB electrode. Parkin’s Figure 3A taught a CoFeB layer 175 above a “highly (100) textured MgO layer”:



Pet., 26-28 (citing EX1062, Fig. 3A, 19:16-17); *see also* EX1062, 9:58-10:2 (using polycrystalline or single-crystal MgO), 18:49-51 (“highly textured (100) MgO tunnel barriers”); EX1024 ¶¶131-35; EX2018, 134:1-138:11; EX1101, 156:17-157:14 (Ross admitting Parkin’s disclosure). Parkin explained that its electrodes may be “inverted”: the lower reference electrode 115 in FIG. 3A “may be formed from one or more ferromagnetic layers 118 and 119,” or “[t]he MTJ device of FIG. 3A may also be *inverted*, such that the reference ferromagnetic electrode is formed

above the tunnel barrier and *the storage layer is formed beneath the tunnel barrier.*”

EX1062, 17:19-20, 17:7-10; *see* Pet., 27.

As IPB admits in the copending '134 IPR (IPR2024-01447, Paper 8, 47), Parkin's Figure 11 confirms Figure 3A's “inverted” embodiment expressly discloses an MgO(100) layer over an amorphous CoFeB layer:

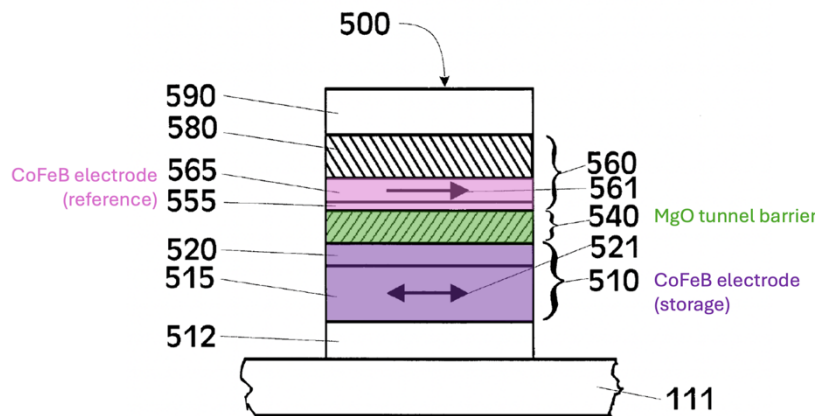


FIG. 11

EX1062, 22:29-63, 23:6-23:15, Fig. 11 (annotated); *see also* EX2018, 134:1-138:11.

Parkin's uncontested disclosures of forming a polycrystalline MgO(100) tunnel barrier over an amorphous CoFeB layer before the annealing step unravels IPB's reasonable expectation of success argument. *See* POR, 13.

D. The Prior Art Demonstrates One Of Skill Reasonably Would Have Expected Success In Growing MgO(001)/(100) On Amorphous Surfaces Including CoFeB

In addition to Parkin, other prior art showed a reasonable expectation of success forming polycrystalline MgO layers on amorphous layers like CoFeB. Pet., 29; EX1024 ¶¶70, 140.

1. Nagahama Itself Taught MgO(001) On Amorphous Surfaces

IPB and Ross admit that Nagahama taught growing MgO(001) seed layers on amorphous surfaces: Nagahama “form[ed] a ‘MgO double underlayer’... compris[ing] an amorphous **MgO**

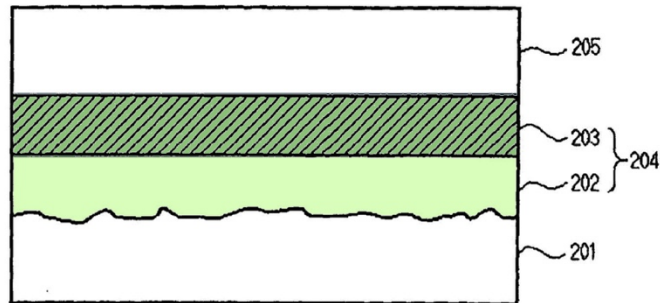
[layer 202] covered by a ‘(001)-oriented highly oriented’ crystal

MgO layer [203]... ‘on an amorphous substrate.’” POR,

38-39 (quoting EX1027 ¶¶55-59,

67); EX2053 ¶¶208-10 (same). This is shown in Nagahama’s Figure 12. EX1027 ¶¶58; EX1105 ¶20. These layers are 10-nm thick or less: “MgO layer 202 is 3 to 10nm, and... MgO(001) crystal layer 203 is also 3 to 10nm.” EX1027 ¶¶58; EX1105 ¶20. Nagahama’s undisputed disclosure demonstrates forming MgO(001) on amorphous surfaces. EX1027 ¶¶58-59; EX2053 ¶¶208-10; EX1105 ¶¶20-22.

FIG. 12



2. Yuasa And His Cited Literature Show Growing MgO(001) On Amorphous Surfaces

Yuasa and the scientific literature contradict IPB’s claim that a skilled artisan would have believed growing MgO(001) on CoFeB or other amorphous surfaces was impossible. *E.g.*, POR, 22-26. Ross’ refusal to address these publications, EX1101, 104:14-105:21, 109:18-110:4, 116:6-16, 124:16-125:8, 146:9-19, shows her claim that MgO forms only “random grain orientation” on amorphous surfaces

to be unreliable, EX2053 ¶¶152-67; EX1105 ¶¶25-30.

IPB claims a “textbook” citing Yuasa’s 2005 *Applied Physics Letters* article (“APL-2005”) is the Petition’s “only cited evidence” that annealing “would actually achieve the claimed MgO.” POR, 26-27 (citing EX1057, 47; EX2006). That ignores Parkin and Nagahama. *Supra* §§II.C, II.D.1.

IPB contends Yuasa’s “surprising” discovery that MgO(001) could be formed on amorphous CoFeB in his APL-2005 supports its claim. POR, 26 (citing EX2006, 2). But APL-2005 refutes it by citing Wang’s 1997 article (EX1097) observing successful MgO(001) growth on amorphous Si₃N₄ substrates. EX2006, 2 & n.14; EX1105 ¶¶7-8. Wang 1997 found “a crystalline pattern of MgO at about 20Å [2nm],” that “suggests that the MgO molecules form well-aligned small 3D crystallites right at the inception of [room temperature] deposition, i.e., right at the nucleation stage.” EX1097, 2955, Fig. 1(a)-(c), Abstract; EX1105 ¶¶9-12; EX2053 ¶178.

Yuasa’s 2004 *Nature Materials* article (EX2008), citing Inaba 2000 (EX1098), recognized “textured Fe/MgO/Fe MTJs with (001) orientation[] [may] be prepared on *any kinds of substrates* by using a highly oriented MgO(001) seed layer.” EX2008, 870 & n.21. Inaba reported, at room temperature, “prepar[ing] Co-Cr-Pt/Cr-alloy/MgO longitudinal thin film media” on thin-film “MgO seedlayers” on “glass substrates.” EX1098, 2372; EX1105 ¶¶13-16. Its “10 nm-thick MgO

seedlayer... shows well developed {100} texture.” EX1098, 2373, Fig. 2; EX1105 ¶16.

Wulff 1995 also expressly taught that “[a]part from epitaxy, MgO grows with strong preferential <100> orientation *regardless of the substrate selection.*” EX1036, 148. IPB and Ross falsely claim Wulff “described the behavior of MgO films with thicknesses exceeding 100 nm,” not “2 nm thickness that would be used in an MTJ.” EX2053 ¶¶153-54; POR, 22. But Wulff cited Tonouchi 1987 (EX1099), confirming this property was true for 0.5-1.0-nm-thick MgO layers. EX1105 ¶17. Tonouchi confirmed MgO(100) grew “regardless of the substrate selection” and proved it for 1-nm “(100)-oriented MgO” layers grown on amorphous “oxidized Si” substrates. EX1099, 962, 964; EX1105 ¶¶17-19. Wulff’s citation to Tonouchi proved there was no material difference between 1- and 100-nm MgO layers. EX1105 ¶¶17-19; *see* POR, 22-26; EX2053 ¶¶152-67.

3. Jimbo And Cardoso Support A Reasonable Expectation Of Success

Ignoring all of the prior art discussed above, IPB inaccurately claims that Jimbo and Cardoso provide no evidence supporting annealing CoFeB. POR, 13-14. Jimbo’s and Cardoso’s teachings about crystallization of CoFeB in the (111)-orientation, POR, 50-52, are irrelevant since a skilled artisan expected CoFeB crystallizes in the (001)-orientation when annealed adjoining MgO(001), as Parkin

taught, EX1062, 18:49-55; EX1024 ¶61.

E. Grounds 1-2 Never Stated Epitaxial MgO Satisfied The Claims

IPB erects another strawman, inaccurately asserting that “ground 1 expressly relies on Bowen’s process of *epitaxially growing* MgO on the Fe(100) bottom electrode to meet 1[b], 1[e], and 11[b].” POR, 18-19. It tries to make the same argument for Nagahama, while acknowledging Nagahama taught polycrystalline MgO(001). POR, 18. But the Petition plainly proposed replacing Bowen’s/Nagahama’s Fe electrodes with CoFeB: “[O]ne of skill would have been motivated to replace Bowen’s lower, Fe electrode with a CoFeB layer” and “[f]orming an MgO layer over a ferromagnetic layer in an MTJ was conventional.” Pet., 28-29; *see also id.*, 54-55 (same for Nagahama).

For its argument, IPB also misrepresents Wang by relying on a cropped version of Wang’s full disclosure that “amorphous CoFeB does not support any crystalline grain growth *of the CrMnPt layer*,” POR, 18 (citing EX1055, 2270). The CrMnPt layer is not relevant to “epitaxially growing MgO on an amorphous surface” as Ross falsely represents. EX2053 ¶137; EX1101 at 179:12-13 (Ross: Wang’s CrMnPt is “intended to be an antiferromagnetic pinning layer”); EX1105 ¶12.

F. The ’167 Patent Itself Provides No Instructions For Forming MgO(001) Atop CoFeB

The parties agree that Bowen, Nagahama, and Parkin disclose MgO(001)/(100) layers. *See* POR, 2, 14, 19-21. IPB’s insistence that Petitioner

demonstrate the “contemplated workings of the combination” to form MgO(001) on CoFeB before the MTJ is annealed improperly demands more from the prior art than its own ’167 Patent. POR, 19; *see also, e.g., Lockwood v. Am. Airlines*, 107 F.3d 1565, 1570 (Fed. Cir. 1997) (“[T]he ’359 patent itself does not disclose the level of detail that Lockwood would have us require of the prior art.”); *In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994). *Personal Web v. Apple* does not support IPB’s argument, because it instead held that “[t]he amount of explanation” “necessarily depends on context,” and “[a] brief explanation may do all that is needed if... the prior art is clear,” like Parkin is here. 848 F.3d 987, 994 (Fed. Cir. 2017) (cited POR, 19).

The ’167 Patent provides nothing about how to fabricate MgO on an amorphous CoFeB layer. *See* EX1013, 9:6-27. Its entire description for the MgO layer in its CoFeB electrode “variation” is a single sentence. EX1013, 9:10-18. Despite this allegedly “surprising” discovery, POR, 26-27, the ’167 Patent expresses no surprise and provides no specific instructions for forming MgO on CoFeB, *see* EX1013, 9:6-27. Others, including the prior art in Grounds 1-2, already explained how to grow MgO(001) on amorphous underlayers, including CoFeB. *Supra* §§II.C, II.D. IPB is not entitled to a patent for “accomplishing” what the prior art already taught. *Lockwood*, 107 F.3d at 1570.

G. Grounds 1-2 Present Predictable Combinations

Finally, IPB does not exempt itself from *KSR*'s familiar elements/predictable results doctrine. *See* POR, 27-29. *KSR* does not demand “seek[ing] out precise teachings... for a court can take account of the inferences and creative steps [one of skill] in the art would employ.” *KSR*, 550 U.S. at 418. Parkin's inverted Figure 3A embodiment and teachings about the benefits of crystallized and amorphous CoFeB informed a skilled artisan how the MgO(001) barrier layer would interact with an amorphous CoFeB layer that is subsequently crystallized. EX1062, 18:49-55, 19:10-17; *supra* §II.C.

III. THE PETITION MET ITS BURDEN FOR GROUNDS 1-2

With prior art undisputedly teaching or suggesting all claim limitations including annealing CoFeB-MgO(001)/(100) MTJs with a reasonable expectation of success, IPB resorts to improperly attacking isolated teachings while ignoring the cumulative knowledge of the prior art. Its arguments have no merit.

A. One Of Skill Would Have, And In Fact Did, Combine The References As Set Forth In The Petition

IPB argues at length that a skilled artisan would not have combined Bowen/Nagahama with Sunai or Parkin. POR, 30-39. IPB's lengthy analysis of omits the most critical detail—their resulting TMR. *See id.* IPB's use of Parkin's teachings on manufacturing techniques to attack Bowen only provides further motivation to modify Bowen/Nagahama exactly as Parkin taught. POR, 36-37.

1. Bowen’s And Nagahama’s Supposed “Heroic Efforts” Ignores TMR

IPB portrays Bowen and Nagahama as engaging in “heroic efforts” to achieve single-crystalline MTJs to urge that one of skill would not abandon them. POR, 30-33, 38-39. Even if true, ignoring TMR as a motivating force to improve designs undoes IPB’s argument. *See id.*

It is undisputed that one of skill was motivated to improve TMR. POR, 1, 65 (long-felt but unmet need for MTJs with high room-temperature TMR). Such “‘universal’ motivations known in a particular field to improve technology provide ‘a motivation to combine prior art references even absent any hint of suggestion in the references themselves.’” *Intel v. PACT XPP Schweiz*, 61 F.4th 1373, 1380 (Fed. Cir. 2023). Bowen’s room temperature TMR of 27%, EX1026, 1657, and Nagahama’s “more than 90%” TMR, EX1027 ¶74, certainly left room for improvement when compared to Parkin’s “more than 220%,” EX1062, 18:44-47.

Nagahama’s and Parkin’s undisputed criticism of Bowen’s single-crystal substrates, EX1027 ¶14; EX1026, 1655-56 (cited POR, 36-37), undercut IPB’s arguments by expressly showing skilled artisans jettisoning that design to achieve a better device.

2. Improvement Does Not Fundamentally Change An MTJ's Principle of Operation

IPB asserts Grounds 1-2 resulted in combinations that would change Bowen's/Nagahama's basic principles of operation. POR, 39-40 (citing *In re Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959)). That is easily disproved when forming MgO(100) barrier layers on CoFeB electrodes already had been done, by, for example, Parkin. EX1062, 17:7-10; *supra* §II.C. IPB agrees Parkin's MTJ taught an "amorphous CoFeB electrode 175" in Figure 3A, POR, 15 (citing EX1062, Fig. 3A), and does not dispute that Parkin taught a lower CoFeB electrode when Figure 3A was inverted, EX1062, 17:7-20; *supra* §II.C. Everyone agrees that Parkin's MgO-CoFeB MTJ performed phenomenally, achieving a "very high TMR value[]" of "***more than 220%***" for his prior art CoFeB MTJ. EX1062, 18:44-51; EX2006, 1 (Yuasa: acknowledging Parkin's "220% of MR ratio at RT").

Parkin's disclosure defeats IPB's specious argument that one of skill would not use a CoFeB electrode because it would subvert the operation of Bowen's/Nagahama's MTJ. *See id.*; *see, e.g., Mouttet*, 686 F.3d at 1332 ("finding *Ratti* inapplicable where the modified apparatus will operate 'on the same principles as before'" (quoting *In re Umbarger*, 407 F.2d 425, 430-31 (C.C.P.A. 1969))).

3. Sunai Would Motivate Use Of CoFeB

IPB's scattershot attacks improperly target Sunai individually. POR, 40-44; *Palo Alto Networks v. Centripetal*, 122 F.4th 1378, 1386 (Fed. Cir. 2024) (prior art

“must be read together, not in isolation”). None have merit.

IPB first asserts that the Petition only asserts that CoFeB was known to increase TMR compared to CoFe when Bowen/Nagahama used Fe. POR, 40-41 (citing Pet., 24-25). But the same sentence in the Petition also states, “and CoFe was known to obtain better results than Fe,” Pet., 25 (citing EX1035 at 3274), a point which is now undisputed.

IPB argues that Sunai’s low TMR compared to Bowen/Nagahama would dissuade one of skill from using CoFeB. POR, 41-42. But that ignores the Petition’s cited teachings that, for example, “it is natural to replace both the free and pinned layers to CoFeB to further increase the TMR value.” EX1055, 2270; *see also* EX1056 ¶¶67-68; Pet., 24. IPB’s attack on this motivation based on the use of alumina barriers in Wang (EX1055) and Hosomi (EX1056) is baseless. POR, 41-42. IPB falsely asserts that Bokor rejected consideration of TMR data from MTJs with alumina barriers when considering an MTJ with an MgO barrier. *Id.* But IPB’s sole cited support is Bokor’s explanation that Slonczewski’s simple model was inapplicable to MgO MTJs, EX2017, 197:15-203:24 (partially cited in POR, 42), which one of skill understood, *e.g.*, EX1044, 1 (Butler: “One of our conclusions is that this approach is completely inadequate for understanding tunneling.”); EX1024 ¶65. Bokor never opined that all teachings about alumina MTJs would be discarded by a skilled artisan.

IPB tries to find support in Sunai depositing CoFeB amorously. POR, 42-44; EX1030 ¶¶27-28 (describing “film formation”), 30 (same). But Sunai says nothing about crystallization after the film is formed. EX1030 ¶30; EX1024 ¶130. IPB ignores Parkin’s express teaching that some crystallization is beneficial as one of skill plainly understood. EX1062, 18:49-62 (“very high TMR” for “nominally amorphous storage layers”); EX1024 ¶168.

4. Parkin Taught Use Of CoFeB

Arguing that Parkin would dissuade one of skill from modifying Bowen/Nagahama is self-defeating. POR, 44-46; *id.*, 36-38. “Nagahama’s” and “Parkin’s disparagement of Bowen’s techniques” only expressly shows a motivation to improve Bowen’s/Nagahama’s techniques. *See* POR, 44; *id.*, 37 (arguing “Nagahama similarly disparages Bowen’s process”).

IPB recounts Parkin’s discussion of the benefits of amorphous CoFeB electrodes and asserts that it “diverges” from the path taken by Yuasa and “teaches away” from the invention, which requires crystallized CoFeB layers. POR, 45-46. IPB shows no daylight between Yuasa and Parkin in that respect. *Compare* EX2006, 2 (“some parts of the CoFeB layers were crystallized.”), *with* EX1062, 18:49-62 (“a portion of the [CoFeB] storage layer 175... has crystallized”); *see also* EX2053 ¶¶290-96 (Ross opining that EX2006 embodies the ’167 claims).

5. IPB Ignores The Collective Prior Art Teachings Showing The Benefits Of Annealing

IPB attacks the Petition’s motivation to combine, claiming it would be inconsistent to replace Bowen’s Fe electrodes with amorphous CoFeB before crystallizing the CoFeB. POR, 46-55. Again IPB flatly ignores the collective teachings in Parkin, Sunai, Jimbo, and Cardoso. *E.g.*, Pet., 24, 30-31 (citing EX1030 ¶¶27-28; EX1060, 311; EX1061, 2272-73); Pet., 26-27, 32-33 (citing EX1062, 18:49-51); *Palo Alto*, 122 F.4th at 1386 (Prior art “must be read together, not in isolation.”). Parkin expressly taught the benefits of depositing “amorphous” electrodes and “crystalliz[ing]” them by annealing. EX1062, 18:49-55. IPB’s argument that a skilled artisan would disregard what the prior art recommends is baseless. *E.g.*, *Soft Gel v. Jarrow Formulas*, 864 F.3d 1334, 1341-42 (Fed. Cir. 2017) (affirming obviousness because patent owner “fails to account for the recommendations in the Nazzal reference”).

IPB attacks the Petition’s showing for the “entirely crystallized” claims, asserting that the Board interpreted “entirely crystallized” to mean “the entirety of the first and second CoFeB layers be crystallized.” POR, 47 (quoting Paper 9, 20). Even if that were the Board’s holding, Parkin’s crystallized CoFeB layer is sufficient because it is legally irrelevant whether an adjacent amorphous CoFeB layer existed in the ’167 Patent’s “comprising” claims. *See, e.g., Exergen Corp. v. Wal-Mart*

Stores, 575 F.3d 1312, 1319 (Fed. Cir. 2009) (references including unclaimed elements satisfying “comprising” claims).

IPB instead argues that there is no “reason” one of skill would crystallize Sunai’s or Parkin’s electrode because their benefits are achieved because the CoFeB electrode is *amorphous*. POR, 48-55. IPB ignores Parkin’s express teaching that “very high TMR values” occur with some crystallization in the “*nominally* amorphous” CoFeB layers. EX1062, 18:49-55, 19:10-17 (“only a very thin crystalline interface layer would need to be formed” in “the CoFeB layer 175”).

a) Jimbo (EX1060)

First, IPB claims that “[t]here was no TMR” in Jimbo’s devices, POR, 49-50, despite Jimbo expressly teaching an improvement to the “MR ratio” with annealing and crystallization of its CoFeB layers, EX1060, 311; EX1024 ¶¶61-62. Jimbo’s teachings are plainly relevant to the use of CoFeB in MTJs because (1) they describe annealing and crystallizing CoFeB, EX1060, 308, 310-11; EX1024 ¶¶162-64; and (2) Jimbo’s GMR devices were the predecessor technology “spawning MTJ devices,” as IPB concedes, IPR2024-01447, Paper 19, 67-68.

IPB asserts Jimbo’s CoFeB-Cu interface would have no bearing on a CoFeB-MgO interface. POR, 50. But that ignores the broader context in the art in which such interfaces were known to be useful. *E.g.*, EX1062, 18:49-62 (benefits of

crystallization at CoFeB-MgO interface). Jimbo’s additional data point for crystallizing CoFeB interfaces would thus be useful to one of skill.

IPB argues that Jimbo “does not teach that CoFeB crystallizes,” POR, 50, but again is contradicted by Jimbo’s disclosure: “[T]he CoFeB layer is confirmed to be amorphous in the as-deposited state and begin[s] to *crystallize* after annealing at 250°C,” EX1060, 311; EX1024 ¶¶61-62; *see also* ID, 17 (finding IPB “incorrectly conflate[d] the subsequent annealing step”). IPB’s effort to contest these conclusions using Jimbo’s reported diffraction data, POR, 50-51 (citing EX2053 ¶¶250-53), overlooks that Jimbo reported EXAFS data confirming that cobalt in CoFeB was crystallized by annealing. EX1060, 310 (Co EXAFS data was “very weak” as-deposited, but “[a]fter annealing at 300°C... indicates fcc structure.”); EX1105 ¶24. Finally, IPB’s assertion that crystallizing to enhance TMR is inconsistent with using amorphous CoFeB to increase TMR is bad logic. POR, 51. Depositing amorphous CoFeB may enhance TMR as taught by Sunai, EX1030 ¶¶27-28, while annealing to crystallize may further enhance TMR as taught by Parkin, EX1062, 18:49-62.

b) Cardoso (EX1061)

IPB asserts Cardoso doesn’t show crystallized CoFeB, contending that Cardoso only says that the post-annealing films were “not amorphous.” POR, 51 (quoting EX1061, 2273). IPB ignores Cardoso’s Figure 3 data with “X-ray

measurements... [that] confirmed the CoFeB films are not amorphous” and showed peaks and thus “strong texture enhancement,” corresponding to crystalline CoFeB FCC (45.3°). EX1061, 2273, Fig. 3; Pet., 31-32 (citing EX1024 ¶¶155, 162, 164-66); *see* POR, 51-52 (citing EX2053 ¶¶126-27, 134); EX1024 ¶¶61-62. IPB also again rehashes its false assertion that Bokor testified that no alumina barrier data could be relevant to MgO. POR, 51-52. But Bokor only criticized the use of Slonczewski’s model for alumina barriers, which was known to be “completely inadequate” for MgO. EX2017, 197:15-203:24; EX1044, 1; *see also* IPR2024-01494, EX1105 ¶¶34, 38.

c) Bowen (EX1026)

IPB incoherently argues that the Petition does not “explain how Bowen could motivate crystallizing the amorphous CoFeB while at the same time arguing that a POSA was motivated to replace Bowen’s crystalline Fe with amorphous CoFeB.” POR, 53. IPB willfully ignores Parkin’s express disclosure of crystallized CoFeB electrodes. EX1062, 18:49-62; EX1024 ¶¶61, 168. Both IPB and Ross acknowledge Parkin’s teachings on this exact point. *See* EX2053 ¶¶93-94 (quoting EX1062, 18:51-62); POR, 14 (quoting EX1062, 13:3-25).

d) Klaua (EX1045)

IPB’s selective criticism of Klaua’s teachings about the benefit of crystalline MTJ interfaces, POR, 53, overlooks how a skilled artisan exercising “ordinary

creativity” would incorporate Klaua with their knowledge of CoFeB crystallization and “fit the teachings of multiple [references] together like pieces of a puzzle,” *KSR*, 550 U.S. at 420-21.

e) Parkin (EX1062)

Finally, IPB disingenuously attacks Parkin as not teaching “annealing an amorphous lower reference electrode” while completely ignoring Parkin’s “inverted” embodiment with an amorphous lower CoFeB electrode. POR, 54-55; *see also* Pet., 27 (citing EX1062, 17:7-10 (“inverted” Figure 3A embodiment)).

IV. IPB FAILS TO ADDRESS THE PETITION’S ARGUMENTS FOR CLAIMS 2, 4, 6, 12-13

Dependent Claims 2, 4, 6, 12-13 require “entirely crystallized” CoFeB layers. EX1013, 10:3, 10:10, 10:22, 10:60, 10:62. Contrary to IPB’s argument, POR, 56, the Petition quoted Parkin’s column 18 disclosure of an entirely crystallized CoFeB layer. Pet., 37-38 (quoting EX1062, 18:47-55, Fig. 5).

Ross admits Parkin disclosed this crystallized layer. EX2053 ¶93 (citing EX1062, 18:51-62). Bokor also testified about Parkin’s crystallized layer. *E.g.*, EX1024, ¶¶61-62, 131-32, 167-68. Parkin provides far more disclosure than the ’167 Patent or Yuasa’s APL-2005 publication about crystallization of CoFeB layers. *Compare* EX1062, 18:49-59, *with* EX2006, 2; EX1013, 9:10-18. Parkin’s undisputed disclosure of a crystallized layer requires no additional expert testimony. *Sundance v. DeMonte Fabricating*, 550 F.3d 1356, 1365 (Fed. Cir. 2008).

IPB has no response to Parkin’s disclosure. POR, 55-56. According to IPB and its expert, “a few monolayers” of “crystallized” CoFeB adjacent to the MgO barrier in an “otherwise amorphous” CoFeB layer satisfy the “entirely crystallized” claim limitation. EX1101, 185:9-19; *see also id.*, 187:4-188:2; POR, 59-60 (citing EX2053 ¶¶295-96); Pet., 35-38 (quoting EX1072, 6-7). Although Ross later attempted to retract this testimony, she refused to explain why or to offer “any opinions about the construction or the meaning of ‘entirely crystallized.’” EX1102, 14:8-15:8. Absent any basis, her retraction is unreliable. *Apple v. Gesture Tech.*, 127 F.4th 364, 370 (Fed. Cir. 2025) (PTAB “not required to accept [expert’s] conclusory assertion.”).

V. IPB DOES NOT ESTABLISH NON-OBVIOUSNESS BY SECONDARY CONSIDERATIONS

A. Ross’ Retraction Undermines Alleged Secondary Considerations

“For objective evidence of secondary considerations to be accorded substantial weight, [IPB] must establish a nexus between the evidence and the merits of the claimed invention.” *In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (citation omitted).

Ross retracted her alleged nexus between the alleged secondary considerations and dependent Claims 2, 4, 6, and 12-13. The foundation for IPB and Ross’ secondary considerations argument is that inventor Yuasa’s APL-2005 paper “disclosed the results achieved by the ’167 Patent’s claimed methods” including

CoFeB layers that are “entirely crystallized.” POR, 59-60; *see also* POR, 59-63, 67-68 (citing EX2006); EX2053 ¶¶288-325. She opined the secondary considerations are “directly connected to” APL-2005’s disclosure. EX2053 ¶299. After defending her opinion that APL-2005 disclosed the claimed invention, including the “entirely crystallized” limitation, EX1101, 182:3-201:10, Ross took back her opinions on the dependent claims during deposition day two. EX1102, 10:4-19 (“that’s an error”), 9:17-15:18, 15:10-18. Ross’ retraction undercuts IPB’s alleged nexus.

B. No Nexus Between The ’167 Claims And Alleged Industry Praise Or Long-Felt Need

If considered, IPB’s purported industry praise and long-felt need evidence provides no nexus because it is untethered to the ’167 Patent claims and/or relates to limitations “already in the prior art.” *Kao*, 639 F.3d at 1069 (quoted POR, 60). By asserting the same secondary considerations that it did for its tunnel barrier height claims in IPR2024-01494, IPB tacitly concedes the lack of any genuine nexus to the ’167 claims. EX1105 ¶¶31-32.

1. APL-2005 Provides No Nexus

IPB asserts Yuasa “disclosed the results achieved by the ’167 Patent’s claimed methods” in APL-2005, POR, 59, and that the APL-2005 methodology received praise for the following four attributes. None establish nexus. EX1105 ¶¶33-36.

a. 230% TMR. IPB does not show nexus to TMR of “230% room temperature” because the claims require neither a TMR nor temperature. POR, 60;

EX1013, 9:55-11:9. IPB offers nothing attributing a 230% TMR to the claims. POR, 60. The '167 specification reports a much lower TMR value for its Figure 11 CoFeB MTJs. *See* EX1013, 6:6-13 (first embodiment), 8:4-8 (room-temperature 88% TMR for first embodiment), 9:18-19 (Figure 11 CoFeB-MTJ “characteristics are substantially identical to those of the first embodiment.”). The '167 Patent expressly contradicts IPB’s assertions. *See id.*

Regardless, because high TMR was known in the prior art, it provides no nexus. *Kao*, 639 F.3d at 1069. As Yuasa acknowledged, Parkin disclosed a “very high TMR value[]” of “*more than 220%*” for his prior art CoFeB MTJ. EX1062, 18:44-51; EX2006, 1 (Yuasa: Parkin’s “220% of MR ratio at RT”).

b. The “claimed method disclosed by Yuasa-APL2005” used sputtering. Using a sputtering technique to allegedly solve a “CoFeB/MgO/CoFeB” crystal-growth problem is irrelevant because the specification provides no disclosure of any crystal-growth problem, let alone a solution. POR, 60-62; EX1013, 9:6-9:18 (no description of how to grow the “CoFeB/MgO/CoFeB” embodiment). No inference connects Ross’ explanation of the purported “problem concerning crystal growth” and Yuasa’s purported solution to the '167 specification. *Compare* EX1013, 9:6-9:18, *with* EX2053 ¶¶302-03. Unlike APL-2005, EX2006, 1-2, the patent discloses no fabrication conditions or steps for growing CoFeB/MgO/CoFeB where the MgO

is (001)-oriented “despite being grown on an ‘amorphous CoFeB’ underlayer,” POR, 61.

c. APL-2005 “unleas[h]ed a new era of skyrocketing TMRs.” The data from Dieny’s chapter 2 does not show that APL-2005 “unleashed” anything. *See* POR, 61 (citing EX1057, 46 (annotated Fig. 2.21)). Yuasa authored this chapter, EX1057, 29, and Yuasa’s self-praise is not objective evidence of non-obviousness. *Bayer Healthcare v. Watson Pharms.*, 713 F.3d 1369, 1377 (Fed. Cir. 2013) (“self-referential commendation[s] fall well short of demonstrating true industry praise”). APL-2005’s TMR value in the middle of Figure 2.21’s straight line is not an inflection point. *See* POR, 61 (annotated Fig. 2.21).

d. Industry praise for APL-2005. Park (EX2005), Gao (EX2022), and TDK (EX2023) identify CoFeB-MgO-CoFeB development in the history of MTJs, POR, 62-63, but Parkin (EX1062) had already disclosed such MTJs, rendering Park/Gao/TDK incapable of showing non-obviousness, *Kao*, 639 F.3d at 1069; *see also* EX1062, 22:29-23:30, 24:24-29 (Parkin: CoFeB MTJ achieved “the highest possible TMR”).

Fert’s comment on Yuasa’s 2004 *Nature* publication (EX2008), POR, 58-59 (quoting EX2020), diminishes rather than bolsters the ’167 Patent’s alleged invention because the claims do not encompass the single-crystal Fe/MgO/Fe MTJs Yuasa described in *Nature*, *see* EX2008, 1. IPB touts that Yuasa’s APL-2005 “has

been cited more than 1,200 times.” POR, 60. But Yuasa’s chapter credits Parkin’s eminent and earlier 2004 *Nature* publication, POR, 61 (showing “Parkin et al.” in EX1057, Fig. 2.21), which has been cited 4,200 times, EX1103.

2. Yuasa’s Awards Provide No Nexus

IPB resorts to Yuasa’s CV, presenting awards with no nexus to the ’167 claims. POR, 65 (citing EX2028). IPB’s other cited awards generically reference MgO-CoFeB MTJs and/or processes for manufacturing them. POR, 63-65 (citing EX2024, EX2026, EX2029-EX2035). These awards lack nexus because Parkin previously disclosed MgO-CoFeB MTJs, *supra* §§II.C, V.B.1. IPB also touts a “prize” for Yuasa’s JP5120680, POR, 63 (citing EX2027, EX2055), but it claimed a device with an MgO(001) layer on a CoFeB layer (not a method), EX2055, 1, and is what Parkin’s inverted Figure 3A embodiment already taught, EX1062, 17:7-10, 19:16-17. If the alleged invention merely constitutes a fabrication method for placing MgO atop CoFeB, Parkin’s prior disclosure fully defeats nexus. *See id.*; *Kao*, 639 F.3d at 1069.

3. No Nexus To Any Long-Felt, Unmet Need

Finally, IPB never ties the industry’s desire for a method of “commercially manufacturable processes” of MTJs with higher TMRs to the ’167 claims. *See* POR, 65-68. The ’167 Patent states that Fe-electrode and CoFeB-electrode MTJs had “identical” 88% TMRs. *Supra* §V.B.1(a); EX1013, 9:18-19. The 230% TMR from

APL-2005 that IPB touts, POR, 67, marks no advance over Parkin’s earlier finding of “more than 220%” TMR for CoFeB electrodes, EX1062, 18:44-51. Where both CoFeB electrodes and the resulting high TMR are “already in the prior art,” APL-2005’s statements cannot satisfy long-felt need. *Id.*; *Kao*, 639 F.3d at 1069; EX1105 ¶¶37-39.

VI. CONCLUSION

Petitioner requests judgment canceling Claims 1-15 for obviousness.

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that foregoing **PETITIONER’S REPLY TO PATENT OWNER’S RESPONSE** exclusive of the parts exempted as provided in 37 C.F.R. § 42.24, contains 5,581 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24.

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CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 C.F.R. § 42.6(e), a true copy of the foregoing **PETITIONER’S REPLY TO PATENT OWNER RESPONSE and EXHIBITS 1097-1105** are being served electronically on October 8, 2025 to the following counsel for Patent Owner to the following email addresses:

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