

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. IPR2024-01494
Patent No. 11,968,909

**PATENT OWNER'S REPLY TO
PETITIONER'S OPPOSITION TO MOTION TO STRIKE**

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LISTING OF EXHIBITS

Exhibit	Description
2001	Kittel, C., <i>Introduction to Solid State Physics</i> , 6th Edition, 1986, pgs. 13-15, 18, 23 (“Kittel”)
2002	Duke, C.B., <i>Tunneling in Solids</i> , Solid State Physics: Advances in Research and Applications, 1969, pgs. 1, 6-7, 34-35, 78-79 (“Duke”)
2003	Definition of “ferromagnetism,” Oxford English Reference Dictionary, Second Edition, pg. 513 (“Oxford English Reference Dictionary”)
2004	“Ferromagnetism,” The New Encyclopaedia Britannica: Volume 4, 15th Edition, 2003, pgs. 748-749 (“Britannica”)
2005	Zhu, J.G., et al., <i>Magnetic tunnel junctions</i> , Materials today, Volume 9, Number 11, November 2006, pgs. 36-45 (“Zhu”)
2006	Wulfhekel, W., et al., <i>Single-crystal magnetotunnel junctions</i> , Applied Physics Letters, Volume 78, Number 4, January 2001, pgs. 509-511 (“Wulfhekel”)
2007	Hard disk Market – Global Industry Analysis and Forecast (2025-2032), https://www.maximizemarketresearch.com/marketreport/global-hard-disk-market/63888/
2008	Yuasa citations, https://scholar.google.com/citations?view_op=view_citation&hl=en&user=kb5EQcsAAAAJ&citation_for_view=kb5EQcsAAAAJ:3fE2CSJlr18C
2009	Yuasa citations 2, https://scholar.google.com/citations?view_op=view_citation&hl=en&user=kb5EQcsAAAAJ&citation_for_view=kb5EQcsAAAAJ:kNdYIxmWKoC
2010	Wang, S.X., et al., <i>Magnetic Information Storage Technology</i> (Academic Press 1999) (Chapter 6)

Exhibit	Description
2011	RESERVED
2012	Parkin, S.P, et al., <i>Giant tunneling magnetoresistance at room temperature with MgO (100) tunnel barriers</i> , Nature Materials, 3 (2004), 862-867
2013	Transcript of Deposition of Jeffrey Bokor, Ph.D. (June 24, 2025)
2014	Transcript of Deposition of Jeffrey Bokor, Ph.D. (June 25, 2025)
2015	Djayaprawira, D., et al., <i>230% room-temperature magnetoresistance in CoFeB/MgO/CoFeB magnetic tunnel junctions</i> , Applied Physics Letters, 86(9) (2005)
2016	Yuasa, S., et al., <i>High Tunnel Magnetoresistance at Room Temperature in Fully Epitaxial Fe/MgO/Fe Tunnel Junctions due to Coherent Spin-Polarized Tunneling</i> , Japanese Journal of Applied Physics, 43(4B), (2004) L588
2017	Yuasa, S., et al., <i>Giant room-temperature magnetoresistance in single crystal Fe/MgO/Fe magnetic tunnel junctions</i> , Nature Materials, 3(12) (2004), 868-871
2018	Statutory Disclaimer Under 37 C.F.R. § 1.321(a)
2019	Marrows, C.H., <i>Spin-polarised currents and magnetic domain walls</i> , Advances in Physics, 52(8), (2005) 585-713
2020	Tsymbal, E., et al., <i>Handbook of Spin Transport and Magnetism</i> , 2012
2021	Nagamine, Y, et. al., <i>Ultralow resistance-area product of $0.4 \Omega (\mu\text{m})^2$ and high magnetoresistance above 50% in CoFeB/MgO/CoFeB magnetic tunnel junctions</i> , Applied Physics Letters, 89 (2006), 16507
2022	Nakatani, T., et al., <i>Read sensor technology for ultrahigh density magnetic recording</i> , MRS Bulletin, Materials Research Society, 43(2), (2018) 106-111

Exhibit	Description
2023	Jiang, B., et al., <i>Tunneling magnetoresistive devices as read heads in hard disk drives</i> , Journal of Magnetism and Magnetic Materials, 571 (2023) 170546
2024	The 23rd (FY2022) Japan Society of Applied Physics Achievement Award Recipients (with English translation), The Japan Society of Applied Physics, https://www.jsap.or.jp/outstanding-achievementaward/recipients/recipients23
2025	JSAP Outstanding Achievement Award Recipients, The Japan Society of Applied Physics, https://www.jsap.or.jp/english/awards/outstanding-achievementaward/recipients
2026	2021 New Fellows, IEEE Japan Council, https://ieeelp.org/en/kaiin/fellow/fellow21.html
2027	JST owned patent wins Future Creative Invention Prize at the National Invention Award 2021, Japan Science and Technology Agency, https://www.jst.go.jp/report/2021/210525_e.html
2028	Dr. Shinji Yuasa profile, https://www.jst.go.jp/impact/sahashi/en/system/index.html
2029	AIST wins three Science and Technology Awards in the 2016 Minister of Education, Culture, Sports, Science and Technology Commendation for Science and Technology, https://www.aist.go.jp/aist_j/news/prize/pr20160412_3.html
2030	Yuasa, S., <i>Magnetoresistance and Spin-Transfer Torque in Magnetic Tunnel Junctions</i> , IEEE Transactions on Magnetics, IEEE Magnetics Society Distinguished Lecturers for 2012, Vol. 48, No. 1, 2012
2031	Shinji Yuasa – IEEE Magnetics Society, https://ieeemagnetics.org/contact/shinji-yuasa#biography
2032	AIST: 20th Tsukuba Prize winner, https://www.aist.go.jp/aist_j/news/prize/itemid025-000077.html

Exhibit	Description
2033	Announcing the winners for “Tsukuba Prize,” “Esaki Leona Prize,” and “Tsukuba Encouragement Prize”: Ibaraki Prefectural Science and Technology Promotion Foundation (with English translation), https://www.tsukuba-sci.com/cms/?p=9853
2034	AIST: 34th Inoue Harunari Prize, https://www.aist.go.jp/aist_j/news/prize/itemid025-000082.html
2035	RESERVED
2036	RESERVED
2037	Saito, Y. et al. <i>Correlation between barrier width, barrier height, and dc bias voltage dependences on the magnetoresistance ratio in Ir-Mn exchange biased single and double tunnel junctions</i> , Jpn J. Appl. Phys. 39, L1035–L1038 (2000)
2038	Maat, S., et al., <i>Physics and Design of Hard Disk Drive Magnetic Recording Read Heads</i> , Handbook of Spintronics, 2014
2039	Soukup, R.J., <i>Hot Electron Transport in Vacuum Deposited Thin Film Emission Diodes</i> , University of Minnesota, Ph.D., Physics, solid state, 1969, pgs. 1-209 (“Soukup-Dissertation”)
2040	U.S. Patent Application Publication No. 2006/0003185 A1
2041	J. C. Slonczewski, <i>Conductance and exchange coupling of two ferromagnets separated by a tunneling barrier</i> , Phys. Rev. B 39, 6995-7002 (1989)
2042	RESERVED
2043	RESERVED
2044	RESERVED
2045	RESERVED

Exhibit	Description
2046	RESERVED
2047	RESERVED
2048	RESERVED
2049	RESERVED
2050	RESERVED
2051	RESERVED
2052	RESERVED
2053	Declaration of Caroline A. Ross, Ph.D.
2054	<i>Curriculum Vitae</i> of Caroline A. Ross, Ph.D.
2055	U.S. Application No. 10/824835 File History (Partial)
2056	Citations to Butler: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C22&q=Butler+et+al.%2C+Spin-dependent+tunneling+conductance+of+Fe%7CMgO%7CFe+sandwiches%2C+63+Phys.+Rev.+B+054416+%282001%29&btnG=
2057	Citations to Soukup: https://scholar.google.com/scholar?hl=en&as_sdt=0%2C22&q=Soukup+et+al.%2C+Voltage-Current+Characteristics+for+Electrical+Conduction+Through+Thin+MgO+Films%2C+41+J.+Appl.+Phys.+3229-+3236+%281970%29&btnG=
2058	Errata to EX2013 - Deposition of Jeffrey Bokor, Ph.D. (June 24, 2025)
2059	Errata to EX2014 - Deposition of Jeffrey Bokor, Ph.D. (June 25, 2025)
2060-2071	RESERVED

Exhibit	Description
2072	EX2024 - The 23rd (FY2022) Japan Society of Applied Physics Achievement Award Recipients (with English translation), The Japan Society of Applied Physics, https://www.jsap.or.jp/outstanding-achievementaward/recipients/recipients23 with Amended Certification of Translation [SUPPLEMENTAL EVIDENCE - NOT FILED]
2073	Certified English Translation of EX2029 - AIST wins three Science and Technology Awards in the 2016 Minister of Education, Culture, Sports, Science and Technology Commendation for Science and Technology, <i>available at</i> https://www.aist.go.jp/aist_j/news/prize/pr20160412_3.html [SUPPLEMENTAL EVIDENCE - NOT FILED]
2074	Certified English Translation of EX2032 - AIST, “Winner of the 20th Tsukuba Award,” <i>available at</i> https://www.aist.go.jp/aist_j/news/prize/itemid025-000077.html [SUPPLEMENTAL EVIDENCE - NOT FILED]
2075	Certified English Translation of EX2034 - AIST: 34th Inoue Harunari Prize, <i>available at</i> https://www.aist.go.jp/aist_j/news/prize/itemid025-000082.html [SUPPLEMENTAL EVIDENCE - NOT FILED]
2076	RESERVED
2077	RESERVED
2078	Declaration of Dara Del Rosario [SUPPLEMENTAL EVIDENCE - NOT FILED]
2079	Transcript of October 24, 2025 Board Conference Call
2080	RESERVED
2081	RESERVED
2082	RESERVED
2083	RESERVED

Exhibit	Description
2084	RESERVED
2085	Transcript of Deposition of Jeffrey Bokor, Ph.D. (Oct. 30, 2025)
2086	Transcript of Deposition of Jeffrey Bokor, Ph.D. (October 31, 2025)
2087	Sur-Reply Declaration of Caroline A. Ross, Ph.D.
2088	Errata to EX2085 - Deposition of Jeffrey Bokor, Ph.D. (Oct. 30, 2025)
2089	Errata to EX2086 - Deposition of Jeffrey Bokor, Ph.D. (Oct. 31, 2025)

I. NEW REPLY ARGUMENTS SHOULD BE STRUCK

Ignoring facts does not erase them. Petitioner ignores, and thus never refutes, that the Petition's sole argument as to *why* POSAs seeking increased TMR allegedly would have lowered barrier height was that "*lowering the resistance* (barrier height) *for parallel electrons (R_p) would improve TMR.*" Petition, 34; Paper 9 ("DI"), 14 and 17-18 (*the Board recognized this*); Paper 29 ("Mot."), 2. The Board can read the handful of relevant Petition pages for itself. If the Board again correctly sees that the Petition's "contention" was that POSAs would have lowered barrier height to "lower R_p and in turn *increase the TMR*" (DI, 18), that is fatal to Petitioner's assertion that the Reply's motivation arguments are not new.

The Opposition ("Opp.")'s focus on Bokor testimony (Opp., 3-6) attempts to distract from the *Petition*'s argument which is all that matters. 37 C.F.R. §42.6(a)(3) (incorporation by reference prohibited). But even Bokor's testimony *confirms* the Reply's arguments are new. Petitioner misleadingly seeks to connect disparate declaration testimony—100 paragraphs apart—to suggest Bokor said Butler was the basis for his opinion that lowering barrier height would facilitate tunneling of parallel electrons. Opp., 3 (*citing* EX1024, ¶68 and ¶171). Petitioner mischaracterizes ¶171. After explaining TMR in ¶169, Bokor alleged lowering barrier height would "facilitate tunneling of parallel electrons." EX1024, ¶171. Resistance and tunneling conductance are inversely related. EX2086, 71:12-16;

EX2053, ¶33. Thus, Bokor's assertion that lowering barrier height would allegedly "*facilitate tunnelling of parallel electrons*" simply restates the *Petition's* failed argument that lowering barrier height would "*lower[] the resistance...for parallel electrons.*" Pet., 34. Indeed, while Petitioner misleadingly omits it, ¶171 alleges lowering barrier height would "*increase* TMR." That is the *Petition's* failed argument that it is undisputed is not supported by any evidence. POR, 31-43.

Petitioner's assertion that the Reply and Petition both argued POSAs were motivated "to explore lower barrier heights" (Opp., 2-5) ignores that the reasons *why* were different. Petitioner's assertion that the Reply's theory that POSAs were motivated to achieve an "uncertain" impact on TMR "is precisely the theory articulated in the Petition" *never cites the Petition*. Opp., 7. That is because the Petition never argued that an "uncertain" impact on TMR was "legally sufficient motivation." Reply, 7. Petitioner's suggestion that by arguing in the Petition that lowering barrier height would improve/increase TMR what Petitioner really meant was that POSAs would have thought this would have an "uncertain" impact on TMR so there was a 50/50 shot TMR would improve (Mot., 3-4) strains credibility.

Petitioner's allegation that the Petition said Butler was the motivation for lowering barrier height fares no better. Petitioner omits the Petition's argument of *why* POSAs allegedly would have lowered barrier height – to "improve TMR" (Pet., 34) – and starts with the Petition's explanation that Butler/Mathon theorized

that MgO's "improved symmetry matching" would increase TMR. Opp., 7. The Petition relied on "Butler *and Mathon*" for these same "symmetry matching" teachings. Petition, 34. That this argument alleged nothing about barrier height is reinforced by (1) Bokor's admission that Butler never mentions barrier height (EX2086, 65:15-66:3); (2) the Reply needing to resort exclusively to portions of Butler not cited in the Petition to make this argument (Mot., 5-7; Reply, 14-15 (citing "data" and the "DOS" and "Fermi" level in Butler Figs. 3-4)); and (3) the Reply never arguing that *Mathon* taught lowering barrier height to increase TMR.

Butler's Petition-cited teaching that MgO's "symmetry matching" would increase parallel vs antiparallel tunneling is not the same argument as the Reply's allegation that Butler said moving the Fermi level *might* (it was "uncertain") also achieve that *result*. Opp., 8-9. By definition, TMR increases if parallel tunneling increases relative to antiparallel tunneling. EX2053, ¶33. Butler's "symmetry matching" achieves this *result* by using MgO which couples with *d₁ state electrons* that are present in the electrodes only in the parallel configuration. POR, 12-14; Butler, 1. The Reply's assertion that Butler says lowering barrier height *might* also achieve the same *result* (increased TMR) a *different way* is a different argument.

The Petition must state its grounds with "*particularity*" and "*must* include ... [a] *full statement* of the reasons for the relief requested, including a *detailed explanation* of the significance of the evidence." 35 U.S.C. §312(a)(3); 37 C.F.R.

§42.22. Those requirements prevent Petitioners from leveraging alleged ambiguity in the Petition to change course and offer a different unpatentability theory after the Petition’s theory is proven deficient. *Wasica Finance GmbH v. Cont’l Auto. Sys.*, 853 F.3d 1272, 1286–1287 (Fed. Cir. 2017). The Board should not allow it.

II. NEW EVIDENCE SHOULD BE STRUCK

Cases finding it proper reply to cite additional evidence supporting the *petition*’s arguments (Opp., 5, 7-8) are inapposite because the Reply cites new evidence to make a meaningfully distinct contention. Mot., 1-8 (citing *Ariosa*). That *Ariosa* principle is not limited to evidence of a new “embodiment.” Opp., 9. EX1105-EX1106 should be struck. As for the EX2013-EX2014, Rule 42.64 is inapposite because IPB is not challenging “admissibility.” IPB timely moved to strike some Bokor deposition testimony when cited in “briefing” (the Reply) to support a new argument. Mot., 7-8. IPB citing cross-examination testimony does not authorize new Reply arguments unveiled by Bokor at deposition. *Id.*

III. PETITIONER FAILS TO REFUTE PREJUDICE

The Reply arguments should be struck because they are clearly new and IPB would be prejudiced from having to address them at oral hearing (Mot., 1-10), not because their “merits” are weak. Opp., 9. Butler needing to be discussed at the oral hearing “anyway” (Opp., 1) ignores that the “uncertain” argument should be struck independent of Butler. Mot., 3-4. Paper 31 (“Sur-reply”) illustrates the prejudice:

half that paper was needed to address Petitioner’s new arguments based on Butler’s “data,” “DOS” and “Fermi” levels in Figs. 3-4. Sur-reply, 7-18. The Board will need to rule on whether these Reply arguments are new at some point. If the Board rules before oral hearing and strikes them, this “complicated” subject matter need not be addressed at oral hearing. EX2013, 72:8-25 (Bokor had a “hard time” understanding Butler because it is “pretty complicated”). The sur-reply declaration does not “moot” the Motion. Opp., 10. Petitioner never refutes that they serve different purposes. Mot., 8-9. *Apple* and *Life Spine* (Opp., 10) are inapposite—the Board did not strike arguments in those cases because they were *proper* reply.

Petitioner never disputed that its new arguments rest on Bokor’s unreliable testimony. Mot., 9-10; Sur-reply, 11-17; EX2087. Bokor moves Butler’s Fermi level despite admitting it is not that “simple” (EX1105, ¶11) and that a new model would be needed that he and POSAs lacked the expertise to make. EX2086, 56:4-15, 60:16-61:7. Bokor did not understand Butler’s details and could only “trust” its “bottom line conclusions” (*id.*, 46:18-48:16), yet opined that Butler teaches a TMR/barrier height relationship he admitted Butler never “explores” (EX2013, 71:22-72:7). Bokor finds in Butler teaching of an “uncertain” TMR/barrier height relationship Bokor cannot explain (*id.*) and that no one has ever seen despite Butler having been cited thousands of times. Sur-reply, 12. Devoting oral hearing time to entertaining this clearly new baseless theory is not warranted. It should be struck.

Respectfully submitted,
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Date: November 21, 2025

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CERTIFICATE OF SERVICE UNDER 37 C.F.R. § 42.6 (e)(4)

I certify that on November 21, 2025, a copy of the foregoing document, including any exhibits filed therewith, is being served via electronic mail, as previously consented to by Petitioner, upon the following:

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