

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

RJ TECHNOLOGY, LLC,
Patent Owner.

Case: IPR2023-01183
U.S. Patent No. 7,749,641

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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PETITIONER’S EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 7,749,641 to Ren, et al.
1002	Declaration of Marc Juzkow
1003	Prosecution History of U.S. Patent Application No. 10/491,134 as obtained from the USPTO Patent Center
1004	Prosecution History of U.S. Patent Application No. 12/817,028 as obtained from the USPTO Patent Center
1005	JPH10189052 to Abe et al. (including Declaration of Yoshiko Ishikawa and translation) (“Abe”)
1006	B. Kennedy, et al., <i>Use of lithium-ion batteries in electric vehicles</i> , J. Power Sources 90, pp.156-162 (2000).
1007	U.S. Patent No. 6,577,105 to Iwaizono (“Iwaizono”)
1008	PCT Publication No. 93/21665 to Guyomard (“Guyomard”)
1009	U.S. Patent Application Publication No. 2002/0012830 to Uemura et al. (“Uemura”)
1010	Seiko Instruments, Inc., Battery Protection IC S-8491 Series.
1011	U.S. Patent No. 5,871,863 to Miyasaka
1012	G. Au, et al., <i>Performance of the Sony Lithium-Ion Rechargeable Battery</i> , Army Research Laboratory, ARL-TR-71 (DTIC Selected Mar. 16, 1994).
1013	U.S. Patent No. 5,721,067 to Jacobs et al.
1014	Proof of Service in <i>RJ Technology, LLC v. Samsung Electronics Co., Ltd.</i> , No. 2:22-cv-00401-JRG-RSP, Dkt. 8 (Oct. 18, 2022)
1015	D. Guyomard, et al., <i>Li Metal-Free Rechargeable LiMn2O4/Carbon Cells: Their Understanding and Optimization</i> ,

Exhibit No.	Description
	J. Electrochem Soc., Vol. 139, No. 4, pp.937-948 (Apr. 1992).
1016	Exhibit A to the Parties' Joint Claim Construction and Prehearing Statement filed in <i>RJ Technology, LLC v. Apple Inc.</i> , No. 8:22-cv-01874-JVS-JDE, Dkt. 67-1 (May 31, 2023).
1017	Exhibit A-138 to Plaintiff's Infringement Contentions in <i>RJ Technology LLC v. Samsung Electronics Co., Ltd.</i> , No. 22-cv-00401.
1018	U.S. Patent No. 5,853,914 to Kawakami
1019	U.S. Patent Application Publication No. 2003/0118912 A1 to Watanabe et al.
1020	U.S. Patent No. 6,872,491 to Kanai et al.
1021	U.S. Patent No. 6,926,992 to Isozaki et al.
1022	U.S. Patent No. 6,800,399 to Matsumoto
1023	U.S. Patent No. 5,618,640 to Idota et al.
1024	The $\text{Li}_{1+x}\text{Mn}_2\text{O}_4/\text{C}$ Rocking-Chair System: A Review, <i>Electrochimica Acta</i> , Vol. 38, No. 9, pp.1221-1231 (1993).
1025	J.R. Dahn et al., Rechargeable $\text{LiNiO}_2/\text{Carbon}$ Cells, <i>J. Electrochem. Soc.</i> , Vol. 138, No. 8, pp.2207-2211 (Aug. 1991)
1026	RESERVED
1027	RESERVED
1028	RESERVED
1029	RESERVED
1030	RESERVED
1031	Plaintiff RJ Technology LLC's Proposed Claim Constructions, <i>RJ Technology LLC v. Apple Inc.</i> , No. 8:22-cv-1874-JVS-JDE,

Exhibit No.	Description
	Dkt. 69-7 (Jun. 23, 2023).
1032	Plaintiff RJ Technology LLC's Opening Claim Construction Brief in <i>RJ Technology, LLC v. Apple Inc.</i> , No. 8:22-cv-1874-JVS-JDE, Dkt. 70 (Jun. 23, 2023).
1033	Proposed Protective Order
1034	Redline Comparison of Proposed Protective Order vs. Board's Default Protective Order
1035	Redacted Version of Sealed Petition
1036	Declaration of Jeffrey Colin
1037	Comparison of EX2022, ¶18 and EX2006, ¶49
1038	Plaintiff RJ Technology LLC's Opening Claim Construction Brief in <i>RJ Technology, LLC v. Apple Inc.</i> , No. 8:22-cv-1874-JVS-JDE, Dkt. 70 (Jun. 23, 2023).
1039	Exhibit 3 to RJ Technology LLC's Responsive Claim Construction Brief in <i>RJ Technology, LLC v. Apple Inc.</i> , No. 8:22-cv-1874-JVS-JDE, Dkt. 74-5 (Jul. 14, 2023).
1040	Kajiyama et al., "Layered Li-Co-Mn Oxide as a High-Voltage Positive Electrode Material for Lithium Batteries," J. of the Electrochemical Society, 148 (9) A981-A983 (2001)
1041	Transcript of the <i>Markman</i> hearing in <i>RJ Technology, LLC v. Apple Inc.</i> , No. 8:22-cv-1874-JVS-JDE, Dkt. 91 (Jul. 31, 2023).
1042	Transcript of Dr. Yanliang Liang, Ph.D., dated July 2, 2024
1043	Transcript of Dr. Yan Yao, Ph.D, dated August 8, 2024
1044	Reply Declaration of Marc Juzkow
1045	Jang et al., "Stabilization of LiMnO ₂ in the α -NaFeO ₂ Structure Type by LiAlO ₂ Addition," Electrochemical and Solid-State Letters, 1(1) 13-16 (1998) ("Jang")

Exhibit No.	Description
1046	Ammundsen et al., “Formation and Structural Properties of Layered LiMnO ₂ Cathode Materials,” J. of the Electrochemical Society, 147 (11) 4078-4082 (2000) (“Ammundsen”)
1047	Ceder et al., “Identification of cathode materials for lithium batteries guided by first-principles calculations,” Nature, Vol. 392, 16 April 1998, 694-695 (“Ceder”)
1048	Exhibit A-3 to RJ Technology’s Disclosure of Asserted Claims and Infringement Contentions in <i>RJ Technology LLC v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.</i>
1049	RESERVED
1050	Declaration of Dr. Yan Yao in Support of RJ Technology LLC’s Responsive Claim Construction Brief in <i>RJ Technology, LLC v. Apple Inc.</i> , No. 8:22-cv-1874-JVS-JDE, Dkt. 74-1 (Jul. 14, 2023).

The Petition proves that certain challenged claims are unpatentable over Uemura and Abe alone and other challenged claims are unpatentable over those references in combination with Guyomard and Iwaizono. PO's attempt to show otherwise is predicated on its efforts to reinterpret claim constructions that it successfully advanced in district court. PO's efforts to reconstrue its constructions in a manner that is at odds with PO's own prior characterizations of the intrinsic evidence should be rejected and the claims should be found unpatentable.

PO persuaded the *Apple* court that a "charge cut-off voltage" is a "charging voltage" that is applied to the battery as confirmed by the intrinsic evidence. PO repeatedly equated the "charge cut-off voltage" with a charging or applied voltage in litigation. In an effort to distinguish Uemura and Abe, PO now says the charge cut-off voltage is not the charging voltage, but instead some internal voltage of the battery after charging. PO cites no intrinsic evidence to support its current position and the intrinsic record contradicts it.

PO also seeks to reconstrue its construction of the capacity ratio limitations. PO persuaded the *Apple* court that the patent expressly defined the phrase "theoretic capacity" to mean "capacity," and "the fact that the *patent defines it by dropping the word 'theoretical' tells you that the construction shouldn't have that word [theoretical] reinstated.*" EX1041, 20:5-8. But PO's arguments now seek to do just that and reincorporate the concept it convinced the district court was removed by the

definition PO found in the specification. Under the construction that both parties say should apply here, the prior art discloses the claimed capacity ratio.

PO's further efforts to disqualify Uemura as prior art on enablement grounds fall flat. One iteration of testing, by someone who has never tried to make inorganic layered battery materials, of several examples from Uemura without following Uemura's directions does not meet PO's burden to prove a need for "undue" experimentation.

As detailed below, PO's patentability arguments fail to squarely address its own claim constructions, the teachings of the prior art, and the evidence and arguments presented in the Petition. Therefore, Petitioner submits that the Board should find all challenged claims unpatentable.

I. PO OFFERS NO REBUTTAL TO THE PATENT OFFICE'S FINDING THAT CHARGE CUT-OFF VOLTAGES OVER 4.2V WERE KNOWN

After considering Guyomard, a 1993 publication that discloses $\text{Li}_{1+x}\text{Mn}_2\text{O}_4$ cells that were cycled at charge cut-off voltages of 4.9V and 4.5V and retained about 90% of their capacity after 500 cycles (EX1008, 8:23-9:8), the Patent Office concluded PO's argument that raising the cutoff voltage above 4.2V provided results that were "wholly unforeseen by the art *is not true*." EX1004, p.66 (emphasis added). Yet PO continues to argue that "conventional wisdom" taught away from a charge cut-off voltage over 4.2V and that no motivation to combine Uemura or Abe

with Guyomard existed. *See* POR, pp.1-2, 8-10, 21, 58-59, 63-65. But the intrinsic evidence, the art in the Petition, and even references cited in the POR¹ uniformly demonstrate that PO's assertions about cut-off voltages above 4.2V are "not true" for a wide range of battery materials the claims encompass, including manganese-containing cathode materials.

II. PO'S SHIFTING CLAIM CONSTRUCTION POSITIONS ARE UNSUPPORTED AND INCORRECT

PO's claim construction positions are inconsistent with those that it has taken in litigation. PO's inconsistencies warrant rejecting its most recent iteration on the meaning of the claims.

A. Charge cut-off voltage

- 1. PO's argument that the cutoff voltage cannot be a voltage applied to the battery contradicts the intrinsic evidence.*

PO's present argument that a "charge cutoff voltage" is "different than the

¹ *E.g.*, EX2009, p.501 ("the electrolyte was stable in contact with this [LiMnO₂] electrode up to at least 4.4V"); EX2017, p.40 (charging and discharging a Li_xCo_{0.5}Mn_{0.5}O₂ cell "in a voltage range between 3.5 and 5.2V"); EX2023, p.3653, Table I (showing LiMn₂O₄ cathodes charged to voltages above 4.3V); EX2030, ¶33 (citing several references disclosing charge cut-off voltages greater than 4.2V); EX2039, Abstract (cycling LiMn_{0.7}M_{0.3}O₂ cells between 2-4.4V).

voltage applied to the battery during charging,” *i.e.*, the “applied voltage” or “charging voltage” is contrary to the intrinsic evidence *as PO interpreted it* in litigation. POR, pp.18-21, 27-34; EX2006, ¶¶83-96. Tellingly, PO cites no intrinsic evidence to support its construction and its expert admits as much. POR, pp.18-21, EX1043, 67:12-69:7. The ’641 patent contradicts PO’s argument that the charge cutoff voltage is “not the externally applied voltage at which a battery is charged.” POR, 21. According to the patent, a “charging device ***controls the charge cut-off voltage*** of the ... cell within a range from 4.3V to 5.8V.”² EX1001, 9:49-55; *id.*, 3:45-50 (same), 4:26-37 (“cell[s] having the adjusted ratios were tested by ***charging at a charge cut-off voltage of*** 4.45V, 4.6V...”). The “charge cut-off voltage” is something that is “used” according to the patent—not some intrinsic property of the battery. *E.g.*, *id.*, 4:45-46, 10:33-37 (“using an [sic] charge cut-off voltage”), 10:45-49 (same), 10:57-61, 11:13-16, 11:23-26, 11:44-49, 11:56-61. Under PO’s view of its own construction, a charging device would be unable to control the charge cut-off voltage. Nor would the cut-off voltage be something that is “used.”

Furthermore, PO’s argument cannot be correct because examples 14 and 15 are identical batteries with different charge cut-off voltages, thus showing that the cut-off voltage is not a property intrinsic to the battery design:

² Emphasis added unless otherwise indicated.

TABLE 2

Example	Charge cut-off voltage (V)	Processing change	Recycle property	Capacity (mAh)
14	4.20	—	Maintaining 84.23% after 400 recycles	375
15	4.30	—	Maintaining 85.12% after 400 recycles	405

EX1001, 12:58-13:59; *id.*, 14:28-53 (examples 19-20).

PO recently knew the intrinsic evidence contradicted the position it now takes. It previously argued that the intrinsic evidence confirms that the “maximum voltage to which the battery is configured to be charged”—*i.e.*, the cut-off voltage—is a “charging voltage”:

- The specification “refers to the **charging voltage** maximum” (EX1032, p.12);
- The prosecution history shows “the inventors distinguished a prior art reference by arguing that the reference ‘shows that the cycle property of a cell drastically decreases when the **charging voltage increases beyond 4.2V**’” (*id.*, p.13); and
- “*The Examiner understood the term the same way*, using charge cutoff voltage . . . *synonymously with charging voltage*” (*id.*).

PO also contended that the extrinsic evidence was in accord: “the 4.2 V limit was a **maximum charging voltage**” (*Id.*, pp.13-14). The district court agreed that the ’641 patent claims discuss “setting a particular charge cut-off voltage.” EX2010,

p.15.³

Accordingly, the Board should reject PO's attempt to engraft an implied limitation on the construction of "charge cutoff voltage" that would limit it to an internal property of the battery as opposed to the voltage to which the battery is designed to be charged as applied to the battery.

2. *"Charge cutoff voltage" does not, by itself, require a full- or half-cell voltage and thus context must be considered*

The claimed "charge cutoff voltage" does not necessarily imply a full-cell voltage. PO's position that it refers to "the voltage of the battery as a whole" should thus be rejected. POR, pp.22-23. Instead, the claims say when the charge cutoff voltage relates to the battery. Claim 5 uses "cut-off voltage" twice. In one case it states "***the secondary lithium ion cell or battery has*** a charge cut-off voltage" and in the second case it states that the claimed ratio is "calculated by a theoretic capacity ***with*** a charge cut-off voltage set at 4.2V." Interpreting "charge cut-off voltage" as referring to the "voltage of the battery as a whole," as PO posits, would render the phrase "the secondary lithium ion cell or battery has" superfluous. That

³ PO's infringement contentions further show it has equated "charging voltage" with the "charge cutoff voltage." EX1048, p.4 (referring to regulation of charging using circuits and/or software "such that the charge cut-off voltage received in the claim is within the claimed range" and identifying a "charging voltage of 4.47V").

interpretation is disfavored. *Akzo Nobel Coatings, Inc. v. Dow Chem. Co.*, 811 F.3d 1334, 1340 (Fed. Cir. 2016).

PO's position is also contrary to the specification, which reveals that a half-cell is used to determine the capacity of *an electrode* at a charge cutoff voltage, as admitted by Dr. Yao. EX1001, 1:64-2:30; EX1043, 94:14-21. The patent inventors similarly disclosed that the capacity ratio is based on electrode capacity relative to metallic lithium—not the battery's anode. EX1039, p.4. Dr Yao's prior declaration admitted the inventors' statement "is consistent with my reading of the claims in the '641 patent." EX1050, ¶8. Dr. Yao admits that electrode capacities are determined using half-cells, and that the capacity ratio is determined using a half-cell. EX2006, ¶95; EX1043, 79:21-80:11, 96:2-9.

Thus, "charge cut-off voltage" does not require a full-cell voltage—particularly for the capacity ratio limitation.

B. Capacity ratio limitation

PO does not dispute that it convinced the *Apple* court to omit the word "theoretic" from the construction of the ratio limitation or that the court's construction merely requires "capacity"—however determined. Yet, now, PO argues that "theoretic" must be read *back into* the construction it successfully advocated should not be limited to that concept. Thus, while PO purports to apply the construction it successfully argued for in court (POR at 23), it applies a narrower

construction in its POR by reading “theoretic” into its own construction. POR, pp.24-26, 34-40, 59-62; EX2006, ¶¶100, 113-114, 132-138, 203-204; EX1043, 121:11-19. PO’s interpretation of its construction conflicts with the *Apple* court’s claim construction—and the one it purports to adopt in this proceeding—because any capacity measured at 4.2V is a “capacity.” Dr. Yao agrees because he admitted that “[p]ractical specific capacity” is a “type[] of specific capacity for an electrode.” EX2006, ¶104; EX1043, 134:14-16.

PO repeatedly argued in court that “theoretic” should not be included in the construction of the ratio limitation because, according to PO, “theoretic capacity” *was defined in the specification*:

- “the patent specification expressly defines theoretical capacity to mean *the capacity* at 4.2V: ‘theoretical capacities of the positive and negative electrode’ means *the capacities of the positive electrode and the negative electrode ...*” (EX1032, p.18 (citing EX1001, 4:5-9));
- “the claim expressly provides that the capacity is *measured ‘at 4.2V’*.” (*Id.*, pp.20-21);
- “the fact that the *patent defines it by dropping the word ‘theoretical’* tells you *that the construction shouldn’t have that word reinstated*, again, which doesn’t add clarity” (EX1041, 20:5-8);
- “in this patent, when we say ‘theoretical capacity,’ *we mean capacity at that*

voltage.” (*Id.*, 23:10-15; *see also* EX2022, ¶¶37-40, 47).

PO prevailed on its argument and “theoretical” was omitted from the *Apple* court’s construction. Now, PO tries to “reinstate” that word—just as it told the district court it shouldn’t do. The Board should hold PO to what it said and prevailed on before. Indeed, PO should be judicially estopped from taking its current position because it is (1) clearly inconsistent with its litigation position, which was adopted by the court, and would result in PO gaining an unfair advantage by pivoting from its own construction in this proceeding to the detriment of Petitioner, which relied on PO’s successful construction arguments. *Cf. Sonos Inc. v. Implicit, LLC*, IPR2018-00766, 2023 Pat. App. LEXIS 3124, at *12 (Sep. 19, 2023) (applying judicial estoppel in IPR). And, because PO is not applying the construction it purports to be applying, its arguments about the capacity ratio limitation are flawed.

Because PO failed to apply its own construction here and contradicts its own prior characterization of the intrinsic evidence, its arguments about the capacity ratio limitation should be rejected. *Petroleum Geo-Services Inc. v. WesternGeco LLC*, 2016 Pat. App. LEXIS 7577, at *30 (Jul. 11, 2016) (PO’s assertions “rely mainly upon an incorrect claim construction, and therefore, are not persuasive”). PO consistently applies this flawed construction in addressing all grounds, thus tainting its analysis.

III. PO'S EXPERT DECLARATIONS ARE UNSUPPORTED, CONCLUSORY, AND SHOULD BE GIVEN MINIMAL WEIGHT

A. Dr. Yao's Declaration is Largely Unsupported, Contradicted By His Previous Sworn Testimony and the Intrinsic Evidence, and Should Be Afforded Little Weight

Large sections of Dr. Yao's declaration lack evidentiary support (*see, e.g.*, EX2006, ¶¶37-52, 55, 57, 83-96, 100-111, 137-143, 155-174, 180-186). At his deposition, Dr. Yao explained that such information was known to a POSITA and need not have been cited. *E.g.*, EX1043, 69:8-72:7, 96:10-20, 136:10-22, 128:22-130:6, 139:8-140:19. But Dr. Yao's previous declarations, as well as the intrinsic evidence, contradict his new unsupported positions on the charge cutoff voltage and capacity ratio limitations. *Supra* §II. Because Dr. Yao can't keep his story straight and his current story is contrary to the intrinsic evidence his declaration should be given minimal weight.

B. Dr. Liang's Testing Is Unreliable

Dr. Yao and PO rely on unreliable testing by Dr. Liang to contend that Uemura is not enabled. Dr. Liang conducted only one set of experiments and did not follow Uemura's directions. EX1042, 112:5-113:12; EX1044, ¶¶17-19, 28-43. Then, Dr. Liang did a second set of experiments *further deviating from Uemura*. Dr. Liang has no expertise in synthesizing inorganic cathode materials and admittedly has never previously attempted to synthesize layered materials comprising lithium and manganese. EX1042, 44:5-9, 45:10-46:7. That he tried once, failed to follow the

prior art, and failed to produce Uemura's materials is not particularly surprising. What is surprising, however, is that Dr. Yao chose to rely on this testing performed by his own company—LiBeyond—conducted by its co-founder and co-owner, Dr. Liang—without disclosing this relationship. In fact, Dr. Liang and Dr. Yao have a close, undisclosed relationship in that not only are they co-owners of LiBeyond, but Dr. Yao was Dr. Liang's "Ph.D. advisor," and is a "long-time colleague," co-author on "a number of papers," and "co-inventor[] on a number of patents." EX1042, 30:10-31:8, 32:19-38:2. That Dr. Yao would have his own company hired to do the testing and then not disclose that fact to the Board indicates that Dr. Yao is not being candid.

IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Uemura Anticipates and Renders Obvious Claims 1-8 (Grounds 1-2).

Claims 1-8 are unpatentable under the appropriate claim constructions.

1. Uemura discloses the charge cut-off voltage limitations

Uemura meets the charge cut-off voltage limitations of the claims as properly construed because it describes 4.3V as the maximum voltage to which the disclosed batteries are configured to be charged. Uemura explains that charging and discharging the cells was performed using a constant current to "a voltage ranging from 4.3V to 2.0V," meaning that the battery was charged "to" a maximum voltage of 4.3V. EX1009, ¶¶0081]; EX1044, ¶¶56-59. Indeed, under the proper construction

of “charge cut-off voltage,” PO concedes that Uemura teaches this limitation. POR, p.13 (“Uemura teaches an externally applied voltage as high as 4.3V”). But Uemura discloses this limitation even under PO’s proposed construction because a POSITA would have understood that “4.3V to 2.0V” refers to the voltage of the battery at the fully charged and discharged states of the battery—and not some property of the charging system. EX1044, ¶60.

Moreover, PO’s application of Uemura to the claims is contrary to its litigation positions. In litigation PO explained that “Constant Current (CC)” charging is a regime in which “[t]he battery is charged at a constant current *until it reaches the charge cut-off voltage.*” EX1032, p.9. As Dr. Yao admits, “[o]nce *the battery* reaches a predetermined voltage (*i.e., the charge cut-off voltage*), the charging stops.” EX2022, ¶33; EX1050, ¶4 (“the voltage at which the charging switches to constant voltage in CC/CV is the charge cutoff voltage”); EX2010, p.9. Consistent with PO’s understanding applied in litigation—but apparently jettisoned by PO in this proceeding—Uemura describes applying “constant current” until the battery reaches a “predetermined voltage”—i.e., 4.3V. EX1009, ¶[0081]. This is sufficient to meet the cut-off voltage limitations.

2. *Uemura discloses the capacity ratio limitations*

As discussed above in Section II.B, the claim construction both parties say they are applying, the intrinsic evidence, and PO’s litigation arguments confirm that

the capacity ratio limitations require only a “*capacity*” at 4.2V. The claimed ratio is disclosed in Uemura. As explained in the Petition, Uemura discloses a range of negative electrode material to positive electrode material of “1 to 1.5”—and justifies this ratio for the same reasons the inventors supposedly did. EX1009, ¶[0033]; EX1001, 4:57-5:15. Uemura’s examples also fall within the claimed range:

FIG.3

	Positive electrode material					Negative electrode material			Capacity balance Pc:Nc	Ic/Pc × 100(%) of cycles	Number of cycles	
	Used transition metal material	Composition of positive electrode material	X	Y	Weight (mg) : Pc (mAh)	Total capacity Weight (mg) : Nc (mAh)	Total capacity : Nc (mAh)	Total irreversible capacity : Ic				
Example 1	Cobalt(II) nitrate	$\text{Li}_{0.67}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_2 - \delta$	0.033	0.5	15	1.8	6.2	2.36	0.002	(1:1.3)	0.1	300
Example 2	Cobalt(II) nitrate	$\text{Li}_{0.83}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_2 - \delta$	0.17	0.5	15	2.24	6.2	3.41	0.44	(1:1.5)	20.0	330
Example 3	Cobalt(II) nitrate	$\text{Li}_{0.967}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_2 - \delta$	0.033	0.5	15	2.6	6.2	3.27	1.18	(1:1.3)	45.0	310
Example 4	Cobalt(II) nitrate	$\text{Li}_{0.967}\text{Mn}_{0.5}\text{Co}_{0.5}\text{O}_2 - \delta$	0.033	0.5	15	2.6	4.9	2.6	0.94	(1:1)	36.0	350
Example 5	Cobalt(II) nitrate	$\text{Li}_{0.75}\text{Mn}_{0.75}\text{Co}_{0.25}\text{O}_2 - \delta$	0.25	0.25	15	2	6.2	2.36	0.002	(1:1.3)	0.1	330
Example 6	Nickel(II) nitrate	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Ni}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	325
Example 7	Iron(III) nitrate	$\text{Li}_{0.83}\text{Mn}_{0.67}\text{Fe}_{0.33}\text{O}_2 - \delta$	0.17	0.33	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	245
Example 8	Aluminium(III) nitrate	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Al}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	310
Example 9	Chromium(III) nitrate	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Cr}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	350
Example 10	Gallium(III) nitrate	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Ga}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	120
Example 11	Indium(III) hydroxide	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{In}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	110
Example 12	Zirconium(IV) hydroxide	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Zr}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	95
Example 13	Vanadium(III) oxide	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{V}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	130
Example 14	Iron(III) oxide	$\text{Li}_{0.75}\text{Mn}_{0.875}\text{Fe}_{0.125}\text{O}_2 - \delta$	0.25	0.125	15	2	6.2	2.36	0.002	(1:1.3)	0.1	220
Example 15	Niobium(II) oxide	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Nb}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	190
Example 16	Tantalum(V) oxide	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Ta}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	180
Example 17	Titanium(IV) oxide	$\text{Li}_{0.83}\text{Mn}_{0.75}\text{Ti}_{0.25}\text{O}_2 - \delta$	0.17	0.25	15	2.24	6.2	2.36	0.002	(1:1.3)	0.1	250
Comparative example		$\text{LiMnO}_2 - \delta$	0	0	15	2.7	10	—	—	(1:1.3)	—	10

EX1009, Fig.3. PO does not dispute that the disclosure in Paragraph 33 or the examples meet the “at 4.2V portion” of the claim based on the reasoning in the Petition. Pet., pp.20-27.

Instead, PO applies a construction limited to “theoretic capacities” and asserts the values reported by Uemura are not “theoretic capacities.” POR, pp.34-35. While

PO seeks to exclude all measured capacities from the claims, it pulls capacity values from the literature that are themselves *experimentally measured* capacities *at 4.3V* and then uses them as if they were “theoretical” just because they were published in the literature. POR, p.36 (citing EX2009, p.500). PO does not acknowledge, let alone address, this paradox. Finally, Armstrong also teaches 270 mAh/g is an “initial charge” capacity (EX2009, p.500), yet PO argues that only the “reversible capacity of the active material (i.e., what should be used to calculate the claimed ratio)” is relevant. POR, pp.38-39. PO has not explained why it applies the initial capacity in its calculations when it says that value should not be applied. PO’s attempts to recalculate the ratios are not only irrelevant under the claim construction PO argued for and obtained in court, but are contrived and inconsistent with its own arguments.

To further manipulate Uemura’s capacity ratios, PO argues that “capacity” should not include “capacity attributable to non-carbon content” or “inactive material” to lower the capacity of the negative electrodes. POR, p.35. PO’s argument is unsupported by any intrinsic evidence, and it is well-known to a POSITA that “inactive” material—by definition—doesn’t provide or affect capacity. EX1044, ¶¶52-55.

Based on its manipulation of Uemura’s examples, PO argues that the claimed ratio of Uemura’s examples is under 1. However, PO focused solely on the examples of Uemura and failed to address Uemura’s explicit teaching of a range of capacity

ratios from 1.0–1.5 found in the text at paragraph 33. Uemura discloses that it is preferable to have a capacity ratio “fixed” within the claimed range for the same reasons advanced by the ’641 patent, thus confirming that Uemura does disclose the claimed ratio. EX1009, ¶[0033]; EX1001, 4:57-5:15. Indeed, if Uemura’s ratio was less than 1 as PO now says, Uemura would exhibit the very problems that Uemura says it resolved by fixing the capacity ratio to be between 1 and 1.5.

3. *Uemura is enabled*

To suggest that Uemura is not enabled, PO misapplies the law and relies on unreliable experiments conducted by Dr. Liang that did not even try to reproduce Uemura’s examples. EX1044, ¶¶17-43. Because the prior art is presumed enabling, and PO has not presented competent evidence that it is not, the Board should reject PO’s arguments about lack of enablement.

a. PO misapplies the law.

Even if PO had presented competent evidence that faithfully tried to reproduce Uemura’s examples and showed that it would take “undue” experimentation to do so (a matter which Petitioner disputes below), PO does not apply the correct legal inquiry. Instead, in an anticipation or obviousness inquiry, prior art references are presumed to be enabled. *In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012). A prior art reference “need not enable its full disclosure, but, instead, ***it only needs to enable the portions of its disclosure alleged to anticipate the claimed***

invention.” *Id.* at 1290.⁴

In this case, for anticipation or obviousness, Uemura must enable the subject matter of claims 1-8, not each example cathode material. Each of the claims concerns secondary lithium ion cells or batteries that have a charge cut-off voltage greater than 4.2V but less than 5.8V and a capacity ratio of 1:1.0 to 1:2.5. The Petition showed, and PO did not dispute, that Uemura discloses a rechargeable secondary lithium-ion battery. Pet., 16-17. Uemura discloses a charge cut-off voltage of 4.3V in Paragraph 81 (see Section IV.A.1) and a capacity ratio of 1-1.5. EX1009, ¶[0033]. But PO does not address the broader teachings of Uemura, including the capacity ratio description found in Paragraph 33—which PO admitted discloses an overlapping range with that recited in the claim.⁵ POPR, pp.26, 36-38.

⁴ See also *In re Morsa*, 803 F.3d 1374, 1377 (Fed. Cir. 2015) (“Enablement of prior art requires that the reference teach a skilled artisan-at the time of filing-to make or carry out what it discloses *in relation to the claimed invention* without undue experimentation” and “the reference *need only enable a single embodiment of the claim.*”).

⁵ While the POPR stated that the range of Uemura is “partially overlapping” with the claimed range but that the ranges are critical, the POR dropped that argument. POPR, pp.36-38.

None of the '641 Patent claims, nor the relevant disclosure in Uemura, requires specific cathode materials. Accordingly, PO misses the mark by attempting to establish that a few of Uemura's examples are not enabled. POR, pp.43-47. This fails to apply the correct legal standards and does not address Uemura's other teachings as they relate to the claims and are relied upon in the Petition.⁶

- b. Dr. Liang failed to follow Uemura's directions and, unsurprisingly, did not produce Uemura's materials.

Even if PO viewed enablement through the correct legal lens, the testing that Dr. Liang performed does not show non-enablement because Dr. Liang did not follow Uemura's directions and failed at his one attempt to reproduce several of Uemura's examples.

The POR calls Dr. Liang's testing "extensive" (POR, p.47), but this is, at best, an overstatement. Dr. Liang tried to reproduce three of Uemura's examples *only one time*.⁷ EX1042, 112:5-113:12, EX1043, 217:12-218:5. Dr. Liang did not follow

⁶ Dr. Yao asserted that the tested examples were "representative" of the other examples (EX2006, ¶147), but that assertion lacks basis and is incorrect. EX1044, ¶45. Indeed, Dr. Yao admitted that he ignored clear differences in the examples in making that assertion. EX1043, 242:21-244:13, 248:14-249:7.

⁷ Examples 3 and 4 of Uemura are the same electrode material in different quantities. EX2031, ¶¶16, 20, 25; EX1009, FIG. 3.

Uemura's instructions and instead added steps like annealing and disregarded others, like ensuring the proper particle size, applying significant pressure in forming the cathode, or applying heat to remove moisture. EX1044, ¶¶28-43. These changes would have been expected to impact the results. *Id.*, ¶¶31-32, 34, 36, 38, 40, 42-43. And, Dr. Liang made some odd choices—such as using a molybdenum electrode—that may have impacted his results. *Id.* Dr. Yao did not even address Dr. Liang's chosen deviations from Uemura.⁸ EX1043, 251:13-255:9.

Compounding the problem, Dr. Liang used no experimental control, so he cannot say whether his results are reliable. EX1044, ¶¶21-24. Once Dr. Liang was unsuccessful in his attempt to reproduce Uemura, he further modified Uemura's processes and tried one more time using a significantly difference process. EX1044, ¶23; EX2031, ¶29. The fact that Dr. Liang tried to reproduce Uemura only once, without an experimental control, and failed to follow Uemura's instructions, does not show undue experimentation would be required to produce Uemura's cathodes. EX1044, ¶¶17-43.

⁸ Dr. Liang testified that he never discussed the testing with Dr. Yao (EX1042, 32:22-33:5), but Dr. Yao testified that they did discuss the testing, but he felt no reason to disclose it to the Board. EX1043, 206:8-208:12. This further undermines the credibility of these witnesses.

While PO makes no effort to characterize the amount of experimentation that would be considered “undue,” one failed attempt that does not even faithfully follow the directions in the prior art cannot reasonably be enough. POR, p.47; EX2006, ¶¶153-161. Accordingly, PO has not established that undue experimentation would be needed to reproduce even the few example materials attempted by Dr. Liang, let alone the legally relevant disclosure found in Uemura.⁹

c. PO Mischaracterizes the State of the Art Regarding Production of Layered Lithium Manganese Materials.

PO argues that researchers have “consistently failed to produce layered LiMnO₂ ... with properties that would make it a suitable cathode material (e.g., adequate crystallinity)” using a coprecipitation method. POR, pp.44-45. However, there are numerous articles that rebut that assertion. EX1044, ¶¶46-51 (citing EX1045, EX1046, EX1047). For example, Ceder utilized a coprecipitation method to produce Li(Co,Al)O₂ cathodes that were cycled between 2.0-4.4V. EX1047,

⁹ Dr. Liang only tried to synthesize and test materials for four of the seventeen examples in Uemura. A prior art reference “need only enable a single embodiment of the claim.” *In re Morsa*, 803 F.3d at 1377 (emphasis added) (citing *Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373, 1381 (Fed. Cir. 2003)). Accordingly, even if the Board finds that the presumption of enablement of Examples 1-4 of Uemura is rebutted by PO, the presumption should remain in place for Examples 5-17.

pp.694-695. Ammundsen synthesized $\text{LiAl}_x\text{Mn}_{1-x}\text{O}_2$ and $\text{LiCr}_x\text{Mn}_{1-x}\text{O}_2$ compounds with a layer-type crystal structure using a solid-state route, and demonstrated that the materials retained over 90% of their capacity after 200 cycles with charging from 2.0V-4.4V. EX1046, pp.4078-4080, Fig. 5.

4. *A POSITA Would Not Disregard Uemura Based on Alleged “Serious and Obvious Errors”*

As discussed above, Uemura discloses a secondary lithium-ion battery with a charge cut-off voltage of 4.3V and a range of capacity ratios from 1.0-1.5 (EX1009, ¶¶[0033], [0081], [0103]), teaching all aspects of claims 1-8 even without consulting the examples of Figure 3. Thus, even if PO were correct about errors in Uemura’s Figure 3, these errors are irrelevant to whether Uemura discloses and/or renders obvious the capacity ratio limitation in its *text*—which is undisputed.¹⁰ This sets this case apart from *LG Elecs. Inc. v. Immervision, Inc.*, 39 F.4th 1364, 1367, 1372 (Fed. Cir. 2022), which observed that LG “did not rely on any other...portion of [the reference’s] disclosure for this limitation” and that “[t]he remainder of the reference

¹⁰ The POR does not address whether Uemura and/or the combination of Uemura and Guyomard disclose the cycling limitations. Even if the Board found that Uemura does not enable the cycling limitations, there is no question that the combination of Guyomard and Uemura disclose the cycling limitations for the undisputed reasons discussed in the Petition. Pet., pp.28-34.

would remain pertinent prior art.”

Moreover, unlike in *LG Elecs.* where the experts agreed there was an error (*id.* at 1371), there is a dispute about whether portions of Figure 3 are both erroneous and result in a material difference. As Mr. Juzkow opined, there appear to be some minor calculation errors in the table (EX1002, p.78), however, that does not detract from the reported capacities or cycling values or bring them outside the claimed ranges; the values are consistent with the other portions of Uemura that describe a capacity ratio between 1–1.5 and high cyclability. EX1009, ¶¶[0033], [0040]-[0041], [0102]-[0103]; EX2008, 180:1-10.

PO asserts that Uemura “reports that its total cathode capacities were experimentally determined. EX1009, ¶81” (POR, p.48), but that paragraph doesn’t even mention capacity.¹¹ Indeed, both experts believe Uemura’s capacities are calculated based on Figure 3. EX2008, 163:18-166:13, 169:16-174:4; EX2006, ¶¶163-167, n.68 (“Uemura *calculates* the specific capacity”); EX1043, 183:13-184:12; POR, pp.51-52. PO’s arguments that the capacities look too uniform to be measured (POR, pp.48-50), lacks merit because there is agreement that they are calculated values.¹²

¹¹ PO does not assert that there are any apparent errors on the cycling data.

¹² PO asserts that the molar amount of lithium for each example should be multiplied

B. Claims 9-18 Are Obvious Over Uemura Alone or in View of Guyomard, Iwaizono, or Guyomard and Iwaizono (Grounds 3-4, 8-9)

PO provided no substantive response to Grounds 3-4, 8-9. Accordingly, for the reasons discussed in the Petition and here, Claims 9-18 are obvious. Pet., pp.28-34.

C. Abe Anticipates and/or Renders Obvious Claims 1-8 (Grounds 5-6)

PO's arguments against the Abe-based grounds are predicated entirely on its flawed views of the "charge cut-off voltage" and the capacity ratio limitations. Under the proper view of PO's litigation constructions, Abe anticipates and/or renders obvious claims 1-8.

1. Abe Teaches a Charge Cutoff Voltage of 4.2–4.3V

The POR mischaracterizes Abe by asserting it only discloses a charge cutoff voltage of 4.2V-4.3V for a *half-cell* with metallic lithium. POR, 54-55. Abe describes a secondary lithium-ion battery with a "vapor-phase-grown carbon fiber negative electrode" and a LiMn_2O_4 cathode:

The predetermined voltage is 0 V at the vapor-phase-grown carbon fiber negative electrode, and at the positive

by the same specific capacity to determine "theoretic capacity" at 4.2V (POR, pp.36-37; EX2006, ¶¶134-138), but criticizes Uemura because Uemura apparently used that same procedure with a different value. EX1043, 183:13-184:12.

electrode, the voltage is set to a range in which no electrolyte decomposition occurs, and no irreversible structural breakdown of the positive electrode active material occurs. *For example, LiMn_2O_4 is 4.2–4.3 V, preferably 4.2 V...*

EX1005, ¶[0078].

Tellingly, Dr. Yao intentionally omits—through the strategic placement of ellipses—this portion of Paragraph 78 from his declaration:

When a positive electrode is used for the working electrode, *the voltage at the start is the potential difference between the metal lithium and the positive electrode material*, and the voltage rises with charging (applying current from the counter electrode to the working electrode) and at the positive electrode, the voltage is set to a range in which no electrolyte decomposition occurs, and no irreversible structural breakdown of the positive electrode active material occurs. For example, LiMn_2O_4 is 4.2-4.3 V, preferably 4.2 V, and LiCoO_2 and LiNiO_2 are 4.1-4.2 V, preferably 4.1 V.¹²³

Omits key text

EX2006, ¶188 (annotated); EX1043, 258:4-263:9.

Thus, Abe establishes the charge cut-off voltage is 4.2-4.3V for LiMn_2O_4

relative to a carbon fiber negative electrode. This is consistent with PO's argument that 4.2V was often used as the cutoff voltage but is *also consistent* with the knowledge that lithium manganese oxide-based batteries were also charged to cut-off voltages of more than 4.2V. *E.g.*, EX1008, 8:23-37; EX1009, ¶[0081]; EX1040, p.A981; EX1045, p.14; EX1046, p.4078; EX1047, p.695; EX2009, p.501; EX2017, p.40; EX2023, p.3653, Table I; EX2030, ¶33; EX2039, Abstract. Abe discloses a cut-off voltage of 4.2-4.3V because, as discussed above, it is the maximum voltage to which the lithium-ion battery is configured to be charged. *Supra* §II.A.

PO asserts that Abe “teach[es] *against* raising the charge cut-off voltage to above 4.2V” POR, p.58 (citing ¶[0080]). But PO cites disclosures about LiNiO₂ batteries described in Abe paragraph 79 (“in *this* non-aqueous electrolyte-based secondary battery”). Abe teaches that a LiNiO₂ battery is charged to a lower cutoff voltage than a LiMn₂O₄ battery. EX1005, ¶[0078]. As discussed above, PO's argument that “the body of literature [] consistently demonstrates that a POSITA would not raise the charge cutoff voltage above 4.2V” (POR at 59) is “not true” as the Patent Office already found. *Supra* §I.

That Abe's working examples are all charged to 4.1V for comparative purposes does not detract from the teachings of Abe as a whole. *In re Snow*, 471 F.2d 1400, 1403 (Ct. Cust. & Pat. App. 1973) (“All the disclosure in a reference, not just the specific examples, must be evaluated for what it fairly teaches those of

ordinary skill in the art.”); *In re Boe*, 355 F.2d 961, 964 (Ct. Cust. & Pat. App. 1966) (“All of the disclosure in a reference must be evaluated for what they fairly teach one of ordinary skill in the art.”). The examples do not teach away from Abe’s explicit disclosure that LiMn_2O_4 batteries are charged to 4.2-4.3V relative to a carbon anode. EX1005, ¶[0078].

2. *Abe Discloses and/or Renders Obvious the Capacity Ratio Limitation*

a. PO is Wrong About the Charge Cutoff Voltage

PO bootstraps its argument about cut-off voltage into one about the capacity ratio limitation. But, as explained above, PO has overlooked key teachings from Abe that undermine its charge cut-off argument. *Supra* §IV.C.I.

Abe discloses—like the ’641 patent—that there should be more anode capacity than cathode capacity—a ratio of more than 1 and less than 1.6. EX1005, ¶[0016]. As the Petition explains a POSITA would understand that Abe discloses using that range at both 4.2V and 4.3V for LiMn_2O_4 depending on what ultimate charge cut-off voltage is used. Pet., 39-40. And, PO does not dispute that if the ratio is determined at 4.3V, it falls within the claims as calculated at 4.2V. *Id.* And, as explained above, it is irrelevant that the working examples are only charged to 4.1V because there are broader teachings in Abe that disclose cut-off voltages of, for example, 4.3V.

b. PO Misinterprets Its Own Construction of The Capacity Ratio Limitations

PO's assertion that Abe's ratio is based on "the practical specific capacity of the cathode, instead of its theoretic capacity" (POR, p.62), is irrelevant under the construction both parties agree applies in this proceeding because that construction does not require "theoretic" capacity. Practical specific capacity is a "capacity" that falls within the construction PO had the court adopt in litigation. *Supra* §II.B.

D. Abe in View of Guyomard Renders Obvious Claims 2-4, 6-8, and 11-18 (Ground 7)

The POR does not dispute that Abe in view of Guyomard disclose claims 2-6, 6-8, and 11-18 beyond its argument about the independent claims. Instead, the POR contends there is no motivation to combine Abe and Guyomard (POR, 62-64), and there would not have had a reasonable expectation of success. But the POR misrepresents the state of the art and the references, and relies on largely unsupported expert testimony (EX2006, ¶¶205-212).

1. There is an Express Motivation to Combine Abe and Guyomard

The Petition identifies an express motivation to combine Abe and Guyomard. Pet., pp.48-50. Rather than addressing it, PO asserts that Abe teaches "for spinel LiMn₂O₄ electrolyte decomposition and irreversible structural breakdown of the cathode may occur between 4.2V to 4.3V" and that "it is safer to limit the half-cell voltage of spinel LiMn₂O₄ to 4.2V." POR, p.64. But Abe says the opposite: at 4.2-4.3V "no electrolyte decomposition occurs, and no irreversible structural breakdown

of the positive electrode active material occurs.” EX1005, ¶[0078]. And, as explained above, PO incorrectly relies on voltages for LiNiO₂ and mischaracterizes Abe as relating to half-cell voltages. *Supra* §IV.C.1. PO also overlooks the teachings of Guyomard, which plainly show that with the right choice of electrolyte, charging to higher voltages without damage to the electrodes is possible. Pet., pp.49-50; EX1008, 1:11-15; Inst. Dec., p.23.

PO’s assertion that “Guyomard provides no disclosure about the state of the cathode at 4.5V or 4.9V” and instead focuses on electrolyte properties (POR, p.64), ignores Guyomard’s teaching that “there was no significant loss of cell capacity” and “the ability of the electrolyte to extend the cycle life of the batteries was amply demonstrated by the remarkable fact that the cell capacities after 500 cycles was only about 10% less than after 5 cycles.” EX1008, 9:4-8. Indeed, the PTO has recognized that “Guyomard discloses a **battery** where cut-off voltage is used up to 5 voltage for **increased cycle life and enhanced cell capacity**.” EX1004, p.18. Thus, Guyomard shows that the LiMn₂O₄ cathode, and thus the battery, does not significantly degrade at higher voltages when the appropriate electrolyte is used.

2. *A POSITA would have a reasonable expectation of success in combining Abe and Guyomard*

The Petition proves that a POSITA would have had a reasonable expectation of success in combining Guyomard’s electrolyte and voltages with Abe. Pet., pp.50-51. Nevertheless, PO argues that the “electrolyte cannot enhance the stability of the

cathode” and that “the cathode would still dissolve at voltages higher than 4.2V.” POR, p.64.

PO does not reconcile its argument with Guyomard’s disclosure which relates to an electrolyte that minimizes decomposition in batteries “comprising strongly oxidizing positive electrode materials” to enhance “cycle life” of the cells. EX1008, 3:34-4:3. Guyomard describes testing that shows “there was no significant loss of cell capacity” and that the electrolyte could “extend the cycle life of the batteries....” *Id.*, 8:23-9:9. Guyomard’s cathodes did not “dissolve” despite the high applied voltage of between 4.5V and 4.9V and PO offers no evidence to show that it did in fact dissolve. There is no reason to believe Abe’s cathode would dissolve when Guyomard’s techniques are applied because the materials are the same—thus showing a POSITA would have expected to succeed in combining Abe and Guyomard. Pet., pp.50-51.

E. Abe in View of Guyomard and Iwaizono Renders Obvious Claims 9-10 (Ground 10)

The POR does not address the substance of Ground 10. Accordingly, its arguments fail for the same reasons discussed above for Grounds 5-7. Pet., pp.60-61.

V. CONCLUSION

For all these reasons, Petitioner requests that the challenged claims be canceled.

Dated: August 16, 2024

Respectfully Submitted,

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CERTIFICATE OF COMPLIANCE

This petition complies with the word count limits set forth in 37 C.F.R. § 42.24(c)(1), effective May 2, 2016, because this Petition contains less than 5,600 words, excluding the parts of the petition exempted by 37 C.F.R. § 42.24(c), as determined using the word count provided by Microsoft Word, which was used to prepare this Petition.

Dated: August 16, 2024

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CERTIFICATE OF SERVICE

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