

IPR2023-01349

Petitioner's Reply to Patent Owner's Preliminary Response

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMPEREX TECHNOLOGY LTD.
Petitioner,

v.

SEMICONDUCTOR ENERGY LABORATORY CO., LTD.
Patent Owner

U.S. Patent No. 11,043,660

Issued: June 22, 2021

Filed: July 8, 2020

Inventor: Teruaki Ochiai et al.

Title: Positive Electrode Active Material Including Lithium Cobaltate Coated with
Lithium Titanate and Magnesium Oxide

Case IPR2023-01349

PETITIONER'S REPLY TO PATENT OWNER'S PRELIMINARY RESPONSE
PURSUANT TO 37 C.F.R. § 42.108(C)

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1004	<i>Curriculum Vitae</i> of Dr. Troy Hayes
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1006	U.S. Patent Pub. No. 2016/0149215 A1 (“Shim”)
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1008	U.S. Patent No. 10,283,770 (“Cho”)
1009	Kim et al., <i>A New Coating Method for Alleviating Surface Degradation of LiNi_{0.6}Co_{0.2}MnO₂ Cathode Material: Nanoscale Surface Treatment of Primary Particles</i> , 15 <i>Nano Lett.</i> , 2111–19 (2015) (“Kim”)
1010	Shim et al., <i>Effects of MgO Coating on the Structural and Electrochemical Characteristics of LiCoO₂ as Cathode Materials for Lithium Ion Battery</i> , 26 <i>Chem. Mater.</i> 2537–43 (2014)
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1025	M.C. Rao, <i>Structure and Surface Morphology of LiCoO₂ Thin Film Cathodes Prepared by Pulsed Laser Deposition</i> , 2 J. Intense Pulsed Lasers & Applications in Advanced Physics, 35–38 (2012)
1026	Lu et al., <i>Probing the Origin of Enhanced Stability of “AlPO₄” Nanoparticle Coated LiCoO₂ During Cycling to High Voltages: Combined XRD and XPS Studies</i> , 21 Chem. Mater., 4408–24 (2009)
1027	JP2012-018914 (“Patent Document 1”) (translated)
1028	JP2015-201432 (“Patent Document 2”) (translated)
1029	Wang et al., <i>Infiltrative Coating of LiNi_{0.5}Co_{0.2}Mn_{0.3}O₂ Microspheres with Layer-Structured LiTiO₂: Toward Superior Cycling Performances for Li-ion Batteries</i> , J. Mater. Chem. A (2012)
1030	Xu et al., <i>Lithium Transport Through Lithium-ion Battery Cathode Coatings</i> , 3 J. Mater. Chem. A, 17248–72 (2015)
1031	Bai et al., <i>Performance Improvement of LiCoO₂ by Molten Salt Surface Modification</i> , 167 J. Power Sources, 504–09 (2007)
1032	Shim et al., <i>Synergistic Effects Of Coating and Doping for Lithium Ion Battery Cathode Materials: Synthesis And Characterization Of Lithium Titanate-Coated LiCoO₂ with Mg Doping</i> , Electrochimica Acta 186, 201–08 (2015)
1033	Mizushima et al., <i>A New Cathode Material for Batteries of High Energy Density</i> , Mat. Res. Bull., 783–89 (1980)
1034	Yang et al., <i>Hybrid Microwave Synthesis and Characterization of the Compounds in the Li-Ti-O System</i> , 175 J. Power Sources 1, 575–80 (2008)

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1035	Li et al., <i>Lithium Titanate Epitaxial Coating on Spinel Lithium Manganese Oxide Surface for Improving the Performance of Lithium Storage Capability</i> , 6 ACS Appl. Mater. Interfaces 21, 18742–50 (2014)
1036	Eom et al., <i>M3 (PO4)2-Nanoparticle-Coated LiCoO2 vs LiCo0.96M0.04O2 (M = Mg and Zn) on Electrochemical and Storage Characteristics</i> , 155 Journal of the Electrochemical Society 3, A201–05 (2008)
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Unless otherwise noted, all emphasis is added.

A. PATENT OWNER MISCHARACTERIZES THE PETITION'S ARGUMENTS AND REFERENCES

1. PO Limits References To Particular Embodiments

The POPR repeatedly misrepresents cited references by limiting them to specific embodiments and ignoring others identified by the Petition. *First*, referencing *a single* embodiment, PO erroneously contends Blangero does not disclose MgO, TiO₂, or LTO (lithiated titanium oxide) because Blangero “*never shows an example*” of their usage and allegedly merely suggests those compounds in coatings. POPR, 22, 28–29 (citing Ex. 1005, ¶ [0062]). But PO ignores Blangero’s other embodiments explicitly disclosing these compounds. Pet., 22, 25–28, 30–32. For instance, PO fails to mention Blangero’s ¶ [0094], which discloses—and in fact, praises—“careful selection” of “MgO and TiO₂, that may also be lithiated” in coatings. *Id.*; *see also* Ex. 1005, ¶¶ [0059], [0062], [0094], [0133]. A reference “must be considered for everything it teaches.” *Netflix, Inc. v. DivX, LLC*, 2023 WL 2298768, at *4 (Fed. Cir. 2023); *In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012) (a reference is not limited to a “preferred embodiment”).

Indeed, even Blangero’s “suggest[ion]” of MgO, TiO₂, and LTO in the lone embodiment challenged by PO is more than enough to show obviousness. *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1049 (Fed. Cir. 2019) (a reference must be considered “for what it *fairly suggests*”); *Novo Nordisk Pharmaceuticals, Inc. v. Bio-Tech. Gen. Corp.*, 424 F.3d 1347, 1355 (Fed. Cir. 2005) (even anticipation only

requires suggestions be enabled to a POSITA); POPR, 28–29. In fact, Blangero makes clear that its hypotheses (in this embodiment) regarding oxides of Mg and Ti were “supported by [] XPS experiments.” Ex. 1005, ¶ [0062].

Second, PO argues that Blangero does not “*conclusively* demonstrate that LiF *is* present on the PEAM surface.” POPR, 26. Setting aside the fact that the law has no such requirement (*Novo Nordisk*, 424 F.3d at 1355), PO’s attack again focuses on one embodiment despite **admitting** that Blangero “indicates that ‘F . . . may be present on the surface under the form of LiF.’” POPR, 26; *see also id.*, 12. Nor is PO’s criticism that LiF is a “contaminant[] intended to be limited” relevant, even putting aside PO’s lack of evidentiary support. Rather Blangero actually **claimed**, as an invention, a PEAM particle with LiF in the coating layer. Pet. 31–32; Ex. 1005, ¶¶ [0011], Cls. 33, 62. *Netflix*, 2023 WL 2298768, at *4–*5 (considering prior art patent application’s background teachings and its invention as “described and claimed”); *Linear Tech. Corp. v. Int’l Trade Ass’n*, 292 F. App’x 52, 57, n.5 (Fed. Cir. 2008) (considering “both claimed and unclaimed material”).

Third, regarding Cho and Kim, PO similarly misrepresents the Petition in arguing “none of the examples in Cho [Ex. 1008] or Kim [Ex. 1009] have a coating layer that contains magnesium [or] titanium.” POPR, 44–49. PO improperly focuses on certain embodiments of Cho while ignoring those expressly disclosing using Mg and Ti in a coating. Pet. 61–62, 68–69. *See Applied Materials, Inc.*, 692 F.3d at 1298.

In fact, PO ***admits*** that Cho discloses Mg and Ti as suitable coating elements. POPR, 49 (citing Ex. 1008, 7:38–60); Pet., 68–69. And even if Cho had not expressly disclosed this, its “fair suggestion” of using these elements among others is more than enough for obviousness. *See Bradium Techs.*, 923 F.3d at 1049.

2. PO Miscasts § 103 Arguments As “Inherency”

Again misapprehending Petitioner's arguments, PO concludes that the Petition relies on inherency to show MgO, LiF, and LTO would be in rock-salt form in Blangero's particle and to show fluorine's presence in Cho's particle. POPR, 24–25, 27–28, 30–31, 47–48. These arguments are flawed for several reasons.

First, PO's arguments attack a strawman, as the Petition uses Blangero and Cho with ***a POSITA's knowledge*** to show obviousness. *See, e.g.*, Ex. 1003, ¶¶ 42–45, 141–46. “[I]nherency is not necessarily coterminous with the knowledge of those of ordinary skill in the art.” *Atlas Powder Co. v. Ireco, Inc.*, 190 F.3d 1342, 1347 (Fed. Cir. 1999); *Solenis Techs., LP v. SNF SAS*, 813 F. App'x 565, 571 (Fed. Cir. 2020) (rejecting inherency argument where claims “would have been obvious” to a POSITA from reference's “disclosure”); *Unified Patents, LLC v. DataCloud Techs., LLC*, IPR2021-00361, Paper 21 at 51–54 (even if reference did not “inherently disclose” limitation, it would “teach or at least fairly suggest” it to a POSITA).

Here, the Petition cites un rebutted evidence that a POSITA would have understood MgO, LiF, and LTO (as disclosed by Blangero) to exist in rock salt form

on Blangero's particle, as these compounds were known to exist in rock-salt forms at typical conditions and to improve PEAMs' electrochemical characteristics like capacity and structural stability. Pet. 29–30 (citing Exs. 1010, 1013, 1029, 1030, 1031, 1040; Ex. 1003, ¶¶ 141–46). Accordingly, PO's argument that Blangero's MgO and LiF cannot inherently be rock-salt structures because they may also form “disordered or amorphous” structures (POPR, 25, 27–28) is irrelevant. Indeed, even “prior art that *sometimes* meet the claim elements [is] sufficient to show obviousness.” *Unwired Planet, LLC v. Google Inc.*, 841 F.3d 995, 1002 (Fed. Cir. 2016) (alphabetical ordering that sometimes, but “not always,” “result[s] in *instances* of farther-over-nearer ordering” renders the latter obvious); *Target Corp. v. Proxicom Wireless, LLC*, 2023 WL 6135787, at *5 (Fed. Cir. Sept. 20, 2023).

Further, PO's mischaracterization is fatal to its argument that Blangero fails to show the claimed crystal alignment. POPR, 32–33. Setting aside PO's unsupported speculation that Blangero's surface is “amorphous” (*id.*), PO ignores the Petition's unrebutted evidence of a POSITA's understanding that MgO and LTO in Blangero's PEAM would be crystalline. Pet. 29–30. Neither PO nor Dr. Lucht disputes the Petition's explanation that crystalline LTO and MgO can grow epitaxially on crystalline LiCoO₂. *Id.*, 33–34; POPR 32–33; Ex. 2001, ¶¶ 78–79.

Similarly for Cho, the Petition explains that a POSITA would have understood Cho's particle would include fluorine due to a POSITA's knowledge of electrolyte

decomposition, especially given Cho's LiPF_6 electrolyte and Kim's teaching that "decomposition products of the electrolyte" form on "primary particles." Pet., 68–69 (citing Ex. 1008, 12:13–30, 16:4–9; Ex. 1009, 2–3).

Third, the Petition more than meets the standard for inherency, which PO concedes only requires that the "*natural result* flowing from the operation as taught would result in the performance of the questioned function." *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1194–95 (Fed. Cir. 2014). That is exactly what the Petition shows: as to Blangero, it explained rock-salt structures were known to form "under typical environmental conditions," which PO's expert Dr. Lucht did not dispute. Pet., 15, 27–30, 64–67; Ex. 2001, ¶ 65–66. As to Cho, the Petition explained that LiPF_6 would cause fluorine to appear on Cho's PEAM, including in view of Kim's teaching of an SEI layer formed with "decomposition products of the electrolyte." Pet., 68–69. PO argues that such elements would not appear, alleging Kim teaches preventing the formation of an SEI layer. POPR, 45–46. Kim does not teach this. Ex. 1009, 1–2. At most, Kim teaches reducing the incidence of cracks in its particles (*id.*), but this would not have changed a POSITA's understanding that fluorine would be present on the particles' surface. Pet. 68–69.

3. PO Mischaracterizes the Petition As Suggesting Bodily Incorporation

PO's arguments against combining Yamamoto with Cho or Blangero (POPR,

40–44, 58–60) also attack a strawman. The Petition's obviousness case does not depend on bodily incorporation, but rather applies Yamamoto's well-praised MgO coating and EDX analysis to Cho or Blangero's PEAM. Pet., 45–50, 79–81. This combination renders irrelevant whether Cho or Blangero's coating methods are "incompatible" with Yamamoto. *Id.*, 51–53, 82–83; see *Philip Morris Prods., S.A., v. RAI Strategic Holdings, Inc.*, IPR2020-00071, Paper 29 at 29–30 (proper to combine an advantageous **heater** with an incompatible heater's **housing**); *Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (obviousness test is not "bodily incorporation," but rather whether "a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention").

Likewise, PO criticizes the Shim and Blangero combination as "importing [Shim's] crystal structure alignment" where the references use "markedly different" manufacturing processes. POPR 31, 33, 37; Ex. 2001, ¶¶ 79–82. This also attacks a strawman because, rather than propose bodily incorporation, the Petition suggests a POSITA would apply Shim's **teaching of crystallographic alignment** to Blangero's particle. See Pet. at 21–23; Ex. 1003, ¶¶ 127–32 (explaining benefits of Shim's coatings, including that "[c]rystallographic alignment of a cathode particle and its coating . . . is energetically favorable"). Combining this aspect of Shim's teachings with Blangero's particle renders irrelevant whether the references use incompatible

manufacturing processes. *Philip Morris Prods.*, IPR2020-00071, Paper 29 at 29–30.

B. YAMAMOTO AND KIM ARE PRINTED PUBLICATIONS

PO's argument that Yamamoto and Kim are not printed publications is incorrect, as the indicia on the faces of the references establish a reasonable likelihood of public availability. *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 14–15, 19–20 (PTAB Dec. 20, 2019) (precedential). Both are peer-reviewed scientific journal articles with publication dates on the face before the '660 Patent's earliest priority date. Pet., 4–5; *Provepharm Inc. v. Wista Laboratories Ltd.*, IPR2018-00182, Paper 16 at 17–18 (PTAB July 5, 2018) (finding publication date of scientific article sufficient). Additionally, these references bear other “conventional markers”—*e.g.*, dates when the author submitted the articles, submitted revised versions, publisher acceptance, and online publication—all before July 5, 2016. *See id.* (crediting such dates); Ex. 1007, 1; Ex. 1009, 1.

For the avoidance of doubt, and despite the fact that no additional evidence is necessary, Petitioner hereby submits a librarian expert declaration to show the references' public availability before July 5, 2016, including with reference to online libraries, catalogues, and publishers. *See* Ex. 1044, ¶¶ 36–67 (Yamamoto's public availability before July 5, 2016), 68–94 (same re Kim).

C. THE REFERENCES WERE NOT PREVIOUSLY CONSIDERED

1. Grounds I.A, I.B, II.B, II.C, II.D Were Never Considered

Because the Examiner did not apply Blangero and Yamamoto in rejecting any claims and never considered the Petition's specific combinations, discretionary denial under § 325(d) is not warranted. The Examiner never substantively considered or issued a rejection based on Blangero or Yamamoto. Additionally, the Examiner erroneously overlooked these references and never had the benefit of expert testimony explaining why a POSITA would have understood that Blangero's first and second regions are substantially aligned (Pet., 36; Ex. 1003, ¶¶ 155–56) or that Yamamoto's magnesium concentration would reach 1/5 of its peak at the bottom of the coating layer (Pet., 53; Ex. 1003, ¶¶ 192–98). Even if Blangero and Yamamoto were previously addressed, § 325(d) still would not apply because the Examiner never addressed the Petition's *specific* combinations. *Samsung Electronics Co., Ltd., v. Netlist, Inc.*, IPR2023-00455, Paper 11 at 7–8 (PTAB Aug. 1, 2023).

2. Petitioner's Prior Art Is Not Cumulative

Patent Owner argues that Petitioner's prior art is cumulative to Yura (POPR, 68–70). However, Yura does not teach a second region comprising titanium, magnesium, fluorine, and oxygen. *See* Pet., 10–12, 31–32, 37–38. And the Examiner never considered Yura in view of a POSITA's knowledge, as demonstrated by Dr. Hayes and further corroborated by references, such as Cho, which the Petition explains would have demonstrated a POSITA's understanding of a second region comprising titanium, magnesium, fluorine, and oxygen. *See* Pet., 10–12, 31–32, 37–

38, 76–77. Thus, denial under § 325(d) is not warranted.

D. PO'S IMPLIED CONSTRUCTIONS SHOULD BE REJECTED

Despite claiming that “Patent Owner does not offer any claim constructions” (POPR, 20), PO implicitly construes the term “second region compris[ing] a rock-salt crystal structure.” PO argues that Cho’s second region, which has “rock-salt layer structure” (Ex. 1008, 7:7–14), does not disclose this element because the claimed second region purportedly “requires titanium, magnesium, fluorine, and oxygen all together” with “the same crystal structure[.]” POPR, 52. In short, PO argues that the second region can *only* be a rock-salt structure and/or that the claimed titanium, magnesium, fluorine, and oxygen must all have rock-salt structure. *Id.*

Neither implicit construction is supported. The claims do *not* require that the second region or any specific element must only have a rock-salt crystal structure. Ex. 1001, Cls. 1, 6 (“[W]herein the second region *comprises* a rock-salt crystal structure . . . wherein the [PEAM] particle *comprises* titanium, magnesium, fluorine, and oxygen in the second region[.]”). “Comprising” means “*elements may be added* and still form a construct within the scope of the claim.” *Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed. Cir. 1997). PO’s implicit construction also runs afoul of the specification, which states: “the entire second region 102 *does not necessarily have a rock-salt crystal structure*” and “may have *another crystal structure*.” Ex. 1001, 11:65–12:2. Thus, the Board should reject PO’s implicit construction.

E. EACH GROUND IS IDENTIFIED WITH PARTICULARITY

PO mischaracterizes the petition as “rel[ying] on permutations of five references, yet fails to support any of these permutations ‘with particularity.’” But the Petition clearly articulates particularized grounds of unpatentability. Pet., 5–6, 21, 45, 56, 74, 79, 85. PO has not identified any burden from addressing these grounds and instead has provided a lengthy, fulsome response. *See* POPR. The use of alternative bases for invalidity using and/or conjunctions between references does not violate § 312(a) or 37 C.F.R. § 42.104(b)(4) when the practice does not exceed “reasonable limits of particularity and specificity.” *Foursquare Labs, Inc. v. Boardactive Corp.*, IPR2023-00918, Paper 8. PO’s cited cases are inapposite. *Smith & Nephew, Inc. v. Conformis, Inc.*, IPR2017-00545, Paper 8, 12–13 (PTAB July 13, 2017) (failing to articulate “how and why specific teachings of the references would have been combined”); *Securus Techs., Inc. v. Global Tel-Link Corp.*, IPR2015-00153, Paper 12, 8 (PTAB May 1, 2015).

The present Petition is unlike cases where the Board found a lack of particularity, including where a petition used a “catch-all ground” combining 10 references, resulting in hundreds of combinations without particularly identifying how the combination disclosed the claims. *See Adaptics Ltd. v. Perfect Co.*, IPR2018-01596, 2019 Pat. App. LEXIS 4775, *25–*26 (PTAB Mar. 6, 2019). At bottom, the Petition should not be denied for any reasons presented in the POPR.

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Petitioner's Reply to Patent Owner's Preliminary Response

Dated: January 29, 2024

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Petitioner's Reply to Patent Owner's Preliminary Response

CERTIFICATION OF SERVICE

Pursuant to 37 CFR § 42.6(e), the undersigned hereby certifies that the foregoing Petitioner's Reply to Patent Owner's Preliminary Response and accompanying Exhibit 1044 was served on Patent Owner's lead and back-up counsel in its entirety by electronic service at the email addresses provided below:

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