

IPR2023-01016

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. 10,741,828

Issued: August 11, 2020

Filed: June 30, 2017

Inventor: Teruaki Ochiai et al.

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

Case IPR2023-01016

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

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LIST OF EXHIBITS

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1001	U.S. Patent No. 10,741,828 (“’828 Patent”)
1002	File History of U.S. Patent No. 10,741,828 (“’828 FH”)
1003	Declaration of Dr. Troy Hayes in Support of <i>Inter Partes Review</i> of U.S. Patent No. 10,741,828
1004	<i>Curriculum Vitae</i> of Dr. Troy Hayes
1005	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> , 186 <i>Electrochimica Acta</i> , 201–08 (2015)
1006	Lee & Park, <i>Interface Characterization of MgF₂-Coated LiCoO₂ Thin Films</i> , 230 <i>Solid State Ionics</i> , 86–91 (2013)
1007	Yu et al., <i>The Investigation of Ti-Modified LiCoO₂ Materials for Lithium Ion Battery</i> , 262 <i>Journal of Power Sources</i> , 136–139 (2014)
1008	U.S. Patent No. 9,105,926 (“Fujiki”)
1009	Van Schalkwijk & Scrosati, <i>Advances in Lithium-Ion Batteries</i> (2002)
1010	Wang et al., <i>TEM Study of Electrochemical Cycling-Induced Damage and Disorder in LiCoO₂ Cathodes for Rechargeable Lithium Batteries</i> , 146 <i>Journal of the Electrochemical Society</i> , 473–80 (1999)
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1012	Tukamoto et al., <i>Electronic Conductivity of LiCoO₂ and Its Enhancement by Magnesium Doping</i> , 144 J. Electrochem. Soc., 3164–68 (1997)
1013	Shi et al., <i>Effect of Mg-doping on the Structural and Electronic Properties of LiCoO₂: A First-Principles Investigation</i> , 171 Journal of Power Sources, 908–12 (2007)
1014	Jang et al., <i>Electrochemical and Electron Microscopic Characterization of Thin-Film LiCoO₂ Cathodes Under High-Voltage Cycling Conditions</i> , 119–121 Journal of Power Sources 295–99 (2003)
1015	Bhattacharya et al., <i>A Transmission Electron Microscopy Study of Crack Formation and Propagation in Electrochemically Cycled Graphite Electrode in Lithium-Ion Cells</i> , 196 Journal of Power Sources, 8719–27 (2011)
1016	Fey et al., <i>MgAl₂O₄ Spinel-Coated LiCoO₂ as Long-Cycling Cathode Materials</i> , 146 Journal of Power Sources, 245–49 (2005)
1017	Int'l Patent No. WO 2013/048048 (“Song”)
1018	U.S. Patent No. 9,048,495 B2 (“Sun”)
1019	CN 102610806 (“Liu”) (translated)
1020	U.S. Patent Application 2007/0224506 A1 (“Ooyama”)
1021	Dedryvère et al., <i>Surface Film Formation on Electrodes in a LiCoO₂/Graphite Cell: A Step by Step XPS Study</i> , 174 Journal of Power Sources, 462–68 (2007)
1022	Solano, <i>Development of Artificial Surface Layers for Thin Film Cathode Materials</i> , Material Chemistry, Université de Bordeaux (2015)

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1023	Aurbach et al., <i>On the Capacity Fading of LiCoO₂ Intercalation Electrodes: The Effect of Cycling, Storage, Temperature, and Surface Film Forming Additives</i> , 47 <i>Electrochimica Acta</i> , 4291–306 (2002)
1024	Aykol et al., <i>Thermodynamic Aspects of Cathode Coatings for Lithium-Ion Batteries</i> , <i>Advanced Energy Materials</i> , 1400690 (2014)
1025	Kitagawa et al., <i>Application of Fluorine-containing Solvents in High Voltage Operation</i> , 78 <i>Electrochemistry</i> , 345–48 (2010)
1026	Muto et al., <i>Capacity-Fading Mechanisms of LiNiO₂-Based Lithium-Ion Batteries</i> , 156 <i>Journal of the Electrochemical Society</i> , A371–A377 (2009)
1027	Sun et al., <i>Role of AlF₃ Coating on LiCoO₂ Particles During Cycling to Cutoff Voltage Above 4.5 V</i> , 156 <i>Journal of the Electrochemical Society</i> , A1005–A1010 (2009)
1028	Park et al., <i>Amorphous Metal Fluoride Passivation Coatings Prepared by Layer Deposition on LiCoO₂ for Li-Ion Batteries</i> , 27 <i>Chemistry of Materials</i> , 1917–20 (2015)
1029	Aboulaich et al., <i>High Voltage Stability and Enhanced Electrochemical Performances of LiCoO₂ by CeF₃ Coating</i> , <i>IEEE</i> (2015)
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1031	JP2012-018914 (“Patent Document 1”) (translated)
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1033	Declaration of Jennifer Babbitt in Support of <i>Inter Partes Review</i> of U.S. Patent No. 10,741,828
1034	Declaration of James Mullins, Ph.D.
1035	Declaration of Yanbing Fu
1036	Declaration of Helen Habernickel

A. SHIM, LEE, AND YU ARE PRINTED PUBLICATIONS

Patent Owner's ("PO") argument that Shim (Ex. 1005), Lee (Ex. 1006), and Yu (Ex. 1007) are not printed publications under 35 U.S.C. § 102(b) is incorrect, as the indicia on the faces of the references are sufficient to establish a reasonable likelihood of public availability. *See Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 14–15, 19–20 (PTAB Dec. 20, 2019) (finding that dates on face of reference from an established publisher were sufficient evidence of public availability at the institution stage, and supplemental evidence of public availability can be presented in in a reply to a patent owner preliminary response or response, or by separate motion to file supplemental information) (precedential). All three references are peer-reviewed scientific journal articles with publication dates before the '828 Patent's earliest priority date of July 5, 2016. Petition at 10–11; *see Provepharm Inc. v. Wista Laboratories Ltd.*, IPR2018-00182, Paper 16 at 17–18 (PTAB July 5, 2018) (finding that petitioner made sufficient showing that reference qualified as "printed publication" by pointing out publication date of scientific article). Additionally, these references bear other "conventional markers" under *Provepharm* which signal publication before 2016, including the dates on which the author submitted the articles to the publisher, the authors submitted revised versions, the articles were accepted by the publisher, and the articles were published on the web—all well before July 5, 2016. *See id.* (noting that dates of submission, review,

and e-publication appearing on face of article are conventional markers that signal publication in that year); Ex. 1005 at 1; Ex. 1006 at 1; Ex. 1007 at 1. Further, the three references were available on Elsevier, one of the world's leading scientific publishers which "publishes and makes available scientific and medical publications" and "maintains copies of publications in the ordinary course of its regularly conducted activities." *See, e.g.,* Ex. 1035, ¶¶ 6–7; *see Hulu* at 19 (publisher's webpage showing that reference was a "textbook from an established publisher" is evidence of public availability); *Ericsson Inc. v. Intellectual Ventures I LLC*, IPR2014-00527, Paper 41 at 10–11 (PTAB May 18, 2015) (taking "Official Notice" scientific and technical communities rely on dates published by a "well-known, reputable compiler and publisher of scientific and technical publications").

For the avoidance of doubt, and despite the fact that no additional evidence is necessary to establish public availability, Petitioner submits declarations from third party record custodians and a librarian expert to illustrate that these references were publicly available. *See* Ex. 1034, ¶¶ 35–47 (showing Shim, Ex. 1005, was publicly available prior to July 5, 2016); Ex. 1035, ¶¶ 10–11 (showing Lee, Ex. 1006, was publicly available prior to July 5, 2016); Ex. 1036, ¶¶ 10–11 (showing Yu, Ex. 1007, was publicly available prior to July 5, 2016).

B. THE REFERENCES WERE NOT PREVIOUSLY CONSIDERED BY THE EXAMINER

1. Ground 1 Was Not Previously Considered by the Examiner

Because the Examiner did not apply Shim in rejecting any of the claims of the '828 Patent and never considered Shim in combination with Lee, discretionary denial under § 325(d) is not warranted. As noted in the petition, Shim was buried in a post-allowance Information Disclosure Statement (IDS) that contained *over 170* references. Petition at 12–13. The Examiner never issued an Office Action based on Shim and never articulated any substantive consideration of Shim. Discretionary denial is thus inappropriate. Indeed, the Office is currently considering a rule to make this point explicit. 88 Fed. Reg. 24503 at 24511-12 (proposing that “mere citation” of reference to Examiner does not mean reference was “previously addressed”). Additionally, it was error for the Examiner to overlook the buried reference, as the Examiner did not have the benefit of expert testimony explaining why a POSITA would have understood that the degradation discussed by Shim refers to cracks (*i.e.*, structural defects) within the cathode structure. Petition at 13; Ex. 1003, ¶¶ 147–49.

Further, even if Shim had been previously addressed by the Examiner (which it was not), § 325(d) still does not apply because the combination of Shim and Lee raised by Petitioner was not addressed by the Examiner. *See Samsung Electronics Co., Ltd., v. Netlist, Inc.*, IPR2023-00455, Paper 11 at 7–8 (PTAB Aug. 1, 2023).

2. Shim, Lee, and Fujiki Are Not Cumulative

Patent Owner argues that Shim, Lee, and Fujiki are cumulative over Liu

(POPR at 60–62). However, Liu does not teach crack portions or crystal defects. *See* Petition at 17–25, 46, 72–73. And the Examiner never considered Liu in view of the knowledge of a POSITA, as demonstrated by Dr. Hayes and which is corroborated by the teachings of references such as Fey and Wang, which the Petition explains would have taught a POSITA that crack portions (visible using TEM) are commonly formed from cycling of the PEAM and that coating elements would have been found in the crack portions. *See* Petition at 23–25, 50–51, 74–75. Thus, denial under § 325(d) is unwarranted.

C. THE BOARD SHOULD REJECT PATENT OWNER'S IMPLIED CLAIM CONSTRUCTIONS

Despite claiming that “Patent Owner does not formally construe any claim terms at this time” (POPR at 20), PO improperly imports limitations from the specification and implicitly construes the claim language, including the terms: (1) “present in a crack portion” and (2) “in a portion which includes crystal defects.” ’828 Patent, cls. 1, 5. For example, PO argues that Shim’s “doping of the bulk of a PEAM particle” and Fujiki’s “diffusion of magnesium throughout [the] PEAM particle” do not render obvious the presence of magnesium or fluorine in a crack portion because “the ’828 Patent discloses that the representative element (in this example, magnesium) is ‘in the vicinity of crystal defects’ or ‘in the crack portion’ *after the magnesium (and fluorine) is segregated through heating.*” POPR at 39,

51 (emphasis added, citations omitted). In short, PO argues that an unclaimed heating step is required for the representative element to be “present in a crack portion” or “in a portion which includes crystal defects.” ’828 Patent, cls. 1, 5.

The claim language does not recite any segregation or heating step. Ex. 1001, 20:23–28, cls. 1–8. While the specification suggests in some embodiments that a heating step could facilitate segregation of magnesium into the crack portions, neither heating nor segregation is claimed. *Compare id.*, cls. 1–8, *with id.*, 27:1–15. Indeed, PO’s own specification does **not** require heating or segregation, and the limitations PO reads into the claims would exclude other PEAM particles embodiments described in the specification that fall within the claim language. For instance, Sample 05 of the ’828 Patent shows that even in samples that were “not heated,” a “certain amount of magnesium and fluorine is unevenly distributed in the vicinity of the surface.” Ex. 1001, 59:1–4. And the specification expressly indicates that the coating layers—including the region PO now claims must be formed by segregation—“can be formed by a sputtering method, a solid phase method, a liquid phase method such as a sol-gel method, or the like.” *Id.*, 21:38–40.

The Federal Circuit has repeatedly rejected such attempts to implicitly construe claims by importing limitations, as PO did here. For example, in *Vectura Limited v. Glaxosmithkline LLC*, 981 F.3d 1030, 1038–39 (Fed. Cir. 2020), the Federal Circuit disagreed that the term “composite active particles” should be

narrowly construed to require the “composite particles be produced by the ‘high-energy milling’ process referred to in the specification,” because the specification, while “contain[ing] a few statements suggesting that its high-energy milling is required, those statements are outweighed by the numerous statements indicating that high-energy milling is merely a preferred process.” *Id.*; *see also Continental Circuits LLC v. Intel Corporation*, 915 F.3d 788, 799 (Fed. Cir. 2019) (“Generally, a novel product that meets the criteria of patentability is not limited to the process by which it was made.”) (citation omitted). Similarly here, none of the passages cited by PO requires a segregation or heating step is a necessary part of the claimed subject matter. *Compare* POPR at 39–40, *with* Ex. 1001, 24:11–12 (“Note that *in the case* where the representative element is segregated by heating . . .”) (emphasis added), 22:46–50 (noting that heating step is “one embodiment of the present invention”). Thus, contrary to PO’s argument, the specification reveals that the claims should not be narrowed only to cover coatings formed from heating and segregation.

Further, the intrinsic record does not justify importing heating or segregation into the claim language. Instead, as PO admits, “[t]he Examiner found that Liu did not disclose ‘a positive electrode active material particle comprising a representative element and fluorine present in a portion that include [*sic*] crystal defects or a crack portion in the positive electrode active material particle.’” POPR at 61. Because the Examiner found that the novelty of the claimed subject matter was the presence of

the elements in the crack portions or crystal defects, no justification exists in the file history for importing limitations that exclude other embodiments. PO's argument is a thinly-veiled attempt to circumvent the prior art by importing a method described in some embodiments to the claims, running afoul of claim construction principles. *See* POPR at 39–40, 50–51. *See Zebra Technologies Corporation v. Lone Star SCM Systems, Ltd.*, IPR2022-01376, Paper 11 at 35–36 (PTAB Feb. 24, 2023) (rejecting patent owner's implied claim construction argument).

Similarly, while PO did not propose any formal construction of “crystal defect,” PO proffers an implicit construction that a “crystal defect” must be “enclosed within a crystal structure.” POPR at 8; *see id.* at 42, n. 5. However, the claims do not impose any such restriction. Rather, the '828 specification provides an express and unambiguous definition of “crystal defect” including a “defect[] which can be observed from a TEM image” and “a cavity,” which does not limit crystal defects to those “enclosed within a crystal structure.” Petition at 33–34; Ex. 1001, 9:55–58. Thus, the Board should reject PO's implicit construction of “crystal defect” and construe the term according to the definition provided by the '828 Patent.

Accordingly, the Petition should not be denied for any of the reasons presented in the POPR.

IPR2020-01553

Petitioner's Reply to Patent Owner's Preliminary Response

Dated: October 6, 2023

Respectfully submitted,

/Yimeng Dou/

Yimeng Dou (Reg. No. 69,770)

**Attorney for Petitioner Ampere
Technology, Ltd.**

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 Exhibits 1034 through 1036 were served on Patent Owner's lead and back-up counsel in its entirety by electronic service at the email addresses provided below:

Nicholas W. Stephens, Reg. No. 74,320
Grace J. Kim, Reg. No. 71,977
Matthew L.Chun, Reg. No. 77,763
FISH & RICHARDSON P.C.
60 South Sixth Street, Suite 3200
MINNEAPOLIS, MN 55440-1022

IRP124732-2330IP1@fr.com

/Yimeng Dou/
Yimeng Dou (Reg. No. 69,770)