

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. and SAMSUNG ELECTRONICS
AMERICA, INC.,
Petitioner,

v.

MOLECULAR REBAR DESIGN, LLC,
Patent Owner.

IPR2025-00359
Patent 10,153,483 B2

Before GRACE KARAFFA OBERMANN, JULIA HEANEY, and
AVELYN M. ROSS, *Administrative Patent Judges*.

ROSS, *Administrative Patent Judge*.

DECISION

Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

Granting Petitioner's Unopposed Motion for Joinder
35 U.S.C. § 315(c); 37 C.F.R. § 42.112(b)

I. INTRODUCTION

Samsung Electronics Corporation, Ltd. and Samsung Electronics America, Inc. (collectively “Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of claims 1–4 and 7–18 of U.S. Patent No. 10,153,483 B2 (Ex. 1001, “the ’483 patent”) along with a Motion for Joinder (Paper 5, “Mot. for Joinder”). Molecular Rebar Design, LLC (“Patent Owner”) waived its preliminary response under 37 C.F.R. § 42.107(b) based on the expectation that this proceeding will be joined with a proceeding that has already been instituted (i.e., IPR2024-01013). Paper 9, 1.

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314 (2012); 37 C.F.R. § 42.4(a) (2024). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted “unless the Director determines . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least [one] of the claims challenged in the petition.”

For the reasons set forth below, upon considering the Petition and evidence of record, we determine that Petitioner has established a reasonable likelihood of prevailing with respect to at least one challenged claim. Accordingly, we grant the Petition and institute an *inter partes* review.

A. *Real Parties-in-Interest*

Petitioner identifies Samsung Electronics, Co., Ltd. and Samsung Electronics America, Inc. as the real parties-in-interest. Pet. 69.

Patent Owner identifies itself as the real party-in-interest and notes that its subsidiary Black Diamond Structures, LLC has an exclusive license to the ’483 patent. Paper 7, 1.

B. Related Proceedings

The parties indicate that the '483 patent is at issue in *Molecular Rebar Design, LLC v. LG Energy Solution, Ltd.*, 2-23-cv-00107 (E.D. Tex.) filed February 16, 2024 (“district court litigation”) and *Molecular Rebar Design, LLC v. Samsung Electronics Co., Ltd.*, 2-24-cv-00108 (E.D. Tex.) filed February 16, 2024. Pet. 69–70; Paper 7, 1–2.

C. The '483 patent

The '483 patent, titled “Lithium Ion Batteries Using Discrete Carbon Nanotubes, Methods for Production Thereof and Products Obtained Therefrom,” issued on December 11, 2018. Ex. 1001, codes (45), (54). The '483 patent explains that lithium-ion rechargeable batteries that use “cobalt, nickel or manganese oxides for their cathode materials are known for their poor electrical conductivity and poor electrochemical stability which results in poor cycling (charge/discharge) ability.” Ex. 1001, 1:26–31. The '483 further explains that olivine structures, such as LiFePO_4 and LiMnPO_4 , operate at higher charge and discharge rates, “but are still limited by low electrical conductivity and the kinetics of Li-ion diffusion.” *Id.* at 1:31–35. The '483 patent notes that improvement in the charge/discharge rates of batteries have been achieved using nano-sized crystals of lithium salts and carbon nanotubes. Ex. 1001, 1:36–40. Although these materials have improved the charge/discharge rates of batteries, the '483 patent notes that the carbon nanotubes of the prior art were not considered to be discrete, i.e., individually and uniformly dispersed tubes, and the “lithium nanocrystals [were] not ionically or covalently attached to the surface of the discrete carbon nanotubes to provide for intimate electron transfer and enhanced mechanical strength of the active material.” *Id.* at 1:39–50. The '483 patent discloses a composition useful for lithium ion batteries that has “discrete carbon nanotubes¹ having attached to their surface lithium ion

active materials in the form of nanometer sized crystals or layers.” Ex. 1001, 2:35–38. The attachment of the crystals to the carbon nanotubes may be by ionic or chemical means. *Id.* at 3:33–37. The discrete carbon nanotubes preferably have an aspect ratio of 10 to 500 and oxidation levels from 1 to 15 weight percent of the carbon nanotube. *Id.* at 2:46–49.

D. Illustrative Claim

Petitioner challenges claims 1–4 and 7–18 of the ’483 patent. Independent claim 1 is representative of the challenged claims and is reproduced below with Petitioner’s annotations¹:

- [1pre] A composition useful for lithium ion batteries comprising:
- [1a] discrete, non-agglomerated, and exfoliated carbon nanotubes having a surface, and
- [1b] mixtures of ion active materials comprising migratable ions said materials comprising crystals or layers of lithium ion active material,
- [1c] wherein a ratio of lithium ion to other total ions in the ion active materials is at least 2:1 to 25:1, and
- [1d] wherein the discrete carbon nanotubes have crystals or layers of lithium ion active material ionically attached to their surface and
- [1e] wherein the discrete carbon nanotubes comprise oxidized species selected from the group consisting of carboxylic, ketone, or hydroxyl functionalities, and
- [1f] wherein the discrete carbon nanotubes have an aspect ratio of 10 to 500 and
- [1g] oxidation levels from 1% to 15% by weight of the carbon nanotube.

Ex. 1001, 7:5–19.

E. The Asserted Unpatentability Challenges

Petitioner asserts the following grounds of unpatentability (Pet. 1):²

¹ For convenience, we adopt Petitioner’s annotated claim format.

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, took effect on

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–4, 7–18	103(a)	Ohata ³ , Kavan ⁴ , Gong ⁵
1–4, 7–18	103(a)	Ohata, Kavan, Liu ⁶
1, 2, 7–18	103(a)	Ohata, Kavan, Ichinose ⁷

Petitioner also relies on declaration testimony of Dr. Yu Zhu. Ex. 1003.

II. ANALYSIS

A. Principles of Law

In an *inter partes* review, “the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (2012) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

March 16, 2013. The ’483 patent issued from an application filed June 21, 2012. Ex. 1001, code (22). Thus, we apply the pre-AIA version of §103.

³ US 2004/0160156 A1, published August 19, 2004 (Ex. 1004, “Ohata”)

⁴ Kavan, et al., Multi-walled carbon nanotubes functionalized by carboxylic groups: Activation of TiO₂ (anatase) and phosphate olivines (LiMnPO₄; LiFePO₄) for electrochemical Li-storage, *Journal of Power Sources*, Vol. 195, 5360–5369 (2010) (Ex. 1005, “Kavan”).

⁵ CN 101364643 A, published February 11, 2009 (Ex. 1006 (Chinese language document); Ex. 1007 (certified English translation) (“Gong”)).

⁶ CN 102456881, published May 16, 2012 (Ex. 1008, Chinese language document); Ex. 1009 (certified translation) (“Liu”).

⁷ US 2006/0269842 A1, published November 30, 2006 (Ex. 1034, “Ichinose”).

Obviousness is a question of law based on underlying determinations of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966); *Richardson-Vicks, Inc. v. Upjohn Co.*, 122 F.3d 1476, 1479 (Fed. Cir. 1997). A claim is unpatentable as obvious, under 35 U.S.C. § 103, if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time of the invention to a person having ordinary skill in the art. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham*, 383 U.S. at 17–18. Consideration of the *Graham* factors “helps inform the ultimate obviousness determination.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc), cert. denied, 138 S. Ct. 420 (2017). Subsumed within the *Graham* factors are the requirements that all claim limitations be found in the prior art references and that the skilled artisan would have had a reasonable expectation of success in combining the prior art references to achieve the claimed invention. *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007). “Obviousness does not require absolute predictability of success . . . all that is required is a reasonable expectation of success.” *In re O’Farrell*, 853 F.2d 894, 903–04 (Fed. Cir. 1988) (citations omitted). But, a petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

B. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the invention. *Graham*, 383 U.S. at 17.

Petitioner contends that a person of ordinary skill in the art would have had at least a Master's degree in materials science, chemistry, chemical engineering, a field relevant to polymer science and engineering, or the equivalent, and at least three years of experience in nanomaterials, electrochemistry, batteries, or polymer related activities. Additional work experience can compensate for less formal education and vice versa.

Pet. 7 (citing Ex. 1003 ¶ 11–12).

Patent Owner does not address the level of ordinary skill in the art at this stage of the proceeding. *See generally* Paper 9.

In light of the record before us, and for purposes of this Decision, we adopt Petitioner's proposal regarding the level of ordinary skill in the art. Based on our review of the '483 patent and the prior art of record, we determine that the definition offered by Petitioner comports with the qualifications a person would have needed to understand the '483 patent and the prior art. We will make any final determination pertaining to the level of ordinary skill in the art, however, on the full trial record.

C. *Claim Construction*

We construe claim terms according to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–17 (Fed. Cir. 2005) (en banc); 37 C.F.R. § 42.100(b). Under *Phillips*, we give claim terms “their ordinary and customary meaning.” *Phillips*, 415 F.3d at 1312. “[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Id.* at 1313. “Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.*

Petitioner provides a construction for the term “ratio of lithium ion to other

total ions in the ion active materials.” Pet. 8–9. Patent Owner does not address claim construction at this stage of the proceeding. *See generally* Paper 9.

For purposes of this Decision, we need not expressly construe any claim terms. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs.* in the context of an *inter partes* review).

D. Institution of Inter Partes Review

Petitioner contends that the Petition is substantially the same as the petition on which we instituted review in IPR2024-01013. Mot. for Joinder 3–7. In particular, Petitioner contends that “the Samsung Petition does not present any new grounds of unpatentability; rather it is substantively identical to the LGES Petition [i.e., IPR2024-01013].” *Id.* at 4–5. Petitioner explains that “there are no changes in the facts, citations, evidence, or arguments presented in the LGES Petition in relation to the grounds of the LGES Petition,” and because “the proceedings are substantively identical, good cause exists for joining this proceeding with the LGES IPR.” *Id.* at 5.

We instituted review of claims 1–4 and 7–18 of the ’483 patent in IPR2024-01013 after a review of all arguments and evidence presented by the parties, including Patent Owner’s arguments in its preliminary response. For the reasons discussed in the Institution Decision in IPR2024-01013, we determine that Petitioner demonstrates a reasonable likelihood of showing at least one claim of the ’483 patent is unpatentable. Thus, we find that the Petition warrants institution of *inter partes* review on all claims and grounds set forth in the Petition.

E. Motion for Joinder

Pursuant to 35 U.S.C. § 315(c),

If the Director institutes an inter partes review, the Director, in his or her discretion, may join as a party to that inter partes review any person who properly files a petition under section 311 that the Director, after receiving a preliminary response under section 313 or the expiration of the time for filing such a response, determines warrants the institution of any inter partes review under section 314.

In considering a motion for joinder, and whether such joinder is appropriate, the Board may consider “whether a new ground of unpatentability is raised in the second petition, how the cost and schedule of the first proceeding will be impacted if joinder is granted, and whether granting joinder will add to the complexity of briefing and/or discovery.” Patent Trial and Appeal Board Consolidated Trial Practice Guide November 2018⁸ at 76 (citing *Kyocera Corp. v. SoftView LLC*, IPR2013-00004, Paper 15 at 4 (PTAB Apr. 24, 2013)).

Petitioner contends that no new grounds of unpatentability are raised in the Petition. Mot. for Joinder 3–6. Petitioner further agrees to an “understudy” role in which it will not seek additional depositions or deposition time, and “will assume the primary role only if LGES ceases to participate in the LGES IPR.” *Id.* at 8–9. And, Petitioner argues that “the Samsung Petitioner presents unpatentability of the same claims of the same patent in the same way as the LGES Petition” and “joinder . . . would not unduly burden or negatively impact the trial schedule in any meaningful way.” *Id.* at 5–6; *see also id.* at 6 (“due to the same issues being presented in the LGES Petition, Patent Owner will not be required to present any additional responses or arguments”).

Patent Owner waived the Preliminary Response in expectation of the proceedings being joined. Paper 9, 1 (stating further that it represented to the Board

⁸ Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

that “it [does] not oppose joinder”).

Upon consideration of Petitioner’s arguments, we are persuaded that it is appropriate under these circumstances to join Petitioner to the proceeding in IPR2024-01013. Petitioner’s agreement to accept an “understudy” role and to not actively participate in IPR2024-01013 unless the current petitioner ceases to participate will limit any potential impact on the trial schedule and will avoid increasing the costs or complexity of the proceeding. Therefore, joinder of Petitioner to IPR2025-00359 will further the goals of a just, speedy, and inexpensive resolution of Petitioner’s challenge. 37 C.F.R. § 42.1(b).

III. CONCLUSION

For the foregoing reasons, we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to at least one of the claims challenged in the Petition. Accordingly, we order an *inter partes* review of the ’483 patent and grant Petitioner’s Motion for Joinder.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–4 and 7–17 of U.S. Patent No. 10,153,483 B2 on all grounds set forth in the Petition;

FURTHER ORDERED that Petitioner’s Motion for Joinder is granted, and Petitioner is joined as a petitioner in IPR2024-01013;

FURTHER ORDERED that Petitioner shall have an “understudy” role in IPR2024-01013 under the conditions reproduced above;

FURTHER ORDERED that all further filings in the joined proceeding shall be made in IPR2024-01013 and that IPR2025-00359 is terminated and no

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further filings shall be made in IPR2025-00359;

FURTHER ORDERED that the Scheduling Order in IPR2024-01013 remains unchanged and shall govern the joined proceedings;

FURTHER ORDERED that a copy of this Decision shall be entered in IPR2024-01013; and

FURTHER ORDERED that the case caption in IPR2024-01013 shall be modified to reflect Petitioner's joinder in accordance with the attached example.

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MOLECULAR REBAR DESIGN, LLC,
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⁹ Samsung Electronics Corporation, Ltd. and Samsung Electronics America, Inc. were joined as petitioners in this proceeding based on a petition and motion for joinder filed in IPR2025-00359, which was granted.