

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ENERGY SOLUTION, LTD.,
Petitioner,

v.

MOLECULAR REBAR DESIGN, LLC,
Patent Owner.

IPR2024-01013
Patent 10,153,483 B2

Before JON B. TORNQUIST, JEFFREY W. ABRAHAM, and
JULIA HEANEY, *Administrative Patent Judges*.

TORNQUIST, *Administrative Patent Judge*.

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

I. INTRODUCTION

LG Energy Solution, Ltd. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–4 and 7–18 of U.S. Patent No. 10,153,483 B2 (Ex. 1001, “the ’483 patent”). Paper 2 (“Pet.”). Molecular Rebar Design, LLC (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 5 (“Prelim. Resp.”). With authorization, Petitioner subsequently filed a Preliminary Reply (Paper 6, “Prelim. Reply”) and Patent Owner filed a Preliminary Sur-reply (Paper 7, “Prelim. Sur-reply”) addressing the issue of discretionary denial.

An *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). Having considered the arguments and evidence set forth by Petitioner and Patent Owner, we determine that the information presented in the Petition demonstrates a reasonable likelihood that Petitioner would prevail on at least one of the challenged claims of the ’483 patent. We also determine that the arguments and evidence of record do not support discretionary denial under either 35 U.S.C. § 314(a) or § 325(d). Accordingly, we institute an *inter partes* review as to all of the challenged claims of the ’483 patent on all of the grounds of unpatentability set forth therein.

II. BACKGROUND

A. *Related Matters*

The parties indicate that the ’483 patent is at issue in *Molecular Rebar Design, LLC v. LG Energy Solution, Ltd.*, 2-24-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. 70; Paper 4, 2.

B. Real Parties-in-Interest

Petitioner identifies itself as the real party-in-interest. Pet. 70. 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 in the energy storage field. Paper 4, 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*

Claims 1, 7, 8, and 9 are independent, with challenged claims 2–4, 11, and 12, depending, directly or indirectly from claim 1, challenged claims 13 and 14 depending from claim 7, challenged claims 15 and 16 depending from challenged claim 8, and challenged claims 10, 17, and 18 depending from claim 9. Ex. 1001, 7:5–8:55. Claim 1 is representative of the challenged claims and is reproduced below.

1. [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

¹ The ’483 patent defines “discrete carbon nanotubes” as “carbon nanotubes capable of being separated to give individual tubes.” Ex. 1001, 3:53–55.

[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 oxidation levels from 1% to 15% by weight of the carbon nanotube.

Ex. 1001, 7:5–19 (claim identifiers added to conform with Petitioner’s arguments (Pet. vii)).

E. Asserted Grounds of Unpatentability

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

Claims 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 upon the declaration testimony of Dr. Yu Zhu.

Ex. 1003.

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

III. ANALYSIS

A. Legal Standard

A patent claim is unpatentable under 35 U.S.C. § 103(a) 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 the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *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) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner contends that one 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.” Pet. 7. Petitioner further contends that “[a]dditional work experience can compensate for less formal education and vice versa.” *Id.*

For purposes of its Preliminary Response, Patent Owner “does not dispute the Petition’s definition of [the] level of ordinary skill in the art.” Prelim. Resp. 3.

On this record, we preliminarily adopt Petitioner’s definition of the person of ordinary skill in the art as it appears consistent with the prior art of

record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (holding that the prior art itself can reflect the appropriate level of ordinary skill in the art).

C. *Claim Construction*

In an *inter partes* review proceeding, a patent claim is construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (as amended Oct. 11, 2018). This rule adopts the same claim construction standard used by Article III federal courts, which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. Under this standard, the words of a claim are generally given their “ordinary and customary meaning,” which is the meaning the term would have to a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *See Phillips*, 415 F.3d at 1312–13.

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 assert that any claim terms require express construction. Prelim. Resp. 2–3

Upon review of the record, we determine that no claim terms require express construction for purposes of this Decision. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent

necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

D. *Priority Date*

Petitioner contends that the limitations “aspect ratio of 10 to 500” and “ratio of lithium ion . . . at least 2:1 to 25:1” lack written description support in provisional application no. 61/500,560. Pet. 4–5. As such, Petitioner contends the earliest possible priority date for each independent claim of the ’483 patent is June 21, 2012. *Id.* at 5.

Patent Owner takes no position regarding the priority date of the claims of the ’483 patent. Prelim. Resp. 3.

Given that the priority date of the challenged claims is not disputed, and the issue impacts only whether Liu (and not Gong) is prior art to the ’483 patent, we need not address the issue at this time. The parties may, however, address the priority date of the challenged claims during trial.

E. *Claims 1–4 and 7–18 over Ohata, Kavan, and Gong or Liu*

Petitioner contends the subject matter of claims 1–4 and 7–18 would have been obvious over the combined disclosures of Ohata, Kavan, and Gong or Liu. Pet. 10–61.

1. *Ohata*

Ohata discloses that an electrode for a secondary lithium-ion battery “is typically produced by mixing an electrode active material with a conductive material and a binder to form a paste, which is then applied onto a current collector.” Ex. 1004 ¶ 2. Ohata explains that the conductive material “is used to secure the conductivity of an electrode,” but if the amount of conductive material is large, the battery capacity will be decreased. *Id.* “[I]n order to reduce the amount of conductive material

used,” Ohata notes that it has been “proposed to use a masterbatch process,” wherein a conductive material such as a carbon black or powdered graphite is uniformly dispersed in a binder in the production of a positive electrode.

Id. In this method, the “primary particles of carbon black or powdered graphite are linked into a chain to form a conductive path.” *Id.* ¶ 3. Such a conductive path, however, is likely to be damaged by shearing forces applied to the conductive material during the masterbatch process. *Id.* “For this reason,” according to Ohata, “the use of the masterbatch process to uniformly disperse the conductive material in a binder does not yield an electrode superior in conductivity.” *Id.*

To overcome these difficulties, Ohata discloses a method of producing an electrode for a battery comprising the steps of:

- (a) producing a masterbatch comprising at least carbon nanotubes and a resin; (b) blending an electrode material mixture containing at least the masterbatch and an electrode active material with a dispersion medium to prepare an electrode material mixture paste; (c) applying the electrode material mixture paste onto an electrode substrate and then drying and rolling the electrode material mixture paste coated on the electrode substrate to obtain an electrode plate; and (d) cutting the electrode plate to obtain an electrode with a predetermined shape.

Ex. 1004 ¶ 5.

Figure 1 of Ohata is reproduced below.

FIG. 1

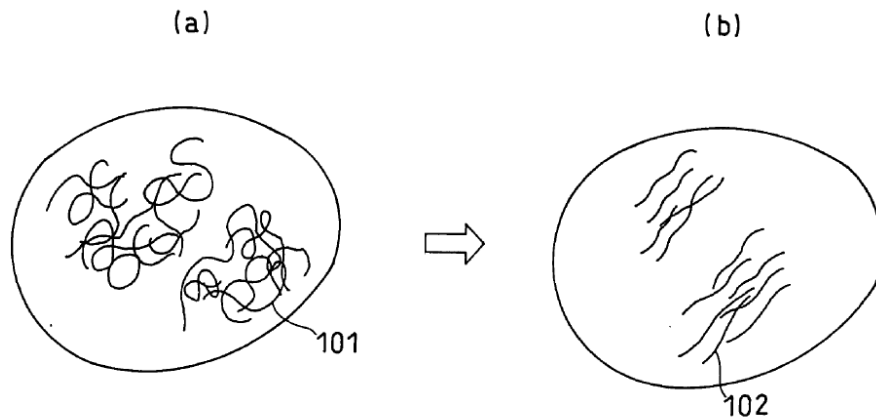


Figure 1(a) is a schematic diagram showing carbon nanotubes tangled and twisted with one another before being blended with a resin, and Figure 1(b) is a schematic diagram showing the carbon nanotubes unraveled and straightened after they have been blended with the resin. Ex. 1004 ¶¶ 12–13. Ohata explains that “[t]he unraveled and straightened carbon nanotubes 102 are expected to form an excellent conductive path in an electrode even if the amount thereof is small.” *Id.* ¶ 16. Ohata further explains that having a resin with unraveled and straightened carbon nanotubes “serves to increase the mechanical strength of an electrode plate,” providing the plate with “great strength against bending and therefore electrode damage” during production of the electrode group. *Id.* ¶ 17.

Ohata explains that the carbon nanotubes preferably have an average length of 1 to 100 μm . Ex. 1004 ¶ 19. According to Ohata, when the carbon nanotubes are too short “excellent conductive paths may not be formed in some electrodes,” and when the carbon nanotubes are too long “[n]o problems arise,” but “the dispersibility of the carbon nanotubes in the resin may be slightly low.” *Id.*

Ohata explains that “[t]he carbon nanotubes preferably have an average diameter (outer diameter) of not greater than 0.1 μm and an aspect ratio of not less than 100 determined by dividing the average length of the carbon nanotubes by the average diameter.” Ex. 1004 ¶ 6. The carbon nanotubes preferably have an aspect ratio of not less than 100 because when the aspect ratio is too small, excellent conductive paths may not be formed in some electrodes. *Id.* ¶ 20. Conversely, the aspect ratio of the carbon nanotubes is preferably no greater than 1000 because “[w]hen the aspect ratio is too large, the carbon nanotubes are unlikely to be straightened sufficiently even after a resin is blended thereto.” *Id.*

Ohata explains that the positive electrode active material to be used “varies depending on the battery type.” Ex. 1004 ¶ 26. For example, LiCoO_2 , LiNiO_2 or LiMn_2O_4 may be used as the positive electrode active material. *Id.* The negative electrode active material may be a graphite material, or other carbonaceous materials such as hard carbon. *Id.* ¶ 27.

2. Kavan

Kavan discloses a secondary lithium-ion battery that uses phosphate olivines, such as LiMnPO_4 and LiFePO_4 , as the positive electrode active material in combination with carbon nanotubes that have been functionalized by carboxylic groups. Ex. 1005, 5360. Kavan notes that phosphate olivine materials are promising cathode materials due to their “high safety, low cost and environmental tolerability,” but “their poor electrical conductivity is a crucial issue” to be addressed. *Id.* Kavan explains that the poor electrical conductivity of phosphate olivine materials was previously addressed in the art “either by doping or by surface coating with elemental carbon.” *Id.* (internal citations omitted). The use of carbon nanotubes to improve

conductivity was disclosed in the art, according to Kavan, but the resulting improvement in capacity and charging rate was “quite modest.” *Id.* at 5360–5361. Kavan further notes that surface oxidation of carbon nanotubes by nitric acid (HNO_3) to produce carboxyls “was sometimes mentioned to improve the anchoring of TiO_2 or LiMPO_4 (wherein $\text{M} = \text{Fe}, \text{Mn}$).” *Id.*

Kavan reports that the combination of LiFePO_4 and functionalized carbon nanotubes was found to provide excellent electrochemical activation with reversible charging near 100%, which was unperturbed during repeated discharge/charge cycling. Ex. 1005, 5368; *see also id.* at 5367 (“It is obvious that the functionalization of nanotubes is, indeed, crucial for enhancing the electrochemical activity of the composite materials with LiFePO_4 .”).

3. *Gong*

Gong discloses a boron-containing lithium iron phosphate/carbon composite material, characterized by having a chemical formula of: $\text{Li}_{1-x}\text{M}_x\text{Fe}_{1-y}\text{N}_y\text{P}_{1-z}\text{Si}_z\text{O}_4 \cdot \xi\text{B}_2\text{O}_3/\text{C}$ or $\text{Li}_{1-x}\text{M}_x\text{Fe}_{1-y}\text{N}_y\text{P}_{1-z}\text{Si}_z\text{O}_4 \cdot \zeta\text{LiBO}_2/\text{C}$, wherein the metal element M doped at a lithium site in a bulk phase is at least one of Mg, Ca, Zn, Al, Cr, V, Ti, Zr and Nb, and $0 \leq x \leq 0.1$ and $0 \leq y \leq 1$. Ex. 1007, claim 1.

4. *Liu*

Liu discloses that transition metal phosphates having an olivine structure are mainly used as positive active materials for secondary lithium batteries, “and have advantages such as low prices and rich reserves of raw materials, no environmental pollution, good chemical stability, very good safety performance, high lithium storage capacity, good cycle performance, high voltage, etc.” Ex. 1009, 3. “The most studied at present is lithium iron

phosphate (LiFePO_4), which is considered an ideal candidate for future power supply applications.” *Id.* To overcome some known problems with phosphate olivines, however, Liu discloses the use of carbon nanotubes and a doping element, with the chemical composition of the positive electrode active material being “ $\text{Li}_x\text{A}_a\text{M}_m\text{B}_b\text{PO}_z\text{N}_n$,” where “doping element A is selected from at least one of Na, Mg, Ti, V, Cr, Cu, Mn, Co, Ni, Zn, Ga, In, Ge, W, Hg, Au, Ag, Nb, and Zr.” *Id.* at 6.

5. Analysis—Independent Claim 1

Petitioner argues that claim 1 is unpatentable as having been obvious in view of the combined teachings of Ohata, Kavan, and Gong or Liu. Pet. 10–49. In its ground, Petitioner explains that it uses Ohata “as a starting point,” including its “electrode material mixture containing [a] masterbatch and an electrode active material.” *Id.* at 18 (quoting Ex. 1004 ¶ 23). Petitioner further explains that the masterbatch contains nanotubes with an aspect ratio of between 100 and 1000, as taught by Ohata. *Id.* In the proposed combination, the nanotubes used to prepare the masterbatch are first “functionalized by oxidation with HNO_3 ,” as disclosed in Kavan, to form “carboxylic groups,” wherein “[t]he amount of atomic oxygen present’ on the nanotube surface is ‘7%.’” *Id.* at 19 (quoting Ex. 1005, Abstract, 5361, 5363). Following the teachings of Ohata, Petitioner contends the oxidized nanotubes are then “unraveled and straightened by blending them with a resin” to form Ohata’s masterbatch. *Id.*

According to Petitioner, the masterbatch is mixed with an electrode active material including Kavan’s phosphate olivines (LiMnPO_4 or LiFePO_4), and this combination is then blended with a dispersion medium to form an “electrode material mixture paste,” as described in Ohata. Pet. 19.

Petitioner contends one of ordinary skill in the art would have sought to incorporate oxidized nanotubes in Ohata because (1) Kavan demonstrated that oxidized nanotubes improve the electrochemical performance of an electrode, such as LiFePO_4 , (2) oxidized nanotubes would further Ohata's goal of having well-dispersed nanotubes in the composite, and (3) oxidation was understood in the art to remove amorphous carbon and metallic impurities from carbon nanotubes. Pet. 21–23. Petitioner further contends that the use of oxidized carbon nanotubes would merely constitute the application of a known technique, to a known structure, to yield a predictable result. *Id.* at 23.

Petitioner contends one of ordinary skill in the art would have sought to use the phosphate olivines of Kavan as the positive electrode active material because (1) they were known to have good electrochemical performance, (2) phosphate olivines were known to have high capacity, long cycle life, and stability, and (3) phosphate olivines were understood to be economically desirable, to have a “robust safety profile,” and to be environmentally friendly. Pet. 25–26.

Petitioner contends one of ordinary skill in the art would have sought to dope the phosphate olivines of Ohata and Kavan in view of the teachings of Gong and/or Liu. Pet. 27. In particular, Petitioner contends that Gong discloses that lithium iron phosphate doped at lithium sites with a non-lithium metal ion can have a higher discharge capacity as well as other advantages, such as “low preparation temperature, small average particle size, high tapped density, and good rate charge and discharge characteristics.” *Id.* at 28 (quoting Ex. 1007, 26–27). Similarly, Petitioner contends Liu discloses that doping can lead to improved “electron conductivity and ion conductivity.” *Id.* (quoting Ex. 1009 ¶¶ 2–3).

According to Petitioner, the use of Gong or Liu’s doping techniques in the Ohata and Kavan electrode would constitute merely the application of known techniques, to a known structure, to yield predictable results. *Id.* at 28–29.

Patent Owner disputes (1) whether Petitioner has demonstrated that Ohata, Kavan, and Gong or Liu teach or suggest every limitation of claim 1, and (2) whether Petitioner has demonstrated that one of ordinary skill in the art would have combined the references to arrive at the claimed invention with a reasonable expectation of success. We address these issues below.

a. Limitations of Claim 1

Limitation [1pre]

Claim 1 recites “[a] composition useful for lithium batteries.” Ex. 1001, 7:5–6. To the extent the preamble is limiting, Petitioner asserts that the combined teachings of Ohata, Kavan, and Gong or Liu disclose or suggest the recited composition. Pet. 30. In particular, Petitioner argues that Ohata’s “electrode material mixture paste” is a composition “useful for lithium ion batteries.” *Id.* at 30–31 (citing Ex. 1004, Abstract, ¶¶ 5, 17, 15, 26, 27, 32, 36, 37, 39, 46). Patent Owner does not dispute Petitioner’s arguments about the preamble.

After reviewing Petitioner’s unchallenged evidence and arguments, we determine that Petitioner has demonstrated sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest the preamble of claim 1.⁸

⁸ In view of this determination, we need not address whether the preamble is limiting.

Limitation [1a]

Limitation [1a] requires that the composition comprises “discrete, non-agglomerated, and exfoliated carbon nanotubes having a surface.” Ex. 1001, 7:6–7. Petitioner contends that Ohata’s masterbatch includes carbon nanotubes blended with a resin, which results in the carbon nanotubes becoming “unraveled and straightened” and “dispersed” within the resin, as depicted in Figure 1(b) of Ohata. Pet. 32–33 (quoting Ex. 1004 ¶¶ 16, 17 (emphasis omitted)). Petitioner further argues that “to the extent discrete is interpreted as referring to nanotubes that are generally uniformly dispersed or individually distinct,” a person of ordinary skill in the art would have understood “that at least some of these ‘unraveled and straightened carbon nanotubes’ are discrete because they are generally ‘dispersed’ as individual nanotubes in the resin, as described and illustrated by Ohata.” *Id.* at 35–36 (citing Ex. 1004 ¶ 17, Fig. 1(b); Ex. 1003 ¶¶ 82–83). Petitioner also argues that the carbon nanotubes of the combination have a surface. *Id.* at 36

Patent Owner argues that Petitioner wrongly alleges that any “‘generally uniformly dispersed’ nanotubes inherently include ‘discrete carbon nanotubes.’” Prelim. Resp. 22–23. According to Patent Owner, a person of ordinary skill in the art would have understood “that aggregates of dispersed non-discrete carbon nanotubes may be generally uniformly dispersed.” *Id.* at 23.

On this record, Patent Owner’s arguments do not dissuade us from instituting trial. As Petitioner notes, Ohata expressly discloses that its carbon nanotubes are “unraveled and straightened” and then “dispersed” within the resin. Ex. 1004 ¶¶ 16–17. Figure 1(b) of Ohata also depicts the carbon nanotubes as being discrete and non-agglomerated, and Patent Owner

presents no persuasive evidence to suggest that the carbon nanotubes of Ohata are subsequently agglomerated during the dispersal or electrode forming steps described in Ohata.

Patent Owner also argues that Kavan Figure 2 shows its oxidized nanotubes are highly entangled and not discrete. Prelim. Resp. 23. This argument, however, fails to account for the combined teachings of Ohata and Kavan, in which Petitioner relies on Ohata's disclosure of dispersing discrete, non-agglomerated carbon nanotubes in resin. Pet. 32–33, 35–36.

In view of the foregoing, we determine that Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu teach or suggest limitation [1a].

Limitation [1b]

Limitation [1b] requires that the nanotubes in the composition have “mixtures of ion active materials comprising crystals or layers of lithium ion active material.” Ex. 1001, 7:7–9. Petitioner contends that its proposed composition is formed by blending the masterbatch with an electrode active material, which is a lithium ion active material, based on Ohata's disclosure. Pet. 37–38 (citing Ex. 1004 ¶¶ 5, 23, 26, 27, 32, Abstract). Petitioner further contends, based on Kavan's disclosure, that the specific composition of the positive electrode active material in the combination may be phosphate olivine, which is present in the composition as crystals. *Id.* (citing Ex. 1005, 1, 4). Petitioner also argues that one of ordinary skill in the art would have understood that the Li⁺ ions present within the phosphate olivine are “migratable ions” and that some migratable lithium ions may be substituted with other migratable ions, such as Mg, Na, Al, Ni, Hg, Au, and Ag, as disclosed in Gong or Liu. *Id.* at 38–39 (citing Ex. 1003 ¶ 87; Ex. 1027, 3; Ex. 1028, 1–4; Ex. 1029, 5–6; Ex. 1001, 4:27–38).

Patent Owner does not generally dispute that limitation [1b] is disclosed in Ohata, Kavan, and Gong or Liu.

Upon review of the evidence of record, we determine Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest limitation [1b].

Limitation [1c]

Limitation [1c] requires “wherein a ratio of lithium ion to other total ions in the active materials is at least 2:1 to 25:1.” Ex. 1001, 7:10–11. Petitioner contends that this claim limitation, in the context of the ’483 patent, refers to the ratio of lithium ions to other migratable ions. Pet. 39 (citing Ex. 1003 ¶ 88). Petitioner further contends that Gong discloses replacing Li within phosphate olivine with other migratable ions M (i.e., $\text{Li}_{1-x}\text{M}_x$) such that x is between 0 and 1. *Id.* (citing Ex. 1007, 8, claim 1; Ex. 1003 ¶ 90). As applied to the phosphate olivine material of Ohata and Kavan, Petitioner contends that the ratio of lithium ions therefore could be 9:1 (wherein x is 0.1) or 24:1 (wherein x is 0.04). *Id.* at 39–40 (citing Ex. 1003 ¶ 90). Petitioner further contends that following Liu’s teachings, the ratio could be 10:1 or 25:1. *Id.* at 40–41 (citing Ex. 1003 ¶ 91).

Patent Owner does not generally dispute that limitation [1c] is disclosed in Ohata, Kavan, Gong or Liu.

Upon review of the evidence of record, we determine Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest limitation [1c].

Limitation [1d]

Limitation [1d] requires “wherein the discrete carbon nanotubes have crystals or layers of lithium ion active material ionically attached to their

surface.” Ex. 1001, 7:11–13. Petitioner contends that the crystals of olivine phosphate in the Ohata/Kavan combination are attached to the nanotube surface “due at least in part to the surface oxidation of the nanotubes.” Pet. 42–43 (citing Ex. 1005, 2, 4; Ex. 1003 ¶ 94). And, although Kavan is silent as to the type of bond that is formed between the carboxyl group and the olivine material, Petitioner contends one of ordinary skill in the art would have understood that the crystals are ionically attached to the surface of the nanotubes because the negative charge on the outer surface of the nanotube would interact with the positively charged metal ions in the ion active material. *Id.* at 43–44 (citing Ex. 1005, 2; Ex. 1003 ¶¶ 94–95; Ex. 1024 ¶ 57; Ex. 1030).

Patent Owner argues that, contrary to Petitioner’s assertions, Kavan does not disclose that phosphate olivine crystals are attached to the nanotube surface due to surface oxidation. Prelim. Resp. 20. Rather, Patent Owner contends Kavan merely notes it was “sometimes mentioned” in the art that surface oxidation of carbon nanotubes improved the anchoring of phosphate olivines. *Id.* (citing Ex. 1005, 2); *see id.* at 21 (noting that Kavan states that “[t]he interaction of carboxyls with [the] phosphate olivine surface is less understood”). And, given that Kavan is uncertain as to any carbon nanotube attachment, Patent Owner contends Petitioner’s speculation “does not meet the preponderance burden Petition must show.” *Id.* at 21–22.

Patent Owner further contends that Ohata’s masterbatch has a small amount of nanotubes dispersed in a large amount of resin, and Petitioner does not explain what steps would be taken to ensure the crystals or layers of ion active material are ionically attached to the surface of discrete carbon nanotubes. Prelim. Resp. 19. Patent Owner also contends that Ohata teaches that the resin added to the electrode material mixture is preferably

particulate rubber that enables spot bonding between the active material particles to obtain “a high-capacity electrode,” yet Petitioner “does not account in any way for Ohata’s active material particles being spot bonded to each other.” *Id.* at 19–20 (citing Ex. 1004 ¶ 23).

Patent Owner’s arguments do not dissuade us from instituting trial. First, Kavan reports that surface oxidation was “sometimes mentioned to improve anchoring” of LiMPO_4 to carbon nanotubes, which supports Petitioner’s arguments that surface oxidation will cause anchoring of phosphate olivines to carbon nanotubes. Moreover, after mentioning prior studies, Kavan embarked on a systematic study to understand optimized attachment of functionalized carbon nanotubes towards olivine surfaces. Ex. 1005, 5361 (noting that “the central motivation for the study” was to provide a “systematic study” of functionalization of carbon nanotubes “for optimum attachment . . . towards titania and olivine surfaces”). Kavan also reports that functionalized carbon nanotubes provided “excellent electrochemical activation of LiFePO_4 .” *Id.* at 5368. This tends to support Petitioner’s argument that the olivines of Kavan attach to the functionalized carbon nanotubes.

Second, Patent Owner identifies no evidence that dispersing a small amount of nanotubes in a large amount of resin would inhibit or preclude attachment of electrode active material crystals or layers to functionalized carbon nanotubes.

Third, as noted by Patent Owner, Ohata notes that a resin preferably containing particulate rubber “can be added” to the electrode material mixture to spot bond the cathode active materials, but Ohata does not require such materials and Petitioner does not rely on their use. Ex. 1004 ¶ 23.

Upon review of the evidence of record, we determine that Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest limitation [1d].

Limitation [1e]

Claim limitation [1e] requires “wherein the discrete carbon nanotubes comprise oxidized species selected from the group consisting of carboxylic, ketone, or hydroxyl functionalities.” Ex. 1001, 7:14–16. Petitioner contends that carbon nanotubes of the combination are oxidized to form carboxylic groups on their surface, as taught in Kavan. Pet. 44 (citing Ex. 1005, 2, 4, 9; Ex. 1003 ¶ 96).

Patent Owner disputes whether one of ordinary skill in the art would have sought to oxidize the carbon nanotubes of Ohata, but it does not contest that the oxidation process of Kavan would result in oxidized carbon nanotubes with carboxylic functionalities.

Upon review of the evidence of record, we determine Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest limitation [1e].

Limitation [1f]

Claim limitation [1f] requires “wherein the discrete carbon nanotubes have an aspect ratio of 10 to 500.” Ex. 1001, 7:16–17. Petitioner contends the carbon nanotubes of Ohata have an aspect ratio of between 100 and 1000, and Ohata discloses specific examples with aspect ratios of 50, 100, and 200. Pet. 45 (citing Ex. 1004 ¶¶ 6, 9, 10, 20, Table 2). And, given that these examples fall within the claimed range of 10 to 500, Petitioner contends limitation [1f] is disclosed in Ohata. *Id.* at 45–46.

Patent Owner contends that oxidation was known to shorten carbon nanotubes, which would reduce their aspect ratio. Prelim. Resp. 9 (citing

Ex. 1017, Abstract). Patent Owner does not quantify, however, the expected shortening of oxidized carbon nanotubes, or suggest that the examples with aspect ratios of 50, 100, and 200 would fall outside the claimed range of 10 to 500 after oxidation. As such, Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest limitation [1f]. The parties may address during trial, however, the expected level of carbon nanotube shortening in the proposed combination of Ohata, Kavan, and Gong or Liu and whether the oxidation process disclosed in Kavan would result in either the specific examples or ranges set forth in Ohata falling outside the claimed range.

Limitation [1g]

Claim limitation [1g] requires “oxidation levels from 1% to 15% by weight of the carbon nanotube.” Ex. 1001, 7:18–19. Petitioner contends that the functionalized carbon nanotubes of Kavan have 7% atomic oxygen present on their surface, which Dr. Zhu calculates corresponds to an oxidation level of 9.1% by weight. Pet. 47–48 (citing Ex. 1005, 2; Ex. 1003 ¶¶ 103–104).

Patent Owner does not dispute at this stage of the proceeding that the combination of Ohata, Kavan, and Gong or Liu discloses this limitation.

Upon review of the evidence of record, we determine Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest limitation [1g].

For all these reasons, we determine that Petitioner demonstrates sufficiently for purposes of institution that Ohata, Kavan, and Gong or Liu disclose or suggest every limitation of independent claim 1. We next turn to Patent Owner’s arguments regarding Petitioner’s reasons to combine Ohata, Kavan, and Gong or Liu.

b. *Reason to Combine*

Patent Owner disputes whether one of ordinary skill in the art would have sought to use oxidized carbon nanotubes or phosphate olivines as the positive electrode active material in the Ohata, Kavan, and Gong or Liu combination with a reasonable expectation of success. Prelim. Resp. 10–18. We address these arguments in turn.

(1) *Oxidized Carbon Nanotubes*

Patent Owner contends one of ordinary skill in the art would not have sought to oxidize the carbon nanotubes of Ohata because oxidation was known to shorten nanotubes and this would decrease the aspect ratio of the nanotubes below 100, which “Ohata warns about.” Prelim. Resp. 8 (citing Ex. 1017, Abstract). As noted above, however, Patent Owner does not quantify the expected decrease in nanotube length, or present evidence that oxidation would reduce the aspect ratio of all of Ohata’s carbon nanotubes below its desired range of 100 to 1000. *Id.*; Ex. 1004 ¶ 20. Thus, we have no reason to question Petitioner’s assertion that at least some of the aspect ratio examples cited in the Petition would fall within both Ohata’s desired range and the claimed range of 10 to 500. Nor does Patent Owner present evidence that the range of aspect ratios set forth in Ohata (100 to 1000) would no longer overlap the claimed range (10 to 500) after the carbon nanotubes are oxidized. *See In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) (“In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a *prima facie* case of obviousness.”).

Patent Owner also argues that Petitioner has not explained why one of ordinary skill in the art would have attempted to retain Ohata’s nanotube

aspect ratio and expect success when the conductive path is altered by substituting chemically different nanotubes, “i.e., shortened oxidized nanotubes with a small aspect ratio due to oxidation, while also substituting Ohata’s electroactive material with something else that Ohata does not contemplate.” Prelim. Resp. 11. Contrary to Patent Owner’s arguments, Petitioner explains why one of ordinary skill in the art would seek to oxidize the carbon nanotubes of Ohata, maintain an aspect ratio within the claimed range, and use phosphate olivine materials as the positive electrode active material. Pet. 11–12, 21–27, 45–47. To the extent Patent Owner contends one of ordinary skill in the art would not have agreed with Petitioner’s reasoning, it may present such evidence during trial.

Patent Owner contends Petitioner’s primary reason for oxidizing Ohata’s carbon nanotubes is because of improved performance when used with phosphate olivine electrode materials, which is circular because Ohata’s masterbatch does not have a phosphate olivine as the active material. Prelim. Resp. 13–14. This argument, however, does not address the combination as a whole, which expressly contemplates using the phosphate olivine materials of Kavan in combination with the oxidized carbon nanotubes of the Ohata/Kavan combination. Pet. 18.

Patent Owner also contends that “Ohata nowhere suggests it is in need of better dispersion” and Petitioner’s assertion that Ohata’s oxidized nanotubes are generally consistent with the objective of better dispersion is false because Ohata does not have oxidized nanotubes. Prelim. Resp. 14. These arguments, however, do not address the combination of Ohata, Kavan, and Gong or Liu set forth in the Petition, which uses oxidized carbon nanotubes in Ohata in view of Kavan’s disclosures. Pet. 18–19. Moreover, Ohata discloses that the carbon nanotubes are “dispersed” in a resin, which

generally supports Petitioner’s argument that one of ordinary skill in the art would have sought to ensure dispersion of the carbon nanotubes in the resin through the use of oxidation. Ex. 1004 ¶ 22.

Patent Owner also argues that Petitioner fails to demonstrate that the carbon nanotubes of the proposed combination contain amorphous carbon or metallic impurities, or that the proposed combination is the application of a known technique, to a known structure, to yield predictable results. Prelim. Resp. 15–16. We need not resolve these issues at this time because Petitioner’s other reasons to combine are sufficient to support institution. To the extent the parties maintain these arguments in support of their positions, the parties should continue to address them during trial.

(2) Use of Phosphate Olivines

Patent Owner contends Petitioner’s purported reasons to use phosphate olivines in the proposed combination fail as they rest on faulty assumptions and circular reasoning that (1) Ohata has oxidized carbon nanotubes, and (2) phosphate olivines have “good electrochemical performance.” Prelim. Resp. 16–18. Having reviewed the evidence and arguments of record, Patent Owners arguments do not dissuade us from instituting trial.

First, Patent Owner contends Petitioner’s reason for using phosphate olivines of Kavan in Ohata is “because of their good electrochemical performance when combined with oxidized nanotubes, as described by Kavan.” Prelim. Resp. 16 (quoting Pet. 24–25). According to Patent Owner, this reasoning is circular because Ohata does not have oxidized carbon nanotubes, but rather unoxidized nanotubes. *Id.* at 16–17. This argument is not persuasive because Petitioner clearly seeks to use phosphate

olivines and oxidized carbon nanotubes in Ohata in view of the performance improvements discussed in Kavan when these two materials are combined. Pet. 24–25.

Second, Patent Owner contends that Kavan actually discloses that phosphate olivines have “poor electrical conductivity.” Prelim. Resp. 17 (quoting Ex. 1005, 5360). According to Patent Owner, “Petitioner does not explain how or why in the absence of hindsight” a person of ordinary skill in the art “would ignore Kavan’s warning about ‘poor electrical conductivity’ and follow through” with the proposed combination. *Id.* This argument is not persuasive because, after noting the poor electrical conductivity of phosphate olivines, Kavan expressly addresses and resolves this issue through, among other things, the use of oxidized carbon nanotubes. Prelim. Resp. 17; Ex. 1005, 5360, Abstract (“[E]xcellent performance was found for LiFePO_4 (olivine) in composite materials containing only 2 wt% of functionalized nanotubes.”). Indeed, Kavan concludes that the combination of LiFePO_4 and oxidized carbon nanotubes resulted in “excellent electrochemical activation” and near 100% reversible charging. Ex. 1005, 5368, Abstract.

Upon review of Petitioner’s and Patent Owner’s arguments, we determine that Petitioner explains sufficiently for purposes of institution why one of ordinary skill in the art would have sought to use phosphate olivines, and in particular LiFePO_4 , in the combination of Ohata, Kavan, and Gong or Liu.

(3) *Conclusion*

Upon review of the parties’ arguments and supporting evidence, we determine that Petitioner sufficiently explains for purposes of institution why

one of ordinary skill in the art would have combined the disclosures of Ohata, Kavan, and Gong or Liu to arrive at the claimed invention with a reasonable expectation of success. Thus, Petitioner demonstrates a reasonable likelihood that claim 1 would have been obvious over Ohata, Kavan, and Gong or Liu.

2. Claims 2–4 and 7–18

Petitioner directs us to portions of Ohata, Kavan, and Gong or Liu that disclose or suggest the limitations of claims 2–4 and 7–18. Pet. 49–61. At this stage of the proceeding, Patent Owner does not separately dispute that Ohata, Kavan, and Gong or Liu disclose or suggest the limitations of claim 2–4 and 7–18.

Upon review of the evidence and arguments of record, we are persuaded that Petitioner has established a reasonable likelihood of prevailing on its obviousness challenge with respect to claims 2–4 and 7–18.

F. Claims 1, 2, and 7–18 over Ohata, Kavan, and Ichinose

To the extent Patent Owner disputes Petitioner’s contention that the term “a ratio of lithium ion to other total ions in the ion active materials” refers to the ratio of lithium ions to other migratable ions, Petitioner relies on the disclosures of Ichinose. Pet. 61–62. On the present record, however, Patent Owner does not dispute Petitioner’s construction of the identified claim phrase. Prelim. Resp. 3. Nor does Patent Owner contest Petitioner’s identification of where Ohata, Kavan, and Ichinose disclose the subject matter of claims 1, 2, and 7–18, apart from the arguments discussed above with respect to the combination of Ohata, Kavan, and Gong or Liu. *See generally* Prelim. Resp. As such, we need not further address Petitioner’s arguments with respect to Ohata, Kavan, and Ichinose.

G. *Fintiv*

Under 35 U.S.C. § 314(a) we have discretion to deny institution of an *inter partes* review. *Cuozzo Speed Techs., LLC v. Lee*, 579 U.S. 261, 273 (2016). Patent Owner contends we should discretionarily deny institution under § 314(a) in view of the co-pending district court litigation. Prelim. Resp. 27. For the reasons set forth below, we do not exercise our discretion to deny institution in view of the parallel district court proceeding.

Institution of an *inter partes* review is discretionary. *See* 35 U.S.C. § 314(a) (authorizing institution of an *inter partes* review under particular circumstances, but not requiring institution under any circumstances); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”); *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”).

We consider several factors when determining whether to deny institution under § 314(a) based on a parallel district court proceeding, specifically

1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
2. proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision;
3. investment in the parallel proceeding by the court and the parties;
4. overlap between issues raised in the petition and in the parallel proceeding;

5. whether the petitioner and the defendant in the parallel proceeding are the same party; and

6. other circumstances that impact the Board’s exercise of discretion, including the merits.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). We also consider “several clarifications” made by the Director of the United States Patent and Trademark Office (“USPTO”). See USPTO Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, 2 (June 21, 2022).⁹

1. *Factor 1 – Whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted*

Under the first *Fintiv* factor, we consider “whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted.” *Fintiv* at 6.

Petitioner filed a motion to stay the litigation in the parallel district court litigation, which the district court denied without prejudice to refile after the Board issues its institution decision. Prelim. Resp. 27–28 (citing Ex. 2001). Petitioner argues that factor 1 is neutral because the district court routinely grants motions for stays and the district court permitted Petitioner to refile its motion after an institution decision is issued. Prelim. Reply 1.

Patent Owner contends the likelihood of the district court granting a stay hinges on “whether this IPR and the four other related IPRs are instituted by the Board,” which, according to Patent Owner, is unlikely in

⁹ The Interim Procedure is available under the “Guidance Memorandum” heading on the “Resources and guidance” page for the Patent Trial and Appeal Board, located at <https://www.uspto.gov/patents/ptab/resources>.

view of Board institution statistics. Prelim. Sur-reply 1. Patent Owner further argues that “the Board has acknowledged that in cases where a final written decision and a trial date are close,” and the question of “whether a court will grant a stay is ‘speculative’,” this renders *Fintiv* factor 1 “neutral.” Prelim. Sur-reply 1–2 (quoting *T-Mobile USA, Inc. et al. v. Wireless Alliance, LLC*, IPR2024-00608, Paper 16 at 12 (PTAB Sept. 3, 2024)).

Although the parties agree that this factor is neutral, we note that a district court denial of a motion to stay without prejudice, accompanied by an indication that the district court would consider a renewed motion, “suggests the district court may be willing to avoid duplicative efforts and await the PTAB’s final resolution of the patentability issues raised in the petition before proceeding with the parallel litigation.” *Fintiv* at 6–7. “This fact has usually weighed against exercising authority to deny institution.” *Id.* (also noting that factors 2 and 3 are relevant to how much weight to give to the court’s willingness to reconsider a stay); *see also T-Mobile*, Paper 16 at 12 (noting that a stay was unlikely in that case given the proximity of the trial date to the entry of the institution decision).

In view of the forgoing, we determine that *Fintiv* factor 1 weighs against exercising our authority to deny institution.

2. *Factors 2 and 3 – The proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision and investment in the parallel proceeding by the court and the parties*

Under the second *Fintiv* factor, we consider the “proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision.” *Fintiv* at 6. Under the third *Fintiv* factor, we consider the “investment in the parallel proceeding by the court and the parties.” *Id.*

Trial for the parallel district court litigation is scheduled for December 8, 2025, which, as the parties acknowledge, is “nearly the same time” as the due date for a Final Written Decision in this proceeding. Prelim. Resp. 28; Pet. Reply 1. “If the court’s trial date is at or around the same time as the projected statutory deadline . . . , the decision whether to institute will likely implicate other factors . . . such as the resources that have been invested in the parallel proceeding.” *Fintiv* at 9.

Patent Owner contends that “[t]he parties are beginning to commit substantial resources to the parallel proceeding as discovery has begun in earnest.” Prelim. Resp. 29. Petitioner asserts in response that the majority of discovery relates to Petitioner’s motion to transfer the case, the parties “have not yet ‘commit[ted] substantial resources’ to merits-based discovery,” and fact discovery does not close until July 2025. Pet. Reply 1–2. Petitioner also asserts that it acted diligently in filing its Petition. *Id.* at 2.

The district court litigation appears to be in an early stage, there is no evidence that the district court has issued any substantive orders related to the ’483 patent or the prior art set forth in the Petition, and there is evidence that Petitioner filed its Petition expeditiously. Prelim. Resp. 28–29; Pet. Reply 1–2; *see Fintiv* at 9–11. Thus, we determine that *Fintiv* factors 2 and 3 weigh against exercising our authority to deny institution.

3. Factor 4 – Overlap between issues raised in the petition and in the parallel proceeding

Under the fourth *Fintiv* factor, we consider the “overlap between issues raised in the petition and in the parallel proceeding.” *Fintiv* at 6.

Petitioner contends this factor favors institution because it “stipulates not to seek resolution in the district court of the same grounds presented in this Petition” if the Board institutes trial. Pet. 69.

Patent Owner argues “[t]his factor favors denial because ‘the same or substantially the same claims, grounds, arguments, and evidence’” presented in the Petition are also at issue in the parallel litigation. Prelim. Resp. 29 (quoting *Fintiv* at 12). With regard to Petitioner’s stipulation, Patent Owner asserts that “Petitioner has not offered to withdraw ***all*** grounds/combinations based on these references or that it reasonably could have raised” and this type of stipulation was criticized in *Sand Revolution*¹⁰ as not being as strong as a *Sotera*¹¹-type stipulation. Prelim. Resp. 29–30 (citing 35 U.S.C. § 315(e)(2); IPR2022-00069, Paper 9, 12–14 (PTAB May 25, 2022); Interim Procedure 7). In addition, Patent Owner contends Petitioner has served extensive invalidity contentions in the district court and Petitioner’s stipulation “does nothing to narrow the case for the Court” because the district court will be “forced to consider almost the full range of invalidity contentions served by Defendant.” *Id.* at 30–31 (citing Ex. 2005).

In its Preliminary Reply, Petitioner argues that, “[w]hile a *Sotera*-type stipulation would entirely foreclose the possibility of discretionary denial, a *Sand Revolution*-type stipulation . . . nevertheless continues to mitigate concerns of duplicative efforts and weighs against denial.” Prelim. Reply 2. According to Petitioner, its “stipulation paired with its great diligence in filing this Petition within mere months of the service of the complaint greatly mitigate any potential concerns regarding duplicative efforts between district court and PTAB.” *Id.*

¹⁰ *Sand Revolution II, LLC v. Cont’l Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 12 (PTAB June 13, 2020) (informative) (“*Sand Revolution*”).

¹¹ *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 19 (PTAB Dec. 1, 2020) (precedential) (“*Sotera*”).

In its Preliminary Sur-Reply, Patent Owner maintains its position regarding the breadth of the issues to be litigated in district court. Prelim. Sur-reply 2–3. Patent Owner, however, does acknowledge that Petitioner’s stipulation would “resolve a small portion of the issues before the court,” and that *Sand Revolution*-type stipulations can weigh “slightly against discretionary denial.” Prelim. Sur-reply 3.

We agree with Patent Owner that, “given the breadth of remaining grounds of invalidity in parallel litigation,” Petitioner’s stipulation “would only resolve a small portion of the issues before the court.” Prelim. Sur-reply 3. Nevertheless, the stipulation offered by Petitioner does mitigate, at least to some extent, concerns of “potentially conflicting decisions.” *Sand Revolution* at 12. Accordingly, we determine that *Fintiv* factor 4 weighs, at least to some extent, against exercising our authority to deny institution.

4. *Factor 5 – Whether the petitioner and the defendant in the parallel proceeding are the same party*

Under the fifth *Fintiv* factor, we consider “whether the petitioner and the defendant in the parallel proceeding are the same party.” *Fintiv* at 6. The parties agree that the parties in this IPR are the same as those in the parallel district court litigation. Pet. 69; Prelim. Resp. 31; Prelim. Reply 2. Patent Owner also asserts that “[t]he same five patents are asserted against Samsung in a case that was consolidated with [Petitioner]’s case for all pre-trial issues.” Prelim. Sur-reply 4 (citing *Molecular Rebar Design, LLC v. Samsung Electronics Co., Ltd.*, 2-24-cv-00108, Dkt. 11 (EDTX)). According to Patent Owner, the parties have identified this as a related matter and, “[e]ven in the unlikely case that all five petitions are instituted, Petitioner has not suggested that the district court case would somehow stay

the consolidated case given that Samsung is not a party to the IPR proceedings.” *Id.*

When the petitioner and the defendant in the parallel proceeding are the same, this tends to support discretionary denial. *See Sotera* at 19. We do not find that the district court’s consolidation for purposes of pre-trial issues strengthens this conclusion, however, because Patent Owner never indicates whether the issues in the case involving Samsung are the same as, or substantially similar to, those to be litigated in its case against Petitioner. *See Fintiv* at 13–14.

In view of the foregoing, we consider *Fintiv* factor 5 to favor discretionary denial.

5. Factor 6 – Other circumstances that impact the Board’s exercise of discretion, including the merits

Under the sixth *Fintiv* factor, we consider “other circumstances that impact the Board’s exercise of discretion, including the merits.” *Fintiv* at 6. Petitioner contends this factor weighs against discretionary denial as its recited grounds “present compelling merits.” Prelim. Reply 4. Patent Owner contends Petitioner’s “patentability challenge is deeply flawed” and “fails to show obviousness for any ground.” Prelim. Resp. 27.

The Director has instructed “PTAB panels to only consider compelling merits if they first determined that *Fintiv* factors 1–5 favored a discretionary denial.” *CommScope Techs. LLC v. Dali Wireless, Inc.*, IPR2022-01242, Paper 23 at 4–5 (PTAB Feb. 27, 2023) (decision on Director review) (precedential). Here, we determine that *Fintiv* factors 1 through 4 all weigh against exercising our discretion to deny institution, and factor 5 weighs in favor of discretionary denial. When considered in

combination, we determine that *Fintiv* factors 1–5 do not favor discretionary denial, and we therefore do not consider the question of compelling merits.

6. *Conclusion – Fintiv*

Absent a compelling reason to the contrary, we take “a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review” when evaluating the *Fintiv* factors. *Fintiv* at 6; Interim Procedure. Having evaluated all of the factors, we determine that the circumstances presented do not support exercising our discretion under § 314(a) to deny institution of this *inter partes* review.

H. 35 U.S.C. § 325(d)

Patent Owner contends we should exercise our discretion to deny the Petition under 35 U.S.C. § 325(d). Prelim. Resp. 33–39.

1. *Applicable Framework*

Section 325(d) provides that, in determining whether to institute an *inter partes* review, “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). The Board uses a two-part framework in determining whether to exercise its discretion under § 325(d), specifically we determine:

- (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and
- (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

IPR2024-01013

Patent 10,153,483 B2

Advanced Bionics LLC v. MED-EL Elektromedizinische Geräte GmbH,
IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential).

In applying the two-part framework, we consider several non-exclusive factors identified in *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, First Para.), which provide “useful insight into how to apply the framework” (*Advanced Bionics*, Paper 6 at 9):

- (a) the similarities and material differences between the asserted art and the prior art involved during examination;
- (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
- (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
- (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
- (e) whether Petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and
- (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments. *Becton, Dickinson*, Paper 8 at 17–18.

If, after review of factors (a), (b), and (d), we determine that the same or substantially the same art or arguments previously were presented to the Office, we then review factors (c), (e), and (f), to determine whether the Office erred in a manner material to the patentability of the challenged claims. *Advanced Bionics*, Paper 6 at 10.

2. *Analysis*

Patent Owner concedes that the prior art relied upon by Petitioner was not before the examiner during prosecution. Prelim. Resp. 35. Patent Owner contends, however, that the art and arguments set forth in the Petition are substantially the same as those addressed and resolved during prosecution. *Id.* at 36–37. In particular, Patent Owner contends that the Petition relies upon Ohata’s disclosure that the carbon nanotubes are dispersed in resin to demonstrate that the carbon nanotubes are discrete, non-agglomerated, and exfoliated. *Id.* at 37 (citing Pet. 34–35). Yet, according to Patent Owner, the Board on appeal expressly rejected the examiner’s assertion that just because carbon nanotubes “are dispersed in the composite cathode slurry mixture,” this demonstrates that the carbon nanotubes are “discrete, non-agglomerated, and exfoliated.” *Id.* at 37 (citing Ex. 1002, 32, 34–35).

During prosecution, the examiner stated that the carbon nanotubes of the applied prior art reference “are considered discrete and exfoliated . . . because they are dispersed in the composite cathode slurry mixture.” Ex. 1002, 5–6. The Board determined, however, that “without more,” the examiner’s bare statement was insufficient to address the prior art reference’s “express teaching that suggests bundling or agglomeration of carbon nanotubes.” *Id.* at 6 (noting that Figure 2 of the prior art reference suggested that the carbon nanotubes were in fact bundled and agglomerated).

In contrast to the art and analysis provided by the examiner during prosecution, Petitioner identifies a specific disclosure in Ohata demonstrating that the carbon nanotubes are “discrete, non-agglomerated, and exfoliated.” Pet. 32–33 (citing Ex. 1004, Fig. 1(b)). In further contrast to the arguments presented during prosecution, Patent Owner identifies no

disclosure in Ohata, or any other prior art reference, that would suggest that the carbon nanotubes of Ohata, Kavan, and Gong or Liu are agglomerated or non-discrete. Prelim. Resp. 22–23. As such, we determine that the prior art and arguments set forth in the Petition are not substantially the same as those previously analyzed by the Office. Thus, we decline to exercise discretion to dismiss the Petition under 35 U.S.C. § 325(d).

IV. CONCLUSION

For the foregoing reasons, we determine that there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in the Petition. In addition, we are not persuaded that we should discretionarily deny the Petition under either 35 U.S.C. § 314(a) or § 325(b). Accordingly, we institute an *inter partes* review of all challenged claims based on the grounds asserted in the Petition.

V. ORDER

For the foregoing reasons, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), *inter partes* review is instituted with respect to the grounds of unpatentability set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(a) and 37 C.F.R. § 42.4, notice is given of institution of trial commencing on the entry date of this Decision;

IPR2024-01013
Patent 10,153,483 B2

PETITIONER:

W. Karl Renner
Timothy Riffe
Hyun Jin In
Gretchen DeVries
FISH & RICHARDSON P.C.
axf-ptab@fr.com
riffe@fr.com
in@fr.com
devries@fr.com

FOR PATENT OWNER:

Gregory Porter
Steven Wood
HUNTON ANDREWS KURTH LLP
gregporter@Huntonak.com
swood@huntonak.com