Trials@uspto.gov
571-272-7822

Paper 14
Date: August 18, 2023

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZHUHAI COSMX BATTERY CO., LTD.,
Petitioner,

v.

NINGDE AMPEREX TECHNOLOGY LTD.,
Patent Owner.

IPR2023-00586
Patent 10,833,363 B2

Before DONNA M. PRAISS, KRISTINA M. KALAN, and JEFFREY W. ABRAHAM, *Administrative Patent Judges.*

PRAISS, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314, 37 C.F.R. § 42.4

Dismissing Motion to Cede Jurisdiction for Correction of Inventorship
35 U.S.C. § 256, 35 C.F.R. § 1.324

I. INTRODUCTION

Zhuhai CosMX Battery Co., Ltd. ("Petitioner")[1] filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 1–16 of U.S. Patent No. 10,833,363 B2 (Ex. 1001, "the '363 patent"). Ningde Amperex Technology Ltd. ("Patent Owner")[2] filed a Preliminary Response (Paper 8, "Prelim. Resp."). We authorized a Reply by Petitioner and a Sur-Reply by Patent Owner on the issue of discretionary denial under 35 U.S.C. § 314(a) (Ex. 1033) that the parties subsequently filed (Paper 10, "Reply"; Paper 11, "Sur-Reply"). Pursuant to Board authorization (Ex. 1034), Patent Owner filed a Motion to Cede Jurisdiction for Correction of Inventorship (Paper 12), and Petitioner filed an Opposition (Paper 13).

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314(b) (2018); 37 C.F.R. § 42.4(a) (2022). 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 "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

After considering the Petition, the Preliminary Response, and the evidence of record, we determine that Petitioner has not demonstrated a reasonable likelihood that it would prevail with respect to at least one challenged claim. Accordingly, we do not institute an *inter partes* review of any challenged claim on any asserted ground.[3]

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[1] Petitioner identifies itself as the real party in interest. Pet. 72.
[2] Patent Owner identifies itself as the real party in interest and informs us that it is a wholly owned subsidiary of Amperex Technology Limited. Paper 4, 1.
[3] Because Petitioner has not demonstrated a reasonable likelihood that it would prevail with respect to at least one challenged claim, we do not

A. Related Proceedings

The parties indicate that the '363 patent is the subject of *Ningde Amperex Tech. Ltd. v. Zhuhai CosMX Battery Co., Ltd.*, Case No. 2:22-cv-00232-JRG (E.D. Tex.) ("Texas Litigation") and *Zhuhai CosMX Battery Co., Ltd. v. Ningde Amperex Tech. Ltd.*, Case No. 5:22-cv-04510-BLF (N.D. Cal.) ("California Litigation"). Pet. 72–73; Paper 4, 1. Patent Owner also lists as related matters U.S. patents and pending U.S. patent applications that claim the benefit of the '363 patent's filing date as well as *inter partes* review proceeding IPR2023-00587 involving Patent Owner's co-owned U.S. Patent No. 10,964,987. Paper 4, 2.

B. The '363 patent

The '363 patent, titled "Electrolyte and Electrochemical Device," issued on November 10, 2020. Ex. 1001, codes (45), (54). The patent relates to an electrolyte that comprises a dinitrile compound, a trinitrile compound, and propyl propionate. *Id.* at 1:57–58. According to the '363 patent, the dinitrile compound can form a protective film on the cathode of an electrochemical device that inhibits the decomposition of solvent in the electrochemical device, but the mixture of the three components forms "a firm protective film which is not easily decomposed on the surface of the cathode at a high potential." *Id.* at 1:42–53. The patent describes the weight percentage of dinitrile compound (X), the weight percentage of trinitrile compound (Y), and the weight percentage of propyl propionate (Z) based on the total weight of the electrolyte. *Id.* at 1:59–61. The patent provides the following ranges for the three components: about 0.01–10 wt % X, about

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address Patent Owner's arguments for discretionary denial under 35 U.S.C. § 314(a).

0.01–10 wt % Y, and about 5–50 wt % Z. *Id.* at 2:8–13. The '363 patent also provides the following formulas for the relative proportions of X, Y, and Z which are recited in independent claim 1:

(1) about 2 wt % $\leq$ (X+Y) $\leq$ about 11 wt %

(2) about 0.1 $\leq$ (X/Y) $\leq$ about 8

(3) about 0.01 $\leq$ (Y/Z) $\leq$ about 0.3

Id. at 1:57–2:7.

C. Illustrative Claim

Petitioner challenges claims 1–16 of the '363 patent. Pet. 7. Patent Owner subsequently filed a disclaimer of claims 13–16. Prelim. Resp. 6; Ex. 2003. Thus, the claims remaining in this proceeding are claims 1–12. Claim 1, the sole independent claim, is illustrative and reproduced below:

> 1. An electrolyte, comprising a dinitrile compound, a trinitrile compound, and propyl propionate, wherein, based on a total weight of the electrolyte, a weight percentage of the dinitrile compound is X and a weight percentage of the trinitrile compound is Y, where X and Y meet conditions represented by Formula (1) and Formula (2):
>
> about 2 wt % $\leq$ (X+Y) $\leq$ about 11 wt% (1); and
>
> about 0. 1 $\leq$ (X/Y) $\leq$ about 8 (2)
>
> wherein, based on the total weight of the electrolyte, a weight percentage of the propyl propionate is Z, where Y and Z meet a condition represented by Formula (3):
>
> about 0.01 $\leq$ (Y/Z) $\leq$ about 0.3 (3).

Ex. 1001, 33:2–15.

D. Asserted Grounds of Unpatentability

Petitioner contends that claims 1–16 (following the disclaimer, claims 1–12) of the '363 patent are unpatentable based on the following grounds, edited to reflect the post-disclaimer omission of claims 13–16 (Pet. 7):

Claim(s) Challenged	35 U.S.C. §[4]	Reference(s)/Basis
1–6, 11	102	Hong[5]
7–9	103	Hong, Zhuang[6]
10	103	Hong, Kim '685[7]
12	103	Hong, Kim '934[8]

Petitioner also relies on a declaration from Dr. Menahem Anderman (Ex. 1003).

II. ANALYSIS

A. Claim Construction

We apply the claim construction standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). 37 C.F.R. § 42.100(b). Under *Phillips*, claim terms are afforded "their ordinary and customary meaning." *Phillips*, 415 F.3d at 1312. The "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. Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *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

[4] The relevant sections of the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, took effect on March 16, 2013. The '363 patent claims priority to applications with filing dates before this date. *See* Ex. 1001, code (22), (30). For the purposes of this Decision, pre-AIA statutes apply.
[5] CN 106848381, published June 13, 2017 (Ex. 1004). Citations herein are to the certified English language translation (Ex. 1005).
[6] US 2017/0084956 A1, published Mar. 23, 2017 (Ex. 1006).
[7] US 6,544,685 B2, issued Apr. 8, 2003 (Ex. 1007).
[8] US 2017/0069934 A1, published Mar. 9, 2017 (Ex. 1008).

the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

We have considered Petitioner's proposed claim constructions and Patent Owner's assertion that no claim construction is necessary. Pet. 12–14; Prelim. Resp. 15. We determine we need not explicitly construe any claim term at this stage of the proceeding. *See Realtime Data*, 912 F.3d at 1375.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art ("POSA") "would have a Ph.D. or a similar advanced degree in chemistry, chemical engineering, materials science, or a related field, and two or more years of experience related to . . . electrochemical energy storage devices" with more experience compensating for less formal education. Pet. 12 (citing Ex. 1003 ¶¶ 24–25).

Patent Owner adopts Petitioner's definition of a person of ordinary skill in the art. *See* Prelim. Resp. 16. Accordingly, for the purposes of this Decision, we adopt Petitioner's proposal regarding the level of one of ordinary skill in the art.

C. Legal Standards

"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) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")); *see also* 37 C.F.R. § 42.104(b) (requiring a petition for *inter partes* review to identify how the challenged claim is to be construed and where each element of the claim is found in the prior art patents or printed publications relied upon).

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). "Inherent anticipation requires that the missing descriptive material is "necessarily present," not merely probably or possibly present, in the prior art." *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 (Fed. Cir. 2002) (quoting *In re Robertson,* 169 F.3d 743, 745, (Fed. Cir. 1999)). "[T]he reference must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements arranged as in the claim." *Sanofi-Synthelabo v. Apotex, Inc.*, 550 F. 3d 1075, 1083 (Fed. Cir. 2008) (internal quotation marks omitted). In other words, it is not enough to be able to find all of the pieces of the claimed invention somewhere in a prior art reference; rather, those elements must be set out in the prior art reference in the same way they are in the claimed invention. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) ("Because the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements 'arranged as in the claim.'") (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

D. Challenges Based on Hong

Each of Petitioner's challenges to claims 1–12 relies on Hong's disclosure of every element recited in claim 1. Pet. 7 (Grounds 1–4), 14–30, 32–57. Petitioner's only challenge to claim 1 is that it is anticipated by Hong; Petitioner does not assert obviousness of claim 1 over Hong. *Id.*; Prelim. Resp. 29. Patent Owner argues that Hong fails to disclose the claimed ratio of trinitrile compound to the content of propyl propionate (Z)

and that the Petitioner fails to meet its burden of persuasion because the Petition relies on unsupported and unscientific assumptions and incorrect calculations. Prelim. Resp. 14–15. Therefore, we focus our analysis on whether the Petition sufficiently demonstrates that Hong anticipates claim 1, and, specifically, the claimed ratio and content of propyl propionate (Z).

1. Hong (Ex. 1005)

Hong is titled "Electrolyte and Lithium Secondary Battery Containing the Same." Ex. 1005, code (54). Hong discloses an electrolyte for use in a lithium secondary battery comprising "an electrolyte substance, an organic solvent, an additive, and a functional compound, the functional compound being at least one selected from the group consisting of a tricyanophosphite compound and a tricyanophosphate compound." *Id.* code (57), ¶ 7. According to Hong, the tricyanophosphite or tricyanophosphate compound contained in the electrolyte can form films on the surfaces of the positive and negative electrodes, complex with metal ions at the positive electrode to prevent metal ions from detaching and dissolving into the electrode and to prevent the metal ions from depositing at the negative electrode, thereby stabilizing the structure of the positive electrode and improve the film at the negative electrode. *Id.* ¶ 18.

Hong's tricyanophosphite compounds include Compound I_1 and Hong's tricyanophosphate compounds include Compound II_6 depicted in Hong's Tables 1 and 2. ¶¶ 21–24. Hong discloses that the "mass percentage of the functional compound in the electrolyte is 0.05%–10%." *Id.* ¶ 7. Hong discloses that the organic solvent comprises at least two components selected from a group that includes propyl propionate (PP). *Id.* ¶ 13. Hong discloses that the additive is a common additive used in the art and includes as examples succinonitrile (SN), adiponitrile (ADN), 1, 3, 6-

hexametricarbonitrile (HTCN), and ethylene glycol bis(propionitrile) ether (DENE). *Id.* ¶ 15. Hong's Table 3 lists embodiments and comparison cases where percentages refer to mass percentage in the final electrolyte and the concentration refers to the concentration in the final electrolyte. *Id.* ¶¶ 33–38. Below are Embodiments 2, 18, 25, and Comparison Case 6 from Hong's Table 3.[9] *Id.* ¶¶ 34–35.

Example	Organic solvent	Additive	Functional compound	Electrolyte substance
Embodiment 2	EC:PP:DEC:PC= 25:25:40:10	3% PS, 5% FEC, 2% ADN, 1% SN, 0.3% VEC, 1% DENE	0.8% Compound I_1	1.1 M $LiPF_6$
Embodiment 18	EC:PP:DEC:PC= 25:25:40:10	3% PS, 5% FEC, 2% ADN, 1% SN, 0.3% VEC, 1% DENE	5% Compound I_1	1.1 M $LiPF_6$
Embodiment 25	EC:PP:DEC:PC= 25:25:40:10	3% PS, 5% FEC, 2% ADN, 1% SN, 0.5% DTD, 1% DENE, 0.5% HTCN	1.5% Compound II_6	1.1 M $LiPF_6$ +0.5 M LiTFSI
Comparison Case 6	EC:PP:DEC:PC= 25:25:40:10	3% PS, 5% FEC, 2% ADN, 1% SN, 0.5% DTD, 1% DENE, 0.5% HTCN	--	1.0 M $LiPF_6$ +0.5 M LiTFSI

2. *Analysis of Claim 1*

Petitioner contends that Hong anticipates claim 1 and that Hong's Embodiments 2, 18, 25, and Comparison Case 6 "collectively span almost the entirety of each range recited in Formulas (1)–(3)." Pet. 14 (citing

[9] The additional abbreviations in Table 3 refer to the following compounds: EC (ethylene carbonate), DEC (diethyl carbonate), PC (propylene carbonate), PS (1,3-propane sultone), FEC (fluoroethylene carbonate), VEC (vinyl ethylene carbonate), and DTD (ethylene sulfate). Ex. 1005 ¶¶ 13, 15.

Ex. 1005 ¶¶ 34–35). Petitioner identifies in Hong's embodiments 2, 18, 25, and Comparison Case 6 the required dinitrile compounds as ADN, SN, and DENE, the required trinitrile compounds as Compounds I_1, II_6, and HTCN, and the required propyl propionate compound as PP. *Id.* at 14–17.

In order to compute claim 1's Formulas (1) and (2), Petitioner contends each of Embodiments 2, 18, 25, and Comparison Case 6 contain 4 wt % dinitrile (X) and 0.8, 5, 2.0, and 0.5 wt % trinitrile (Y), respectively. *Id.* at 17–19 (citing Ex. 1003 ¶¶ 88–103). Using these values for X and Y, Petitioner computes the following values for claim 1's Formulas (1) and (2). *Id.* at 18–19.

Example	Dinitrile wt % (X)	Trinitrile wt % (Y)	Formula (1) (X+Y)	Formula (2) (X/Y)
Embodiment 2	4	0.8	4.8	5.0
Embodiment 18	4	5	9	0.8
Embodiment 25	4	2.0	6.0	2.0
Comparison Case 6	4	0.5	4.5	8.0

Petitioner asserts that for each embodiment, X+Y equals 4.5–9, which is in the range of recited Formula (1), and X/Y equals 0.8–8.0, which is in the range of recited Formula (2). *Id.* at 18.

Regarding recited Formula (3), Petitioner asserts that Hong discloses that PP accounts for 25 wt % of the base solvent for the four identified embodiments, and that the solvent is then mixed with lithium salt(s) and various additives to produce the exemplary electrolytes. Pet. 19 (citing Ex. 1005, 25–29, 34–35; Ex. 1003 ¶¶ 104–106). Petitioner notes that even though the same 25 wt % PP is present in the base solvent, each of

Embodiments 2, 18, 25, and Comparison Case 6 has a different PP weight percentage because each contains different additives in different proportions. *Id.* at 20 n.3 (citing Ex. 1003 ¶ 129). Petitioner asserts that its expert, Dr. Anderman, was able to calculate the PP weight percentage value (Z) required by claim 1's Formula (3) for each of Embodiments 2, 18, 25, and Comparison Case 6 by relying on three assumptions. *Id.* at 19. Those assumptions are:

> (1) the total volume of the liquid components does not meaningfully change after mixing, (2) the solid components do not meaningfully contribute to the total volume of the electrolyte, and (3) Hong's tricyanophosphate and tricyanophosphite compounds are liquids at room temperature with a density of 0.60 g/cm^3.

Id. Petitioner asserts that these assumptions are justified based on "Dr. Anderman's experience, the similarity of the solvent components, the common effect of solutes on solvent organization, and the known densities of common organic compounds." *Id.* at 20. Applying these assumptions, Dr. Anderman determines that PP accounts for between 16.1–18.4 wt % of the total electrolyte in the selected embodiments, and thus Y/Z equals 0.030–0.289, which is within the range of claim 1's Formula (3): "about $0.01 \leq (Y/X) \leq$ about 0.3." *Id.* (citing Ex. 1003 ¶¶ 121–129).

Patent Owner contends that Hong does not disclose either expressly or inherently a PP weight percentage value or the claimed Formula (3) range.[10] Prelim. Resp. 17. Patent Owner contends that the Petition improperly uses

[10] When a patent claims a range, as in this case, that range is anticipated by a prior art reference if the reference discloses a point within the range. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782 (Fed. Cir. 1985). Thus, Hong need only disclose a single point in each of the claimed ranges of claim 1 to anticipate the claim.

expert testimony to reach beyond Hong's disclosure to fill in gaps. *Id.* at 27 (citing *Scripps Clinic & Research Foundation v. Genentech, Inc.,* 927 F.2d 1565, 1576 (Fed. Cir. 1991), clarified on denial of reconsideration, 1991 WL 523489 (Fed. Cir. 1991) ("The role of extrinsic evidence is to educate the decision-maker to what the reference meant to persons of ordinary skill in the field of the invention, not to fill gaps in the reference. If it is necessary to reach beyond the boundaries of a single reference to provide missing disclosure of the claimed invention, the proper ground is not § 102 anticipation, but § 103 obviousness.").

Regarding the Petition's use of expert testimony to explain Hong's disclosure, Patent Owner argues that Dr. Anderman's calculations to determine the amount and proportion of PP in Hong's embodiments are based on assumptions that are "unjustified and unscientific and render his methodology unreliable in view of the complexity of Hong's electrolyte formations." *Id.* at 29. Patent Owner contends Dr. Anderman's assumptions are multi-layered and "rely on quantities, states of matter, physical properties, and chemical behaviors that are not disclosed by Hong." *Id.* at 28. Patent Owner provides the Declaration of Victor R. Koch, Ph.D. (Ex. 2001) to support each of its arguments as to why we should not accept the Petition's calculated value for PP in Hong's embodiments. *Id.* at 33–60.

On the present record, we are not persuaded that Petitioner has shown sufficiently that Hong discloses all of the elements of independent claim 1. We agree with Patent Owner that the Petition does not adequately support how Hong's disclosure of solvent containing 25% PP satisfies claim 1's required ratio of trinitrile to PP (Y/Z). The Petition itself acknowledges that Hong's disclosure of the amount of PP in the solvent is not a disclosure of how much PP is present in the electrolyte because the solvent is only one

component of Hong's electrolyte. Pet. 19. The Petition also acknowledges that assumptions are required to compute an amount of PP present in the electrolyte. *Id.* Thus, the assumptions have a bearing on how much PP is present in Hong's electrolyte. We agree with Patent Owner that the assumptions underlying the asserted PP content of Hong's electrolyte do not adequately support the conclusions drawn therefrom because the record does not support the factual basis for the assumptions made. We also agree with Patent Owner that the Petition relies on a computational methodology involving serial calculations based on guesswork that is not adequately explained. Accordingly, we determine Petitioner does not have a reasonable likelihood of prevailing on the anticipation challenge to claim 1 based on this record. We discuss in detail each of the assumptions relied upon by Petitioner, below.

First, Petitioner and Dr. Anderman assume that the total volume of the liquid components does not meaningfully change after mixing. Pet. 19; Ex. 1003 ¶¶ 110–111. According to Dr. Anderman, the polarity of the liquid components in Embodiments 2, 18, 25, and Comparison Case 6 are "*similar*," therefore it is "unlikely that there will be a *meaningful* change in volume in comparison to adding the individual volumes." Ex. 1003 ¶ 110 (emphasis added). As Patent Owner notes, however, neither the Petition nor Dr. Anderman provide a basis for what is meant by "similar" or "meaningful" in terms of a threshold that would impact the calculations for Formula (3). Prelim. Resp. 37; Ex. 2001 ¶ 71. Further, the Petition's assertion that Hong's liquid components (to which the Petition includes Hong's solvents listed in Hong's Table 3 excerpted above as EC, PP, DEC, and PC) have similar polarity is unsupported by the record. Patent Owner demonstrates that Hong's solvents have widely varying dielectric constants,

which Dr. Koch explains is a measure of polarity. Prelim. Resp. 38; Ex. 2001 ¶ 77 (stating that "[t]he higher the dielectric constant of a solvent, the more polar it is"). Patent Owner asserts that there is a 34-fold difference in polarity between EC and DEC and a 20-fold difference in polarity between EC and PP based on dielectric constants reported for these solvents. Prelim. Resp. 38; Ex. 2001 ¶¶ 77–78; Ex. 1025, Table 2 (reporting a dielectric constant of 95.3 at 25°C for EC); Ex. 2004, 13 (reporting a dielectric constant of 2.82 at 68°F for DEC); Ex. 2005, 1 (reporting a dielectric constant of 64.9 at 20°C for PC), Ex. 2004, 34 (reporting a dielectric constant of 4.7 at 68°F for PP). Based on the information presented by Patent Owner, we credit Dr. Koch's testimony that Dr. Anderman's assumption that all of Hong's liquid components have similar properties is not correct. Ex. 2001 ¶ 78.

Regarding the first assumption, Dr. Anderman states that solvents PP, EC, DEC, and PC and additives ADN, VEC, DENE, FEC, and HTCN are all liquid "at room temperature." Ex. 1003 ¶ 111 (citing Ex. 1020, 5; Ex. 1011, 4; Ex. 1019, 5; Ex. 1025, Ex. 1010, 5; Ex. 1024, 4; Ex. 1012, 3, Ex. 1015, 5, Ex. 1016, 5). Dr. Anderman further states that Hong's solvent EC "has long been known to function as a solvent when mixed with liquids." *Id.* (citing Ex. 1025, 127; Ex. 1026).

Because the Petitioner and Dr. Anderman's assumptions and calculations are based on the physical properties of Hong's components, we consider whether the record supports those asserted properties. At the outset, we note that Petitioner and Dr. Anderman do not define the "room temperature" on which their assumptions are based. As Patent Owner points out, "room temperature" is not a universally agreed upon and well-defined temperature, and could possibly constitute any temperature between 18 °C

and 25 °C. Prelim. Resp. 33; Ex. 2001 ¶ 73 This ambiguity is significant, because FEC, which is present in each of Hong's identified Embodiments and its Comparison Case, has a melting point of 18–23 °C. Thus, its physical properties vary depending on the temperature. Prelim. Resp. 33; Ex. 2001 ¶ 73; Ex. 1015, 5 (FEC). In addition, Dr. Anderman identifies ethylene carbonate as a liquid at room temperature, however, the cited data sheet for ethylene carbonate indicates that it is in a solid crystalline form at room temperature. Ex. 1014, 5; Ex. 1003 11. Thus, ethylene carbonate cannot be said to be a liquid that does not change volume after mixing in support of the Petition's first assumption. Ex. 2001 ¶ 72 ("EC cannot be considered a liquid component . . . because it is a solid at room temperature," thus, "whether EC functions as a solvent or liquid after mixing with liquids would be irrelevant to Dr. Anderman's first assumption.").

Petitioner and Dr. Anderman next assume that "the solid components do not *meaningfully* contribute to the total volume of the electrolyte." Pet. 19 (emphasis added); Ex. 1003 ¶¶ 112–113. Dr. Anderman identifies the solid components in Hong's electrolyte as lithium salts $LiPF_6$ and LiTFSI, succinonitrile (SN), 1, 3-propane sultone (PS), and ethylene sulfate (DTD). *Id.* ¶ 113. According to Dr. Anderman, "[t]o the extent that [the solid components] do contribute to the total volume of the electrolyte, they may reduce the total volume because they pull the solvent molecules closer together." *Id.* ¶ 112. Dr. Anderman further states that "the solutes will at most add their volume as solids at room temperature." *Id.* However, the Petition does not provide any parameters for what "meaningfully" means in the context of the solid components affecting the total volume of the electrolyte, nor do the calculations account for the contribution of the solid

components' volume to the total electrolyte solution volume. Ex. 1003 ¶¶ 115–120.

According to Patent Owner, the solid solute added to a solvent or mixture of solvents "must necessarily take up space when dissolved (solvated) because the Li cation and PF_6 anion that $LiPF_6$ dissociates into are not point charges that lack any intrinsic volume, but rather, take up actual space in the solution," having the overall impact of increasing the electrolyte solution volume. Prelim. Resp. 44; Ex. 2001 ¶ 88. Dr. Koch also points out that EC should be included as one of the solid components for purposes of the second assumption based on its known property of being crystalline at room temperature. Ex. 2001 ¶ 83. Dr. Koch further points out that FEC, which has a melting point of 18–23 °C, creates an ambiguity as to whether it should be treated as a solid rather than a liquid for purposes of Dr. Anderman's calculations. *Id.* ¶ 84.

Additionally, Petitioner and Dr. Alderman assume that Hong's tricyanophosphate and tricyanophosphite compounds are liquids at room temperature with a density of 0.60 g/cm^3. Pet. 19; Ex. 1003 ¶ 114. According to Dr. Anderman, the assumed density "is lower than the density of the least dense common organic compound." Ex. 1003 ¶ 114 (citing Ex. 1027). Dr. Anderman states that "[t]his assumption captures the maximum reasonable effect that tricyanophosph[a]te and tricyanophosphite compounds could have in reducing the proportion of propyl propionate in Hong's electrolytes." *Id.* These determinations, however, are not supported by any information about the chemical or physical properties of these compounds, and, therefore, the selection of the density of the least dense common organic compound is merely speculation. Consequently, this

assumption amounts to Dr. Anderman's declaration filling in, without adequate support, for Hong's missing disclosure.

Petitioner asserts that even if the assumptions are set aside, Hong's Embodiments 2, 18, 25, and Comparison Case 6 would satisfy Formula (3) because "propyl propionate could account for no more than 25 wt% and no less than 15.3–18.1 wt% of the total electrolyte" in those examples. Pet. 21 (citing Ex. 1003 ¶¶ 130–151). Dr. Anderman states that if the first assumption is set aside because mixing the solvents results in a meaningful change to their volume, then the total volume of solvents would reduce upon mixing "as the smaller molecules in the solvent occupied the space between the larger molecules." Ex. 1003 ¶ 131. Dr. Anderman then states that assuming Z is 25 wt %, the ratio Y/Z would be 0.032, 0.200, 0.080, and 0.020 for Embodiments 2, 18, 25, and Comparison Case 6, respectively. Ex. 1003 ¶ 131. We are not persuaded by these arguments because the first assumption is not eliminated, but, rather, changed to another assumption about mixing solvents resulting in a reduced volume. Petitioner's new assumption still fills in information about Hong's components that is not supported by the record.

Dr. Anderman next states that if the second assumption is set aside, and the total volume of electrolyte is reduced by the lithium salts and solid additives, the reduction in volume would at most equal their volume as solids at room temperature. *Id.* ¶ 132. Dr. Anderman then proceeds to outline calculations that involve estimated values and calculated values, determining a difference between the estimated values and the calculated values, making a new estimate, and repeating the calculation "until the estimated values matched the calculated values." *Id.* ¶¶ 133–137. Dr. Anderman, however, does not adequately explain how the estimated values are derived and why a

person of ordinary skill in the art would have used such estimated values or the overall methodology itself to determine the proportion of PP in Hong's electrolyte. *See also* Prelim. Resp. 53–54 (criticizing Dr. Anderman's "incomprehensible methodology").

In sum, the Petition's assertion that Hong's embodiments 2, 18, 25, and comparison case 6 anticipate claim 1 is not supported sufficiently by the cited record. Even though Hong discloses the presence of PP in its electrolyte, the record does not adequately support Petitioner's proposition that the amount of PP necessarily present in Hong's electrolyte meets the claimed proportion or amount.

In the absence of a sufficient showing that Hong discloses claim 1's required weight percentage of PP, we determine Petitioner has failed to establish a reasonable likelihood of prevailing on its challenge that claim 1 is unpatentable as anticipated by Hong.

3. Analysis of Claims 2–12

Claims 2–12 depend directly or indirectly from independent claim 1. For its challenges to these claims, Petitioner relies on the arguments discussed above for independent claim 1. Pet. 21–30, 32–57. Nothing in Petitioner's analysis of the additional prior art references relied upon for its challenge under 35 U.S.C. § 103 cures the deficiencies discussed above regarding Hong. *Id.* at 32–57. Therefore, for the same reasons discussed above for independent claim 1, we determine Petitioner has failed to establish a reasonable likelihood of prevailing on its challenges that claims 2–12 are unpatentable as anticipated by Hong or obvious in view of Hong together with Zhuang, Kim '685, or Kim '934.

III. CONCLUSION

Upon consideration of the Petition, the Preliminary Response, the additional briefs, and the evidence presented, we determine that Petitioner has not shown a reasonable likelihood that it will prevail in showing that at least one of the challenged claims is unpatentable. Accordingly, we do not institute an *inter partes* review of any challenged claim based on any ground asserted in the Petition.

We deny institution based on the Petition's insufficiencies enumerated above and, therefore, we need not address the balance of the parties' arguments. Additionally, because we deny institution, we dismiss as moot Patent Owner's Motion to Cede Jurisdiction for Correction of Inventorship (Paper 12).

IV. ORDER

For the foregoing reasons, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314, the Petition is *denied*, and no trial is instituted, and

FURTHER ORDERED that, pursuant to 37 C.F.R. § 1.324, Patent Owner's Motion to Cede Jurisdiction for Correction of Inventorship is *dismissed*.

FOR PETITIONER:

Michele C. Bosch
Joshua L. Goldberg
Daniel F. Klodowski
A. Grace Klock Mills
Anthony Hartmann
FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, LLP
michele.bosch@finnegan.com
joshua.goldberg@finnegan.com
daniel.klodowski@finnegan.com
gracie.mills@finnegan.com
anthony.hartmann@finnegan.com

FOR PATENT OWNER:

Christopher TL Douglas
Nicholas J. Choi
ALSTON & BIRD LLP
christopher.douglas@alston.com
nick.choi@alston.com