

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PASCAL TECHNOLOGIES,

Petitioner

v.

CAMBRIDGE ENTERPRISE LIMITED, UNIVERSITAT DE BARCELONA,

AND UNIVERSITAT POLITÈCNICA DE CATALUNYA,

Patent Owner

U.S. Patent No. 11,230,656

Inter Partes Review No. 2024-01235

PATENT OWNER PRELIMINARY RESPONSE

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Statement of Material Facts in Dispute

Petitioner did not submit a statement of material facts in its Petition.

Accordingly, no response is due pursuant to 37 C.F.R. § 42.23(a), and no facts are admitted.

I. Introduction

Cambridge Enterprise Limited, Universitat De Barcelona, and Universitat Politècnica De Catalunya and exclusive licensee Barocal Ltd. (collectively “Patent Owner”) respectfully submit this Preliminary Response to the Petition for *Inter Partes* Review (“Petition”) filed by Pascal Technologies (“Pascal” or “Petitioner”) challenging Claims 1-3, 6-11, and 14-16 of U.S. Patent No. 11,230,656 (“the ’656 Patent”). Institution should be denied for the following reasons.

Board precedent requires that a petition “must identify, ***with particularity***, evidence sufficient to establish a reasonable likelihood that [a] reference was publicly accessible before the critical date....” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB 2019) (precedential) (emphasis added). In Grounds 1-5, Petitioner relies exclusively on four non-patent literature (NPL) references (Xie, Mañosa, Patel, and Tamarit) as alleged prior art. In so doing, however, the Petition fails to present ***any evidence***¹ that any of these NPL references constitute printed publications. For this reason alone, institution should be denied.

¹ This is not a case where the Petition fails to provide *sufficient* evidence of NPL documents being printed publications. This is a case where the Petition fails to present *any* evidence on the issue.

Additionally, an obviousness analysis requires determining (i) the scope and content of the prior art, (ii) the differences between the claimed invention and the prior art, and (iii) the level of ordinary skill in the art. *See KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (quoting *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966)). The Petition is legally deficient because it fails to follow this framework. In particular, the Petition fails to clearly articulate the differences between the prior art and the challenged claims. As a result, Patent Owner is left guessing which features are being supplied by the secondary references. Additionally, “[i]t does not suffice to simply be known. A reason for combining [prior art elements] must exist.” *Virtek Vision Int’l v. Assembly Guidance Sys.*, 97 F.4th 882, 888 (Fed. Cir. 2024). As explained below, for each ground, the Petition neglects to present a legally sufficient rationale for combining or modifying the prior art, instead relying on the patent itself and impermissible hindsight. Pet. at 58-60, 76-79, 86-87. As such, it fails to present a legally viable obviousness theory.

In view of the foregoing, the Petitioner fails to demonstrate a reasonable likelihood of prevailing in showing claims 1-3, 6-11, and 14-16 of the ’656 Patent are unpatentable. Institution should be denied.

II. Background

Barocaloric materials provide a source of heat absorption and release, which is useful in cooling applications. Ex. 1001, 1:35-38, 2:1-2. Barocaloric materials typically undergo a first-order phase transition induced by changing hydrostatic pressure. *Id.*, 2:2-8. The resulting barocaloric effects, i.e., heat absorption or release near the phase transition temperature, can be used in cooling methods. *Id.*, 1:35-38, 2:1-8. In the '656 patent, the inventors discovered a novel method for barocaloric cooling using organic materials. *Id.*, 2:48-55.

The barocaloric cooling method using organic materials can be accomplished through the method of Claim 1. *Id.*, Claim 1. The method includes the following steps:

- (i) applying hydrostatic pressure to an organic material;
- (ii) permitting heat flow from or to the organic material;
- (iii) releasing hydrostatic pressure from an organic material that is under applied pressure; and
- (iv) permitting heat flow to or from the organic material.

Id., Claim 1.

Prior methods for barocaloric cooling used inorganic materials, which were costly. *Id.*, 3:20-25. The inventors of the '656 patent surprisingly and unexpectedly discovered that, with their method, they could use organic barocaloric materials,

which are more attainable and display larger barocaloric effects than those seen in inorganic materials. *Id.*, 2:66-67, 3:1-8.

The many advantages and benefits of the claimed barocaloric cooling method demonstrate that the USPTO's decision to grant the '656 Patent is consistent with the primary goal of the patent system: rewarding innovation for the benefit of society.

III. Person of Ordinary Skill in the Art

A person of ordinary skill in the art (POSITA) is a hypothetical person presumed to be aware of all pertinent art, to think along with conventional wisdom in the art, and to have ordinary creativity. *KSR*, 550 U.S. at 407-09, 420-21. For the limited purpose of this Preliminary Response, Patent Owner does not dispute Petitioner's definition of a POSITA as having an undergraduate degree in engineering or an equivalent field, and two to four years of experience in caloric materials. Pet. at 24.

IV. Claim Construction

A. Applicable Law

Claims are ordinarily given their "ordinary and customary meaning," which 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." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13, 1315 (Fed. Cir. 2005) (citation omitted). To construe a claim term, the

Board should look to “the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art.” *Id.* at 1314 (citation omitted). “A patent’s specification, together with its prosecution history, constitutes intrinsic evidence to which the PTAB gives priority when it construes claims.” *Knowles Elecs. LLC v. Cirrus Logic, Inc.*, 883 F.3d 1358, 1361-62 (Fed. Cir. 2018) (footnote omitted). The Board need only construe claims to the extent necessary to resolve controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Claim terms not discussed below have plain meanings on their face and should be construed to have their ordinary and customary meanings.

B. Construction of “organic” (claims 1-23)

Claims 1-23 recite “organic.” Petitioner proposes that “organic” means “materials containing carbon.” Pet. at 38. Contrary to Petitioner’s contention, the challenged patent does not define this term. Thus, although Patent Owner agrees that organic compounds contain carbon, Patent Owner maintains that no construction is required for this term, and its plain and ordinary meaning should control.

C. Construction of “organic material” (claims 1 and 9)

Claims 1 and 9 recite “organic material.” Petitioner asserts that “organic material” should not be interpreted as limited by statements in the specification, but ultimately fails to provide a construction of “organic material.” Pet. at 39-43. Petitioner’s position is incorrect. In discussing the claimed “organic material,” the ’656 Patent states: “[t]he organic material **may not be** poly(methyl methacrylate) [(PMMA)], a polyvinylidene difluoride-containing polymer, such as polyvinylidene difluoride (PVDF) or PVDF-TrFE-CTFE, or a phospholipid, such as dihexadecylphosphatidyl-ethanolamine (DHPE).” Ex. 1001 at 8:59-63 (emphasis added). By so doing, the specification contains a clear and unmistakable disavowal of the compounds PMMA, PVDF, PVDF-TrFE-CTFE, and DHPE.

The Federal Circuit has made clear an “expression of manifest exclusion or restriction” constituting disavowal of claim scope does not require rigid formalism, e.g., “my invention does not include _____,” to be effective. *See, e.g., AstraZeneca AB, Aktiebolaget Hassle, KBI-E, Inc. v. Mut. Pharm. Co.*, 384 F.3d 1333, 1340 (Fed. Cir. 2004). On the contrary, courts have held that language such as “may not be” is amply sufficient to constitute a clear and unambiguous disclaimer of subject matter for purposes of claim construction. *See, e.g., Claim Construction Order*, 5-9, *Unicorn Energy AG v. Tesla, Inc.*, No. 5-21-cv-07476 (N.D. Cal. Jan. 19, 2023) (indicating “may not be” is sufficient to find disclaimer); Memorandum Opinion

and Order on Claims Construction, 13-14, *Sesaco Corporation v. Equinom Ltd.* et al, No. 1-20-cv-01053 (W.D. Tex. Nov. 28, 2022) (issuing order rejecting claim construction proposal and stating “the specification does not suggest that the sesame crop must not or ***may not be*** harvested prior to four weeks after ideal harvest time.”) (emphasis added).

Here, the statement of what an organic material “may not be” disclaims the listed compounds. Petitioner’s construction ignores the plain meaning of “may not be,” instead improperly conflating that term with “generally,” “typically,” “usually,” and “here.” Pet. at 39. Petitioner’s construction is incorrect because the plain meaning of “may not be” constitutes a “manifest exclusion” required for disavowal of claim scope under *AstraZeneca*. 384 F.3d 1333, 1340 (Fed. Cir. 2004).

By way of illustration, the statute governing institution of *inter partes* reviews provides that the Director “may not” authorize institution of an IPR unless there is a reasonable likelihood that petitioner will prevail on at least one claim. 35 U.S.C. § 314(a) (2018). This language does not somehow suggest that the Director may, at her discretion, institute an IPR when that threshold is *not* satisfied. Instead, it is an absolute statement: No IPR may be instituted unless the threshold is satisfied.

Common parlance involving the term “may not” supports the same conclusion. For example, a mother telling her small child that she “may not” go to the park is not suggesting that it is up to the child whether she wants to go to the park. It is an edict. An absolute statement. The child is not permitted to go to the park.

Further, the term “may not” is used only twice in the ’656 patent specification, and in each instance, following a discussion of Xie and Patel. Ex. 1001 at 8:28 and 8:59-63. Meanwhile, the permissive terms “generally,” “typically,” “usually,” and “here” are used collectively 45 times throughout the ’656 patent specification. *See generally* Ex. 1001. The contrast between these permissive terms and the absolute term “may not be” highlights that, viewed as a whole, the ’656 patent specification makes a distinction between these modifiers. Correctly construed, the term “organic material,” as used in the ’656 patent, excludes the compounds PMMA, PVDF, PVDF-TrFE-CTFE, and DHPE.

D. Construction of “organic compound” (claims 2 and 10)

Claims 2 and 10 recite that the “organic material” of claims 1 and 9 is also an “organic compound.” Petitioner proposes that this term means a “substance composed of atoms or ions of two or more elements in chemical combination.” Pet. at 43.

At this stage, Patent Owner agrees with Petitioner that the plain and ordinary meaning of this claim term controls, subject to the aforementioned construction of “organic material.” As such, no further formal construction of this term is required. Patent Owner otherwise disagrees with Petitioner’s proposed definition as unnecessary. Pet. at 43.

E. Construction of “agent” (claim 1)

Claim 1 recites the “use of the organic material as a cooling agent” or as a “heating agent.” Ex. 1001. Petitioner asserts that the term “agent” “refers to the material changing temperature within a refrigeration cycle ‘for example within a cooling apparatus,’ and that thereby enables the cooling or heating process.” Pet. at 43.

At this stage, Patent Owner agrees that the plain and ordinary meaning of the term “agent” should control. No further construction is required. Petitioner’s proposed definition as unnecessary.

F. Construction of “optionally” (claims 2, 6, 8, 10, 14, and 16)

Claim 2, 6, 8, 10, 14, and 16 recite “optionally.” Petitioner proposes that “optionally” signals “non-required recitations following the term ‘optionally’.” Pet. at 44.

The term “optionally” is well-understood, and its plain and ordinary meaning should control. No formal construction is required.

V. The Cited Art

A. Xie (Ex. 1006)

The article, “Demonstration of liquid crystal for barocaloric cooling applications,” Ex. 1006, was allegedly submitted to a non-peer reviewed website. Petitioner asserts—without citing any evidence—that the article “was submitted and publicly available on September 26, 2016.” Pet. at 24. Because no evidence has been provided supporting the alleged public accessibility of Xie to those skilled in the art prior to the effective filing date of the ‘656 patent, Petitioner has failed to meet its evidentiary burden.

Xie discusses various measurements taken on the compound DHPE as disclosed by a separate reference, Mencke (Ex. 1016).² As discussed above, however, DHPE is not an “organic compound,” as that term is used in the ’656 patent. Xie does not disclose or suggest the use of organic compounds.

² Petitioner incorrectly asserts that Xie teaches “DHPE undergoes a phase transition” that “occurs near room temperature.” Pet. at 25. In fact, Xie states that “[f]or DHPE, one of the problems is the high transition temperature (82°C), which limits its near room temperature cooling application.” Ex. 1006 at 3 (emphasis added).

B. Mañosa (Ex. 1007)

The article by Lluís Mañosa “Advanced materials for solid-state refrigeration” is a review of “the recent progress on caloric effects.” Ex. 1007 at 1. Petitioner asserts, again without citing any evidence, that Mañosa “was published on January 29, 2013.” Pet. at 27. Because no evidence has been provided supporting the public accessibility of Mañosa to those skilled in the art prior to the effective filing date of the ‘656 patent, Petitioner has failed to meet its evidentiary burden.

Mañosa describes the barocaloric activity of “Ni-Mn-In,” “Gd₅Si₂Ge₂,” and “La-Fe-Co-Si,” all of which are inorganic compounds. Ex. 1001 at 4-6, 8. Mañosa does not describe or suggest the use of organic compounds.

C. Patel (Ex. 1009)

The article “Elastocaloric and barocaloric effect in polyvinylidene difluoride-based polymers” is an article related to the “field of ferroelectric solid-state refrigeration.” Ex. 1009 at 2. Petitioner asserts, without evidence, that the article “was published on October 16, 2016.” Pet. at 30. Because no evidence has been provided supporting the public accessibility of Patel to those skilled in the art prior to the effective filing date of the ‘656 patent, Petitioner has failed to meet its evidentiary burden. Patel is an attempt to extend the documentation of barocaloric effects to PVDF-based polymers as “[m]ost reports concerning BC effects have

been documented for magnetic shape memory alloys only, with the exception of BaTiO₃ single crystal and PbTiO₃.” Ex. 1009 at 3. Both BaTiO₃ and PbTiO₃ are inorganic compounds. As Patel acknowledges, “[s]uch studies have not been reported so far.... [I]t become[s] imperative to mention that BC effect has not been thoroughly examined for many material classes.” *Id.* at 2. Patel discloses “polyvinylidene di-fluoride (PVDF) and its co-polymers” in addition to 18 other compounds all of which are inorganic compounds. *Id.* at 2, 6, Table I. As discussed above, however, PVDF and PVDF-TrFE-CTFE are not an “organic compound,” as that term is used in the ’656 patent. Thus, Patel does not disclose or suggest the use of organic compounds.

D. Tamarit (Ex. 1021)

The article “Thermodynamic Study of Some Neopentane Derivated by Thermobarometric Analysis” describes the study of the “pressure dependence of the phase behavior of some Plastic Crystals.” Ex. 1021 at 3. Tamarit describes experiments in which “simultaneous recording of pressure of a small sample enclosed in a metallic cell as a function of temperature” was performed. *Id.* Importantly, Tamarit did *not* conduct studies involving measurements of heat or temperature under variable pressure that could provide barocaloric information.

Tamarit states that “[i]t is interesting to note that, for all the compounds [tested], the application of pressure displaces the region of the existence of the

plastic phase to a higher and wider temperature range.” *Id.* at 7. The application of temperature begins at 300 kelvin (K), around 26°C, which is well above room temperature. A POSITA would not understand the materials described in Tamarit as likely to exhibit barocaloric effects associated with a near room temperature first order phase transition as described by the ’656 patent.

Petitioner asserts, again without citing any evidence, that Tamarit “was published online on September 24, 2016.” Pet. at 36. Because no evidence has been provided supporting the public accessibility of Patel to those skilled in the art prior to the effective filing date of the ’656 patent, Petitioner has failed to meet its evidentiary burden.

VI. Overview of Arguments

The Board may institute an *inter partes* review (IPR) proceeding only if Petitioner demonstrates 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 (2018). For the reasons discussed below, Petitioner has failed to meet that burden. The Petition should be denied institution. A summary of Patent Owner’s arguments is provided below.

Grounds	Brief Statement of Arguments
1-5	• The Petition fails to present any evidence that the cited NPL references constitute printed publications
1: as obvious over Xie	• The obviousness analysis is legally deficient. • The Petition fails to articulate a proper <i>KSR</i> rationale.

Grounds	Brief Statement of Arguments
	• Xie fails to teach or suggest an “organic material.”
2: as obvious over Mañosa and Patel	• The obviousness analysis is legally deficient. • No motivation for combine Mañosa and Patel has been provided. • Mañosa and Patel fail to teach or suggest an “organic material.”
3: as obvious over Mañosa and Tamarit	• The obviousness analysis is legally deficient. • No motivation for combine Mañosa and Tamarit has been provided.
4 and 5: as obvious over Tamarit and Xie, and Tamarit, Mañosa, and Patel, respectively	• In less than a one page analysis, the Petition fails to articulate with particularity any legally cognizable basis for obviousness.

VII. Petitioner has not demonstrated that there is a reasonable likelihood that it would prevail with respect to at least one of the challenged claims.

A. The Petition fails to show Xie, Mañosa, Patel, and Tamarit qualify as printed publications.

As an initial matter, Petitioner relies upon Xie, Mañosa, Patel, and Tamarit in Grounds 1-5 without showing how any of the references qualify as printed publications. According to the Board, at the institution stage of an IPR, the Petitioner bears the burden “of establishing by a preponderance of the evidence that a particular document is a printed publication.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 11 (PTAB 2019) (precedential); see also *Coal. for Affordable Drugs IV LLC v. Pharmacyclics, Inc.*, IPR2015-01076, Paper 33 at 6 (PTAB 2015) (denying institution and stating “Petitioner, however,

offers no probative evidence that supports its assertions, or that is sufficient to support a reasonable inference that [the document] was publicly accessible before the critical date.”); *Symantec Corp. v. Trs. of Columbia Univ.*, IPR2015-00371, Paper 13 at 5 (PTAB 2015) (denying institution, and indicating it did “not find ***any discussion*** in the Petition in support of the allegation that Cardinale was published in March 1999.”) (emphasis added).

According to PTAB precedent, “***the petition must identify, with particularity, evidence sufficient to establish a reasonable likelihood that the reference was publicly accessible before the critical date of the challenged patent*** and therefore that there is a reasonable likelihood that it qualifies as a printed publication.” *Hulu*, IPR2018-01039, Paper 29 at 13 (precedential) (emphasis added). A “[p]etitioner cannot simply state” a reference “is prior art to satisfy its initial burden of production. Rather, Petitioner must make a threshold showing that the reference is a prior art ‘printed publication’.” *Affordable Drugs*, IPR2015-01076, Paper 33 at 2. Further, as is well established, arguments of counsel cannot take the place of factually supported objective evidence. *Estée Lauder Inc. v. L’Oréal, S.A.*, 129 F.3d 588, 596 (Fed. Cir. 1997).

In *Hulu*, the Board determined there was a reasonable likelihood that a book constituted a printed publication by a showing of the copyright date, printing date, and ISBN date, ***together with*** evidence the publisher of the book series was well-

known and widely discussed in the media as of the critical date. *Hulu*, IPR2018-01039, Paper 29 at 19-20. Conversely, for a research paper, ***providing a date listed as accessible online*** without showing the text was actually accessible to interested persons was held to be insufficient to satisfy the reasonable likelihood standard. *See In-Depth Geophysical, Inc. v. Conocophillips Co.*, IPR2019-00849, Paper 14 at 4-13 (PTAB 2019); *see also Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 77-774 (Fed. Cir. 2018) (affirming Board decision that a ***reference uploaded to a website was not a printed publication*** because petitioner failed to show the website was “meaningfully indexed” such that an interested POSITA could access the reference) (emphasis added).

In this case, the Petition disregards the Board’s mandate for all four of its NPL references and fails to make *any* evidentiary showing on the printed publication issue—let alone one “with particularity.” Instead, the Petition blindly states the dates the references were allegedly “***publicly available***” (Pet. at 24), “***published***” (Pet. at 27), “***public online***” (Pet. at 30), or “***published online***” (Pet. at 36). Such conclusory statements represent the totality of Petitioner’s argument that these references qualify as printed publications. The Petition does not include or cite to any information to show public accessibility at the relevant time, how a copy might be obtained, or whether it was reasonably accessible to those skilled in the art through generally available means. Petitioner’s conclusory statements fall

far short of PTAB requirements. *See, e.g., Affordable Drugs*, IPR2015-01076, Paper 33 at 2 (“Petitioner cannot simply state [a reference] is prior art to satisfy its initial burden of production. Rather, Petitioner must make a **threshold showing** that the reference is a prior art ‘printed publication’.”) (emphasis added); *see also Power Integrations, Inc. v. Semi-Conductor Components Indus., LLC*, IPR2017-01903, Paper 9 at 11-12 (PTAB 2018) (holding petitioner’s “single sentence,” “naked assertion” that article was prior art was “not supported by the record, which fails to identify the circumstances and manner in which the reference was disseminated or in which persons interested and ordinarily skilled in the subject matter could locate the reference”).

The Petition’s treatment of Xie is demonstrative of its greater failure to make any showing that its NPL references constitute printed publications. Petitioner claims, ***without any citation to evidence***, that Xie was “submitted and publicly available on September 26, 2016.” Pet. at 24. In addition to the failure to cite evidence on this issue, Xie (Ex. 1006) itself provides no indication it was submitted to the website, let alone any indication of a publication date as argued by Petitioner. Nowhere does Xie indicate its origin and no declaratory evidence has

been submitted attesting to its origin or public accessibility at the relevant time.³

Nothing in the evidence of record shows the origin of Xie or attempts to prove public accessibility as of September 26, 2016. By failing to present any evidence on public accessibility, Petitioner has not met its burden of production in showing that Xie constitutes a printed publication. *See Elmos Semiconductor SE v. Texas Instruments, Inc.*, IPR2024-00802, Paper 9 at 28 (PTAB 2024) (denying institution and stating a reference's purported publication date alone is not a sufficient showing of public accessibility required to establish a reference as a printed publication when the reference does not bear a date on its face).

For each of the references, Petitioner fails to show or even state that the full text of the reference was available as of the purported public availability date. Further, there is no discussion of the notoriety of the sources in which these references allegedly published. For example, the Petition is silent on the impact factor of any of these sources. The Petition also makes no allegation or showing that Xie, Mañosa, Patel, and Tamarit were reasonably accessible to those skilled in

³ Petitioner's submission of a declaration (Ex. 1024) regarding Català (Ex. 1011) reflects Petitioner's awareness of the importance of submitting testimony on this issue. ***Critically, however, Petitioner filed no similar declarations for any of the NPL references relied upon in Grounds 1-5.***

the art as of the critical date. *See Microsoft Corporation, v. Throughputer, Inc.*, IPR2023-00852, Paper 18 at 17-18 (PTAB 2023) (denying institution and stating “the Petition is devoid of any substantive explanation as to how [the reference] qualifies as a prior art printed publication.... *Petitioner’s failure to develop any argument* regarding the prior art status of [the reference] *represents a fatal flaw in the Petition.*”) (emphasis added).

Petitioner has provided no evidence as to when, where, or to whom any of the cited NPL references were allegedly accessible. The Petition simply concludes, without evidence, that these references were publicly available. Pet. at 24, 27, 30, and 36. Absent any proffered evidence, Petitioner has failed to meet its burden of production on the printed publication issue under 35 U.S.C. §311(b) and PTAB precedent (*Hulu*). As such, none of the references relied upon for Grounds 1-5 have been shown to constitute “printed publications” for purposes of §311(b). For this reason alone, Petitioner is unlikely to prevail, and institution should be denied.

B. Ground 1 is unlikely to prevail because: (i) the Petition fails to provide a proper obviousness analysis, (ii) the Petition does not articulate a *KSR* rationale, and (iii) Xie fails to teach or suggest an organic material.

Petitioner has not established that it has a reasonable likelihood of prevailing on its position that Claims 1-2, 6-10, and 14-16 are invalid as obvious over Xie (Ex. 1006) in view of the knowledge of a POSITA because the Petition does not

provide a proper obviousness analysis and fails to articulate a proper KSR rationale. Additionally, Xie fails to teach or suggest the use of an “organic material” as claimed.

i. The Petition fails to provide a proper obviousness analysis.

As an initial matter, Petitioner is unlikely to prevail on Ground 1 since the Petition fails to conduct a proper obviousness analysis under *KSR* and *Graham v. John Deere*.

According to the Supreme Court, Petitioner bears the burden of demonstrating that subject matter was obvious in view of (i) the scope and content of the prior art, (ii) *the differences between the claimed invention and the prior art*, and (iii) the level of ordinary skill in the art. *See KSR*, 550 U.S. at 418 (quoting *Graham*, 383 U.S. at 17-18 (emphasis added)). The obviousness analysis articulated in *Graham* and *KSR* is not optional—a finding of obviousness cannot be sustained without providing the requisite analysis. *Apple Inc. v. Samsung Elecs.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (“A determination of whether a patent claim is invalid as obvious under § 103 requires consideration of all four Graham factors, and it is error to reach a conclusion of obviousness until all those factors are considered.”) (internal citations omitted)); *In re Magnum Oil Tools International, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016) (reversing the PTAB’s determination of obvious in part because of petitioner’s failure to articulate how the prior art differed from the

claim language); *Travelocity.com L.P. v. Cronos Technologies LLC*, CBM2014-00082, Paper 12 at 4-5 (PTAB 2014) (denying request for rehearing and holding that “Petitioner had not articulated any difference between the recited...method and [the prior art].” (internal citation omitted)).

Petitioner appears to rely on Xie’s disclosure of DHPE⁴ in asserting (incorrectly) that Xie discloses all features of the challenged claims. Pet. at 45. In so arguing, the Petition fails to articulate “the differences between the claimed invention and the prior art” as required in any obviousness analysis. *Graham*, 383 U.S. at 17. As explained by the Board in *Travelocity.com*, “[w]ithout Petitioner having identified specifically these differences, we are unable to evaluate properly any reason offered by Petitioner for modifying [the prior art].” *Travelocity.com*, CBM2014-00082, Paper 12 at 4-5. Similarly, here Patent Owner is left guessing as to *why* or *how* or in *what way* Petitioner proposes modifying Xie to arrive at the claimed invention. For this reason, Ground 1 is legally deficient, fails to provide a proper obviousness analysis, and is unlikely to prevail.

⁴ As discussed above, properly construed, the term “organic material” excludes DHPE, and Xie fails to disclose or suggest at least this feature of the claimed invention.

ii. The Petition fails to provide a proper obviousness rationale.

In addition to the requirement that Petitioner articulate the three *Graham* factors, discussed above, the Supreme Court has explained that “obviousness grounds cannot be sustained by mere conclusory statements; instead, ***there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.***” *KSR*, 550 U.S. at 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

The recent Federal Circuit decision *Virtek Vision Int’l ULC, v. Assembly Guidance Systems* is instructive. 97 F.4th 882 (Fed. Cir. 2024). In *Virtek*, the PTAB held that claims were obvious using an “obvious to try” theory. *Id.* at 886. The Federal Circuit disagreed and reversed based on the petitioner’s failure to provide a rationale for combining prior art references, stating that “[t]he mere fact that these possible arrangements existed in the prior art does not provide a reason that a skilled artisan would have” made the substitution. *Id.* at 887. In holding that Petitioner had failed to supply a *KSR* obviousness rationale, the court noted that:

There was no argument in the petition regarding why a skilled artisan would make this substitution.... [T]here was no argument about common sense.... There was no evidence that there are a finite number of identified predictable solutions. There is no evidence of a design need or market pressure.

Id. at 887-888. Ultimately, the court held that “*KSR* did not do away with the requirement that there must exist a motivation to combine....” *Id.* at 887. On the contrary, “[i]t does not suffice to simply be known. ***A reason for combining must exist.***” *Id.* at 888 (emphasis added).

The same holds true here. In its Petition, Petitioner did not argue why a skilled artisan would make the substitution or even what that substitution would be. Petitioner did not argue common sense. Petitioner did not argue there are a finite number of identified predictable solutions. Petitioner provided no evidence of a design need or market pressure. ***The only purported argument was contained in a single footnote.*** Pet. at 45, n.13. And in that footnote, Petitioner simply stated “it would have been obvious to a POSITA” to use an organic material as a barocaloric heating or cooling agent, without stating *what* that organic material would be, *why* it would be obvious to a POSITA, or *how* the combination would be implemented. *Id.* Such broad, sweeping statements fall far short of the *KSR* mandate for an “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418; *see also SmithKline Beecham Corp. v. Apotex*, 439 F.3d 1312, 1320 (Fed. Cir. 2006) (“[A]rguments raised in footnotes are not preserved.” (internal citations omitted)); *Google LLC v. Jenam Tech LLC*, IPR2021-00868, Paper 39, p. 6 (PTAB 2022) (“We deem...conclusory statements raised only in footnotes and not further developed as forfeited.”).

In view of the foregoing, Petitioner has failed to provide a proper obviousness analysis based on Xie, and Petitioner is unlikely to prevail in showing that the challenged claims are obvious over Xie.

iii. Xie fails to teach or suggest an “organic material”.

Independent claims 1 and 9 recite an “organic material.” Xie fails to teach or suggest this claim limitation.

As discussed above, the Petition appears to contend that Xie satisfies the “organic material” limitation by disclosing DHPE. Pet. at 45. As set forth in Section IV.C., the term “organic material” recited in claims 1 and 9 excludes DHPE. As a result, this feature is not taught by Xie. Moreover, as explained above, the Petition provides no reason or *KSR* rationale for substituting an organic material for DHPE, and no reason exists. Because Xie fails to teach or suggest the use of an organic material, as claimed, Petitioner is unlikely to prevail on Ground 1.

C. Ground 2 is unlikely to prevail because (i) the Petition fails to provide a proper obviousness analysis; (ii) a POSITA would not have been motivated to combine Mañosa and Patel; and (iii) Mañosa and Patel fail to teach the “organic material” as claimed.

Petitioner has not established that it has a reasonable likelihood of prevailing on its position that Claims 1-3, 6-7, 9-11, and 14-15 are invalid as obvious over Mañosa (Ex. 1007) and Patel (Ex. 1009) in view of the knowledge of a POSITA

because: (i) the Petition fails to provide a proper obviousness analysis; (ii) a POSITA would not have been motivated to combine Mañosa and Patel; and (iii) Mañosa and Patel fail to teach the “organic material” as claimed.

i. The Petition fails to supply a proper obviousness analysis.

As explained above, to establish obviousness, a petition must identify the differences between the prior art and the claim at issue and must articulate how the combination of references resolves such differences. *See KSR*, 550 US at 418 (quoting *Graham*, 383 U.S. at 17-18). Any rationale for combining references to demonstrate obviousness must be made explicit. *KSR*, 550 U.S. at 418. Like Ground 1, that approach is absent in Ground 2.

Mañosa describes multicaloric effects of inorganic magnetocaloric materials upon cooling and heating, including the barocaloric effects of an inorganic ferromagnetic material La-Fe-Si. Ex. 1007 at 4. Patel describes multicaloric effects of PVDF and PVDF-TrFE-CTFE polymers. Ex. 1009 at 2. The Petition appears to contend that a POSITA would replace the inorganic material used in the cooling applications of Mañosa with the PVDF-based material of Patel. Pet. at 58-60.

But the modifications do not end there. The Petition appears to indicate that additional modifications to Mañosa would be required, such as by modifying Mañosa’s schematic diagram (FIG. 1). Pet. at 70. But the Petition fails to clearly articulate whether this is (i) a difference between Mañosa and the challenged

claims, (ii) a difference between Patel and the challenged claims, or (iii) both.

Identification of the source of any differences between the prior art the challenged claims is critical in an obviousness analysis, since it identifies what features are being supplied by the secondary reference or the knowledge of a POSITA. In a proper obviousness analysis, once a missing feature has been clearly identified, either a secondary reference or the knowledge of a POSITA may be used to supply that missing feature, so long as a *KSR* rationale is provided for incorporating that feature into the primary reference. Petitioner has not followed this required framework.

Also, in arguing a POSITA would have replaced the inorganic material of Mañosa with the PVDF-based materials of Patel, the Petition fails to undertake any analysis of how *other* claim limitations are satisfied (or whether they are not satisfied). Independent claims 1 and 9 contain numerous limitations other than the “organic material.” In its discussion of these claims, the Petition combines discussions of Mañosa and Patel making it unclear which claim features are being pulled from which references. Pet. at 69-71, 75. By failing to address these features with the requisite specificity, Patent Owner is left guessing as to *why* or *how* or in *what way* Petitioner proposes modifying Mañosa and/or Patel to arrive at a method comprising “(i) applying hydrostatic pressure to an organic material; (ii) permitting heat flow from or to the organic material; (iii) releasing hydrostatic pressure from

an organic material that is under applied pressure; and (iv) permitting heat flow to or from the organic material.” Ex. 1001, claims 1 and 9.

Adding to the confusion in Ground 2, is the ambiguous addition of Lloveras (Ex. 1015). Although the heading for Ground 2 only refers to Mañosa and Patel, the text of the argument weaves in Lloveras (Ex. 1015), apparently as a *solo* obviousness reference (?). Pet. at 72 (“[C]laim 2 is also rendered obvious by Lloveras in view of the knowledge of a POSITA.”). Compounding the problem is that the Petition fails to map Lloveras to the claim features. *Id.* Additionally, the Petition is completely silent as to if and/or how Lloveras is combined with Mañosa and Patel. In its failure to undertake any obviousness analysis for Mañosa, Patel, and Lloveras, Petitioner has again failed to articulate what claim features are absent from the primary reference (or, indeed, which of these references is the primary reference), and which features are being supplied by secondary references. Is it a feature from Mañosa? Patel? Lloveras? Supplied by the knowledge of a POSITA?

Here, Petitioner has again disregarded the Supreme Court’s mandate in *KSR* and does not even assert that a POSITA would find it obvious to combine Lloveras, Mañosa, and Patel. Instead, Petitioner argues that during prosecution, Applicant characterized PMMA as a compound exhibiting barocaloric effects. Pet. at 72. The Petition does not explain how this is relevant to its arguments in Ground

2 regarding Mañosa and Patel, or for which claim limitation the alleged disclosure is relevant. That is, the Petition provides no explanation of how or in what manner Lloveras should be combined with Mañosa and Patel. *Id.* Furthermore, Petitioner never explains *or even states* that a POSITA would find it obvious to combine Lloveras with Mañosa and Patel. *Id.* Omitting any explanation for what claim limitation is satisfied by the reference or for combining references cannot be characterized as an “articulated reasoning with some rational underpinnings” and does not satisfy the *KSR* standard.

In sum, Petitioner has failed to undertake the required *KSR* analysis for its obviousness contentions regarding Mañosa and Patel, and, to the extent relevant, Lloveras. For at least this reason, Petitioner is unlikely to prevail on Ground 2. *See Apple*, 839 F.3d at 1048 (“A determination of whether a patent claim is invalid as obvious under § 103 requires consideration of all four *Graham* factors, and it is error to reach a conclusion of obviousness until all those factors are considered.”) (internal citation omitted)); *Magnum Oil Tools*, 829 F.3d at 1380 (reversing the PTAB’s determination of obvious in part because of petitioner’s failure to articulate how the prior art differed from the claim language); *Travelocity.com*, CBM2014-00082, Paper 12 at 4-5 (denying request for rehearing and holding that “Petitioner ha[s] not articulated any difference between the recited...method and [the prior art].” (internal citation omitted)); *Adaptics*, IPR2018-01596, Paper 20 at

18 (denying institution and holding petition failed to meet the particularity requirement of 35 U.S.C. § 312(a)(3)) (informative).

ii. The Petition fails to provide a proper obviousness rationale for combining Mañosa and Patel, or, to the extent relevant, Lloveras.

The Petition also improperly relies *exclusively* on discoveries and statements made in the '656 Patent as its source for asserting that a POSITA would have been motivated to substitute the materials of Patel for the inorganic barocaloric material described in Mañosa. Reliance on knowledge gleaned only from the patent disclosure itself constitutes impermissible hindsight and cannot serve as the basis for a finding of obviousness. *See In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971). Since it improperly relies entirely on Patent Owner's disclosure as its basis for obviousness, Ground 2 is unlikely to prevail.

First, the Petition broadly claims the '656 Patent admits “numerous advantages to using organic barocaloric materials over inorganic barocaloric materials.” Pet. at 60. The first purported admission is the statement that “organic materials may be used as alternatives to the inorganic materials that have previously been described for use in barocaloric cooling.” Pet. at 59 (citing Ex. 1001 at 5:29-32). This is not an admission, but rather a *finding*. The quoted clause was pulled from a much broader disclosure in the '656 Patent, which reads in full:

The present *inventors have now established* that organic materials, such as those that display non-isochoric phase transitions, and particularly non-isochoric first order phase transitions, can provide large barocaloric effects. These organic materials may be used as alternatives to the inorganic materials that have previously been described for use in barocaloric cooling.

Ex. 1001 at 5:26-32 (emphasis added).

Read in context, it is clear that the “admission” on which Petitioner relies is a finding underlying the invention claimed in the ’656 Patent. Not only is Petitioner’s cut-and-paste strategy legally improper, it is misleading to this tribunal and cannot properly serve as a rationale for combining alleged prior art references.

Second, rather than cite the prior art or the knowledge of a POSITA at the relevant time, in a classic case of impermissible hindsight, the Petition relies *exclusively* on statements in ’656 patent in attempting to show that the invention was obvious. Specifically, the Petition cites various advantages described in the ’656 patent to provide reasons why a POSITA would have substituted the materials in Patel for the inorganic barocaloric material of Mañosa. Pet. at 14-15, 60. As an initial matter, under *KSR*, Petitioner has the burden of showing that a POSITA would be motivated to modify the prior art to arrive at the claimed invention. That task cannot be circumvented by relying solely on the challenged patent itself. That is, perceived advantages described in the challenged patent itself cannot serve as a

proxy for proving that a POSITA would have been motivated to modify the prior art. This is textbook hindsight, which is not permitted under the law. *See In re McLaughlin*, 443 F.2d at 1395; *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) (“To imbue [a POSITA] with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.”); *TP-Link Corp. v. Netgear, Inc.*, IPR2023-01429, Paper 10 at 27 (PTAB 2024) (denying institution and noting “[p]etitioner’s obviousness rationale appears to be based on impermissible hindsight gleaned entirely from the challenged patent’s specification.”); *S.S. Steiner, Inc. v. John I. Haas, Inc.*, IPR2014-01491, Paper 7 at 16 (PTAB 2015) (same). For at least this reason, Ground 2 is unlikely to prevail because the Petition fails to establish a POSITA would have been motivated to combine Mañosa and Patel based on the knowledge of a POSITA as of the relevant priority date *and without knowledge of the inventors’ discovery*.⁵

⁵ Additionally, as discussed below, USPTO Guidelines preclude relying *solely* on a patentee’s statements in providing a motivation for combining the prior art. Ex. 2001 at 4.

Third, to the extent relevant, the Petition fails to provide a *KSR* rationale for combining Lloveras with Mañosa and Patel. In its discussion of Lloveras, other than saying that the invention “is also rendered obvious by Lloveras in view of the knowledge of a POSITA,” the Petition is silent concerning *why* or *how* a POSITA would combine Lloveras with Mañosa and Patel. Pet. at 72. Such unsupported and conclusory statements are legally insufficient and effectively eviscerate the requirement for a *KSR* rationale to combine references. Petitioner’s position fails to satisfy the *KSR* requirement that rejections on obviousness must have some articulated reason with rational underpinnings and “cannot be sustained by mere conclusory statements.” *KSR*, 550 U.S. at 418. By failing to provide a legally adequate reason for combining Lloveras, Mañosa and Patel, and Lloveras, Petitioner has failed to satisfy its burden on obviousness and is unlikely to prevail. *See, e.g., Adaptics*, IPR2018-01596, Paper 20 at 18 (denying institution and holding petition failed to meet the particularity requirement of 35 U.S.C. § 312(a)(3)) (informative).

In sum, Petitioner has failed to establish a POSITA would have been motivated to combine Mañosa and Patel to arrive at the claimed invention in more than a conclusory manner. Further, to the extent Petitioner relies on Lloveras, the Petition is devoid of any articulated obviousness reasoning or rationale for combining these references. The Petition also uses impermissible hindsight in its

reliance on findings in the '656 Patent as its sole support for a motivation to combine the references and relies on conclusory statements about a POSITA's motivation to combine. For at least these reasons, Petitioner is unlikely to prevail on Ground 2.

iii. Mañosa and Patel fail to teach an “organic material.”

Independent claims 1 and 9 recite an “organic material.” Mañosa and Patel fail to teach or suggest this claim limitation.

As discussed above, Mañosa discusses inorganic materials and is silent concerning the claimed organic material. The Petition appears to rely on Patel for supplying this claim feature, contending that Patel teaches the “organic material” limitation by disclosing PVDF-based polymers. Pet. at 68. As set forth in Section IV.C., however, the term “organic material” recited in claims 1 and 9 excludes PVDF and PVDF-TrFE-CTFE. As a result, this feature is not taught by either Mañosa or Patel. Moreover, as explained above, the Petition provides no reason or *KSR* rationale for substituting an organic material for PVDF or PVDF-TrFE-CTFE, and no reason exists. Because Mañosa and Patel fail to teach or suggest the use of an organic material, as claimed, Petitioner is unlikely to prevail on Ground 2.

D. Ground 3 is unlikely to prevail because (i) the Petition fails to provide a proper obviousness analysis, and (ii) a POSITA would not have been motivated to combine Mañosa and Tamarit.

Petitioner has not established that it has a reasonable likelihood of prevailing on its position that Claims 1-3, 6-7, 9-11, and 14-15 are invalid as obvious over Mañosa (Ex. 1007) and Tamarit (Ex. 1021) in view of the knowledge of a POSITA because (i) the Petition fails to supply a legally sufficient basis for obviousness, and (ii) a POSITA would not have been motivated to combine Mañosa and Tamarit.

i. The Petition fails to supply a legally sufficient basis for obviousness.

As discussed above, to establish obviousness, a petition must show the differences between the prior art and the claim at issue and must articulate how the combination of references resolves such differences. *See KSR*, 550 US at 418 (quoting *Graham*, 383 U.S. at 17-18). Any rationale for combining references to demonstrate obviousness must be made explicit. *KSR*, 550 U.S. at 418. That approach is also absent from Ground 3.

Like Ground 2, in arguing a POSITA would have replaced the inorganic material of Mañosa with the organic compounds of Tamarit, the Petition fails to undertake any analysis of how other claim limitations are satisfied. Patent Owner is again left guessing as to *why* or *how* or *in what way* Petitioner proposes modifying Mañosa and Tamarit to arrive at a method comprising “(i) applying hydrostatic

pressure to an organic material; (ii) permitting heat flow from or to the organic material; (iii) releasing hydrostatic pressure from an organic material that is under applied pressure; and (iv) permitting heat flow to or from the organic material.”

Ex. 1001, claims 1 and 9. As such, the *Graham* and *KSR* requirements for obviousness have not been satisfied, and Ground 3 is unlikely to prevail. *See Apple*, 839 F.3d at 1048 (“A determination of whether a patent claim is invalid as obvious under § 103 requires consideration of all four *Graham* factors, and it is error to reach a conclusion of obviousness until all those factors are considered.”) (internal citation omitted)); *Magnum Oil Tools*, 829 F.3d at 1380 (reversing the PTAB’s determination of obvious in part because of petitioner’s failure to articulate how the prior art differed from the claim language); *Travelocity.com*, CBM2014-00082, Paper 12 at 4-5 (denying request for rehearing and holding that “Petitioner ha[s] not articulated any difference between the recited...method and [the prior art].” (internal citation omitted)).

ii. The Petition fails to provide a proper obviousness rationale for combining Mañosa and Tamarit.

As discussed above, a petitioner must provide “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *See KSR*, 550 U.S. at 418 (quoting *Graham*, 383 U.S. at 17-18). In Ground 3, rather than providing an articulated reason based on the prior art or the knowledge

of the POSITA, the Petition again relies on the '656 patent itself as the sole basis for combining Mañosa and Tamarit. Pet. at 77 (“[t]he '656 patent *admits* ‘it is desirable to identify materials displaying a large isothermal entropy change at a relatively low pressure’.”); Ex. 1001 at 2:36-39. From this alleged “admission,” Petitioner improperly concludes a POSITA would “have been motivated to replace Mañosa’s inorganic material with [] Tamarit’s high entropy-change plastic crystals.” Pet. at 77. Reliance on knowledge gleaned solely⁶ from the patent disclosure itself constitutes impermissible hindsight and cannot serve as the basis for a finding of obviousness. *See In re McLaughlin*, 443 F.2d at 1395. For this reason, Ground 3 is unlikely to prevail.

Notably, the June 9, 2022 USPTO Guidance Memorandum entitled “Updated Guidance on the Treatment of Statements of the Applicant in the

⁶ Petitioner’s citation to Català (Ex. 1011/1012) is misplaced as this document was not publicly accessible until January 13, 2017. *See* Univ. Catalunya Publication Certificate, Ex. 2002. Petitioner’s reliance on Ex. 1027 is also misplaced as it supports a January 13, 2017, publication date. Ex. 1027 at 22 (showing dates “accepted” and “available” as “2017-01-13”). Ex. 1027 also fails to explain how Català would have been accessible to a POSITA prior to January 13, 2017 (it was not).

Challenged Patent in Inter Partes Reviews Under § 311” provides that “[a] patentee's admissions regarding the scope and content of the prior art under § 103 can be used, for example, to: ... **support** a motivation to combine particular disclosures ...” Ex. 2001 at 4 (emphasis added). Here, however, Petitioner does not use the statement to support its conclusion that a POSITA would have replaced Mañosa’s inorganic material with Tamarit’s high entropy-change plastic crystals—the Petition instead uses the statement as its **sole basis** for combining these references.⁷ As in Ground 2, by relying exclusively on the ’656 patent itself, Petitioner relies on textbook hindsight, which cannot serve as the basis for a finding of obviousness. *See In re McLaughlin*, 443 F.2d at 1395; *see also MED-EL Elektromedizinische Geräte GmbH v. Advanced Bionics AG*, IPR2020-01016, Paper 13 at 38 (PTAB 2020) (noting that the AAPA Guidance (Ex. 2001) provides AAPA “cannot be used as the ‘basis’—i.e., the ‘foundation or starting point’—of an obviousness ground”).

Finally, the statement pulled from the ’656 patent does not evince any motivation to replace Mañosa’s inorganic material with Tamarit’s organic materials. The ’656 Patent states, “it is desirable to identify materials displaying a

⁷ Ex. 1004, the Dinca Declaration, also cited, simply restates the discussion of entropy changes in the Petition. Ex. 1004 at ¶ 48.

large isothermal entropy change *at a relatively low pressure.*” Ex. 1001 at 2:36-39 (emphasis added). Petitioner completely omits any discussion of pressure and instead concludes that a POSITA would have been motivated to replace Mañosa’s inorganic material with Tamarit’s organic materials. Thus, even if the statement was a proper basis to support Petitioner’s motivation to replace Mañosa’s inorganic material with Tamarit’s organic material (it is not), Petitioner’s motivation is conclusory and unsupported.⁸

By relying solely on statements in the ’656 Patent for its alleged motivation for combining Mañosa and Tamarit in Ground 3, Petitioner’s obviousness position is based on impermissible hindsight and is legally improper. Ex. 2001 at 4; *In re McLaughlin*, 443 F.2d at 1395. For at least this reason, Ground 3 is unlikely to prevail.

⁸ As discussed in Section V.D., the experiments in Tamarit do not involve measurements of heat or temperature under variable pressure and hence do not provide barocaloric information concerning its compounds. For this reason also, it is not combinable with Mañosa.

E. Ground 4 is unlikely to prevail for lack of particularity and because the Petition fails to supply a legally sufficient basis for obviousness.

In Ground 4, Petitioner has failed to state the alleged precise grounds of unpatentability, instead throwing in the proverbial kitchen sink. Ground 4 includes citations back to previous grounds and sections. Then, based on different combinations of references, Petitioner alleges obviousness without any explanation as to why or how a POSITA would combine the references.

As described above, an obviousness assertion requires Petitioner to describe (i) the scope and content of the prior art are to be determined; (ii) differences between the prior art and the claim at issue are to be ascertained; and (iii) the level of ordinary skill in the pertinent art resolved. *See KSR*, 550 U.S. at 418. Mere “conclusory statements” are insufficient. *Id.* Ground 4 is completely devoid of the required obviousness rationale.

At the outset, Grounds 4 and 5 (combined) consist of four sentences. Pet. at 86-87. Even if it is possible to undertake the required *KSR* rationale in two sentences (two for each Ground), Petitioner does not even attempt to do so. Discussion of the combination of Tamarit and Xie is provided in a single sentence which refers to the section of the Petition, § V.A., discussing the Background of

the '656 Patent.⁹ Pet. at 86. Section V.A. describes various “admissions” allegedly present throughout the '656 Patent but nowhere discusses the purported obviousness of Tamarit and Xie. Pet. at 10-18.

In its failure to undertake any obviousness analysis for Tamarit and Xie, Petitioner has failed to articulate what claim features are being supplied, and from which of these references, to arrive at the claimed invention. Is it a feature from Tamarit? Xie? Supplied by the knowledge of a POSITA? What features?

The Petition further fails to identify any differences between the claimed invention and the cited references. As described in Sections VII.B.-VII.D., identification of any differences between the prior art and the claimed invention is critical in an obviousness analysis, since it identifies what features are being supplied by secondary references or the knowledge of a POSITA. In a proper obviousness analysis, once a missing feature is identified, either a secondary

⁹ Ex. 1004, the Dinca Declaration, also cited, is equally conclusory. Dr. Dinca refers to previous sections in which he discussed alternate combinations of the references (e.g., Xie alone or Tamarit and Mañosa) and concludes “[a]s I explained, the claimed methods were admittedly well-known in the art. Applying those methods to different uses, i.e., the intended use of the method, is obvious.” Ex. 1004 at ¶ 185.

reference or the knowledge of a POSITA is cited to supply that missing feature, along with a *KSR* rationale for incorporating that feature into the primary reference. That approach is absent from Ground 4.¹⁰

The Petition does not state, or even suggest, why a POSITA would be motivated to modify Tamarit or to combine Tamarit’s disclosure with that of Xie. Petitioner skips this step and simply concludes “a POSITA would have been motivated to substitute the organic plastic crystals of Tamarit for Xie’s organic material.” Pet. at 86. Such broad sweeping statements fall far short of the *KSR* mandate for an “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418.

In sum, the purported obviousness position in Ground 4, as best Patent Owner can ascertain, appears to be a catch-all ground for new combinations of references without any legally cognizable basis for obviousness. In view of its apparent breadth, Ground 4 also lacks particularly. The Board has cautioned against such practices. *See Adaptics*, IPR2018-01596, Paper 20, at 21 (informative)

¹⁰ Assuming the Petition intended to rely on Grounds 1 and 3 (asserting obviousness over Xie, and Mañosa and Tamarit, respectively), the Petition still fails to set forth a legally adequate obviousness rationale at least because Grounds 1 and 3 fail to do so. *See* Sections VII.B. and VII.D.

(denying institution where “Petitioner’s ‘catch-all’ ground [was] not reasonably bounded in scope and [was] unduly burdensome for both Patent Owner and the Board to address” and denying institution for failure to meet the particularity requirement of 35 U.S.C. § 312(a)(3)). In view of the foregoing, Petitioner is unlikely to prevail on Ground 4, and the Board should exercise its discretion and deny institution under 35 U.S.C. § 314(a).

F. Ground 5 is unlikely to prevail for lack of particularity and because the Petition fails to supply a legally sufficient basis for obviousness.

Similar to Ground 4, in Ground 5 Petitioner has failed to provide any legally identifiable basis of obviousness. Here too, Petitioner has failed to undertake any *KSR* analysis and fails to explain why or how a POSITA would combine the prior art references.

As noted above, Grounds 4 and 5 combined consist of four sentences. Pet. at 86-87. Petitioner does not attempt to undertake a *KSR* rationale for either Ground 4 or 5. Ground 5 appears to rely on Tamarit with Mañosa in combination with Patel. Pet. at 86-87. Although the heading for Ground 5 in the petition refers to Tamarit, Mañosa, and Patel, the text of the argument refers only to Tamarit and Mañosa: “a POSITA would have understood claims 1-3, 6-7, 9-11, and 14-15 to be obvious by the combination of...Tamarit with Mañosa.” Pet. at 87.

Assuming Ground 5 relies on the combination of Tamarit, Mañosa, and Patel, the Petition fails to undertake any analysis of the purported obviousness. Discussion of the combination of Tamarit and Mañosa is provided in a single sentence which refers to the sections of the Petition discussing the Background of the '656 Patent, Ground 2 (Mañosa and Patel), and Ground 3 (Mañosa and Tamarit).¹¹ Pet. at 87. Also, since Ground V appears to rely on Tamarit as the primary reference, these discussions are not helpful since Mañosa is used as the primary reference in Grounds 2 and 3. Simply put, the sections referenced do not provide an obviousness analysis for the combination of Tamarit, Mañosa, and Patel.

First, it is unclear which claim features are supplied, and from which of the three references, to arrive at the claimed invention. Is it a feature from Tamarit? Mañosa? Patel? Supplied by the knowledge of a POSITA? The Petition simply states, “a POSITA would have been motivated to substitute Tamarit’s organic

¹¹ Like Ground 4, the Dinca Declaration is cited but is equally conclusory and only echoes the petition. Ex. 1004 at ¶ 185; Pet. at 87. Dr. Dinca refers to previous sections in which he discussed alternate combinations of the references (e.g., Mañosa and Tamarit or Mañosa and Patel) and simply concludes the claimed method is obvious. Ex. 1004 at ¶ 185.

crystals for Mañosa’s inorganic material for the same reasons specified above.”

Pet. at 87. It appears this statement is intended to suggest Tamarit and Mañosa supply the “organic material” limitation in claims 1 and 9. However, independent claims 1 and 9 include elements other than an organic material for which there is no discussion. Ex. 1001, claims 1 and 9. Moreover, it is unclear which, if any, claim features are supplied by Patel.

Further, like Ground 4, the Petition fails to identify any differences between the claimed invention and Tamarit, Mañosa, and Patel. In a proper obviousness analysis, once a missing feature is identified, either a secondary reference or the knowledge of a POSITA is cited to supply that missing feature, along with a *KSR* rationale for incorporating that feature into the primary reference. That approach is again absent from Ground 5.¹²

Finally, like Ground 4, the Petition does not state, or even suggest, *why* a POSITA would be motivated to modify Tamarit or to combine Tamarit’s

¹² Assuming the Petition intended to rely on Grounds 2 and 3 (asserting obviousness over Mañosa and Patel, and Mañosa and Tamarit, respectively), the Petition still fails to set forth a legally adequate obviousness rationale at least for the above reasons that Grounds 2 and 3 fail to do so. *See* Sections VII.C. and VII.D.

disclosure with that of Mañosa and Patel. Petitioner skips this step and simply concludes “a POSITA would have been motivated” to combine Tamarit and Mañosa, and “a POSITA would have understood” the claims to be obvious over Tamarit and Mañosa. Pet. at 87. Aside from failing to articulate any rationale for combining Tamarit and Mañosa with Patel, Petitioner’s conclusory statements fall short of the *KSR* mandate for an “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418.

In sum, like Ground 4, the purported obviousness position in Ground 5 is devoid of any legally cognizable basis for obviousness. For at least this reason, Petitioner is unlikely to prevail on Ground 5, and the Board should exercise its discretion and deny institution under 35 U.S.C. § 314(a).

VIII. Conclusion

For the foregoing reasons, Petitioner is unlikely to prevail on any ground with respect to any of the challenged claims. Patent Owner respectfully requests that the Board deny institution.

Respectfully submitted,

Dated: December 30, 2024

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U.S. Patent No. 11,230,656
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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Patent Owner's Preliminary Response contains 9,373 words, as measured by the word-processing system used to prepare this paper. This word count does not include the items excluded by 37 C.F.R. § 42.24 as not counting towards the word limit.

Respectfully submitted,

Dated: December 30, 2024

By: /Justin Krieger/

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CERTIFICATE OF SERVICE

I hereby certify that on December 30, 2024, I caused a true and correct copy of the foregoing Patent Owner's Preliminary Response, Exhibits 2001 and 2002, and Patent Owner's Exhibit List to be served electronically on Petitioner at the following email address:

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