

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SNF S.A.,
Petitioner,

v.

CHEVRON U.S.A., Inc.,
Patent Owner.

IPR2022-01534
Patent 10,626,320 B2

Before BARRY L. GROSSMAN, JEREMY M. PLENZLER, and
AMEE A. SHAH, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

SNF S.A. (“Petitioner” or “SNF”) filed a Petition for inter partes review of claims 1–25 of U.S. Patent No. 10,626,320 B2 (Ex. 1001, “the ’320 patent”). Paper 2 (“Pet.”). Chevron U.S.A., Inc. (“Patent Owner” or “Chevron”) timely filed a Preliminary Response to the Petition. Paper 8 (“Prelim. Resp.”). We have jurisdiction under 35 U.S.C. § 314. Under § 314, 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.” 35 U.S.C. § 314(a). The Board determines whether to institute a trial on behalf of the Director. 37 C.F.R. § 42.4(a) (2022).

Petitioner has the burden of proof. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.”).

For the reasons set forth below, we determine that Petitioner has demonstrated that there is a reasonable likelihood that at least one of the challenged claims is unpatentable. Accordingly, we institute an *inter partes* review of all challenged claims and on all grounds asserted in the Petition. *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (stating that a decision to institute is “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

Patent Owner asserts that we should exercise our discretion to deny the “Pitch Grounds” under 35 U.S.C. § 325(d) “because identical prior art and arguments were previously considered.” Prelim. Resp. 46 (heading for Section V.B.3 (bold font and capitalization deleted)). As we explain in Section III of this

Decision, we decline Patent Owner’s invitation to discretionally deny the “Pich Grounds.”

B. Real Parties-in-Interest

SNF identifies itself as well as SPCM S.A. as real parties-in-interest. Pet. 3. Chevron identifies itself as the real party-in-interest. Paper 5, 1. Patent Owner states that “Chevron U.S.A. is a wholly owned indirect subsidiary of Chevron Corporation.” *Id.*

C. Related Matters

Petitioner states that “[t]here are no related litigations.” Pet. 3. Patent Owner states, “there is a pending patent application that is a continuation of the ’320 patent, U.S. Patent Application No. 15/372,168.” Paper 5, 1.

D. The ’320 patent

The ’320 patent is titled “Methods for Hydrocarbon Recovery.” Ex. 1001, code (54). The patent discloses the use of inverted water-soluble polymers to provide enhanced oil recovery (“EOR”) for oil extracted from the ground or other oil reservoirs. *Id.* at 1:13–21. Petitioner refers to these inverted polymer solutions with the acronym “IPS.” *See, e.g.*, Pet. 1 (“The claimed subject matter is directed to the well-known method of preparing inverted polymer solution (IPS) for use in enhanced oil recovery (EOR) operations”). The use of such polymers is acknowledged in the ’320 patent as being well-known. Ex. 1001, 1:22–30. As explained in the ’320 patent,

In the past, these polymers were made available commercially as powders or finely divided solids which were subsequently dissolved in an aqueous medium at their time of use. Because such dissolution steps are sometimes time consuming and often require rather expensive mixing equipment, such polymers are sometimes provided in water-in-oil emulsions wherein the polymer is dissolved in the dispersed aqueous

phase. The *water-in-oil* emulsions can then be inverted to form *oil-in-water* emulsions at their time of use.

Id. (emphasis added). These known inverted oil-in-water emulsions, however, “are often unable to pass through porous structures,” which “significantly limits their utility as . . . fluid mobility control agents in EOR applications.” *Id.* at 1:33–36. According to the ’320 patent, the known emulsions also “cannot be efficiently inverted” when used for enhanced oil recovery. *Id.* at 1:36–39.

The ’320 patent discloses that “[a]s used herein, ‘inverted’ refers to the point at which the viscosity of the inverted polymer solution has substantially reached a consistent viscosity” and “this may be determined for example by measuring viscosity of the inverted polymer solution periodically over time and when three consecutive measurements are within the standard of error for the measurement.” Ex. 1001, 17:34–41.

The written description of the disclosed invention is detailed, comprehensive, and contains numerous embodiments. The written description discusses various liquid polymer compositions (*id.* at 6:15), hydrophobic liquids (*id.* at 8:1), synthetic co-polymers (*id.* at 8:31), emulsifying surfactants ((*id.* at 11:64), process stabilizing agents (*id.* at 12:63), inverting surfactants (*id.* at 13:40), proportions of liquid polymer compositions (*id.* at 14:40), inverted polymer solutions (*id.* at 15:64), methods of use (*id.* at 29:27), and numerous specific examples of methods and materials (*id.* at 30:39).

Central to the issues presented by the parties, however, is a filter quotient, “filter ratio,” or “FR,” commonly used to determine performance of the emulsion or liquid polymer. *Id.* at 5:36–40; *see also*, Prelim. Resp. 5–6 (referring to the filter ratio recited in all the challenged claims and asserting “it is this key limitation that is missing from all of the [asserted] prior art”).

The filter ratio *formula* is *not* a measurement unique to the '320 patent. Ex. 1001, 31:4–14 (“The filter ratio (FR) of the inverted polymer solutions was determined using the *standard procedure* described, for example, in Koh [Ex. 1006] . . . Levitt [Ex. 1007] . . . and Magbagbeola [Ex. 1008]”) (emphasis added).¹

As described in the '320 patent, the filter ratio is “calculated as the ratio of the time for 180 to 200 ml of the inverted polymer solution to filter divided by the time for 60 to 80 ml of the inverted polymer solution to filter.” Ex. 1001, 5:5–8. The filter ratio formula is:

$$FR = \frac{t_{200 \text{ ml}} - t_{180 \text{ ml}}}{t_{80 \text{ ml}} - t_{60 \text{ ml}}}$$

Id. at 5:10–13; 31:21–28; *see also, e.g.*, Ex. 1006 (Koh), 239 (disclosing this identical formula). This standard formula does *not* require a specific or standard filter pore size, nor does it require a specific or standard pressure or temperature. The standard formula for determining a filter ratio in the context of the '320 patent depends solely on the time to filter specific amounts of an inverted polymer. *Id.* at 5:36–43.

As disclosed in the '320 patent, the calculated filter ratio is *not* the critical parameter in determining performance of a specific polymer used for enhanced oil recovery. *Id.* at 5:58–61. The written description states that “[g]enerally, a lower FR indicates better performance.” *Id.* (citing, and incorporating by reference, U.S. Patent 8,383,560, which explains that “a desirable FR using this method is less

¹ Koh, Levitt, and Magbagbeola each are academic papers from Ph.D. or M.S. students at the University of Texas at Austin. Ex. 1001, 31:6–14. Each of these academic papers was “incorporated by reference in its entirety” into to the written description of the '320 patent. *Id.*

than 1.5.”). According to the ’320 patent, however, many polymers that have a filter ratio lower than 1.5 using a 5 micron² filter “exhibit poor injectivity – i.e., when injected into a formation, they tend to plug the formation, slowing or inhibiting oil production.” *Id.* at 5:64–6:1.

The written description states that a modified filter ratio test, using a smaller filter pore size and a lower pressure “provides a better screening method.” Ex. 1001, 6:1–5. The disclosed and claimed invention in the ’320 patent uses the same filter ratio test *formula* to calculate the FR as disclosed in prior patents and publications, except that the 5 micron filter used in U.S. Patent 8,383,560 is replaced with a filter having a smaller pore size of 1.2 microns and a lower pressure of 15 psi, rather than “2 bars.”³ Ex. 1001, 5:45; 6:1–5. According to the ’320 patent, inverted polymer solutions prepared by the methods described in the ’320 patent, which is using a 1.2 micron filter and a pressure of 15 psi, “can provide a FR . . . of 1.5 or less.” *Id.* at 6:6–8. The ’320 patent states that “[i]n field testing, these compositions can exhibit improved injectivity over commercially-available polymer compositions—including other polymer compositions having an FR (using a 5 micron filter) of less than 1.5,” which makes them “suitable for use in a variety of oil and gas applications, including EOR.” Ex. 1001, 6:8–13.

E. Illustrative Claim

Among the challenged claims, claims 1, 24, and 25 are independent claims. Independent claims 1 and 24 are directed to a “method for preparing an inverted

² A micron is a unit of length that is one millionth of a meter or 10⁻⁶ m. The micron is also known as a micrometer or by its abbreviation μm.

³ The bar is a metric unit of pressure. Two bars of pressure equal approximately 29 pounds per square inch (psi)).

polymer solution.” Ex. 1001, 37:63–38:13; 39:27–40:11. Claim 1 requires “at least 39% by weight of one or more synthetic (co)polymers” (Ex. 1001, 38:1–2), whereas claim 24 requires “up to 35% by weight of one or more synthetic (co)polymers” (*id.* at 40:1–2). Except for this one difference, claims 1 and 24 are identical.

Independent claim 25 is directed to a “method for hydrocarbon recovery,” which injects an inverted polymer solution into a wellbore in fluid communication with a subsurface hydrocarbon reservoir. *Id.* at 40:12–31. Except for this difference, claim 25 and claim 1 are identical.

All of the challenged claims recite the same specific filter ratio parameter, which was calculated using the industry-standard formula discussed above. As stated in all the challenged claims, the filter ratio is “1.5 or less at 15 psi using a 1.2 μm filter.” *See, e.g., Id.* at 38:9–10 (claim 1); *see also id.* at 5:1–4 (stating “For purposes of this disclosure, including the claims, the filter ratio (FR) can be determined using a 1.2 micron filter at 15 psi (plus or minus 10% of 15 psi) at ambient temperature (e.g., 25° C.)”; *id.* at 5:14–16 (stating “For purposes of this disclosure, including the claims, the inverted polymer solution is required to exhibit a FR of 1.5 or less.”).⁴

Independent claim 1 is illustrative and is reproduced below.

1. A method for preparing an inverted polymer solution comprising providing a liquid polymer (LP) composition comprising:
 - one or more hydrophobic liquids having a boiling point of at least 100° C.;
 - at least 39% by weight of one or more synthetic (co)polymers;
 - one or more emulsifier surfactants; and
 - one or more inverting surfactants;

⁴ The *disclosed* limitations of a pressure “plus or minus 10% of 15 psi” and “at ambient temperature (e.g., 25° C.)” are *not* included in the challenged claims.

inverting the LP composition in an aqueous fluid to provide an inverted polymer solution having a concentration of synthetic (co)polymer of from 50 to 15,000 ppm;
wherein the inverted polymer solution has a filter ratio of 1.5 or less at 15 psi using a 1.2 μm filter; and
wherein the inverted polymer solution is used in an enhanced oil recovery (EOR) operation.

Id. at 37:63–38:13.

F. Prior Art and Asserted Ground

Petitioner asserts that the challenged claims are unpatentable on the following grounds (*see, e.g.*, Pet. 5–6):

Claims Challenged	35 U.S.C. § ⁵	Basis
1, 2, 13–15, 20–25	102 “and/or” 103	Li ⁶ (2 separate and distinct grounds)
3–12, 16–19	103	Li, Pich ⁷
24	103	Li, BASF ⁸
1–25	103	Pich, “and any of” Koh, ⁹ Levitt, ¹⁰ or Magbagbeola ¹¹ (3 separate and distinct grounds)
24	103	Pich, “any of” Koh, Levitt, or Magbagbeola, and BASF (3 separate and distinct grounds)

Petitioner also relies on the declaration testimony of Reza Barati, Ph.D. *See* Ex. 1012.

⁵ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2011. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any patent application filed before March 16, 2013. Because the application for the patent at issue in this proceeding has an effective filing date after March 16, 2013, we refer to the AIA version of the statute.

⁶ Li et al., US 10,442,980 B2, issued Oct. 15, 2019 (Ex. 1003, “Li”).

⁷ Pich et al., US 2011/0118153 A1, published May 19, 2011 (Ex. 1004, “Pich”).

⁸ Reichenbach-Kline et al., US 9,701,890 B2, issued July 11, 2017 (Ex. 1005, “BASF”).

⁹ Koh, H., *Experimental Investigation of the Effect of Polymers on Residual Oil Saturation*, 2015 (Ex. 1006, “Koh”).

¹⁰ Levitt, D.B., *The Optimal Use of Enhanced Oil Recovery Polymers Under Hostile Conditions*, 2009 (Ex. 1007, “Levitt”).

¹¹ Magbagbeola, O.A., *Quantification of the Viscoelastic behavior of High Molecular Weight Polymers used for Chemical Enhanced Oil Recovery*, 2008 (Ex. 1008, “Magbagbeola”).

II. ANALYSIS

A. *Legal Standards*

“To anticipate a claim, a prior art reference must disclose each and every element of the claim, either explicitly or inherently.” *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 910 (Fed. Cir. 2022) (citing *Eli Lilly & Co. v. Zenith Goldline Pharms., Inc.*, 471 F.3d 1369, 1375 (Fed. Cir. 2006)). “While those elements must be arranged or combined in the same way as in the claim, the reference need not disclose the elements in the very same terms used by the patent.” *Id.* (citing *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009) (“[T]he reference need not satisfy an *ipsissimis verbis* test.” (citing *In re Bond*, 910 F.2d 831, 832–33 (Fed. Cir. 1990)))). “And ‘[e]ven if a reference's teachings are insufficient to find anticipation, that same reference's teachings may be used to find obviousness’ *where it suggests some reason to modify the prior art to obtain the claimed limitations.*” *Id.* (citing *CRFD Rsch., Inc. v. Matal*, 876 F.3d 1330, 1345 (Fed. Cir. 2017) (emphasis added)). “The question of what a reference teaches and whether it describes every element of a claim is a question for the finder of fact.” *Id.* (citing *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1221 (Fed. Cir. 2003)). In an *inter partes* review, the Board is the finder of facts.

Inherent anticipation is a key issue in the proceeding before us. In *Arbutus Biopharma Corp. v. Modernatx, Inc.*, No. 2020-1183, slip op. at 6 (Fed. Cir. Apr. 11, 2023), the main issue before the Board was whether a claim element was “inherently disclosed.” The Federal Circuit noted that a finding of anticipation “does not require the actual creation or reduction to practice of the prior art subject matter; anticipation requires only an enabling disclosure.” *Id.*, slip op. at 8 (quoting *Schering Corp. v. Geneva Pharms.*, 339 F.3d 1373, 1380 (Fed. Cir. 2003)).

Also, as explained in *Net MoneyIN*,

unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. § 102.

Net MoneyIN, Inc. v. VeriSign, Inc., 545 F.3d 1359, 1371 (Fed. Cir. 2008). “The requirement that the prior art elements themselves be arranged as in the claim means that claims cannot be treated . . . as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning.” *VirnetX Inc. v. Mangrove Partners Master Fund, Ltd.*, No. 2020-2272, slip op. at 14 (Fed. Cir. Mar. 30, 2023) (citing *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (internal quotation marks omitted)).

Inherent anticipation requires “merely that the disclosure [of the prior art] is sufficient to show that the natural result flowing from the operation as taught [in the prior art] would result in’ the claimed product.” *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1343–44 (Fed. Cir. 2005) (citing cases). Moreover, “[b]ecause inherency places subject matter in the public domain as well as an express disclosure, the inherent disclosure of the entire claimed subject matter anticipates as well as [the] inherent disclosure of a single feature of the claimed subject matter.” *Schering v. Geneva Pharms.*, 339 F.3d at 1379.

Whether the challenged claims would have been obvious over the cited references also is at issue in this proceeding. Section 103 forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398,

406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, evidence such as commercial success, long felt but unsolved needs, and failure of others.¹² *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); see *KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [Graham] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” 383 U.S. at 18.

Novelty under 35 U.S.C. § 102 and nonobviousness under 35 U.S.C. § 103 are separate conditions of patentability. *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1363 (Fed. Cir. 2008). The tests for anticipation and obviousness are different. *Id.* at 1364. The elements of proof for anticipation and obviousness are different. *Duro-Last, Inc. v. Custom Seal, Inc.*, 321 F.3d 1098, 1107–08 (Fed. Cir. 2003). Thus, “it does not follow that every technically anticipated invention would also have been obvious.” *Cohesive Techs.*, 543 F.3d at 1364; see also *Ericsson Inc. & Telefonaktiebolaget LM Ericsson v. Intellectual Ventures*, IPR2014-01471, slip op. at 14 (PTAB Mar. 18, 2015) (Paper 10) (“Although Petitioner may assert that all the elements . . . are found in the prior art, we note that not every anticipated claim [would have been] obvious.”).

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent

¹² Patent Owner does not direct us to any objective evidence of non-obviousness in its Preliminary Response.

claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To support this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim.

Unigene Labs., Inc. v. Apotex, Inc., 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

In determining whether there would have been a motivation to combine prior art references to arrive at the claimed invention, it is insufficient to simply conclude the combination would have been obvious without identifying any reason *why* a person of skill in the art would have made the combination. *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017).

Moreover, in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 164 (Fed. Cir. 1985) (“It is elementary that the claimed invention must be considered as a whole in deciding the question of obviousness.”); *see also Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983) (“[T]he question under 35 U.S.C. § 103 is not whether the differences *themselves* would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention as a whole would have been obvious.”).

As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

Applying these general principles, we consider the evidence and arguments of the parties.

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.*

“The *Graham* analysis includes a factual determination of the level of ordinary skill in the art. Without that information, a . . . court cannot properly assess obviousness because the critical question is whether a claimed invention would have been obvious at the time it was made to one with ordinary skill in the art.” *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *see also Ruiz v. A.B. Chance*, 234 F.3d 654, 666 (Fed. Cir. 2000) (“The determination of the level of skill in the art is an integral part of the *Graham* analysis.”).

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (citing *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007) (quoting *Env’t Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696 (Fed. Cir. 1983)). These factors are not exhaustive but

merely are a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo*, 501 F.3d at 1256. In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner asserts that a person of ordinary skill in the art would have had “either: (1) a Ph.D. in the field of petroleum engineering, chemistry, polymer chemistry, chemical engineering, and/or a related field, and (2) having at least 2-3 years of work experience in the synthesis and development of chemical flooding techniques for EOR. [sic]” Pet. 17 (citing Ex. 1012 ¶ 18). Other than citing Dr. Barati’s testimony, Petitioner does not state the basis for these conclusions.

Dr. Barati offers a similar, but slightly different, opinion. Ex. 1012 ¶ 18. Dr. Barati refers to “four factors” that “may be considered” in determining the level of ordinary skill (*id.* at ¶ 16), but does not provide any facts, data, or analysis based on the four identified factors. Thus, we do not know how, or whether, these factors informed Dr. Barati’s opinion.

Dr. Barati opines that “a POSITA^[13] would have had a PhD in Chemical or Petroleum Engineering (or related science or engineering discipline) with 2-3 years of experience in the design and implementation of methods for hydrocarbon recovery including use of polymer compositions in such recovery methods.” *Id.* at ¶ 18. Alternatively, according to Dr. Barati, “a POSITA might substitute several years of actual design or implementation experience for the advanced degree.” *Id.*

¹³ “POSITA,” or variations of this acronym, is common patent law jargon for a “person having ordinary skill in the art” to which the claimed invention pertains. *See* 35 U.S.C. § 103 (2011).

Petitioner's and Dr. Barati's asserted level of ordinary skill are reproduced in the chart below.

Petitioner	Dr. Barati
A POSITA would be a person with <i>either</i> : (1) a Ph.D. in the field of petroleum engineering, chemistry, polymer chemistry, chemical engineering, and/or a related field, <i>and</i> (2) having at least 2-3 years of work experience in the synthesis and development of chemical flooding techniques for EOR. Pet. 17 (emphases added).	a POSITA would have had a PhD in Chemical or Petroleum Engineering (or related science or engineering discipline) with 2-3 years of experience in the design and implementation of methods for hydrocarbon recovery including use of polymer compositions in such recovery methods. Alternatively, a POSITA might substitute several years of actual design or implementation experience for the advanced degree. Ex. 1012 ¶ 18.

Patent Owner asserts that the “Petition fails regardless of the level of skill of a POSITA, and thus the Board need not resolve the precise required level of skill in order to deny” the Petition. Prelim. Resp. 6. According to Patent Owner, the emphasized terms in the chart above for Petitioner's proposed level of skill make Petitioner's proposal “grammatically erroneous and confusing.” *Id.* We agree. The word “either” in Petitioner's proposed level of skill is confusing. Patent Owner also criticizes Dr. Barati's proposed level of skill because it “makes no mention of ‘synthesis’.” *Id.* at 7. Patent Owner does not provide argument or evidence as to why “synthesis” is critical or necessary in the level of skill. Patent Owner does not propose a level of skill. *Id.*

The specific level of skill is important in determining the patentability issues. *See, e.g., Kyocera Senco Industrial Tools Inc. v. I.T.C.*, 22 F.4th 1369, 1375–78 (Fed. Cir. 2022). In *Kyocera*, the adopted level of ordinary skill in the art required “experience in power nailer design.” *Id.* at 1375–76. A proffered expert had “advanced degrees in engineering and extensive experience in the design and

manufacture of fastener driving tools” but lacked specific experience in “powered nailer design.” *Kyocera*, 22 F.4th at 1376. The Federal Circuit held it was an abuse of discretion to admit testimony from the proffered expert “on any issue that is analyzed through the lens of an ordinarily skilled artisan.” *Id.* at 1377–1378.

For purposes of this Decision, based on the prior art, the sophistication of the technology disclosed in the ’320 patent, and giving some weight to Dr. Barati’s opinion, we adopt Dr. Barati’s definition of the level of ordinary skill.

Our level of ordinary skill determination is a preliminary determination. It does not preclude the parties from further arguing their proposed level of ordinary skill during trial, as permitted by our rules.

C. Claim Construction

We construe each claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’” (citations omitted)).

Petitioner asserts that “[a]ll claim terms should be given their ordinary and customary meaning to a POSITA at the time of invention in light of the specification” and does not assert a specific definition of any claim term. Pet. 17.

Patent Owner “does not believe it is necessary to construe any claim terms for purposes of the Board’s institution determination.” Prelim. Resp. 8.

Claims must be construed “only to the extent necessary to resolve the controversy.” *AstraZeneca AB v. Mylan Pharms. Inc.*, 19 F.4th 1325, 1345 (Fed.

Cir. 2021) (quoting *Vivid Techs., Inc. v. American Science & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (citations omitted)). We determine that a specific construction of the claims is not necessary to reach a decision on whether to institute an *inter partes* review of the challenged claims.

We now turn to the merits of Petitioner’s asserted Grounds of unpatentability.

D. Ground 1A; Anticipation of Claims 1, 2, 13–15, and 20–25 Based on Li

Ground 1, as stated by Petitioner, is that claims 1, 2, 13–15, and 20–25 are “anticipated and/or obvious” based on the disclosure in Li. Pet. 30. This asserted Ground presents two separate and distinct grounds. We re-label them as Ground 1A, Anticipation, and Ground 1B, Obviousness.

Novelty under 35 U.S.C. § 102 and nonobviousness under 35 U.S.C. § 103 are separate conditions of patentability. *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1363 (Fed. Cir. 2008). The tests for anticipation and obviousness are different. *Id.* at 1364. The elements of proof for anticipation and obviousness are different. *Duro-Last, Inc. v. Custom Seal, Inc.*, 321 F.3d 1098, 1107–08 (Fed. Cir. 2003). Thus, “it does not follow that every technically anticipated invention would also have been obvious.” *Cohesive Techs.*, 543 F.3d at 1364; *see also Ericsson Inc. & Telefonaktiebolaget LM Ericsson v. Intellectual Ventures*, IPR2014-01471, slip op. at 14 (PTAB Mar. 18, 2015) (Paper 10) (“Although Petitioner may assert that all the elements . . . are found in the prior art, we note that not every anticipated claim [would have been] obvious.”); *cf. Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1373 (Fed. Cir. 2019) (“it is well settled that ‘a

disclosure that anticipates under § 102 also renders the claim invalid under § 103, for ‘anticipation is the epitome of obviousness.’”).¹⁴

1. Li (Ex. 1003)

Li “relates to improved emulsions of mobility control polymers that can be used to increase recovery of crude oil from a subterranean hydrocarbon-containing formation.” Ex. 1003, 1:6–9. Li discloses an aqueous flooding fluid or a mobility control agent that comprises a cross-linked water-soluble polymer and an emulsifying surfactant, in which “the aqueous flooding fluid as injected into the well has a filter ratio of from 1 to about 1.5 and a flow rate of at least 0.1 g/s when the membrane filter size is 5 microns and the pressure is 20 psi.” *Id.* at 3:4–26. Li discloses that “[t]ypically, the polymer emulsion is ‘inverted,’ or converted into a water-continuous emulsion with the aid of a high HLB surfactant and high shear, during the dilution process.” *Id.* at 6:10–13. The water-soluble polymer can be a synthetic polymer such as “an ionic, high molecular weight polyacrylamide,

¹⁴ The issue presented in *Realtime Data* was whether the Board erred in its determination that a person of ordinary skill in the art would have been motivated to combine the teachings of two references, O'Brien and Nelson. *Realtime Data*, 912 F.3d at 1372. The Court concluded that, in this case, the Board was not required to make any finding regarding a motivation to combine because the Board did not rely on Nelson for the disclosure of a particular element or teaching. *Id.* at 1373. The Board relied on Nelson simply to demonstrate that a person of ordinary skill in the art would have understood that the string compression disclosed in O'Brien was, in fact, a type of dictionary encoder. *Id.* at 1372–73. Thus, whether anticipation automatically renders a claim invalid under § 103 is dicta in the *Realtime Data* case. *See also, Adasa v. Avery Dennison*, 55 F.4th at 910 (“[e]ven if a reference's teachings are insufficient to find anticipation, that same reference's teachings may be used to find obviousness’ where it suggests some reason to modify the prior art to obtain the claimed limitations.”).

produced by the copolymerization of acrylamide with an anionic monomer such as sodium acrylate or sodium 2-acrylamido-2-methylpropanesulfonate.”

Ex. 1003, 6:19–24. The water-soluble polymer can be a copolymer. *Id.* at 8:18–19. “The water-soluble polymer can be included in an aqueous flooding fluid in an amount of about 100 ppm to about 10000 ppm.” *Id.* at 19:20–22.

Li discloses:

A recognized laboratory test to measure the ability of an aqueous flooding fluid to move through a subterranean formation without blocking the pores of the formation is called a filter ratio test. An example of this type of test is described in The American Petroleum Institute standards RP 63. In a filter ratio test, a standard volume of an aqueous flooding fluid containing a specific concentration of polymer is passed through a filter under a constant pressure. The time required for the solution to pass through the filter is recorded after specific volumes of solution have passed through the filter. The filter ratio is calculated as the ratio of the filter time for the final portion of solution, over the filter time for the initial, equal-sized portion of solution. Ideally, the aqueous flooding fluid should pass through the filter at a constant rate throughout the test, causing no pore-blocking during filtration, so that the filter ratio should be equal to one. The actual measured filter ratio is typically above one, however, so an upper limit to the filter ratio under a specific set of conditions is normally used in order to determine the suitability of an aqueous flooding fluid for use in a mobility control application.

Id. at 20:20–40.

Li discloses in Example 2’s Products I, III, and VII that an oil phase of the product can consist of a paraffinic solvent such as Exxsol D80. *Id.* at 30:49–65, 31:21–40, 32:35–33:6. Li discloses Example 2’s Products I–VIII have Filter ratios ranging from 0.95 to 1.13. *Id.* at 34:15–38.

2. Independent Claims 1, 24, 25

As discussed in Section I.E, concerning an illustrative claim, independent claims 1, 24, and 25 are similar. Moreover, the issues raised by Patent Owner in

its Preliminary Response are directed to the filter ratio and copolymer limitations in the independent claims. Patent Owner does not address specifically any of the dependent claims.

Petitioner provides a clause-by-clause analysis of all the challenged independent claims asserting where Li discloses, either explicitly or inherently, each step or limitation of independent claims 1, 24, and 25. Petitioner cites throughout its analysis to both Li (Ex. 1003) and the Declaration testimony of Dr. Barati (Ex. 1012).¹⁵

Using claim 1 as exemplary, claim element “1G,” as labeled by Petitioner, states “the inverted polymer solution has a filter ratio of 1.5 or less at 15 psi using a 1.2 μm filter.” *See* Ex. 1012 ¶ 76 (heading). At this stage of this proceeding, Patent Owner asserts that the “filter ratio” limitation is the key element in dispute between the parties. *See, e.g.*, Prelim. Resp. 5–6 (“And it is this key [filter ratio] limitation that is missing from all of the prior art relied on by [Petitioner]”).

Petitioner acknowledges that “Li expressly describes IPSs having FRs that were *calculated using a different formula* than the ’320 patent.” Pet. 32 (emphasis added). Dr. Barati, however, conducted a series of tests using the inverted polymers disclosed in Li and also using the “standard procedure” described in the ’320 patent, Koh, Levitt, and Magbagbeola for determining a filter ratio, which

¹⁵ Dr. Barati’s Declaration testimony is 290 pages, including attached exhibits. Dr. Barati currently serves as the Don W. Green Professor of Chemical and Petroleum Engineering at the University of Kansas and also as the Director of the Tertiary Oil Recovery Program. Ex. 1012 ¶ 3. Dr. Barati also is the manager of PetroEconomic Solutions, LLC, “a consulting firm in the oil and gas area.” *Id.* Details of Dr. Barati’s education and experience are provided in his “curriculum vitae,” which is at Appendix A of his Declaration. *See also* Ex. 1012 ¶¶ 6–11 (summarizing Dr. Barati’s research, teaching, publications and other experience).

included testing “at 15 psi (plus or minus 10%) using a 1.2 μ m filter.” *Id.* (citing Ex. 1001, 31:4–27; Ex. 1012 ¶ 76).

To establish that claim steps or limitations are inherently disclosed in Li, Dr. Barati conducted a series of tests based on Li’s disclosure. Dr. Barati conducted tests specifically on Li’s disclosed products I, III, and VII. Ex. 1012, Ex. C.¹⁶ Dr. Barati’s 17-page summary of his experiments in Exhibit C of Exhibit 1012 include a detailed discussion of his testing procedure and data of his testing results.

Dr. Barati’s conclusion from his testing of Li’s products I, III, and VII is:

The liquid polymer compositions of Products I, III and VII of Li each had a weight % of the copolymer greater than 39 weight %. The liquid polymer composition of Modified Product I of Li had a weight % of the copolymer less than 35 weight %. The inverted polymer solutions made from Products I, III, VII, and Modified Product I of Li that were dewatered and kept at 70 °C for 18 hours achieved a FR < 1.5 calculated using the FR as defined in Kim U.S. 10,626,320. The dewatered inverted polymer solution made from Product 1 and Modified Product I also showed a FR < 1.5 (using the FR as defined in U.S. 10,626,320) without being heated at 70 °C for 18 hours.

Ex. 1012, Ex. C, 15.¹⁷

Dr. Barati also provides claim charts for all the challenged claims stating where in the cited references a specific step or limitation is disclosed. *See* Ex. 1012, Ex. B, Part 1 (for the “Li-based” grounds) and Part 2 (for the “Pich-based” grounds).

¹⁶ To avoid confusion, we use the same document identifier’s used by Dr. Barati, which refers to attachments to Exhibit 1012 as “Exhibits A, B, or C.” Exhibits A, B, and C are *not* independent exhibits in this proceeding; they are attachments to Exhibit 1012.

¹⁷ Again, to avoid confusion, this citation format is to page 15 of Exhibit C, which is an attachment to Exhibit 1012 in this proceeding.

Consistent with its identification of the “key” issue in this proceeding, Patent Owner asserts that “none of the grounds of unpatentability properly address the claim requirement that the ‘inverted polymer solution has a filter ratio of 1.5 or less at 15 psi using a 1.2 μm filter’ (the ‘filter ratio limitation’).” Prelim. Resp. 9. Patent Owner also asserts that the “[t]he Petition does not point to any disclosure in Li that *expressly* meets this requirement. *Id.* (emphasis added). Patent Owner and Petitioner agree on this point. *See, e.g.*, Pet. 32 (“Li expressly describes IPSs having FRs that were calculated using a different formula than the ’320 patent”).

Additionally, Patent Owner asserts correctly that “Petitioner relies on Dr. Barati’s experiment” to establish that Li Products I, III, and VII, if prepared and tested using the standard procedure for determining the filter ratio described in the ’320 patent, provide “an alleged inherent disclosure” of the claimed filter ratio. Prelim. Resp. 10. Patent Owner, and the Declaration testimony (Ex. 2001) of its proffered expert, Dr. Gary Pope,¹⁸ take issue with the procedures and results of Dr. Barati’s testing. They question whether he performed his experiments once or multiple times, and, if the latter, they question whether the repeated tests produced consistent results. Prelim. Resp. 12 (citing Ex. 2001 ¶ 26 (Dr. Pope’s testimony stating that Dr. Barati “does not indicate whether his results reflect all of the results he obtained”))).

¹⁸ Dr. Pope was retained by counsel for Patent Owner “to analyze certain opinions set forth in the Barati Declaration.” Ex. 2001 ¶ 3. Dr. Pope earned a Ph.D. in Chemical Engineering. *Id.* ¶ 6. He worked in industry doing research “on the use of polymers and surfactants for enhanced oil recovery (EOR).” *Id.* ¶ 7. He also served as a Professor, and Chair of the Department, of Petroleum Engineering at the University of Texas at Austin. *Id.* ¶ 8. In this role, he served as a “Supervisor” for the Koh, Levitt, and Magbagbeola academic papers cited in the ’320 patent and relied on as references in this proceeding. *Id.* ¶ 16. Details of his education, experience, and publications are in his CV, which is Exhibit 2002.

Patent Owner also questions Dr. Barati's addition of a dewatering step. Li clearly discloses the following:

Additional processing steps can be optionally performed in order to, for example, adjust the product pH, or remove water or other solvents from the reaction product in order to produce a solid polymer product. The final polymer product form is thus dictated by the choice of the formula and the processing steps employed, so that a polymer product comprised of a liquid solution, a liquid emulsion, or a dry solid can be produced.

Ex. 1003 17:56–63. Thus, it appears that Li contemplated the “additional processing steps” that Dr. Barati used. Patent Owner refers to this as a “stray teaching in Li.” Prelim. Resp. 17. According to Patent Owner, “Li merely provides a broad laundry list of potential options that gives no guidance to a POSITA about which options should be chosen or their potential effects.” *Id.* (citing Ex. 2001 ¶ 28). The level of ordinary skill adopted in Section II.B of this Decision is high, “a Ph.D. in Chemical or Petroleum Engineering (or related science or engineering discipline), with 2–3 years of experience in the design and implementation of methods for hydrocarbon recovery including use of polymer compositions in such recovery methods.” There is no persuasive evidence that a person with this high level of education, skill, and experience would not understand when and how to use the options identified in Li.

Patent Owner also questions the use of a “filtering operation” in Dr. Barati's experiments. Prelim. Resp. 22. Patent Owner speculates that this filtering operation “*may* have significantly impacted the results of the subsequent filter ratio test.” *Id.* (emphasis added) (citing Ex. 2001 ¶¶ 32–33). Dr. Pope states the same speculative opinion, that the filtering step “*may*” have affected the results.

Ex. 2001 ¶¶ 32–33

Patent Owner also questions the results of Dr. Barati's tests concerning the "copolymer limitations" in the challenged independent claims. Prelim. Resp. 29–31. Patent Owner states correctly that independent claims 1 and 25 require a liquid polymer composition comprising "at least 39% by weight of one or more synthetic (co)polymers," and independent claim 24 requires a liquid polymer composition comprising "up to 35% by weight of one or more synthetic (co)polymers." *Id.* at 29. Dr. Barati's tests showed that Li disclosed these claim requirements. *See, e.g.* Ex. 1012 ¶¶ 72, 98.

While Patent Owner raises numerous questions about Dr. Barati's procedures and results, Patent Owner provides no contrary test data or persuasive evidence that Dr. Barati's detailed procedures were wrong, relied on hindsight, or were inconsistent with Li's disclosure.

Accordingly, based on the evidence before us, we determine that Petitioner has established that there is a reasonable likelihood that the Petitioner will prevail with respect to at least independent claims 1, 24, and 25. "The 'reasonable likelihood' standard is a somewhat flexible standard that allows the Board room to exercise judgment." Patent Trial and Appeal Board Consolidated Trial Practice Guide, 53 (Nov. 2019).

3. *Claims 2, 13–15, and 20–23*

Patent Owner does not address specifically dependent claims 2, 13–15, and 20–23.

Petitioner provides a clause-by-clause analysis of all the challenged dependent claims in Ground 1A, asserting where Li discloses, either explicitly or inherently, each step or limitation of dependent claims 2, 13–15, and 20–23. Pet. 33–35. Petitioner cites throughout its analysis to both Li (Ex. 1003) and the Declaration testimony of Dr. Barati (Ex. 1012) for evidentiary support. Because

we have determined to institute a proceeding based on independent claims 1, 24, and 25, and because Patent Owner has not specifically addressed dependent claims 2, 13–15, and 20–23, based on this incomplete record we do not address the merits of these claims.

*E. Ground 1B Obviousness of Claims 1, 2, 13–15, and 20–25
Based on Li*

Petitioner fails to provide any persuasive evidence or argument that claims 1, 2, 13–15, and 20–25 would have been obvious in view of Li. As discussed above, anticipation and obviousness are different grounds, requiring different analyses, and different evidence. Petitioner fails to establish what modifications in Li would have been obvious and why it would have been obvious to make the modifications with a reasonable expectation of success. The word “obvious” appears in Ground 1 only in the analysis of claim 24, clause D, on page 37 of the Petition, where Petitioner merely states the conclusion that this clause “would be obvious” [sic, the statute requires a temporal component to establish the claim “would have been obvious”].

Based on a failure of the Petition to provide the requisite evidence and arguments that claims 1, 2, 13–15, and 20–25 would have been obvious in view of Li, it is *not* reasonably likely that Petitioner will prevail on this ground.

*F. Ground 2; Obviousness of Claims 3–12 and 16–19
Based on Li and Pich*

1. Pich (Ex. 1004)

Pich is entitled “Method of Continuous Dissolution of Polyacrylamide Emulsions for Enhanced Oil Recovery (EOR).” Ex. 1004, code (54). Pich discloses “continuously dissolving, in the injection water, a stable invert emulsion of acrylamide (co)polymer containing at least one inverting agent, and a water soluble polymer.” *Id.*, code (57). According to Pich, a test for a stable emulsion

that can be used “consists in measuring the time taken by given volumes of solution containing 1000 ppm of active polymer to flow through a filter” and “[t]he solution is contained in a cell pressurized to 2 bars and the filter has a diameter of 47 mm and a pore size of 5 microns.” *Id.* ¶ 24. For this test, “[t]he times required to obtain 100 ml (t_{100 ml}); 200 ml (t_{200 ml}) and 300 ml (t_{300 ml}) of filtrate are therefore measured and a filtration quotient (or filter ratio denoted ‘FR’) is defined, expressed by” the following formula:

$$FR = \frac{t_{300 \text{ ml}} - t_{200 \text{ ml}}}{t_{200 \text{ ml}} - t_{100 \text{ ml}}}$$

Id. ¶ 25. “A typical acceptability criterion of the industry is FR<1.5.” *Id.* ¶ 27.

Pich discloses “a method for dissolving, in line and continuously, a reverse emulsion of acrylamide (co)polymer to the active polymer injection concentration of 500 to 2000 ppm, in order to obtain the filterability lower than 1.5 in less than 5 minutes of mixing contact time.” *Id.* ¶ 36. An oil phase can be prepared by using Exsol D100 and sorbitan oleate. *Id.* ¶¶ 78–80.

2. *Claims 3–12 and 16–19*

Patent Owner does not address specifically the challenge to claims 3–12 and 16–19 in Ground 2.

Petitioner provides a clause-by-clause analysis of all the challenged dependent claims in Ground 2, asserting where Li or Pich disclose, either explicitly or inherently, each step or limitation of dependent claims 3–12, 16–19. Pet. 39–46. Petitioner cites throughout its analysis to Li (Ex. 1003), Pich (Ex. 1004), and the Declaration testimony of Dr. Barati (Ex. 1012) for evidentiary support. Petitioner also provides reasons why a person of ordinary skill would have been motivated to combine these references with a reasonable expectation of success in doing so. Pet. 46. Because we have determined to institute a proceeding based on

independent claims 1, 24, and 25, and because Patent Owner has not specifically addressed dependent claims 3–12 and 16–19, based on this incomplete record we do not address the merits of these claims.

*G. Ground 3; Obviousness of Claim 24
Based on Li and BASF*

1. BASF (Ex. 1005)

BASF “relates to a process for tertiary mineral oil production in which an aqueous injection fluid comprising at least a water soluble polyacrylamide-(co) polymer dissolved in the aqueous fluid is injected into a mineral oil deposit and the aqueous injection fluid is prepared by mixing a liquid dispersion polymer composition comprising particles of polyacrylamide-(co)polymers dispersed in an organic, hydrophobic liquid with an aqueous fluid.” Ex. 1005, 1:14–22. BASF discloses that “it is known in the art to use inverse emulsions of polyacrylamide (co)polymers for enhanced oil recovery (EOR) in particular for use on offshore platforms” and “[s]uch inverse emulsions typically comprise about 30 wt. % of polymers.” *Id.* at 2:28–32. BASF discloses that a liquid dispersion polymer composition comprising “20% to 59.9% by weight of an organic, hydrophobic liquid having a boiling point > 100° C” and “40% to 79.9% by weight of particles of at least one water soluble polyacrylamide-(co)polymer. *Id.* at 4:7–12.

2. Claim 24

Patent Owner does not address specifically the challenge to claim 24 in Ground 3.

Petitioner provides a clause-by-clause analysis of claim 24 in Ground 3, asserting where Li or BASF disclose, either explicitly or inherently, each step or limitation of claim 24. Pet. 46–48. Petitioner cites throughout its analysis to Li (Ex. 1003), BASF (Ex. 1005), and the Declaration testimony of Dr. Barati (Ex.

1012) for evidentiary support. Petitioner also provides reasons why a person of ordinary skill would have been motivated to combine these references with a reasonable expectation of success in doing so. *Id.* at 47–48. Because we have determined to institute a proceeding based on independent claims 1, 24, and 25, and because Patent Owner has not specifically addressed dependent claim 24, based on this incomplete record we do not address the merits of this claim.

*H. Ground 4; Obviousness of Claims 1–25
Based on Pich and anyone of, Koh, Levitt, and Magbagbeola*

1. Koh (Ex. 1006)

Koh is a Ph.D. dissertation entitled “Experimental Investigation of the Effect of Polymers on Residual Oil Saturation.” Ex. 1006, ii. Koh studies “Transport and In-situ Rheology of EOR Polymers” which includes “Filterability and Filterability Improvement Methods.” *Id.* at xi, 86–95. Koh studies the filterability of heating a “[s]cleroglucan solution containing 1250 ppm polymer in synthetic sea water.” *Id.* at 93. Koh discloses “[a] concentrated solution (5000 ppm) of scleroglucan was prepared” from a “polymer powder (2.5 g) [that] was dispersed in DI water (200 g) in a Waring® blender at low speed for 90 seconds.” *Id.* at 88. Koh discloses the filterability of “5000 ppm scleroglucan in deionized water after four consecutive high-pressure filtrations” with the resulting filtration ratio of 1 using a 1.2 micron filter and 15 psi pressure gradient. *Id.* at 94. Koh discloses that “[s]cleroglucan showed improved filterability after subjected to a purification method developed in the lab” and that “NVP co-polymers showed good filterability with filtration ratios less than 1.2 given the hydration is carefully achieved.” *Id.* at 95.

2. Levitt (Ex. 1007)

Levitt is a Ph.D. dissertation entitled “The Optimal Use of Enhanced Oil Recovery Polymers Under Hostile Conditions.” Ex. 1007, ii. Levitt studies “the

design of a mobility control process using polyacrylamide and related acrylic polymers under hostile conditions” and corresponding stability and filtration properties, in particular those that are “high molecular weight polymers [that] have filtration ratios on the order of 1.2 or less.” *Id.* at vii. Levitt discloses:

Polymers were hydrated in a manner similar to that described by Foshee with the following exceptions. Whereas Foshee et al. (1976)[recommend adding polymer powder over the course of 60 seconds such that all polymer is added before the solution develops too much viscosity to allow adequate dispersal, it was found that extending the time of addition to 3-4 minutes, as is necessary for higher concentration stocks, did not prevent this.

Id. at 10–11. Levitt further discloses:

Filter ratio was measured using a stainless steel Fann filter press bell filled with at least 220 mL of polymer. The bell was pressurized to 15 psi using argon. A 90 mm diameter 1.2 micron Millipore cellulose filter was used. Effluent was collected in a graduated cylinder and the time for 60, 80, 180, and 200 mL to be filtered was recorded. The filter ratio is then calculated as

$$F.R. = \frac{t_{200ml.} - t_{180ml.}}{t_{80ml.} - t_{60ml.}};$$

unless otherwise noted.

Id. at 11.

3. *Magbagbeola (Ex. 1008)*

Magbagbeola is a Master’s thesis entitled “Quantification of the Viscoelastic Behavior of High Molecular Weight Polymers used for Chemical Enhanced Oil Recovery.” Ex. 1008, iii. Magbagbeola studies “a proposed Universal Viscosity Model (UVM) for the apparent viscosity of polymer solutions flowing in permeable media and to determine the parameters of this model and how they vary with the polymer characteristics.” *Id.* at vii.

Magbagbeola discloses that “[t]he chemical components required include: polymer (usually in powder form) and the various electrolyte salts such as NaCl, CaCl₂, MgCl₂.6H₂O, NaHCO₃, etc.” *Id.* at 25. Magbagbeola further discloses:

A fully hydrated and consistent polymer solution will filter through a 1.2µm sized Millipore™ hydrophilic cellulose filter paper under 15 psi at a relatively constant rate (see Figure 3.1) and will give a filtration ratio (F.R) less than or equal to 1.2. The viability of a polymer solution is measured by its ability to pass the filtration test (i.e. a F.R ≤ 1.2). The filtration ratio is a measure of the time taken to filter the same volume of polymer solution at the beginning and end of the filtration process. It is expressed as:

$$F.R. = \frac{t_{200ml} - t_{180ml}}{t_{80ml} - t_{60ml}}$$

Id. at 27–28.

4. Claims 1–25

Patent Owner asserts correctly that “[e]ach of Pich, Koh, Levitt, and Magbagbeola are expressly incorporated in the ’320 patent’s specification and Pich was applied by the Examiner in a rejection during original prosecution.” Prelim. Resp. 31. We address in Section III, below, of this Decision, whether we should deny Ground 4 and Ground 5 under 35 U.S.C. § 325(d) because identical prior art and arguments were previously considered by the Patent and Trademark Office.

On the merits of Ground 4 and Ground 5, Patent Owner asserts that the filter ratio limitation (Prelim. Resp. 32) and the copolymer limitations (*id.* at 45) are not met by the cited references.

Patent Owner’s primary argument is that Petitioner and Dr. Barati repeatedly assert that Koh’s, Levitt’s, and Magbagbeola’s filter ratio tests are tied to inverted polymer solutions rather than powder polymers. Prelim. Resp. 33. Patent Owner argues that “this, in fact, is simply a fundamental error” made by Dr. Barati and

Petitioner. *Id.* at 34. According to Patent Owner, “there were numerous tradeoffs between powder polymers and inverted emulsion polymers.” *Id.* at 36 (citing Ex. 2001 ¶ 52). Patent Owner also asserts that Petitioner “does not properly address the key question about how or why Pich would have been modified to satisfy the claimed filter ratio limitation.” Prelim. Resp. 39.

Petitioner provides a clause-by-clause analysis of the challenged claims. Pet. 50–58. Petitioner also asserts that a “POSITA would have been motivated to combine Pich with the standard procedure for determining FR disclosed in Koh, Levitt, or Magbagbeola.” *Id.* at 48. Petitioner asserts this conclusion is supported because:

Pich and each of Koh, Levitt, and Magbagbeola are in the same field of endeavor of EOR by adding polymer to aqueous fluids to form an IPS for injection into mineral oil boreholes and each addresses use of an IPS having a FR less than 1.5. A POSITA would have been motivated to use the admittedly known ‘standard procedure’ for determining an acceptable FR disclosed for example in Koh, Levitt, or Magbagbeola, which is more stringent and thus likely to provide greater assurance of meeting end user requirements for standard offshore pumping.

Pet. 49 (citing Ex. 1012 ¶ 167).

As we have discussed above, for purposes of this Decision, the level of ordinary skill is high, a Ph.D. in an applicable technology, and two years of experience. While we recognize the clear distinction between powders and inverted polymer solutions, as asserted by Patent Owner, the evidence before us does not fully address whether a highly educated, skilled, and experienced person would have looked to powdered technology for enhanced oil recovery techniques using inverted polymer solutions. *KSR* informs us that:

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, *either in the same field or a different one*. If a person of ordinary skill can implement a

predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

KSR, 550 U.S. at 417 (emphasis added).

Moreover, we note that Inventor Kim, named in the '320 patent, did *not* assert the now-argued by Patent Owner fundamental difference between powders and polymer solutions in the affidavit submitted to obtain allowance of the '320 patent. *See* Ex. 1002, 35–40.

Additionally, this now-argued fundamental difference was *not* mentioned when Koh, Levitt, and Magbagbeola were cited, discussed, and incorporated by reference into the written description of the '320 patent. *See* Ex. 1001, 31:4–29. The '320 patent states that “[t]he *filter ratio (FR)* of the *inverted polymer solutions* was determined using the *standard procedure* described, for example, in Koh . . . Levitt . . . and Magbagbeola.” *Id.* at 31:4–11 (emphases added). This statement seems clear and unequivocal – the standard procedure disclosed in Koh, Levitt, and Magbagbeola applies to “inverted polymer solutions.” Patent Owner now seems to take the position that the written description in the '320 patent is wrong; that the standard procedure in Koh, Levitt, and Magbagbeola cannot be used to determine the filter ratio of inverted polymer solutions. Here, we credit the contemporary disclosure by the inventors in the written description of the '320 patent as persuasive evidence.

Based on the evidence before us, we determine that Petitioner has established that there is a reasonable likelihood that Petitioner will prevail on Ground 4 with respect to claims 1–25.

I. Ground 5; Obviousness of Claim 24 Based on Pich, anyone of, Koh, Levitt, and Magbagbeola, and BASF

Patent Owner argues Grounds 4 and 5 together. Thus, our analysis of Patent Owner's position as stated above applies equally to ground 5.

Petitioner asserts that "[t]o the extent Patent Owner contends that Pich does not teach a LP composition with up to 35% by weight of one or more synthetic (co)polymers ([24D]), BASF teaches that feature. Pet. 58 (citing Ex. 1012, ¶ 246).

Based on the evidence before us, we determine that Petitioner has established that there is a reasonable likelihood that Petitioner will prevail on Ground 5 with respect to claim 24.

**III. DISCRETIONARY DENIAL
UNDER 35 U.S.C. § 325(d)**

Patent Owner asserts that we should exercise our discretion to deny the "Pich Grounds" under 35 U.S.C. § 325(d) "because identical prior art and arguments were previously considered." Prelim. Resp. 46 (heading for Section V.B.3 (bold font and capitalization deleted)). It is clear that Patent Owner's reference to the "Pich Grounds" or "Pich-based grounds" (*id.* at 49) are limited to "Grounds IV and V" asserted by Petitioner. *Id.* at 46 (referring to "these grounds," *i.e.*, the "Pich Grounds" as "Ground IV – V" in Petitioner's Table of Contents).

The Table of Contents of Patent Owner's Preliminary Response divides Petitioner's five asserted grounds into two groups: Grounds 1–3 are referred to as the "Li Grounds" (*see* Prelim. Resp. i (heading V.A)); Grounds 4 and 5 are referred to as the "Pich Grounds" (*id.* (heading V.B)). Patent Owner's assertion for discretionary denial is included as subsection 3 of the Pich Grounds. There is no similar assertion for the Li Grounds.

Patent Owner also states Petitioner “presents five grounds of unpatentability, with three of the grounds relying on U.S. Patent No. 10,442,980 (Ex. 1003, ‘Li’) as a *primary reference*, and two of the grounds relying on U.S. Patent Application Publication No. 2011/0118153 (Ex. 1004, ‘Pich’) as a *primary reference*.” *Id.* at 1 (emphasis added). Patent Owner then refers to “the Li-based grounds” and “[t]he Pich-based grounds.” *Id.* Patent Owner also asserts that “[t]he Li-based grounds rely on an experiment performed by [Petitioner’s] expert, Dr. Barati, which purports to recreate examples from Li,” and “the Pich-based grounds rely on the same prior art and arguments already considered by the Examiner.” *Id.* at 9. Again, Patent Owner confirms that its argument for discretionary denial is limited to Petitioner’s “Grounds IV and V”, the “Pich-based grounds” in which Pich is a “primary reference.”

Binding precedent precludes us from denying institution on some grounds and granting institution on other grounds. As stated in the Introduction of this Decision, a decision to institute is “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition.” *PGS Geophysical v. Iancu*, 891 F.3d at 1360. Thus, even if we agreed with Patent Owner that discretionary denial is appropriate on the Pich grounds, which we do not, we would institute a trial on all asserted grounds and all challenged claims based on our decision above to institute a trial for claims 1–25 based on Grounds I–III. *See also*, *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018). In *SAS*, the Supreme Court held that 35 U.S.C. § 314(a)

does not require the Director to evaluate every claim individually. Instead, it simply requires [the Director] to decide whether the petitioner is likely to succeed on ‘at least 1’ claim. Once that single claim threshold is satisfied, it doesn't matter whether the petitioner is likely to prevail on any *additional* claims; the Director need not even consider any other claim before instituting review. Rather than

contemplate claim-by-claim institution, then, the language anticipates a regime where a reasonable prospect of success on a single claim justifies review of all.

Id. Nonetheless, to provide a complete record of our determination, we consider below Patent Owner’s arguments for discretionary denial.

A. Legal Standard

We have discretion to deny review when “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C.

§ 325(d). Section 325(d) provides that the Director may elect not to institute a proceeding if the challenge to the patent is based on matters previously presented to the Office.¹⁹ *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 7 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”).

In evaluating the exercise of discretion to deny institution under § 325(d), the Board applies a two-part framework: (1) first, we determine whether the same or substantially the same art previously was presented to the Office, or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, we examine whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims. *Id.* at 8.

In applying the two-part framework, we consider several nonexclusive factors, including:

(a) the similarities and material differences between the asserted art and the prior art involved during examination;

¹⁹ By regulation, the Director has delegated the decision whether to institute trial to the Board. 37 C.F.R. § 42.4(a) (2020).

(b) the cumulative nature of the asserted art and the prior art evaluated during examination;

(c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;

(d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art or patent owner distinguishes the prior art;

(e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and

(f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments.

Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to Section III.C.5, first paragraph) (“*Becton, Dickinson*”). Factors (a), (b), and (d) of the *Becton, Dickinson* factors relate to whether the art or arguments presented in the petition are the same or substantially the same as those previously presented to the Office. *Advanced Bionics*, Paper 6 at 10. “If, after review of Factors (a), (b), and (d), it is determined that the same or substantially the same art or arguments previously were presented to the Office, then Factors (c), (e), and (f) relate to whether the petitioner has demonstrated a material error by the Office.” *Id.*

B. Advanced Bionics Step 1: Factors (a), (b), and (d)

We first consider whether Petitioner has asserted substantially the same art or arguments presented to the Office during initial examination, a prior *inter partes* review petition, or *ex parte* reexamination. *Advanced Bionics*, Paper 6 at 8 (Factors (a), (b), and (d)).

Petitioner’s Ground IV relies on “Pich and any of Koh, Levitt or Magbagbeola.” Pet. 6. Petitioner’s Ground V relies on the references as asserted in Ground IV, plus BASF. *Id.*

There is no dispute that the Pich, Koh, Levitt and Magbagbeola references were “presented to the Office” during examination of the patent application that matured into the ’320 patent.

Patent Owner asserts correctly that “Pich [Ex. 1004, the reference asserted against the challenged claims in this proceeding] is a patent publication that matured into U.S. Patent No. 8,323,560 [sic, corrector number is 8,383,560] on February 26, 2013.” Prelim. Resp. 46 (citing Ex. 2003). The Pich ’560 patent is cited in, and incorporated by reference into, the written description of the ’320 patent challenged in this proceeding. Ex. 1001, 5:40–61. The written description states:

For example, U.S. Pat. No. 8,383,560 describes a filter ratio test method which measures the time taken by given volumes of a solution containing 1000 ppm of active polymer to flow through a filter. The solution is contained in a cell *pressurized to 2 bars* and the filter has a diameter of 47 mm and *a pore size of 5 microns*. The times required to obtain 100 ml (t100 ml), 200 ml (t200 ml), and 300 ml (t300 ml) of filtrate were measured. These values were used to calculate the FR . . .

The FR generally represents the capacity of the polymer solution to plug the filter for two equivalent consecutive volumes. Generally, a lower FR indicates better performance. U.S. Pat. No. 8,383,560, which *is incorporated herein by reference*, explains that a desirable FR using this method is less than 1.5.

Ex. 1001, 5:40–61 (emphases added). The Pich reference asserted in this proceeding also was relied on by the Examiner to reject the claims in the application that matured into the ’320 patent. *See* Ex. 1002, 12–21. In the Reasons for Allowance the Examiner stated “the instant claims recite wherein the prepared inverted polymer solution has a filter ratio of specifically ‘1.5 or less at 15 psi using a 1.2 μ m filter’ whereas Pich (US 2011/0118153) teaches a filter ratio of 1.5

or less but at a much different standard, and no rationale or reason to modify Pich to arrive at the limitations instantly claimed.” *Id.* at 48.

Koh, Levitt, and Magbagbeola also were incorporated by reference into the written description of the ’320 patent. Ex. 1001, 31:4–15. The written description also noted that these references determined a filter ratio for an inverted liquid polymer solution that was filtered through “a 5.0 μm and 1.2 μm ISOPORE™ polycarbonate filter with a diameter of 47 mm at 15 psi (plus or minus 10% of 15 psi) pressure and ambient temperature (25° C.).” *Id.* at 31:17–21.

Advanced Bionics states that “Previously presented art includes art made of record by the Examiner, and art provided to the Office by an applicant, such as on an Information Disclosure Statement (IDS), in the prosecution history of the challenged patent.” *Advanced Bionics*, Paper 6 at 7–8. Koh, Levitt, and Magbagbeola each fall into this category.

What was *not* considered specifically by the Examiner, however, was Pich combined with any one of the other references in Grounds IV or V. For example, Koh, asserted in each of Grounds IV and V, refers specifically to experiments where a tested polymer “did not pass through a 1.2 micron Millipore cellulose acetate filter at 15 psi, but it did pass the filtration ratio test using a 5 micron filter paper.” Ex. 1006, 209; *see also id.* at 225 (“This modified HPAM did not passed through 1.2 and 3 μm Millipore cellulose acetate filter at 15 psi, but it did pass the filtration ratio test using a 5 micron filter paper.”); 93 (“Figure 5.3 shows the filtration index for 5000 ppm scleroglucan in deionized water after four high pressure filtrations. The final solution passed with a filtration ratio of unity in the *laboratory standard filtration test (1.2 micron filter under 15 psi argon pressure drop)* (emphasis added); 94 (Figure 5.3). Thus, Koh appears to suggest the

specific filter and pressure parameters, that were not identified in Pich. This *argument* was not presented to the Examiner.

C. *Advanced Bionics Step 2: Factors (c), (e), and (f)*

In the second part of the *Advanced Bionics* framework, we consider whether Petitioner has sufficiently shown that the Office erred in a manner material to the patentability of the challenged claims. Examples of such errors may include misapprehending or overlooking specific material teachings of the relevant prior art or misapplying the law in a material way. *See Advanced Bionics*, Paper 6 at 8–9 n.9. For this analysis, *Becton, Dickinson* Factors (c), (e), and (f) are particularly relevant. *See id.* at 10.

Petitioner asserts “the Examiner failed to address that the applicant admitted in the ’320 patent that the FR formula *and conditions* were already recognized as standard in the prior art, particularly in any of Koh, Levitt, or Magbagbeola.” Pet. 9 (citing Ex. 1001, 31:4–15) (emphasis added). The specific filter pore size (1.2 μm) and the specific pressure (15 psi) stated in the claims, and relied on by the Examiner in the Reasons for Allowance, are disclosed in Koh as laboratory standard conditions.

Patent Owner asserts that to accept Petitioner’s argument, “the Board must assume that the Examiner did not read the specification of the patent he was examining—an absurd assumption that should be rejected out of hand.” Prelim. Resp. 49. We disagree with Patent Owner’s premise and conclusion. We do not assume the Examiner did not read the Specification. We determine from the evidence before us that it was a material error for the Examiner to not rely on the clear disclosures that 1.2 μm filters and 15 psi pressures were known laboratory conditions for testing polymers used in enhanced oil recovery.

Patent Owner speculates that “[t]he better conclusion is that . . . the Examiner appreciated that Koh, Levitt, and Magbagbeola were directed to powder polymers, and therefore were not applicable to the teachings of Pich.” Prelim. Resp. 49. Patent Owner cites no evidence to support this speculation. We give it no probative weight.

D. Conclusion Regarding Discretionary Denial
Under 35 U.S.C. § 325(d)

We determine that Petitioner has demonstrated that the Examiner materially erred when considering the references asserted in Grounds 4 and 5. Accordingly, we do *not* exercise our discretion to deny institution of *inter partes* review of these Grounds, or the Petition, under 35 U.S.C. § 325(d).

IV. CONCLUSION

Taking into consideration the arguments in the Petition, the Preliminary Response, and the evidence of record, based on our analysis above, we determined that there is a reasonable likelihood that Petitioner will prevail on at least one claim. Accordingly, we institute an *inter partes* review of all challenged claims on all asserted grounds.

Our review of the Petition under 35 U.S.C. § 314 is not to determine whether an individual asserted fact is indisputable or whether a preponderance of the evidence supports Petitioner. Our review is to determine whether the totality of the information presented in the Petition and Preliminary Response shows that there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in the Petition.

This is a decision to institute an *inter partes* review under 35 U.S.C. § 314. Our determinations at this stage of the proceeding are preliminary, and based on the evidentiary record developed thus far. This is not a final decision as to the

patentability of claims for which *inter partes* review is instituted. Our final decision will be based on the record as fully developed during trial, including all arguments and evidence in the Patent Owner's Response, Petitioner's Reply, Patent Owner's Sur-reply, or submitted otherwise during trial, as permitted by our rules.

Patent Owner is reminded that arguments from a Preliminary Response not made in a Response may be deemed waived.

V. ORDER

Accordingly, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–25 of the '320 patent, on all asserted grounds, is *instituted*; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), notice is hereby given of the institution of trial, which will commence on the entry date of this Decision.

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Patent 10,626,320 B2

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