

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ARKEMA FRANCE,
Petitioner,

v.

HONEYWELL INTERNATIONAL, INC.,
Patent Owner.

Case IPR2015-00916
Patent 8,710,282 B2

Before JO-ANNE M. KOKOSKI, JON B. TORNQUIST, and
ROBERT A. POLLOCK, *Administrative Patent Judges*.

KOKOSKI, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Arkema France (“Petitioner”) filed a Petition (“Pet.”) to institute an *inter partes* review of claims 1–20 of U.S. Patent No. 8,710,282 B2 (“the ‘282 patent,” Ex. 1001). Paper 2. On October 21, 2015, we instituted an *inter partes* review of claims 1–20 based on our determination that the information presented in the Petition demonstrated a reasonable likelihood that Petitioner would prevail in challenging claims 1–20 as unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Smith,¹ Masayuki,² and Harrison.³ Paper 16 (“Dec. on Inst.”). Honeywell International, Inc. (“Patent Owner”) filed a Patent Owner Response (Paper 21, “PO Resp.”). Petitioner filed a Reply (Paper 41, “Reply”).

Petitioner filed a Motion to Exclude (Paper 46) Exhibits 2007, 2009, 2014, 2017, 2020, 2023, 2025, 2027, and 2028. Patent Owner filed an Opposition (Paper 50), and Petitioner filed a Reply (Paper 51). We decide Petitioner’s Motion to Exclude in a separate decision, issued concurrently with this Final Written Decision.

An oral hearing was held on July 18, 2016. A transcript of the hearing is included in the record (Paper 57, “Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has not shown by a

¹ Smith, WO 2009/138764 A1, filed May 15, 2009 (Ex. 1003).

² Masayuki, Japanese Publication No. JP S59–70626, published April 21, 1984 (Exs. 1004, 1005 (English translation)). Petitioner provided an affidavit attesting to the accuracy of the translation. Ex. 1005, 17–18; *see* 37 C.F.R. § 42.63(b).

³ Harrison, U.S. 4,414,185, published Nov. 8, 1983 (Ex. 1006).

preponderance of the evidence that claims 1–20 of the '282 patent are unpatentable.

A. *The '282 Patent*

The '282 patent, titled “Integrated Process for the Manufacture of Fluorinated Olefins,” is directed to methods of dehydrohalogenating a fluorinated alkane in the presence of a dehydrohalogenation agent (“DHA”) to produce a fluorinated olefin. Ex. 1001, 2:52–56. According to the '282 patent, the claimed methods increase cost efficiency of the dehydrohalogenation production of fluorinated olefins by recovering and recycling the spent DHA. *Id.* at 2:49–52.

The methods described in the '282 patent include: (1) hydrogenating a first haloolefin to produce a haloalkane; (2) optionally separating the haloalkane into intermediate product streams, consisting of a first stream rich in at least a first alkane, a second stream rich in a second alkane, and an alkane recycle stream; (3) dehydrohalogenating the haloalkane in step (1) or (2) in the presence of a DHA to produce a second haloolefin; (4) withdrawing a reaction stream comprising spent DHA; and (5) recovering, purifying, and/or regenerating spent DHA. *Id.* at 3:4–17. The Specification includes embodiments where the first haloalkene is hexafluoropropylene (HFP), the intermediate haloalkanes are 1,1,1,2,3,3-hexafluoropropane (HFC-236ea) and/or 1,1,1,2,3-pentafluoropropane (HFC-245eb), and the second haloolefin is 2,3,3,3-tetrafluoropropene (HFO-1234yf) and/or 1, 2, 3,3,3-pentafluoropropene (HFO-1225ye). *Id.* at 3:17–4:12.

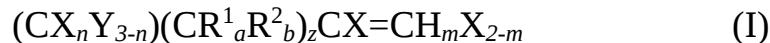
The Specification states that the dehydrohalogenation step “can be carried out in a liquid phase in the presence of a [DHA],” and describes an embodiment where “the converting step involves a reaction in which HFC-

245eb and/or HFC-236ea is contacted with a [DHA] such as KOH, NaOH, Ca(OH)₂, LiOH, Mg(OH)₂, CaO, and combinations thereof to form the fluorinated olefin.” *Id.* at 12:12–22. The Specification also states that spent DHA and by-product salts “may be withdrawn from the reactor by a product stream either continuously or intermittently using one or more known separation techniques,” and, “[i]n certain embodiments, withdrawal of spent [DHA] is especially beneficial for component separation as it allows for facile separation of organic and [DHA].” *Id.* at 13:16–18, 13:22–26. For example, the Specification describes “stopping the stirrer and then removing spent [DHA] during the time agitation is stopped” and taking that product stream that “typically carries with it some dissolved organic (e.g. HFC-236ea and/or HFC-245eb)” to “a container where additional separation of the [DHA] and organic can be accomplished using one or more” known separation techniques. *Id.* at 13:29–38.

Claims 1 and 10 are independent claims. Claim 1 is illustrative, and recites as follows:

1. A method for producing at least one fluorinated olefin comprising:

a. hydrogenating a starting material stream comprising at least one alkene according to Formula (I):



by contacting said starting material with a reducing agent to produce an intermediate product stream comprising at least one alkane according to Formula (II):



where:

each X is independently Cl, F, I or Br, provided that at least two Xs are F;

each Y is independently H, Cl, F, I or Br;

- each R¹ is independently H, Cl, F, I, Br or unsubstituted or halogen substituted methyl or ethyl radical;
each R₂ [sic] is independently H, Cl, F, I, Br or unsubstituted or halogen substituted methyl or ethyl radical;
n is 1, 2 or 3;
a and b are each 0, 1 or 2, provided that a+b=2;
m is 0, 1 or 2; and
z is 0, 1, 2 or 3;
- b. optionally, separating said intermediate product stream into a plurality of intermediate product streams, said plurality of intermediate product streams comprising two or more streams selected from the group consisting of a first stream rich in at least a first alkane according to Formula II, a second[sic] stream rich in at least a second alkane according to Formula II, and an alkane recycle stream;
 - c. dehydrofluorinating, in the presence of a dehydrohalogenating agent, at least a portion of said intermediate process stream from step (a) or said plurality of intermediate process streams of step (b) to produce an alkene product stream comprising 1,1,1,2,3-pentafluoropropene and at least one additional alkene having a lower degree of fluorine substitution compared to the degree of fluorination of the compound of formula (I); and
 - d. withdrawing from a dehydrofluorinated product stream a product reaction stream comprising a spent dehydrohalogenating agent; and
 - e. recovering spent dehydrohalogenating agent.

Ex. 1001, 16:29–17:4.

II. ANALYSIS

A. *Claim Interpretation*

We interpret claims of an unexpired patent using the “broadest reasonable construction in light of the specification of the patent in which [the claims] appear[.]” 37 C.F.R. § 42.100(b); *see also Cuozzo Speed*

Techs., LLC v. Lee, 136 S. Ct. 2131, 2144–46 (2016) (“We conclude that [37 C.F.R. § 42.100(b)] represents a reasonable exercise of the rulemaking authority that Congress delegated to the Patent Office.”). The Board, however, may not “construe claims during IPR so broadly that its constructions are *unreasonable* under general claim construction principles. . . . ‘[T]he protocol of giving claims their broadest reasonable interpretation . . . does not include giving claims a legally incorrect interpretation.’”

Microsoft Corp. v. Proxyconn, Inc., 789 F.3d 1292, 1298 (Fed. Cir. 2015) (citation omitted). “Rather, ‘claims should always be read in light of the specification and teachings in the underlying patent’” and “[e]ven under the broadest reasonable interpretation, the Board’s construction ‘cannot be divorced from the specification and the record evidence.’” *Id.* (citations omitted). Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

1. “*recovering spent DHA*”

For purposes of the Decision on Institution, we addressed the interpretation of the claim term “recovering spent DHA” as set forth in claims 1 and 10, and determined that it did not need to be construed expressly. Dec. on Inst. 6–9. Based on our review of the complete record and the claim construction arguments raised by the parties, for purposes of this Final Written Decision we determine that it is necessary to expressly construe this claim term.

Petitioner proposes that we construe “recovering spent DHA” to mean “collecting spent DHA for further use (may include separating, purifying, concentrating and/or regenerating).” Pet. 15. In support of its construction,

Petitioner contends that the Specification “describes ‘the invention’ as relating ‘. . . to a method of increasing the cost efficiency for dehydrohalogenation production of a fluorinated olefin by recovering and recycling spent reagent’ as well as ‘(d) recovering, purifying and/or regenerating spent [DHA].’” *Id.* (citing Ex. 1001, 2:49–52, 3:15–17).

Patent Owner proposes that we construe the term to mean “substantially separating spent DHA from any other materials in the reaction stream.” PO Resp. 8–9. Patent Owner argues that the ’282 patent discusses recovering spent DHA “in the context of separating organics, and any identified heavies, dissolved in the aqueous reaction mixture from the previously withdrawn spent DHA.” *Id.* at 7 (citing Ex. 1001, 2:61–63, 13:29–45, 15:44–49, 16:14–23). Patent Owner points to an example in the Specification that “describes ‘recovering’ in terms of a Scrubber Product Collection Cylinder (SPCC), where the SPCC is configured to trap the dissolved organics so as to separate the dissolved organics from the spent DHA.” *Id.* (citing Ex. 1001, 15:43–47). Patent Owner also notes that “additional positively recited steps of converting, concentrating and/or recycling found in the dependent claims demonstrate that such steps are distinct from the steps of recovering spent DHA” and should not be read into the “recovering spent DHA.” *Id.* at 8.

Based on the record before us, we are persuaded that Patent Owner’s interpretation is the broadest reasonable interpretation in light of the Specification. Patent Owner’s proposed interpretation is consistent with the Specification, which describes separating the spent DHA from other components in the reaction stream that is withdrawn from the reactor. *See, e.g.*, Ex. 1001, 2:62–64 (“Removal of spent [DHA] from the reactor allows

for facile separation of the organic and [DHA].”), 5:16–19 (“From the reaction product stream, a stream of spent [DHA] may be withdrawn and purified on a continuous or intermittent basis.”), 13:23–26 (“[W]ithdrawal of spent [DHA] is especially beneficial for component separation as it allows for facile separation of organic and [DHA].”), 13:34–38 (“Spent [DHA] and dissolved organic would be taken into a container where additional separation of [DHA] and organic can be accomplished using one or more of the foregoing separation techniques.”)

Accordingly, we interpret “recovering spent DHA” to mean “separating spent DHA from other materials in the [product reaction stream (Claim 1)/second product reaction stream (Claim 10)].”

2. *“product reaction stream” and
“second product reaction stream”*

Petitioner proposes that we construe the claim terms “product reaction stream” as used in claim 1 and “second product reaction stream” as used in claim 10 (collectively, “the stream terms”) to mean “a volume of material present after dehydrofluorination including spent DHA that may also contain by-product salts and/or dissolved organics.” Pet. 17–18. Patent Owner proposes that we construe the stream terms to mean “a continuous flow of a fluid consisting of at least spent DHA resulting from a dehydrofluorination reaction.” PO Resp. 10; Ex. 2002 ¶ 78.

We are not persuaded that the stream terms are limited to a continuous flow of fluid as Patent Owner proposes. The Specification states that “[s]pent [DHA] and by-product salts (e.g. metal fluoride salts) may be withdrawn from the reactor by a product stream *either* continuously *or* intermittently.” Ex. 1001, 13:16–18 (emphasis added). The Specification further states:

The product stream containing spent [DHA] typically carries with it some dissolved organic (e.g. HFC-236ea and/or HFC-245eb). By stopping the stirrer and then removing spent [DHA] during the time agitation is stopped, separation of [DHA] and such organic can be facilitated. Spent [DHA] and dissolved organic would be taken into a container where additional separation of [DHA] and organic can be accomplished using one or more of the foregoing separation techniques.

Id. at 13:29–38. The examples in the Specification also describe stopping the stirrer at predetermined time intervals, removing spent KOH, and re-starting the stirrer. *Id.* at 15:24–16:27. Taken together, these disclosures in the Specification indicate that the product reaction stream/second product reaction stream/reaction stream may be a continuous flow of fluid, or it may be withdrawn intermittently.

Accordingly, we interpret the stream terms to mean “a volume of material comprising spent DHA resulting from a dehydrofluorination reaction.”

B. Antedating Smith

Smith was published, pursuant to Article 21(2) of the Patent Cooperation Treaty, on November 19, 2009, from an international application that designated the United States that was filed on May 15, 2009. Pet. 20–21; Ex. 1003. Thus, Smith is available as prior art under 35 U.S.C. § 102(e) as of May 15, 2009, and under 35 U.S.C. § 102(a) as of its November 19, 2009 publication date. Patent Owner acknowledges that “Smith is entitled to a prior art date of no earlier than May 15, 2009.” PO Resp. 38. The parties do not dispute that the ’282 patent is entitled to a priority date of October 12, 2010, the filing date of the provisional application that led to the issuance of the ’282 patent. Pet. 4–7; PO Resp. 2,

37.⁴ Instead, Patent Owner seeks to disqualify Smith as prior art by establishing a date of invention prior to the publication of these references. PO Resp. 34–35. In particular, Patent Owner contends that the inventors conceived of the claimed invention as early as March 26, 2008, and that they were reasonably diligent in reducing the claimed subject matter to practice during the time period starting before the publication of the reference and ending when the claims were constructively reduced to practice when the provisional patent application was filed on October 12, 2010. *Id.* at 26–27, 37–47. As a consequence, Patent Owner contends that Smith does not qualify as prior art.

Petitioner bears the burden of persuasion that the challenged claims are unpatentable, which includes the burden of establishing that any reference upon which it relies constitutes prior art under 35 U.S.C. § 102. 35 U.S.C. § 316(e); *see Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576 (Fed. Cir. 1996) (holding that the challenger “bore the burden of persuasion . . . on all issues relating to the status of [the asserted reference] as prior art”). However, because Petitioner offered Smith into evidence, which was published before the ’282 patent’s filing date, Patent Owner bears the burden of producing evidence supporting a date of invention before Smith was published. *Mahurkar*, 79 F.3d at 1576–77; *see Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378–80 (Fed. Cir. 2015). Patent Owner can antedate Smith by establishing conception before Smith’s May

⁴ We note that, in a number of places in its Response, Patent Owner identifies the date of filing of the provisional application as October 21, 2010, instead of October 12, 2010. *See* PO Resp. 37, 38. We recognize this is a typographical error (*see* Ex. 1001 at [60]), and that there is no dispute as to the filing date of the provisional application.

15, 2009 filing followed by a diligent reduction to practice. *Purdue Pharma L.P. v. Boehringer Ingelheim GMBH*, 237 F.3d 1359, 1365 (Fed. Cir. 2001) (“To antedate . . . an invention, a party must show either an earlier reduction to practice, *or* an earlier conception followed by a diligent reduction to practice.”) (emphasis added) (citation omitted).

At the outset, as we note in our accompanying Decision on Petitioner’s Motion to Exclude, we have determined that several exhibits provided by Patent Owner with respect to the antedating arguments are inadmissible for lack of proper authentication. We will not consider the excluded evidence as part of this Decision.

1. *Reasonable Diligence*

Patent Owner contends that the inventors were reasonably diligent in constructively reducing to practice the subject matter of claims 1–20 during the time period starting before Smith’s filing and ending when the claims were constructively reduced to practice upon the filing of the provisional application on October 12, 2010.⁵ PO Resp. 37–47. In support of its contentions, Patent Owner relies on the Tung Declaration (Ex. 2006), and the Declarations of Thomas Morris (Ex. 2036, “the Morris Declaration”), Angela Goodie (Ex. 2037, “the Goodie Declaration”), Bruce Bradford, Esq. (Ex. 2041, “the Bradford Declaration”), and Joseph F. Posillico, Esq. (Ex. 2043, “the Posillico Declaration”). Patent Owner provides several supporting exhibits (Exs. 2008, 2010, 2018, 2019, 2021, 2022, 2024, 2026, 2042). *See id.*

⁵ The analysis of this argument assumes, without deciding, a date of conception prior to Smith’s publication.

During the period in which reasonable diligence must be shown, there must be a continuous exercise of reasonable diligence. *In re McIntosh*, 230 F.2d 615, 619 (CCPA 1956); *see also Burns v. Curtis*, 172 F.2d 588, 591 (CCPA 1949) (referring to “reasonably continuous activity”). A party alleging diligence must account for the entire critical period. *Griffith v. Kanamaru*, 816 F.2d 624, 626 (Fed. Cir. 1987); *Gould v. Schawlow*, 363 F.2d 908, 919 (CCPA 1966). Even a short period of unexplained inactivity is sufficient to defeat a claim of diligence. *Morway v. Bondi*, 203 F.2d 742, 749 (CCPA 1953); *Ireland v. Smith*, 97 F.2d 95, 99–100 (CCPA 1938). In *In re Mulder*, 716 F.2d 1542, 1542–46 (Fed. Cir. 1983), for example, the Federal Circuit affirmed a determination of lack of reasonable diligence where the evidence of record was lacking for a two-day period. Likewise, in *Rieser v. Williams*, 255 F.2d 419, 424 (CCPA 1958), there was no showing of diligence where no activity was shown during the first thirteen days of the critical period.

To satisfy the reasonable diligence requirement, “the work relied on must ordinarily be directly related to reduction to practice of the invention.” *Naber v. Cricchi*, 567 F.2d 382, 385–86 (CCPA 1977) (citing *Anderson v. Scinta*, 372 F.2d 523 (CCPA 1967)); *Gunn v. Bosch*, 181 USPQ 758 (BPAI 1973); *Moore v. Harris v. Hale*, 92 USPQ 187 (BPAI 1951)) (holding that the work done directed an improving oxide and nitride layer deposition techniques generally applicable to all MNOS devices, not merely the drain-source protected device of the claimed invention, did not satisfy the requirement of reasonable diligence). A party alleging diligence must provide corroboration with evidence that is specific both as to facts and dates. *Gould*, 363 F.2d at 920; *Kendall v. Searles*, 173 F.2d 986, 996

(CCPA 1949). The rule of reason does not dispense with the need for corroboration of diligence that is specific as to dates and facts. *Gould*, 363 F.2d at 920; *Kendall*, 173 F.2d at 993; *see also Coleman v. Dines*, 754 F.2d 353, 360 (Fed. Cir. 1985) (“The rule of reason . . . does not dispense with the requirement for some evidence of independent corroboration.”).

Patent Owner must establish reasonable diligence for the critical period starting from just before Smith’s prior art date of May 15, 2009,⁶ to October 12, 2010. Mr. Bruce Bradford, Patent Owner’s in-house intellectual property counsel responsible for the Fluorocarbon Process Technology Group, testifies that Dr. Selma Bektesevic used Patent Owner’s Worldwide Invention Disclosure System (“WIDS”) to submit an “invention disclosure form marked as H0024680 entitled ‘Integrated Continuous Process for Dehydrofluorination of 236ea and 245eb’” on August 21, 2009. Ex. 2041 ¶¶ 2, 7; Ex. 2029. Mr. Bradford testifies that Dr. Bektesevic’s invention disclosure form was scheduled for review at the next Patent Committee (“PC”) meeting, which was set for January 2010. Ex. 2041 ¶ 9. Mr. Bradford further testifies that, as a result of the PC meeting held on January 11, 2010, the PC requested that Dr. Bektesevic draft a detailed disclosure of the invention, which was the regular practice of the PC “if further information was needed for review.” *Id.* ¶ 10. Mr. Bradford

⁶ As already noted, Smith is available as prior art under 35 U.S.C. § 102(e) as of May 15, 2009, and under 35 U.S.C. § 102(a) as of its November 19, 2009 publication date. *See* Ex. 1003. The parties agree that Smith’s earliest prior art date is May 15, 2009. *See* Pet. 20–21; PO Resp. 38. We note, however, that because the period between May 15, 2009 and October 12, 2010 includes the period between November 19, 2009 and October 12, 2010, our ultimate determination is the same regardless of which date is used to determine the critical period.

received the detailed disclosure from Dr. Bektesevic on February 10, 2010. *Id.*; see Ex. 2030.

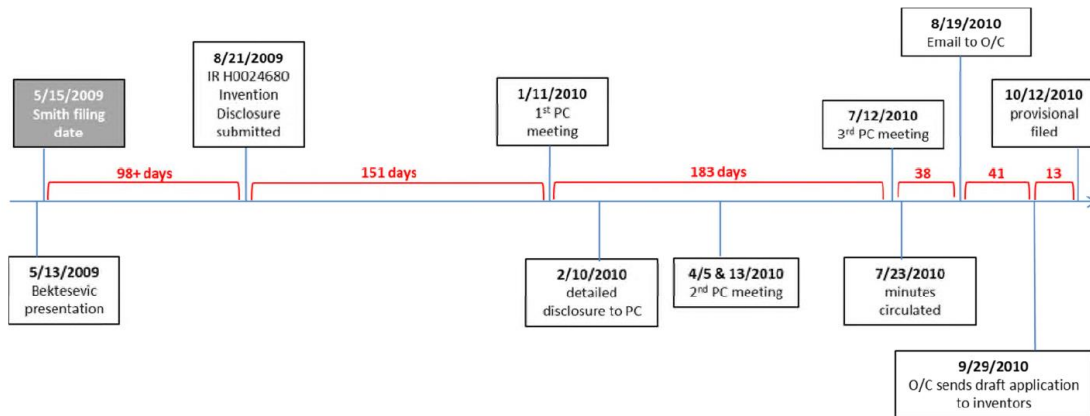
Mr. Bradford testifies that at the next PC meeting, held on April 5 and 13, 2010, the PC requested him to “review the invention disclosure form and the detailed disclosure for the ‘Integrated Continuous Process for Dehydrofluorination of 236ea and 245eb’ with an eye to filing.” Ex. 2041 ¶ 11. At the July 12, 2010 PC meeting, the PC requested that Mr. Bradford “send the invention disclosure form and the detailed disclosure to outside counsel for filing.” *Id.* ¶ 12. Mr. Bradford testifies that his paralegal transmitted the invention disclosure and supporting material to Joe Posillico, Patent Owner’s counsel at Fox Rothschild LLP, on August 19, 2010. *Id.* ¶ 15.

Mr. Posillico testifies that he received the documents on August 19, 2010. Ex. 2043 ¶ 5; see Ex. 2031. Mr. Posillico testifies that he instructed Eric Sumner to review the documents, and “to prioritize the drafting of this patent application consistent with his other tasks but with a target filing date of September 30, 2010.” Ex. 2043 ¶ 8. Mr. Posillico further testifies that Mr. Sumner worked on the draft application on September 22, 23, 24, 27, and 29, 2010. *Id.* ¶ 9. Mr. Sumner sent the draft application to the inventors for comment and proposed revisions on September 29, 2010, with a request that the inventors provide input by October 6, 2010. *Id.* ¶ 11; see Ex. 2032.

Mr. Posillico testifies that, on October 1, 2010, Dr. Bektesevic requested additional time to review the draft, and on October 12, 2010, Dr. Bektesevic responded that “the inventors had discussed the draft and that is was ‘OK to file invention [sic] as is.’” Ex. 2041 ¶ 12; Exs. 2033, 2034.

Mr. Posillico instructed Mr. Sumner to file the provisional application, which he did on October 12, 2010. Ex. 2041 ¶ 12; Ex. 2035.

Petitioner provides the following timeline:



Reply 17. Petitioner argues that Patent Owner “took no action for the 98 days after the Smith filing date until August 21, 2009, when [Dr. Bektesevic] submitted an invention disclosure.” *Id.* at 18. Petitioner argues that the Morris Declaration, which “covers the time span of April 2009 through the fourth quarter of 2011” does not describe “dates of work more specifically than by a particular month.” *Id.* (citing Ex. 2036 ¶¶ 5–10). Petitioner also argues that the Morris Declaration “discusses Patent Owner’s commercialization of 1234yf without ever referencing the process of the ’282 patent.” *Id.* Petitioner further argues that Patent Owner only provides general testimony regarding activities that occurred after the January 2010 PC meeting. *Id.* at 19–20 (citing Exs. 1032, 1033, 1037, 2029, 2030, and 2041).

Petitioner also argues that there was no activity relative to the invention for 27 days between when the minutes for the July 12, 2010 PC meeting were circulated and August 19, 2010. *Id.* at 21–22. Petitioner argues that the only activity that occurred between August 19, 2010, when

outside counsel received instructions to draft the patent application, and September 29, 2010, when the application was sent to the inventors for review, “is that between September 22 and 29 attorneys spent 18.3 hours working on the application,” which “falls far short of demonstrating continuous activity.” *Id.* at 22. Petitioner also argues that “Patent Owner does not identify any activities undertaken by the inventors related to reviewing the draft application” and “has not identified a single edit or comment made by the inventors.” *Id.* at 23.

Based on the record before us, we agree with Petitioner. The evidence that Patent Owner relies upon to explain the activities performed to implement the claimed invention is not specific as to facts and dates for the entire critical period during which diligence was required. For example, Patent Owner does not provide any evidence to account for Dr. Bektesevic’s actions after the August 21, 2009 submission of the invention disclosure to WIDS. Indeed, the only evidence of activity provided by Patent Owner for the time period between the August 21, 2009 WIDS submission and the January 2010 PC meeting is the Morris Declaration. *See* PO Resp. 43–44. Mr. Morris’s testimony, however, is vague and not sufficiently corroborated.

Specifically, Mr. Morris testifies that (a) sales specifications and sales presentations were worked on in June and July 2009, (b) recommendations for the safe handling and use of 1234yf in automotive air conditioning systems were drafted in August 2009, (c) by September of 2009, there was “a working draft of a whitepaper to brief [Patent Owner’s] top executives regarding 1234yf and to obtain approval for business decisions related to the manufacture of 1234yf,” and (d) Patent Owner “continued to invest in the development of 1234yf” throughout the remainder of 2009 and into 2010.

Ex. 2036 ¶¶ 6–10. Mr. Morris does not provide evidence to corroborate these activities, is not specific as to facts and dates, and does not establish that the activities were directed toward the processes claimed in the '282 patent. Given the absence of specific details concerning the work that was done, Mr. Morris's testimony amounts to mere pleadings and is insufficient to establish diligence with respect to constructive reduction to practice during this time period. *See In re Harry*, 333 F.2d 920, 922 (CCPA 1964) (Statements that are unsupported by evidence or a showing of facts essentially amounts to mere pleadings.).

With respect to the period from the circulation of the July 2010 PC meeting minutes to the submission of instructions to outside counsel to prepare the patent application, Patent Owner notes Mr. Bradford and his paralegal were on vacation from July 26–August 1, 2010, but that “immediately on return from vacation” on August 2, 2010, “Mr. Bradford instructed his paralegal to proceed with the instructions outlined in the minutes in the ordinary course and in line with other responsibilities.” PO Resp. 43 (citing Ex. 2041 ¶ 14). Mr. Bradford testifies that, at that time, he “was involved in negotiations related to at least two technology transactions including due diligence, and negotiating licensing and supply agreements, which occupied a significant amount of [his] time on a daily basis,” and that his paralegal “would have assisted [him] with those transactions on a daily basis.” Ex. 2041 ¶ 15.

Mr. Bradford does not identify any dates on which he or his paralegal performed work related to the constructive reduction to practice of the claimed invention between August 2 and 19. Although Mr. Bradford states that he was involved in technology transactions that occupied his time, as

well as that of his paralegal, he does not provide details such that we can assess the reasonableness of this explanation for this period of inactivity. *See Rieser*, 255 F.2d at 424; *see also Olympus America, Inc. v. Perfect Surgical Techniques, Inc.*, Case IPR2014-00233, slip op. at 20 (PTAB June 8, 2015) (Paper 56) (inventor did not provide any testimony regarding his actions relating to constructive reduction to practice for nineteen days of the critical period, and the Board could not assess the reasonableness of the gap in activity). Because the testimony from Mr. Bradford is not specific as to facts and dates for at least the time period between August 2, 2010 and August 19, 2010, it does not establish diligence during the entire critical period.

Additionally, with respect to the period from the inventors' receipt of the draft application for review and the filing of the provisional application, Patent Owner argues that "[t]his time period is not an unreasonable time period for the inventors to review the patent application, given the weekend and their general work requirements." PO Resp. 47. In support of this argument, Patent Owner cites to the Tung Declaration, in which Dr. Tung testifies that "[d]uring the period of October 1 and October 12, I reviewed the draft application as I was available given my other day to day responsibilities." Ex. 2006 ¶ 59. Dr. Tung also testifies that he "was copied on an email from Dr. Bektesevic to Mr. Sumner indicating that she had spoken with Mr. Haluk Kopkalli and [Dr. Tung] and providing our approval to file the provisional patent application." *Id.* ¶ 60; Ex. 2034. In the email, Dr. Bektesevic indicated that "it is OK to file invention as is." Ex. 2034.

The testimony offered by Dr. Tung concerning the review of the draft patent application is not specific as to facts and dates for the entire critical

period during which diligence is required, and does not provide specific evidence to corroborate the work actually performed on the draft patent application between October 1 and October 12, 2010. Dr. Tung does not account for his actions during this period, other than to cite generally to his day-to-day responsibilities, such that we can determine whether any gaps in his activity, and the explanations for such gaps, are reasonable.

Additionally, Patent Owner does not provide any evidence regarding actions taken by the other named inventors (Dr. Bektesevic and Mr. Kopkalli) relating to the constructive reduction to practice of the claimed invention during this portion of the critical period. Given the absence of specific details concerning the work that was done on the draft patent application, Patent Owner's proffered evidence is insufficient to establish reasonable diligence during this time period.

For the foregoing reasons, we determine that Patent Owner fails to demonstrate by a preponderance of the evidence that there was a continuous exercise of reasonable diligence to reduce the claimed invention to practice during the critical period. As a result, Patent Owner has not antedated Smith, which, in turn, qualifies as prior art to the '282 patent with respect to challenged claims 1–20.

2. *Conception*

Patent Owner argues that the named inventors conceived of the claimed subject matter “at least as early as March 26, 2008, more than one year before the alleged prior art date of Smith.” PO Resp. 37. Patent Owner relies on a March 26, 2008 email and attachments prepared by inventor Haluk Kopkalli (“Kopkalli Email,” Ex. 2007) as evidence of conception. *Id.* As support, Patent Owner also proffers the Tung Declaration (Ex. 2006) and

the Lousenberg Declaration (Ex. 2002). As set forth in our accompanying Decision on Petitioner's Motion to Exclude, we have determined that the Kopkalli Email is inadmissible for lack of proper authentication, and thus do not consider it here.

In view of our determination that Patent Owner has not proven reasonable diligence leading to constructive reduction to practice, we do not need to determine whether Patent Owner adequately demonstrated conception, and therefore do not reach the issue.

C. Level of Ordinary Skill in the Art

Petitioner and Patent Owner each propose a particular level of ordinary skill in the art. Pet. 19; PO Resp. 12–13. In light of the evidence before us, we find that the references themselves represent the level of ordinary skill in the art, and that we need not explicate it further. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the level of ordinary skill in the art usually is evidenced by the references themselves); *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (finding that the Board of Patent Appeals and Interferences did not err in concluding that the level of ordinary skill in the art was best determined by the references of record).

D. Obviousness over Smith, Masayuki, and Harrison

Petitioner asserts that claims 1–20 would have been obvious under 35 U.S.C. § 103(a) over the combination of Smith, Masayuki, and Harrison. Pet. 25–56; Reply 1–15. In support of its contentions, Petitioner relies on the Declaration of Leo E. Manzer, Ph.D. (“Manzer Declaration,” Ex. 1002). *Id.* Patent Owner disagrees with Petitioner's assertions and relies on the Lousenberg Declaration. PO Resp. 12–34.

To prevail on its patentability challenge, Petitioner must establish facts supporting its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). A claim is unpatentable under 35 U.S.C. § 103 if 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 to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 406 (2007). A party that petitions the Board for a determination of obviousness must show that “a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *Procter & Gamble Co. v. Teva Pharm. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009) (quoting *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1361 (Fed. Cir. 2007)).

1. *Overview of Smith*

Smith is directed to a process for preparing 2,3,3,3-tetrafluoropropene (“HFO-1234yf” or “1234yf”). Ex. 1003, 1.⁷ The process described in Smith includes: (1) contacting 1,1,2,3,3,3-hexafluoropropene (“HFP” or “1216”) with hydrogen in the presence of a catalyst to produce 1,2,3,3,3-hexafluoropropane (“236ea”); (2) dehydrofluorinating 236ea to produce 1,2,3,3,3-pentafluoropropene (“1225ye”); (3) contacting 1225ye with hydrogen in the presence of a catalyst to produce 1,2,3,3,3-pentafluoropropane (“245eb”); and (4) dehydrofluorinating 245eb to

⁷ The cited page numbers in Exhibit 1003 refer to the numbers at the bottom of each page that are original to the document, rather than those added by Petitioner.

produce 1234yf. *Id.* at 1–2. Smith states that the products from steps (1), (2), (3), and/or (4) “may be subjected to a purification step” including “separation of the desired product(s) or reagents by one or more distillation, condensation or phase separation steps and/or by scrubbing with water or aqueous base.” *Id.* at 2.

According to Smith, dehydrofluorination steps (2) and (4) can be carried out by contacting 236ea and/or 245eb with a base, where “the base is a metal hydroxide or amide (preferably a basic metal hydroxide or amide, e.g., an alkali or alkaline earth metal hydroxide or amide).” *Id.* at 10. Smith states that “[a] preferred base is an alkali metal hydroxide selected from the group consisting of lithium hydroxide, sodium hydroxide and potassium hydroxide, more preferably, sodium hydroxide and potassium hydroxide and most preferably potassium hydroxide.” *Id.* at 11.

2. Overview of Masayuki

Masayuki is directed to methods of producing chloroprene (2-chloro-butadiene-1,3) by the dehydrochlorination of 3,4-dichloro-butene-1. Ex. 1005, 4:2–5. Masayuki describes a process where “3,4-dichloro-butene-1 is subjected to dehydrochlorination in an aqueous solution containing a relatively high concentration (25–55% by weight) of an alkali metal hydroxide in the presence of an organic catalyst.” *Id.* at 6:15–19. Masayuki teaches that a gas-phase mixture of chloroprene, unreacted 3,4-dichloro-butene-1, and water is then removed by evaporation. *Id.* at 6:19–22. This evaporated mixture is condensed, and the condensed mixture is separated into an aqueous phase and an organic phase. *Id.* at 6:23–26. The aqueous phase “primarily containing an aqueous solution of alkali metal hydroxide and alkali metal chloride, which in turn contains solid alkali metal chloride

obtained from the reaction” is then “concentrated to recover an aqueous solution containing alkali metal hydroxide” that is re-used in the reaction. *Id.* at 6:30–36. According to Masayuki, the alkali metal hydroxide “is typically sodium hydroxide primarily for economic reasons, but hydroxides of metals such as potassium, lithium, etc. can also be used.” *Id.* at 6:37–7:2.

3. *Overview of Harrison*

Harrison is directed to “the production of calcium fluoride from industrial waste waters by lime precipitation and carbonation.” Ex. 1006, 1:9–11. The process described in Harrison includes: (a) contacting the fluoride-containing industrial waste waters with aqueous potassium hydroxide to obtain an aqueous solution of potassium fluoride and potassium hydroxide; (b) contacting the aqueous solution of potassium fluoride and potassium hydroxide with finely-divided, high-purity lime to obtain a calcium fluoride precipitate in aqueous potassium hydroxide; (c) settling the reaction product into an aqueous potassium hydroxide supernatant phase and an aqueous slurry of calcium fluoride phase; and (d) recovering the aqueous potassium hydroxide supernatant. *Id.* at 2:6–21. Harrison teaches that the recovered aqueous potassium hydroxide is recycled back to step (a) of the process. *Id.* at 2:28–29.

4. *Motivation to Combine Smith, Masayuki, and Harrison*

Petitioner contends that a person having ordinary skill in the art “would be motivated to try to recover and recycle as much valuable material (e.g., [DHA]) as possible from the reactions described in *Smith*.” Pet. 32. In support of this contention, Dr. Manzer testifies that

it is a ‘rule of thumb’ in chemical process design to try to recover and re-use as much valuable material as possible in a process. Further, operating as efficiently and economically as possible is

always a goal in chemical processing. Thus, as with any process, a [person having ordinary skill in the art] would be motivated to try to recover and recycle as much valuable material (e.g., dehydrohalogenating agent) as possible from the reactions described in *Smith*.

Ex. 1002 ¶ 68; *see also* Ex. 1016, 116–117 (“There is a rule of thumb in process design . . . that it is desirable to recover more than 99% of all valuable materials.”).

Patent Owner argues that a person having ordinary skill in the art “reading *Smith* would not have, without knowledge of the ’282 Patent, looked beyond *Smith* in order to formulate a more efficient process for manufacturing 1234yf.” PO Resp. 24. Patent Owner argues that “*Smith* does not disclose or ever allude to the presence of, let alone, any significant amount of, spent DHA that would need to be recovered or recycled,” and, therefore, “there would be no motivation leading a [person having ordinary skill in the art] to conclude that recovering or recycling spent DHA would be needed in the process disclosed by *Smith*.” *Id.* at 23–24 (citing Ex. 2002 ¶¶ 83–89, 115).

The Supreme Court requires an expansive and flexible approach in determining whether a patented invention would have been obvious at the time it was made. *See KSR*, 550 U.S. at 415 (2007). The existence of a reason for a person having ordinary skill in the art to modify a prior art reference is a question of fact. *See In re Constr. Equip. Co.*, 665 F.3d 1254, 1255 (Fed. Cir. 2011). In an obviousness analysis, some kind of reason must be shown as to why a person having ordinary skill in the art would have thought of combining or modifying the prior art to achieve the patented invention. *See Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008). A reason to combine or modify the prior art may be found

explicitly or implicitly in market forces, design incentives, the “interrelated teachings of multiple patents,” “any need or problem known in the field of endeavor at the time of invention and addressed by the patent,” and “the background knowledge, creativity, and common sense of the person of ordinary skill.” *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed Cir. 2009) (quoting *KSR*, 550 U.S. at 418–21).

Here, Petitioner offers only the general proposition that chemical processes should be designed to try to recover and re-use valuable materials, and should operate as efficiently and economically as possible, as the reason why a person having ordinary skill in the art would have been motivated to modify the Smith process. Pet. 32. From this general proposition, Petitioner concludes that, “as with any process,” a person having ordinary skill in the art “would be motivated to try to recover and recycle as much valuable material (e.g., [DHA]) as possible from the reactions described in *Smith*.” *Id.* Neither Petitioner nor Dr. Manzer, however, provide sufficient explanation or reasoning to support this conclusion. *See id.*; Ex. 1002 ¶¶ 68, 102, 114. Petitioner does not direct us to, nor do we discern, any statements in *Smith* with respect to the recovery or recycling of any material, or the efficiency or economic feasibility of the described process. That it is generally known that a chemical process should operate as efficiently and economically as possible does not explain sufficiently why a person having ordinary skill in the art would modify the process in *Smith* specifically to recover spent DHA.

As Patent Owner notes, Petitioner’s argument appears to assume that recovering and recycling spent DHA would increase the efficiency and reduce the cost of the Smith process. PO Resp. 24. Petitioner, however,

does not provide adequate explanation as to why a person having ordinary skill in the art would think that to be the case. Dr. Lousenberg convincingly states that

the rule of thumb I follow requires that you extract as much value out of the process, based on economics. In practice, this can mean much more or something entirely different than recovery and recycle. Instead, in my experience, the overall project and process economics need to be considered. Indeed, capital investment, fixed and variable costs, need to be evaluated in order to decide whether it is necessary or practical to recover or recycle products of a reaction. It may be more economical to dispose or even sell materials to maximize value, instead of recovering or recycling.

Ex. 2002 ¶ 113. Additionally, at his deposition Dr. Manzer agreed that “[o]ne can recover various materials from the reaction” and “[s]ome may be valuable, some may not be valuable,” but “that’s an economic consideration.” Ex. 2004, 108:24–109:4. In light of the number of variables that are considered when determining whether a process operates as economically as possible, as well as the number of reactants and reagents involved in the Smith process, Petitioner has not explained adequately why a person having ordinary skill in the art would look to recover and recycle spent DHA to increase the efficiency of the process and decrease its costs.

Petitioner’s arguments and Dr. Manzer’s testimony with respect to the modification of Smith leave an analytical gap that does not apprise us of how or why one of ordinary skill in the art would have modified Smith with Masayuki’s recovery of an aqueous solution containing alkali metal hydroxide that is reused in the reaction. Neither Petitioner’s nor Dr. Manzer’s assertions that a person having ordinary skill in the art would be motivated to modify Smith due to a general “rule of thumb” regarding the

design of chemical processes adequately explain why a person having ordinary skill would have modified the Smith process by combining it with elements described in Masayuki and Harrison.

Petitioner's argument that a person having ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of Smith and Masayuki is equally unavailing. Petitioner, with supporting testimony from Dr. Manzer, attributes the reasonable expectation of success to the fact that Smith and Masayuki "describe very similar processes, namely the aqueous base-mediated dehydrohalogenation of a halogenated organic compound, which produce organic products and an aqueous phase comprising unreacted (spent) DHA and a by-product salt of DHA." Pet. 34 (citing Ex. 1002 ¶¶ 102, 107). That statement of similarity, however, does not constitute an articulated reasoning with rational underpinning as to why one of ordinary skill in the art would combine elements of Smith with some elements of Masayuki, and why one of ordinary skill in the art would modify the teachings of Smith in view of Masayuki's teachings to arrive at the claimed invention.

In an obviousness determination, we must avoid analyzing the prior art through the prism of hindsight. Instead, we must "cast the mind back to the time the invention was made" and "occupy the mind of one skilled in the art who is presented only with the references, and who is normally guided by the then-accepted wisdom in the art." *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983). Here, Petitioner attempts to imbue one of ordinary skill in the art with knowledge of the claimed invention, when no prior art reference, references of record, or other evidence conveys or suggests that knowledge. Rather, Petitioner's argument

that Smith is combinable with Masayuki and Harrison appears to be premised on Petitioner's knowledge of the '282 patent disclosure. In order to establish a motivation to combine the references, Petitioner needed to explain what would have led a person having ordinary skill in the art at the time of the invention to consider modifying the Smith process to recover and/or recycle spent DHA. Petitioner failed to provide such an explanation.

Petitioner must demonstrate obviousness by a preponderance of the evidence. 35 U.S.C. § 316(e). After considering the parties' arguments and evidence, however, we are not persuaded that Petitioner has made a sufficient showing that person of ordinary skill would have combined the teachings in the manner contended by Petitioner. Accordingly, we find that Petitioner has not shown by a preponderance of the evidence that independent claim 1, and claims 2–9 that depend, directly or indirectly therefrom, and independent 10, and claims 11–20 that depend, directly or indirectly, therefrom, are unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Smith, Masayuki, and Harrison.

III. CONCLUSION

For the reasons given, we are not persuaded that Petitioner has shown by a preponderance of the evidence that claims 1–20 of the '282 patent would have been obvious over the combined teachings of Smith, Masayuki, and Harrison.

IV. ORDER

In consideration of the foregoing, it is

ORDERED that Petitioner has not shown by a preponderance of the evidence that claims 1–20 of the '282 patent are unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of this Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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