No. 21-

IN THE

Supreme Court of the United States

INFINEUM USA L.P.,

Petitioner,

v.

CHEVRON ORONITE COMPANY LLC AND ANDREW HIRSHFELD, PERFORMING THE FUNCTIONS AND DUTIES OF THE UNDERSECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE,

Respondents.

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

PETITION FOR A WRIT OF CERTIORARI

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QUESTIONS PRESENTED

1. Whether this Court should vacate the judgment below in view of its recent decision in *United States v. Arthrex, Inc.*, 141 S. Ct. 1970 (2021), and remand so that the United States Court of Appeals for the Federal Circuit may in turn order the Acting Director to decide whether to rehear the petition filed by Chevron Oronite Company LLC.

2. Petitioner Infineum's Appointments Clause challenge was raised with respect to a November 6, 2019 final written decision issued after the Federal Circuit's *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019), opinion but before the issuance of the mandate pursuant to Federal Rule of Appellate Procedure 41 and before this Court's decision in *United States v. Arthrex, Inc.*, 141 S. Ct. 1970 (2021). To the extent that this Court's decision in *United States v. Arthrex* did not foreclose the Federal Circuit's conclusion that the remedy ordered by *Arthrex v. Smith & Nephew* cured the Appointments Clause violation, whether the panel decision was final and effective on the date of that decision such that the Appointments Clause violation was cured prior to the mandate being issued in that case.

PARTIES TO THE PROCEEDINGS

Petitioner Infineum USA L.P. was the patent owner in proceedings before the Patent Trial and Appeal Board and the appellant in the United States Court of Appeals for the Federal Circuit.

Respondent Chevron Oronite Company LLC was the petitioner in the proceedings before the Patent Trial and Appeal Board and the appellee in the Federal Circuit.

Andrew Hirschfeld, Performing the Functions and Duties of the Undersecretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office, was an intervenor in the Federal Circuit.

RULE 29.6 STATEMENT

Petitioner Infineum USA L.P. states that parent corporations and publicly held companies that own 10% or more of its stock are ExxonMobil Corp., Shell Oil Co. and Infineum International Limited.

RELATED PROCEEDINGS

The following proceedings are directly related to this case within the meaning of Rule 14.1(b)(iii):

- *Infineum USA L.P. v. Chevron Oronite Company LLC*, No. 2020-1333, U.S. Court of Appeals for the Federal Circuit. Judgment entered January 21, 2021.

- *Chevron Oronite Company LLC v. Infineum USA L.P.*, No. IPR2018-00923, Patent Trial and Appeal Board. Final written decision entered November 6, 2019.

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Petitioner Infineum USA L.P. respectfully petitions for writ of certiorari to review the judgment of the United States Court of Appeals for the Federal Circuit.

OPINIONS AND ORDERS BELOW

The opinion of the United States Court of Appeals for the Federal Circuit is not published in the Federal Reporter but is reported at 844 F. App'x 297 (Fed. Cir. 2021). App. 1a. The Federal Circuit's order denying rehearing and rehearing en banc is unreported. App. 121a. The Patent Trial and Appeal Board's opinion and order instituting the inter partes review (IPR2018-00922) is unreported. App. 95a. The Patent Trial and Appeal Board's final written decision is unreported. App. 24a.

STATEMENT OF JURISDICTION

The Federal Circuit entered its judgment on January 21, 2021, App. 1a, and denied a timely petition for panel rehearing and rehearing en banc on April 6, 2021, *id.* at 121a. This Court's July 19, 2021 Order extended the time to file this Petition to September 3, 2021. This Court has jurisdiction under 28 U.S.C. § 1254(1).

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

1. The Appointments Clause of the Constitution provides that the President:

> shall nominate, and by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and

> consuls, judges of the Supreme Court, and all other officers of the United States, whose appointments are not herein otherwise provided for, and which shall be established by law: but the Congress may by law vest the appointment of such inferior officers, as they think proper, in the President alone, in the courts of law, or in the heads of departments.

U.S. Const. art. II, § 2.

2. Title 35 of the United States Code provides in relevant part:

> **§ 318. DECISION OF THE BOARD**
>
> (a) FINAL WRITTEN DECISION.—
>
> > If an inter partes review is instituted and not dismissed under this chapter, the Patent Trial and Appeal Board shall issue a final written decision with respect to the patentability of any patent claim challenged by the petitioner and any new claim added under section 316(d).
>
> (b) CERTIFICATE.—
>
> > If the Patent Trial and Appeal Board issues a final written decision under subsection (a) and the time for appeal has expired or any appeal has terminated, the Director shall issue

> and publish a certificate canceling any claim of the patent finally determined to be unpatentable, confirming any claim of the patent determined to be patentable, and incorporating in the patent by operation of the certificate any new or amended claim determined to be patentable.

35 U.S.C. § 318.

§ 6. Patent Trial and Appeal Board

(c) 3-Member Panels.—

> Each appeal, derivation proceeding, post-grant review, and inter partes review shall be heard by at least 3 members of the Patent Trial and Appeal Board, who shall be designated by the Director. Only the Patent Trial and Appeal Board may grant rehearings.

35 U.S.C. § 6.

3. Federal Rule of Appellate Procedure 41 provides in relevant part:

Mandate: Contents; Issuance and Effective Date; Stay

> (a) Contents. Unless the court directs that a formal mandate issue, the mandate consists of

> a certified copy of the judgment, a copy of the court's opinion, if any, and any direction about costs.
>
> (b) When Issued. The court's mandate must issue 7 days after the time to file a petition for rehearing expires, or 7 days after entry of an order denying a timely petition for panel rehearing, petition for rehearing en banc, or motion for stay of mandate, whichever is later. The court may shorten or extend the time by order.
>
> (c) Effective Date. The mandate is effective when issued.
>
> (d) Staying the Mandate Pending a Petition for Certiorari.
>
> > (1) Motion to Stay. A party may move to stay the mandate pending the filing of a petition for a writ of certiorari in the Supreme Court. The motion must be served on all parties and must show that the petition would present a substantial question and that there is good cause for a stay.

Fed. R. App. P. 41(a)-(d)(1).

STATEMENT OF THE CASE

On June 21, 2021, this Court issued its decision in *United States v. Arthrex* vacating the Federal Circuit's

decision and judgment in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019). 141 S. Ct. 1970, 1988 (2021). First addressing "whether the [Patent Trial and Appeal Board's ("PTAB's")] structure is consistent with the Appointments Clause", *id.* at 1978, this Court held "that the unreviewable authority wielded by [Administrative Patent Judges ("APJs")] during inter partes review is incompatible with their appointment by the Secretary to an inferior office." *Id.* at 1985. This Court further held "that 35 U.S.C. §6(c) is unenforceable as applied to the Director insofar as it prevents the Director from reviewing the decisions of the PTAB on his own." *Id.* at 1987. With respect to the appropriate remedy for this constitutional violation, this Court held that a patent owner aggrieved by such a decision of the PTAB in inter partes review ("IPR") "is not entitled to a hearing before a panel of new APJs" under the Constitution. *Id.* at 1988. Rather, this Court concluded that "the appropriate remedy is a remand to the Acting Director for him to decide whether to rehear the petition filed by Smith & Nephew." *Id.* at 1987. This Court reasoned further that "[w]hat matters is that the Director have the discretion to review decisions rendered by APJs" and that "[i]n this way, the President remains responsible for the exercise of executive power –and through him, the exercise of executive power remains accountable to the people." *Id.* at 1988.

Before this Court's ruling in *Arthrex*, the Federal Circuit applied its holding in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320, to other challenges to the IPR statute, including that of Petitioner Infineum.

As the parties sought further review of the Federal Circuit's decision in *Arthrex, Inc. v. Smith & Nephew, Inc.*,

941 F.3d 1320, Infineum USA L.P. ("Infineum") sought review in the Federal Circuit of a final written decision from the PTAB.

Infineum, the assignee of United States Patent No. 6,723,685 (the "'685 patent"), sued respondent Chevron Oronite Company LLC ("Oronite") in the United States District Court for the District of Delaware, on February 27, 2018, for infringement of the '685 patent. *See Infineum USA L.P. v. Chevron Oronite Co. LLC*, No. 18-323 (D. Del. Filed February 27, 2018).

On April 16, 2018, Oronite filed three petitions for inter partes review, IPR2018-00922, IPR2018-00923 and IPR2018-00924, against the '685 patent. *See* App. 26a; *id.* at 97a. On November 7, 2018, the PTAB instituted review of the claims of the '685 patent in IPR2018-00922 and denied the request to review the claims of the '685 patent in IPR2018-00923 and IPR2018-00924. *See id.* at 26a; *id.* at 96a. The proceedings in the District of Delaware were stayed pending IPR2018-00922. *See* Oral Order, *Infineum USA L.P. v. Chevron Oronite Co. LLC*, No. 18-323 (D. Del. Feb. 5, 2019), ECF No. 62.

Thereafter, Infineum filed a Patent Owner Response, Oronite filed a Reply and Infineum filed a Sur-reply. App. 25a. On November 6, 2019, the PTAB issued the final written decision, which determined that all challenged claims were unpatentable. *Id.* at 24a-93a.

Infineum timely appealed to the United States Court of Appeals for the Federal Circuit from the PTAB's final written decision. *See id.* at 2a. The Federal Circuit had jurisdiction over the appeal under 28 U.S.C. § 1295(a)(4)(A)

and 35 U.S.C. §§ 141, 318-319. On appeal, Infineum argued, *inter alia*, that in view of the Federal Circuit's decision in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019), at the time the final written decision of the PTAB was issued there was a violation of the Appointments Clause of the United States Constitution. *Id.* at 21a. Infineum also argued that, as a result of that violation, the IPR proceedings should be dismissed or, consistent with the Federal Circuit's decision, vacated and remanded to a new panel of APJs because the PTAB had issued its final written decision prior to the issuance of the mandate in *Arthrex*. *Id.* at 21a-22a.

On January 21, 2021, the Federal Circuit affirmed the final written decision. *Id.* at 23a. With respect to the Appointments Clause argument, the Federal Circuit held that its invalidation of the tenure provision was effective on the date its decision in *Arthrex v. Smith & Nephew* was issued. *Id.* at 22a. According to the Federal Circuit, because the invalidation of the tenure provision cured the constitutional infirmity on that date and before the final written decision was issued in this case in IPR2018-00922, there was no constitutional violation warranting a remand. *Id.* In denying Infineum's request for remand, the Federal Circuit rejected Infineum's argument that the remedy ordered in *Arthrex v. Smith & Nephew* was not effective until the issuance of the mandate pursuant to Federal Rule of Appellate Procedure 41. *Id.* at 21a-22a.

In light of the *United States v. Arthrex* ruling, this Court has granted other petitions for certiorari that similarly challenged the IPR statute, vacated the underlying Federal Circuit's decisions and remanded those proceedings to the Federal Circuit. *See Iancu v. Fall*

Line Pats., No. 20-853, 2021 WL 2637823, at *1 (U.S. June 28, 2021); *Polaris Innovations Ltd. v. Kingston Tech. Co.*, No. 19-1459, 2021 WL 2637818, at *1 (U.S. June 28, 2021); *RPM Int'l Inc. v. Stuart*, No. 20-314, 2021 WL 2637821, at *1 (U.S. June 28, 2021); *Iancu v. Luoma*, No. 20-74, 2021 WL 2637820, at *1 (U.S. June 28, 2021).

Further, since this Court's *Arthrex* decision, the Federal Circuit has granted requests to remand proceedings "for the limited purpose of allowing appellant the opportunity to request Director rehearing of the final written decisions." *E.g.* Order at 2, *Sipco, LLC v. Emerson Elec. Co.*, Nos. 2021-1039, -1040 (Fed. Cir. Aug. 2, 2021), ECF No. 34; Order at 2, *Veveo, Inc. v. Hirshfeld*, Nos. 2020-2214, -2215, -2216, -2217 (Fed. Cir. Aug. 3, 2021), ECF No. 51; Order at 2, *Corephotonics, Ltd. v. Apple Inc.*, No. 2020-1424 (Fed. Cir. July 26, 2021), ECF No. 67. This includes proceedings in which an Appointments Clause challenge was raised after the Federal Circuit's decision in *Arthrex v. Smith & Nephew* but before this Court's decision in *United States v. Arthrex*. *See* Appellant's Opening Br. at 73, *Sipco LLC v. Emerson Elec. Co.*, No. 2021-1039 (Fed. Cir. Mar. 22, 2021), ECF No. 21; Appellant's Br. at 8-18, *Veveo, Inc. v. Hirshfeld*, No. 2020-2214 (Fed. Cir. Jan. 22, 2021), ECF No. 28; Appellant's Opening Br. at 15-26, *Corephotonics, Ltd. v. Apple Inc.*, No. 2020-1424 (Fed. Cir. July 14, 2020).

Consequently, parties that are similarly situated to Infineum have been afforded the constitutional remedy provided for by *United States v. Arthrex*.

REASONS FOR GRANTING THE PETITION

If the Federal Circuit had the benefit of this Court's decision in *United States v. Arthrex* when considering Infineum's appeal, it would have been compelled to allow Infineum to seek Director rehearing of the PTAB's final written decision. If the Federal Circuit ruling in this case stands, the final written decision in IPR2018-00922 will be insulated from executive review, which this Court has now held is a violation of the Appointments Clause. *See Arthrex*, 141 S. Ct. at 1985 ("We hold that the unreviewable authority wielded by APJs during IPR is incompatible with their appointment by the Secretary to an inferior office."). This Court should therefore grant certiorari, vacate the judgment below, and remand so that the Federal Circuit may in turn permit Infineum to request Director rehearing of the final written decision consistent with *United States v. Arthrex.*

Furthermore, to the extent that the Federal Circuit's decision may nevertheless be considered to have cured the Appointments Clause violation (albeit through a remedy that this Court did not adopt), the Federal Circuit's ruling that the Appointments Clause violation was remedied on the date of its opinion in *Arthrex v. Smith & Nephew* and not upon the issuance of the mandate in that case puts the Federal Circuit in direct conflict with numerous other circuits, and that ruling is inconsistent with authority from this Court and the plain language of the Federal Rules of Appellate Procedure. The final written decision in this case was issued on November 6, 2019, before the issuance of the mandate in *Arthrex v. Smith & Nephew.* Because the *Arthrex v. Smith & Nephew* ruling invalidating the tenure provision of the IPR statute was not effective until

the issuance of the mandate, the final written decision in this case was rendered under an unconstitutional regime of inter parties review. Accordingly, even if the Court were to allow for the *Arthrex v. Smith & Nephew* remedy to have effectively cured the constitutional infirmity, the Federal Circuit's ruling in this matter errs in concluding that the infirmity was cured prior to the final written decision in this case was entered. As a result, if this Court does not grant certiorari, vacate the judgment below and remand the case for proceedings consistent with *United States v. Arthrex*, this Court should grant certiorari to determine whether a remedy ordered by a court of appeals takes effect prior to the issuance of the mandate.

A. In light of *United States v. Arthrex*, this Court should grant certiorari, vacate, and remand to the Federal Circuit.

After the Federal Circuit denied Infineum's request for rehearing and before this Petition was filed, this Court issued its opinion in *United States v. Arthrex*, which vacated the Federal Circuit precedent upon which the judgment in this case is based and ordered that the matter be remanded to the "Acting Director for him to decide whether to rehear the petition filed by Smith & Nephew." *Arthrex*, 141 S. Ct. at 1987, 1988. The same result is appropriate here.

As in *Arthrex*, Infineum challenged the IPR statute as unconstitutionally affording APJ's unreviewable authority absent the nomination and confirmation required by the Appointments Clause, U.S. Const., art. II, § 2, cl. 2. App. 21a. The Federal Circuit in *Arthrex v. Smith & Nephew* held that APJs were principal officers, "not inferior

officers under the direction of the Secretary or Director." *Arthrex*, 141 S. Ct. at 1978. To fix the constitutional violation, "the Federal Circuit invalidated the tenure protections for APJs." *Id.* "The Federal Circuit vacated the PTAB's decision and remanded for a fresh hearing before a new panel of APJs, who would no longer enjoy protection against removal." *Id.*

Following its decision in *Arthrex v. Smith & Nephew*, in matters where the appellant "raised an Appointments Clause challenge in its opening brief," the Federal Circuit began immediately ordering the final written decisions vacated. *Uniloc 2017 LLC v. Facebook, Inc.*, 783 F. App'x 1020, 1021 (Fed. Cir. 2019); *Bedgear LLC v. Fredman Bros. Furniture Co., Inc.*, 783 F. App'x 1029, 1030 (Fed. Cir. 2019). The Federal Circuit also remanded those cases to the PTAB "for proceedings consistent with [its] decision in *Arthrex*." *Uniloc 2017 LLC*, 783 F. App'x at 1021; *Bedgear LLC*, 783 F. App'x at 1030.

However, in matters where the appellant, like Infineum here, raised an Appointments Clause challenge to a final written decision issued *after* the Federal Circuit's *Arthrex v. Smith & Nephew* opinion *but before* the mandate issued, the Federal Circuit held that there was no Appointments Clause violation. App. 21a-22a; *Caterpillar Paving Prods. Inc. v. Wirtgen Am., Inc.*, 957 F.3d 1342, 1343 (Fed. Cir. 2021); *Daikin Indus., Ltd. v. Chemours Co. FC, LLC*, 846 F. App'x 907, 912 n.5 (Fed. Cir. 2021); *Transtex Inc. v. Laydon Composites Ltd.*, 848 F. App'x 901, 905 n.3 (Fed. Cir. 2021); *Nuance Commc'ns Inc. v. MModal LLC*, 847 F. App'x 860, 869 (Fed. Cir. 2021). The Federal Circuit reasoned that the constitutional defect was cured on the date that the decision was issued. *See* App. 21a-22a;

Caterpillar, 957 F.3d at 1343; *Daikin*, 846 F. App'x at 912 n.5; *Transtex Inc.*, 848 F. App'x at 905 n.3; *Nuance*, 847 F. App'x at 869. Thus, according to the Federal Circuit, there was no Appointments Clause violation when the final written decision was issued in IPR2018-00922, App. 21a-22a, notwithstanding the fact that it was issued before any remedy for the constitutional defect took effect.

Subsequently, this Court in *United States v. Arthrex*, vacated the Federal Circuit's decision and the "fix" ordered by the Federal Circuit. 141 S. Ct. at 1988. Instead, this Court held that the appropriate cure is to "hold that 35 U.S.C. §6(c) is unenforceable as applied to the Director insofar as it prevents the Director from reviewing the decisions of the PTAB on his own." *Id.* at 1987. Further, "the appropriate remedy is a remand to the Acting Director for him to decide whether to rehear the [IPR petition]." *Id.* Consequently, contrary to the Federal Circuit's holding in this matter, Infineum was denied the opportunity required by the Constitution to request a rehearing by the Director in IPR2018-00922.

This Court's decision in *United States v. Arthrex* constitutes an intervening development that would have changed the Federal Circuit's determination in this case. *See Lawrence v. Chater*, 516 U.S. 163, 167-68 (1996). As this Court has reasoned, a GVR may be appropriate

> [w]here intervening developments, or recent developments that we have reason to believe the court below did not fully consider, reveal a reasonable probability that the decision below rests upon a premise that the lower court would reject if given the opportunity for further

> consideration, and where it appears that such a redetermination may determine the ultimate outcome of the litigation . . . [depending also] on the equities of the case.

Id. The equities do not weigh against this Court granting GVR as this is not a case where "the intervening development . . . is part of an unfair or manipulative litigation strategy, or [where] the delay and further cost entailed in a remand are not justified by the potential benefits of further consideration by the lower court." *Id.* at 168. This is an appropriate case for the issuance of a GVR because allowing the Federal Circuit's ruling to remain in place notwithstanding this Court's intervening decision in *United States v. Arthrex* would deprive Infineum of the opportunity to seek an additional level of review that this Court ruled is required to make the PTAB's structure consistent with the Appointments Clause. *See Arthrex*, 141 S. Ct. at 1987 ("In sum, we hold that 35 U.S.C. § 6(c) is unenforceable as applied to the Director insofar as it prevents the Director from reviewing the decisions of the PTAB on his own.").

In fact, this Court has already granted, vacated, and remanded petitions in view of *United States v. Arthrex* for petitioners that, similar to Infineum, challenged the IPR statute under the Appointments Clause. *See Fall Line Pats.*, No. 20-853, 2021 WL 2637823, at *1; *Polaris Innovations Ltd.*, No. 19-1459, 2021 WL 2637818, at *1; *RPM Int'l Inc.*, No. 20-314, 2021 WL 2637821, at *1; *Luoma*, No. 20-74, 2021 WL 2637820, at *1. Further, the Federal Circuit, consistent with this Court's decision in *United States v. Arthrex*, is granting requests to remand proceedings to the USPTO so that requests for rehearing

may be submitted to the Director. *See, e.g.*, Order at 2, *Sipco LLC v. Emerson Electric Co.*, Nos. 2021-1039, -1040 (Fed. Cir. Aug. 2, 2021), ECF No. 34; Order at 2, *Veveo, Inc. v. Hirshfeld*, Nos. 2020-2214, -2215, -2216, -2217 (Fed. Cir. Aug. 3, 2021), ECF No. 51; Order at 2, *Corephotonics, Ltd. v. Apple Inc.*, No. 2020-1424 (Fed. Cir. July 26, 2021), ECF No. 67. Infineum is entitled to the same constitutionally required remedy that similarly situated litigants have been afforded.

Thus, this Court should grant certiorari, vacate the judgment below, and remand so that the Federal Circuit may in turn permit Infineum to request Director rehearing of the final written decision consistent with *United States v. Arthrex.*

B. The Federal Circuit's Decision that the Appointments Clause Violation Was Remedied Before the Issuance of the Mandate Conflicts With The Rulings in Other Circuits and Federal Rule of Appellate Procedure 41.

The Federal Circuit, relying on its precedential decision in *Caterpillar Paving Prods. Inc. v. Wirtgen Am., Inc.*, 957 F.3d 1342 (Fed. Cir. 2020), concluded that the Appointments Clause violation was remedied under *Arthrex v. Smith & Nephew* on the date that opinion was issued, and, therefore, here, there was "no Appointments Clause violation because the [PTAB'S] final written decision issued after *Arthrex* was decided." App. 22a. In other words, the Federal Circuit found that its *Arthrex v. Smith & Nephew* decision was final and the disposition took effect before the mandate issued under Federal Rule of Appellate Procedure 41.

Other circuits do not apply the same standard; the First, Second, Third, Fifth, Ninth, Eleventh and District of Columbia Circuits have all held that "[a] Court of Appeals decision does not become effective until its mandate issues." *United States v. Simmons*, 923 F.2d 934, 956 (2d Cir. 1991); *see also Mary Ann Pensiero, Inc. v. Lingle*, 847 F.2d 90, 97 (3d Cir. 1988) ("An appellate court's decision is not final until its mandate issues."); *Bryant v. Ford Motor Co.,* 886 F.2d 1526, 1529 (9th Cir. 1989) ("'An appellate court's decision is not final until its mandate issues.'" (quoting *Mary Ann Pensiero*, 847 F. 2d at 97)); *Carver v. Lehman*, 558 F.3d 869, 879 n. 16 (9th Cir. 2009) ("[U]ntil the mandate issues, an opinion is not fixed as 'settled Ninth Circuit law,' and reliance on the opinion is a 'gamble.'" (quoting *United States v. Ruiz*, 935 F.2d 1033, 1037 (9th Cir. 1991)); *Charpentier v. Ortco Contractors*, 480 F.3d 710, 713 (5th Cir. 2007) (holding that the petitioner was required to continue paying benefits until the date that the mandate issued and rejecting the argument that an award ceased to exist "on the date we issued our opinion [vacating the award]" and reasoning "our decision is not final until we issue a mandate"); *United States v. Jackson*, 549 F.3d 963, 980 (5th Cir. 2008) (The defendant's "convictions did not cease to exist when the panel opinion vacating them was entered."); *Comer v. Murphy Oil USA, Inc.*, 718 F.3d 460, 468 (5th Cir. 2013) ("Absent the issuance of a mandate, 'the original district court judgment remain[s] in effect.'" (quoting *Jackson*, 549 F.3d at 980)). As each of these circuits has recognized, "[u]ntil the mandate issues, an appellate judgment is not final; the decision reached in the opinion may be revised by the panel, or reconsidered by the en banc court, or *certiorari* may be granted by the Supreme Court." *Flagship Marine Servs. v. Belcher Towing Co.,* 23 F.3d 341, 342 (11th Cir. 1994).

The District of Columbia Circuit, which routinely reviews constitutional challenges and challenges to agency regulations, recognizes that its dispositions in such cases do not automatically take effect and may be stayed by staying the issuance of the mandate. *See Parker v. District of Columbia*, No. 04-7041, 2007 WL 2892852, at *1 (D.C. Cir. Sept. 25, 2007) (denying motion to lift the stay of a mandate on a decision finding certain District of Columbia gun laws unconstitutional in *Parker v. District of Columbia*, 478 F.3d 370, 373-76 (D.C. Cir. 2007)); *Columbia Falls Aluminum Co. v. E.P.A.*, 139 F.3d 914, 924 (D.C. Cir. 1998) ("Our decision leaves EPA without a regulation governing spent potliner. If EPA wishes to promulgate an interim treatment standard, the Agency may file a motion in this court to delay issuance of this mandate in order to allow it a reasonable time to develop such a standard."); *Nat. Res. Def. Council v. E.P.A.*, 489 F.3d 1250, 1262 (D.C. Cir. 2007) (same); *Cement Kiln Recycling Coal. v. E.P.A.*, 255 F.3d 855, 872 (D.C. Cir. 2001) (same). The Third Circuit has followed the same course. *See Finberg v. Sullivan*, 658 F.2d 93, 94-95 (3d Cir. 1980) (noting that the court had not yet issued a mandate where the underlying "opinion invalidated provisions of state law" and certain parties moved to stay the mandate "in order that they could proceed in the United States Supreme Court before the directive issued that would strike down the invalid rules").

The First Circuit has likewise recognized that its rulings are not immediately effective. *See Aurelius Inv., LLC v. Puerto Rico*, 915 F.3d 838 (1st Cir. 2019), *overruled on other grounds*, *Fin. Oversight & Mgmt. Bd. for Puerto Rico v. Aureleius Inv., LLC*, 140 S. Ct. 1649 (2020). In *Aureleius*, before this Court overturned that ruling on

the merits, the First Circuit held that the members of the Financial Oversight and Management Board for Puerto Rico were "principal" officers of the United States, who must be appointed in accordance with requirements of the Appointments Clause. *Aurelius*, 915 F.3d at 860-61. However, the First Circuit recognized that its holding did not have immediate effect and stayed the issuance of its mandate "for 90 days, so as to allow the President and the Senate to validate the currently defective appointments or reconstitute the Board in accordance with the Appointments Clause." *Id.* at 863. Contrary to the Federal Circuit's ruling here, these courts have all recognized that the mechanism for staying a court of appeals' ruling is a stay of the mandate because the ruling becomes effective upon the issuance of the mandate.

The rule applied by the majority of the circuits is in keeping with the plain language of the Federal Rules of Appellate Procedure. Federal Rule of Appellate Procedure 41 provides for the issuance of a mandate by the court of appeals. "Unless the court directs that a formal mandate issue, the mandate consists of a certified copy of the judgment, a copy of the court's opinion, if any, and any direction about costs." Fed. R. App. P. 41(a). "The mandate is effective when issued." Fed. R. App. P. 41(c). Further, Rule 41 allows a court of appeals to stay the issuance of a mandate. Fed. R. App. P. 41(d). The advisory committee's note accompanying the 1998 amendments to Rule 41 observes with respect to subsection (c) that "[a] court of appeals' judgment or order is not final until issuance of the mandate; at that time the parties' obligations become fixed." Fed. R. App. P. 41(c) advisory committee's note to 1998 amendment. With respect to staying the mandate pending a petition for a

panel rehearing or rehearing en banc, the same committee note states that "[t]he Committee's objective is to treat a request for a rehearing en banc like a petition for panel rehearing so that a request for a rehearing en banc will suspend the finality of the court of appeals' judgment and delay the running of the period for filing a petition for writ of certiorari." Fed. R. App. P. 41(d) advisory committee's note to 1998 amendment.

The rule adopted by the majority of circuits is also consistent with this Court's long-standing recognition that it is the mandate that "give[s] effect to the ruling of the appellate court . . . . " *Rogers v. Hill*, 289 U.S. 582, 587 (1933). It is the appellate mandate that binds the lower courts and agencies and is ultimately what resolves the matters on appeal. *Sprague v. Ticonic Nat. Bank*, 307 U.S. 161, 168 (1939) ("The general proposition which moved that Court—that it was bound to carry the mandate of the upper court into execution and could not consider the questions which the mandate laid at rest—is indisputable."); *Fed. Commc'ns Comm'n v. Pottsville Broad. Co.*, 309 U.S. 134, 140 (1940) ("The Court of Appeals invoked against the Commission the familiar doctrine that a lower court is bound to respect the mandate of an appellate tribunal and cannot reconsider questions which the mandate has laid at rest."). "While a mandate is controlling as to matters within its compass, on the remand a lower court is free as to other issues." *Sprague*, 307 U.S. at 168. When the mandate is stayed, the remedy ordered by the court of appeals is not in effect and cannot be acted upon. *See Meredith v. Fair*, 83 S. Ct. 10, 11 (1962) ("I am therefore of the opinion that all the stays issued by Judge Cameron should be and they are hereby vacated, that the judgment and mandate of the Court of Appeals should be obeyed, and

that pending final action by this Court on the petition for certiorari the respondents should be and they are hereby enjoined from taking any steps to prevent enforcement of the Court of Appeals' judgment and mandate.").

The reason that an appellate judgment is not given effect until the mandate issues is clear.

> Until the mandate has issued, opinions can be, and regularly are, amended or withdrawn, by the merits panel at the request of the parties pursuant to a petition for panel rehearing, in response to an internal memorandum from another member of the court who believes that some part of the published opinion is in error, or sua sponte by the panel itself.

Carver, 558 F.3d at 878-79. In other words, the appellate court may change the disposition provided for in the opinion. The Federal Circuit's decision below departs from this well-established standard.

In light of *United States v. Arthrex*, this Petition should be granted, vacating the Federal Circuit's decision and remanding for further proceedings consistent with *United States v. Arthrex*. Nevertheless, to the extent that this Court concludes that the *United States v. Arthrex* decision did not foreclose the Federal Circuit's conclusion that the remedy ordered in *Arthrex v. Smith & Nephew* cured the constitutional infirmity, the Federal Circuit's decision results in a fundamental misapplication of the function of the mandate that should be resolved by this Court.

While the Federal Circuit's jurisdiction has a unique nature and the subject matter addressed by the Federal Circuit can be different from other courts of appeals at times, this Court has confirmed that the Federal Circuit must apply the same basic standards as other circuits. *See, e.g.*, *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388, 394 (2006) ("We hold only that the decision whether to grant or deny injunctive relief rests within the equitable discretion of the district courts, and that such discretion must be exercised consistent with traditional principles of equity, in patent disputes no less than in other cases governed by such standards."). Absent correction of the Federal Circuit's error regarding the effective date of its rulings, the remedies ordered by the Federal Circuit will not be subject to the same standards as remedies ordered by the other circuits.

Thus, in the event that this Court declines to enter an order granting certiorari, vacating and remanding for further proceedings consistent with *United States v. Arthrex* as requested above, the Petition should be granted to resolve this conflict between the circuits regarding the role and effect of the appellate mandate.

CONCLUSION

For the foregoing reasons, the Petition for writ of certiorari should be granted.

Dated: September 2, 2021

Respectfully submitted.

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APPENDIX

APPENDIX A — OPINION OF THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT, FILED JANUARY 21, 2021

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

2020-1333

INFINEUM USA L.P.,

Appellant,

v.

CHEVRON ORONITE COMPANY LLC,

Appellee,

DREW HIRSHFELD, PERFORMING THE FUNCTIONS AND DUTIES OF THE UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE,

Intervenor.

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2018-00922.

January 21, 2021, Decided

Appendix A

Before O'Malley, Taranto, and Stoll, *Circuit Judges.*

Stoll, *Circuit Judge.*

Infineum USA L.P. appeals from the final written decision of the Patent Trial and Appeal Board holding claims 1-20 of U.S. Patent No. 6,723,685 unpatentable under 35 U.S.C. § 103. The '685 patent claims cover lubricating oil compositions and their use in internal combustion engines. Because substantial evidence supports the Board's determination of obviousness, we affirm.

Background

Lubricating oil compositions for internal combustion engines comprise a base oil (or mixture of base oils) of lubricating viscosity and additives used to improve the performance characteristics of the base oil. Base oils are comprised of basestocks classified by the American Petroleum Institute (API) in Groups I—V. Additive components are generally known by their structure and properties and may be used to inhibit corrosion and to reduce engine wear, oil consumption, and friction loss.

Industry standards, such as those set by the International Lubricant Standardization and Approval Committee (ILSAC), set requirements for certain properties, ingredients, and performance of base oils. The ILSAC GF-3 standard, in effect as of the filing date of the '685 patent, set a maximum engine oil volatility of

15%.[1] A higher viscosity index (VI)[2] reduces base oil and finished oil volatility. The base oil is the primary influence on a finished engine oil's volatility. High VI is a feature of premium, high-quality base oils. Though the GF-3 standard does not recite any particular VI threshold, it was understood that commercially available base oils would need to have a VI of at least 95 for the engine oil to comply with the maximum Noack volatility requirement of 15%. *See* J.A. 1835, 1847 Fig. 1, 2285-86. At the time of the '685 patent's filing, the industry was using base oils in Groups III and IV and certain base oils in Group II in developing engine oils that would meet the GF-3 standard. *See* J.A. 566.

Traditionally, anti-wear additive components contained phosphorous. The GF-3 standard set a limit on the phosphorous content of engine oils. Seeking to reduce phosphorous content in additive components, formulators turned to solutions such as oil-soluble molybdenum compounds and organic friction modifiers to control wear and reduce friction.

The '685 patent, titled "Lubricating Oil Composition," was filed on April 5, 2002, and sought "to find a lubricating oil composition that provides improved fuel economy

1. The GF-3 standard measures volatility using an industry-standard Noack volatility test, which measures the evaporative loss of lubricant oil at a high temperature.

2. VI is a measure of base oil viscosity that indicates an oil's change in viscosity with variations in temperature. A high-VI oil exhibits significantly lower changes in viscosity over the temperature range of use than a low-VI oil.

benefit[,] demonstrates excellent wear protection characteristics, is relatively low in cost, and is free of nitrogen-containing friction modifiers." '685 patent col. 1 ll. 63-67.

Claim 1 is the sole independent claim of the '685 patent:

> 1. A lubricating oil composition comprising:
>
> a) an oil of lubricating viscosity having a viscosity index of at least 95;
>
> b) at least one calcium detergent;
>
> c) at least one oil soluble molybdenum compound;
>
> d) at least one organic ashless nitrogen-free friction modifier; and
>
> e) at least one metal dihydrocarbyl dithiophosphate compound, wherein said composition is substantially free of ashless aminic friction modifiers, has a Noack volatility of about 15 wt. % or less, from about 0.05 to 0.6 wt. % calcium from the calcium detergent, molybdenum in an amount of from about 10 ppm to about 350 ppm from the molybdenum compound, and phosphorus from the metal dihydrocarbyl dithiophosphate compound in an amount up to about 0.1 wt. %.

Id. at col. 13 ll. 47-62.

Appendix A

Chevron Oronite Co. filed a petition for inter partes review challenging all claims of the '685 patent as obvious under 35 U.S.C. § 103 over primary reference Toshikazu[3] in view of Henderson.[4]

Toshikazu is a published Japanese patent application titled "Lubricating Oil Composition for Internal Combustion Engines" that discloses formulations having "excellent wear resistance and friction characteristics." Toshikazu ¶ 55. Toshikazu's Examples 1-19 are inventive lubricating oil formulations, most of which contain varying amounts of each of the additive components claimed in the '685 patent. Toshikazu Tables 1-2.

Henderson is a technical paper published in 1998 and discusses the changing requirements for engine oils as of that time. Henderson describes an industry shift toward higher-viscosity, lower-volatility base oils and discusses the then-upcoming GF-3 standard, its requirements, and its expected performance improvements to engine oils.

Relevant to this appeal, the petition challenged claims 1-4, 6-11, and 13-20 as obvious over Toshikazu Example 16 in view of Henderson, and challenged claims 1-20 as

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3. Japanese Pub. Pat. App. No. JP H5-279686 A (published Oct. 26, 1993). We cite to the same certified English-language translation of Toshikazu relied on by the Board. *See* J.A. 542-52.

4. H.E. Henderson, et al., *Higher Quality Base Oils for Tomorrow's Engine Oil Performance Categories* 1-10 (SAE Tech. Paper Series, No. 982582, 1998).

obvious over Toshikazu Example 2 in view of Henderson.[5] Oronite supported its petition with a declaration from its expert, Dr. Donald Smolenski, who has significant experience in lubricating engine oil development and testing.

Infineum did not file a preliminary response to Oronite's petition, and the Board instituted review of all challenged claims on all grounds. Infineum then filed a patent owner response supported by the declaration of its expert, Dr. Jai Bansal. In addition to responding to the merits of Oronite's petition, Infineum's patent owner response argued that Dr. Smolenski was not a person of ordinary skill in the art because he had not worked as a formulator, and that the Board should disregard his testimony in its entirety.

In reply, Oronite argued that Dr. Smolenski was a person of ordinary skill, and it further supported its reply with the declaration of a new expert, Dr. Syed Rizvi, who has experience in engine oil formulation. The Board permitted Infineum to file a sur-reply, in which Infineum responded to Oronite's reply arguments on the merits, in addition to arguing that the Board should disregard Oronite's reply and Dr. Rizvi's testimony in their entirety. The Board denied Infineum's request to file a motion to strike the reply and Dr. Rizvi's testimony, but permitted the parties to file a joint chart identifying reply arguments and evidence that Infineum considered improper.

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5. The obviousness grounds for claims 4, 9, 16, and 17 included additional references not relevant to the issues on appeal. *See* J.A. 74-76.

Appendix A

Relevant to this appeal, the Board issued a final written decision holding claims 1-4, 6-11, and 13-20 obvious over Example 16 of Toshikazu in view of Henderson and holding claims 1-20 obvious over Example 2 of Toshikazu in view of Henderson. *Chevron Oronite Co. v. Infineum USA L.P.*, IPR2018-00922, 2019 WL 5806946, at *14-15, *17-19, *21-23 (P.T.A.B. Nov. 6, 2019) (*Decision*).

Infineum appeals. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4).

DISCUSSION

On appeal, Infineum argues that the Board improperly relied on new theories and evidence raised for the first time in Oronite's reply, that substantial evidence does not support the Board's decision, and that the decision runs afoul of certain constitutional provisions. We address each set of arguments in turn.

I

Infineum first asserts that the Board improperly relied on certain new theories and evidence that Oronite raised for the first time in its reply. We disagree.

"Whether the Board improperly relied on new arguments is reviewed de novo." *Nike, Inc. v. Adidas AG*, 955 F.3d 45, 50 (Fed. Cir. 2020) (citing *In re IPR Licensing, Inc.*, 942 F.3d 1363, 1369 (Fed. Cir. 2019)). The IPR provisions of the America Invents Act (AIA) require that a petition identify, "with particularity, each

claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim." 35 U.S.C. § 312(a)(3). The regulations implementing the AIA further state that "[a] reply may only respond to arguments raised in the corresponding opposition, patent owner preliminary response, or patent owner response." 37 C.F.R. § 42.23(b); *see also* 35 U.S.C. § 316(a). Because an IPR must proceed "'[i]n accordance with' or 'in conformance to' the petition," *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1356, 200 L. Ed. 2d 695 (2018) (alteration in original) (quoting Oxford English Dictionary (3d ed., Mar. 2016), www.oed.com/view/Entry/155073), it would "not be proper for the Board to deviate from the grounds in the petition and raise its own obviousness theory," *Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018).

As inter partes review is a formal adjudication, the Administrative Procedures Act (APA) also "imposes certain procedural requirements on the agency." *Genzyme Therapeutic Prods. Ltd. v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1365-66 (Fed. Cir. 2016). For example, "[i]n interpreting the APA's notice provisions in the context of IPR proceedings, we have cautioned that 'an agency may not change theories in midstream without giving respondents reasonable notice of the change and the opportunity to present argument under the new theory.'" *Nike*, 955 F.3d at 52 (first quoting *SAS Inst., Inc. v. ComplementSoft, LLC*, 825 F.3d 1341, 1351 (Fed. Cir. 2016), *rev'd on other grounds*, 138 S. Ct. 1348, 200 L. Ed. 2d 695 (2018); and then citing *Genzyme*, 825 F.3d at 1366).

But the AIA and APA do not uniformly preclude the introduction of new evidence after the petition is filed in an IPR proceeding. *See Anacor Pharms., Inc. v. Iancu*, 889 F.3d 1372, 1380 (Fed. Cir. 2018) ("There is, however, no blanket prohibition against the introduction of new evidence during an inter partes review proceeding."). Rather, "the introduction of new evidence in the course of the trial is to be expected in *inter partes* review trial proceedings and, as long as the opposing party is given notice of the evidence and an opportunity to respond to it, the introduction of such evidence is perfectly permissible." *Genzyme*, 825 F.3d at 1366.

Infineum argues that the Board erred by relying on two new theories raised for the first time in Oronite's reply—first, that a skilled artisan "would select Examples 2 or 16 because they are equal to all other examples," and second, "that other examples from Toshikazu did not perform better than Examples 2 or 16." Appellant's Br. 28; *see id.* at 30-31. Contrary to Infineum's assertions, the Board did not err in concluding that these arguments were proper rebuttal arguments or in relying on them in its decision. Oronite's reply arguments that a skilled artisan would have understood that "all of *Toshikazu*'s Examples 1-19 performed similarly" and "performed significantly better than *Toshikazu*'s Comparative Examples 1-5," J.A. 1451, responded directly to Infineum's contentions that a skilled artisan would not have been motivated to select Examples 2 and 16, J.A. 773, would have considered examples other than Examples 2 and 16 "more promising for further development," J.A. 792, and would have understood that Example 16 "did not perform as well . . . as Examples 3, 5 and 7," J.A. 793.

To the extent Infineum argues that the Board impermissibly "change[d] theories in midstream" in violation of the APA, we disagree. *Genzyme*, 825 F.3d at 1366. The theory of unpatentability advanced in Oronite's petition remained the same throughout the proceedings. Oronite's reply maintained the petition's position that each of the challenged '685 patent claims would have been obvious over either Toshikazu Example 16 in view of Henderson or Toshikazu Example 2 in view of Henderson. *Compare* J.A. 146 (petition noting that obviousness Grounds 1-3, covering claims 1-4, 6-11, and 13-20, "rely on Example 16 of *Toshikazu*," and that obviousness Grounds 4-6, covering claims 1-20, "rely on Example 2 of *Toshikazu*"), *with* J.A. 1450 (reply arguing that "Examples 16 and 2 of *Toshikazu*, in combination with *Henderson*, each renders the independent claims (and others) unpatentable as obvious"). And the Board's decision held each of the challenged claims obvious on those same grounds. *Decision*, 2019 WL 5806946, at *14-15, *17-19 (relying on Example 16 of Toshikazu to hold obvious claims 1-4, 6-11, and 13-20); *id.* at *21-23 (relying on Example 2 of Toshikazu to hold obvious claims 1-20).

Infineum's argument that the Board's reliance on Dr. Rizvi's testimony was improper appears to be tied to its assertions that the Board impermissibly relied on new theories advanced for the first time in Oronite's reply.[6]

6. Infineum's opening brief also alleges that Oronite's "new theories" were supported by "thirty new pieces of evidence," Appellant's Br. 28 (emphasis omitted), some of which Infineum identifies in a footnote, *id.* at 28 n.1. The same footnote acknowledges that "Infineum sought the Board's permission to move to strike

See, e.g., Appellant's Br. 29; Reply Br. 12 ("Oronite admits that it tried to introduce the theory as to why [a] POSITA would select Examples 2 and 16 for the first time in its Reply, . . . and does not deny that this new theory was only supported by Dr. Rizvi's reply declaration."); *accord* J.A. 2634 (arguing before the Board that portions of Dr. Rizvi's testimony subsequently relied on by the Board "[p]resent[] a new theory regarding the interpretation of the data from Toshikazu").

Like the reply arguments Infineum identifies on appeal, Dr. Rizvi's testimony was a proper rebuttal to arguments raised in Infineum's patent owner response. For example, Infineum takes issue with the Board's reliance on paragraphs 35-38 of Dr. Rizvi's declaration. *See* Appellant's Br. 29; *see also Decision*, 2019 WL 5806946, at *12 (citing J.A. 2281-82 (Rizvi Dec. ¶¶ 35-38)). Paragraphs 35-38 merely explain, based on the state of the art, Dr. Rizvi's statement in paragraph 34 (which Infineum did not challenge as improper) that "[a] person of ordinary skill in the art would not have found the differences between coefficient of friction or wear values reported in *Toshikazu* for Examples 1-19 to be important." J.A. 2280. And Dr. Rizvi's assertion of unimportant differences responded to Dr. Bansal's assertion that a skilled artisan would "pursue formulations based on Examples 3, 5, and 7 and not on Example 16." *Id.* (quoting J.A. 908). Further, the portions of Dr. Rizvi's declaration Infineum highlights on appeal

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the Reply, Dr. Rizvi's Declaration," and certain exhibits submitted with the reply, and filed a motion to exclude certain reply exhibits. *Id.* Infineum has not appealed the Board's denials of its motion to strike and motion to exclude.

rely principally on record evidence, not new evidence. *E.g.*, J.A. 2290-91, 2313-15. We discern no impropriety in the challenged portions of Dr. Rizvi's declaration.

Additionally, the Board's reliance on Dr. Rizvi's testimony did not violate the APA because Infineum had ample notice and opportunity to respond to Dr. Rizvi's testimony. The Board permitted Infineum to depose Dr. Rizvi after receiving his reply declaration, and then to file a sur-reply, in addition to allowing the parties to file a joint chart identifying the reply arguments and evidence Infineum believed were improper.[7] Infineum availed itself of both of these opportunities to respond. For example, Infineum's sur-reply argued that the Board should disregard Oronite's reply and Dr. Rizvi's testimony in their entirety, J.A. 2344-47, in addition to responding extensively to Dr. Rizvi's testimony on the merits, J.A. 2347-65. Accordingly, the Board afforded Infineum the process it was due under the APA.

We thus conclude that the Board did not err in considering Oronite's reply arguments or Dr. Rizvi's testimony.

II

Infineum also challenges several aspects of Board's decision as unsupported by substantial evidence. We find none of Infineum's challenges persuasive.

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7. To the extent that Infineum contends that the Board was categorically prohibited from relying on Dr. Rizvi's testimony, our precedent forecloses any such argument. *See Anacor*, 889 F.3d at 1380.

We review the Board's legal determinations de novo, *In re Elsner*, 381 F.3d 1125, 1127 (Fed. Cir. 2004), and its fact findings for substantial evidence, *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). Substantial evidence is "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *OSI Pharms., LLC v. Apotex Inc.*, 939 F.3d 1375, 1381 (Fed. Cir. 2019) (quoting *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229, 59 S. Ct. 206, 83 L. Ed. 126 (1938)). Obviousness is a question of law based on underlying findings of fact. *Id.* at 1382 (quoting *In re Kubin*, 561 F.3d 1351, 1355 (Fed. Cir. 2009)). "An obviousness determination requires finding that a person of ordinary skill in the art would have been motivated to combine or modify the teachings in the prior art and would have had a reasonable expectation of success in doing so." *Id.* (quoting *Regents of Univ. of Cal. v. Broad Inst., Inc.*, 903 F.3d 1286, 1291 (Fed. Cir. 2018)). "Whether a person of ordinary skill in the art would have been motivated to modify or combine teachings in the prior art, and whether he would have had a reasonable expectation of success, are questions of fact." *Id.* (quoting *Regents of Univ. of Cal.*, 903 F.3d at 1291).

Infineum's assertion that the Board erred in giving any credit to Oronite's "unqualified expert," Dr. Smolenski, lacks merit. It merely reprises the same argument Infineum essentially raised before the Board—that Dr. Smolenski's testimony is not admissible because he is not sufficiently qualified. Much like district court evidentiary rulings, the Board's evidentiary determinations, such as its decision not to exclude Dr. Smolenski's testimony, are reviewed for abuse of discretion. *See Belden Inc. v.*

Berk-Tek LLC, 805 F.3d 1064, 1078 (Fed. Cir. 2015) (citing *Chen v. Bouchard*, 347 F.3d 1299, 1307 (Fed. Cir. 2003)); *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1363 (Fed. Cir. 2006) (holding that the district court abused its discretion in permitting a witness not qualified as an expert in the pertinent art to testify as an expert regarding issues of noninfringement or invalidity); *see also Hologic, Inc. v. Minerva Surgical, Inc.*, 764 F. App'x 873, 881 n.8 (Fed. Cir. 2019) ("We find no abuse of discretion in the Board's determination that Dr. Mirabile had enough knowledge and skill to testify about this topic."). We also "defer to the Board's findings concerning the credibility of expert witnesses." *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (citing *Velander v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003)); *see also Shoes by Firebug LLC v. Stride Rite Children's Grp., LLC*, 962 F.3d 1362, 1372 (Fed. Cir. 2020) ("The Board was within its discretion to weigh the credibility of expert testimony." (citing *Yorkey*, 601 F.3d at 1284)). Abuse of discretion occurs if the ruling: "(1) is clearly unreasonable, arbitrary, or fanciful; (2) is based on an erroneous conclusion of law; (3) rests on clearly erroneous fact findings; or (4) follows from a record that contains no evidence on which the Board could rationally base its decision." *Bouchard*, 347 F.3d at 1307 (citing *Gerritsen v. Shirai*, 979 F.2d 1524, 1529 (Fed. Cir. 1992)).

Here, Infineum does not challenge the Board's determination, grounded in the '685 patent specification and the prior art of record, that "one of ordinary skill in the art could have experience in either formulating an engine oil or testing such oils in internal combustion engines." *Decision*, 2019 WL 5806946, at *5. Rather,

Infineum argues that Dr. Smolenski's "experience in a tangential aspect of testing motor oils, did not qualify him to testify as to how [a] POSITA would make or formulate a new motor oil." Appellant's Br. 45-46 (citation omitted). The Board reasonably considered and rejected this argument when it determined that "Dr. Smolenski has sufficient education and experience of a specialized nature to assist the Board in understanding the evidence of record." *Decision*, 2019 WL 5806946, at *5; *see Hologic*, 764 F. App'x at 880 n.6 (applying abuse of discretion standard to the Board's rejection of a patent owner's argument that an expert lacked sufficient experience with the relevant technology after finding no error in the Board's determination of the level of ordinary skill in the art). Infineum offers no basis to contradict this conclusion, or to call into question the Board's statement that it accounted for "Dr. Smolenski's lack of benchtop formulating experience" in "determining the weight to give his testimony." *Decision*, 2019 WL 5806946, at *5. Accordingly, we discern no abuse of discretion in the Board's consideration of or reliance on Dr. Smolenski's testimony.

No more compelling is Infineum's argument that the Board's decision is unsupported by substantial evidence because the Board relied on Dr. Smolenski's "hindsight analysis" to select Examples 2 and 16 from Toshikazu, when "other examples from Toshikazu performed better." Appellant's Br. 41-42. We have rejected the notion that a patent challenger seeking to demonstrate obviousness must prove that a person of ordinary skill would have been motivated to select one prior art disclosure over

another. *Novartis Pharms. Corp. v. W.-Ward Pharms. Int'l Ltd.*, 923 F.3d 1051, 1059 (Fed. Cir. 2019) ("It is thus improper to require West-Ward to prove that a person of ordinary skill would have selected everolimus over other prior art treatment methods."); *see also In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) ("[O]ur case law does not require that a particular combination must be the preferred, or the most desirable, combination described in the prior art in order to provide motivation for the current invention."). In any event, Infineum's argument amounts to a disagreement with how the Board weighed the evidence. The Board was within its province to credit Dr. Rizvi's testimony that "one of ordinary skill in the art [would] have selected any of the example lubricating oils of Toshikazu for further development." *Decision*, 2019 WL 5806946, at *12 (discussing J.A. 2280-82 (Rizvi Dec. ¶¶ 33-38) and J.A. 174-76 (Smolenski Dec. ¶¶ 44-47)). The Board reasonably credited Dr. Rizvi›s explanation that «benchtop testing rigs, such as the shell-type four ball test employed in *Toshikazu*, have a certain amount of repeatability associated with their data," and that the variance in the coefficients of friction reported in Toshikazu's Examples 1-19 was within the repeatability specified by the applicable American Society for Testing and Materials standard. J.A. 2280-82; *see Decision*, 2019 WL 5806946, at *12.

Similarly unavailing is Infineum's apparent assertion that the Board's decision is not supported by substantial evidence because "[t]he overwhelming evidence . . . showed that [a] POSITA would not presume that modifying additive components and base oils would necessarily work

or improve the performance of a formulation." Appellant's Br. 47. The Board reasonably relied on primary reference Toshikazu's express teachings to conclude that a skilled artisan "would have had a reasonable expectation of success in using a synthetic base oil that imparts an overall viscosity index of 95 or above to the lubricating composition of Example 16 of Toshikazu." *Decision*, 2019 WL 5806946, at *8 (citations omitted); *see id.* ("Toshikazu expressly indicates that '[t]here is no particular limitation on the base oil used in the present invention, and it is possible to use various types of mineral oils, synthetic oils, and so on that are known in the art.'" (alteration in original) (quoting Toshikazu ¶ 12)); *id.* ("Toshikazu reports essentially identical results when the additive package of Example 16 is used with a mineral base oil, a synthetic base oil, or a mineral oil/high pressure hydrogenated base oil." (citing Toshikazu Examples 3, 16, and 17)). The general need for routine compatibility testing of any modified formulation does not undermine Toshikazu's teachings that different base oils could be used.

Moreover, contrary to Infineum's contentions, the Board's rationale for holding claim 12 obvious is not internally inconsistent. Infineum identifies a purported contradiction between: (1) the Board's conclusion that a skilled artisan "would have found it obvious to increase the amount of aliphatic acid glyceride," an organic ashless nitrogen-free friction modifier, "in Example 2 to at least 'about 0.25 wt. %' in order to save on costs," *id.* at *22 (citing J.A. 140); and (2) the Board's finding with respect to claim 1, from which claim 12 depends, that notwithstanding that "mineral oils are cheaper than synthetic oils," a skilled

artisan "would have sought to substitute the mineral oil of Example 2 with . . . a synthetic oil . . . in order to comply with the GF-3 standard and to achieve the benefits of higher quality oils discussed in Henderson," *id.* at *20 (citing J.A. 127-28, 131-32). Appellant's Br. 48-49. To the extent that Infineum argues that the Board's first finding amounts to a conclusion that a skilled artisan would have settled for decreased performance to reduce costs, the Board considered this argument and reasonably rejected it. *Decision*, 2019 WL 5806946, at *22 ("Patent Owner's arguments based on an alleged decrease in performance from such a change are not persuasive because we have found that one of ordinary skill in the art would not have differentiated the performance results reported for Examples 1-19 of Toshikazu.").

Indeed, the Board credited the petition's argument that cost would motivate a skilled artisan to increase the amount of aliphatic acid glyceride in Toshikazu's Example 2 in view of the fact that it was "less expensive than other anti-wear compounds, including molybdenum," *id.* (citing J.A. 139-40 (petition)), and the fact that "other examples in Toshikazu indicate that the amount of organic ashless nitrogen-free friction modifier may be increased without significantly affecting the performance of the lubricating compositions," *id.* (first citing J.A. 139-40; and then citing J.A. 1471-72 (reply)); *see also* Toshikazu Table 1 (reflecting similar friction coefficients and wear track diameters for Examples 2 and 4 notwithstanding differences in aliphatic acid glyceride content). It is reasonable for a skilled artisan to be driven more by cost when effects on performance are minor or nonexistent. The Board's conclusion that claim

12 would have been obvious is supported by substantial evidence.

Substantial evidence also supports the Board's decision to give "limited weight" to Infineum's unexpected results evidence with respect to fuel economy. *Decision*, 2019 WL 5806946, at *14. Infineum argued before the Board that because a skilled artisan would have expected formulations with large amounts of molybdenum to provide superior fuel economy performance, the '685 patent's demonstration of superior fuel economy test results for the claimed formulations containing a low amount of molybdenum in combination with an organic ashless nitrogen-free friction modifier provided "truly unexpected" results. *Id.* at *13 (quoting J.A. 825). Relying on *Allergan, Inc. v. Sandoz Inc.*, 726 F.3d 1286, 1293 (Fed. Cir. 2013), the Board concluded that Infineum's unexpected results evidence was not meaningful in view of the fact that Toshikazu "provide[d] a strong reason to use low levels of molybdenum in combination with an organic ashless nitrogen-free friction modifier." *Decision*, 2019 WL 5806946, at *14. Toshikazu discloses "excellent wear resistance and friction characteristics" of formulations containing low levels of molybdenum in combination with an organic ashless nitrogen-free friction modifier. Toshikazu ¶ 55. Toshikazu's formulations containing combinations of these two additives "further improved" the "wear resistance and the friction characteristics" "in comparison with the cases where either one is solely used." *Id.* ¶ 24. Considering Infineum's "evidence that this same combination of additives also provides an additional benefit with respect to fuel economy," the Board reasoned

that it did "not alter the fact that the advantages of the combination of low molybdenum and an organic ashless nitrogen-free friction modifier were known in the art." *Decision*, 2019 WL 5806946, at *14 (citing J.A. 1474).

Infineum does not meaningfully challenge this analysis, offering only an unsupported argument that "there was no evidence in this IPR that showed a clear motivation to combine." Appellant's Br. 39. This assertion does not call into question the Board's amply supported finding that Toshikazu taught advantages of the combination of low levels of molybdenum and an organic ashless nitrogen-free friction modifier independent of any improved fuel economy performance, or that Toshikazu would provide a skilled artisan with "a strong reason to use" a formulation with this combination. *Decision*, 2019 WL 5806946, at *14; *see* Toshikazu ¶¶ 1, 9, 24, 55. Nor does Infineum meaningfully engage with the Board's finding that a skilled artisan would have a motivation, separate from increased fuel economy, to combine Toshikazu and Henderson to meet the then-applicable GF-3 industry standard. *Decision*, 2019 WL 5806946, at *9. Accordingly, substantial evidence supports the Board's decision finding that Infineum's unexpected results evidence did not outweigh the evidence of obviousness in this case. *See Allergan*, 726 F.3d at 1293 (concluding that evidence that a particular combination solved additional problems was insufficient to outweigh other evidence of obviousness in view of a separate motivation to make the combination).

III

Finally, our precedent forecloses Infineum's constitutional challenges to the Board's decision.

Infineum requests "vacatur and remand to the Board with instructions to dismiss the IPR" because under *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320, 1329 (Fed. Cir. 2019), "the [Administrative Patent Judges (APJs)] who presided over this IPR were unconstitutionally appointed." Appellant's Br. 49. In Infineum's view, the remedy this court adopted in *Arthrex* did not cure the Appointments Clause violation, and "there is no permissible interpretation of the statute." *Id.* Infineum implicitly acknowledges, however, that we must apply *Arthrex*, which forecloses Infineum's argument. *Arthrex*, 941 F.3d at 1337 ("This as-applied severance is the narrowest possible modification to the scheme Congress created and cures the constitutional violation in the same manner as *Free Enterprise Fund [v. Public Co. Accounting Oversight Board*, 561 U.S. 477, 130 S. Ct. 3138, 177 L. Ed. 2d 706 (2010)] and *Intercollegiate* [*Broadcasting System, Inc. v. Copyright Royalty Board*, 684 F.3d 1332, 401 U.S. App. D.C. 407 (D.C. Cir. 2012)]. Title 5's removal protections cannot be constitutionally applied to APJs, so we sever that application of the statute."); *see* Appellant's Br. 52 ("Infineum presents this challenge in order to preserve its rights in the event that these issues are resolved by the Supreme Court.").

Our precedent also undermines Infineum's alternative argument that vacatur and remand to a new panel of

Administrative Patent Judges is warranted because the Board issued its final written decision prior to issuance of the mandate in *Arthrex*. *See* Appellant's Br. 52-53; *Caterpillar Paving Prods. Inc. v. Wirtgen Am., Inc.*, 957 F.3d 1342 (Fed. Cir. 2020). Infineum acknowledges that "in *Caterpillar*[,] this [c]ourt found that where an *inter partes* review argument occurred before the *Arthrex* opinion issued and the *inter partes* review's final written decision issued post-*Arthrex*, the patent holder was not entitled to vacatur and remand for a new hearing." Reply Br. 26 (citing *Caterpillar*, 957 F.3d at 1343). In *Caterpillar*, as here, the Board's final written decision issued before the mandate issued in *Arthrex*. Applying *Caterpillar* and *Arthrex* to this case, there is no Appointments Clause violation because the Board's final written decision issued after *Arthrex* was decided. *See Caterpillar*, 957 F.3d at 1342-43; *Arthrex*, 941 F.3d at 1340.

Finally, our precedent also forecloses Infineum's argument that the Board's retroactive application of IPR proceedings to invalidate the '685 patent claims violates the Takings and Due Process Clauses of the U.S. Constitution. *See* Appellant's Br. 54-59. Infineum appears to acknowledge as much, abandoning its Takings and Due Process Clause arguments in its reply brief. In any event, *Celgene Corp. v. Peter* held "that the retroactive application of IPR proceedings to pre-AIA patents is not an unconstitutional taking under the Fifth Amendment." 931 F.3d 1342, 1362 (Fed. Cir. 2019), *cert. denied*, 141 S. Ct. 132, 207 L. Ed. 2d 1078 (2020).

Appendix A

CONCLUSION

We have considered the parties' remaining arguments and do not find them persuasive. Accordingly, we affirm the Board's decision.

AFFIRMED

APPENDIX B — JUDGMENT OF THE UNITED STATES PATENT AND TRADEMARK OFFICE, PATENT TRIAL AND APPEAL BOARD, DATED NOVEMBER 6, 2019

UNITED STATES PATENT
AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL
AND APPEAL BOARD

CHEVRON ORONITE COMPANY LLC,

Petitioner,

v.

INFINEUM USA L.P.,

Patent Owner.

IPR2018-00922
Patent 6,723,685 B2

Before JON B. TORNQUIST, MICHELLE N. ANKENBRAND, and JULIA HEANEY, *Administrative Patent Judges.*

TORNQUIST, *Administrative Patent Judge.*

JUDGMENT

Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

Appendix B

I. INTRODUCTION

Chevron Oronite Company LLC ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–20 of U.S. Patent No. 6,723,685 B2 (Ex. 1001, "the '685 patent"). Infineum USA L.P. ("Patent Owner") did not file a Preliminary Response to the Petition.

Upon consideration of the Petition and the evidence of record, we determined that Petitioner demonstrated a reasonable likelihood that it would prevail with respect to at least one claim of the '685 patent. Paper 6, 20 ("Dec."). Thus, consistent with the Supreme Court's decision in *SAS Institute Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018), and USPTO Guidance,[1] we instituted review of all challenged claims on all challenged grounds.

Following institution of trial, Patent Owner filed a Patent Owner Response (Paper 13, "PO Resp."), Petitioner filed a Reply (Paper 16, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 22, "Sur-reply"). In support of their respective positions, Petitioner relies on the testimony of Dr. Donald J. Smolenski (Ex. 1002) and Dr. Syed Q. A. Rizvi (Ex. 1055), and Patent Owner relies on the testimony of Dr. Jai Bansal (Ex. 2003).

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1. In accordance with USPTO Guidance, "if the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition." *See* USPTO, Guidance on the Impact of SAS on AIA Trial Proceedings (April 26, 2018) (available at https://www.uspto.gov/patents-application-process/patent-trialand-appeal-board/trials/guidance-impact-sas-aia-trial) ("USPTO Guidance").

Appendix B

An oral hearing was held on August 30, 2019, and a transcript of the hearing is included in the record (Paper 32, "Tr.").

A. Related Proceedings

The parties identify *Infineum USA LP v. Chevron Oronite Company LLC*, Case No. 1-18-cv-00323 (D. Del.), as a related matter. Pet. 2; Paper 4, 1. The '685 patent was also the subject of IPR2018-00923 (institution denied) and IPR2018-00924 (institution denied). Paper 4, 1; Pet. 2.

B. The '685 Patent

The '685 patent is directed to lubricating oil compositions that "exhibit simultaneously improved low temperature valve train wear performance, excellent compatibility with fluoroelastomer materials commonly used for seals in modern internal combustion engines, and improved fuel economy properties." Ex. 1001, 1:4–9.

The '685 patent explains that lubricating oil compositions for combustion engines typically contain a base oil of lubricating viscosity, as well as various additives used "to improve detergency, to reduce engine wear, to provide stability against heat and oxidation, to reduce oil consumption, to inhibit corrosion, to act as a dispersant, and to reduce friction loss." *Id.* at 1:12–19. The '685 patent further explains that "[s]ome additives provide multiple benefits, such as dispersant-viscosity modifiers," whereas other additives improve one characteristic of the lubricating oil while adversely affecting one or more other characteristics. *Id.* at 1:19–22.

The '685 patent discloses that when "small amounts of one or more oil soluble molybdenum compounds," an ashless, organic, nitrogen-free friction modifier, zinc dihydrocarbyl dithiophosphate (ZDDP), and a calcium detergent are added to a base oil having a viscosity of at least 95 and a Noack volatility[2] of less than 15%, a low-cost lubricating composition with improved fuel economy, excellent wear protection, and reduced adverse effects on fluoroelastomer seals is provided. *Id.* at 2:1–8, 2:47–55.

C. Illustrative Claim

Petitioner challenges claims 1–20 of the '685 patent. Independent claim 1 is illustrative of the challenged claims and is reproduced below:

> 1. A lubricating oil composition comprising:
>
> a) an oil of lubricating viscosity having a viscosity index of at least 95;
>
> b) at least one calcium detergent;
>
> c) at least one oil soluble molybdenum compound;
>
> d) at least one organic ashless nitrogen-free friction modifier; and

2. Noack volatility measures the evaporative loss of lubricant oil at high temperature. Ex. 1001, 2:52–54; Ex. 1002 ¶ 23. A lower Noack volatility is associated with a less volatile oil. Ex. 1002 ¶ 23.

> e) at least one metal dihydrocarbyl dithiophosphate compound, wherein said composition is substantially free of ashless aminic friction modifiers, has a Noack volatility of about 15 wt. % or less, from about 0.05 to 0.6 wt. % calcium from the calcium detergent, molybdenum in an amount of from about 10 ppm to about 350 ppm from the molybdenum compound, and phosphorus from the metal dihydrocarbyl dithiophosphate compound in an amount up to about 0.1 wt. %.

Ex. 1001, 13:47–63.

D. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–20 of the '685 patent on the following grounds (Pet. 3–4):

Claim(s) Challenged	35 U.S.C. §	References
1–3, 6–8, 10, 11, 13–15, 18–20	103	Toshikazu<?>, Henderson<?>
4	103	Toshikazu, Henderson, Schlicht<?>
9, 16, 17	103	Toshikazu, Henderson, Walker<?>
1–3, 5–8, 10–15, 18–20	103	Toshikazu, Henderson

4	103	Toshikazu, Henderson, Schlicht
9, 16, 17	103	Toshikazu, Henderson, Walker

II. ANALYSIS

A. Claim Construction

In this *inter partes* review, claim terms are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017);[3] *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). In determining the broadest reasonable construction, we presume that claim terms carry their ordinary and customary meaning. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). A patentee may define a claim term in a manner that differs from its ordinary meaning; however, any special definitions must be set forth in the specification with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

3. A recent amendment to this rule does not apply here, because the Petition was filed before November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018) (codified as amended at 37 C.F.R. § 42.100(b) (2019)).

Appendix B

Claims 18–20

Claims 18–20 recite:

> 18. A method for improving the fuel economy and fuel economy retention properties of an internal combustion engine, which comprises: (1) adding to said engine the lubricating oil composition of claim 1; and (2) operating said engine.
>
> 19. A method for improving the anti-wear protection of an internal combustion engine comprising the steps of: (1) adding a lubricating oil composition of claim 1; and (2) operating the engine.
>
> 20. A method for improving the compatibility between a lubricating oil composition and the seals of an internal combustion engine comprising the steps of: (1) adding to said engine a lubricating oil composition of claim 1; and (2) operating the engine.

Ex. 1001, 14:52–65. As shown above, claims 18–20 each include a preamble that identifies the purpose or intended result of the claimed invention and two method steps requiring (1) the addition of the lubricating oil composition of claim 1 to an engine and (2) operating the engine. *Id.* The parties dispute whether the preambles of claims 18–20 are limiting. Pet. 35–40; Pet. Reply 13; Sur-reply 12–13.

"In general, a preamble limits the invention if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claims. Conversely, a preamble is not limiting 'where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention.'" *Catalina Mkt'g Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (internal citations omitted) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999), and *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). A preamble is also generally not limiting when "deletion of the preamble phrase does not affect the structure or steps of the claimed invention." *Id.* at 809.

Here, the preambles of claims 18–20 are statements of purpose or intended result and deletion of these preamble phrases would not affect the steps set forth in claims 18–20. This suggests the preambles are not limiting.

Patent Owner contends a finding that the preambles are limiting is "necessitated" by the doctrine of claim differentiation. Sur-reply 12–13. In support of this position, Patent Owner quotes from *Tandon Corp. v. U.S. International Trade Commission*, 831 F.2d 1017, 1023 (Fed. Cir. 1987), which states:

> There is presumed to be a difference in meaning and scope when different words or phrases are used in separate claims. To the extent that the absence of such difference in meaning and scope would make a claim superfluous,

> the doctrine of claim differentiation states the presumption that the difference between claims is significant.

Although the doctrine of claim differentiation "creates a presumption that each claim in a patent has a different scope," "it is not a 'hard and fast' rule of construction." *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1375 (Fed. Cir. 2001); *Seachange Int'l, Inc. v. C-COR Inc.*, 413 F.3d 1361, 1368–69 (Fed. Cir. 2005). Thus, where the preambles of multiple claims provide only a statement of purpose or intended result, and do not result in a manipulative difference in the steps of the methods, the doctrine of claim differentiation, without more,[4] does not require a finding that the preambles are limiting. *Bristol-Meyers Squibb*, 246 F.3d at 1375–1376. This is true even if the result is multiple claims having identical scope. *Id.* at 1376 (finding that independent claims 1 and

4. Neither party cites to or relies on the written description or prosecution history of the '685 patent to support its proposed construction. *See Allergan Sales, LLC v. Sandoz, Inc.*, 935 F.3d 1370, 1374–75 (Fed. Cir. 2019) (determining that statements of purpose or intended result were limiting where they were relied upon during prosecution to support the patentability of the claims). Moreover, although the preambles of each claim identify the subject of the method as an "internal combustion engine" and the body of each claim refers back to this engine ("said engine" or "the engine"), this is no different than the claims at issue in *Bristol-Meyers Squibb* that were found to be non-limiting, which identified the subject of the method ("a patient" or "a cancer patient") in the preamble and then referred back to this subject in the body of the claims ("said patient"). *Bristol-Meyers Squibb*, 246 F.3d at 1371–72.

5 and independent claims 2 and 8 of the involved patent were of identical scope); *see also Tandon*, 831 F.2d at 1023 (noting that "practice has long recognized that 'claims may be multiplied . . . to define the metes and bounds of the invention in a variety of different ways,'" and "two claims which read differently can cover the same subject matter") (quoting *Bourns, Inc. v. United States*, 537 F.2d 486, 492 (Ct. Cl. 1976)). Thus, we find that the preambles of claims 18–20, which set forth the intended result of the method steps, are not limiting.

B. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *See 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) if in the record, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

C. Level of Ordinary Skill in the Art and Dr. Smolenski's Testimony

The parties dispute the proper level of ordinary skill

in the art and whether Dr. Smolenski's testimony should be relied upon in this proceeding.

1. Level of Ordinary Skill in the Art

Petitioner contends a person of ordinary skill in the art

> would have had an undergraduate degree in a relevant field (e.g., Mechanical Engineering, Materials Science Engineering, Chemical Engineering, or Chemistry) with three to five years of experience with formulating and/or testing engine lubricating oil compositions or a graduate degree in a relevant field with one to three years of experience with formulating and/or testing engine lubricating oil compositions.

Pet. 13 (citing Ex. 1002 ¶ 17).

Patent Owner does not set forth a definition of a person of ordinary skill in the art, but Dr. Bansal testifies that

> a person of ordinary skill in the art would have a B.S. degree in Chemistry, Chemical Engineering or an equivalent field as well as at least 5 years of experience directly formulating engine lubricating oil compositions or a graduate degree in Chemistry, Chemical Engineering or an equivalent field as well as at least 3 years of experience directly formulating engine lubricating oil compositions.

Ex. 2003 ¶ 19.

As shown above, both parties generally agree on the amount and type of education, as well as the amount of experience, that would have been possessed by one of ordinary skill in the art, and agree that an individual with experience in directly formulating engine lubricating oil compositions may be one of ordinary skill in the art. Ex. 1002 ¶ 17; Ex. 2003 ¶ 19. The parties' dispute centers around whether an individual with experience in the testing of engine oils may also qualify as one of ordinary skill in the art. PO Resp. 3–5; Pet. Reply 25–27.

Dr. Bansal testifies that, "[i]n view of the '685 Patent, the specification and prosecution history, a deep understanding and hands-on experience formulating engine lubricant oil is . . . a pre-requisite" to be a person of ordinary skill in the art. Ex. 2003 ¶ 23. Dr. Bansal further testifies that in the engine oil additive industry a "formulation scientist," or "formulator," "must possess extensive knowledge of the additive components, inter-component interactions, and additive interactions with the common materials of construction in the engine." *Id.* ¶ 20. Dr. Bansal contends additive companies closely guard this knowledge, which is not available from public sources. *Id.* According to Dr. Bansal, in his "long experience in the additive industry" he has "not come across a single case where an individual with zero hands-on formulation experience has been tasked with important formulation decision making." *Id.* ¶ 21. Dr. Rizvi, testifying in support of Petitioner, agrees with Dr. Smolenski's assertion that a person with experience in the testing of engine oils may qualify as one of ordinary skill in the art. Ex. 1055 ¶ 24.

Dr. Rizvi further testifies that direct experience formulating an engine oil is not a prerequisite to appreciate that one could combine well-known additive components to achieve the advantages disclosed in the prior art, and notes that he has "interacted with dozens of individuals who understand the intricacies involved in formulating engine oils even though they may not have directly formulated an engine oil." *Id.* ¶ 22.

The '685 patent claims are directed to both a lubricating oil composition and a method of using this lubricating oil composition to improve certain qualities of an internal combustion engine. Ex. 1001, 13:47–63, 14:52–65. The '685 patent specification discloses engine oil additives, formulations of additives in a base oil, and test results for these formulations. *Id.* at 10:42–13:45 (concluding that the disclosed test results demonstrate unexpected results), Tables 1–5. Similar to the '685 patent, the prior art of record discloses both engine oil formulations and testing results for the disclosed compositions. *See* Ex. 1005 ¶ 9, Tables 1, 2 (providing formulation information and testing results for Examples 1–19 and Comparative Examples 1–5). In view of these disclosures, we agree with Petitioner that one of ordinary skill in the art could have experience in either formulating an engine oil or testing such oils in internal combustion engines. Thus, we adopt Petitioner's definition of a person of ordinary skill in the art as more accurately depicting the level of education and experience of one of ordinary skill in the art, as reflected in the prior art of record and the '685 patent.[5]

5. We have adopted the lower level of skill in the art Petitioner has advocated. To the extent a higher level of skill in

2. Dr. Smolenski's Testimony

Patent Owner contends Dr. Smolenski is not a person of ordinary skill in the art and this "automatically impugns his Declaration." PO Resp. 4–5. We are not persuaded by this argument. First, it is undisputed that Dr. Smolenski is one of ordinary skill in the art under the definition we adopt. Tr. 73:16–18. Second, there is no requirement that an expert's education and experience perfectly match that of one of ordinary skill in the art in order to provide testimony. *SEB S.A. v. Montgomery Ward & Co.*, 594 F.3d 1360, 1373 (Fed. Cir. 2010); *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1363–64 (Fed. Cir. 2008). An expert must instead have sufficient knowledge, skill, training, experience or education of a "specialized" nature to assist the trier of fact in understanding the evidence of record. *SEB*, 594 F.3d at 1373.

On this record, we are persuaded that Dr. Smolenski has sufficient education and experience of a specialized nature to assist the Board in understanding the evidence of record. Ex. 1003 (Dr. Smolenski's CV); Ex. 2005, 141:4–143:8 (Dr. Smolenski testifying that despite the fact that he has never worked as a formulator, he has had "extensive exposure to engine oil formulations" and has a "broad understanding of how engine oil formulations affected results"), 292:2–13 (Dr. Smolenski testifying that he has evaluated hundreds of engine oil formulations and

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the art were applicable, we note that "[a] less sophisticated level of skill generally favors a determination of nonobviousness, and thus the patentee, while a higher level of skill favors the reverse." *Innovention Toys, LLC v. MGA Entm't, Inc.*, 637 F.3d 1314, 1324 (Fed. Cir. 2011).

their performance data during his career). Thus, we will consider his testimony in this proceeding.

Although we decline to exclude or ignore Dr. Smolenski's testimony as a whole, we recognize that Dr. Smolenski lacks significant experience in benchtop formulation of engine oils. PO Resp. 4; Ex. 2005, 140:22–141:12 ("No, I don't indicate that I'm an expert formulator."). Accordingly, where relevant, we take Dr. Smolenski's lack of benchtop formulating experience into account when determining the weight to give his testimony, especially where Dr. Rizvi did not confirm this testimony[6] in his declaration and Dr. Bansal did not confirm this testimony during his cross-examination.

D. Obviousness of Claims 1–3, 6–8, 10, 11, 13–15, and 18–20 over Toshikazu (Example 16) and Henderson

Petitioner contends the subject matter of claims 1–3, 6–8, 10, 11, 13–15, and 18–20 would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson. Pet. 18–40.

1. Toshikazu

Toshikazu discloses lubricating oils for internal combustion engines that have "excellent wear resistance and friction characteristics." Ex. 1005, Abstract, ¶ 1.

6. There is no dispute that Dr. Rizvi is one of ordinary skill in the art under either party's definition, and Dr. Rizvi testifies that the opinions set forth in his declaration would be the same under either party's definition of one of ordinary skill in the art. Ex. 1055 ¶ 24.

Toshikazu explains that anti-wear agents, such as zinc dithiophosphate (ZnDTP) and zinc dithiocarbamate (ZnDTC), prevent wear by creating protective films on metal surfaces. *Id.* ¶ 6. When anti-wear and friction reducing agents are used together in a lubricating composition, however, the function of both components may be inhibited due to competitive adsorption at metal surfaces. *Id.* In addition, ZnDTP and ZnDTC may interact with certain detergent/dispersant additives, further impairing their wear resistance. *Id.* ¶ 7. In view of these interactions, Toshikazu reports that it had not previously been possible to achieve satisfactory wear resistance, friction reduction, cleaning, and dispersion using ZnDTP or ZnDTC in combination with known lubricant additives. *Id.* ¶ 8.

Toshikazu reports that the above limitations can be overcome

> by using the combination of an organic molybdenum compound and an aliphatic acid ester as a friction reducing agent, by using calcium or magnesium sulfonate, or calcium or magnesium phenate, as a metal detergent, by using benzylamine, alkenyl succinimides, or boron derivatives of alkenyl succinimides, as [an] ashless detergent/dispersant, and by using ZnDTP or ZnDTC as an antiwear additive.

Id. ¶ 10.

Tables 1 and 2 of Toshikazu are reproduced below:

Appendix B

[Table 1]

		Example											
		1	2	3	4	5	6	7	8	9	10	11	12
Friction Reducing Agent	MoDTC	0.225	0.075	0.15	1.50	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	MoDTP	---	---	---	---	---	---	---	---	---	---	---	---
	Aliphatic Acid Glyceride	0.075	0.225	0.075	1.50	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
	Oleamide	---	---	---	---	---	---	---	---	---	---	---	---
Metal Detergent	Ca-S (Overbased)	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	---	---	0.72	0.72
	Ca-S (Neutral)	---	---	---	---	---	---	---	---	---	---	0.40	---
	Ca-P (Overbased)	---	---	---	---	---	---	---	---	0.92	---	---	---
	Mg-S (Overbased)	---	---	---	---	---	---	---	---	---	0.92	---	---
Ashless Detergent/Dispersant	Boron-based Alkenyl Succinimide	2.4	2.4	2.4	2.4	0.4	4.0	---	---	2.4	2.4	2.4	2.4
	Alkenyl Succinimide	---	---	---	---	---	---	---	1.56	---	---	---	---
	Benzylamine	---	---	---	---	---	---	2.92	---	---	---	---	---
Antiwear Additive	*sec*-C_{3-6}ZnDTP	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	---
	pr-C_{3-6}ZnDTP	---	---	---	---	---	---	---	---	---	---	---	0.96
	sec-C_{3-6}ZnDTC	---	---	---	---	---	---	---	---	---	---	---	---
Base Oil		Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil
Friction and Wear Characteristics	Friction Coefficient	0.044	0.045	0.041	0.046	0.041	0.043	0.039	0.052	0.048	0.046	0.044	0.043
	Wear Track Diameter (mm)	0.43	0.44	0.41	0.48	0.41	0.45	0.41	0.39	0.44	0.40	0.46	0.4

Appendix B

[0053] [Table 2]

		Example							Comparative Example				
		13	14	15	16	17	18	19	1	2	3	4	5
Friction Reducing Agent	MoDTC	0.15	---	0.15	0.15	0.15	0.15	0.15	---	0.3	---	0.15	0.15
	MoDTP	---	0.15	---	---	---	---	---	---	---	---	---	---
	Aliphatic Acid Glyceride	0.075	0.075	0.075	0.075	0.075	0.075	---	---	---	0.3	0.075	0.075
	Oleamide	---	---	---	---	---	---	0.3	---	---	---	---	---
Metal Detergent	Ca-S (Overbased)	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72	---
	Ca-S (Neutral)	---	---	---	---	---	---	---	---	---	---	---	---
	Ca-P (Overbased)	---	---	---	---	---	---	---	---	---	---	---	---
	Mg-S (Overbased)	---	---	---	---	---	---	---	---	---	---	---	---
Ashless Detergent/Dispersant	Boron-based Alkenyl Succinimide	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	1.6	2.4
	Alkenyl Succinimide	---	---	---	---	---	---	---	---	---	---	---	---
	Benzylamine	---	---	---	---	---	---	---	---	---	---	---	---
Antiwear Additive	*sec*-C_{3-6}ZnDTP	0.48	0.96	0.96	0.96	0.96	---	0.96	0.96	0.96	0.96	0.96	0.96
	pr-C_{3-6}ZnDTP	0.48	---	---	---	---	---	---	---	---	---	---	---
	sec-C_{3-6}ZnDTC	---	---	---	---	---	0.96	---	---	---	---	---	---
Base Oil		Mineral Oil	Mineral Oil	High Pressure Hydro-genated Oil	Synthetic Oil	Mineral Oil / High Pressure Hydro-genated Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil	Mineral Oil
Friction and Wear Characteristics	Friction Coefficient	0.042	0.045	0.044	0.045	0.044	0.046	0.045	0.123	0.088	0.103	0.097	0.101
	Wear Track Diameter (mm)	0.45	0.44	0.42	0.43	0.45	0.42	0.42	0.54	0.56	0.43	0.59	0.52

Tables 1 and 2 provide the compositions of the nineteen Example lubricants and five Comparative Example lubricants of Toshikazu. As shown in Tables 1 and 2 above, the lubricants of Examples 2 and 16 each contain MoDTC (an organic molybdenum compound), an aliphatic acid glyceride friction reducing agent, an overbased calcium sulfonate detergent, a boron-based alkenyl succinimide ashless detergent/dispersant, an *sec*-C3-6-ZnDTP antiwear additive, and a base oil comprised of either mineral oil (Example 2) or synthetic oil (Example 16). *Id.* at Tables 1, 2; *see also id.* ¶¶ 49–51 (identifying the specific type of additives used in the Example lubricants).

2. Henderson

Henderson discusses the changing requirements in the art for engine oils. Ex. 1006, Abstract. Henderson reports that previous improvements in engine oils had focused on additive technology, but "with the current shift in automotive oil requirements, the need for improved

base oils to complement the additives has led to significant refinery investments." *Id.* at 1.[7]

Henderson reports that one of the improvements in the art was a shift toward higher quality base oils with viscosity indices of 100 and above and Noack volatility levels of less than 15%. *Id.* at 1–2 ("However, this change is considered minor compared to the proposed 15% maximum Noack limit as a secondary mandatory volatility specification.").

By using higher quality base oils, Henderson reports that an oil with enhanced features may be obtained. *Id.* at 4. These enhanced features include "improved fuel economy and retention, oxidation stability, lower volatility for improved oil consumption control, high temperature deposit control and exceptional low temperature pumpability." *Id.*

3. Analysis—Independent Claim 1

Petitioner persuasively demonstrates that the lubricating composition of Example 16 of Toshikazu contains an oil of lubricating viscosity, at least one calcium detergent (overbased calcium sulfonate), at least one oil soluble molybdenum compound (MoDTC), at least one organic ashless nitrogen-free friction modifier (aliphatic acid glyceride), and at least one metal dihydrocarbyl

7. We refer to the original page numbers of Henderson, as opposed to the page numbers added in the lower left corner by Petitioner.

dithiophosphate compound (*sec*-C3-6ZnDTP). Pet. 19–24; Ex. 1005 ¶¶ 20–23, 49–51, Table 2. Petitioner also persuasively demonstrates that the composition of Example 16 is substantially free of ashless aminic friction modifiers. Pet. 24.

With respect to the amounts of the recited additive components, Petitioner persuasively demonstrates that the composition of Example 16 contains between 300 to 320 ppm of molybdenum and has a phosphorus content from the metal dihydrocarbyl dithiophosphate compound (*sec*-C3-6ZnDTP) that is between 0.09 and 0.12 wt. %, a range that overlaps the claimed range of "up to about 0.1 wt. %." *Id.* at 28–29 (quoting *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003) ("In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a *prima facie* case of obviousness.")).

Although Toshikazu reports that Example 16 contains 0.72 wt. % overbased calcium sulfonate detergent, it does not report the total amount of calcium imparted by this detergent. Petitioner argues, however, that typical overbased calcium sulfonate detergents in the art had a calcium content between 11 and 16%, and calculates that the use of these typical detergents in Example 16 of Toshikazu would result in a calcium content from the calcium detergent that is between 0.08 and 0.12%, a range that the claimed range of 0.05 to 0.6 wt. % fully encompasses. *Id.* at 27–28.

Toshikazu also does not report the viscosity index or Noack volatility of its synthetic base oil, but Petitioner contends one of ordinary skill in the art would have ensured that the base oil of Example 16 had a viscosity index above 95 and a Noack volatility below 15%, in view of Henderson's disclosure that the industry was rapidly shifting toward such oils due to their improved performance and in order to meet the then-applicable GF-3 standard. *Id.* at 20–21, 25–27 (citing Ex. 1006, 1–2, 4, 5, 8, Table 5).

In its response, Patent Owner disputes (1) whether one of ordinary skill in the art would have selected a base oil with a viscosity index above 95 for use in Example 16 of Toshikazu; (2) whether one of ordinary skill in the art would have selected a base oil with a Noack volatility less than 15% for use in Example 16 of Toshikazu; (3) whether one of ordinary skill in the art would have selected an overbased calcium sulfonate detergent for use in Example 16 of Toshikazu that would provide a calcium content between 0.05 to 0.6 wt. %; and (4) whether one of ordinary skill in the art would have selected the lubricant of Example 16 of Toshikazu for further development and modification. PO Resp. 5–9, 24–35. Patent Owner also asserts that unexpected results reported in the '685 patent for the claimed composition support a finding of nonobviousness. *Id.* at 8–9, 55–58. We address these points below.

a. "an oil of lubricating viscosity having a viscosity index of at least 95"

The base oil of Example 16 is composed of 80 wt. % poly-α-olefins and 20 wt. % diisodecyl adipate (a diester). Pet. 19; Ex. 1005 ¶ 49; Ex. 1002 ¶ 60. Petitioner presents uncontested testimony that the predominant viscosity grades for synthetic base stocks in engine oils were 4 and 6 centistoke ("cSt"). Pet. 20 (citing Ex. 1009, 449; Ex. 1002 ¶ 61); *see also* Ex. 1005 ¶ 12 (Toshikazu disclosing that the base oil preferably has a kinematic viscosity within the range of 3 to 20 cSt). At a viscosity grade of 4 cSt, PAO-4 (poly-α-olefin) has a viscosity index of 123, polyol ester has a viscosity index of 130, and dibasic acid ester (i.e., a diester) has a viscosity index of 161. Pet. 20 (citing Ex. 1009, 450, Fig. 4). At a viscosity grade of 6 cSt, PAO-6 has a viscosity index of 135, polyol ester has a viscosity index of 114, and a diester has a viscosity index of 145. *Id.* (citing Ex. 1009, 450, Fig. 5). Applying these values to the lubricating oil of Example 16, Petitioner contends one of ordinary skill in the art would have understood that this lubricating oil had a viscosity index above 95. *Id.* (citing Ex. 1002 ¶ 62 (Dr. Smolenski testifying that the mixture of two synthetic base oils having a viscosity index above 95 would result in a combined base oil with a viscosity index above 95)).

To the extent one of ordinary skill in the art would have had any question regarding the viscosity index of Example 16, Petitioner contends they would have sought to achieve a viscosity index above 95 in view of Henderson's disclosure that base oils having a viscosity index of 100

or above provided several improved features, including "improved fuel economy and retention, oxidation stability, lower volatility for improved oil consumption control, high temperature deposit control, and exceptional low temperature pumpability." *Id.* at 20–21 (citing Ex. 1006, 1–2, 4).

Patent Owner contends one of ordinary skill in the art would not have simply presumed that the PAO of Example 16 was either 4 cSt or 6 cSt, or that the viscosity index of Example 16 is greater than 95. PO Resp. 28. Patent Owner further contends that one of ordinary skill in the art would not have had a reasonable expectation of success in using a base oil with a viscosity index exceeding 95 in Example 16 due to Henderson's and Lakes'[8] disclosures that additive packages used with one type of oil may not be compatible with, and may not necessarily give the same performance in, another type of base oil. *Id.* at 29–30 (citing Ex. 2003 ¶ 102; Ex. 1006, 2; Ex. 1009, 17).

Upon review of the parties' arguments and evidence as a whole, we find that Toshikazu's synthetic oil composed of 80 wt. % poly-α-olefins and 20% diisodecyl adipate (a diester) could have been formulated to have a viscosity index of 100 or greater simply by using the predominant viscosity grades for PAOs known in the art. Pet. 19–20; Ex. 1055 ¶¶ 42–44 (noting that diisodecyl adipate has a viscosity index of 136) (citing Ex. 1038, 145 (Table 1)). We further find that one of ordinary skill in the art would

8. Stephen C. Lakes, *Automotive Crankcase Oils*, Marcel Dekker, Inc. (1999) (Ex. 1009, "Lakes").

have sought to achieve this viscosity index in view of Henderson's disclosure that the art was rapidly shifting towards such oils due to their improved performance. Ex. 1006, 2, 4.

Although Lakes and Henderson disclose respectively that certain additive packages designed for petroleum-based engine oils may not be suitable for use with synthetic oils (Ex. 1009, 449), and additive solubility must be investigated when new types of base oils are used (Ex. 1006, 2), Petitioner's proposed combination does not require a change from the 80 wt% poly-α-olefins and 20% diisodecyl adipate base oil used in Example 16. Instead, one of ordinary skill in the art would only have needed to select a PAO having one of the predominant viscosity grades used in the art (4 cSt or 6 cSt). Thus, it is not evident why Henderson's and Lakes' concerns with respect to *changing* the type of base oil in a lubricating composition would have been applicable to the selection of an appropriate viscosity grade for the PAO and diisodecyl adipate in Example 16 of Toshikazu.

Moreover, as Dr. Rizvi testifies, Toshikazu expressly indicates that "[t]here is no particular limitation on the base oil used in the present invention, and it is possible to use various types of mineral oils, synthetic oils, and so on that are known in the art."[9] Ex. 1005 ¶ 12; Ex. 1055 ¶¶ 46–49. Consistent with this disclosure, Toshikazu

9. Toshikazu's disclosures are consistent with those of the '685 patent, which indicate that any of Group I–V base stocks, either alone or in combination, may be used in the claimed invention. Ex. 1001, 2:47–3:22.

reports essentially identical results when the additive package of Example 16 is used with a mineral base oil, a synthetic base oil, or a mineral oil/high pressure hydrogenated base oil. Ex. 1005, Tables 1, 2 (Examples 3, 16, 17). These disclosures suggest that the additive packages of Toshikazu are not susceptible to solubility issues when a new base oil is used. Ex. 1055 ¶ 49. Thus, we credit the testimony of Dr. Smolenski and Dr. Rizvi and find that one of ordinary skill in the art would have had a reasonable expectation of success in using a synthetic base oil that imparts an overall viscosity index of 95 or above to the lubricating composition of Example 16 of Toshikazu. Ex. 1002 ¶ 64; Ex. 1055 ¶¶ 46–49; *see In re O'Farrell*, 853 F.2d 894, 904 (Fed. Cir. 1988) ("For obviousness under § 103, all that is required is a reasonable expectation of success.").

In view of the foregoing, we find that one of ordinary skill in the art would have formulated the lubricating composition of Example 16 of Toshikazu to have a viscosity index greater than 95 and that such an ordinarily skilled artisan would have had a reasonable expectation of success in so doing. Ex. 1055 ¶ 47.

b. "the composition having a Noack volatility of about 15 wt. % or less"

Petitioner contends that at 4 cSt and 6 cSt the base oil of Example 16 would have a Noack volatility of less than 15%. Pet. 25–27. And to the extent Example 16's Noack volatility is unclear, Petitioner contends one of ordinary skill in the art would have ensured that Example 16 had a Noack volatility of less than 15% in order to comply

with the then-applicable GF-3 standard (as discussed in Henderson). *Id.*; Pet. Reply 10; Ex. 1006, 2.

In response, Patent Owner repeats its argument set forth above regarding potential compatibility or solubility issues with additive packages when a base oil is changed. PO Resp. 33 (citing Ex. 2003 ¶¶ 115–118) (asserting that any formulation changes could necessitate modifications "of the relative amounts of additive components and the engine oil"); Sur-reply 10.

At the time the '685 patent was filed, the GF-3 standard set a maximum Noack volatility level of 15%. Ex. 1002 ¶ 76; Ex. 1006, 1–2; Ex. 1016, 591, 596. This requirement, as disclosed in Henderson, essentially mandated that any base oil used in Example 16 be formulated with a Noack volatility of 15% or less. Pet. 26; Pet. Reply 10; Ex. 1002 ¶¶ 76, 80; Ex. 1053, 96:22–97:10 (Dr. Bansal testifying that, "[b]y 2002, if you were meeting GF-3 standard, then you would have had to meet 15 percent NOACK"). Thus, we find that one of ordinary skill in the art would have sought to formulate the lubricating composition of Example 16 to have a Noack volatility level of 15% or less prior to the earliest effective filing date of the '685 patent.

With respect to the question of reasonable expectation of success, Petitioner persuasively demonstrates that one of ordinary skill in the art could have formulated the 80 wt. % poly-α-olefins and 20% diisodecyl adipate synthetic oil of Toshikazu to have a Noack volatility level of 15% or less by simply choosing the predominant grades of PAOs used in the art, and Toshikazu indicates there is no particular limitation on the type of synthetic oil used. Pet. 25–27;

Ex. 1005 ¶ 12 ("There is no particular limitation on the base oil used in the present invention, and it is possible to use various types of mineral oils, synthetic oils and so on that are known in the art."); Ex. 1055 ¶¶ 48–50; Ex. 1053, 57:21–58:3 (Dr. Bansal agreeing that one of ordinary skill in the art had the necessary skills to select an appropriate base stock for compliance with the GF-3 standard). Thus, we find that one of ordinary skill in the art would have had a reasonable expectation of success in formulating Example 16 of Toshikazu to have a Noack volatility of less than 15%.

c. "0.05 to 0.6 wt. % calcium from the calcium detergent"

Toshikazu discloses that Example 16 contains 0.72 wt. % overbased calcium sulfonate, but does not report the Total Base Number (TBN) or the calcium concentration of this overbased calcium sulfonate. Ex. 1005 ¶ 50, Table 2; PO Resp. 33–34.

In formulating Example 16 of Toshikazu, Petitioner contends one of ordinary skill in the art would have sought to use "a typical overbased calcium sulfonate" known in the art, which Dr. Smolenski testifies would have a calcium content between "about 11 and 16%." Pet. 27 (citing Ex. 1002 ¶¶ 82–85; Ex. 1011, 2:43–50); Pet. Reply 11 (citing Ex. 1055 ¶¶ 55–60). Dr. Smolenski testifies that this level of calcium content is consistent with the range of 11 to 16% reported in Schlicht, the 12.8 and 12.9 wt. % calcium levels reported in Woodle,[10] and the 11.9% calcium value

10. US 3,373,108, issued Mar. 12, 1968 (Ex. 1012, "Woodle").

reported in the '685 patent. Ex. 1002 ¶¶ 83–85 (citing Ex. 1011, 2:43–50; Ex. 1012, 5:47–6:22, 6:42–7:15; Ex. 1001, 11:45–46, Table 3); Ex. 1055 ¶¶ 55–60.

Petitioner, with supporting testimony from Dr. Smolenski, calculates that use of a typical overbased calcium sulfonate in Example 16 of Toshikazu would result in a total calcium concentration of between 0.08 and 0.12 wt. %, a range that the calcium range recited in claim 1 fully encompasses. Pet. 27 (citing Ex. 1002 ¶¶ 82–85). And to the extent it was possible to find "outlier overbased calcium detergents" that would result in Example 16 having a range of calcium content outside the claimed range, Petitioner contends the range of calcium content Example 16 suggests would have "at a minimum rendered the claimed range obvious." *Id.* at 28 (citing *Peterson*, 315 F.3d at 1329).

Patent Owner does not expressly dispute that typical overbased calcium sulfonate detergents known in the art had a calcium content between 11 and 16%, but contends it is impossible to know the total calcium in the composition of Example 16 because Toshikazu does not report the pedigree of the calcium sulfonate, which is usually delivered in a diluent oil. PO Resp. 33–35. Patent Owner further contends there is no reason to assume the same calcium sulfonate was used in both Toshikazu and the '685 patent, or that the total calcium wt. % would be the same as in Schlicht or Woodle. *Id.* at 34–35. Finally, Patent Owner contends Woodle discloses the use of at least one calcium sulfonate that would provide a total calcium content of 0.0144 wt. % in Example 16, which is outside the range recited in claim 1. *Id.* at 35.

We agree with Patent Owner that it is impossible to determine, based on the information provided in Toshikazu, the calcium content provided by the overbased calcium sulfonate detergent of Example 16. That said, Petitioner presents an obviousness ground, not an anticipation ground, and with supporting testimony from Dr. Smolenski and Dr. Rizvi, demonstrates that (1) one of ordinary skill in the art looking to replicate Example 16 of Toshikazu would have used a typical overbased calcium sulfonate detergent, (2) typical overbased calcium sulfonate detergents generally had a calcium content ranging from 11 to 16%, and (3) using a typical overbased calcium sulfonate detergent in Example 16 would result in a range of calcium between 0.08 and 0.12 wt. %. Pet. 27; Pet. Reply 11–13; Ex. 1002 ¶¶ 84–85; Ex. 1055 ¶¶ 56–60 (examining the amount of calcium used in prior art lubricating compositions); Ex. 1012, 2:7–9 (Woodle disclosing that its overbased calcium sulfonate concentrate *preferably* has a calcium content of 11 to 18 wt. %); Ex. 1011, 2:50–51 (Schlicht disclosing that its overbased calcium sulfonate concentrate has a calcium content of between about 11 and 16 wt. %).[11] This evidence is sufficient to demonstrate that one of ordinary skill in the art would have found it obvious to provide a calcium content for use in Example 16 of Toshikazu that is within the range recited in claim 1.

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11. Petitioner cites to calcium sulfonate products identified in the '685 patent. Pet. 27. We do not rely on these disclosures as evidence of the state of the art as of the filing date of the '685 patent. We note, however, that the identified disclosures are consistent with Petitioner's arguments regarding typical overbased calcium sulfonate detergents.

Appendix B

Patent Owner presents evidence that some overbased calcium sulfonates are delivered in diluent oil. Ex. 2003 ¶ 121. Even if it is possible that a particular batch of a typical overbased calcium sulfonate detergent could be diluted, however, the range of calcium Toshikazu teaches or suggests would still significantly overlap the range of calcium recited in claim 1. Pet. 27–28; Pet. Reply 12; Ex. 1053, 107:12–25 (Dr. Bansal testifying that the range of calcium recited in claim 1 is "pretty broad"). Thus, the calcium range of claim 1 is presumptively obvious. *See E.I. du Pont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1006 (Fed. Cir. 2018) ("[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.") (quoting *In re Aller*, 220 F.2d 454, 456 (CCPA 1955)); Pet. 28 (citing *In re Peterson*, 315 F.3d at 1329); Pet. Reply 12.

A presumption of obviousness may be overcome by showing the range in question is "critical," i.e., the range produces new and unexpected results, or by showing that the prior art taught away from the claimed range. *E.I. DuPont*, 904 F.3d at 1006. On this record, we are presented with no evidence or argument to suggest that the *calcium range* recited in claim 1 is "critical," or that the prior art taught away from such a range. *See* PO Resp. 58 (Patent Owner asserting that it is the combination of relatively small amounts of molybdenum compounds and organic ashless nitrogen-free friction modifiers that provides unexpected results). Thus, Patent Owner has not rebutted the presumption of obviousness in this case.

Upon review of the evidence as a whole, we find that the combined disclosures of Toshikazu and Henderson render the range of calcium recited in claim 1 obvious.

d. Selection of Example 16 of Toshikazu

Toshikazu discloses nineteen Example lubricants for internal combustion engines that demonstrate "excellent wear resistance," "low friction coefficient," and better performance than five Comparative Example lubricants. Ex. 1005 ¶¶ 11, 44–51, Abstract, Tables 1, 2; Pet 14. Petitioner contends one of ordinary skill in the art would have selected any one of Toshikazu's Example lubricants, including Example 16, for further development and improvement. Pet. 15, 20–21, 25–27; Pet. Reply 1–2.

Patent Owner contends Petitioner has not persuasively demonstrated that one of ordinary skill in the art would have looked to any of Toshikazu's nineteen Example lubricants, much less specifically selected Example 16 of Toshikazu for further development. PO Resp. 5–7, 24–26. First, Patent Owner contends one of ordinary skill in the art would not have looked to any of Toshikazu's Example lubricants in view of its incomplete disclosure of the viscosity of its base oil, the wt. % of calcium, and the amount of molybdenum and phosphorus in its lubricating oils. *Id.* at 5–6, 25 (citing Ex. 2003 ¶¶ 41–42, 69–73, 90). We are not persuaded by this argument.

Toshikazu discloses the amount of MoDTC, overbased calcium sulfonate, and ZnDTP in Example 16, and Petitioner persuasively demonstrates that one of ordinary skill could have readily calculated from Toshikazu's

disclosures the ranges of molybdenum and phosphorus in Example 16. Pet. 28–30; Pet. Reply 4–5; Ex. 1005, Table 2. In addition, for the reasons discussed above, we find that one of ordinary skill in the art would have found it obvious in view of Henderson and the general knowledge of one of ordinary skill in the art to use a typical overbased calcium sulfonate detergent, a base oil having a viscosity index above 95, and a base oil with a Noack volatility below 15%.[12] Pet. 19–21, 24–28; Pet. Reply 4–5. Accordingly, we are not persuaded that one of ordinary skill in the art would have avoided the disclosures of Toshikazu in view of a perceived lack of critical information.

Second, Patent Owner contends that even if one of ordinary skill in the art were to look to Toshikazu's Examples, they would not have selected Example 16 for further development because this lubricating composition performed worse than the lubricating compositions of Examples 3, 5, and 7. PO Resp. 7, 25–26; Ex. 2003 ¶¶ 91–92 (Dr. Bansal testifying that Example 16 of Toshikazu "did not perform as well in friction coefficient and wear track diameter as Examples 3, 5, and 7").

As Patent Owner notes, the results reported for the inventive Examples are not identical. PO Resp. 25–26. For example, the lubricant of Example 16 of Toshikazu

12. Petitioner presents persuasive evidence that one of ordinary skill in the art would have understood how to successfully blend the additives with the base oil of Toshikazu. Pet. Reply 4–5 (citing Ex. 1055 ¶¶ 25, 33; Ex. 1053, 57:21–58:3, 58:18–59:22, 98:20–103:12); *see also* Ex. 1001, 10:16–17 (instructing that "[t]he individual additives may be incorporated into a base stock in any convenient way").

provides a friction coefficient of 0.045 and a wear track diameter (mm) of 0.43, whereas the lubricants of Examples 3, 5, and 7 provide a friction coefficient of 0.041, 0.041, and 0.039, respectively, and a wear track diameter (mm) of 0.41, 0.41, and 0.41, respectively. Ex. 1005, Tables 1, 2; PO Resp. 25–26 (provided chart).

Dr. Rizvi testifies that the ASTM standard test for measuring coefficient of friction uses a "shell-type four ball test" having a repeatability of "0.20 x average value" and the standard test for wear preventive characteristics has a repeatability of "0.12 mm scar diameter difference." Ex. 1055 ¶¶ 34–37. According to Dr. Rizvi, because the results reported in Toshikazu for coefficient of friction and wear track diameter are all within the repeatability of the applicable tests, a person of ordinary skill in the art would not have considered the differences in Examples 1–19 to be significant or important. *Id.* ¶¶ 34–38, 94. Patent Owner did not contest the substance of this testimony in its briefing. *See* Sur-reply 5–7. Given that the results reported in Toshikazu are all within the repeatability of the applicable tests, we credit the testimony of Dr. Rizvi that one of ordinary skill in the art would not have differentiated the results reported for Examples 1–19 of Toshikazu.[13] Ex. 1055 ¶¶ 33–38; Pet. Reply 2.

Patent Owner argues "Petitioner cannot credibly allege that *Toshikazu* Examples 16 and 2 motivate a

13. During cross examination, Dr. Smolenski agreed that the friction wear results reported for Examples 3, 5, and 7 of Toshikazu were "better" than those reported for Example 16. Ex. 2005, 216:5–10. Dr. Smolenski did not concede, however, that one of ordinary skill in the art would have considered these numerically "better" results significant or important.

skilled artisan to the claims of the '685 patent while at the same time argue that they are no different than any other example." Sur-reply 7. According to Patent Owner, the disclosure of nineteen similar example lubricants is "at most an invitation at guesswork that would only be successful via hindsight if the '685 patent was used as a blueprint." *Id.*

As Petitioner explains, Toshikazu discloses that its lubricating oil compositions for internal combustion engines have "excellent wear resistance," "a low coefficient of friction," and perform better than Comparative Examples 1–5. Pet. 14–15 (citing Ex. 1005 ¶¶ 1, 9, Tables 1, 2, Abstract; Ex. 1002 ¶¶ 44–47). These disclosures provide ample reason for one of ordinary skill in the art to have selected any of the example lubricating oils of Toshikazu for further development. Moreover, even if the results reported for Examples 3, 5, and 7 were understood to be quantifiably better than those reported for Example 16, we agree with Petitioner that there was still a reason one of ordinary skill would have selected any of Examples 1–19 for further development; namely, these example lubricants all provided excellent results and outperformed each of the Comparative Examples.[14] Pet. Reply 1–2 (citing Ex. 1005 ¶¶ 52–53, Tables 1, 2; Ex. 1053, 171:9–25).

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14. Patent Owner asserts a "lead compound" analysis should be used in this case. Sur-reply 1, 8; PO Resp. 6. To the extent a lead compound analysis were applicable to lubricating oil compositions, however, the Federal Circuit has expressly rejected the argument that a lead compound analysis requires that the prior art point to only a single, or best, lead compound for further development efforts. *See Altana Pharm. Ag v. Teva Pharms. USA, Inc.*, 566 F.3d 999, 1008–09 (Fed. Cir. 2009).

Third, Patent Owner contends the data in Toshikazu and Waddoups[15] would have led away from the claimed invention by encouraging the use of more MoDTC, not less, and the use of less ashless nitrogen-free friction modifier, not more. PO Resp. 7, 26 (asserting that a comparison of Examples 2 and 3 of Toshikazu would have led away from the claim elements of the '685 patent), 52 (asserting formulations in Waddoups with 900 ppm molybdenum provided superior performance). We do not find this argument persuasive because, as discussed above, we credit the testimony of Dr. Rizvi that one of ordinary skill in the art would not have differentiated the results reported for the Example lubricants of Toshikazu.

Moreover, even if one of ordinary skill in the art would have differentiated the results reported for Toshikazu's examples, we do not agree that they would have been led from these examples to use more MoDTC and less aliphatic glyceride. As Petitioner notes, Examples 2 and 3 of Toshikazu vary in aliphatic glyceride content, whereas Examples 1 and 3 contain the same amount of aliphatic glyceride. Pet. Reply 3; Ex. 1005, Table 1. The results reported for Examples 1 and 3 demonstrate that the composition containing lower amounts of MoDTC in combination with an aliphatic glyceride actually provides better results (at least under Patent Owner's interpretation of the test results). Pet. Reply 3 (citing Ex. 1055 ¶ 95); Ex. 1005, Table 1.

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15. US 6,074,993, issued June 13, 2000 (Ex. 2008, "Waddoups").

In view of the foregoing, and upon review of the parties' arguments and the art as a whole, we find that one of ordinary skill in the art would have selected Example 16 of Toshikazu for further development.

e. Unexpected Results

Patent Owner contends that, in the 1990s, there was a movement to reduce the phosphorous content of engine oils by limiting the amount of ZDDP additive in lubricating oil compositions. PO Resp. 55 (citing Ex. 2003 ¶ 252). As part of this movement, additive companies began to use oil-soluble molybdenum compounds in place of phosphorus-containing antiwear additives. *Id.* at 55–56. According to Patent Owner, prior art patents, including Waddoups, demonstrated that lubricating oil compositions with high levels of molybdenum provided superior performance in terms of coefficient of friction as compared to formulations containing small amounts of molybdenum. *Id.* at 56. In view of these coefficient of friction results, Patent Owner contends one of ordinary skill in the art would have believed that formulations with large amounts of molybdenum would also provide superior fuel economy performance, especially under boundary conditions. *Id.* (citing Ex. 2003 ¶¶ 260–266).

Patent Owner contends test results reported in the '685 patent show the same improvement in coefficient of friction when relatively high amounts of molybdenum are used in lubricating compositions, but also show that when these same lubricating oils were subjected to a fuel economy test, compositions containing a low amount

of molybdenum in combination with an organic ashless nitrogen-free friction modifier actually provided superior fuel economy results. *Id.* at 57–58. Patent Owner contends these results "are truly unexpected." *Id.* at 58.

Secondary considerations of nonobviousness must be considered when present "and can serve as an important check against hindsight bias." *Bristol-Myers Squibb Co. v. Teva Pharms. USA, Inc.*, 752 F.3d 967, 977 (Fed. Cir. 2014). "To be particularly probative," however, "evidence of unexpected results must establish that there is a difference between the results obtained and those of the closest prior art, and that the difference would not have been expected by one of ordinary skill in the art at the time of the invention." *Id.* (citing *Kao Corp v. Unilever U.S., Inc.*, 441 F.3d 963, 971 (Fed. Cir. 2006)). A finding of unexpected results may also be entitled to limited weight when there would have been a separate reason to modify the prior art to arrive at the claimed invention. *Id.* at 976.

Patent Owner provides no comparison of fuel economy improvement between the claimed lubricating compositions and the closest prior art. For example, Patent Owner does not compare the fuel economy results for the claimed lubricating compositions and the lubricating composition of Example 16 of Toshikazu, which has the same combination of relatively low molybdenum levels and an organic ashless nitrogen-free friction modifier that the '685 patent reports provides the alleged unexpected results. Ex. 1001, 13:3–35. Thus, we cannot conclude that Patent Owner has demonstrated "a difference between the results obtained" in the '685 patent "and those of the closest prior art." *Bristol-Meyers Squibb*, 752 F.3d at 977.

In addition, Toshikazu reports that its inventive Examples provide "excellent" results. These reported results provide a strong reason to use low levels of molybdenum in combination with an organic ashless nitrogenfree friction modifier. Patent Owner's evidence that this same combination of additives also provides an additional benefit with respect to fuel economy does not alter the fact that the advantages of the combination of low molybdenum and an organic ashless nitrogen-free friction modifier were known in the art. Pet. Reply 25 ("A [person of ordinary skill in the art] would have understood from *Toshikazu* and other literature that MoDTC and ashless organic friction modifiers should be combined."). Thus, we find that Patent Owner's evidence of unexpected results with respect to fuel economy is entitled to limited weight. *See Allergan, Inc. v. Sandoz Inc.*, 726 F.3d 1286, 1293 (Fed. Cir. 2013) (noting that evidence that a particular combination also solved additional problems is not meaningful when "the motivation to make the combination was real"); *Bristol-Myers Squibb*, 752 F.3d at 976 ("As here, *Dillon*'s claimed compound demonstrated both expected and additional, unexpected properties. Those additional unexpected properties, however, did not upset an already established motivation to modify a prior art compound based on the expected properties of the resulting compound.") (citing *In re Dillon*, 919 F.2d 688, 692 (Fed. Cir. 1990) (en banc)).

f. Conclusion with Respect to Claim 1

As discussed above, Petitioner has identified where Toshikazu and enderson teach or suggest every limitation of claim 1. Petitioner also provides a persuasive

explanation as to why record evidence supports that one of ordinary skill in the art would have sought to combine the teachings of Toshikazu and Henderson with a reasonable expectation of success.

When Petitioner's arguments and supporting evidence are considered in combination with Patent Owner's relatively weak evidence of nonobviousness, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson.

4. Analysis—Dependent Claims 2, 3, 6–8, 10, 11, and 13–15

Petitioner provides detailed analysis explaining where Toshikazu and Henderson teach or suggest the subject matter of dependent claims 2, 3, 6–8, 10, 11, and 13–15. Pet. 30–35. In particular, Petitioner identifies where the combined disclosures of Toshikazu and Henderson teach or suggest: (1) using an overbased calcium sulfonate detergent (claims 2 and 3) (*id.* at 30–31 (citing Ex. 1002 ¶¶ 91–92; Ex. 1005 ¶¶ 50, 52, 53)); (2) using an organomolybdenum compound in the form of molybdenum dialkyldithiocarbamate (claims 6–8) (*id.* at 31–32 (citing Ex. 1002 ¶¶ 93–98; Ex. 1005 ¶¶ 49, 53)); (3) using a molybdenum/sulfur complex of a basic nitrogen compound (claim 10) (*id.* at 32 (citing Ex. 1002 ¶¶ 99–100; Ex. 1005 ¶¶ 49, 53)); (4) using at least one zinc dihydrocarbyl dithiophosphate compound in the form of *sec*-C3-6ZnDTP (claim 11) (*id.* at 33 (citing Ex. 1002 ¶¶ 101–102; Ex. 1005

¶ 53)); (5) using an organic ashless nitrogen-free friction modifier that is an ester (glycerol monooleate) (claims 13–14) (*id.* at 33–34 (citing Ex. 1002 ¶¶ 103–105 (Dr. Smolenski testifying that the glycerol monooleate of Toshikazu is an aliphatic acid ester); Ex. 1005 ¶¶ 49–50, 53)); and (6) a composition that contains between 0.09 to 0.12 wt. % phosphorus from the metal dihydrocarbyl dithiophosphate compound (*sec*-C3-6ZnDTP), a range that overlaps the claimed range of about 0.025 wt. % to about 0.1 wt. % (claim 15) (*id.* at 34–35 (citing Ex. 1002 ¶¶ 106–108; Ex. 1005 ¶¶ 51, 53)).

Patent Owner does not address Petitioner's arguments or evidence with respect to these challenged claims, apart from asserting that these claims would not have been obvious over Toshikazu and Henderson because they depend from claim 1. PO Resp. 35–36.

Upon review of the evidence of record and the parties' arguments as a whole, and for the reasons discussed above with respect to claim 1, we determine that Petitioner has demonstrated by a preponderance of the evidence that claims 2, 3, 6–8, 10, 11, and 13–15 would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson. Pet. 30–35 (citing Ex. 1005 ¶¶ 49, 50, 52, 53; Ex. 1002 ¶¶ 91–108).

5. Analysis—Dependent Claims 18–20

As noted above, we conclude that the preambles of claims 18–20 are not limiting. Thus, these claims require the steps of (1) adding the lubricating oil of claim 1 to an

internal combustion engine and (2) operating the engine. Ex. 1001, 14:52–65.

Toshikazu discloses a lubricating oil composition for internal combustion engines that provides "excellent wear resistance and friction characteristics" and Henderson reports that its disclosed lubricating oils provide improved properties when used in an internal combustion engine. Ex. 1005, Abstract; Ex. 1006, 4. As Petitioner notes, to achieve the results reported in Toshikazu and Henderson, the lubricating oil composition of Toshikazu and Henderson would necessarily be added to an internal combustion engine and the engine then operated using this oil, thereby meeting both steps of claims 18–20. Pet. 35–40 (and evidence cited therein); Ex. 1002 ¶¶ 110, 112. Accordingly, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 18–20 would have been obvious over the combined disclosures of Toshikazu and Henderson.

Even if we were to find that the preambles of claims 18–20 are limiting, Petitioner has sufficiently demonstrated that Toshikazu and Henderson teach or suggest these limitations. As Petitioner notes, Toshikazu expressly discloses that its lubricating compositions provide excellent wear performance (claim 19) and Henderson discloses that using a base oil with a viscosity index exceeding 95 and a Noack volatility level below 15% would lead to improved fuel economy and retention (claim 18). Pet. 36–39 (citing Ex. 1006, 4 (Henderson explaining that high viscosity index base oils provide "improved fuel economy and retention")). Petitioner also demonstrates that one of ordinary skill in the art would have reasonably

expected Example 16, which utilizes a nitrogen-free friction modifier, to provide improved compatibility with fluoroelastomer seals of an internal combustion engine. *Id.* at 40 (citing Ex. 1008, 2; Ex. 1002 ¶ 121); Pet. Reply 15 (citing Ex. 1055 ¶¶ 66–70).

In view of the foregoing, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 18–20 would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson.

6. Conclusion

Upon review of Petitioner's and Patent Owner's arguments and supporting evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 1–3, 6–8, 10, 11, 13–15, and 18–20 of the '685 patent would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson.

E. Obviousness of Claim 4 in View of Toshikazu (Example 16), Henderson, and Schlicht

Claim 4 depends from claim 3 and further requires that the "overbased calcium sulfonate has a total base number of between about 150 to 450." Ex. 1001, 14:3–5. Petitioner contends the subject matter of claim 4 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Schlicht. Pet. 41–42; Pet. Reply 16.

Appendix B

1. Schlicht

Schlicht discloses "a method of producing very highly overbased calcium sulfonate-lube oil concentrates." Ex. 1011, 1:25–28. The example overbased calcium sulfonates disclosed in Schlicht have a TBN from 193 to 311. *Id.* at 5:21–7:27.

Schlicht reports that "[o]verbased metal sulfonates are known to have excellent detergent characteristics and are particularly effective in preventing sludge build-up in heavy duty oils used for combustion engines." *Id.* at 1:45–48. According to Schlicht, "[o]ne of the most effective overbased sulfonates is overbased calcium sulfonate." *Id.* at 1:51–52.

2. Analysis

Example 16 of Toshikazu contains 0.72 wt. % overbased calcium sulfonate, but Toshikazu does not report the precise type of calcium sulfonate used in its example lubricants. Ex. 1005 ¶ 50. Petitioner contends that, because Schlicht discloses that its overbased calcium sulfonates are particularly effective in preventing sludge build-up and were "known to have excellent detergent characteristics," one of ordinary skill in the art would have sought to use these disclosed detergents (having a TBN between 193 and 311) in Example 16 of Toshikazu. Pet. 42 (citing Ex. 1011, 1:45–48; Ex. 1002 ¶¶ 124–126). Petitioner further contends that one of ordinary skill in the art would have expected the detergents of Schlicht to work successfully in the lubricating composition of Toshikazu and Henderson,

as Toshikazu reports that overbased calcium sulfonates have a minimal effect on the friction reducing properties of the lubricating composition. *Id.* (citing Ex. 1005 ¶ 34).

Patent Owner asserts that one of ordinary skill in the art would not have looked to Schlicht's disclosures because they would not have known whether the overbased calcium sulfonate suggested in Schlicht was compatible with Example 16 of Toshikazu. PO Resp. 41–42; Sur-reply 14–15 (asserting that use of a new overbased calcium sulfonate detergent could require a formulation change). We do not find this argument persuasive.

First, Petitioner persuasively argues that one of ordinary skill would have combined the disclosures of Toshikazu, Henderson, and Schlicht to achieve the excellent results reported in Schlicht for its overbased calcium sulfonate detergents. Pet. 42 (citing Ex. 1011, 1:45–48). Patent Owner does not dispute this reasoning. Sur-reply 14 (Patent Owner asserting that there may well have been "a motivation to apply the teaching of *Schlicht to Toshikazu*").

Second, the reasonable expectation of success requirement looks to "the likelihood of success in combining references to meet the limitations of the claimed invention," and there is no credible argument from Patent Owner or testimony from Dr. Bansal that one of ordinary skill would have had any difficulty in adding the overbased calcium sulfonates suggested in Schlicht to the lubricating oil of Toshikazu and Henderson to arrive at the claimed invention. *See Intelligent Bio-Systems, Inc. v.*

Illumina Cambridge Ltd., 821 F.3d 1359, 1367 (Fed. Cir. 2016); Ex. 1055 ¶ 72 (Dr. Rizvi testifying that Dr. Bansal's concerns with respect to the selection of a particular overbased calcium sulfonate detergent are "overstated"); Ex. 1005 ¶¶ 33–34 (Toshikazu disclosing that the metal detergent may be selected from any of calcium sulfonates, magnesium sulfonates, calcium phenates, and magnesium phenates); Ex. 1001, 7:53–8:12.

In view of the foregoing, we find that Petitioner provides a persuasive rationale supported by factual underpinnings to explain why one of ordinary skill in the art would have sought to use overbased calcium sulfonates having a TBN between 193 and 311 in Example 16 of Toshikazu. Petitioner also sufficiently demonstrates that one of ordinary skill in the art would have had a reasonable expectation of success in combining the disclosures of Toshikazu, Henderson, and Schlicht to arrive at the subject matter of claim 4 of the '685 patent. Pet. 42; Pet. Reply 16. Thus, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 4 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Schlicht.

F. Obviousness of Claims 9, 16, and 17 over Toshikazu (Example 16), Henderson, and Walker

Claim 9 depends from claim 8 and further requires that the molybdenum compound is a trinuclear molybdenum compound. Ex. 1001, 14:21–23. Claim 16 depends from claim 15 and further requires that the composition contains "from about 0.025 wt. % to 0.075 wt. % phosphorus from

the metal dihydrocarbyl dithiophosphate compound." *Id.* at 14:44–47. Claim 17 depends from claim 16 and further requires that the composition contains "from about 0.025 wt. % to 0.05 wt. % phosphorus from the metal dihydrocarbyl dithiophosphate compound." *Id.* at 14:48–51.

Petitioner contends the subject matter of claims 9, 16, and 17 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Walker. Pet. 42–47.

1. Walker

Walker discloses crankcase lubricants for internal combustion engines that comprise "a lubricating base stock, a dispersant, a metal dihydrocarbyl dithiophosphate, and either a copper-containing compound or a molybdenum-containing compound." Ex. 1007, 1:3–5, 2:12–15.[16]

Walker instructs that the molybdenum compound may be selected from, among other things, molybdenum salts of inorganic or organic acids, or molybdenum compounds comprising a "trinuclear molybdenum core." *Id.* at 11:7–12:11. The trimer form of the molybdenum compounds in Walker "may be represented by the general formula Mo3SkLp," wherein "L represents a ligand for example dithiocarbamate," "p is in the range from 1 to 4," and "k is at least 4, especially 4 to 10, preferably 4 to 7." *Id.* at 12:6–11.

16. We refer to the original page numbers of Walker found at the top of each page.

Walker discloses that use of ZDDP or other dihydrocarbyl dithiophosphate salts as anti-wear agents was "common," but it had been found that the phosphorus in such materials has a harmful effect on catalytic converters. *Id.* at 2:4–7. As such, Walker indicates that "it is desirable to minimize the proportions of such materials so far as possible." *Id.* at 2:8–11. In Walker's inventive lubricating compositions, "the phosphorus content of the composition is at most 0.08% and preferably it is at most 0.06%, more preferably at most 0.05%, by weight of the composition." *Id.* at 2:26–29.

2. Analysis—Claim 9

Petitioner contends one of ordinary skill in the art would have understood that the trinuclear molybdenum dialkyldithiocarbamate of Walker "was substitutable with other molybdenum dialkyldithiocarbamates" and would have expected this trinuclear molybdenum compound to exhibit "similar results" to the molybdenum compound used in Example 16 of Toshikazu. Pet. 43–44 (citing Ex. 1002 ¶ 130). Petitioner further contends that one of ordinary skill in the art "would not have believed that a substantial difference in amount" of trinuclear molybdenum "would be required to meet or exceed improvements in friction coefficient and wear." *Id.*; Pet. Reply 16–17 (citing Pet. 43–44; Ex. 1002 ¶¶ 128–130; Ex. 1055 ¶ 73).

Patent Owner asserts that one of ordinary skill in the art "would not necessarily modify Example 16 from Toshikazu to incorporate a trinuclear molybdenum compound as disclosed in Walker," because one of

ordinary skill in the art "would be left to guess how much of the trinuclear molybdenum compound would need to be employed in order to achieve the same or improved performance in terms of friction coefficient and wear." PO Resp. 43 (citing Ex. 2003 ¶ 159).

When a known composition is altered "by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." *KSR*, 550 U.S. at 416 ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."). On this record, Petitioner sufficiently demonstrates that one of ordinary skill in the art would have considered the trinuclear molybdenum compound of Walker to be interchangeable with the MoDTC compound used in Example 16 of Toshikazu, and would have expected this substitution to yield a predictable result. Ex. 1002 ¶¶ 129–130; Ex. 1055 ¶¶ 73–74. As such, we are persuaded that one of ordinary skill in the art would have found it obvious to use a trinuclear molybdenum compound in Example 16 of Toshikazu.

Contrary to Patent Owner's arguments, we are not persuaded that one of ordinary skill in the art would have needed to blindly "guess" as to the appropriate amount of trinuclear molybdenum to use in Example 16 of Toshikazu. PO Resp. 43. First, Toshikazu Example 16 uses between 300 and 320 ppm molybdenum, and Patent Owner fails to persuasively rebut Petitioner's argument and evidence that the amount of trinuclear molybdenum necessary to achieve the same results in Example 16 would

not be substantially different. Pet. 43–44; Pet. Reply 16–17. Second, although the precise amount of trinuclear molybdenum required in Example 16 of Toshikazu is not disclosed in Toshikazu, Henderson, or Walker, Petitioner provides credible evidence that the appropriate amount of trinuclear molybdenum could be determined using a simple bench test. Ex. 1055 ¶ 73. Third, Walker and other prior art references expressly suggest using specific amounts of molybdenum that fall within the range of claim 9. Pet. Reply 17 (citing Ex. 1055 ¶ 74); Ex. 1007, 10:31–11:2 (Walker disclosing that the most preferred amount of molybdenum is 250 ppm).[17]

In view of the foregoing, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 9 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Walker.

3. Claims 16 and 17

The lubricating composition of Example 16 of Toshikazu contains between 0.09 and 0.12 wt. % phosphorus. Pet. 29, 44 (citing Ex. 1002 ¶¶ 89, 132, 137). Petitioner asserts that one of ordinary skill in the art would have been

17. Example 16 of Toshikazu utilizes between 300 and 320 ppm molybdenum and Walker's preferred range is 50 to 350 ppm. Patent Owner does not direct us to any evidence to suggest that use of Walker's trinuclear molybdenum compound in Toshikazu would require increasing total molybdenum levels, or that such a substitution would result in less than 10 ppm molybdenum, which is the lower end of the range recited in claim 1 of the '685 patent.

motivated to lower the level of phosphorus in Example 16 to 0.05 wt. % because it was well known in the art that the phosphorus in engine oils poisons emission control devices and the proposed GF-4 standard mandated lower levels of phosphorus in lubricating oils. *Id.* at 44–45; Ex. 1007, 2:4–11 (noting that phosphorus in engine oils is harmful to catalytic converters), 2:26–28 (setting the preferred range of phosphorus to a level of "at most 0.05%"); Ex. 1014, 1 (noting that the GF-4 standard limited phosphorus to "between 0.05 percent and 0.08 percent"); Ex. 1002 ¶¶ 133, 138.

Patent Owner argues that because Walker's test results indicate "that decreasing phosphorus loading from 0.09% to 0.05% could increase the friction coefficient of a lubricating oil," one of ordinary skill in the art would not have reasonably expected to achieve the "same or improved performance" when modifying Example 16 to have a phosphorus loading of 0.05%. PO Resp. 44. We are not persuaded by this argument.

A proposed combination or modification need not result in the "same or improved performance." *See Transocean Offshore Deepwater Drilling Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1304 n.1 (Fed. Cir. 2010) ("[W]e note that the focus must be on whether the claimed invention would have been obvious to one of skill in the art, not whether it is an improvement over the prior art."). There must instead be an articulated reason that would have caused one of ordinary skill in the art to make the proposed combination. Here, Petitioner articulates a factually supported reason to make the proposed change

even if performance is degraded to some degree, i.e., to avoid catalyst damage and to comply with the upcoming GF-4 standard Pet. 44–45; Ex. 1007, 2:4–11, 2:26–28; Ex. 1014, 1.

Moreover, success in the context of claims 1, 16, and 17 does not require any particular level of performance, only the successful combination of each lubricating oil component to arrive at the subject matter of claim 1, i.e., a composition. *See Intelligent Bio-Systems*, 821 F.3d at 1367. The evidence of record does not suggest that one of ordinary skill would have had any difficulty in formulating the lubricating oil of Example 16 to have 0.05% phosphorus from the metal dihydrocarbyl dithiophosphate compound. Indeed, Walker expressly discloses successfully reducing phosphorus to a preferred level of 0.05 wt. %. Ex. 1007, 2:26–29 (disclosing that the phosphorus content of the composition is "preferably at most 0.05%, by weight of the composition").

In view of the foregoing, we find that one of ordinary skill in the art would have sought to lower the phosphorus content in Example 16 of Toshikazu to 0.05 wt. % in order to avoid catalyst damage and to comply with the upcoming GF-4 standard. We further find that one of ordinary skill in the art would have had a reasonable expectation of success in lowering the phosphorus levels of Example 16 of Toshikazu to 0.05 wt. %. Accordingly, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 16 and 17 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Walker.

Appendix B

G. Obviousness of Claims 1–3, 5–8, 10–15, and 18–20 over Toshikazu (Example 2) and Henderson

Petitioner contends the subject matter of claims 1–3, 5–8, 10–15, and 18–20 would have been obvious over the combined disclosures of Toshikazu (Example 2) and Henderson. Pet. 47–65.

The compositions of Examples 2 and 16 of Toshikazu are reproduced below:

		Example	
		2	16
Friction Reducing Agent	MoDTC	0.075	0.15
	MoDTP	---	---
	Aliphatic Acid Glyceride	0.225	0.075
	Oleamide	---	---
Metal Detergent	Ca-S (Overbased)	0.72	0.72
	Ca-S (Neutral)	---	---
	Ca-P (Overbased)	---	---
	Mg-S (Overbased)	---	---

Appendix B

Ashless Detergent/ Dispersant	Boron-based Alkenyl Succinimide	2.4	2.4
	Alkenyl Succinimide	---	---
	Benzylamine	---	---
Antiwear Additive	*sec*-C3–6ZnDTP	0.96	0.96
	pr-C3–6ZnDTP	---	---
	sec-C3–6ZnDTC	---	---
Base Oil		Mineral Oil	Synthetic Oil
Friction and Wear Characteristics	Friction Coefficient	0.045	0.045
	Wear Track Diameter (mm)	0.44	0.43

The table above is a reproduction of a portion of Tables 1 and 2 of Toshikazu and shows the contents of Examples 2 and 16. Ex. 1005, Tables 1, 2. As shown in the table, Example 2 of Toshikazu differs from Example 16 in that it has a lower level of MoDTC and a higher level of aliphatic acid glyceride. *Id.* Example 2 also differs in that it uses a mineral base oil as opposed to a synthetic base oil. *Id.*

1. Analysis—Independent Claim 1

Petitioner persuasively demonstrates, and Patent Owner does not contest, that the lubricating oil composition of Example 2 of Toshikazu contains at least one calcium

detergent (overbased calcium sulfonate) (Pet. 49); at least one oil soluble molybdenum compound (MoDTC) (*id.* at 50); at least one organic ashless nitrogen-free friction modifier (aliphatic acid glyceride) (*id.*); and at least one metal dihydrocarbyl dithiophosphate compound (*sec*-C3–6ZnDTP) (*id.* at 50–51). Petitioner also persuasively demonstrates that Example 2 of Toshikazu is substantially free of ashless aminic friction modifiers (*id.* at 51 (citing Ex. 1002 ¶¶ 157–158)); contains between 150 to 160 ppm molybdenum from the MoDTC compound (*id.* at 54); and contains between 0.09 to 0.12 wt. % phosphorus from the ZnDTP compound (*id.* at 29–30, 55). Petitioner also repeats its argument regarding the level of calcium discussed above with respect to Example 16. *Id.* at 54.

Petitioner contends the mineral base oil of Example 2 could have a viscosity index of greater than 95 and a "Noack volatility approaching 15 wt. %," but in any event, one of ordinary skill in the art would have selected a synthetic base oil for Example 2 that had viscosity index of greater than 95 and a Noack volatility level of no more than 15%, in view of Henderson's disclosure that the art was rapidly shifting toward these types of oils due to their improved properties. *Id.* at 47–49, 51–53.

Patent Owner contends, for the same reasons discussed above with respect to Example 16, that one of ordinary skill in the art would not have selected Example 2 for further development. PO Resp. 45. Patent Owner further contends that there is insufficient evidence that the mineral oil of Example 2 has a viscosity index of 95 or greater or a Noack volatility of 15% or less. *Id.* at

46, 48. Finally, Patent Owner contends one of ordinary skill in the art would not have substituted the mineral oil in Example 2 of Toshikazu with a synthetic oil with the recited properties, because mineral oils are cheaper than synthetic oils, the mineral oil-based lubricants of Toshikazu "achieved the best performance in terms of both Friction Coefficient and Wear Track Diameter," and a formulator would have recognized that modification of the base oil would require extensive testing and possibly further modification of the oil formulation to achieve similar results. *Id.* at 45–50.

Patent Owner's arguments are not persuasive. First, for the reasons discussed above with respect to Example 16, we are persuaded that one of ordinary skill in the art would have selected any of Examples 1–19 for further development, including Example 2. *See* Section II.D.3.d. Second, although mineral oils are cheaper than synthetic oils, Petitioner presents persuasive evidence that one of ordinary skill in the art would have sought to substitute the mineral oil of Example 2 with, for example, a synthetic oil having a viscosity index of 95 or above and Noack volatility of less than 15%, in order to comply with the GF-3 standard and to achieve the benefits of higher quality oils discussed in Henderson. Pet. 48–49, 52–53 (and evidence cited therein). Finally, as discussed above with respect to Example 16, we are not persuaded that one of ordinary skill in the art would have had any significant concern in substituting the mineral oil in Example 2 with the synthetic oil of Toshikazu, as Toshikazu reports that there is no limit on the type of lubricating oil used in his invention and test results show that the same additive

package could be successfully used with a synthetic oil, a mineral oil, or a mineral oil/high pressure hydrogenated oil. Pet. Reply 2; Ex. 1005, Tables 1, 2; Ex. 1055 ¶¶ 52–53.

In view of the foregoing, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 1 would have been obvious over Toshikazu (Example 2) and Henderson.

2. Dependent Claims 2, 3, 6–8, 10, 11, and 13–15

With respect to dependent claims 2, 3, 6–8, 10, 11, and 13–15, Petitioner persuasively identifies where the subject matter of these claims is disclosed in Toshikazu (Example 2) and Henderson. Pet. 55–64. In particular, Petitioner identifies where the combined disclosures of Toshikazu and Henderson teach or suggest: (1) using an overbased calcium sulfonate detergent (claims 2 and 3) (*id.* at 55–56 (citing Ex. 1002 ¶¶ 174–175; Ex. 1005 ¶¶ 50, 52)); (2) using an organo-molybdenum compound in the form of molybdenum dialkyldithiocarbamate (claims 6–8) (*id.* at 57–58 (citing Ex. 1002 ¶¶ 180–185; Ex. 1005 ¶¶ 49, 52)); (3) using a molybdenum/sulfur complex of a basic nitrogen compound (claim 10) (*id.* at 59 (citing Ex. 1002 ¶¶ 186–187; Ex. 1005 ¶¶ 49, 52)); (4) using at least one zinc dihydrocarbyl dithiophosphate compound in the form of *sec*-C3-6ZnDTP (claim 11) (*id.* at 59 (citing Ex. 1002 ¶¶ 188–189; Ex. 1005 ¶ 52)); (5) using an organic ashless nitrogen-free friction modifier that is an ester (glycerol monooleate) (claims 13–14) (*id.* at 62–63 (citing Ex. 1002 ¶¶ 196–198 (Dr. Smolenski testifying that the glycerol monooleate of Toshikazu is an aliphatic acid

ester); Ex. 1005 ¶¶ 50, 52, 53)); and (6) a composition that contains between 0.09 to 0.12 wt. % phosphorus from the metal dihydrocarbyl dithiophosphate compound (*sec*-C3-6ZnDTP), a range that overlaps the claimed range of about 0.025 wt. % to about 0.1 wt. % (claim 15) (*id.* at 63–64 (citing Ex. 1002 ¶¶ 199–201; Ex. 1005 ¶¶ 51, 52; Ex. 1013, 63 (noting that phosphorus in engine oil generally poisons emission control devices); Ex. 1014, 1)).

Patent Owner does not address these claims beyond noting that they depend from claim 1. PO Resp. 50; Pet. Reply 21.

Upon review of the parties' arguments and supporting evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 2, 3, 6–8, 10, 11, and 13–15 would have been obvious over Toshikazu (Example 2) and Henderson.

3. Dependent Claim 5

Claim 5 depends from claim 1 and further requires "wherein said molybdenum from a molybdenum compound is present in an amount of about 30 ppm to 200 ppm." Ex. 1001, 14:6–8. Petitioner persuasively demonstrates, and Patent Owner does not dispute, that the molybdenum content in Example 2 of Toshikazu is between 150 and 160 ppm. Pet. 56 (citing Ex. 1002 ¶ 177). Patent Owner asserts, however, that the performance data reported in Toshikazu would have led one of ordinary skill in the art to use more MoDTC, not less. PO Resp. 51–52. This argument is not persuasive because Example 2 has a range of molybdenum that the range recited in claim 5 fully encompasses, and we

previously found that the results reported for Examples 1–19 in Toshikazu would not have been differentiated by one of ordinary skill in the art. Pet. Reply 21–22; *see* Section II.D.3.d.

In view of the foregoing, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 5 would have been obvious over the combined disclosures of Toshikazu (Example 2) and Henderson.

4. Claim 12

Claim 12 depends from claim 1 and further requires "wherein said organic ashless nitrogen-free friction modifier is present in an amount of from about 0.25 wt. % to about 2.0 wt. %, based on the total weight of the composition." Ex. 1001, 14:31–34.

Petitioner concedes that the 0.225 wt. % aliphatic acid glyceride content in Example 2 of Toshikazu falls outside the 0.25 wt. % range recited in claim 12. Pet. 60. Petitioner contends, however, that one of ordinary skill in the art would have been motivated to increase the amount of organic ashless nitrogen-free friction modifier in Example 2 to at least 0.25 wt. % because this compound was known to be less expensive than other anti-wear compounds, including molybdenum. *Id.* at 60–61. Petitioner further contends that one of ordinary skill in the art would have expected this modification to be successful because other Examples in Toshikazu indicate that the amount of organic ashless nitrogen-free friction modifier may be increased without significantly affecting the performance of the lubricating compositions. *Id.*; Pet. Reply 22–23.

Appendix B

Patent Owner contends one of ordinary skill in the art would not have sought to increase the amount of friction modifier in Example 2 because molybdenum friction modifiers are more effective at reducing the coefficient of friction than ashless friction modifiers, and the Examples of Toshikazu containing higher levels of aliphatic acid glyceride performed worse than those containing lower amounts of these compounds. PO Resp. 53–54 (citing Ex. 1005, Tables 1, 2; Ex. 2003 ¶ 211).

To the extent the term "about 0.25 wt. %" does not encompass 0.225 wt. % aliphatic acid glyceride, we find persuasive Petitioner's argument that one of ordinary skill in the art would have found it obvious to increase the amount of aliphatic acid glyceride in Example 2 to at least "about 0.25 wt. %" in order to save on costs. Pet. 61 (citing Ex. 1002 ¶ 192) (Petitioner providing evidence that aliphatic acid glycerides are less expensive than molybdenum compounds). Patent Owner's arguments based on an alleged decrease in performance from such a change are not persuasive because we have found that one of ordinary skill in the art would not have differentiated the performance results reported for Examples 1–19 of Toshikazu. *See* Section II.D.3.d.

With respect to the question of reasonable expectation of success, given the successful results reported in Toshikazu for lubricating compositions containing increased levels of aliphatic acid glyceride, we credit the testimony of Drs. Smolenski and Rizvi that one of ordinary skill in the art would have had a reasonable expectation of success in increasing the aliphatic glyceride content in

Example 2 from 0.225 wt. % to at least "about 0.25 wt. %." Pet. 60–61 (citing Ex. 1002 ¶¶ 191–192); Pet. Reply 22–23 (citing 1055 ¶¶ 99–102).

In view of the foregoing, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 12 would have been obvious over Toshikazu (Example 2) and Henderson.

5. Dependent Claims 18–20

With respect to claims 18–20, Petitioner and Patent Owner repeat their arguments discussed above for Example 16 of Toshikazu. Pet. 35–40, 64–65; PO Resp. 54; Pet. Reply 23. Accordingly, for the reasons set forth above in Section II.D.5, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claims 18–20 would have been obvious over Toshikazu (Example 2) and Henderson.

H. Obviousness of Claim 4 over Toshikazu (Example 2), Henderson, and Schlicht and Claims 9, 16, and 17 over Toshikazu (Example 2), Henderson, and Walker

With respect to dependent claims 4, 9, 16, and 17, Petitioner and Patent Owner rely on the same arguments presented above for the grounds based on Example 16 of Toshikazu. Pet. 66–67; PO Resp. 54–55. Accordingly, for the reasons discussed above in Sections II.E and II.F, Petitioner has demonstrated by a preponderance of the evidence that the subject matter of claim 4 would have

been obvious over Toshikazu (Example 2), Henderson, and Schlicht, and the subject matter of claims 9, 16, and 17 would have been obvious over Toshikazu (Example 2), Henderson, and Walker.

III. PATENT OWNER'S IDENTIFICATION OF ALLEGEDLY IMPROPER REPLY ARGUMENTS AND EVIDENCE

Patent Owner previously requested permission to file a motion to strike Petitioner's Reply, the declaration of Dr. Rizvi, and Exhibits 1023–1052, 1054, 1055. We denied this request, but authorized the parties to file a joint chart identifying the Reply arguments and evidence Patent Owner believes are improper and providing Petitioner's response to Patent Owner's arguments.[18] Paper 23 ("Objec."). We address the issues the parties identify below.

A. Person of Ordinary Skill in the Art

The Petition provides a definition of one of ordinary skill in the art and supports that definition with Dr. Smolenski's testimony. Pet. 13 (citing Ex. 1002 ¶ 17). Patent Owner disagrees with this analysis in its Response, providing testimony of Dr. Bansal to support its arguments. PO Resp. 4–5; Ex. 2003 ¶¶ 17–27. In response to these counter arguments, Dr. Rizvi provides additional

18. Patent Owner subsequently filed a Motion to Exclude Exhibits 1016, 1017, 1023–1052, and 1054, the declaration of Dr. Rizvi (Ex. 1055), and certain cross-examination testimony of Dr. Bansal (Ex. 1053). Paper 24.

evidence and arguments in support of Petitioner's original definition of one of ordinary skill in the art, and explains why we should consider Dr. Smolenski's testimony under either Petitioner's or Patent Owner's definition. Ex. 1055 ¶¶ 20–24.

Patent Owner objects to paragraphs 19–24 of Dr. Rizvi's declaration as allegedly offering new opinions on the level of skill in the art that are not in the Petition. Objec. 1–2.

Neither Petitioner's Reply nor Dr. Rizvi's declaration testimony seek to change the proposed definition of one of ordinary skill in the art set forth in the Petition. Dr. Rizvi, instead, addresses the specific arguments made in Patent Owner's Response and Dr. Bansal's declaration. As such, we find that Dr. Rizvi's testimony related to the level of ordinary skill in the art constitutes proper rebuttal.

B. General Rebuttal Arguments and Evidence

Patent Owner also objects to multiple portions of Dr. Rizvi's testimony as advancing new theories and relying on new evidence. Objec. 2–5. Upon review of Patent Owner's objections and Petitioner's responses to those objections, we are persuaded that the identified portions of Dr. Rizvi's testimony represent proper rebuttal arguments intended to respond to opinions Dr. Bansal presented in his declaration, and not to fill gaps in the prior art disclosures.

Patent Owner is correct that many Exhibits Dr. Rizvi discusses are not addressed in the Petition. As our reviewing court has instructed, however, "the introduction of new evidence in the course of the trial is to be expected in *inter partes* review trial proceedings and, as long as the opposing party is given notice of the evidence and an opportunity to respond to it, the introduction of such evidence is perfectly permissible under the [Administrative Procedure Act]." *Genzyme Therapeutic Prod. Ltd. P'ship v. Biomarin Pharm. Inc.*, 825 F. 3d 1360, 1366 (Fed. Cir. 2016). Here, Patent Owner deposed Dr. Rizvi after receiving his reply declaration, had an opportunity to respond to his arguments and supporting evidence in a Surreply, and has filed a motion to exclude his testimony on relevance grounds. *See Yeda Research v. Mylan Pharms, Inc.*, 906 F.3d 1031, 1040 (Fed. Cir. 2018). Thus, we find that Dr. Rizvi's testimony and supporting documentary evidence are not improper.

IV. MOTION TO EXCLUDE

Patent Owner filed a Motion to Exclude Exhibits 1016, 1017, 1023–1052, 1054, and 1055, as well as certain portions of Dr. Bansal's crossexamination testimony (Paper 24, "Mot. to Excl."). We address Patent Owner's arguments below.

A. Exhibits 1016, 1017, 1027–1031, 1034, and 1048

Patent Owner moves to exclude Exhibits 1016, 1017, 1027–1031, 1034, and 1048 as irrelevant because they allegedly postdate the April 4, 2002, filing date of the '685 patent. Mot. to Excl. 2–3.

Appendix B

1. Exhibits 1016 and 1017

Exhibit 1016 is titled "Automotive Lubricants Reference Book" and contains as Appendix 10 the ILSAC GF-3 standards for passenger car engine oils, which is itself dated October 12, 2000. Ex. 1016, 591. Exhibit 1017 appears to be the front cover of the ILSAC GF-4 standard for passenger car engine oils and bears a date of January 14, 2004. Ex. 1017, 1. Patent Owner contends that because Exhibits 1016 and 1017 were each published after the April 4, 2002, filing date of the '685 patent they are irrelevant to show the state of the art as of the filing date of the '685 patent. Mot. to Excl. 3.

Because both parties agree that the GF-3 standard contained in Exhibit 1016 was released prior to April of 2002 and was accessible to those of ordinary skill in the art, we are not persuaded that the relied upon portion of Exhibit 1016 is irrelevant due to its publication date. Ex. 1055 ¶ 52; Ex. 1002 ¶ 76; Ex. 1053, 36:19–37:5.

Petitioner does not rely upon Exhibit 1017 to show the state of the prior art as of the April 2002 filing date of the '685 patent, but instead to show when the GF-4 standard was ultimately adopted in 2004. Paper 28, 3. Because Petitioner is not relying on Exhibit 1017 to show the state of the art as of the filing date of the '685 patent, Patent Owner's motion to exclude Exhibit 1017 is *denied*.

In view of the foregoing, we deny Patent Owner's motion to exclude Exhibits 1016 and 1017 in view of their publication dates.

2. Exhibits 1027, 1030, and 1031

Exhibits 1027, 1030, and 1031 were introduced during Dr. Bansal's deposition. Ex. 1053, 192:20–21, 214:8–12, 221:9–11. As Petitioner and Dr. Rizvi do not cite or rely upon these exhibits, we dismiss Patent Owner's motion to exclude Exhibits 1027, 1030, and 1031 as *moot.*

3. Exhibits 1028, 1029, and 1048

Patent Owner contends Exhibits 1028, 1029, and 1048 were all published after the filing date of the '685 patent and, therefore, are irrelevant to show the state of the art as of the filing date of the '685 patent. Mot. To Excl. 2–3.

Petitioner contends it is not relying on the identified exhibits to show the state of the art as of the filing date, but to show that the TBN associated with overbased detergents did not change after the filing date of the '685 patent. Paper 28, 4.

Because Petitioner is not relying on Exhibits 1028, 1029, and 1048 to show the state of the art as of the filing date of the '685 patent, Patent Owner's motion to exclude Exhibits 1028, 1029, and 1048 is *denied.*

4. Exhibit 1034

Exhibit 1034 is an article identifying both Dr. Smolenski and Dr. Bansal as "peer experts." Ex. 1034, 32; Pet. Reply 26–27. This document was published in 2018, well after the 2002 filing date of the '685 patent, and it does

not show the state of the art in 2002. That said, Exhibit 1034 is at least somewhat relevant to the questions of whether Dr. Smolenski's testimony will be helpful to the trier of fact and whether he can opine from the viewpoint of one of ordinary skill in the art. Accordingly, Patent Owner's motion to exclude Exhibit 1034 is *denied.*

B. Exhibits 1023–1052, 1054, and 1055

Patent Owner contends Exhibits 1023–1052, 1054, and 1055 are not relevant because they were submitted for the first time with Petitioner's Reply. Mot. to Excl. 4. Patent Owner further contends that we should exclude Exhibits 1025, 1027, 1030, and 1031 because they are not cited in the Reply or Dr. Rizvi's declaration, and that we should exclude Exhibits 1029, 1033, 1036, 1039–1046 and 1048–1052 because they are cited only in Dr. Rizvi's declaration, but not in Petitioner's Reply. *Id.* at 5–6.

As noted above, there is nothing improper with submitting new Exhibits with a Reply declaration. *Genzyme*, 825 F. 3d at 1366. Accordingly, we deny Patent Owner's motion to exclude Exhibits 1023–1052, 1054, and 1055 on this basis.

Exhibits 1025, 1027, 1030, and 1031 were introduced during Dr. Bansal's cross-examination, but are not cited in Dr. Rizvi's declaration or in the Reply. As the parties and this Decision do not rely upon these documents, we dismiss as *moot* Patent Owner's motion to exclude Exhibits 1025, 1027, 1030, and 1031.

Exhibits 1029, 1033, 1036, 1039–1046, and 1048–1052 are cited in Dr. Rizvi's declaration, but not in the Reply. *Id.* at 5–6. As Dr. Rizvi cites these documents, we decline to exclude them as irrelevant.

C. Authentication of Exhibit 1030

Exhibit 1030 is a slide-deck bearing the corporate logo of Infineum. Ex. 1030. Patent Owner contends we should exclude Exhibit 1030 because it is unauthenticated and not cited in the Petition, Reply, Dr. Smolenski's declaration, or Dr. Rizvi's declaration. Mot. to Excl. 6.

As Petitioner and Dr. Rizvi do not rely on Exhibit 1030, and this Decision does not cite to or rely upon this exhibit, the motion to exclude Exhibit 1030 is dismissed as *moot*.

D. Exhibit 1053 Beyond Scope of Direct

Patent Owner contends we should exclude certain portions of Dr. Bansal's deposition testimony because Petitioner's questions went beyond the scope of Dr. Bansal's direct testimony. Mot. to Excl. 7–8. In particular, Patent Owner contends Petitioner questioned Dr. Bansal about documents he had never seen before, about issues related to enablement, and about ownership interests of various parties. *Id.* at 7–9.

Petitioner's Reply does not rely upon the majority of the testimony to which Patent Owner objects. As such, Patent Owner's motion to exclude this testimony is dismissed as *moot*.

Petitioner specifically identifies, however, testimony cited at pages 8, 10, 24, and 25 of the Reply. Mot. to Excl. 9. Having reviewed this testimony, we find that the recited testimony is within the scope of Dr. Bansal's direct testimony. For example, Petitioner asserts that one of ordinary skill in the art would have understood that the combination of 80 wt. % poly-α-olefins and 20 wt. % diisodecyl adipate (a diester) would have a viscosity index above 95. Pet. 20 (citing Ex. 1009, 450, Figures 4, 5). In support of this argument, Petitioner cites to specific record evidence. *Id.* Patent Owner and Dr. Bansal disagree that the recited evidence demonstrates that the synthetic oil of Toshikazu had a viscosity index above 95, arguing that absent more specific information regarding the viscosity index of the diisodecyl adipate, the viscosity index of the mixture is "unknowable." PO Resp. 29 (citing Ex. 2003 ¶ 100).

During his deposition, Petitioner presented Dr. Bansal with a reference showing that the viscosity index of diisodecyl adipate was known in the art and is greater than 95. Ex. 1038; Ex. 1053, 193:25–194:9. Petitioner's questions related to the viscosity index of diisodecyl adipate are directly relevant to the position both Patent Owner and Dr. Bansal take that the viscosity index of the synthetic oil of Example 16 was "unknowable." As such, we do not agree that Petitioner's questions went beyond the scope of Dr. Bansal's direct testimony.

We have reviewed the additional testimony Patent Owner identifies (Mot. to Excl. 8) and likewise conclude that this testimony was within the scope of Dr. Bansal's

direct testimony. Accordingly, Patent Owner's motion to exclude Exhibit 1053 is *denied*.

E. Exhibit 1055

Exhibit 1055 is the declaration of Dr. Rizvi. Ex. 1055. Patent Owner contends we should exclude this exhibit because it advances new theories and its probative value is outweighed by the unfair prejudice to Patent Owner in admitting such evidence. Mot. to Excl. 10.

As discussed above, we find that Dr. Rizvi's testimony properly responds to Patent Owner's arguments and the testimony of Dr. Bansal. *See Genzyme*, 825 F. 3d at 1366. Accordingly, Patent Owner's motion to exclude Exhibit 1055 is *denied*.

V. CONCLUSION[19]

For the reasons discussed herein, Petitioner has demonstrated by a preponderance of the evidence that claims 1–20 of the '685 patent are unpatentable.

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19. Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this Decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

Appendix B

VI. ORDER

It is hereby

ORDERED that claims 1–20 of the '685 patent are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *denied* with respect to Exhibits 1016, 1017, 1027–1031, 1034, and 1048 and further dismissed as *moot* with respect to Exhibits 1025, 1027, 1030, and 1031.

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

In summary:

Claim(s)	References	35 U.S.C §	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 6–8, 10, 11, 13–15, 18–20	Toshikazu, Henderson	103	1–3, 6–8, 10, 11, 13–15, 18–20	
4	Toshikazu, Henderson, Schlicht	103	4	

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9, 16, 17	Toshikazu, Henderson, Walker	103	9, 16, 17	
1–3, 5–8, 10–15, 18–20	Toshikazu, Henderson	103	1–3, 5–8, 10–15, 18–20	
4	Toshikazu, Henderson, Schlicht	103	4	
9, 16, 17	Toshikazu, Henderson, Walker	103	9, 16, 17	
Overall Outcome			1–20	

APPENDIX C — OPINION OF THE UNITED STATES PATENT AND TRADEMARK OFFICE, PATENT TRIAL AND APPEAL BOARD, DATED NOVEMBER 7, 2018

UNITED STATES PATENT
AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL
AND APPEAL BOARD

CHEVRON ORONITE COMPANY LLC,

Petitioner,

v.

INFINEUM USA L.P.,

Patent Owner.

Case IPR2018-00922
Patent 6,723,685 B2

Before JON B. TORNQUIST, MICHELLE N. ANKENBRAND, and JULIA HEANEY, *Administrative Patent Judges.*

TORNQUIST, *Administrative Patent Judge.*

Appendix C

DECISION
Institution of *Inter Partes* Review
35 U.S.C. § 314(a)

I. INTRODUCTION

Chevron Oronite Company LLC ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–20 of U.S. Patent No. 6,723,685B2 (Ex. 1001, "the '685 patent"). Infineum USA L.P. ("Patent Owner") did not file a Preliminary Response to the Petition.

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314. The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted "unless the Director determines . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition."

After considering the Petition and the evidence of record, we determine that there is a reasonable likelihood that Petitioner will prevail with respect to at least one claim challenged in the Petition. Accordingly, we institute an *inter partes* review on all claims and all grounds set forth in the Petition.

A. Related Proceedings

The parties identify *Infineum USA LP v. Chevron Oronite Company LLC*, Case No. 1-18-cv-00323 (D. Del.),

as a related matter, and note that IPR2018-00923 and IPR2018-00924 are also directed to the '685 patent. Pet. 2; Paper 4, 1.

B. The '685 Patent

The '685 patent is directed to lubricating oil compositions that "exhibit simultaneously improved low temperature valve train wear performance, excellent compatibility with fluoroelastomer materials commonly used for seals in modern internal combustion engines, and improved fuel economy properties." Ex. 1001, 1:4–9.

The '685 patent explains that lubricating oil compositions for combustion engines typically contain a base oil of lubricating viscosity, as well as various additives used "to improve detergency, to reduce engine wear, to provide stability against heat and oxidation, to reduce oil consumption, to inhibit corrosion, to act as a dispersant, and to reduce friction loss." *Id.* at 1:12–19. The '685 patent further explains that "[s]ome additives provide multiple benefits, such as dispersant-viscosity modifiers," whereas other additives improve one characteristic of the lubricating oil while adversely affecting one or more other characteristics. *Id.* at 1:19–22. Thus, according to the '685 patent, "to provide lubricating oil having optimal overall performance, it is necessary to characterize and understand all the effects" of available additives and "carefully balance the additive content of the lubricant." *Id.* at 1:23–26.

The '685 patent discloses that when "small amounts of one or more oil soluble molybdenum compounds," an ashless, organic, nitrogen-free friction modifier, zinc dihydrocarbyl dithiophosphate (ZDDP), and a calcium detergent are added to a base oil having a viscosity of at least 95 and a Noack volatility[1] of less than 15%, a low-cost lubricating composition with improved fuel economy, excellent wear protection, and reduced adverse effects on fluoroelastomer seals is provided. *Id.* at 2:1–8, 2:47–55.

C. Illustrative Claim

Petitioner challenges claims 1–20 of the '685 patent. Independent claim 1 is illustrative of the challenged claims and is reproduced below:

> 1. A lubricating oil composition comprising:
>
> a) an oil of lubricating viscosity having a viscosity index of at least 95;
>
> b) at least one calcium detergent;
>
> c) at least one oil soluble molybdenum compound;
>
> d) at least one organic ashless nitrogen-free friction modifier; and

1. Noack volatility measures the evaporative loss of lubricant oil at high temperature. Ex. 1001, 2:52–54; Ex. 1002 ¶ 23. A lower Noack volatility is associated with a less volatile oil. Ex. 1002 ¶ 23.

> e) at least one metal dihydrocarbyl dithiophosphate compound, wherein said composition is substantially free of ashless aminic friction modifiers, has a Noack volatility of about 15 wt. % or less, from about 0.05 to 0.6 wt. % calcium from the calcium detergent, molybdenum in an amount of from about 10 ppm to about 350 ppm from the molybdenum compound, and phosphorus from the metal dihydrocarbyl dithiophosphate compound in an amount up to about 0.1 wt. %.

Ex. 1001, 13:47–63.

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D. The Asserted Grounds of Unpatentability

Petitioner contends claims 1–20 of the '685 patent are unpatentable in view of the following grounds (Pet. 3–4):[2][3][4][5][6]

References	Basis	Claim(s) Challenged
Toshikazu[3] and Henderson[4]	§ 103	1–3, 6–8, 10–11, 13–15, and 18–20
Toshikazu, Henderson, and Schlicht[5]	§ 103	4
Toshikazu, Henderson, and Walker[6]	§ 103	9, 16, and 17

2. Petitioner also relies on a declaration from Donald J. Smolenski, Ph.D. (Ex. 1002).

3. Japanese Patent Application Publication No. JP1993/279686, published Oct. 26, 1993 (Ex. 1005). Exhibit 1005 contains the English-language translation of Toshikazu, the Japanese language version of this reference, and a declaration attesting to the accuracy of the translation. Our citations are to the English-language translation.

4. H.E. Henderson, et al., *Higher Quality Base Oils for Tomorrow's Engine Oil Performance Categories*, SAE Technical Paper Series 982582, 1–13 (1998) (Ex. 1006).

5. US 3,365,396, issued Jan. 23, 1968 (Ex. 1011).

6. WO/99/60080, published Nov. 25, 1999 (Ex. 1007).

Toshikazu and Henderson	§ 103	1–3, 5–8, 10–15, and 18–20
Toshikazu, Henderson, and Schlicht	§ 103	4
Toshikazu, Henderson, and Walker	§ 103	9, 16, and 17

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2016); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard).

Petitioner does not identify any claims of the '685 patent that are in need of express construction and contends each claim term should be given its "plain and ordinary meaning under the [broadest reasonable interpretation] standard." Pet. 13. Upon review of the Petition and Petitioner's supporting evidence, we determine that no terms of the '685 patent require express construction for purposes of this Decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc.*

v. Am. Sci. & Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999) ("[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.")).

B. Asserted Obviousness of Claims 1–3, 6–8, 10, 11, 13–15 and 18–20 over Toshikazu (Example 16) and Henderson

Petitioner contends the subject matter of claims 1–3, 6–8, 10, 11, 13–15 and 18–20 of the '685 patent would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson. Pet. 18–40.

1. Toshikazu

Toshikazu is directed to lubricating oils that have "good wear resistance and a low friction coefficient." Ex. 1005 ¶ 1. Toshikazu discloses that antiwear agents, such as zinc dithiophosphate (ZnDTP) and zinc dithiocarbamate (ZnDTC), prevent wear by creating protective films on metal surfaces. *Id.* ¶ 6. When antiwear and friction reducing agents are used together in a lubricating composition, however, the function of both components may be inhibited due to competitive adsorption at metal surfaces. *Id.* In addition, ZnDTP and ZnDTC may interact with certain detergent/dispersant additives, further impairing their wear resistance. *Id.* ¶ 7. In view of these interactions, Toshikazu reports that it had not previously been possible to achieve satisfactory wear resistance, friction reduction, cleaning, and dispersion using ZnDTP or ZnDTCin combination with known lubricant additives. *Id.* ¶ 8.

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Toshikazu reports that the above limitations can be overcome

> by using the combination of an organic molybdenum compound and an aliphatic acid ester as a friction reducing agent, by using calcium or magnesium sulfonate, or calcium or magnesium phenate, as a metal detergent, by using benzylamine, alkenyl succinimides, or boron derivatives of alkenyl succinimides, as [an] ashless detergent/dispersant, and by using ZnDTP or ZnDTC as an antiwear additive.

Id. ¶ 10.

Toshikazu discloses nineteen example lubricants and five comparative lubricants. *Id.* at Tables 1 and 2. The contents and test results for Examples 2 and 16 are reproduced below:

		Example	
		2	16
Friction Reducing Agent	MoDTC	0.075	0.15
	MoDTP	---	---
	Aliphatic Acid Glyceride	0.225	0.075
	Oleamide	---	---

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		Example	
		2	16
Metal Detergent	Ca-S (Overbased)	0.72	0.72
	Ca-S (Neutral)	---	---
	Ca-P (Overbased)	---	---
	Mg-S (Overbased)	---	---
Ashless Detergent/ Dispersant	Boron-based Alkenyl Succinimide	---	---
	Alkenyl Succinimide Benzylamine	---	---
Antiwear Additive	*sec*-C_{3-6}ZnDTP	0.96	0.96
	pr-C_{3-6}ZnDTP	---	---
	sec-C_{3-6}ZnDTC	---	---
Base Oil		Mineral Oil	Synthetic Oil
Friction and Wear Characteristics	Friction Coefficient	0.045	0.045
	Wear Track Diameter (mm)	0.44	0.43

As shown in the table above—which is a reproduction of a portion of Table 1 (Example 2) and Table 2 (Example 16)—the lubricants of Examples 2 and 16 each contain MoDTC (an organic molybdenum compound) and aliphatic acid glyceride friction reducing agents, an overbased calcium

sulphonate detergent, a boron-based alkenyl succinimide ashless detergent/dispersant, an *sec*-C_{3-6}ZnDTP antiwear additive, and a base oil comprised of either mineral oil (Example 2) or synthetic oil (Example 16). *Id.* at Tables 1 and 2; *see also id.* ¶¶ 49–50 (identifying the additives used in the example lubricants).

2. Henderson

Henderson discusses the changing requirements in the art for engine oils. Ex. 1006, Abstract. Henderson reports that previous improvements in engine oils had focused on additive technology, but "with the current shift in automotive oil requirements, the need for improved base oils to complement the additives has led to significant refinery investments." *Id.* at 1.[7]

By using higher quality base oils, Henderson reports that an oil formulator may obtain enhanced features, such as "improved fuel economy and retention, oxidation stability, lower volatility for improved oil consumption control, high temperature deposit control and exceptional low temperature pumpability." *Id.* at 4. Given these improved qualities, Henderson explains that the art was shifting towards higher quality base oils with viscosity indices of 100 and above and Noack volatility levels of less than 15%. *Id.* at 2 ("However, this change is considered minor compared to the proposed 15% maximum Noack limit as a secondary mandatory volatility specification.").

7. We refer to the original page numbers of Henderson, not the page numbers Petitioner added.

3. Analysis

Petitioner presents evidence that the lubricating oil of Example 16 of Toshikazu is of lubricating viscosity and contains an overbased calcium sulfonate detergent, an oil soluble molybdenum compound, at least one organic, ashless, nitrogen-free friction modifier in the form of aliphatic acid glycerides, and a metal dihydrocarbyl dithiophosphate compound in the form of *sec*-C_{3-6}ZnDTP. Pet. 22–24. Dr. Smolenski testifies that the composition of Example 16 is substantially free of ashless aminic friction modifiers and calculates that the calcium imparted by the calcium detergents is from 0.08 to 0.12 wt. %, the molybdenum imparted by the soluble molybdenum compound is between 300 and 320 ppm, and the phosphorous imparted by the *sec*-C_{3-6}ZnDTP compound is between 0.09 wt. % and 0.12 wt. %. Pet. 24, 27–30 (citing Ex. 1002 ¶¶ 73–74, 81–90).

With respect to viscosity, the base oil of Example 16 of Toshikazu is composed of 80 wt. % Poly-α-olefin and 20 wt. % diisodecyl adipate (a diester). Ex. 1005 ¶ 49. Dr. Smolenski testifies that a person of ordinary skill in the art would have known that many synthetic base oils, "particularly those that contained poly-α-olefin . . . and diester, had VI [viscosity index] values above 95," and would have found it obvious to select a base oil in Example 16 with a viscosity index above 95 in view of Henderson's disclosure that high quality base oils with a viscosity index above 100 provide "improved fuel economy and retention." Ex. 1002 ¶¶ 61–64; Pet. 20–21.

With respect to Noack volatility, Petitioner contends one of ordinary skill in the art would have understood that low volatility base oils improve the performance of lubricating oil compositions and that poly-α-olefins and dibasic acid esters with Noack volatilities below 15% were available in the art. *Id.* at 24–26 (citing Ex. 1002 ¶¶ 22, 76, 77, 79, 80; Ex. 1006, 2, 4; Ex. 1009, 450). Thus, Petitioner asserts one of ordinary skill in the art would have had a reason to select a synthetic base oil for use in Example 16 of Toshikazu that had a Noack volatility of about 15 wt. % or less. *Id.* at 26–27.

Upon review of Petitioner's arguments and supporting evidence, we determine that Petitioner sufficiently explains how the combined disclosures of Toshikazu (Example 16) and Henderson would have taught or suggested the subject matter of claim 1. Petitioner also sufficiently explains why one of ordinary skill in the art would have looked to Henderson's disclosure when selecting a base oil for use in Example 16. Accordingly, Petitioner has demonstrated a reasonable likelihood that the subject matter of claim 1 would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson.

Claims 2, 3, 6–8, 10, 11, and 13–15 are composition claims that depend, directly or indirectly, from claim 1. Ex. 1001, 13:64–14:43. Claims 18–20 are method claims that are directed to improving certain properties of an internal combustion engine by operating said engine with the lubricating oil composition of claim 1. *Id.* at 14:52–64.

Appendix C

Petitioner, with supporting testimony from Dr. Smolenski, presents evidence that the combined disclosures of Toshikazu (Example 16) and Henderson would have taught or suggested: (1) the use of a calcium sulfonate detergent (claim 2) (Pet. 30 (citing Ex. 1005 ¶ 50, Table 2; Ex. 1002 ¶ 91)); (2) the use of an overbased calcium sulfonate detergent (claim 3) (*id.* at 30–31 (citing Ex. 1005 ¶ 50, Table 2; Ex. 1002 ¶ 92)); (3) use of an organo-molybdenum compound (claim 6) that is in the form of molybdenum dialkyldithiocarbamate (claims 7 and 8) (*id.* at 31–32 (citing Ex. 1002 ¶¶ 93–98; Ex. 1005 ¶ 49, Table 2)); (4) use of a molybdenum/sulfur complex of a basic nitrogen compound (claim 10) (*id.* at 32 (citing Ex. 1005 ¶ 49, Table 2; Ex. 1002 ¶¶ 99–100)); (5) use of at least one zinc dihydrocarbyl dithiophosphate compound, in the form of *sec*-C_{3-6}ZnDTP (claim 11) (*id.* at 33 (citing Ex. 1005, Table 2; Ex. 1002 ¶¶ 101–102)); (6) use of an organic, ashless, nitrogen-free friction modifier that is in the form of an ester (claim 13) (*id.* at 33 (citing Ex. 1002 ¶¶ 103–104 (explaining that the aliphatic acid glyceride friction modifiers of Toshikazu contain an ester that is organic, ashless, and nitrogen free))); (7) use of an ester friction modifier in the form of glycerol monooleate (claim 14) (*id.* at 34 (citing Ex. 1002 ¶ 105 (Dr. Smolenski testifying that the "aliphatic acid glycerides" of Toshikazu contain "a 50/50 mixture of the aliphatic acid esters glycerol monooleate and dioleate"))); and (8) a phosphorus content from the metal dihydrocarbyl dithiophosphate compound that is in the range of 0.09 to 0.12 wt. %, which overlaps with the range of "from about 0.025 wt. % to about 0.1 wt. %" recited in claim 15 (*id.* at 34–35 (citing Ex. 1002 ¶¶ 106–108; Ex. 1005 ¶ 51, Table 2); *see also id.* at 35

(asserting that one of ordinary skill in the art would have sought to reduce the level of phosphorous below 0.1 wt. % in order to avoid known issues of phosphorous poisoning of emission control devices)).

With respect to method claims 18–20, Petitioner contends the preamble phrases of claims 18–20, which identify a particular benefit to be obtained by the claimed methods, are statements of intended use that are not entitled to patentable weight. *Id.* at 35–36 (citing *Minton v. NASD, Inc.*, 336 F.3d 1373, 1381 (Fed. Cir. 2003)). Nevertheless, Petitioner presents evidence that one of ordinary skill in the art would have understood that the lubricating composition of Example 16 of Toshikazu is intended for use in internal combustion engines and that such use would improve fuel economy and fuel economy retention properties (claim 18), anti-wear protection of an internal combustion engine (claim 19), and compatibility between a lubricating oil composition and the seals of an internal combustion engine (claim 20). *Id.* at 36–40.

Upon review of Petitioner's arguments and supporting evidence, we determine that Petitioner has demonstrated a reasonable likelihood that the subject matter of dependent claims 2, 3, 6–8, 10, 11, 13–15, and 18–20 would have been obvious over the combined disclosures of Toshikazu (Example 16) and Henderson.

C. Asserted Obviousness of Claim 4 over Toshikazu (Example 16), Henderson, and Schlicht

Claim 4 depends from claim 3 and further requires that the "overbased calcium sulfonate has a total base number of between about 150 to 450." Ex. 1001, 14:2–5. Petitioner contends the subject matter of this claim would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Schlicht. Pet. 41–42.

1. Schlicht

Schlicht discloses "a method of producing very highly overbased calcium sulfonate-lube oil concentrates, i.e., having a total base number (TBN) greater than about 250." Ex. 1011, 1:25–28. Schlicht reports that "[o]verbased metal sulfonates are known to have excellent detergent characteristics and are particularly effective in preventing sludge build-up in heavy duty oils used for combustion engines such as diesel engines." *Id.* at 1:45–48. According to Schlicht, "[o]ne of the most effective overbased sulfonates is overbased calcium sulfonate." *Id.* at 1:51–52.

Schlicht discloses nine example methods for producing overbased calcium sulfonates having a TBN from 193 to 311. *Id.* at 5:21–7:27.

2. Analysis

The lubricating oil of Example 16 of Toshikazu contains 0.72 wt. % of an overbased calcium sulfonate. Pet.

41 (citing Ex. 1005 ¶ 50, Table 2). Because Toshikazu does not report the TBN of this overbased calcium sulfonate detergent, and because Schlicht's overbased calcium sulfonate detergents with TBN between 191 and 311 are reported to "prevent sludge build-up," Petitioner contends one of ordinary skill in the art would have sought to use the calcium sulfonates of Schlicht in the lubricating composition of Example 16. *Id.* at 42. Petitioner further contends that one of ordinary skill in the art would have expected these compounds to work successfully in Example 16 because calcium sulfonate detergents have a "small inhibition effect on the friction reduction effect," i.e., the overbased compounds of Schlicht would not be expected to interfere with the friction reducing characteristics of ZnDTP. *Id.*; Ex. 1005 ¶¶ 7, 34.

On this record, Petitioner sufficiently explains why one of ordinary skill in the art, needing to select an appropriate overbased calcium sulfonate detergent for use in Example 16, would have looked to the overbased calcium sulfonate detergents of Schlicht. Accordingly, Petitioner has demonstrated a reasonable likelihood that the subject matter of claim 4 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Schlicht.

D. Asserted Obviousness of Claims 9, 16, and 17 over Toshikazu (Example 16), Henderson, and Walker

Claim 9 depends from claim 8 and further requires that "said molybdenum compound is a trinuclear molybdenum compound." Ex. 1001, 14:21–23. Claim 16

depends from claim 15 and further requires that the composition contain "from about 0.025 wt. % to 0.075 wt. % phosphorus from the metal dihydrocarbyl dithiophosphate compound." *Id.* at 14:44–47. Claim 17 depends from claim 16 and further requires that the phosphorus from the metal dihydrocarbyl dithiophosphate compound is "from about 0.025 wt. % to 0.05 wt. %." *Id.* at 14:48–51.

Petitioner contends the subject matter of claims 9, 16, and 17 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Walker. Pet. 43–47.

1. Walker

Walker discloses crankcase lubricants for internal combustion engines that are composed of "a lubricating base stock, a dispersant, a metal dihydrocarbyl dithiophosphate, and either a copper-containing compound or a molybdenum-containing compound." Ex. 1007, 1:3–5, 2:12–15.[8]

Walker instructs that the molybdenum compound may be selected from, among other things, molybdenum salts of inorganic or organic acids or molybdenum compounds comprising a "trinuclear molybdenum core." *Id.* at 11:7–12:14. According to Walker, the trimer form of the molybdenum compounds "may be represented by the general formula $Mo_3S_kL_p$," wherein "L represents a ligand

8. We refer to the original page numbers of Walker, not the page numbers Petitioner added.

for example dithiocarbamate," "p is in the range from 1 to 4," and "k is at least 4, especially 4 to 10, preferably 4 to 7." *Id.* at 12:6–11.

Walker discloses that "the phosphorus content of the composition is at most 0.08% and preferably it is at most 0.06%, more preferably at most 0.05%, by weight of the composition." *Id.* at 2:26–29.

2. Analysis—Claim 9

Petitioner presents evidence that the lubricant of Example 16 of Toshikazu includes a molybdenum dialkyldithiocarbamate compound. Pet. 43; Ex. 1005 ¶ 49, Table 1. Dr. Smolenski testifies that one of ordinary skill in the art would have understood that the trinuclear molybdenum dialkyldithiocarbamate of Walker could be substituted for this molybdenum dialkyldithiocarbamate and would have been expected to exhibit "similar results" to those disclosed in Example 16 of Toshikazu. Pet. 43–44 (citing Ex. 1002 ¶ 130).

When a known compound is altered "by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." *KSR Int'l Co v. Teleflex Inc.*, 550 U.S. 398, 416 (2007) ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."). On this record, Petitioner has demonstrated sufficiently for purposes of institution that the substitution of the trinuclear molybdenum dialkyldithiocarbamate of Walker for the

dialkydithiocarbamate of Toshikazu would constitute the mere substitution of one known element for another known element and would yield a predictable result. *See* Ex. 1007, 11:7–12:11 (disclosing a broad array of acceptable molybdenum compounds, including those containing a trinuclear molybdenum core). Accordingly, Petitioner has demonstrated a reasonable likelihood that the subject matter of claim 9 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Walker.

3. Analysis—Claims 16 and 17

Petitioner concedes that the wt. % of phosphorus imparted by the 0.96 wt.% *sec*-C_{3-6}ZnDTP in Example 16 of Toshikazu is higher than the ranges recited in claims 16 and 17. Pet. 44 (citing Ex. 1002 ¶¶ 132, 137). Petitioner contends, however, that one of ordinary skill in the art would have been motivated to reduce the phosphorus content of Example 16 "down to 0.05%" in view of both Walker's disclosure of maintaining phosphorus levels at or below 0.05 wt. %, and in view of a proposed industry standard limiting phosphorus in lubricating compositions to 0.05%. *Id.* at 45 (citing Ex. 1014, 1; Ex. 1002 ¶¶ 133, 138; Ex. 1007, 2:26–29). Petitioner further contends that one of ordinary skill in the art reviewing the results reported in Walker would have expected that a lubricating oil composition with reduced loading of phosphorus would work successfully "despite having a lower amount of ZDDP." *Id.* at 46 (citing Ex. 1002 ¶¶ 135, 140).

Toshikazu discloses using 0.1 to 7 wt. % of at least one organic zinc compound selected from the group consisting of zinc dithiophosphate and zinc dithiocarbamate. Ex. 1005 ¶ 11, Claim 1. Thus, it appears that Toshikazu contemplates using *sec*-C_{3-6}ZnDTP at levels one ninth of that used in Example 16. Given this disclosure, Walker's disclosure of successfully reducing the loading of metal dihydrocarbyl dithiophosphate compounds in lubricating compositions, and the known need for compositions with phosphorus levels at or below 0.05 wt. %, we determine that Petitioner has demonstrated a reasonable likelihood that the subject matter of claims 16 and 17 would have been obvious over the combined disclosures of Toshikazu (Example 16), Henderson, and Walker.

E. Asserted Obviousness of Claims 1–3, 6–8, 10, 11, 13–15 and 18–20 over Toshikazu (Example 2) and Henderson

Petitioner contends that the subject matter of claims 1–3, 6–8, 10, 11, 13–15 and 18–20 of the '685 patent would have also been obvious over the combined disclosures of Example 2 of Toshikazu and Henderson. Pet. 47–67.

Similar to its ground based on Example 16 of Toshikazu, Petitioner provides evidence that the lubricating composition of Example 2 is of lubricating viscosity and contains at least one calcium detergent, at least one oil soluble molybdenum compound, at least one organic ashless nitrogen-free friction modifier, and at least one metal dihydrocarbyl dithiophosphate compound. Pet. 47–51. Petitioner also presents evidence that the

lubricating composition is substantially free of ashless aminic friction modifiers, has a molybdenum content in an amount from about 10 ppm to 350 ppm, and has a range of calcium content from the calcium detergent and a range of phosphorus content from the metal dihydrocarbyl dithiophosphate that overlap with the ranges recited in claim 1. *Id.* at 51, 54–55.

The lubricating oil of Example 2 differs from the lubricating oil of Example 16 in that it has a mineral base oil. Ex. 1005, Tables 1 and 2. This mineral base oil is described in Toshikazu as a "150 neutral mineral oil, kinematic viscosity at 100 °C: 5.1 cSt." Ex. 1005 ¶ 49. Dr. Smolenski testifies that one of ordinary skill in the art would have understood that a mineral base oil with the disclosed kinematic viscosity "may have" a viscosity index of greater than 95 and would have selected such a base oil in view of Henderson's disclosure that oils with increased viscosity improve fuel economy and retention. Ex. 1002 ¶¶ 146–148.

With respect to Noack volatility, Dr. Smolenski testifies that the mineral base oil disclosed in Toshikazu "may have a Noack volatility approaching 15 wt.%" and, to the extent it does not, it would have been obvious to replace it with one that did, such as a poly-α-olefin or diester base stock, in view of Henderson's disclosure that a 15% Noack volatility limit had been proposed in the art. Ex. 1002 ¶¶ 160–165; Pet. 51–53.

On this record, Petitioner has not demonstrated that the mineral oil of Example 2 has a Noack value of 15% or

less, as recited in claim 1. Nor has Petitioner demonstrated that one of ordinary skill in the art could have and would have modified the mineral oil of Example 2 to achieve the claimed Noack values. At best, Petitioner demonstrates that it was possible to achieve a mineral oil base with a Noack value "approaching 15%." *See* Ex. 1002 ¶ 160.

There is at least some evidence, however, to support Dr. Smolenski's testimony that one of ordinary skill in the art, to the extent they could not formulate the mineral oil of Example 2 to have a Noack volatility of 15% or less, would have sought to use a poly-α-olefin and diester base stock with a viscosity index above 95 and a Noack volatility less than 15% as the base oil in Example 2 of Toshikazu. First, Toshikazu indicates that "[t]here is no particular limitation on the base oil used in the present invention, and it is possible to use various types of mineral oils, synthetic oils and so on that are known in the art." Ex. 1005 ¶ 12. Second, Henderson discloses that increased viscosity and reduced Noack volatility improve the performance of base oils, and Dr. Smolenski testifies that one of ordinary skill in the art would have understood that the synthetic oil of Toshikazu could be selected to have these properties. Ex. 1006, 2, 4; Ex. 1002 ¶¶ 146–148, 160–165. Accordingly, we determine that Petitioner has demonstrated a reasonable likelihood that the subject matter of claim 1 would have been obvious over the combined disclosures of Toshikazu (Example 2) and Henderson.

With respect to dependent claims 2, 3, 6–8, 10, 11, 13–15, and 18–20, Petitioner provides argument and supporting evidence to explain where the combined

disclosures of Toshikazu (Example 2) and Henderson taught or suggested the subject matter of these claims. Pet. 55–65. Upon review of these arguments and Petitioner's supporting evidence, we determine that Petitioner has demonstrated a reasonable likelihood that the subject matter of claims 2, 3, 6–8, 10, 11, 13–15, and 18–20 would have been obvious over the combined disclosures of Toshikazu (Example 2) and Henderson.

F. Asserted Obviousness of Claim 4 over Toshikazu (Example 2), Henderson, and Schlicht and Claims 9, 16, and 17 over Toshikazu (Example 2), Henderson, and Walker

Petitioner contends that the subject matter of claim 4 would have been obvious over the combined disclosures of Toshikazu (Example 2), Henderson, and Schlicht, and that the subject matter of claims 9, 16, and 17 would have been obvious over the combined disclosures of Toshikazu (Example 2), Henderson, and Walker. Pet. 66–67. In these grounds, Petitioner relies on "substantially the same reasons as discussed above" for the grounds based on Example 16 of Toshikazu. *Id.* Thus, for the reasons set forth above, we determine that Petitioner has demonstrated a reasonable likelihood that the subject matter of claim 4 would have been obvious over the combined disclosures of Toshikazu (Example 2), Henderson, and Schlicht and that the subject matter of claims 9, 16, and 17 would have been obvious over the combined disclosures of Toshikazu (Example 2), Henderson, and Walker. *See supra* §§ II.C–II.D.

Appendix C

III. CONCLUSION

For the forgoing reasons, Petitioner has demonstrated a reasonable likelihood that at least one challenged claim of the '685 patent would have been obvious over the prior art of record. Accordingly, we institute an *inter partes* review on all claims and all grounds set forth in the Petition.

IV. ORDER

It is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314, an *inter partes* review is instituted on all claims and all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, *inter partes* review of the '685 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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Appendix C

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APPENDIX D — DENIAL OF REHEARING OF THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT, FILED APRIL 6, 2021

UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

2020-1333

INFINEUM USA L.P.,

Appellant,

v.

CHEVRON ORONITE COMPANY LLC,

Appellee,

ANDREW HIRSHFELD, PERFORMING THE FUNCTIONS AND DUTIES OF THE UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE,

Intervenor.

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2018-00922.

ON PETITION FOR PANEL REHEARING AND REHEARING EN BANC

Appendix D

Before PROST, *Chief Judge*, NEWMAN, LOURIE, O'MALLEY, REYNA, WALLACH, TARANTO, CHEN, HUGHES, and STOLL, *Circuit Judges*.*

PER CURIAM.

ORDER

Infineum USA L.P. filed a combined petition for panel rehearing and rehearing en banc. The petition was referred to the panel that heard the panel, and thereafter the petition for rehearing en banc was referred to the circuit judges who are in regular active service.

Upon consideration thereof,

IT IS ORDERED THAT:

The petition for panel rehearing is denied.

The petition for rehearing en banc is denied.

The mandate of the court will issue on April 13, 2021.

FOR THE COURT

April 6, 2021
Date

/s/ PETER R. MARKSTEINER
Peter R. Marksteiner
Clerk of Court

* Circuit Judges Dyk and Moore did not participate.