

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VANTAGE SPECIALTY CHEMICALS, INC.,
Petitioner,

v.

CARGILL, INC.,
Patent Owner.

IPR2023-00589
Patent 11,248,245 B2

Before SHERIDAN K. SNEDDEN, TIMOTHY G. MAJORS, and
MICHAEL A. VALEK, *Administrative Patent Judges*.

MAJORS, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining No Challenged Claims Unpatentable

35 U.S.C. § 318(a)

Denying Petitioner's Motion to Exclude

37 C.F.R. § 42.64

Conditionally Granting Parties' Joint Motions to Seal

37 C.F.R. § 42.14

I. INTRODUCTION

Vantage Specialty Chemicals, Inc. (“Petitioner” or “Vantage”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–3 and 5 of U.S. Patent No. 11,248,245 B2 (Ex. 1001, “the ’245 patent”). Pet. 3–4.

We instituted trial on September 13, 2023. Paper 11 (“Inst. Dec.”). During trial, Cargill (“Patent Owner” or “Cargill”) filed a Patent Owner Response. Paper 22 (“PO Resp.”). Later filings include Petitioner’s Reply (Paper 33 (“Pet. Reply”)) and Patent Owner’s Sur-Reply (Paper 41 (“PO Sur-Reply”)). An oral hearing was held on June 11, 2024, and a transcript is of record. Paper 53 (“Tr.”).

Petitioner filed a motion to exclude (Paper 47; Paper 50 (reply in support of motion)). Patent Owner opposed that motion. Paper 48. Motions to seal also remain pending (Papers 34 and 39).

We have jurisdiction under 35 U.S.C. § 6(b). After considering the full record developed through trial, we determine that Petitioner has not proved by a preponderance of the evidence that the challenged claims are unpatentable. *See* 35 U.S.C. § 316(e). Our reasoning is explained below, and we issue this Final Written Decision under 35 U.S.C. § 318(a).

II. BACKGROUND

A. *Real Parties-in-Interest*

Vantage identifies itself as the real party-in-interest. Pet. 2. Cargill identifies itself as the real party-in-interest. Paper 3, 2.

B. *Related Matters*

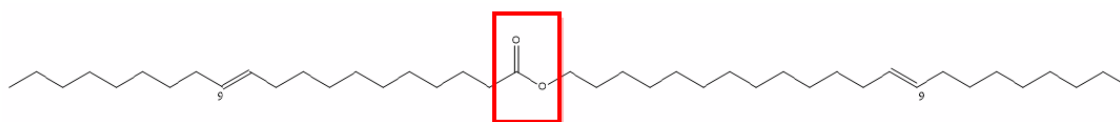
The parties identify the following lawsuit involving assertion of the ’245 patent: *Cargill, Inc. v. Vantage Specialty Chemicals, Inc.*, 1:22-cv-00979 (D. Del.). Pet. 2; Paper 3, 2.

C. The '245 Patent & Background Technology

The '245 patent, titled “Processes and Systems for Catalytic Manufacture of Wax Ester Derivatives,” issued on February 15, 2022. Ex. 1001, codes (45), (54). The application that matured into the '245 patent was filed December 19, 2014. *Id.* at code (22).¹ The patent lists Jeff Addy, Clay Daly, and James H. Brown as inventors, and lists International Flora Technologies, Ltd. as assignee.² *Id.* at codes (72), (73).

“Wax esters are found in various animals and plants, including the jojoba plant (*Simmondsia chinensis*).” *Id.* at 1:14–16. According to the '245 patent, “[w]ax esters are used in various applications, including in cosmetic and personal care products.” *Id.* at 1:16–18. “A wax ester is formed from the chemical reaction of a fatty acid and a fatty alcohol, which results in the formation of an ester group that links two carbon chains.” *Id.* at 1:12–14.

The chemical structure for a representative jojoba wax ester is shown below.



Jojoba Wax Ester Structure.

Ex. 2009 ¶ 53. As shown above and as Patent Owner’s expert Dr. Thomas Schultz explains, “jojoba wax esters are monoesters (i.e., having one ester group) with two long carbon chains on either side of the ester”—the ester

¹ In this Decision, we consider December 19, 2014 to be the priority date. Pet. 11 n.2 (asserting priority “no earlier than December 19, 2014”).

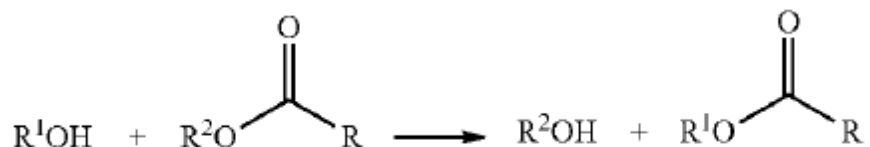
² Patent Owner, Cargill, indicates that International Flora Technologies, Ltd. (“Floritech”) is “Cargill’s predecessor-in-interest.” PO Resp. 61–62.

bond depicted in the red box near the center of the molecule. *Id.* (noting that jojoba wax esters are formed by combinations of, in most cases, twenty carbon (C20) and twenty-two carbon (C22) unsaturated fatty acids and fatty alcohols). One side chain of the wax ester is derived from a fatty acid, while the other side chain is derived from a fatty alcohol, and each side chain shown above includes a single carbon-carbon double bond (C=C) between the ninth and tenth carbons (counting from the ester molecule's respective terminal ends). *Id.* (citing Ex. 1010, 2:51–54). Although sometimes referred to as “oils,” jojoba wax esters are “not technically oils” and, instead, are comprised almost entirely of pure waxes. *Id.* ¶ 52 (citing, e.g., Ex. 1028, 5–7) (“Jojoba esters are proper waxes, with no triglyceride components”); Ex. 1004, 1 (jojoba oil “is chemically a liquid wax ester”).

The '245 patent describes processes for “transesterifying” wax esters. Ex. 1001, Abstr., 1:22–2:41. The wax esters, which are provided as “feedstock” to the transesterification process, include jojoba wax esters and hydrogenated jojoba wax esters. *Id.* at 1:29–45, 12:26–14:23 (Example 3 disclosing jojoba oil and hydrogenated jojoba oil as a combined feedstock to a lipase-catalyzed transesterification reaction).³

³ The hydrogenation state of lipid materials relates to the extent to which lipids chains are unsaturated (include one or more carbon-carbon (C=C) double bonds in the chain) or fully saturated (no carbon-carbon double bonds). *See, e.g.,* Ex. 1005, 2; Ex. 2009 ¶ 54 (testifying a chain may be saturated (no C=C bonds), monounsaturated (single C=C), or polyunsaturated (multiple C=C bonds)); *see also* Ex. 1005, 2–3 (discussing whether the C=C double bond of a lipid is in a *cis* configuration (hydrogens of the double bond on the same side of the chain) or *trans* configuration (hydrogens of the double bond on opposite sides of the chain)); Ex. 1006, 1 (“The majority of all lipids produced by nature contain only ‘cis’ isomers.”).

“Transesterification involves the process of exchanging acyl groups located on each side of a[n] ester group with an acyl group contained in an alcohol group.” *Id.* at 3:28–30. An example of a transesterification reaction is illustrated below.

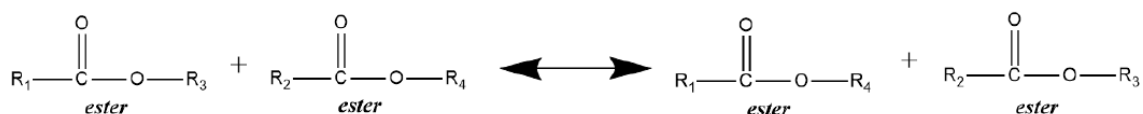


Id. at 3:31–37. The image above is a schematic of the chemical reaction where the R¹ group of the alcohol and the R² group of the ester reactants on the left side of the arrow are exchanged, resulting in an alcohol product R²OH and an ester product R-COO-R¹ on the right side.

As Dr. Schultz explains, transesterification reactions are classified into several categories, the common categories being acidolysis, alcoholysis, and interesterification. Ex. 2009 ¶ 59. Pertinent to Petitioner’s challenge to the claims here, a transesterification reaction may involve the exchange of acyl groups directly between two esters, in a so-called “[e]ster-ester exchange reaction.” *Id.*; *see also id.* Ex. 1003 ¶¶ 56–57 (testimony from Petitioner’s expert Dr. Rockstraw about the ester-ester exchange reaction in Cummings (Ex. 1004, Fig. 1) between jojoba oil and fully saturated jojoba oil); Ex. 1008, 298 (“Ester-ester exchange is a reaction between two esters.”); Ex. 2046, 23:2–12 (testifying that the claimed transesterifying step is an ester-ester reaction between the esters, specifically jojoba wax esters and hydrogenated/saturated jojoba wax esters).

Transesterification or interesterification with an illustrative ester-ester exchange is depicted in the schematic reaction below.

Ester-ester exchange reaction



Ex. 2009 ¶ 59. In the reaction shown above, “a first ester (R1-COO-R3) is reacted with a second ester (R2-COO-R4) such that the chains on either side of each ester are swapped with one another, forming new esters (R1-COO-R4 and R2-COO-R3, among others).” *Id.* ¶ 61 (citing, e.g., Ex. 1014, 6); *see also id.* ¶ 62 (showing an ester-ester exchange reaction (adapted from Ex. 1014, 6) between jojoba oil and hydrogenated jojoba oil in the presence of a chemical catalyst (i.e., sodium methylate) that randomizes the C22 and C20 carbon chains on either side of the ester bond in the reaction product).

According to the '245 patent, “[t]ransesterification for naturally occurring or structured or synthetic esters permits altering of various physical properties of the transesterified product when compared to the original feedstock.” *Id.* at 3:38–41. The patent explains that “physical properties such as viscosity, dropping point, oil (oxidative) stability index (OSI), carbon chain distribution, and other properties of the transesterified product may be greater, equal to, or less than the corresponding values of the original wax-ester containing feedstocks.” *Id.* at 3:41–51 (“These changes take place at least in part because the chain lengths of the resulting ester products are randomized compared to the distribution in the original wax ester feedstock.”).

The '245 patent states that “conventional transesterification reactions use a chemical catalyst, such as sodium methylate (methoxide) or sodium hydroxide.” *Id.* at 3:66–4:1. In the '245 patent, however, “processes for transesterifying wax esters are disclosed that use enzymes to catalytically facilitate the transesterification reaction.” *Id.* at 4:57–59. “In particular

implementations, the enzymes are lipases, which are proteins that various biological organisms use to catalyze the hydrolysis and/or esterification of various compounds, such as lipids.” *Id.* at 4:59–62.

D. Illustrative Claims

Claim 1, the only independent claim of the ’245 patent, is illustrative of the challenged claims. It reads:

1. [preamble] A process for transesterifying wax esters, the process comprising:
 - [1a] providing a feedstock comprising jojoba wax esters and hydrogenated jojoba wax esters, wherein the amount of hydrogenated jojoba wax esters is 20% to 50% by weight of the feedstock;
 - [1b] contacting the feedstock with a lipase; and transesterifying the jojoba wax esters and the hydrogenated jojoba wax esters in the feedstock with the lipase to form a transesterified product;
 - [1c] wherein an oxidative stability index (OSI) of the transesterified product is greater than an OSI of the feedstock.

Ex. 1001, 19:8–21 (adding bracketed designations consistent with Petitioner’s annotation of claim 1). Challenged claims 2, 3, and 5 each depend from claim 1. Claim 2 adds that “the feedstock consists essentially of the jojoba wax esters and the hydrogenated wax esters”; claim 3 adds that “the feedstock does not comprise any free fatty alcohols”; and claim 5 adds that “the feedstock does not comprise any methyl esters.” *Id.* at 20:7–19.

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–3 and 5 are unpatentable on the following grounds:

Claims Challenged	35 U.S.C. § ⁴	References/Basis
1–3, 5	103	Cummings, ⁵ Xu, ⁶ Sessa ⁷
1–3, 5	103	Trans Isomers 2, ⁸ Xu, Sessa
1–3, 5	103	Trans Isomers 2, Trans Isomers 1, ⁹ Sessa
1–3, 5	103	Brown, ¹⁰ Xu, Cummings, Sessa

Petitioner submits testimony from David A. Rockstraw, Ph.D., P.E., in support of its challenge to the claims. Ex. 1003 (Rockstraw Decl.). Patent Owner responds with testimony from Thomas Schultz, Ph.D. Ex. 2009 (Schultz Decl.). The deposition testimony from Drs. Rockstraw (Ex. 2046) and Schultz (Ex. 1041) is also of record.

⁴ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. §§ 102, 103 effective March 16, 2013. The ’245 patent claims priority to an application filed December 19, 2014, and we apply §§ 102 and 103 under the AIA. Ex. 1001, code (22).

⁵ Melanie Cummings et al., *A natural alternative*, Soap, Perfumery, and Cosmetics (SPC) Asia (May 1, 1999) (Ex. 1004 (“Cummings”)).

⁶ Xuebing Xu, *Engineering of enzymatic reactions and reactors for lipid modification synthesis*, 105 Eur. J. Lipid Sci., Technol., 289–304 (2003) (Ex. 1008 (“Xu”)).

⁷ David J. Sessa, *Derivation of a Cocoa Butter Equivalent from Jojoba Transesterified Ester via a Differential Scanning Colorimetry Index*, 72 J. Sci. Food Agric., 295–298 (June 3, 1996) (Ex. 1009 (“Sessa”)).

⁸ James Brown & Robert Kleinman, *Trans Isomers in Cosmetics Part 2*, Soap & Cosmetics (June 2001) (Ex. 1006 (“Trans Isomers 2”)).

⁹ James Brown & Robert Kleinman, *Trans Isomers in Cosmetics*, Soap & Cosmetics (May 2001) (Ex. 1005 (“Trans Isomers 1”)).

¹⁰ Brown, US RE38,141 E, issued June 10, 2003 (Ex. 1007 (“Brown”)).

III. ANALYSIS

A. *Legal Standards*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3)).

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious at the time the invention was made (or, for post-AIA inventions as here, before the effective filing date) to a person having ordinary skill in the relevant art. *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) secondary considerations of nonobviousness when presented. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Moreover, “[a]n obviousness determination requires finding both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *CRFD Research, Inc. v. Matal*, 876 F.3d 1330, 1340 (Fed. Cir. 2017) (internal quotation marks omitted).

B. *Level of Ordinary Skill in the Art*

In determining the level of skill in the art, we consider the problems encountered in the art, the art’s solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the

educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

Petitioner proposes that the person of ordinary skill in the art (“POSA”) would have had “at least a B.S. in Chemical Engineering, Chemistry, or a related field, and three years[’] work experience working in the specialty chemicals industry . . . although more education or skill might make up for less experience and vice-versa.” Pet. 9 (citing Ex. 1003 ¶¶ 30–32). Patent Owner proposes essentially the same description, and adds that the “specialty chemicals industry” includes “the beauty, personal care, home care, food, or environmental chemical industries or in other specialty chemical industry areas.” PO Resp. 24–25.

We apply Petitioner’s POSA definition with Patent Owner’s further elaboration to that definition. On this record, this POSA definition is consistent with the skill level reflected in the prior art.

C. Claim Construction

In *inter partes* review, we construe claims using the same claim construction standard used to construe the claim in a civil action before the courts under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by the POSA and the patent’s prosecution history. 37 C.F.R. § 42.100(b). We need only construe terms that are in controversy and only as needed to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019).

Petitioner does not identify any claim term for which it is seeking an express claim construction. Pet. 9–10. Patent Owner cites the district court’s claim construction order (Ex. 2006, 1) but, like Petitioner, does not identify any terms that require express claim construction here. PO Resp. 25

(“Given the arguments before the Board at this time, it is not currently necessary to resolve the issues related to claim construction.”).

We have considered the court’s claim construction order. Ex. 2006, 1. On this record, however, we need not further construe the claims to resolve the dispute before us. *See Realtime Data*, 912 F.3d at 1375. Thus, in this Decision, we apply the plain and ordinary meaning of the claims as written.

D. Ground 1 – Obviousness over Cummings, Xu, and Sessa

Petitioner contends that claims 1–3 and 5 would have been obvious over Cummings in view of Xu and/or in further view of Sessa. Pet. 27–42.

Petitioner contends, and Patent Owner does not dispute, that Cummings, Xu, and Sessa are prior art to the ’245 patent. *Id.* at 10–11, 23, and 26. We agree that Cummings, Xu, and Sessa qualify as prior art.

We summarize the asserted prior art below before turning to the parties’ arguments and our analysis.

1. Cummings (Ex. 1004)

Cummings is an article entitled “*A natural alternative*” that published in May 1999. Ex. 1004, 1. Cummings relates to “Jojoba esters,” which are described as new, “naturally derived, oil free emollients” that “offer good properties for a wide variety of cosmetic products.” *Id.* (describing the Cummings article as being from “Floritech” representatives about Jojoba esters products (i.e., “Floraesters (INCI name: jojoba esters)”).¹¹

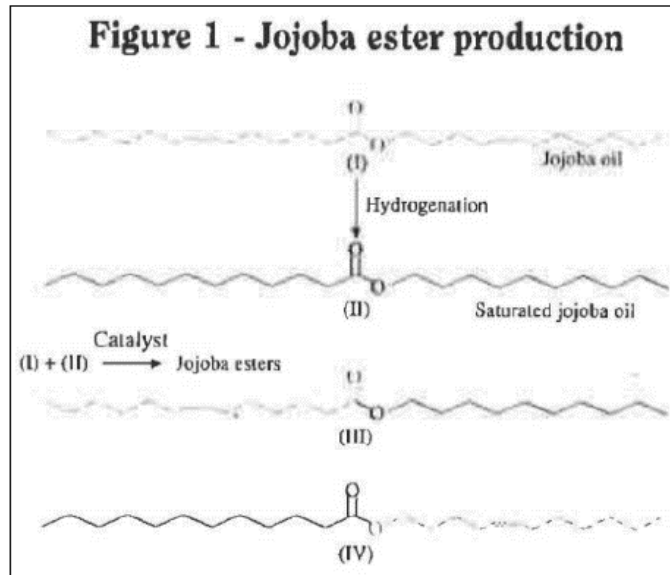
Cummings provides a brief history about jojoba oil’s harvesting and use. *Id.* (“While other seed oils are triglycerides,” the jojoba plant provides

¹¹ According to Patent Owner and Dr. Schultz, standard industry practice with marketing publications like Cummings avoids use of trade names, explaining why Cummings generally refers to the products as “Jojoba esters” rather than “Floraesters.” PO Resp. 40 n.2; Ex. 2009 ¶ 139 n.3.

a “unique oil that is chemically a wax ester” and includes “no undesirable triglycerides.”). According to Cummings, “[j]ojoba oil is oxidatively stable and a popular cosmetic ingredient known for its non-greasy skin feel.” *Id.* Cummings discloses that “[j]ojoba oil is a complex mixture consisting predominantly of 40 and 42 carbon straight-chain monoesters composed of C20 and C22 fatty alcohols and fatty acids.” *Id.* at 2 (teaching jojoba oil “has a double bond located between the ninth and tenth carbon position from the ends of the carbon chain.”).

Cummings discloses a “new family” of jojoba ester products, which Cummings describes as “unique compositions of a broad range of saturated, partially saturated and unsaturated wax esters.” *Id.* at 1. Cummings teaches that “jojoba esters are a new creation of oxidatively stable, plant-derived, oil-free emollients shown to be non-toxic, non-comedogenic, hypoallergenic and biodegradable.” *Id.* “The jojoba ester family presently consists of the following five products: jojoba esters (15), (20), (30), (60), and (70).” *Id.* at 2; *see also id.* (Fig. 2, “Jojoba ester composition”). Cummings teaches that the jojoba esters have shown improved cosmetic, functional, and structural properties in a broad array of personal care products. *Id.* at 1 (noting that these jojoba esters have provided “distinct utility” in pigmented systems “where emolliency and oxidative stability is sometimes lacking”).

Cummings also provides an overview of jojoba ester production through “interesterification.” *Id.* at 1–2. Figure 1 of Cummings is reproduced below.



Id. at 2. Figure 1 depicts an “interesterification” reaction, in which jojoba oil (I) is combined with saturated jojoba oil (II) in the presence of a catalyst, to produce illustrative jojoba esters (III) and (IV). *Id.* As shown, jojoba esters (III) and (IV) combine an unsaturated lipid chain component from the jojoba oil (faint, hashed line and including C=C double bond) and a saturated lipid chain component (bold, unbroken line without a C=C double bond) from a fully saturated (fully hydrogenated) jojoba oil to form new esters.¹² *Id.* As Cummings further explains:

Jojoba oil is converted to jojoba esters through a process known as interesterification. In this process, different ratios of unsaturated jojoba oil are combined with fully saturated jojoba oil and then interesterified. The process results in jojoba esters engineered to deliver specific physical, functional and chemical characteristics.

¹² Cummings’s Figure 1 is lacking in image quality. A similar reaction schema is shown more clearly in Exhibit 1014, 6 (Fig. 4) and in the declarations of the parties’ experts. *See* Ex. 1003 ¶ 65; Ex. 2009 ¶ 62 (discussing reaction and adapting figure for improved clarity).

Id. This process “produces jojoba esters engineered to contain different ratios of molecules with either no double bonds (fully saturated), one double bond (monounsaturated) or two double bonds (fully unsaturated).” *Id.* (“[T]hese compositional differences within the family of jojoba esters . . . create their expanded utility in cosmetic preparations.”).

Cummings teaches that “[j]ojoba esters are more oxidatively stable than most similar cosmetic ingredients.” *Id.* According to Cummings, “[o]xidative stability of many cosmetic ingredients can be measured to determine an Oxidative Stability Index (OSI).” Further, Cummings teaches, “Jojoba esters demonstrate remarkable stability with OSI values of all jojoba esters greater than 100 hours and as high as 675 hours. The OSI of refined jojoba oil is around 35 hours.” *Id.*

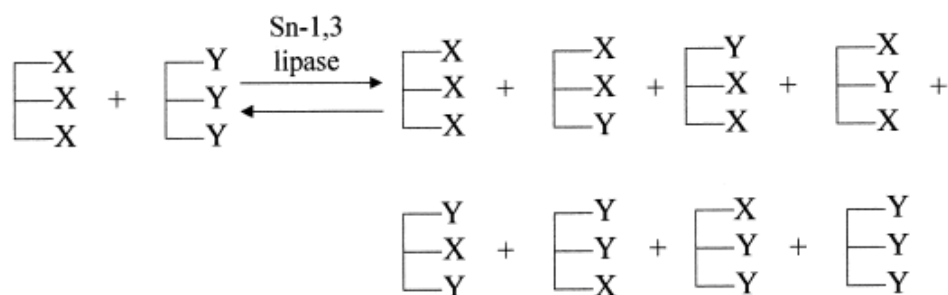
2. *Xu (Ex. 1008)*

Xu is a journal article titled “*Engineering of enzymatic reactions and reactors for lipid modification and synthesis*,” which published in 2003. Ex. 1008, 289.

Xu teaches that “enzymes can also be used for the catalysis of . . . esterification,” which “opens up a variety of potential applications in the lipid area.” *Id.* According to Xu, “a reaction such as interesterification (acidolysis, alcoholysis, and ester-ester exchange) is also possible with the catalysis of lipases.” *Id.* Xu teaches that “chemical interesterification, which has been implemented in the current industry can be fully replaced.” *Id.*; *see also id.* at 301 (“In principle, many chemical methods can be replaced by enzymatic ones.”).

Xu teaches that “[e]nzymatic ester-ester exchange is an alternative to the chemical method for the modification of oils and fats” and depicts the reaction scheme using a *sn*-1,3 lipase. *Id.* at 298–299 (“The reaction is

given in Fig. 18”). That reaction scheme, shown in Xu’s Figure 18, is reproduced below:



X and Y are two types of fatty acids.

Fig. 18. Reaction scheme of enzymatic ester-ester exchange between two triacylglycerols (XXX and YYY) with *sn*-1,3 specific lipases.

Id. at 298–299, Fig. 18. Figure 18 above shows a “[r]eaction scheme of enzymatic ester-ester exchange between two triacylglycerols (XXX and YYY) with *sn*-1,3 specific lipases.” *Id.* As Xu discloses, because the lipase is *sn*-1,3 specific, the *sn*-1,3 positions of the triacylglycerols (TAGs) in this reaction will be exchanged while the *sn*-2 position of the original XXX and YYY triacylglycerol molecules is maintained. *See id.* (explaining that this enzymatic reaction is different, in principle, from the chemical reaction in which all positions will be randomized).

Xu discloses several factors contributing to the interest in enzymatic lipid processing. Xu lists “improvement of product quality refereeing to mild conditions,” “reduction in enzyme price,” and “environmental considerations,” among others. *Id.* at 289. According to Xu, “[t]his list can be prolonged: ‘image’ strategy by using enzyme technology is important for many industrial companies; energy-efficiency of the technology is also often mentioned.” *Id.*

Xu teaches that “[t]he major enzymatic reactions for the modification of lipids are often referring to hydrolysis, esterification, acidolysis, alcoholysis, and ester-ester exchange from the reaction mechanisms.” *Id.* at 290. As Xu explains, “[i]nteresterification or transesterification is also commonly used in literature to describe some of the above reactions.” *Id.* Xu further explains that both interesterification and transesterification are often used in the literature to describe “ester-ester exchange.” *Id.*

3. *Sessa (Ex. 1009)*

Sessa is a journal article titled “*Derivation of a Cocoa Butter Equivalent from Jojoba Transesterified Ester via a Differential Scanning Calorimetry Index*,” which published in 1996. Ex. 1009, 295.

Sessa teaches that “[a] series of wax ester blends was constructed by transesterifying native jojoba oil with 50–500 g kg⁻¹ completely hydrogenated jojoba wax esters.” *Id.* at Abstr. According to Sessa, “[n]atural cocoa butter and the calibration sets consisting of native jojoba wax esters that were transesterified with proportionate blends of completely hydrogenated wax esters to give a series of 50, 100, 150, 200, 300, 400 and 500 g kg⁻¹ saturated esters were provided.” *Id.* at 296.

Sessa describes, through mathematical and statistical techniques, estimating the level of saturation of the blends. *Id.* at 295–296 (noting that the study aimed to use the derived indices to select a jojoba saturation blend that most closely mimics thermal properties of cocoa butter); *see also id.* at 298 (“We devised mathematical indices . . . to define the level of saturation needed for obtaining a cocoa butter equivalent.”).

Sessa discloses that “[t]he wax ester blend with 400 g kg⁻¹ saturation most closely resembled the thermal properties of cocoa butter.” *Id.* at Abstr.; *see also id.* at 296–298 (discussing results).

4. *Analysis*

We provide an overview of the parties' arguments regarding claim 1, then move to analysis of the arguments and evidence concerning the disputed issues. As we explain below, we determine that Petitioner has not met its burden to prove by a preponderance of the evidence that claim 1 is unpatentable over Cummings, Xu, and Sessa.

a) Overview of the Parties' Arguments

Petitioner's Arguments

Petitioner contends that the combination of Cummings, Xu, and Sessa renders obvious the method of claim 1. Pet. 27–41.

According to Petitioner, Cummings discloses claim 1 [preamble], reciting “[a] process for transesterifying wax esters.” Pet. 28 (citing Cummings’s teaching (Ex. 1004, 2, Fig. 1) of a reaction between different ratios of unsaturated jojoba oil and fully saturated jojoba oil (both wax esters) to make transesterified jojoba ester products). There is no dispute on this record that Cummings teaches claim 1’s preamble and thus, that Petitioner has shown that the prior art satisfies the recitation of the preamble, whether that language is limiting or not.

Petitioner contends that Cummings teaches a reaction feedstock that combines jojoba wax esters and hydrogenated jojoba wax esters, where the feedstock’s hydrogenated fraction is 20–50% by weight, meeting limitation 1[a] of claim 1. *Id.* at 29–35. Although Cummings does not disclose “20% to 50% in specific words,” Petitioner argues a POSA would have understood that the percentage of hydrogenated jojoba wax esters used in the feedstock can be mathematically derived from Cummings’s reported iodine value (IV) for the various jojoba ester products. *Id.* at 29–33 (estimating the overall range of the hydrogenated feedstock fraction as

between about 3.7–100% across all five reported jojoba ester products, and about 21%, 30%, and 50%, respectively for Jojoba esters (20), (30), and (60)); Ex. 1003 ¶¶ 99–107 (explaining that IV is used to determine degree of unsaturation (i.e., number of double bonds, which does not change due to the transesterification reaction) and providing calculations)).¹³ Regardless, Petitioner contends that it would have been obvious to use between 20–50% by weight of hydrogenated jojoba wax esters in a feedstock, as disclosed by Sessa and as a matter of routine optimization, to obtain improved properties in the product. Pet. 31–34 (citing Ex. 1009, 296; Ex. 1003 ¶¶ 108–113).

Petitioner contends that the combination of Cummings and Xu teaches limitation 1[b], which includes the steps of “contacting the feedstock with a lipase” and “transesterifying the jojoba wax esters and the hydrogenated jojoba wax esters in the feedstock . . . to form a transesterified product.” Pet. 35. Because Cummings does not disclose use of a lipase to contact the feedstock and catalyze its reaction, Petitioner turns to Xu. *Id.*¹⁴ According to Petitioner, a POSA would have found it obvious to modify the catalyzed

¹³ Fully hydrogenated jojoba wax esters are fully saturated (meaning there are no double bonds capable of absorbing iodine) and, thus, the IV of such fully saturated wax esters is zero. Pet. 30–31 (citing Ex. 1004, 2, Fig. 1; Ex. 1023, 789, 792). Conversely, the IV of refined jojoba oil, which is unsaturated and includes C=C double bonds on both sides of the ester bond, ranges from 81 to 89. *See, e.g.*, Ex. 1028, 3; Ex. 1003 ¶ 105. The ester-ester exchange reaction rearranges the saturated and unsaturated side chains of the jojoba wax esters, but the overall number of double bonds in the feedstock and transesterified product stay the same. Ex. 2009 ¶ 143.

¹⁴ Petitioner agrees that Cummings does not disclose the use of any enzymatic catalyst. Tr. 17:20–25. The conventional practice before the ’245 patent used chemical catalysts like sodium methylate. Ex. 1001, 3:66–4:1; Ex. 1014, 5–7, Fig. 4 (describing use of a “Sodium Methylate Catalyst” to transesterify jojoba wax esters).

reaction of Cummings to use a lipase in view of Xu’s teachings that lipases can catalyze transesterification reactions. *Id.* at 36 (citing, e.g., Ex. 1008, 296–299, Fig. 18). Petitioner argues that a POSA would have been motivated to make this change, and done so with a reasonable expectation of success, because Xu cites favorable attributes with use of lipases. *Id.* at 36–37; Ex. 1008, 289 (listing, e.g., improved “product quality”); Ex. 1003 ¶¶ 118–119 (citing reasons listed in Xu).

Claim 1’s limitation [1c] recites “wherein an oxidative stability index (OSI) of the transesterified product is greater than an OSI of the feedstock.” Petitioner argues “Cummings discloses this limitation 1[c].” Pet. 38 (citing Ex. 1003 ¶¶ 122–124). As noted by Petitioner, Cummings discloses that the transesterified products have “remarkable stability with OSI values of all jojoba esters greater than 100 hours and as high as 675 hours.” *Id.* (quoting Ex. 1004, 2). According to Petitioner, those OSI values are “significantly greater than the OSI of refined jojoba oil [(~ 35 hours)] that forms part of the feedstock.” *Id.*; Ex. 1004, 2 (“The OSI of refined jojoba oil is around 35 hours.”). Thus, Petitioner argues, “a POSA would have understood” that they “could achieve—and had a reasonable expectation of achieving—an OSI of the transesterified product (jojoba esters) that is greater than the OSI of the feedstock.” Pet. 38; Ex. 1003 ¶ 122. Petitioner also argues, “it was well-known” that transesterification of fats, oils, and wax esters can produce a product having improved, and thus greater, oxidative stability. Pet. 38–39 (citing Ex. 1003 ¶¶ 24–26, 123; Exs. 1015–1018).

Petitioner contends that increased OSI as claimed is not unexpected in view of the asserted art and the POSA’s background knowledge. *Id.* at 39–41 (citing precedents about a patentee’s mere recognition of expected properties or properties that flow naturally from the art’s teachings). And,

Petitioner contends, the claimed OSI increase is inherent. Pet. Reply 16–19; *see also* PO Resp. 57 (characterizing the Petition (Pet. 38–40) as relying on inherency).

Patent Owner's Arguments

Patent Owner disputes Petitioner's arguments on four main points.

First, Patent Owner contends that Petitioner's asserted art does not render obvious the claimed step of contacting a jojoba wax ester feedstock with a lipase to carry out the claimed reaction. PO Resp. 25–32. According to Patent Owner, neither Cummings nor Sessa discloses using a lipase to interesterify jojoba wax esters. *Id.* (citing, e.g., Ex. 2046 (Rockstraw deposition), 31:24–32:9, 59:17–19; Ex. 2047, 2 (errata); Ex. 2009 ¶ 113). Xu, Patent Owner argues, only discloses use of lipases to transesterify triglycerides, which have “critical structural differences” compared to jojoba wax esters that would have counseled against a POSA's use of a lipase in the ester-ester exchange reaction of Cummings. *Id.* at 26–29, 32 (citing, e.g., Ex. 2009 ¶¶ 48, 53, 113–120 (testifying, for example, that a glycerol backbone with which the lipase binding site and catalytic domain interacts in the triglyceride-based reaction is missing in jojoba wax esters)). The structural differences between jojoba wax esters and triglycerides would, according to Patent Owner and Dr. Schwartz, have been expected to hinder any use of a lipase in an ester-ester exchange reaction between jojoba wax esters. *Id.* at 29–30 (citing Ex. 2009 ¶¶ 120–121; Ex. 2035, 2–3; Ex. 2063, Figs. 1, 8–10). In contrast, Patent Owner contends that Petitioner's expert, Dr. Rockstraw, admitted at his deposition that he was unfamiliar with the chemistry underlying the structures and interactions between lipases and triglycerides, and unable to explain, beyond generalities and absent hindsight, why lipases would have been expected to catalyze the ester-ester

exchange between jojoba wax esters. *Id.* at 30–31 (citing, e.g., Ex. 2046, 35:11–19, 57:20–58:6, 94:2–9). Thus, Patent Owner argues, Petitioner has not met its burden to show that an ordinarily skilled person would have been motivated to use, and expected success in using, a lipase in Cummings’s process of transesterifying jojoba wax esters. *Id.* at 2–3, 25–32.

Second, Patent Owner argues that Cummings does not disclose the OSI of a feedstock that comprises a mixture of both saturated and unsaturated jojoba wax esters. PO Resp. 32–39. Patent Owner contends that, by Petitioner’s own admission, Cummings’s refined jojoba oil with an OSI of about 35 hours “forms only ‘part of’ the feedstock, meaning the unsaturated part.” *Id.* at 32–33 (citing Pet. 38). Patent Owner contends that the Petition never accounts for the stability conferred by Cummings’s fully saturated/hydrogenated portion of the feedstock to the overall mixture. *Id.* at 33–36 (“Ultimately, the OSI is specific for any mixture, and one is mistaken to conclude that because a mixture contains one component its OSI would be the same at all concentrations of that component”) (citing, e.g., Ex. 2009 ¶¶ 123–128); *see also* Ex. 2009 ¶ 132 (“Saturated wax esters are well known to have high oxidative stability”¹⁵ (citing, e.g., Ex. 1015 ¶ 4)). Because Cummings does not disclose this feedstock OSI, Patent Owner reasons, Cummings does not disclose limitation 1[c]’s recitation that the jojoba ester product OSI is greater than the feedstock’s OSI. PO Resp. 33–35.

According to Patent Owner, Petitioner’s assertion that it was “well-known” that transesterification results in products with greater oxidative

¹⁵ “Fully hydrogenated forms are also the most oxidatively stable of all possible chemical structures of lipids. Fully hydrogenated jojoba oil (melting point 68-70°C) contains neither *cis* nor *trans* isomers (there are no remaining double bonds in the molecule).” Ex. 1005, 2 (cited at Pet. 14).

stability fares no better in showing that limitation 1[c] is met. PO Resp. 35–39. Patent Owner contends that none of the “background” references cited by Petitioner allow one to compare the OSI of the full reaction feedstock to the reaction product. *Id.* That such references may, for example, suggest that an oil can, through transesterification, be made more saturated and, hence, more oxidatively stable than the oil’s unmodified/unsaturated counterpart is, Patent Owner argues, uninformative relative to the claimed comparison and simply reflects a basic statement of chemistry. *Id.* (“[W]hen no unsaturated residues (i.e., double bonds) are present, a fatty acid is at its most stable.”) (citing Ex. 2009 ¶¶ 132–133).

Relatedly, Patent Owner contends, Petitioner fails to show that a POSA would have expected the OSI to increase in comparison to the feedstock where, as in Cummings’s reaction, “the number of double bonds—i.e., the source of oxidative *instability*—does not change.” *Id.* at 39–40 (citing Ex. 2009 ¶ 138); *see also id.* at 42–47 (“Critically, the total number of double bonds in the mixture *stays the same* before and after the ester-ester exchange.”) (citing Ex. 2009 ¶ 143; Ex. 2046, 80:19–22 (Rockstraw admitting that the number of double bonds in the feedstock and product is the same)). With no net gain or loss of C=C double bonds, Patent Owner contends the POSA would not have expected a material change in the OSI of the transesterified product. *Id.* at 43–45 (citing Rozenaal¹⁶ (Ex. 2030, 1232), involving lipase-catalyzed ester-ester exchange in triglycerides where the distribution but not the saturation state of the fatty acid chains in the reaction products is changed and therefore “[t]he stability

¹⁶ A. Rozenaal, “Interesterification of oils and fats,” *INFORM*, Vol. 3, No. 11, 1232–1237 (November 1992) (Ex. 2030 (“Rozenaal”)).

of the oil remains essentially unchanged,” while properties like “melting” and “crystallization” are modified); Ex. 2030, 1232 (the reaction “only alters the distribution of the fatty acids over the triacylglycerols”); Ex. 2009 ¶ 61.

Third, Patent Owner argues that Petitioner’s use of IV values to calculate the percent of hydrogenated wax esters in Cummings’s feedstock is unreliable. PO Resp. 47–49. According to Patent Owner, the reported IV values are for “**commercial** products” following transesterification, which may not reflect all reaction products (e.g., including undesired side products or unreacted feedstock), which allegedly could impact IV values. *Id.* (citing Ex. 2009 ¶¶ 154–155). Insofar as Petitioner relies on Sessa and routine optimization of the hydrogenated jojoba wax ester fraction, Patent Owner argues that Sessa describes an already transesterified product and “does not disclose a **feedstock**.” *Id.* at 48–49 (citing Ex. 2009 ¶ 159).

Fourth, Patent Owner argues that objective indicia of nonobviousness also supports the patentability of the challenged claims. PO Resp. 56–67. The objective indicia includes assertions of unexpected results, Petitioner’s copying and disbelief, and a long delay between the asserted prior art and the filing of the application that issued as the ’245 patent. *Id.*

Patent Owner argues unexpected results, including an allegedly surprising increase in the OSI of the jojoba wax esters produced in a lipase-catalyzed transesterification. *Id.* at 57–59 (citing, e.g., results in the ’245 patent (Ex. 1001, 9:26–62), showing that, compared to the use of a chemical catalyst where the OSI decreased, “using a lipase catalyst, the oxidative stability surprisingly improved without the addition of **any** antioxidants”); *see also* PO Sur-reply 7 (“During prosecution, the inventors showed that when a 20% hydrogenated [jojoba] wax ester feedstock is transesterified with a lipase, the OSI increased over three-fold, from 33.8 to

117 [hours].”) (citing Ex. 1002 (file history), 1075–1076). Patent Owner contends such results were unpredictable, especially where experimental data in the prior art and other testing in the prosecution history showed that transesterification resulted in a *lower* OSI. PO Resp. 57 (citing Kodali¹⁷ (Ex. 1015 ¶ 81 (reporting “[t]he oxidative stabilities of the transesterified products without added antioxidants were lower than the starting oil”))); *see also* Ex. 1002, 841 (alcoholysis-based transesterification where the OSI of transesterified jojoba oil decreased compared to the feedstock, while the OSI of transesterified sunflower oil increased). And, Patent Owner contends, such unpredictability precludes reliance on inherency. PO Resp. 60–61.

Patent Owner argues that Petitioner copied Patent Owner’s use of a lipase-catalyzed ester-ester transesterification between jojoba wax esters—and used the disclosures of the ’245 patent to do so. PO Resp. 61–66. Patent Owner contends that Petitioner tried for years, but failed, to make a jojoba ester product that could compete with Patent Owner’s Floratech products. *Id.* (citing Exs. 2050–2057). According to Patent Owner, Petitioner “did not even think to try lipase-catalyzed ester-ester exchange until, in 2018, it discovered Floratech’s patent application disclosing superior results when lipases were used in place of chemical catalysts.” *Id.* at 63–64 (citing Ex. 2054, 85:23–89:5 (testimony of Petitioner’s scientist, Michael Savidakis, detailing how Petitioner’s research team learned about the lipase catalysis). Patent Owner contends that, once presented with this information, Petitioner’s Chief Technology Officer (CTO) expressed “disbelief.” *Id.* (quoting Ex. 2053); *see also* Ex. 2051 (email); Ex. 2052 (attachment), 1–2 (reporting on Petitioner’s work toward making a lipase-

¹⁷ Kodali, US 2005/0176597 A1, publ. Aug. 11, 2005 (Ex. 1015 (“Kodali”)).

catalyzed Jojoba Esters 20 product comparable to Floraesters 20). Patent Owner argues that, having found the key in Patent Owner's disclosures, Petitioner went on to make an improved lipase-catalyzed jojoba esters product and win business that it had failed to capture years earlier. PO Resp. 65 (citing Ex. 2052, 1–2; Ex. 2057, 9).

Lastly, Patent Owner contends that there was a ten-plus year delay between the publication of the asserted prior art and the filing of the application that issued as the '245 patent. PO Resp. 66–67. Patent Owner argues this temporal gap is evidence of nonobviousness. *Id.*

b) *Whether a feedstock comprising jojoba wax esters and 20–50% by weight of hydrogenated jojoba wax esters would have been obvious*

Based on the preponderance of the evidence, we determine that Petitioner has shown that claim 1's limitation 1[a] is taught by or otherwise obvious over the asserted art.

At the institution stage, we had concerns about the accuracy of Petitioner's calculation of the feedstock's hydrogenated jojoba wax ester fraction from the IV values of the product. Inst. Dec. 17–19 (noting what appeared to be incorrect negative values for some calculations and the asserted omission of a constant in the equation). And Patent Owner continues to argue through trial that Petitioner's calculations are unreliable. PO Resp. 47–48 (arguing Petitioner's calculations do not show satisfaction of limitation 1[a]). Regardless of Patent Owner's criticisms, what Patent Owner fails to persuasively grapple with are the teachings of Sessa and Petitioner's argument that the relative proportion of saturated and unsaturated jojoba wax esters in the feedstock would have been understood by the POSA as a variable subject to routine optimization. Inst. Dec. 19–21

(finding persuasive Petitioner’s arguments about Sessa’s teachings and routine optimization).

Patent Owner urges a strained interpretation of Sessa that we reject. According to Patent Owner, Sessa does not teach or suggest a feedstock, much less a feedstock percentage that overlaps with the range recited in limitation 1[a]. PO Resp. 48–49. We disagree. Sessa discloses that “[a] series of wax ester blends was constructed by transesterifying native jojoba oil with 50–500 g kg⁻¹ completely hydrogenated jojoba wax esters.” Ex. 1009, 295. We find persuasive Dr. Rockstraw’s testimony that this disclosure suggests a use of proportionate blends with between 5–50% hydrogenated jojoba wax esters. Ex. 1003 ¶¶ 110–112 (testifying, further, that selecting a hydrogenated wax ester fraction within the scope of claim 1 and doing so would have been nothing more than routine variation). Sessa, thus, evidences that proportional blends of jojoba wax ester (jojoba oil) and hydrogenated jojoba wax ester within the scope of claim 1 were known and subject to optimization through routine experimental inquiry and testing. *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (“[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.”); *Genentech, Inc. v. Hospira, Inc.*, 946 F.3d 1333, 1341–42 (Fed. Cir. 2020) (same).

Patent Owner also leaves unaddressed Petitioner’s arguments about a POSA’s anticipated arrival at the claimed ratio of the feedstock’s saturated to unsaturated jojoba wax esters components through routine optimization. Pet. 32–33. Cummings suggests that the ratio of saturated to unsaturated jojoba wax esters is a known optimizable variable insofar as it discloses that “different ratios of unsaturated jojoba oil are combined with fully saturated jojoba oil” and then reacted to deliver desired physical and functional

characteristics. Ex. 1004, 1. Petitioner also cites other evidence probative of the “POSA’s background knowledge,” such as Haumann,¹⁸ recognizing that properties of transesterified products are based on the amounts of the reagents chosen. Pet. 34–35; Ex. 1012, 675 (teaching that “melting and solidification properties [of the product] ultimately depends on the type and mixture of the starting materials”); *see also* Ex. 1007, 4:49–51 (teaching that “the properties of the [transesterified] emollient depend upon the relative amounts of II[n] [(unsaturated jojoba wax esters)] and III[n] [(fully saturated jojoba wax esters)]”); Ex. 1003 ¶¶ 111–112 (testifying that “manipulating the ratio of the reacting fats and oils in a feedstock would have been within the background knowledge possessed by a [POSA] as such concepts are fundamental to the topic of chemical reaction engineering”).

Petitioner’s argument and evidence on routine optimization relative to satisfying limitation 1[a] is persuasive and unrebutted.

c) *Whether use of a lipase in Cummings’s method for transesterifying jojoba wax esters would have been obvious*

Based on the preponderance of the evidence, we determine that Petitioner has not shown that claim 1’s limitation 1[b] is taught by or otherwise obvious over the asserted art.

Cummings does not teach or suggest the use of any enzymatic—specifically, a lipase—catalyst to transesterify jojoba wax esters as recited in limitation 1[b]. *See* Ex. 1004, 2; Ex. 2046, 31:19–32:9; Ex. 2009 ¶ 113. Petitioner, thus, turns to Xu and its teachings about a “use of lipases as a catalyst in interesterification/transesterification reactions.” Pet. 36 (citing

¹⁸ Barbara Fitch Haumann, *Tools: hydrogenation, interesterification*, 5 Inform 668 (June 1994) (Ex. 1012).

Ex. 1008, 296–299, Figs. 15, 18). Petitioner contends a POSA would have been motivated to use a lipase as taught in Xu in the reaction of Cummings for the reasons given in Xu, which cites, *inter alia*, “interesting products,” “improvement of product quality refereeing to mild conditions,” and “customer perception.” *Id.* at 37 (citing Ex. 1008, 289, 301). Petitioner further contends that “replacing chemical catalysts . . . with lipases would have been within a POSA’s background knowledge.” *Id.* (citing, e.g., Ex. 1012, 676 (“Chemical interesterification, however, is not the only route for this process. Also gaining scrutiny is enzymatic interesterification, now used commercially to produce high value-added products such as structured triglycerides for confectionary use.”)). Petitioner cites Dr. Rockstraw’s testimony in support, which echoes Petitioner’s contentions. Pet. 36–37 (citing Ex. 1003 ¶¶ 117–121).

Patent Owner did not, at the institution stage, provide any counterargument or evidence on limitation 1[b]. Inst. Dec. 21–22. Based on the preliminary record at that time, we found Petitioner had met its institution burden for limitation 1[b]. *Id.*

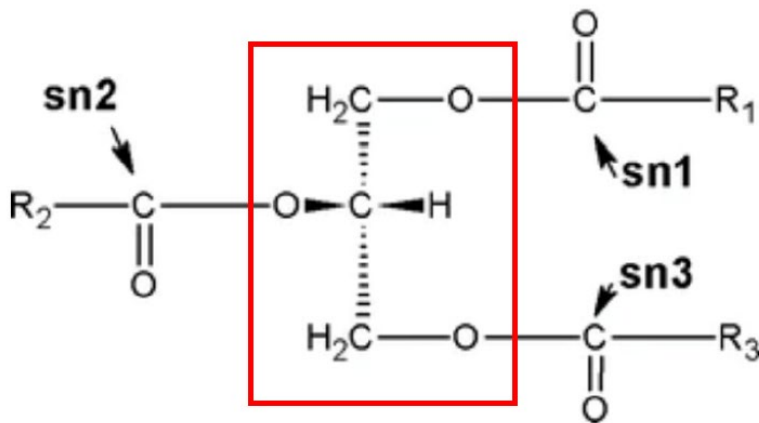
Since that time, the record has evolved. As outlined above, Patent Owner, with the supporting testimony of Dr. Schwartz, argues that the Petition does not explain adequately why a POSA would have been motivated to use lipases in an ester-ester exchange of jojoba wax esters or would have had a reasonable expectation of success in doing so. PO Resp. 2–3, 13–15, 25–32, 67–68 (citing, e.g., Ex. 2009 ¶¶ 64, 72–87, 113–122).

Patent Owner argues that the Petition “does not cite a single piece of prior art that discloses, contemplates, or suggests using a lipase to transesterify jojoba wax esters, as all of the references, including Xu, only disclose transesterifying triglycerides.” PO Resp. 26–27 (“Vantage never

addresses why a [POSA] would have sought to modify Cummings or expected a lipase-catalyzed ester-ester exchange to work on jojoba wax esters.”) (citing Ex. 2009 ¶¶ 113–114)). Patent Owner and Dr. Schwartz provide a detailed discussion about triglycerides, their structures and how those structures are “critical[ly]” different from jojoba wax esters, and why a POSA would have considered those differences significant relative to use of a lipase in an ester-ester exchange between jojoba wax esters. PO Resp. 5–15, 26–30 (citing, e.g., Ex. 2009 ¶¶ 47–87, 113–122).

Jojoba wax esters are not triglycerides. Ex. 2009 ¶ 53 (jojoba wax esters are monoesters with no triglyceride component (Ex. 1028, 7)); Ex. 2046, 73:24–74:5 (“[Jojoba oil] is not a triglyceride, that is correct.”). By contrast, as Dr. Schultz explains, almost all other natural oils comprise triglycerides. Ex. 2009 ¶ 47 (testifying “almost all naturally derived oils are made of triglycerides”).

An illustrative triglyceride structure is shown below.



Triglyceride Structure.

PO Resp. 6 (citing Ex. 2009 ¶ 48). As depicted above, triglycerides include a glycerol head or backbone (shown in the red box) and three fatty acid chains attached to the glycerol head, which chains are indicated according to

their position (*sn*-1, *sn*-2 (center), and *sn*-3). Ex. 2009 ¶ 48 (citing Ex. 2062, 1). Each of those chains generally has sixteen to eighteen carbons. *Id.* ¶ 49. As shown above, there are three esters in a triglyceride. In contrast, jojoba wax esters are monoesters that have longer carbon chains (predominantly 20 to 22 carbons) that extend on either side of the ester bond. *Id.* ¶ 53; Ex. 1010, 2:51–54; *see supra* Section II.C. (depicting an illustrative unsaturated 42-carbon jojoba wax ester). That is, jojoba wax esters do not have a glycerol backbone. Ex. 2009 ¶ 114; Ex. 2046, 74:6–10.

Patent Owner offers evidence that a POSA would have understood that lipases have high specificity for triglyceride substrates, with preferential binding to the glycerol backbone that is missing in jojoba wax esters. PO Resp. 13–15, 28. For example, as Dr. Schwartz explains, lipases are known to exhibit various activities, including type- and regio-selectivity that favor triglyceride binding. Ex. 2009 ¶¶ 73–74 (explaining that *sn*-1,3 lipases, such as disclosed in Xu (Ex. 1008, Fig. 18), preferentially act on fatty acid moieties at the *sn*-1 and *sn*-3 positions of a glyceride while not affecting the *sn*-2 position).¹⁹ Further, Dr. Schwartz testifies “[t]he literature demonstrates that, regardless of type-, regio-, or enantio-selectivity, lipases exhibit very specific interactions with triglycerides” and explains in detail how a lipase’s catalytic domain comprises an oxyanion hole, a “catalytic triad” of three amino acids (Ser-His-Asp), and a beta sheet, and how those

¹⁹ Dr. Schwartz testifies, “[l]ipases are categorized as enzymes that are specific to glycerides, and are more specifically defined as triacylglycerol acylhydrolases.” Ex. 2009 ¶ 72 (citing Ex. 2039, Abstr.; Ex. 2028, 1 (“Lipases are serine hydrolases defined as triacylglycerol acylhydrolases . . . and should be differentiated from esterases . . . by nature of their substrate.”)).

aspects interact with triglycerides in specific ways (e.g., activating glycerol backbone as a nucleophile) to catalyze and facilitate the ester-ester exchange reaction). Ex. 2009 ¶¶ 77–80 (citing Ex. 2019, 2–3; Ex. 2024, 3; Ex. 2028, 8; Ex. 2035, 3, Fig. 2). According to Patent Owner and Dr. Schwartz, “[i]t would not have been obvious to a [POSA] that the lipase binding sites that were known to attach specifically to the glycerol backbone . . . at the start of an ester-ester exchange would work when exposed to molecules ***lacking*** that glycerol backbone” such as jojoba wax esters. PO Resp. 29–30 (citing Ex. 2009 ¶ 121).

Additionally, Patent Owner contends that a POSA would have been concerned with the size and steric hindrance involved with jojoba wax esters (comprising long, straight-chain monoesters) and whether such molecules would fit in a lipase’s active binding site. PO Resp. 14–15, 30; PO Sur-reply 18–19. Patent Owner notes that lipases have different protein geometries, such as crevice-like or funnel-like, that change the length of the binding site and affect how the substrate interacts with the lipase. PO Resp. 14–15 (citing Ex. 2009 ¶ 81; Ex. 2028, 12–13; Ex. 2063, 67, 69 (Fig. 1), 74). According to Patent Owner, a POSA would have been aware of the specificity, size, and shape of such binding sites, and would have been aware of the differences in the structures between triglycerides and jojoba wax esters. *Id.* at 29–30 (citing Ex. 2009 ¶ 121). As Dr. Schwartz explains, illustrating the binding site shapes in several lipases and their binding with triglycerides as shown in the technical literature, the longest triglyceride fatty acid side chain accommodated in the binding pocket was 18 carbons

long. Ex. 2009 ¶ 81 (citing Ex. 2063,²⁰ 69, Fig. 1). Dr. Schwartz testifies that jojoba wax esters are large and, by way of comparison, include a large alcohol moiety (22 carbons) versus just three carbons on the glycerol side of a triglyceride. *Id.* ¶ 82.

Based on such considerations, Dr. Schwartz testifies that “the structural differences from triglycerides would be expected to affect a jojoba wax esters ability to fit into the core catalytic domain of the lipase.” *Id.* ¶¶ 82–84. And, he further opines, “[i]t would not be expected that a jojoba wax ester could fit within the restricted space of the enzyme’s reaction site due to the steric hindrance resulting from its large alcohol chain and its acid chain extending in the opposite direction from the ester group.” *Id.* (citing Ex. 2063, 69, Fig. 1).

Petitioner, in its Reply, characterizes Patent Owner’s argument and Dr. Schultz’s testimony about lipases as technological misdirection. Pet. Reply 1. Yet Petitioner declined to submit a rebuttal declaration from Dr. Rockstraw (or any other expert) that responds to the points raised by Dr. Schultz and whether, as Dr. Schultz opines, such considerations would have discouraged use of lipases in an ester-ester exchange between jojoba wax esters like claimed. That strategic choice is curious because it is Petitioner who bears the ultimate burden of proof in this proceeding. Moreover, Dr. Rockstraw admitted on cross-examination that he “knew nothing about lipase chemistry” and was unable to explain in any detail how the art’s teachings about lipase-catalyzed transesterification of triglycerides should be extended to jojoba wax esters. *See* PO Sur-reply 22 (citing

²⁰ Pleiss et al., *Anatomy of lipase binding sites: the scissile fatty acid binding site*, 93 *Chemistry and Physics of Lipids* 67–80 (1998). Ex. 2063.

Ex. 2046, 35:11–19, 57:20–58:6, 69:9–17, 98:14–17, 99:10–12); PO Resp. 31–32 (same). Dr. Rockstraw also admitted that he had not studied triglycerides as part of his work on this case despite triglycerides being the subject of Xu’s use of lipases in an ester-ester exchange. *Id.*; Ex. 2046, 98:22–99:12 (admitting “I haven’t studied triglyceride reactions with regard to this matter”).²¹ Such admissions undermine the value of the general assertions in Dr. Rockstraw’s original testimony in rebutting Dr. Schultz’s more particularized testimony identifying specific reasons why a POSA would not have understood Xu’s teachings to be applicable to jojoba wax esters.

Unable to provide a persuasive technical basis to explain why a POSA would have reasonably expected success extending the use of Xu’s teachings regarding lipases to an ester-ester exchange reaction with jojoba wax esters as in Cummings, Dr. Rockstraw testified that he expected the reaction to work *because it does work*. Asked at deposition, “[w]ould you expect the lipase to work if there is not a glycerol backbone?” Dr. Rockstraw answered “[w]ell, there is not a glycerol backbone in jojoba oil, and it works to transesterify those, so I guess the answer is yes, I expect it to work.” Ex. 2046, 94:3–9.²² Patent Owner argues, and we agree, this testimony

²¹ Based on the context and surrounding testimony, Dr. Rockstraw was unfamiliar with how sn-1,3 lipases or non-specific lipases can chemically catalyze ester-ester exchange in triglycerides. *See, e.g.*, Ex. 2046, 97:17–101:3. And, even extended to esters generally and jojoba oil specifically, Dr. Rockstraw did not know of any chemical mechanism by which lipases can transesterify the esters. *See, e.g., id.* at 97:17–22, 100:16–101:3.

²² The only support Dr. Rockstraw cited to back this hindsight-driven response is Xu’s Section VI, which describes ester-ester exchange between

reveals a hindsight bias. PO Resp. 31–32 (citing Ex. 2046, 94:3–9). Even if it did not, we find Dr. Schwartz’s testimony more credible than the opinions of Dr. Rockstraw, particularly given the above-noted admissions regarding the limits of Dr. Rockstraw’s understanding about lipases.

Nevertheless, Petitioner argues that Dr. Schwartz “confessed” that how lipases work on triglycerides’ glycerol backbones is not definitive and expressed caution extrapolating that mechanism to jojoba wax esters. Pet. Reply 2–3 (citing Ex. 1041, 101:13–22). It is unclear how this testimony helps Petitioner meet its burden. To the contrary, it underscores that little was known—or is known, even now—about how lipases are able to catalyze an ester-ester exchange between jojoba wax esters. Indeed, neither of the experts here was able to opine on how that reaction mechanism works. *See, e.g.*, Ex. 1041, 101:10–22; Ex. 2046, 100:7–101:3. This lack of understanding about how lipases catalyze ester-ester exchange in jojoba wax esters is consistent with the lack of predictability concerning lipase use expressed in the ’245 patent. According to the patent:

Interestingly, both 1, 3 lipases and lipases that operate using insertion of a triglyceride work equally well when used in jojoba ester transesterification reactions. This result is unexpected, as these lipases sterically interact quite differently with the molecules they are involved in catalyzing. Without being bound by any theory, it is possible that because a jojoba ester is primarily a long carbon chain without much molecular bending due to the ester group, both 1, 3 lipases and lipases that operate using insertion are able to interact sterically with the jojoba esters in ways that produce substantially the same catalytic effect. In other words, the long chain jojoba ester can fit into the opening in an insertion lipase and also slide into the

glycerol-containing triglycerides, not wax esters. Ex. 2046, 94:10–25; *see, e.g.*, Ex. 1008, 298–299, Fig. 18.

active areas of a 1,3 lipase. As this processing characteristic for lipase catalytic processing of jojoba wax esters is not a predictable result, this illustrates a unique aspect of processing jojoba wax esters using lipases.

Ex. 1001, 14:38–54. Ex. 2009 ¶ 87 (testifying that “the ’245 patent discussed the low odds of jojoba wax esters successfully undergoing transesterification using a lipase” (citing Ex. 1001, 14:38–42)).

Petitioner further contends that Patent Owner’s arguments are flawed because lipase use is not limited to reactions with triglycerides, and that lipases were known to catalyze jojoba ester reactions. Pet. Reply 3–7.²³

On whether lipases are limited to use with triglycerides, Petitioner contends that lipases can catalyze reactions that do not involve molecules with a glycerol backbone. *Id.* at 3–4. Petitioner cites disclosure in, for example, Xu about lipases catalyzing esterification reactions between various acids and alcohols, such as oleic acid and cetyl alcohol. *Id.* at 3–4 (Ex. 1008, Fig. 5, Tab. 3); *see also* Ex. 1032, 978 (disclosing lipase-catalyzed esterification with oleic acid and cetyl alcohol). Petitioner cites testimony from Dr. Schwartz that such molecules are not triglycerides. *Id.* (citing Ex. 48:4–50:23); Ex. 1008, 294 (describing acidolysis reaction of triglycerides but suggesting reactant esters can be “alkyl fatty acid esters”); Ex. 1033, 601 (indicating that lipases may have broad substrate specificities

²³ In a footnote, Petitioner contends that Patent Owner’s expert “ignored” the broad definition of lipases in the ’245 patent as being any enzyme or protein that catalyzes the reaction. Pet Reply 3 n.1. We agree that the definition is not limited to true lipases, but Petitioner’s grounds rely on the obviousness of modifying an ester-ester exchange using true lipases—not other hypothetical enzymes. *See* PO Sur-reply 16–17 n.5 (asserting that Dr. Schultz considered the lipases as described in Petitioner’s cited art).

and “[m]any alcohols other than glycerol can be substrates”). As Patent Owner points out, however, Petitioner’s argument concerns lipases catalyzing “other reactions,” like esterification or acidolysis, **not** an ester-ester exchange in any reaction that lacks a triglyceride. PO Sur-reply 16–19 (arguing, e.g., that synthesis with smaller-molecule acids and alcohols do not provide a POSA with a reasonable expectation of success related to the claimed reaction). Petitioner’s reply evidence does suggest lipases were known to catalyze other types of reactions involving molecules that do not have a glycerol backbone, but the record is wanting for **any** evidence that persuasively ties the newly cited disclosures to the proposed obviousness of modifying Cummings’s ester-ester exchange to include a lipase.²⁴

Petitioner also contends in its Reply that lipases were known to catalyze jojoba ester reactions. Pet. Reply 5–7 (citing Exs. 1034–1038). But, as Patent Owner points out, Petitioner’s new references describe “different reactions” and reaffirm that lipases were primarily thought of as interacting with triglycerides. PO Sur-reply 22–24. Exhibits 1034 and 1037, for example, describe alcoholysis reactions, not ester-ester exchange.

²⁴ At the oral hearing, Petitioner was unable to explain persuasively how the Reply’s newly cited disclosures and reactions speak to the obviousness of using a lipase in an ester-ester exchange reaction like claimed. *See, e.g.*, Tr. 26:10–28:8 (counsel arguing, without citing evidence, that jojoba oil could be considered within the scope of the alcohols and acids that Hills (Ex. 1033, 601) suggests may be catalyzed with a lipase; evidence not supplied in rebuttal); 30:17–32:5 (counsel agreeing that an esterification reaction [(i.e., in Xu’s Table 3)] between, e.g., alcohols and acids, is a different reaction from an ester-ester exchange). The art teaches that “[t]he [ester-ester-exchange (like in Xu’s Fig. 18)] reaction is different from other reactions discussed above such as hydrolysis, esterification, acidolysis, or alcoholysis.” Ex. 1008, 299–300.

Ex. 1034, cl. 1 (describing the reaction mixture as comprising a fatty acid feedstock, “a lower alcohol” and water); Ex. 1037, Abstr., 4:33–5:2, 5:9–13 (“The feedstock containing glycerides and/or free fatty acids may be initially treated with a lipase in the presence of the lower alkyl alcohol”), 7:5–11 (noting “[g]lyceride containing plant oils . . . are particularly suitable as the feedstock”). Exhibit 1037 suggests that lipases are selective for smaller chain fatty acids and glycerides in the feedstock, more consistent with Dr. Schultz’s opinions discussed above. Ex. 1037, 6:4–7. To the extent jojoba oil is mentioned, it is merely part of a laundry list of plant oils that would appear to be glycerol-containing triglycerides (which is inapt, as jojoba oil contains no glycerol or triglyceride component as discussed above); *see also* Ex. 1034 ¶ 14 (including jojoba oil in a laundry list of apparent triglycerides); Ex. 1036, Abstr. (reaction forming substituted *acylglycerols*), cl. 19 (reciting “wherein said triglyceride is a vegetable oil” and incorrectly listing jojoba oil (which is not a triglyceride) among the oils). And, as Patent Owner asserts, Petitioner “offers no expert testimony to support its new references,” i.e., testimony to show that a POSA would have understood the teachings in these references regarding other types of reactions to be relevant to the claims and proposed modification of Cummings’s reaction. PO Sur-reply 22.²⁵

²⁵ Petitioner also cites a single sentence in another exhibit that states “Isomerized Jojoba Oil . . . [is] produced by enzymatic intraesterification.” Pet. Reply 6 (citing Ex. 1028, 4). But intraesterification and isomerization are not interesterification; nor are any details provided about this reaction, including what enzyme is contemplated. PO Sur-reply 19 (noting the lack of any citation for this sentence in the reference).

We agree with Patent Owner that Petitioner's approach in its Reply "seems to be raising any reference that contains the words 'jojoba oil' and 'lipase' without providing any explanation as to why the references are relevant to the claimed invention." PO Sur-reply 25. This approach is, perhaps, most apparent in Petitioner's citation to Exhibit 1038, which describes a lipase-catalyzed ammonolysis reaction that creates fatty acid amides. Ex. 1038, 346, 348 (describing ammonolysis combining ammonia (NH₃) and jojoba wax in the presence of catalyst, resulting in fatty acid amides and fatty alcohols). Petitioner asserts that ammonia cleaves esters in this reaction, and criticizes Dr. Schultz for not considering ammonolysis as part of his review. Pet. Reply 7 (citing Ex. 1041, 58:3–12). It is, however, Petitioner that bears the burden of proof. Petitioner provided no evidence, e.g., testimony from Dr. Rockstraw to explain why the skilled artisan would have considered ammonolysis relevant to the ester-ester exchange reaction of Cummings or the claims. Without expert testimony, Petitioner does not persuasively show the relevance of this reaction. Tr. 33:2–24, 62:10–63:3.²⁶

The closest Petitioner comes with its newly-cited references to evidence that is on-point and persuasive is a paper by Lei.²⁷ Pet. Reply 5–6.

²⁶ At oral hearing, Petitioner pointed to the cross examination of Dr. Schultz, but that testimony only confirms that he had not studied ammonolysis as part of his engagement, that he was only vaguely familiar with the reaction, and that, to the extent he was familiar, it involves "very different chemistries." Ex. 1041, 56:12–58:17.

²⁷ Lei et al., *Functional monoesters of jojoba oil can be produced by enzymatic interesterification: reaction analysis and structural characterization*, 117(5) Eur. J. Lipid Sci. and Technol., 630–636 (2015) (Ex. 1035 ("Lei")). According to the Declaration of Nancy E. Adams, Ed.D., Lei was first published on December 22, 2014. Ex. 1040 ¶¶ 24–29.

Lei describes using a lipase (Novozym 435) in an ester-ester exchange between jojoba oil and ethyl acetate to make derivative esters for possible uses in the cosmetics and other industries. *Id.* (citing Ex. 1035, 630–633); *see* Ex. 1035, 631, Fig. 1 (schematic of reaction); Ex. 1041, 50:24–51:3 (Schultz agreeing that ethyl acetate is an ester derived from ethanol and acetic acid). According to Petitioner, Lei thus shows that lipases were known to catalyze ester-ester exchange reactions using wax esters, including jojoba oil, and Lei “never characterizes the ability of lipases to catalyze jojoba transesterification as unexpected.” Pet. Reply 5–6.

Patent Owner argues that Lei “[i]s not prior art, as Vantage admits . . . and the Board would commit legal error by relying on it.” PO Sur-reply 24. Patent Owner is correct that Lei is not prior art. The undisputed priority date of the ’245 patent is December 19, 2014, and Lei published three days later on December 22, 2014. Ex. 1001, code (22); Ex. 1040 ¶ 24. Petitioner contends, however, that, even if Lei is not prior art, it can be relied upon as rebuttal evidence to Patent Owner’s argument against the obviousness of using lipases with jojoba wax esters including as “simultaneous invention evidence.” Tr. 28:14–29:7.

We do not agree with Patent Owner that the Board cannot rely on Lei for any purpose. The Federal Circuit and, recently, the Director of the Patent Office, have explained that “simultaneous invention may bear upon the obviousness analysis in two ways. . . . First, it is evidence of the level of skill in the art. . . . Second, it constitutes objective evidence that persons of ordinary skill in the art understood the problem and a solution to that problem.” *Prime Time Toys LLC v. Spin Master, Inc.*, IPR2023-01339, Paper 12 at 14–17 (PTAB July 9, 2024) (“*Prime Time Toys*”) (quoting *Regents of the Univ. of Cal. v. Broad Instit., Inc.*, 903 F.3d 1286, 1295 (Fed.

Cir. 2018)).²⁸ In *Prime Time Toys*, for example, the Director determined that a petitioner’s simultaneous invention evidence, including a foreign patent application published one day after the earliest filing date of the challenged patents, must be considered by the Board because it could bear on the obviousness of the problem recognized and solved by those patents (i.e., a need for softer and safer projectiles in air guns). *Id.*

We find that Lei is objective evidence entitled to some weight relative to Petitioner’s obviousness challenge. It shows that, within a few days of the ’245 patent’s effective date, other researchers had described using lipases in an ester-ester exchange reaction that (a) did not include triglycerides and (b) used a feedstock at least partially comprised of a jojoba wax ester. Ex. 1035, 631, Fig. 1. And, as Petitioner asserts, there is no apparent expression of surprise from Lei’s authors in being able to carry out their reactions. Pet. Reply 6. That said, Lei’s reaction is not on all fours with the claimed reaction—the claimed reaction uses long-chain jojoba wax esters (unsaturated and saturated) in the feedstock, while Lei’s reaction uses a short four-carbon ester (ethyl acetate) as a reactant. PO Sur-reply 24–25 (annotating the ethyl acetate in Lei’s Fig. 1, and arguing that short chain molecule would not carry “the same steric hindrance concerns as jojoba wax

²⁸ As the Federal Circuit has held, “[i]ndependently made, simultaneous inventions, made within a comparatively short space of time” can comprise evidence that the invention was the product of only ordinary skill. *Geo. M. Martin Co. v. Alliance Mach. Sys. Int’l LLC*, 618 F.3d 1294, 1305 (Fed. Cir. 2010) (internal quotation marks omitted); *Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1379 (Fed. Cir. 2000) (explaining that simultaneous invention by two or more independent, equally talented inventors may be an indication of obviousness when considered in light of all circumstances).

esters”).²⁹ Still, we give weight to Lei’s disclosure, which somewhat weakens Dr. Schultz’s testimony that skilled artisans would not have considered or expected success in using lipases in the claimed ester-ester exchange reactions simply because jojoba wax esters lack a glycerol backbone and are monoesters.³⁰

Nevertheless, we also have evidence showing that Petitioner copied the use of lipase-catalyzed jojoba esters synthesis from Patent Owner, which undermines Petitioner’s arguments based on Lei and the other evidence of obviousness. *See* PO Resp. 61–66 (citing exhibits). “Objective considerations such as failure by others to solve the problem and copying may often be the most probative and cogent evidence of nonobviousness.” *Volvo Penta of the Americas, LLC v. Brunswick Corp.*, 81 F.4th 1202, 1213 (Fed. Cir. 2023) (quoting *Advanced Display Sys. v. Kent State Univ.*, 212 F.3d 1272, 1285 (Fed. Cir. 2000)); *Liqwd, Inc. v. L’Oréal USA, Inc.*, 941 F.3d 1133, 1137 (Fed. Cir. 2019) (“Copying requires duplication of features of the patentee’s work based on access to that work.”). Combined with the copying, Patent Owner cites evidence that Petitioner’s “then-Chief Technical

²⁹ Because Lei does not disclose the same process recited in the challenged claims, it does not in and of itself demonstrate simultaneous invention of the claimed process by another. That said, we consider Lei’s disclosure relevant and afford it weight in our analysis as explained below.

³⁰ For sake of argument, we assume here that Lei reflects the skill possessed by ordinarily skilled artisans, although Petitioner provides no other evidence, e.g., testimony from Dr. Rockstraw, on that issue, or addressing Lei at all. *See* Tr. 29:8–30:11 (noting that the Lei authors could have been “unusually prescient” and that Petitioner’s argument requires an assumption that “the understanding of the Lei authors is representative of the understanding of a POS[A] even though Lei wasn’t publicly available as of that time”).

Officer even said there was ‘disbelief that Floratech is using this sort of technology.’” PO Resp. 63 (quoting Ex. 2053, 1).

Based on this trial record, we find that Petitioner learned about the use of lipases to catalyze ester-ester exchange between jojoba wax esters from Patent Owner. Petitioner’s scientist and corporate designee testified that, as part of Petitioner’s efforts to improve the manufacturing process of its jojoba esters products, Petitioner discovered lipase-catalyzed transesterification of jojoba esters in Patent Owner’s patent documents. Ex. 2054 (Savidakis deposition), 87:2–89:5 (describing Petitioner’s “enzyme work” starting in 2018, admitting that “before 2018, Vantage wasn’t aware of enzyme-based catalysis for these types of processes,” and that Petitioner discovered lipase catalysis of jojoba wax esters in Floratech’s patent applications).

Petitioner replies that it learned about this use of lipases, not from Patent Owner’s disclosures, but from a general review of the literature. Pet. Reply. 25. But that assertion is contrary to the record here. Petitioner’s contemporaneous, internal documents of record only cite Patent Owner’s patent disclosures for that subject matter. In a November 20, 2018, technical report about Petitioner’s attempts to develop a “Floraesters 20 offset,” Petitioner’s chemist explains that all Petitioner’s prior efforts to change the manufacturing processes for its own Jojoba Esters 20 product (e.g., changing the feedstock ratio, and changing the identity of the chemical catalyst) “**have all failed** to provide comparable material.” Ex. 2052, 1 (emphasis added). Then, the report states, “[b]ased on patent literature, we believe that the harsh nature of the chemical interesterification catalyst (sodium methoxide) has negative impact on the sensory of the final product,” relaying that an “enzyme catalyst is less harsh, more selective,” and “vastly improves” product parameters—just below that discussion is a solitary link to Patent

Owner's patent application. *Id.* (citing "US20160177350A1," which is the child, continuation-in-part application, to the '245 patent (Ex. 2056, code (63)); *see also* Ex. 2053 (2018 emails between Petitioner's scientist and CTO, discussing and attaching Patent Owner's published patent application).

We also find that Petitioner's internal documents show that Petitioner sought to, and did (at least in internal development efforts) copy Patent Owner's lipase-catalyzed jojoba wax ester transesterification reaction so that Petitioner's products could better compete with Patent Owner's products. A meeting presentation from 2016 describes lost business opportunities, noting "our jojoba esters did not match FloraEsters in terms of specs" and cites the need to "rework" its own products. Ex. 2050. A 2018 technical report states that "[w]hen compared to Floratech's 'Floraesters' product line, our Jojoba Esters do not provide the same sensory experience," then cites Patent Owner's patent disclosures about using a lipase catalyst as the putative solution to Petitioner's problem. Ex. 2052, 1 (describes making Jojoba Esters 20 by "adding jojoba oil (80 g) and jojoba wax (20g)," in the presence of "enzyme catalyst," noting "results suggest similar composition to Floraesters 20"); Ex. 2055, 1 (emails about "Liponate Jojoba 20" batch tests, with Petitioner's scientist writing "[w]hat you are describing is very close to the Floratech Patent that clued us in on how they were making their Jojoba esters"); Ex. 2057, 1, 9 (presentation from September 2019, listing "GOALS: Develop a knock-off of Floratech Ester 20 by replacing current chemical catalysis method using sodium methyllate with enzymatic catalysis (lipase)," and indicating samples sent to, and presaging meeting with, customer); Ex. 2054, 236:21–237:23 (testifying Petitioner's goal was taking the business from Floratech "to expand our jojoba derivatives business").

Moreover, we find that Petitioner's internal documents evidence initial "disbelief" concerning the use of lipases to transesterify jojoba wax esters. Petitioner's CTO, after receiving an email from Petitioner's scientist about Patent Owner's patent application and the scientist's instruction to other employees to continue "evaluation of lipase enzymatic catalysis for the Jojoba Esters and esters in general," responded that it "[m]akes sense to continue the evaluation of these 'catalysts'" and remarked that "[t]here is *disbelief* that Floratech is using this sort of technology, so I'm excited to see what we learn from our work." Ex. 2053, 1 (emphasis added).

This evidence shows skepticism among those in the industry who would purport to have at least ordinary skill in the art, and undercuts Petitioner's position that using lipases to transesterify jojoba wax esters would have been obvious. Petitioner contends that there could be other reasons why its employees expressed skepticism, arguing, as an example, lipase cost. Tr. 65:7–23. Petitioner, however, cites no evidence favoring its alternative interpretation. *Id.* And, in the context of the internal documents, the evidence on balance suggests Petitioner's skepticism was directed to the technical merits of using lipases to catalyze the reaction of jojoba esters, e.g., whether there would have been a reasonable expectation of success in using a lipase instead of a chemical catalyst.

Petitioner argues that the copying evidence should receive no weight because the evidence does not show that Petitioner copied any actual Patent Owner product that is made by the claimed method. Pet. Reply 23–24 (arguing Patent Owner's contention that the '245 patent covers the method of making Cargill's Floraesters jojoba wax ester products is conclusory and insufficient to establish a nexus). Although it has not been proved on this record that Patent Owner's Floraesters products referenced in Petitioner's

internal documents are, in fact, made by the claimed process, those documents show that Petitioner, in its internal product development work, copied the use of lipases for ester-ester exchange of jojoba wax esters, such as it is described and claimed in the '245 patent. The use of lipases to transesterify jojoba wax esters in this way is a unique characteristic of the claimed invention and, as discussed above, Petitioner's documents show that Petitioner sought to use a lipase for that same purpose in its own products—a use that Petitioner gleaned from studying Patent Owner's disclosures. *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1375 (Fed. Cir. 2019) (explaining that a nexus can be established where secondary considerations are the direct result of the unique characteristics of the claimed invention); *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012) (holding that “a nexus between the copying and the novel aspects of the claimed invention must exist for evidence of copying to be given significant weight in an obviousness analysis”) (internal quotation marks omitted).

Petitioner also argues that Patent Owner fails to show that Petitioner copied the '245 patent's claims or that any commercially-released Petitioner product copies those claims. Pet. Reply 24 (arguing Petitioner “made a test batch of transesterified-jojoba-and-hydrogenated-jojoba wax esters using a lipase” after reviewing “a related Floratech patent application” before the claims of the '245 patent issued).

This argument is unavailing. The evidence shows that Petitioner, upon studying Patent Owner's patent application and the reactions described

therein,³¹ and in an effort to make a Jojoba Esters 20 product that could compare to the Floraesters 20 product, transesterified a feedstock comprising 80% jojoba oil and 20% hydrogenated jojoba wax esters and used a lipase to catalyze that reaction. Ex. 2052, 1 (“results suggest similar composition to Floraesters 20”). The internal documents do not report the OSI of the feedstock and product (relative to the comparison in claim 1’s wherein clause), but Petitioner argues that feature of the claim is inherent if the other recited steps are carried out. Pet. Reply 16–17. If Petitioner’s inherency argument is correct, Petitioner identifies no aspect of claim 1’s method that is missing from the process it followed in its internal documents. And, Petitioner cites no authority for the proposition that a copying party must be aware of and/or intentionally copy an already-issued patent claim for objective indicia of copying to carry weight. The evidence also indicates that Petitioner “replicated the very experiment described in the ’245 Patent that is the basis for the claimed invention” and that Petitioner’s commercial goal, thereafter, was to “switch[] from a chemical catalyst to a lipase” and take jojoba wax esters business from Floratech. PO Sur-reply 26–27; PO Resp. 64 (comparing Examples 1 and 3 of the ’245 patent with Petitioner’s process (Ex. 2052, 1)); Ex. 2057, 9. Whether Petitioner ultimately sold products made by the copied process (and did so in significant volume) goes

³¹ Patent Owner explains that, although the patent application referenced in Petitioner’s internal documents is a CIP of the application that issued as the ’245 patent, the specifications are identical in all material respects relative to the experiments described therein that Petitioner reproduced. PO Resp. 63–64 n.5 (comparing Ex. 1001, 8:41–13:12 (including Examples 1 and 3) and Ex. 2056 ¶¶ 56–67 (same)). Petitioner provides no contrary argument.

to the magnitude of the copying, but it does not negate the copying as objective indicia of nonobviousness.

Lastly, Petitioner argues that it was only trying to replicate sensory attributes of Patent Owner's products to meet customer demands. Pet. Reply 24–25 (citing, e.g., Ex. 2050, 12; Ex. 1045, 1). Petitioner contends such efforts are common in the cosmetics industry and should be considered irrelevant to the obviousness inquiry. *Id.* (citing Ex. 1041, 14:11–22:21 (testifying, *inter alia*, that competitive product analysis and review of competitors' patent literature is routine)).

As discussed above, the balance of the evidence indicates Petitioner's reason for copying was to have a competitive product of its own and to take business from Patent Owner. The question here is not whether Petitioner's reasons for copying were wrong, commercially or otherwise; we offer no opinion on that. Rather, the issue is the extent to which Petitioner's copying of the lipase-based catalysis of an ester-ester exchange between jojoba wax esters undermines Petitioner's contention that using a lipase in that way would have been obvious to a POSA without the benefit of Patent Owner's patent disclosures. As discussed above, Petitioner's reliance on Patent Owner's teaching of using lipases to catalyze transesterification of jojoba wax esters to produce a competitive product that, in years prior and before it studied Patent Owner's disclosure, Petitioner had been unable to produce using a chemical catalyst, undermines Petitioner's position that using lipases for that reaction would have been obvious in late 2014. *Medtronic, Inc. v. Teleflex Innovations S.a.r.l.*, 70 F.4th 1331, 1340 (Fed. Cir. 2023) (“The fact that a competitor copied the patentee's invention, rather than one within the public domain, is probative of nonobviousness because it suggests the

competitor saw value in the invention that he could not achieve without copying.”).³²

Weighing the totality of the record, we find that Petitioner has not met its burden to show that an ordinarily skilled artisan would have been motivated to change Cummings’s reaction to include a lipase and have done so with a reasonable expectation of success in arriving at the claimed subject matter. Xu discloses lipase-catalyzed interesterification and cites favorable attributes of lipases, but Xu’s interesterification reactions involve only triglycerides, which Dr. Schwartz testifies a POSA would have understood was a critical difference compared to the long, straight-chain jojoba wax esters comprising claim 1’s feedstock. Dr. Schultz provides technically-detailed and evidence-backed testimony explaining why a POSA would not have reasonably expected success in modifying Cummings’s ester-ester exchange reaction to include Xu’s lipase. Petitioner’s argument about the references it submitted with its Reply does raise questions regarding some of that testimony, but does not sufficiently rebut it. Moreover, the absence of *any* rebuttal expert testimony from Petitioner factors significantly here. *Juniper Networks, Inc. v. Correct Transmission, LLC*, 2024 WL 3517862 at * 5 (Fed. Cir. July 24, 2024) (affirming Board’s finding that a reasonable

³² Petitioner’s reliance on *Wrigley* for the notion that the copying evidence here should receive no weight is inapposite. Pet. Reply 25 (arguing it is common in the industry to market similar products). Unlike in *Wrigley*, we find that Petitioner’s copying was directly tied to the novel aspects and merits of the invention—the lipase use providing improved jojoba esters—after Petitioner had failed to find a suitable solution of its own, as discussed. As for whether competitive product research or review of competitors’ patent portfolios was common, there is no persuasive evidence here that copying a competitor’s novel and ultimately proprietary method for achieving desired product attributes was commonplace.

expectation of success had not been shown where patentee's expert contradicted testimony of petitioner's expert and petitioner's expert "failed to address the issues identified by" patentee's expert). This is true even though we find that Petitioner's Lei reference somewhat weakens Patent Owner's position that a POSA would not have considered the use of a lipase to catalyze an ester-ester exchange in molecules lacking a glycerol backbone. But, outweighing Lei and Petitioner's related evidence in the Reply, is the evidence of Petitioner's copying and skepticism related to the use of lipases in the catalysis of jojoba wax ester exchange reactions as recited in the challenged claims. For these reasons, we are unpersuaded that limitation 1[b], and the subject matter of claim 1 as a whole, would have been obvious.

d) Whether an increase in the OSI of the transesterified product versus the OSI of the feedstock would have been obvious

Based on the preponderance of the evidence, we determine that Petitioner has not shown that claim 1's limitation 1[c] is taught by or otherwise obvious over the asserted art.

Petitioner argues that Cummings teaches that transesterifying a jojoba feedstock increases OSI and satisfies limitation 1[c]. Pet. 38–40; Reply 9–13. Petitioner also argues that the claimed OSI increase is inherent when claim 1's active steps are performed. Pet. 39–40 (suggesting the invention only recognizes a latent property); Pet. Reply 16–19. We address these arguments below after first reviewing the additional argument in the Petition that an OSI increase was well-known and expected based on a handful of secondary references, which argument Petitioner did not revisit during trial.

In the Petition, Petitioner argued that it was “well-known” that transesterification of oils and wax esters can make products with a greater oxidative stability. Pet. 39–40 (citing background references (Exs. 1015–1018)). We found this reasoning sufficient at the institution stage based on the preliminary record, and despite our expressed doubts that Cummings itself taught limitation 1[c]. Inst. Dec. 26–27 (“The additional evidence cited by Petitioner does, at least at this stage, support a conclusion that it was known that, through transesterification, the OSI of the resulting product could be improved.”).

Through trial, however, Patent Owner responds with persuasive argument and evidence that explains why Petitioner’s background references do not suggest the subject matter in limitation 1[c]. PO Resp. 35–39 (citing, e.g., Ex. 1015, and arguing the referenced increase in oxidative stability “is in comparison to only the unmodified [(i.e., unsaturated)] oil, and does not factor in the saturated portion of the feedstock”).³³ That, for example, a saturated oil would be expected to be more stable than its unsaturated (pre-transesterification) counterpart oil is unremarkable and also insufficient to meet the claimed comparison—where double bonds are neither lost nor gained between the feedstock and product. Ex. 2009 ¶¶ 133, 138.

In its Reply, Petitioner never revisits its background references or substantively responds to Patent Owner’s argument about them. On this record, we agree with Patent Owner and credit Dr. Schultz’s unrebutted testimony, that those references do not establish that it was well known and

³³ Patent Owner further explains persuasively that, in experimental data, Kodali (Ex. 1015 ¶ 81) actually teaches that the OSI of the transesterified product was lower (17.9 hours) versus the starting oil (38 hours). PO Resp. 37 (citing Ex. 2009 ¶ 133; Ex. 1015 ¶ 81).

obvious that the OSI of the transesterified product would be greater than the OSI of a feedstock that contains both unsaturated and saturated components as claimed. Ex. 2009 ¶¶ 130–138 (testifying, *inter alia*, that none of Petitioner’s background references disclose the feedstock OSI or explain why a POSA would have expected an OSI increase in comparison to the feedstock when the number of double bonds does not change).

Turning to the argument that Cummings teaches limitation 1[c], Petitioner initially cited Cummings’s disclosure that jojoba esters demonstrate “remarkable stability” with values of “greater than 100 hours and as high as 675 hours.” Pet. 38 (citing Ex. 1004, 2). Petitioner contrasted this disclosure with Cummings’s disclosure that refined jojoba oil has an OSI of 35 hours, and argued that a value of between 100 to 675 hours is “significantly greater” than 35 hours. *Id.* (citing Ex. 1003 ¶ 122).

At institution, we doubted that Petitioner could prevail on that argument because Petitioner did not show that Cummings discloses the OSI of a feedstock as claimed—one that contains a mixture of jojoba oil and between 20–50% hydrogenated jojoba wax esters. Inst. Dec. 24. Indeed, we cited Petitioner’s own argument that refined jojoba oil with an OSI of 35 hours “forms only ‘*part of*’ the feedstock . . . [,] mean[ing] the *unsaturated* part of the feedstock.” *Id.* (quoting Pet. 38) (emphasis added). The argument in the Petition did not, therefore, account for the OSI of the *full* feedstock composition, including any stability conferred in the mixture by including up to 50% fully hydrogenated (i.e., saturated) jojoba wax esters. Ex. 2009 ¶¶ 123–124; *see also id.* ¶¶ 55, 135 (testifying that fully-saturated chains contain no carbon-carbon double bonds, are less prone to oxidation, and thus are more stable); Ex. 1005, 2 (“Fully hydrogenated

forms are also the most oxidatively stable of all possible chemical structures of lipids.”).

In its Reply, Petitioner maintains that Cummings discloses limitation 1[c]. Pet. Reply 9–14. First, Petitioner argues that Cummings’s “qualitative” teachings meet the claim language. *Id.* at 9–10. Petitioner cites Cummings’s disclosures about the jojoba esters products being new and improved, comprising different ratios of saturated and unsaturated esters, and noting that one of the products’ highlighted characteristics is oxidative stability. *Id.*

Petitioner accurately characterizes Cummings’s “qualitative” teachings, but the conclusion that limitation 1[c] is met by those teachings does not follow. At best, the teachings indicate that jojoba esters products are more stable than refined jojoba oil and unnamed “similar cosmetic ingredients.” *Id.* (citing Ex. 1004, 1–4). But we disagree that this establishes the OSI of the products would be understood as greater than the OSI of the claimed feedstock that, as we have explained, contains a significant fully-saturated jojoba wax ester component (i.e., 20–50 wt%) and has the same number of C=C double bonds as the resulting product. Ex. 2009 ¶¶ 125–128; Ex. 2046, 80:19–22.

Second, Petitioner argues that Cummings’s “quantitative” teachings meet the language of limitation 1[c]. Pet. Reply 10–14. Petitioner cites the five jojoba esters products in Cummings: jojoba esters (15), (20), (30), (60), and (70). *Id.* (citing Ex. 1004, 1–2). According to Petitioner, jojoba oil and jojoba esters (15) include only unsaturated monoesters; jojoba esters (70) includes only fully saturated monoesters; and jojoba esters (20), (30), and (60) “correspond to ‘partially saturated’ wax esters products from the claimed feedstocks.” *Id.* (citing Cummings’s Fig. 2 (Ex. 1004, 2), which

shows the various species of wax esters comprising jojoba oil, jojoba esters (15), etc.).³⁴ From this, Petitioner argues, a POSA would understand that the feedstock for jojoba esters (15) is *only* refined jojoba oil (i.e., with no saturated component). Ex. 2046, 138:19–139:21. Petitioner contends that the POSA would understand that transesterification itself increases the oil’s OSI because Cummings discloses the OSI of refined jojoba oil is 35 hours and the OSI of jojoba esters (15) is at least 100 hours. Pet. Reply 11–12 (asserting that, even if viewed narrowly, Cummings’s disclosure is akin to the ’245 patent, which provides a numerical OSI comparison only between a jojoba-oil-only feedstock and its transesterified product). Petitioner further contends that a POSA would have understood that the OSI of the feedstocks used to make other jojoba esters products would also be about 35 hours because OSI measurements are biased toward the first component to oxidize in a blend (here, allegedly, the refined jojoba oil). Pet. Reply 12–13 (citing Ex. 2046, 139:13–143:17).

Petitioner’s OSI biasing argument is unpersuasive. Dr. Rockstraw testified that a POSA would expect that “the fully hydrogenated material . . . has no effect on the stability of the oil” and “would expect about the same [OSI] result” as the unsaturated oil’s OSI, but he provides no independent support for this testimony. Ex. 2046, 139:4–141:16 (re-direct); *see also id.* at 141:23–143:16 (testifying, on recross, that “the OSI of a blend is dictated by the OSI of the unsaturated material,” what he described as “the weakest

³⁴ In Cummings’s Figure 2, the left-most column indicates the number of double bonds (either 2, 1, or 0) in the various monoester species listed in the second column. Ex. 1004, Fig. 2. An “X” appearing under the jojoba oil and jojoba esters product columns indicates whether the monoester species in each row is in the oil/product compositions. *Id.*

link”);³⁵ *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1358 (Fed. Cir. 2019) (“Conclusory expert testimony does not qualify as substantial evidence.”).

We also credit Dr. Schultz’s testimony in rebuttal, noting examples where jojoba wax ester compositions with a significant unsaturated fraction have OSIs that are not biased toward the unsaturated fraction’s OSI. Ex. 2009 ¶¶ 125–128; PO Sur-reply 8–9. If the OSI of a mixture of esters was biased toward the unsaturated component as the “weakest link,” then Jojoba Esters 60—which includes the unsaturated wax monoesters in jojoba oil, along with partially- and fully-saturated ester species—should have an OSI of about 35 hours. *See, e.g.*, Ex. 1004, 2, Fig. 2; Ex. 1028,³⁶ 7 (disclosing Jojoba Esters 60 includes 9–27% unsaturated esters). Yet Jojoba Esters 60 is described in the art as having an OSI five times greater. Ex. 1028, 5, Tab. 2 (teaching Jojoba Esters 60 has an OSI of ~ 175 hours, even with no antioxidants added). The evidence on balance contradicts

³⁵ This opinion from Dr. Rockstraw is nowhere in his initial declaration but was, instead, solicited on redirect during his deposition. On recross, he testified that he found support “in the intrinsic evidence.” Ex. 2046, 142:19–143:16. We assume he was referring to the inventor, Mr. Addy’s, testing data submitted in during prosecution (Ex. 1002, 1074–1079 (describing a 20% hydrogenated feedstock with an OSI of 33.8)); Pet. Reply 12–13 (citing Ex. 1002, 1075–76). It is not evident how this data, submitted in 2021, would have been available to and inform a POSA’s understanding in 2014.

³⁶ Cosmetic Ingredient Review, *Final Report of the Cosmetic Ingredient Review Panel: Safety Assessment of Simmondsia Chinensis (Jojoba) Seed Oil, Simmondsia Chinensis (Jojoba) Seed Wax, Hydrogenated Jojoba Oil, Hydrolyzed Jojoba Esters, Isomerized Jojoba Oil, Jojoba Esters, Simmondsia Chinensis (Jojoba) Butter, Jojoba Alcohol, and Synthetic Jojoba Oil* (Sept. 23, 2008) available at <https://www.cirsafety.org/ingredient/simmondsia-chinensis-jojoba-seed-oil>.

Petitioner’s biasing argument and Dr. Rockstraw’s conclusory “weakest link” theory.

On this record, we also find unpersuasive Petitioner’s argument that a POSA would understand from Cummings that transesterification itself increases the OSI of the products compared to the feedstock OSI.

As a threshold matter, we credit Patent Owner’s argument and supporting testimony of Dr. Schultz that, where the number of double bonds does not change (as in an ester-ester exchange), the POSA would not have expected a meaningful change in the OSI of the transesterified product. PO Resp. 43–45; Ex. 2009 ¶¶ 142–144. Dr. Schultz explains that the prior art, including Rozenaal (Ex. 2030), is consistent—disclosing that “[t]he stability of the oil remains essentially unchanged” where only the distribution of the side chains, and not their saturation state, changes. *Id.* ¶ 144 (quoting Ex. 2030, 1232). Moreover, even where the saturation state of a starting oil versus transesterified oil does change, the art discloses that at least in some instances a *decrease* in the OSI of the transesterified product was observed, which was only increased by adding antioxidants to the reaction product after the fact. Kodali, for example, discloses:

The oxidative stabilities of the transesterified products without added antioxidants were *lower* than the starting oil, which is thought to be due to the loss of tocopherols [(i.e., an antioxidant)³⁷] from the canola oil during production of the transesterified products. . . . Addition of antioxidants to the transesterified oils brought the oxidative stabilities above those of IMC-130 [(the starting oil)] fortified with a similar amount of antioxidant.

³⁷ Tocopherols “are one kind of antioxidant that can be added to increase the OSI of a mixture.” Ex. 2009 ¶ 91; *see also* Ex. 2042, 858 (describing antioxidant effects of tocopherols on oil stability).

See, e.g., Ex. 1015 ¶ 81, Table 1 (showing product OSI of 17.9 (with no added antioxidant) vs. starting oil OSI of 38.0); PO Sur-reply 12.

Against that backdrop, we find more persuasive Patent Owner’s argument that a POSA would have attributed the difference between the reported OSIs for jojoba oil and Cummings’s jojoba esters product cited by Petitioner to post-reaction processing, specifically addition of antioxidants. PO Resp. 40–41; PO Sur-reply 1, 4–8; Ex. 2009 ¶ 45 (testifying addition of antioxidants, such as tocopherols, can be used to prevent or slow down oxidation in commercial products), ¶¶ 140–141 (opining any increase in Cummings or Trans Isomers 2 would be thought due to added tocopherols). Patent Owner notes jojoba oil’s OSI (~ 35 hours) and the OSI of Jojoba Esters 15, suggested as ~100 hours in Cummings (Ex. 1004, 2) and reported as ~ 70 hours in Petitioner’s other asserted reference, Trans Isomers 2 (Ex. 1006, 3). PO Sur-reply 4–5. However, Patent Owner argues, this is because “Cummings’s commercial products contain tocopherols for the purpose of increasing OSI.” *Id.* Indeed, Patent Owner argues that related prior-art evidence shows the OSI of Jojoba Esters 15 both before (“~35”) and after (“~80”) tocopherols are added. Ex. 1028, 5 (showing, also, Jojoba Esters 60 with OSIs of ~ 175 and ~ 230, before and after tocopherol addition, respectively). Thus, Patent Owner argues, *without* antioxidants, the OSI of Jojoba Esters 15 is about 35 hours, the same as jojoba oil; but *with* antioxidants, the OSI increases to about 80 hours. PO Sur-reply 5 (“In other words, transesterification did not increase OSI, the addition of tocopherols did.”) (citing Ex. ¶¶ 138–147, 180–185) (emphasis omitted); *see also* Ex. 1028, 7 (teaching that “Each [Jojoba Ester product in Table 6] was reported as being 99.95% Jojoba Esters and 0.05% tocopherol”); *id.*

(“Tocopherol is then added to make the commercial Jojoba Ester 15 (Floritech 2005b).”).

Petitioner contends that Patent Owner’s argument is without merit because Cummings does not describe adding tocopherols as part of its process. Pet. Reply 13. And, Petitioner contends, the only reference in Cummings to tocopherols is as an additional ingredient for a lipstick that already contains Jojoba Esters 30 and 70. *Id.* (citing Ex. 1004, 3).

We disagree with Petitioner for the reasons stated in Patent Owner’s Sur-reply. PO Sur-reply 7–8.³⁸ That is, Cummings is not interpreted in isolation but should be read in view of other prior art, including at least Exhibit 1028, which discloses that the commercial jojoba esters products have tocopherols added. Cummings’s silence about adding tocopherols to the products does not erase other, and more comprehensive, disclosures in the art. Regarding the lipstick described in Cummings, that is a full cosmetic formulation that includes numerous ingredients, such as macadamia and sunflower oils, beeswax, Jojoba Esters 30 and 60, as well as dyes and fragrance. Ex. 1004, 3 (“Formulation 1 – Castor Oil Free Lipstick”). Insofar as tocopherol is listed among the lipstick’s many ingredients, it is notably at a concentration much higher than the amount that Exhibit 1028 indicates is added to the jojoba esters composition itself. *Compare id.* (0.1 % wt/wt of the entire formulation), *with* Ex. 1028, 7

³⁸ We agree with Patent Owner, for example, that *In re Clark* is distinguishable because there is no asserted “error” in Cummings; rather, when considered with the art as a whole, its disclosure is simply higher-level and, thus, omits certain well-known details, yet does not cut against the evidence showing that a POSA would understand that tocopherols are added to commercial jojoba esters in post-reaction processing. PO Sur-reply 8 (citing *In re Clark*, 420 Fed. App’x 994, 998 (Fed. Cir. 2011)).

(teaching that each of the Floratech Jojoba Esters products included “99.95% Jojoba Esters and 0.05% tocopherol”).³⁹ Cummings’s “lipstick” disclosure does not undercut Patent Owner’s position that a POSA would understand that tocopherols are added to commercial jojoba esters in post-reaction processing and thus the OSI values Cummings reports for those commercial products, e.g., Jojoba Esters 15, does not reflect the OSI of the esters themselves. Additionally, Petitioner submitted no rebuttal testimony to try to refute Dr. Schwartz’s opinions about the addition of tocopherols.

We also disagree with Petitioner’s contention that Cummings’s OSI disclosure is akin to the ’245 patent’s disclosure. Pet. Reply 11. Although true that the ’245 patent does not provide a specific OSI comparison between a transesterified product and a feedstock comprising 20–50% hydrogenated jojoba wax esters used in making such product, Patent Owner provided data on that during prosecution—showing a three-fold increase in the product’s OSI. Ex. 1002, 1075–1076. Moreover, the patent gives an example where, in a chemically-catalyzed transesterification of jojoba oil, the OSI of the product *decreased* compared to the feedstock, yet the OSI of the product *increased* when a lipase was used as a catalyst, even with no

³⁹ At the oral hearing, Petitioner asserted that Exhibit 1028 undermines Patent Owner’s argument because it discloses that natural jojoba oil already has 0.05% tocopherols. Tr. 20:2–6. That assertion does not, however, account for the art’s teachings that chemically-catalyzed transesterification was thought to cause a loss of natural tocopherols, which is also consistent with the patent’s experimental results. See, e.g., Ex. 1015 ¶ 81 (describing believed “loss of tocopherols” and noting that “transesterified products are more responsive to [added] antioxidants” than the starting oils); Ex. 1001, 9:53–56 (“[R]esults also indicate that the chemically catalyzed reaction destroys the original amount of tocopherols present in the feedstock, which reduces the OSI of the transesterified product”).

added antioxidants. Ex. 1001, 8:41–9:67 (Example 1 (disclosing, *inter alia*, that “[s]urprisingly, however, the OSI of the enzymatically catalyzed transesterified product is greater than that of the feedstock . . . indicat[ing] that the enzymatic catalysis has an unexpected positive effect on OSI that is not explainable simply by the enzymatic catalyst preserving the natural tocopherols originally present in the feedstock during the reaction”)). Cummings does not disclose use of enzymes for the catalysis of its reaction and, thus, unlike the patent does not teach that lipase-based catalysis increases OSI without added antioxidants.

That leaves Petitioner’s argument that the OSI comparison recited in claim 1’s wherein clause is inherent. Pet. Reply 16–19. According to Petitioner, the other steps of the claim are taught in the art and would have been obvious, leaving only the “wherein” result in limitation 1[c]. *Id.* And, Petitioner contends, Patent Owner has “repeatedly admitted that the claimed OSI increase is inherent.” *Id.* at 17–19.

Petitioner cites two categories of evidence as allegedly showing that the claimed OSI increase is inherent. First, Petitioner points to a handful of prosecution history excerpts. *Id.* at 17–18. Petitioner cites a response to an indefiniteness rejection. *Id.* at 17 (citing Ex. 1002, 371 (rejection), 394 (claims), 396 (remarks)). In response to that rejection, which found that “it is unclear what steps are minimally required by the above [wherein] phrase,” the applicant remarked as follows:

The steps of the method are recited in the first three clauses of the claim which is apparent with the gerund form of the verbs which is required in method steps. The wherein phrase of the claim is merely describing one of the properties of the product formed using the method that is unique to products using this particular method.

Ex. 1002, 396. According to Petitioner, the applicant then reiterated that the “wherein” clause was merely an inherent property that results from carrying out the process steps, even after narrowing the claims from wax esters to jojoba wax esters. Ex. 1002, 944 (claims), 947–949 (remarks).

The cited prosecution history is missing context and, on balance, fails to support Petitioner’s argument. Far from admitting during prosecution that the wherein clause was an inherent result, the applicant repeatedly argued against such a finding. *See, e.g.*, Ex. 1002, 479–484, 608–611, 795–799, 947–949, 1016–1020. Indeed, one of Petitioner’s cited excerpts is merely the applicant’s characterization of the Examiner’s obviousness rejection as not invoking “intended use” reasoning but an “inherency argument”—an argument the applicant explicitly sought to debunk with its evidence of experimental testing. Ex. 1002, 947–948 (arguing, “[i]f the Examiner’s [inherency] speculations were correct, processing jojoba wax esters with the method of Gunawan should produce a product that demonstrates a higher OSI than the OSI of the feedstock materials,” yet “[t]he experimental results directly contradict these speculative arguments”), 841–842 (showing OSI decreased 25% in transesterified product versus feedstock comprising jojoba oil and a fatty alcohol). We are unpersuaded the cited prosecution history constitutes an admission that claim 1’s “wherein” clause is inherent.

The second category of evidence Petitioner cites is the inventor, Mr. Addy’s, deposition testimony given in August 2023. Pet. Reply 18. Petitioner quotes the following, and argues it is an admission that claim 1’s “wherein” clause is an inherent result:

Q. If you do the providing, contacting and transesterifying activities that are specified in the claim prior to the wherein step, do you automatically get the OSI result in that wherein step?

A. If you do the reaction, you will get an increased oxidative stability from the feedstock.

Q. And would that transesterified product automatically have a higher OSI than the feedstock's OSI?

A. The product going through the lipase reaction will have a higher OSI than the feedstock.

Ex. 1043, 60:1–61:24.

This testimony does tend to support a finding that the OSI increase recited in limitation 1[c] is inherent when the other active steps of the claim are carried out. Relevant to Petitioner's challenge, if an ester-ester exchange is carried out in the presence of a lipase catalyst and using a feedstock with 20–50% fully hydrogenated jojoba wax esters and the remainder is jojoba oil—steps that both parties agree are squarely encompassed by claim 1's limitations 1[a] and 1[b]—the OSI of the transesterified product would, therefore, be greater than the feedstock's OSI. Experimental data submitted during prosecution corroborates that, when a feedstock of 20% hydrogenated jojoba oil and 80% refined jojoba oil is transesterified, using a lipase catalyst, the OSI of the product is greater than the OSI of the feedstock by a factor of three. Ex. 1002, 1075–1078. And, Patent Owner concedes, there is no evidence in the record showing a reaction that is otherwise within the scope of limitations 1[a] and 1[b] where the OSI value did not increase as recited in limitation 1[c]. Tr. 41:12–25.

Still, Patent Owner responds that Petitioner has not met the high burden to establish inherency.⁴⁰ PO Sur-reply 13–15. We agree that there

⁴⁰ At oral argument, Patent Owner suggested that there are “many conditions” one might choose that could affect whether the reaction occurs and the OSI increases. Tr. 39:1–41:2 (citing, e.g., “temperature,” “flow rate,” and “contact time”). Such conditions are, however, not recited in the

is a “high standard” needed to rely on inherency as part of an obviousness analysis. *Par Pharm., Inc. v. TWi Pharma., Inc.*, 773 F.3d 1186, 1194–96 (Fed. Cir. 2014); *Honeywell Int’l Inc. v. Mexichem Amanco Holding S.A. de C.V.*, 865 F.3d 1348, 1354 (Fed. Cir. 2017) (explaining that “use of inherency in the context of obviousness must be carefully circumscribed because that which may be inherent is not necessarily known and that which is unknown cannot be obvious”). However, as to the question whether limitation 1[c] is an inherent result that follows carrying out a reaction within the scope of limitations 1[a] and 1[b], the evidence of record suggests the answer may be “yes.”

But even if the OSI increase in limitation 1[c] follows inherently from practicing the steps recited in limitations 1[a] and 1[b], this does not end the obviousness inquiry. As the Federal Circuit has explained, “[w]hat is important regarding properties that may be inherent, but unknown, is whether they are unexpected.” *Honeywell*, 865 F.3d at 1355. We find, as discussed below, that a POSA would not have predicted an increase in the transesterified product’s OSI, and that testing data of record evidences objective indicia (i.e., unexpected results) that undermines Petitioner’s argument that limitation 1[c] and claim 1 would have been obvious.

Patent Owner argues that an increase in the OSI of the transesterified product compared to the feedstock was unexpected. PO Resp. 57–61; PO

claim and there is no evidence cited by Patent Owner to show what, if any, effect hypothetical and unrecited reaction conditions would have on the OSI measurements. Moreover, the speculation of Patent Owner’s counsel regarding the possible effects of these unrecited conditions is contradicted by Mr. Addy’s testimony above.

Sur-reply 12–13, 26. According to Patent Owner, testing in the patent and prosecution history, as well as the prior art’s disclosures, show that transesterification more likely than not results in a product that has a lower or equivalent oxidative stability, not increased OSI as claimed here. PO Resp. 57–61 (citing Ex. 2009 ¶¶ 181–185; Ex. 1001, 7:24–42, 9:26–47; Ex. 1002, 467, 841; Ex. 1015 ¶ 81); *see also id.* 21–24 (discussing testing in file history); PO Sur-reply 12 (citing Ex. 2030, 1232). We agree with Patent Owner on this record.

Petitioner contends that a POSA would have expected an increased OSI and that Patent Owner’s assertions of “surprising” results should carry no weight because Patent Owner “provides no evidence that a decrease would have been expected.” Pet. Reply 22–23. We disagree with Petitioner’s contention that an OSI increase would have been expected, for reasons already discussed above. We also disagree that Patent Owner provided no evidence that a decrease would have been expected. As we explained above, the evidence suggests that a skilled artisan would have expected a transesterified product’s OSI to stay essentially the same where double bonds are neither lost nor gained (*see, e.g.*, Ex. 2030, 1232) and, even where the saturation state increases, experimental data in the prior art showed that a transesterified product’s OSI could decrease unless antioxidants were subsequently added (Ex. 1015 ¶ 81).

The testing evidence of record also shows that whether the OSI of a transesterified product that includes jojoba esters increases or decreases is unpredictable. In Example 1 of the ’245 patent, the OSI of the chemically-catalyzed transesterified product decreased compared to the feedstock OSI, yet the OSI of the lipase-catalyzed product increased without any additional antioxidants. Ex. 1001, 9:26–67 (showing an increase from 26.5 to 38.6

hours, and describing this result as “[s]urprising” and “unexpected”). Conversely, in an alcoholysis-based, lipase-catalyzed transesterification between sunflower oil and oleyl alcohol (Experiment 1), or jojoba oil and oleyl alcohol (Experiment 2), Mr. Addy showed in prosecution that the OSI increased about 20% in Experiment 1, but decreased 25% in Experiment 2. Ex. 1002, 838–843.

Additionally, experimental testing during prosecution evidences an unexpected OSI increase with the reaction as claimed. Mr. Addy showed that a lipase-catalyzed ester-ester exchange between 20% hydrogenated jojoba oil and 80% refined jojoba oil resulted in a product with an OSI three-fold higher than the feedstock OSI. *Id.* at 1074–1079.⁴¹ This testing data ultimately persuaded the Examiner to allow the claims. *Id.* at 1167 (citing Mr. Addy’s testing described in the July 2021 Declaration), 1178 (“The instant method . . . results in an unexpected higher OSI of the transesterified product as compared to the OSI of the feedstock even without the addition of an alcohol.”). We agree with the Examiner on this record that the increased OSI constitutes an unexpected result.

Petitioner puts forth no evidence that persuasively rebuts the lack of predictability and unexpected results concerning whether the OSI would increase, as illustrated by the above testing data.

In sum, while increased OSI may be an inherent property of the transesterified product made by performing the other steps of claim 1, the

⁴¹ Although Mr. Addy’s testing also showed a “small increase” in OSI for the chemically-catalyzed reaction product, Mr. Addy attributed that difference to imprecision of the OSI measurements, and testified the feedstock and product OSIs are “functionally” and “practically” the same. Ex. 1002, 1077–1078.

evidence of record suggests that property would have been both unknown and unexpected to a POSA at the time. *See Honeywell*, 865 F.3d at 1355. Considering the totality of the evidence, we are unpersuaded that limitation 1[c], and the subject matter of claim 1 as a whole, would have been obvious.

e) Objective Indicia

We addressed the parties' objective indicia of obviousness and nonobviousness as part of our analysis above (*see* Sections III.D.4.c and III.D.4.d), including Petitioner's allegation of simultaneous invention, and Patent Owner's assertions of copying, skepticism, and unexpected results. Patent Owner additionally argues that the ten-year delay between the publication of Petitioner's asserted art and the effective filing date of the '245 patent supports a determination that the claims are nonobvious. PO Resp. 66–67; PO Sur-reply 27. The temporal gap between the references and the filing of the application that issued as the '245 patent does not factor in our decision here. Patent Owner prevails on this record for the reasons explained above regardless of the alleged delay.

f) Dependent Claims

Petitioner contends that claims 2, 3, and 5 would have been obvious. Pet. 41–42; Ex. 1003 ¶¶ 125–130; Pet. Reply 22. Petitioner's challenge to those dependent claims, relies on the argument and same combination of art asserted against claim 1. Petitioner does not argue or show that its challenge to the dependent claims makes up for deficiencies in its showing for claim 1 that we have discussed above. Thus, we conclude that Petitioner has not proved that claims 2, 3, and 5 are unpatentable. *In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (“[D]ependent claims are nonobvious if the independent claims from which they depend are nonobvious.”).

g) Conclusion

For the reasons above, we determine that Petitioner has not proved by a preponderance of the evidence on this record that claims 1–3 and 5 would have been obvious over Cummings, Xu, and Sessa.

E. Grounds 2 & 3 – Obviousness over Trans Isomers 2 Combinations

Petitioner argues that claims 1–3 and 5 would have been obvious over Trans Isomers 2, Xu, and Sessa (Pet. 42–54 (Ground 2)) and that claims 1–3 and 5 would have been obvious over Trans Isomers 2, Trans Isomers 1, and Sessa (Pet. 54–59 (Ground 3)). There is no dispute that the asserted references under Grounds 2 and 3 qualify as prior art to the '245 patent.

Xu and Sessa are summarized above. We summarize Trans Isomers 2 and Trans Isomers 1 below, and our analysis follows.

1. Trans Isomers 2 (Ex. 1006)

Trans Isomers 2 is an article titled “*Trans Isomers in Cosmetics, Part 2*” that published in 2001, and its content republished in 2004. Ex. 1006, 1, 6; Ex. 1014 (reprint). It is part of a two-part series with Trans Isomers 1 (summarized below).⁴²

Trans Isomers 2 teaches that “interesterification” is a process that, unlike certain other methods for manipulating natural lipids, produces no trans isomers. Ex. 1006, 1. Trans Isomers 2 discloses that “[t]he interesterification reaction used to produce trans free emollients is one in which a fully hydrogenated lipid material (no trans isomers) is reacted with neat oil containing only cis isomers.” *Id.* “The resulting product [of interesterification] is an amorphous mixture of partially saturated, saturated

⁴² Trans Isomers 2 and Trans Isomers 1 are authored by James Brown and Robert Kleiman, both from Floratech. Ex. 1006, 5; Ex. 1005, 4.

and unsaturated esters that contain no trans isomers.” *Id.*; *see also id.* at 2–3, Fig. 4 (illustrating reaction where the saturated and unsaturated chains of the feedstock materials are randomized in new jojoba esters products); Ex. 1014, 5–7 (clearer depiction of the same reaction). The interesterification reaction described in Trans Isomers 2 uses a sodium methyllate catalyst. *Id.*

Trans Isomers 2 includes “Table 2” and teaches that “Table 2 illustrates the range of properties achievable [through] this interesterification process used to produce ‘Trans Free’ Jojoba Esters.” *Id.* at 2. Table 2 is reproduced below.

TABLE 2. CHEMICAL AND PHYSICAL PROPERTIES OF JOJOBA ESTERS						
Jojoba Ester	Melting Point °C	Iodine Value g I/100g	Oxidative Stability Value, Hours	Lubricity Degrees	Penetration, Mm	Monoene, Content, 0%
15	10-15	78-85	70	19.0	—	0
20	42-48	64-70	130	20.4	—	25-35
30	47-51	57-61	165	18.9	26.4	36-46
60	56-61	40-44	225	17.9	9.3	42-52
70	66-70	0-2	680	15.9	0.3	0

Ex. 1014, 7; Ex. 1006, 3. Table 2 is titled “Chemical and Physical Properties of Jojoba Esters” and includes measures of various properties, including melting points, iodine values, and OSI values for Jojoba Esters 15, 20, 30, 60, and 70. Ex. 1006, 3.

Trans Isomers 2 also includes “Table 4,” which is reproduced below.

TABLE 4. PHYSICAL PROPERTIES OF INTERESTERIFIED JOJOBA ESTERS IN COMPARISON WITH LIKE MELTING PARTIAL HYDROGENATES								
Sample	Melting Point °C	Iodine Value g I/100g of Sample	% Trans	Oxidative Stability Index, Hours	Index of Refraction $\mu_{80^\circ\text{C}}$	Penetrometer, Mm	Silp, Cadcamo, Degrees (1%)	Silp, IFT, Degrees (100%)
Jojoba Esters 30	49	58	0	165	1.4418	26.4	18.9	23
Jojoba oil Partial Hydrogenate	49	69	11	27	1.4435	—	19.3	>25
Jojoba Esters 60	59	42	0	225	1.4403	9.3	17.9	14.1
Jojoba Oil Partial Hydrogenate	59	49	37	108	1.4408	5.2	18.1	15.4

Ex. 1006, 3–4. Table 4 is titled “Physical Properties of Interesterified Jojoba Esters in Comparison with Like Melting Partial Hydrogenates,” and the table lists several properties for two Jojoba Esters products and two Jojoba Oil Partial Hydrogenates. *Id.* (listing, e.g., melting points and OSI measures).

2. *Trans Isomers 1 (Ex. 1005)*

Trans Isomers 1 is an article titled “Trans Isomers in Cosmetics” that published in 2001. Ex. 1005, 1, 5.

Trans Isomers 1 describes a move in the industry toward products with no trans-isomer content. *Id.* at 1 (noting that cosmetic chemists may soon be asked to certify that their products are trans-free). Trans Isomers 1 teaches, as an alternative to the use of products with trans isomers, using products formed by interesterification. *Id.* at 3 (“Oil phase emollients with these desirable characteristics [(i.e., oxidatively stable, broad range of melting points, and trans-free)], can be obtained without the formation of trans isomers through a process known as ‘interesterification.’”). Trans Isomers 1 states: “Rozenaal [8] discussed use of this interesterification process to modify the melting characteristics of triglycerides using various catalysts including enzymes.” *Id.*⁴³

Trans Isomers 1 also describes cis- and trans- geometry in lipid molecules. *Id.* at 1. Trans Isomers 1 teaches that “cis and trans labels refer to the geometric positioning of hydrogen atoms about points of unsaturation (double bonds) found in lipid chains.” *Id.* Trans Isomers 1 teaches that the overwhelming majority of the lipid components created in nature are in a cis form. *Id.* Conversely, “[t]rans isomers of lipid materials occur infrequently in nature” and “[n]on-natural trans isomers are usually formed when lipid materials are subjected to various chemical transformations,” such as partial hydrogenation and transisomerization. *Id.*

⁴³ Rozenaal cited here in Trans Isomers 1 is of record as Exhibit 2030, and is discussed in more detail above. See Section III.D.4.

Trans Isomers 1 teaches that “[f]ully hydrogenated lipid materials contain neither cis nor trans fatty acid isomers.” *Id.* at 2. “The double bonds of a fully hydrogenated lipid have been eliminated by completely ‘saturating’ the molecule with hydrogen.” *Id.* (“Fully hydrogenated forms are also the most oxidatively stable of all possible chemical structures of lipids.”). Trans Isomers 1 also teaches that “[f]ully hydrogenated jojoba oil (melting point 68-70[degrees]C) contains neither cis nor trans isomers . . . and is frequently found as a component of lipsticks . . . and other ‘wax matrix’ type formulations”). *Id.*

3. Analysis

Petitioner’s argument under Grounds 2 and 3 is, in material respects, similar to Ground 1, and Petitioner’s challenge fails for essentially the same reasons as discussed above for Ground 1. Pet. 42–59.

For Ground 2, Petitioner argues that Trans Isomers 2 teaches a transesterification reaction between jojoba wax esters, and the percentage of the hydrogenated jojoba wax esters in the feedstock can be calculated from iodine values or, alternatively, would be obvious over Sessa and routine optimization. *Id.* at 42–48. Because Trans Isomers 2’s reaction uses a chemical catalyst, Petitioner turns to Xu and the teaching about lipases, urging the same reasoning as Ground 1. *Id.* at 48–51. Petitioner argues Trans Isomers 2 discloses limitation [1c] in “Table 4.” *Id.* at 51.⁴⁴

⁴⁴ Petitioner’s identical argument for the remaining grounds (Pet. 52, 58, 69) (cross-referencing Ground 1 argument)), and citing the same background references, that it was “well-known” that transesterification increases OSI, is unpersuasive in view of Patent Owner’s un rebutted argument and evidence about those references as discussed above for Ground 1.

Ground 3 is the substantially the same as Ground 2 except that Petitioner swaps Xu for a sentence in Trans Isomers 1 that references a disclosure in Rozenaal about using enzyme catalysts. Pet. 57.

Patent Owner’s counterarguments parallel those raised against Ground 1. PO Resp. 50–54 (cross-referencing, e.g., its arguments about the claimed use of lipases and the OSI comparison being nonobvious, and unreliability of Petitioner’s IV back-calculation).

Our analysis above about limitation 1[b] applies equally here. Petitioner has not met its burden on this record to show that use of lipases in the claimed method would have been obvious. *See supra* Section III.D.4.b. Petitioner’s reliance on Trans Isomers 1 rather than Xu for Ground 3 does not change the result. Trans Isomers 1 does not disclose the use of enzymes to transesterify wax esters, much less jojoba wax esters. Ex. 1005, 3 (“Rozenaal [8] discussed use of this interesterification process to modify the melting characteristics of triglycerides using various catalysts including enzymes.”). And, Dr. Schultz explains persuasively that Rozenaal, which is the sole basis Petitioner cites for Trans Isomers 1’s single mention of enzyme catalysts, only describes using lipases with triacylglycerols. Ex. 2009 ¶¶ 169–172 (discussing Rozenaal’s teachings (Ex. 2030, 1232–1233)). Petitioner’s Reply does not address Rozenaal or Dr. Schultz’s testimony about it.

Additionally, we are unpersuaded that Trans Isomers 2 discloses the OSI increase of limitation 1[c]. The Petition itself fails to explain how Trans Isomer 2’s Table 4 teaches or suggests this limitation, and Dr. Rockstraw’s declaration is equally unhelpful. Pet. 51; Ex. 1003 ¶ 159. Inasmuch as the Petition purports to compare the OSI values of Jojoba Esters products and “Jojoba Oil Partial Hydrogenate[s]” exhibiting “identical melting points”

(Pet. 51), we understand this to mean comparing the OSIs for those products with identical melting points to each other. For example, comparing Jojoba Esters 30 (melting point of 49 °C and an OSI of 165 hours) to the Jojoba oil Partial Hydrogenate (melting point of 49 °C and an OSI of 27 hours). Inst. Dec. 32–33. Although true that 165 hours is more than 27 hours, as we explained at institution, Petitioner’s comparison is inapt relative to limitation 1[c] because the “Jojoba oil Partial Hydrogenate[s]” of Table 4 form no part of any feedstock to the Jojoba Esters. *Id.* To the contrary, Trans Isomer 2’s partial hydrogenates include trans isomers, which are not part of jojoba oil, hydrogenated jojoba oil, or the Jojoba Esters products. Ex. 1006, 1. Moreover, the partial hydrogenates appear to be comparative *products* made by a different method—not interesterification. *See* Ex. 1006, 1–2 (describing a “transisomerization” reaction); *see also* Ex. 1005, 1 (describing formation of non-natural trans isomers through chemical transformations like transisomerization). PO Resp. 51–52; Ex. 2009 ¶¶ 164–166 (testimony of Dr. Schwartz supporting this reading of Table 4 and related disclosures); PO Sur-reply 10–11 (arguing Trans Isomers 2 “purports to compare those commercial [Jojoba Esters] products to products of unknown composition and origin”).

In its Reply, Petitioner advances a different theory about Trans Isomers 2’s Table 4 that is found nowhere in the Petition or Dr. Rockstraw’s declaration, but was espoused for the first time at Dr. Rockstraw’s deposition. Pet. 14–16 (citing Ex. 2046, 41:24–48:5). The theory is essentially as follows: Jojoba Esters 30 in the first row of Table 4 has an IV value of 58 (reflecting a relative saturation state of the composition) and 0% of any stability-enhancing trans isomers; conversely, the Jojoba Oil Partial Hydrogenate at the last row of the table has an IV value of 49 (meaning the

sample is relatively more saturated than Jojoba Esters 30) and also includes 37% stability-enhancing trans isomers. From this, Petitioner argues that, even if Trans Isomers 2 discloses no OSI measure for any feedstock component, it does indicate an “upper bound” for the Jojoba Esters 30 feedstock, which allegedly must be lower than the OSI of 108 reported for the Jojoba Oil Partial Hydrogenate listed in Table 4’s last row. Pet. Reply 14–16 (comparing the products at rows 1 and 4, and arguing “the OSI of the Jojoba Esters 30 feedstock—having a lower amount of hydrogenation and none of the OSI-boosting trans isomers generated during partial hydrogenation—must be lower than 108”). Because the reported OSI of Jojoba Esters 30 in Table 4 is 165 hours, which is greater than 108 hours, Petitioner argues limitation 1[c] is met. *Id.*

We find that this is a new and untimely theory attempting to “gap-fill” a claim element omitted from the Petition, i.e., evidence and argument to explain how limitation 1[c] is purportedly disclosed by Trans Isomers 2. *See* Consolidated Trial Practice Guide (Nov. 2019), 74–75, available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf>. There is no discussion in the Petition or Dr. Rockstraw’s declaration about comparing IV values or trans-isomer percentages of the products listed in Table 4, or how those parameters inform what the OSI measurement of any feedstock component would be. Pet. 51. Nor was there an allegation of any OSI value for the partial hydrogenate products representing a ceiling or “upper bound” for the OSI of the feedstock used to form the Jojoba Esters product. *Id.* (noting only the products’ “identical melting points” and listed OSI values). Moreover, given Petitioner’s initial reference to “identical melting points” in Table 4, the Petition’s suggested OSI comparison was between the products at rows 1 and 2 (with melting points of 49, and OSIs of 27 and 165), and

between rows 3 and 4 (with melting points of 59, and OSIs of 108 and 225). That is not the comparison made in the Reply. PO Sur-reply 11–12 (arguing the Reply is at odds with the theory advanced in the Petition).

While some elaboration to a petitioner’s challenge through trial is allowed and even expected, we find that Petitioner crossed the line of what is permissible here. The only thing the perfunctory theory in the Petition (and equally conclusory Dr. Rockstraw declaration) share with the theory that appeared in the Reply is citation to Trans Isomers 2’s Table 4. *Compare* Pet. 51 (citing Ex. 1003 (Rockstraw Decl.) ¶¶ 158–159), *with* Pet. Reply 14–16 (citing, *inter alia*, Dr. Rockstraw’s deposition testimony spanning six pages, and notably omitting any citation to paragraphs 158 or 159 of his declaration). *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“[T]he expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition”). “It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” *Id.* (quoting 35 U.S.C. § 312(a)(3)). The Petition is short on meeting the “particularity” requirement, and the Reply advances a new theory to explain how Trans Isomers 2’s Table 4 teaches or suggests limitation 1[c]. Accordingly, the Reply argument on this issue is untimely and has been waived. 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.23(b).

But, even if we were to consider the Reply argument on this issue, it is unavailing on this record to show that Trans Isomers 2 discloses limitation 1[c]. As discussed above and in connection with Ground 1, in an ester-ester exchange where C=C bonds are neither lost nor gained, Patent Owner persuades us that the POSA would not expect a material change in

the OSI between the feedstock and the transesterified product. Moreover, as we explained above, Patent Owner cites evidence related to the addition of antioxidants (i.e., tocopherols) to the Jojoba Esters products and Dr. Schultz testifies that a POSA would regard the addition of antioxidants—not the transesterification reaction itself—as responsible for any observed increase in the OSI of those products. *See, e.g.*, Ex. 2009 ¶¶ 138–147, 180–185. Petitioner argues that Trans Isomers 2 is silent about adding tocopherols to Jojoba Esters. Pet. Reply 16. Yet the related prior art (e.g., Ex. 1028, 5, 7) does describe adding tocopherols to the Jojoba Esters and the significant impact on OSI of doing so. *See supra* Section III.D.4.d.

For the reasons above, we determine that Petitioner has not proved by a preponderance of the evidence on this record that claims 1–3 and 5 are unpatentable under Grounds 2 and 3.

F. Ground 4 – Obviousness over Brown, Xu, Cummings, and Sessa

Petitioner contends that claims 1–3 and 5 would have been obvious over Brown, Xu, Cummings, and Sessa. Pet. 60–70. There is no dispute that the asserted references qualify as prior art.

Xu, Cummings, and Sessa are summarized above. We summarize Brown below and then turn the analysis.

1. Brown (Ex. 1007)

Brown is a U.S. patent that reissued June 10, 2003, and was assigned to Floratech. Ex. 1007, codes (45), (73). Brown relates to an “effective dry-feel emollient composition additive for use in personal care” and “cosmetic” products, and methods of making such composition. *Id.* at 3:36–39.

Brown describes methods for producing the emollient that may include alcoholysis and interesterification. *Id.* at 4:60–67. Brown teaches

that the starting materials for the reaction may include (I) alcohol, especially isopropyl alcohol, (II) jojoba wax esters ($R^1\text{--COO--CH}_2\text{--}R^1$), and (III) fully hydrogenated jojoba wax esters ($R^2\text{--COO--CH}_2\text{--}R^2$). *Id.* at 4:6–24 (disclosing that R^1 comprises a carbon chain of various lengths and includes a C=C bond, and R^2 comprises a carbon chain of various lengths and includes no C=C bonds). Brown describes the use of chemical catalysts. *Id.* at 5:1–38 (describing, e.g., sodium methoxide as a catalyst).

Brown further describes several reaction products. For example, Brown describes “Reaction C” where “I, and II_n and III_n (catalyst) → IV, V, VI, VII, VIII, IX, II_r and III_r.” *Id.* at 4:48–51. According to Brown, “[t]his product is referred to . . . as ‘the broad melting range emollient’ and the properties of the emollient depend on the relative amounts of II_n and III_n.” *Id.*; *see also id.* at 4:52–54 (subscripts “n” and “r” refer, respectively to the naturally occurring distribution of wax esters and the randomized distribution of wax esters resulting from the rearrangement that occurs during the reaction). Brown discloses that IV, VI, VII, and VIII are “[p]artially saturated wax esters” and “[t]ypical product components” from reactions with jojoba oil. *Id.* at 4:25–38. Brown teaches that “Floraesters 70 is III, Floraesters 15 is II_r, and Floraesters 20, 30, and 60 are combinations of II_r, IV, V, and III_r.” *Id.* at 5:39–43.

Brown includes a table listing iodine values for the jojoba ester compositions. *Id.* at 8:45–55 (listing for Floraesters 15, 20, 30, 60, and 70).

2. Analysis

Petitioner’s argument and analysis under Ground 4 is similar to Ground 1. Pet. 60–70. Petitioner relies on Brown for teaching transesterification of jojoba wax esters and hydrogenated jojoba wax esters, IV back-calculation (or Sessa) for the hydrogenated jojoba wax ester

percentage, Xu for its disclosures related to lipases, and Cummings for disclosure of the OSI comparison between the transesterified Jojoba Esters product and feedstock. *Id.* Patent Owner raises essentially the same arguments on Ground 4 as Ground 1. PO Resp. 55; *see also* Pet. Reply (no separate argument on Ground 4); PO Sur-reply (same); Tr. (same).

We are unpersuaded on this record that claims 1–3 and 5 would have been unpatentable under Ground 4 for substantially the same reasons given above for Ground 1—namely, Petitioner does not, on this record, establish by a preponderance of the evidence that: (1) using a lipase in the manner claimed in limitation 1[b]; and (2) the increase in OSI required by limitation 1[c] would have been obvious over the asserted art. *See supra* Section III.D.4. Petitioner has not, therefore, shown that claim 1 (and the challenged dependent claims) would have been obvious.

IV. MOTIONS

1. Petitioner’s Motion to Exclude

Petitioner moves to exclude several exhibits, a declaration of Delrika Curry supporting certain exhibits, and portions of Dr. Schultz’s testimony that rely on the challenged exhibits. Paper 47 (“Motion” or “Mot.”); *see also* Paper 50 (“Mot. Reply”). Patent Owner opposes the Motion. Paper 48 (“Opposition” or “Opp.”).

a) Exhibits 2012–2014 and Curry Declaration (Exhibit 2049)

Delrika Curry (“Curry”) is Cargill’s Sales Director and attested that Exhibits 2012 and 2013 are, respectively, true and correct copies of Certificates of Analysis for Floratech’s Floraesters 15 and Floraesters 20 products, dated in 2004. Ex. 2049 ¶¶ 6–7. Curry testified that Exhibit 2014

is a true and correct copy of the Standard Manufacturing Protocol for Floraesters, bearing a revision date in 1998. *Id.* ¶ 8.

Petitioner argues that Exhibits 2012–2014 should be excluded for lack of authenticity. Mot. 5–7. According to Petitioner, Curry did not write the declaration or speak to anyone about the specific documents subject to the declaration before it was signed. *Id.* at 5–8. Petitioner also alleges that Curry was unable to testify about the meaning of some of the content in those documents. *Id.* at 8–10 (soliciting an admission that Curry did not know what “Lot Number FELM35 means”). Petitioner’s arguments go to the weight of the evidence, not its admissibility. The evidence shows that Curry did speak with other knowledgeable custodians for the documents to confirm his understanding after the declaration was signed and before Petitioner was permitted to (and did) depose Curry about them. Ex. 2049, 27–28 (noting discussions with others confirming the exhibits are archival copies of Floratech documents). Petitioner provides no evidence that would suggest Exhibits 2012–2014 are anything other than what they purport to be and what Curry testified they are.

Petitioner also argues that Exhibits 2012–2014 should be excluded as hearsay. Mot. 5–12. According to Petitioner, Curry’s declaration parrots the language of the business records exception to the hearsay rule without providing a factual basis for the testimony. *Id.* at 10–12.

Even if we agreed with Petitioner’s characterization of the Curry declaration and whether it was sufficient to invoke the hearsay exception under FRE 803(6), we decline to exclude Exhibits 2012–2014. The Final Written Decision does not rely on Exhibits 2012–2014. Dr. Schultz relies on those exhibits but he does so in further support of his own opinion about what a POSA would understand about the art—that tocopherols are added to

jojoba esters as part of post-reaction processing. There is no indication that the information in Exhibits 2012–2014 is anything other than the type experts in the field reasonably rely on in forming opinions about the products at issue and, thus, under FRE 703 we decline to exclude the exhibits.⁴⁵ Also, even if we did exclude these exhibits, our Final Written Decision would not change because Petitioner’s own evidence discloses that tocopherols are added to the jojoba esters products. Ex. 1028, 5, 7.

For the reasons above, we decline to exclude Exhibits 2012–2014 or the portions of Dr. Schultz’s testimony that cite those exhibits.

b) Exhibit 2048

Petitioner argues that Exhibit 2048, a “slide deck” submitted by Patent Owner, should be excluded for lack of authenticity and as hearsay. Mot. 13–14. Patent Owner responds that “EX 2048 was found in Floratech/Cargill’s files and is dated September 10, 1998, so it is authentic under FRE 901(8).” Opp. 7. Patent Owner provides no evidence that supports this assertion.

Notwithstanding the above, this Final Written Decision does not rely on Exhibit 2048. Although we do not rely on Exhibit 2048, our decision relies on portions of Dr. Schultz’s testimony that cite the exhibit (i.e., paragraphs 127 and 140). Exclusion of those paragraphs is, however, unwarranted. Paragraphs 127 and 140 of Dr. Schultz’s declaration cite Exhibit 2048 among several other exhibits that support the testimony in

⁴⁵ At the hearing, Patent Owner represented that Exhibits 2012 and 2013 were incorrectly marked as confidential when filed, which marking was corrected in view of Curry’s testimony about certificates being sent to customers. Tr. 52:8–53:2; Ex. 2049, 52:9–53:21 (testifying the general practice is customers get a certificate of analysis for each lot purchased, but that he lacked personal knowledge whether Exhibit 3 to his deposition (Ex. 2013) had been sent to a customer).

those paragraphs. Moreover, to the extent Dr. Schultz cites Exhibit 2048, substantively equivalent disclosures as in Exhibit 2048 appear in Petitioner's own prior art evidence. *See* Ex. 2009 ¶ 140 (citing Ex. 2048 for OSI comparison of Jojoba Esters 15 and 60 with/without tocopherols); *compare* Ex. 2048, 15 (disclosing Jojoba Esters 60 with tocopherol has OSI of ~225 hours; Jojoba Esters 15 with tocopherol has OSI of ~70 hours; Jojoba Esters 15 without tocopherol has OSI of ~35 hours), *with* Ex. 1028, 5 (disclosing Jojoba Esters 60 with tocopherol has OSI of ~230 hours; Jojoba Esters 15 with tocopherol has OSI of ~80 hours; Jojoba Esters 15 without tocopherol has OSI of ~35 hours). It is, thus, reasonably clear that excluding Exhibit 2048 would not change Dr. Schultz's opinions on this record.

For the above reasons, we do not exclude Exhibit 2048 or the portions of Dr. Schultz's declaration that cite it.

c) Other Exhibits

Petitioner also moves to exclude Exhibits 2010, 2011, 2015, 2017, 2019–2021, 2024–2026, 2028, 2032, 2033, 2035, 2037, 2038, 2040, 2041, 2058, 2059, 2060, 2061, and 2064 for alleged lack of authenticity. Mot. 14–15. According to Petitioner, Patent Owner did not authenticate these materials. *Id.*

Petitioner's Motion is denied as to these "other" exhibits. The burden to show authentication is low—it merely requires evidence sufficient to support a finding that the item is what it purports to be. FRE 901; *Paragon 28, Inc. v. Wright Medical Tech., Inc.*, IPR2019-00894, Paper 41 at 9 (PTAB Sept. 23, 2020). Many of the exhibits are self-authenticating journal articles. This includes, for example, Exhibits 2033, 2035, and 2038, among several others. *See, e.g.*, Ex. 2035 (article in ACS (American Chemical Society) Publications), Ex. 2038 (article in Biotechnology Advances); Opp. 10–13.

Most other exhibits are apparent textbook chapters or excerpts bearing sufficient indicia on their face and throughout that we find they are likely authentic. *See, e.g.*, Ex. 2010 (Textbook of Cosmetic Formulations), Ex. 2024 (Chapter 10 excerpt from March’s Advanced Organic Chemistry); FRE 901(b)(3)-(4) (authentication provided by comparison of expert or trier of fact, or by distinctive characteristics of the evidence taken together with all the circumstances). The Final Written Decision does not rely on any of the alleged website printouts (Exhibits 2015, 2017, 2037, and 2060). And, in any event, we find that Dr. Schultz may base opinions on facts or data set forth in these “other” exhibits even if they were not otherwise admissible. FRE 703. Indeed, Petitioner and Dr. Rockstraw rely in this proceeding on similar articles, including online reprints, and book excerpts. *See, e.g.*, Exs. 1005, 1008, 1027.

For the above reasons, we deny the Motion to exclude these “other” exhibits and the portions of Dr. Schultz’s declaration that cite them.

d) Exhibits 2018 and 2044

Lastly, Petitioner moves to exclude Exhibit 2018 and 2044 as neither cited nor relied upon in the papers. Mot. 15. Exhibits 2018 and 2044 do not factor into this Final Written Decision. Because neither the Board nor the parties or their experts rely on these exhibits, we dismiss the remainder of Petitioner’s Motion as moot.

2. Parties’ Motions to Seal

The parties filed a Joint Motion to Seal Petitioner’s Reply and Exhibits 1043, 1044, and 1045. Paper 34. The parties also filed a Joint Motion to Seal Sur-reply. Paper 39. The Board previously entered a Protective Order that controls access to confidential information in this proceeding. Paper 38; Paper 31 App’x A (“Protective Order”).

The Board recognizes “a strong public policy for making all information filed in a quasi-judicial administrative proceeding open to the public, especially in an *inter partes* review which determines the patentability of claims in an issued patent and therefore affects the rights of the public.” *Garmin Int’l v. Cuozzo Speed Tech., LLC*, IPR2012-00001, Paper 34, 1–2 (PTAB Mar. 14, 2013). Except as otherwise ordered by the Board, the record of an *inter partes* review shall be made available to the public. 35 U.S.C. § 316(a)(1); 37 C.F.R. § 42.14.

The standard for granting a motion to seal is “for good cause.” 37 C.F.R. §§ 42.20(c), 42.54(a). In determining whether good cause has been shown, the Board considers, among other things, whether the information sought to be sealed is truly confidential and whether the expressed interest in maintaining confidentiality outweighs the strong public interest in an open record. *Argentum Pharm. LLC v. Alcon Rsch., Ltd.*, IPR2017-01053, Paper 27, 2–3 (PTAB Jan. 19, 2018) (informative).

a) Joint Motion to Seal Petitioner’s Reply and Exhibits 1043, 1045, 1046 (Paper 34)

The Joint Motion to Seal Petitioner’s Reply and Exhibits 1043, 1045, and 1046 is conditionally granted. Exhibit 1043 is the deposition transcript of inventor, Mr. Addy, in his personal capacity and as a corporate witness under FRCP 30(b)(6); Exhibits 1045 and 1046 are internal documents of Petitioner related to its product development work. Paper 34, 5–6. Each of those exhibits is marked confidential and, as represented by the parties, are also subject to the district court’s protective order in the parallel lawsuit. The parties also persuade us that those exhibits, as a whole, include the confidential research, development, and commercial information from the

parties that is confidential—the public disclosure of which could result in competitive harm. *Id.* Those exhibits are, accordingly, sealed.

Petitioner’s Reply (Paper 33) is sealed subject to the following modifications to the current, redacted version of that paper (Paper 35). The parties have not shown that the particular Addy testimony relied on by Petitioner (redacted at page 18 of Paper 35) should be sealed. Pet. 18 (citing Ex. 1043, 60:1–61:24).⁴⁶ Mr. Addy is, in that excerpt, testifying about his patent and the process of carrying out the steps recited in the claims; the parties do not demonstrate why that testimony comprises confidential information. The parties will meet and confer and, unless excused by the Board, submit a public version of Petitioner’s Reply that removes the redactions noted above within ten business days.

Subject to the changes discussed above, Petitioner’s Reply (Paper 33) includes confidential information and is, accordingly, sealed.

b) Joint Motion to Seal Sur-reply (Paper 39)

We conditionally grant the Joint Motion to Seal Sur-reply. Paper 40 is a redacted version of Patent Owner’s Sur-reply (Paper 41). The redactions on page (i) and page 26 of the Sur-reply obscure information that conveys little more than Patent Owner has raised an assertion here that Petitioner copied the claimed method. Although more particular details about any alleged copying (e.g., like redacted on page 27 of the Sur-reply) may comprise confidential information that warrants protection from public disclosure, the parties have not demonstrated that a generic assertion of copying should be sealed. The parties will meet and confer and, unless

⁴⁶ This is the only specific testimony of Mr. Addy in Exhibit 1043 that is cited by either party in this proceeding.

excused by the Board, submit a public version of Patent Owner's Sur-reply that removes the redactions on pages (i) and (26) above within ten business days. Subject to this modification, the Sur-reply (Paper 41) is sealed.

V. CONCLUSION

On this record, Petitioner has not shown by a preponderance of the evidence that any of the challenged claims are unpatentable based on the grounds advanced in the Petition.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1-3, 5	103	Cummings, Xu, Sessa		1-3, 5
1-3, 5	103	Trans Isomers 2, Xu, Sessa		1-3, 5
1-3, 5	103	Trans Isomers 2, Trans Isomers 1, Sessa		1-3, 5
1-3, 5	103	Brown, Xu, Cummings, Sessa		1-3, 5
Overall Outcome				1-3, 5

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has not proved by a preponderance of the evidence that claims 1-3 and 5 are unpatentable;

FURTHER ORDERED that Petitioner's Motion to Exclude (Paper 47) is *Denied*;

FURTHER ORDERED that the Parties' Joint Motions to Seal (Papers 34 and 39) are *Conditionally Granted* as provided above;

FURTHER ORDERED that within ten (10) business days, the parties will jointly provide a minimally redacted version of this decision that is available to the public; and

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.

IPR2023-00589
Patent 11,248,245 B2

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