

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VANTAGE SPECIALTY CHEMICALS, INC.,

Petitioner,

v.

CARGILL, INC.,

Patent Owner.

Case No. IPR2023-00589

U.S. Patent No. 11,248,245

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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PETITIONER'S UPDATED EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 11,248,245
1002	File History of U.S. Patent No. 11,248,245
1003	Declaration of Dr. David A. Rockstraw, Ph.D., P.E.
1004	Melanie Cummings et al., <i>A natural alternative</i> , SOAP, PERFUMERY, AND COSMETICS (SPC) ASIA (May 1, 1999) <i>available at</i> https://www.floratech.com/PDFs/Articles_MKT/ART15.pdf ("Cummings")
1005	James Brown & Robert Kleinman, <i>Trans Isomers in Cosmetics</i> , SOAP & COSMETICS at 33 (May 2001) (" <i>Trans Isomers 1</i> ")
1006	James Brown & Robert Kleinman, <i>Trans Isomers in Cosmetics Part 2</i> , SOAP & COSMETICS at 44 (June 2001) (" <i>Trans Isomers 2</i> ")
1007	U.S. Patent No. RE38,141E1 to Brown et al. ("Brown")
1008	Xuebing Xu, <i>Engineering of enzymatic reactions and reactors for lipid modification and synthesis</i> , 105 EUR. J. LIPID SCI TECH. 289 (2003) ("Xu")
1009	David J. Sessa, <i>Derivation of a Cocoa Butter Equivalent from Jojoba Transesterified Ester via a Differential Scanning Calorimetry Index</i> , 72 J. SCI. FOOD AGRI. 295 (1996) ("Sessa")
1010	U.S. Patent No. 5,968,530 to Arquette et al. ("Arquette")
1011	U.S. Patent No. 6,280,746 to Arquette et al. ("the '746 patent")
1012	Barbara Fitch Haumann, <i>Tools: hydrogenation, interesterification</i> , 5 INFORM 668 (June 1994)
1013	Otero et al., <i>Continuous Enzymatic Transesterification of Sesame Oil and a Fully Hydrogenated Fat: Effects of Reaction Conditions on Product Characteristics</i> , 94 BIOTECH. & BIOENG'G 877 (2006)
1014	James Brown & Robert Kleinman, <i>Trans Isomers in Cosmetics Parts 1 and 2</i> , Reprinted from SOAP & COSMETICS (May & June 2001) <i>available at</i> https://www.floratech.com/PDFs/Articles_MKT/ART17.pdf
1015	U.S. Patent App. Pub. No. 2005/0176597 to Kodali & Nivens
1016	U.S. Patent App. Pub. No. 2004/0208904 to Touitou & Bergelson
1017	X. Xu et al., <i>Chemical and enzymatic interesterification of lipids for use in food</i> , in <i>Modifying lipids for use in food</i> 234 (Frank D. Gunstone, ed., 2006)

Exhibit No.	Description
1018	Arnaldo Lopez-Hernandez et al., <i>Lipase-catalyzed Transesterification of Medium-chain Triacylglycerols and a Fully Hydrogenated Soybean Oil</i> , 70 J. FOOD SCI. C365 (Jul. 13, 2005)
1019	Declaration of Nancy Adams, MLIS, EdD
1020	Complaint (Dkt No. 1) filed in <i>Cargill, Inc. v. Vantage Specialty Chemicals, Inc.</i> , No. 1:22-cv-00979-RGA-SRF (D. Del. July 26, 2022)
1021	Scheduling Order (Dkt No. 15) filed in <i>Cargill, Inc. v. Vantage Specialty Chemicals, Inc.</i> , No. 1:22-cv-00979-RGA-SRF (D. Del. Oct. 3, 2022)
1022	Excerpt of United States District Courts, Federal Court Management Statistics Report for the 12-month period ending June 30, 2022, <i>available at</i> https://www.uscourts.gov/sites/default/files/fcms_na_distprofile0630.2022_0.pdf
1023	T. Haryati et al., <i>Determination of Iodine Value of Palm Oil Based on Triglyceride Composition</i> , 75 J. AM. OIL CHEMISTS' SOC. 789 (1998)
1024	ASTM Int'l, ASTM D5554-95 Standard Test Method for Determination of the Iodine Value of Fats and Oils (Reapproved 2006)
1025	Am. Oil Chemists' Soc., <i>AOCS Recommended Practice Cd 1c-85</i> (Reapproved 2009), in Am. Oil Chemists' Soc., <i>Official Methods and Recommended Practices of the AOCS</i> (David Firestone, ed., 2013)
1026	Excerpt of Richard O'Brien, <i>Fats and Oils: Formulating and Processing for Applications</i> (CRC Press 3rd ed. 2009)
1027	Excerpt of <i>Physical and Chemical Characteristics of Oils, Fats, and Waxes</i> (AOCS Press, David Firestone, ed., 3rd ed. 2013).
1028	Cosmetic Ingredient Review, <i>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</i> (Sept. 23, 2008) <i>available at</i> https://www.cir-safety.org/ingredient/simmondsia-chinensis-jojoba-seed-oil
1029	Junzo Otera, <i>Transesterification</i> , 93 CHEM. REV. 1449 (1993)

Exhibit No.	Description
1030	Ramesh Chandra Gupta & Gulab Kanwar, <i>Determination of Iodine Numbers of Edible Oils</i> , 22 Biomedical Education 47 (1994)
1031	Declaration of Thomas R. Makin in support of <i>pro hac vice</i> admission
1032	L. Deng, et al., “Synthesis of wax esters by lipase-catalyzed esterification with immobilized lipase from <i>Candida</i> sp. 99–125,” <i>Chinese Journal of Chemical Engineering</i> , vol. 19, no. 6 (2011), 978-982
1033	Hills, Geoffrey, “Industrial use of lipases to produce fatty acid esters,” <i>European journal of lipid science and technology</i> , 105(10) (2003), 601-607
1034	U.S. Patent Application Pub. No. 2014/0017741
1035	Lei, et al. “Functional monoesters of jojoba oil can be produced by enzymatic interesterification: reaction analysis and structural characterization,” <i>European Journal of Lipid Science and Technology</i> , 117(5) (2015)
1036	International Patent Appl. Pub. No. WO 2001/072683 A1
1037	International Patent Appl. Pub. No. WO 2008/092207 A1
1038	M.C. De Zoete, et al., <i>Ammonolysis of Carboxylic Esters Catalyzed by Lipases</i> , included as a chapter in Jonathan S. Dordick et al., <i>Enzyme Engineering XIII</i> , ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, Vol. 799, New York Academy of Sciences (October 12, 1996)
1039	Kirk-Othmer, <i>Concise Encyclopedia of Chemical Technology</i> , United Kingdom, Wiley (1999)
1040	Second Declaration of Nancy Adams, MLIS, EdD
1041	Deposition Transcript of Thomas M. Schultz, <i>Vantage Special Chemicals, Inc. v. Cargill, Inc.</i> PTAB Proceeding No. IPR2023-00589, February 15, 2024

Exhibit No.	Description
1042	Exhibit 6 to the Deposition Transcript of Thomas M. Schultz, <i>Vantage Special Chemicals, Inc. v. Cargill, Inc.</i> PTAB Proceeding No. IPR2023-00589, February 15, 2024 (Lei, et al. “Functional monoesters of jojoba oil can be produced by enzymatic interesterification: reaction analysis and structural characterization,” <i>European Journal of Lipid Science and Technology</i> , 117(5) (2015))
1043	CONFIDENTIAL – Deposition Transcript of Jeff Addy, <i>Cargill, Inc., et al. v. Vantage Specialty Chemicals, Inc.</i> , No. 1:22-cv-00979-RGA-SRF (D. Del.), dated August 24, 2023
1044	U.S. Patent App. Pub. No. 2016/0177350
1045	CONFIDENTIAL – Exhibit 35 to the Deposition Transcript of Michael Savidakis, <i>Cargill, Inc., et al. v. Vantage Specialty Chemicals, Inc.</i> , No. 1:22-cv-00979-RGA-SRF (D. Del.), dated August 16, 2023
1046	CONFIDENTIAL – Exhibit 36 to the Deposition Transcript of Michael Savidakis, <i>Cargill, Inc., et al. v. Vantage Specialty Chemicals, Inc.</i> , No. 1:22-cv-00979-RGA-SRF (D. Del.), dated August 16, 2023

I. INTRODUCTION

A POSA would have found the Challenged Claims obvious. The limitations are disclosed in the prior art, and there is ample motivation to combine the prior art's teachings, including the reasons recited in Xu (*e.g.*, improved quality, environmental considerations).

Because Patent Owner ("PO") cannot overcome the overwhelming documentary evidence, PO foments confusion through misleading technical arguments and insinuations that the prior art publications do not mean what they say.

Most glaringly, PO crafts a new argument that lipases were known to only catalyze reactions involving triglycerides, and "[t]he fact that lipases do work on jojoba wax esters...was astonishing at the time the '245 Patent issued...." PO's Response (Paper 22) ("POR"), 2. This is false.

PO also argues that Cummings and *Trans* Isomers 2 ("TI2") do not teach an increase in oxidative stability ("OSI") from feedstock to transesterified product. But they do. Cummings provides a teaching that at least mirrors the '245 patent itself—*i.e.*, that transesterification of a jojoba-oil feedstock increases its OSI. TI2 discloses that the OSI of Jojoba Esters 30 (created from transesterifying a feedstock having ~30% hydrogenated jojoba oil) is greater than the OSI of jojoba oil that was partially hydrogenated to an amount greater than 30%. Accordingly, because the OSI of this

partially hydrogenated jojoba oil must be higher than the feedstock of Jojoba Esters 30, TI2 discloses an increase in OSI from feedstock to transesterified product.

PO's fallback position is that the prior art's disclosed OSI-increase is due to undisclosed processing steps—*e.g.*, adding tocopherols. PO submits alleged, secret evidence in support thereof. But it neither is convincing nor changes what a POSA would have understood from the references' text.

Further, while PO criticizes Petitioner—and the Board—for “rely[ing] on the assumption that a transesterification reaction inherently results in a product with increased...OSI” (POR 57, 60), PO has admitted repeatedly that the increased OSI in the “wherein” clause is an inherent result of the claimed process steps.

And, while PO has abandoned most of its POPR critiques of Dr. Rockstraw's feedstock-composition calculation, PO's remaining criticism is unfounded; and, regardless, Sessa discloses the claimed compositions.

Last, PO's proffered secondary considerations fail.

II. A POSA WOULD HAVE BEEN MOTIVATED TO EMPLOY LIPASE TO CATALYZE JOJOBA-ESTER TRANSESTERIFICATION

PO and its expert argue that there was no motivation to combine because a POSA understood lipases were structurally limited to triglycerides, and would not work with jojoba esters. POR, 2, 5-15, 25-32. Not only is this false, but also PO's expert has since confessed, “the mechanism of even how lipases work on glycerol

backbones is poorly understood and not definitive. So I wouldn't try to extrapolate to jojoba wax esters.” EX-1041, 101:13-22.

A. Lipases Were a Natural Choice for Catalyzing Jojoba-Ester Transesterification

The evidence shows that PO's assertion—that “enzymatic catalysts such as lipases were understood in the art at the time of the invention to be specific to triglycerides” (POR, 12; EX-2009, ¶¶64, 76)¹—is false. The evidence also teaches that a POSA would have known that lipases could have been—and actually were—used to transesterify jojoba esters.

1. Lipases Were Not Limited to Triglycerides

Long ago, lipases were shown to catalyze esterification of non-triglycerides (glycerol-free fatty acids and alcohols). EX-1008, 291-293 (Figure 5 and Table 3 showing that a variety of non-glycerol-containing reactions—involving, *e.g.*, ferulic acid, caffeic acid, anthranilic acid, quinic acid, glucuronic acid, kojic acid, sterols,

¹ PO's expert admitted that, in supporting PO's assertion, he ignored the '245 patent's broad definition of “lipase” as “any enzyme or protein capable of being used in a transesterification reaction of a wax ester” and his opinion is not “absolute” as to the hundreds of available lipases. EX-1001, 4:63-65; EX-1041, 91:24-92:6; 92:17-93:1; 94:8-22; 113:10-115:9. In fact, enzyme-catalyzed transesterification of jojoba oil was well-known in the cosmetics industry by 2008. EX-1028, 4.

flavonoids, ascorbic acid, glucose, citronellol, pyridoxine, oleic acid, cetyl alcohol, and cetyl oleate—may be catalyzed with a lipase); EX-1032, 978 (“Wax esters were synthesized...catalyzed by immobilized lipase from *Candida* sp. 99-125, with oleic acid and cetyl alcohol...”); EX-1041, 48:4-50:13 (Dr. Schultz confirming that the acids, alcohols, and compounds recited in the immediately preceding two parentheticals are non-triglycerides).

Lipases were also known to catalyze transesterification by acidolysis of non-glycerol-based esters and fatty acids. EX-1008, 294 (“In most applications in the lipid field, esters can be tri-(di-, or mono-)acylglycerols, glycerophospholipids,” but the esters can also be “alkyl fatty acid esters, *etc.* and acids can be fatty acids or other acids.”); EX-1041, 50:14-23.

Lipases were “well known to catalyse hydrolysis, esterification and transesterification reactions on a wide range of substrates” and “this group of enzymes are very versatile in a variety of bioconversions on natural and synthetic substances.” EX-1033, 601. It was further known that “lipases...have broad substrate specificities and can thus catalyse conversions with many other non-glycerol based compounds” and that “[m]any alcohols other than glycerol can be substrates for lipases.” *Id.*

2. Lipases Were Specifically Known to Catalyze Jojoba Ester Reactions

U.S. Patent Application Pub. No. 2014/0017741, published January 16, 2014 (§102(a)(1) prior art)—expressly incorporated into the '245 patent for its teaching of lipases, (EX-1001, 6:25-31)—discloses lipase-catalyzed transesterification of jojoba wax esters:

1. A process for the production of fatty acid alkyl esters (FAAE) from a fatty acid feedstock, comprising the steps of:
 - (a) providing a reaction mixture 1 comprising a *fatty acid feedstock*....;
 - (b) contacting the reaction mixture 1 with a *lipase*;

...

5. The process according to claim 1, wherein the *fatty acid feedstock* is derived from any of the group consisting of: ...
jojoba oil....

EX-1034, claims 1 and 5 (emphases added); *see also* ¶14 (“The fatty acid feedstock may be...jojoba oil....”). The '741 publication and the '245 patent both specifically mention using the lipase Novozym 435. EX-1034, ¶¶29, 50, 67; EX-1001, 5:39-6:56.

Similarly, a research paper accepted for publication prior to the '245 patent filing (published three days later and submitted by applicants during prosecution) reported on the use of two lipases (including Novozym 435) to catalyze the ester-ester exchange transesterification of jojoba oil with ethyl acetate to produce esters

for the cosmetics industry. EX-1035, 630-633; EX-1002, Pt. 2, 415; EX-1041, 47:24-48:1, 50:24-51:3; 119:1-130:21 (Dr. Schultz confirming jojoba oil and ethyl acetate are non-triglycerides and that Lei, Exhibit 6 to his deposition (EX-1042, also provided as EX-1035), discloses interesterifying them with a lipase); EX-1040, ¶¶28-30. Lei never characterizes the ability of lipases to catalyze jojoba transesterification as unexpected. Nor is that surprising given that enzyme-catalyzed transesterification of jojoba oil was a well-known technique for creating cosmetics ingredients by no later than 2008. *See, e.g.*, EX-1028, 4 (“Isomerized Jojoba Oil...is...produced by the enzymatic intraesterification of *Simmondsia Chinensis* (Jojoba) Oil....”).

The evidence shows that POSAs did not even differentiate between triglycerides and jojoba oil (and sometimes conflated them) when considering lipase-catalyzed transesterification.

For example, International Pub. No. 2001/072683, published October 4, 2001 (§102(b) prior art), assigned to the United States (Secretary of Agriculture), teaches the “Novozyme 435 lipase-catalyzed transesterification” of oils (which it defines as “inclusive of all lipids”). EX-1036, 4-6, 9-10. And, while the ’683 publication indicates that the “sunscreen compounds of the invention are most readily produced in a lipase-catalyzed transesterification reaction” involving a glyceride (and

preferably a triglyceride), “[e]xemplary oils include...jojoba oil.” *Id.*, 5-6, 9-10 (“[c]ommonly used oils for cosmetic formulations include...jojoba oil.”).

Likewise, International Pub. No. 2008/092207, published August 7, 2008 (§102(b) prior art), teaches that “beef tallow, and other suitable animal fats and plant oils, can be treated with lipases and transesterified.” Ex-1037, 3:33-35. The ’207 publication states that “[t]he feedstock contain[s] glycerides and/or free fatty acids,” that the “glycerides and/or free fatty acids may be an animal fat or plant oil,” and that “glycerides...may be selected from the group consisting of...vegetable oils,” including “jojoba oil.” *Id.*, 4:9-26, 7:5-33.

Still further, lipases (including Novozym 435) were long-known to catalyze ammonolysis—a reaction in which ammonia is used to cleave esters—of jojoba wax esters. EX-1038, 346-48; EX-1039, 764. PO’s expert admitted that he did not even consider whether lipases were known to catalyze jojoba ester reactions other than transesterification, *e.g.*, ammonolysis. EX-1041, 58:3-12. This undercuts his opinion that purported structural incompatibilities would discourage a POSA from using a lipase to catalyze jojoba oil transesterification.

B. PO’s Evidence Fails to Show Lipases Were Limited to Triglycerides

Even PO’s cited evidence does not establish that lipases were known to be incompatible with non-triglycerides. *See, e.g.*, EX-2028, 2 (“Lipases...are also

active on a broad range of substrates” and “catalyze a large variety of synthesis reactions....”).

Nor does the ’245 patent suggest it was unexpected that lipases would catalyze jojoba-ester transesterification reactions. *See* EX-1001, 5:39-6:43. The patent merely contends it was surprising that “1, 3 lipases” worked just as well as “lipases that operate using insertion.” EX-1001, 14:38-42. Tellingly, during the seven-year prosecution, applicants never challenged Examiner’s repeated statement: “[i]t was also known in the art that jojoba oil can be esterified using a lipase to produce wax esters.” EX-1002, Pt. 3, 554; Pt. 4, 765, 813.

C. A POSA Would Have Been Motivated to Use Lipases

And a POSA would have had many strong and uncontested reasons to try a lipase to catalyze the reactions taught in Cummings and TI2, including those in Xu. Petition (Paper 1) (“Pet.”), 23-24, 36-37, 50, 67; EX-1003, ¶¶118, 153, 229; Institution Decision (Paper 11) (“I.D.”), 22; EX-1041, 85:4-89:20 (Dr. Schultz confirming benefits taught by Xu).

III. TRANSESTERIFICATION WAS KNOWN TO INCREASE OSI

A. A Numerical Comparison Between Feedstock and Transesterified-Product OSI Values Is Not Required

As a threshold matter, the obviousness of the claims does not require disclosure of a numeric feedstock OSI value. The claims simply require that feedstock OSI be lower, by some amount, than transesterified-product OSI—which

the prior art shows. Notably, the '245 patent specification discloses no OSI value for a claimed feedstock (*i.e.*, jojoba wax esters and 20-50% hydrogenated jojoba wax esters) or for a transesterified product made therefrom. EX-1041, 105:9-107:2.

B. Cummings Teaches—Qualitatively and Quantitatively—that Transesterifying a Jojoba Feedstock Increases OSI

1. Cummings' Qualitative Teachings

Cummings introduces jojoba oil as a cosmetic ingredient with beneficial properties—including that jojoba oil itself is “oxidatively stable” with an OSI at “around 35 hours.” EX-1004, 1, 2. However, Cummings' main point is not jojoba oil's properties, but rather the improved characteristics that result when feedstocks of different ratios of “unsaturated” and “fully saturated jojoba oil” are interesterified to create “jojoba esters.” EX-1004, 2. Cummings states, “[w]hile jojoba oil has unique and beneficial cosmetic properties its utility has been broadened significantly by using it as the base material for the creation of a new family of jojoba esters”—which are “unique compositions of a broad range of saturated, partially saturated, and unsaturated wax esters.” EX-1004, 1.

Increased OSI is one of the highlighted characteristics that results from interesterifying jojoba feedstocks comprised of different ratios of “unsaturated jojoba oil” and “fully saturated jojoba oil,” EX-1004, 2:

- “[J]ojoba esters are a new creation of oxidatively stable, plant-derived, oil-free emollients....”

- “Jojoba esters are more oxidatively stable than most similar cosmetic ingredients.”
- “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.”
- “One of the most remarkable attributes of this odourless, colourless family of emollients is its extended oxidative stability when compared to similar cosmetic ingredients.”

Id., 1-4.

2. Cummings’ Quantitative Teachings

Cummings discloses five transesterified products—“jojoba esters (15), (20), (30), (60), and (70)” (*id.*, 2)—and that the OSI values of these five products range from 100-675 hours. EX-1004, 1-2. Given the IV ranges from Cummings’ Figure 3 (and the disclosure in Cummings’ Figure 2, showing two double bonds—*i.e.*, only di-unsaturated monoesters—in “Jojoba oil” and “Jojoba esters (15)” and no double bonds—*i.e.*, only fully saturated monoesters—in “Jojoba esters (70)” *see* EX-2046, 29:25-31:5), a POSA would have known that:

- jojoba esters (15) corresponds to the “unsaturated” wax ester product; EX-1003, ¶107; EX-2046, 29:25-31:5, 138:19-139:21;
- jojoba esters (70) corresponds to the “saturated” wax ester product, *id.*; EX-2009, ¶127 (citing EX-1004, 2); and

- the jojoba esters (20), (30), and (60) products correspond to the “partially saturated” wax esters products from the claimed feedstocks. EX-1004, 2; EX-1003, ¶¶97-108; EX-2046, 29:25-31:5.

Given Cummings’ disclosure that refined-jojoba-oil OSI is 35, and a POSA’s understanding that the feedstock of jojoba esters (15) is refined jojoba oil, Cummings explicitly teaches that transesterification of a jojoba-oil-only feedstock increases its OSI from 35 to at least 100. EX-1003, ¶122; EX-2046, 138:19-139:21 (Dr. Rockstraw confirming).

Thus, Cummings teaches the claimed feedstock and (at least) that transesterification of jojoba oil—the claimed feedstock’s primary ingredient—increases the oil’s OSI, such that transesterifying the claimed feedstock to increase its OSI would have been obvious. *See Masimo Corp. v. Apple Inc.*, 2024 WL 111647, *3 (Fed. Cir. Jan. 10, 2024) (“The question is not whether the prior art disclosed the very thing claimed; it is whether, in light of the prior art, the claimed invention would have nonetheless been *obvious* to a person of ordinary skill in the art as of the relevant date.”); *Fleming v. Cirrus Design Corp.*, 28 F.4th 1214, 1222 (Fed. Cir. 2022); *see also Bot M8 LLC v. Sony Interactive Ent. LLC*, 66 F.4th 1380, 1386 (Fed. Cir. 2023).

Even viewed narrowly, Cummings’ disclosure is akin to the ’245 patent, which provides a numerical-OSI comparison only between a *jojoba-oil-only* feedstock and its transesterified product. EX-1001; EX-1041, 105:9-107:2 (Dr.

Schultz confirming the '245 patent does not report OSI values for the claimed feedstock); POR, 16-17. From this comparison, the '245 patent concludes: “This result indicates that the enzymatic catalysis has an unexpected positive effect on OSI.” EX-1001, Tables 3 and 6; 9:58-62 (emphasis added). The Board cannot hold the prior art to a higher standard than that of the patent. *E.g., In re Publicover*, 813 Fed. App'x 527, 532 (Fed. Cir. 2020) (“Publicover argues that Venable and Kiderman’s disclosures are too sparse to adequately explain to a skilled artisan how to modify Venable’s system to identify vestibulo-ocular movement. But...Publicover’s specification is just as sparse....”).

But Cummings teaches more. As Dr. Rockstraw explained, a POSA would have understood that Cummings’ jojoba esters (20) product (from a feedstock of approximately 20% fully hydrogenated jojoba oil) also would have had a feedstock OSI of approximately 35 because OSI testing is biased toward the first component to oxidize in a blend—here, the unsaturated refined jojoba oil. EX-2046, 139:13-143:17. Therefore, a POSA would have understood an OSI improvement of a claimed feedstock—from 35 to at least 100—through transesterification. *Id.*; see also 78:4-79:14.

Experimental data corroborates Dr. Rockstraw. During prosecution, inventor Addy submitted a declaration listing the OSI of a feedstock “composed of 20%

hydrogenated jojoba oil and 80% refined jojoba oil (by weight)” as 33.8 (*i.e.*, ~35 OSI).² EX-1002, Pt. 5, 1075-76.

PO’s argument that Cummings’ improved OSI is attributable to the addition of tocopherols is without basis.³ Cummings’ description of its process does not reference tocopherol addition:

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.

EX-1004, 2. The only mention of “tocopherols” is as an additional ingredient to a lipstick that already contains Jojoba esters (30) and (70). *Id.*, 3. Surely, had the “remarkable” OSI results been the result of tocopherols and not transesterification, Cummings would have reported that fact. *See, e.g., In re Clark*, 420 Fed. App’x 994, 998-99 (Fed. Cir. 2011) (“Clark primarily argues that the CEDS96 publication

² This silences any assertion that additional hydrogenated material in the jojoba esters 20, 30 and 60 feedstocks could conceivably eviscerate the improved OSI seen from transesterification of the oil alone. Those transesterified products must also show an increased OSI.

³ The same is true of TI2, discussed below.

does not teach a modulation transmitter because the reference incorrectly states that the LISTEN system employed an FM transmitter and transmitted an FM signal. However, absent an obvious error on the face of the reference, a reference is prior art for what it discloses, even if the commercial system that the reference describes operated differently than disclosed in the reference.”).

C. TI2 Teaches that Transesterifying a Jojoba Feedstock Increases OSI

TI2 introduces “interesterification” as a reaction that results in “‘Trans Free’ oxidatively stable emollients....” EX-1006, 1.⁴

TI2 then provides OSI data that teach that interesterification increases OSI from feedstock to product. TI2 compares the OSI of transesterified products (from feedstocks within the scope of the Challenged Claims) with the OSI of trans-isomer-containing jojoba-oil partial hydrogenates having similar melting points and similar amounts of hydrogenation (as indicated by iodine values (“IV”)):

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 μ @80°C	Penetrometer, Mm	Slip, Cadcamo, Degress (1%)	Slip, IFT, Degress (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-1014, 7, Table 4.

⁴ Hereinafter, Petitioner cites—for EX-1005/1006—the more legible reprinted-article EX-1014. See EX-1019, ¶22.

This table indisputably discloses that the transesterification of the claimed feedstock leads to an increased OSI in the transesterified product. For example, a comparison of rows 1 and 4 discloses that the transesterification of the claimed feedstock leads to an increased OSI in the Jojoba Esters 30 transesterified product.

Specifically, Jojoba Esters 30 (OSI of 165) is produced by transesterifying the claimed feedstock (*i.e.*, jojoba wax esters and approximately 30% hydrogenated jojoba wax esters). EX-1014, 7; EX-1003, ¶143 (Dr. Rockstraw calculating 29.6-32.2% hydrogenated jojoba wax esters). While TI2 does not specifically disclose this feedstock's OSI, it does disclose *an upper bound* for that feedstock.

TI2 discloses an OSI of 108 for jojoba oil that has been partially hydrogenated (IV of 49) to a greater extent than the Jojoba Esters 30 feedstock (IV of 58). *See* EX-1014, 7; EX-1003, ¶101 (IV is inversely proportional to percent hydrogenation). Therefore, 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*. *See* Ex-1014, 7 (partially hydrogenated jojoba oil generates trans isomers), Table 4; POR, 34 (“[A]s the percentage of saturated wax esters increases, the OSI value will increase.”); EX-2046, 47:4-9 (“[T]rans is known to be more stable than cis. So as you add more trans isomers to your blend, your OSI is going to go up.”).

Therefore, for Jojoba Esters 30, TI2 teaches an OSI increase of at least 47 hours (from [less than] 108 to 165). EX-1014, 7.

In short, TI2 discloses that the OSI of Jojoba Esters 30 (created from transesterifying a feedstock having ~30% hydrogenated jojoba oil) is greater than the OSI of jojoba oil that was partially hydrogenated to an amount greater than 30%; and, because the OSI of this partial hydrogenate must be higher than said feedstock, TI2 discloses an increase in OSI from feedstock to transesterified product. EX-2046, 41:24-48:5. Like Cummings, TI2 **does not** teach the addition of tocopherols to the jojoba esters products it references. *See In re Clark*, 420 Fed. App'x at 998-99.

D. The Claimed OSI Increase Is Inherent

Even if the references do not teach the OSI increase in the “wherein” clause, (i) the prior art teaches all of the other claim limitations (including ester-ester-exchange transesterification), (ii) it would have been obvious to try these process steps in order to achieve improved OSI, and (iii) the “wherein” result is inherent.

PO argues that “Vantage’s Petition and the Board’s Institution Decision rely on the assumption that a transesterification reaction inherently results in a product with increased oxidative stability or OSI.” POR, 57 (citing Pet., 38-40; I.D., 26); *see id.*, 60 (“Vantage must rely on...an argument of inherency, specifically an assumption that a transesterification reaction inherently results in a product with increased oxidative stability or OSI compared to the feedstock. The Board clearly

relied on this inherency argument in its Institution Decision to find that Vantage's evidence 'support[s] a conclusion that it was known that, through transesterification, the OSI of the resulting product could be improved.'"). But PO has repeatedly admitted that the claimed OSI increase is inherent.

1. Applicants Admitted an OSI Increase Is Inherent

During prosecution, the Examiner rejected the pending claims as indefinite, characterizing the phrase "wherein an oxidative stability index (OSI) of the transesterified product is greater than an OSI of the feedstock" as "confusing" because "it is unclear what steps are minimally required by the above phrase to perform the method step." EX-1002, Pt. 2, 308, 371. Applicants responded that no additional steps were required and instead that:

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 phase of the claim is merely describing one of the properties of the product formed using the method that is unique to products made using this particular method.

Id., 396; *see also* 394.

After narrowing the claims to "jojoba wax esters," applicants reiterated that the "wherein" clause merely recites a property that inherently results when the process is performed with the jojoba feedstock:

[T]he claimed...effect of increasing OSI is a feedstock dependent effect and thus the use of the proper feedstock is what is involved in causing the observed increase in the OSI.

Id., Pt. 4, 948-49; 947-48 (“[R]eciting a physical property in a claim for the product of a claimed chemical reaction does not recite a use of that product but rather recites a result of the reaction....”).

In August 2023, Addy again admitted this inherency:

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.

2. PO Cannot Explain Away the Inherent OSI Increase

PO now asserts that an “assumption” that transesterification increases OSI does not hold true. POR, *e.g.*, 57. But its denial ignores enzymatic ester-ester

exchange-type transesterification—the very type admittedly taught by Petitioner’s prior art⁵—and argues only that transesterification (1) by chemical or enzymatic alcoholysis or (2) by chemically catalyzed ester-ester exchange may not lead to the claimed OSI increase. POR, 20-21, 57-59.

PO’s cited cases, POR 60-61, are inapposite, because, here, applicants argued (and Addy admitted in deposition) that an OSI increase was inherent.

IV. The Prior Art Discloses the Claimed Feedstock Composition

A. IV Can Be Used to Accurately Estimate Feedstock Composition

Dr. Rockstraw’s estimates of feedstock composition, using the IV listed in the prior art, are accurate—and PO knows it. PO never says that his estimated feedstock-composition values are inaccurate. Rather, PO vaguely states that the calculations might be based on mistaken assumptions. POR, 47. The Board should credit Dr. Rockstraw’s estimates and find a POSA would have understood that Cummings, TI2 and Brown teach feedstocks within the claimed 20-50% range.

PO has dropped its baseless POPR arguments that Dr. Rockstraw’s estimates are “unreliable” because (i) the equation omitted a “fatty acid constant” and (ii) the

⁵ PO admits that Cummings discloses ester-ester exchange-type transesterification. *E.g.*, POR, 46 (“Figure 1 of Cummings shows...ester-ester exchange....”), 11, 26, 43; EX-2009, ¶ 146; *see also* EX-1004, 2 (Figure 1); EX-1014, 6 (Figure 4).

equation, as reproduced, had a minor typographical sign-error that resulted in negative (albeit correct) values. First, a fatty acid constant—which is used to estimate IV—is unnecessary because Dr. Rockstraw used experimentally observed IV for jojoba oil disclosed in the prior art. EX-2046, 84:13-85:16. Second, Dr. Rockstraw explained that, while the denominator variables should have been reversed, he did the calculations properly and recorded accurate values. EX-2046, 19:7-20:2, 137:8-138:3.

Regarding the remaining argument—that feedstock percentages cannot accurately be estimated because processing methods and corresponding yields are unknown—Dr. Rockstraw’s calculations are not dependent on the trace presence of any reaction side-products or the precise reaction yield because the number of carbon double bonds (the substantially determinative factor for reactant and product IV) is conserved. EX-2046, 79:24-83:4; *see also* EX-2009, ¶¶109, 138, 143. Thus, IV remains the same during the transesterification process, regardless whether the process is taken to completion, *i.e.*, 100% yield.

Experimental data corroborates Dr. Rockstraw. For example, Dr. Rockstraw estimated the feedstock of Jojoba Esters 20 in Cummings to be 21-21.3% hydrogenated jojoba oil. EX-1003, ¶107. Cummings’ disclosed IV range for this product is 64-70. EX-1004, 1. Addy submitted in prosecution the results from an experiment in which he determined the IV of a feedstock that was “composed of

20% hydrogenated jojoba oil and 80% refined jojoba oil (by weight)” prior to transesterification and after transesterification alternately using lipase and chemical catalysts. EX-1002, Pt. 5, 1075-76; *see also* EX-2009, ¶ 109. Addy recorded a feedstock IV of 66.3—squarely in Cummings’ 64-70 range. EX-1002, Pt. 5, 1076. Moreover, Addy’s IV values for feedstock and transesterified product are essentially the same (whether chemically or enzymatically catalyzed), showing that transesterification does not change IV. EX-1002, Pt. 5, 1076 (Table 1).

B. Sessa Teaches the Claimed Feedstock Composition

Sessa’s first sentence is: “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, Abstract. Accordingly, Sessa teaches a feedstock comprised of (i) jojoba oil and (ii) “50-500 g kg⁻¹ [5%-50% by weight] completely hydrogenated jojoba wax esters”—which feedstock was transesterified to “construct[]” “[a] series of wax ester blends,” which were then subject to testing to determine which of the “wax ester blends” most closely resembled cocoa butter. *Id.*; *see also* EX-1003, ¶111. A POSA would have further understood that “the level of saturation needed to best mimic the melt and crystallization properties of cocoa butter” could be “optimise[d]”—*i.e.*, the fully hydrogenated proportion of the feedstock could be altered to obtain the desired level of saturation of the composition post-transesterification. EX-1009, Abstract.

PO does not address Sessa’s first sentence or Sessa’s teaching that the level of saturation of the jojoba wax ester blends was optimizable. Rather, PO proffers a wild interpretation of Sessa’s “Materials and Methods” section, arguing that Sessa does not disclose a “feedstock” (POR, 48-49), despite Sessa’s teaching that native jojoba oil and completely hydrogenated jojoba wax esters were transesterified to create a series of wax ester blends (EX-1009, Abstract).

V. THE DEPENDENT CLAIMS ARE UNPATENTABLE

Cummings, TI2, and Sessa teach feedstocks comprised of jojoba oil and hydrogenated jojoba oil in various percentages—without the addition of any of the materials prohibited by the dependent claims (*e.g.*, “free fatty alcohols” or “methyl ester”). EX-1004, 2, (Figure 1); EX-1014, 5, 6 (Figure 4); EX-1009, Abstract, 295. As previously explained, these disclosures render claims 2, 3, and 5 obvious. Notably, PO does not argue that a POSA would have expected or concluded that any other feedstock ingredients would be required in Cummings, TI2, or Sessa—let alone the particular excluded compounds.

VI. THE ALLEGED SECONDARY CONSIDERATIONS

A. The Allegedly Unexpected Results Are Not Probative

Regarding unexpected results, as explained above, a POSA would have understood that the prior art enzymatic ester-ester exchange transesterification processes provide an increased OSI. PO alleges this increase would have been surprising to a POSA, but provides no evidence that a decrease would have been

expected. Moreover, PO has admitted, as explained above, that the claimed enzymatic ester-ester exchange inherently results in increased OSI. And, of course, purportedly “[n]ewly discovered results of known processes directed to the same purpose are not patentable.” *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1376 (Fed. Cir. 2001). Further, given the un rebutted, independent reasons for using a lipase recited in, e.g., Xu, (EX-1008, 1), it would have been obvious to try using a lipase to catalyze the ester-ester exchange transesterification reactions set forth in Cummings and TI2—regardless of expected OSI improvement.

B. The Alleged Evidence of Failure and Copying Is Not Probative

[REDACTED]

[REDACTED]

[REDACTED]

“Evidence of [secondary considerations] is only relevant to the obviousness inquiry if there is a nexus between the claimed invention and the [secondary considerations].” *Bosch Auto. Serv. Sols., LLC v. Matal*, 878 F.3d 1027, 1036 (Fed. Cir. 2017); *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (“[T]he patentee [must] show[] that the asserted evidence is tied to a specific product and that the product ‘is the invention disclosed and claimed.’”) (citation omitted).

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] POR, 1. This is insufficient. *Volvo Penta of the Ams., LLC v. Brunswick Corp.*, 81 F.4th 1202, 1211 (Fed. Cir. 2023); *see also Fox Factory*, 944 F.3d at 1374 (Nexus may not be presumed “because there are one or more features not claimed by the [asserted patent] that materially impact the functionality of [patent owner’s products].”).

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] *See* EX-1044 (the “’350 publication”); *see also* EX-1002, Pt. 2, 477.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] *See* EX-2054, 193:19-195:20; EX-2050, 12 [REDACTED]

[REDACTED] (emphasis added); EX-1045, 1

[REDACTED]

EX-1046, 9 [REDACTED]

[REDACTED] EX-2052, 1 (discussing [REDACTED]).

[REDACTED]

[REDACTED]

[REDACTED] (EX-2054, 88:16-17), [REDACTED]

[REDACTED]

[REDACTED] *Id.*, 88:3-6, 20-23; *see also* 87:2-4 [REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED] EX-2054, 88:16-23.

[REDACTED]

[REDACTED], which is irrelevant to obviousness in a field like cosmetics, in which the “parties have a practice of marketing very similar products.” *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012); *see also* EX-1041, 14:11-22:21 (Dr. Schultz acknowledging that, in this field, “understanding how your competitors’ products perform allowed you to gain knowledge as to what your competition was doing;” “it’s necessary to

understand your competition;” and “review[ing] patent literature in the context of competitive products analysis...is a routine practice.”).

C. The Age of the Prior Art Is Not Indicative of Nonobviousness

“The mere age of...references is not persuasive of the unobviousness of the combination of their teachings, absent evidence that, notwithstanding knowledge of the references, the art tried and failed to solve the problem.” *In re Wright*, 569 F.2d 1124, 1127 (C.C.P.A. 1977).

The Federal Circuit has rejected attempts to extend *Leo Pharm. Prods. Ltd. v. Rea*, as PO seeks to do here:

Nike over reads our precedent. The relevant portion of *Leo Pharmaceutical* stands for the proposition that the age of a reference can highlight the fact that no one in the art understood the problem to be solved.... [O]ur reversal of the Patent Board’s obviousness determination hinged on the fact that nothing in the cited prior art appreciated the problem the invention recognized and then solved.

Nike, Inc. v. Adidas AG, 812 F.3d 1326, 1337-38 (Fed. Cir. 2016), *overruled on other grounds by Aqua Prods., Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017).

D. The Secondary Considerations Are Insufficient

Here, obviousness is too strong for secondary considerations to overcome it. *See, e.g., Merck Sharp & Dohme Corp. v. Hospira, Inc.*, 874 F.3d 724, 731 (Fed. Cir. 2017).

VII. CONCLUSION

The Board should find the Challenged Claims unpatentable.

Dated: February 27, 2024

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CERTIFICATE OF COMPLIANCE

I hereby certify that this paper complies with the type-volume limitation of 37 C.F.R. §42.24 because it contains 5,499 words (as determined by the Microsoft Word word-processing system used to prepare this paper), excluding the parts of the paper exempted by 37 C.F.R. §42.24(c), plus an additional 91 words (counted by hand) in Table 4 of TI2, reproduced on page 14 above, for a total of 5,590 words.

Dated: February 27, 2024

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CERTIFICATE OF SERVICE

I hereby certify that the foregoing Petitioner's Reply to Patent Owner's Response was served on February 27, 2024, via electronic mail upon counsel of record for Patent Owner, listed below, at the following email address:

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