

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

REACTIVE SURFACES LTD., LLP,
Petitioner,

v.

LG CHEM LTD.,
Patent Owner.

IPR2018-01520
Patent 8,932,717 B2

Before JACQUELINE WRIGHT BONILLA, *Deputy Chief Administrative Patent Judge*, SUSAN L. C. MITCHELL, and TIMOTHY G. MAJORS, *Administrative Patent Judges*.

MAJORS, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Granting Patent Owner's Contingent Motion to Amend
35 U.S.C. § 318(a)

I. INTRODUCTION

Reactive Surfaces Ltd., LLP (“Petitioner”), on August 6, 2018, filed a Petition to institute *inter partes* review of claims 1–8 of U.S. Patent No. 8,932,717 B2 (Ex. 1001, “the ’717 patent”). Paper 1 (“Pet.”). LG Chem Ltd. (“Patent Owner”) filed a timely Preliminary Response to the Petition. Paper 7 (“Prelim. Resp.”).

On February 26, 2019, we instituted *inter partes* review. Paper 8. After institution, Patent Owner filed Patent Owner’s Response (Paper 21, “PO Resp.”) as well as Patent Owner’s Contingent Motion to Amend Claims (Paper 20, “PO MTA”). Petitioner filed a Reply to Patent Owner’s Response (Paper 26, “Pet. Reply”) and an Opposition to Patent Owner’s Motion to Amend (Paper 28, “MTA Opp.”). Patent Owner filed a Sur-Reply to Petitioner’s Reply (Paper 34, “PO Sur-Reply”) as well as a Reply to Petitioner’s Opposition on the Motion to Amend (Paper 35, “MTA Reply”). Petitioner then filed a Sur-Reply related to the Motion to Amend (Paper 39, “MTA Sur-Reply”).

Oral argument took place on November 8, 2019. A transcript of that argument is entered into the record. Paper 43 (“Tr.”).

The ’717 patent’s claims are to a “method of forming [an] anti-fingerprint coating.” Ex. 1001, 10:56–57. As described and claimed in the patent, that coating is formed by “treating” a glass or plastic substrate with a composition that includes a lipolytic enzyme, such as a lipase. *Id.* at 10:56–61 (independent claim 1 and dependent claim 2). The claimed subject matter is reproduced and further discussed below.

We address the parties’ argument and evidence on the challenge to the ’717 patent’s claims in detail in Section III of this Final Written Decision.

As a preview, however, we note that Petitioner’s challenge to claims 1–8 turns largely on the following issues. First, on claim construction, what is meant by the recited “anti-fingerprint coating,” and encompassed by a “fingerprint.” Second, whether the prior art’s lipase-coated substrates would, as a natural result, or necessarily (i.e., inherently) produce a coating with an “anti-fingerprint” property. And third, whether that property would have been expected.

We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. As explained below, we conclude that Petitioner has established by a preponderance of the evidence that claims 1–8 of the ’717 patent are unpatentable. On the proposed substitute claims in Patent Owner’s Contingent Motion to Amend, however, Petitioner has *not* met the burden to show, by a preponderance of the evidence on this trial record, that those claims are unpatentable. Accordingly, for reasons given below, we conclude the original claims (claims 1–8) are unpatentable and should be cancelled, and Patent Owner’s Contingent Motion to Amend Claims is granted as to substitute claims 9–16.

II. BACKGROUND

A. *Related Matters*

The parties do not identify any other challenges to the claims of the ’717 patent before the Board or the courts. Petitioner identifies a challenge to the validity of the claims of U.S. Patent No. 8,394,618 B2 (Ex. 1013, “the ’618 patent”). Pet. 1–2. Petitioner filed a petition for *inter partes* review challenging the claims of the ’618 patent, and Petitioner identifies a Final Written Decision in this other matter. Ex. 1003 (*Reactive Surfaces Ltd. LLP*

v. Toyota Motor Corp., IPR2016-01914, Paper 64 at 41–42 (PTAB Mar. 1, 2018) (concluding the challenged claims are unpatentable) (hereafter “the Toyota IPR”). That decision is on appeal. Pet. 1–2 (citing *Toyota Motor Corp. v. Reactive Surfaces Ltd. LLP*, Case No. 18-1906 (Fed. Cir.)).

The ’618 patent in the Toyota IPR and the ’717 patent are not, in the familial sense, “related.” The two patents have different inventors, and share no common parent or child applications. Nevertheless, Petitioner contends the claims of the ’717 patent and the ’618 patent are “functionally analogous,” and thus, according to Petitioner, the Board’s findings in the Toyota IPR are germane to this Petition. Pet. 2, 22 n.2, 27, 42, 59.

For reasons explained in our Institution Decision, we do not rely on the Board’s findings from the Toyota IPR, which involve a different patent owner and different claims from an unrelated patent. Paper 8, 37–38.

B. The ’717 Patent

The ’717 patent relates to “a use of a lipolytic enzyme for forming anti-fingerprint coating.” Ex. 1001 Abstr. More specifically, according to the ’717 patent, the “invention relates to a novel use of a lipolytic enzyme for forming anti-fingerprint coating capable of providing a self cleaning function to a surface of a substrate.” *Id.* at 1:17–19.

The ’717 patent explains that “[c]ontamination caused by fingerprints is one of the most frequent contaminations occurring on various display devices, highly glossy electronic devices or building materials.” Ex. 1001, 1:27–29. The patent explains that this contamination causes defects in the appearance of such products. *Id.* at 1:30–36.

According to the ’717 patent, although anti-contamination coatings “in the sense of easy cleaning” were known, “no technology of realizing anti-fingerprint coating has been actually developed.” *Id.* at 1:36–56

(describing known anti-contamination compositions/coatings that allow “a contaminant transferred to its surface [to be] easily wiped due to low surface energy”). The patent distinguishes such anti-contamination coatings as not “hav[ing] a self-cleaning function, that is, a function of actively reducing transfer of fingerprints or decomposing fingerprints,” and thus, “the appearance may not be improved without wiping the contaminant off.” *Id.* at 1:57–60.

The ’717 patent also identifies known coatings that include enzymes. *Id.* at 1:65–2:18. Yet the patent distinguishes those coatings as having been “developed to prevent adherence of marine microorganisms,” such as on a ship’s bottom, “not to reduce contamination caused by fingerprints” on, for example, “display devices.” *Id.* at 1:67–2:17 (“[T]his mechanism [i.e., removing adsorbent material produced by the microorganism to prevent adherence] is not associated with the decomposition of the fingerprint contaminant.”), 2:19–22 (“[T]here is no technology of anti-fingerprint coating in the self-cleaning sense, which can be used to provide an anti-fingerprint property to the surface of a display device.”).

Against this background, the ’717 patent describes the “Technical Problem” it aims to address, and the patent’s “Technical Solution.” *Id.* at 2:24–43. For the problem, the patent states that “[t]he present invention is directed to a technique of removing, with no hiding or wiping of, fingerprints by decomposing components of a transferred fingerprint using an enzyme and reducing a deviation in a physical property between the fingerprint components.” *Id.* at 2:26–30. Further, the patent explains, “[t]he present invention is also directed to a method of forming anti-fingerprint coating which may reduce transfer of fingerprints and have a fingerprint decomposing property.” *Id.* at 2:31–33.

In describing its “Technical Solution,” the ’717 patent states that the “inventors have made much research on a method of forming anti-fingerprint coating capable of providing a self-cleaning function, not simply forming an anti-contamination coating providing an easy cleaning function.” *Id.* at 2:40–43. According to the patent:

In detail, in consideration that the fingerprint is mostly composed of lipids,^[1] the present inventors have assumed that when a lipolytic enzyme is coated on a substrate, transferred fingerprints may be reduced by the reaction of the enzyme. Accordingly, the present inventors have confirmed whether such coating provides an anti-fingerprint property by examining a change in a physical property of the fingerprint transferred to the lipolytic enzyme-coated substrate.

Id. at 2:44–51. As the patent explains, when ester bonds in fingerprint lipids (e.g., triglycerides) are broken down by a lipolytic enzyme, the lipid/sebum “is mainly decomposed into fatty acids, especially, oleic acids, leading to an increase in homogeneity and conversion into lower molecular weight materials” for release from a surface. *Id.* at 2:64–3:3; *see also id.* at 3:12–24 (describing hydrolysis of ester bonds in lipids, e.g., triglycerides and wax monoesters, by a lipase). Hence, the patent discloses that “the present invention is directed to a method of forming [an] anti-fingerprint coating including treating the substrate with a composition comprising a lipolytic enzyme.” *Id.* at 3:8–11.

¹ The ’717 patent states that the “major components of a fingerprint are sweat and sebum.” Ex. 1001, 2:52–59 (describing sebum as “composed of lipids including triglycerides, wax monoesters, fatty acids, squalenes, cholesterol, cholesteryl esters, etc.”). The ’717 patent discloses that “triglyceride and wax monoester account for nearly 70% of the total content of the sebum” and that “[t]hese components have a structure in which several fatty acids are bound by ester bonds.” *Id.* at 2:60–64.

The '717 patent also discloses several embodiments and working examples, but the patent indicates the invention is broader than, and not limited to, any particular embodiment or example. *See, e.g.*, Ex. 1001, 7:48–49 (“[T]he present invention is not limited to these examples.”). For instance, although the patent suggests forming the anti-fingerprint coating on display devices, the patent’s disclosure is not so limited. *Id.* at 4:9–12; *see* Pet. 5–8. Indeed, the patent discloses that “the present invention is not limited to the substrate having anti-fingerprint coating, and thus any type of substrate is applicable.” Ex. 1001, 4:7–9; *see also id.* at 6:59–61 (“[T]he present invention is not particularly limited to the kind of the product.”).

Nor does the '717 patent describe the invention as limited to any specific lipolytic enzyme, or any specific method of treating the substrate with the enzymatic composition. The patent discloses that “lipolytic enzymes include any enzymes having a characteristic of hydrolyzing lipid components of a fingerprint.” *Id.* at 3:12–33. The patent repeatedly describes and exemplifies a “lipase” as the preferred lipolytic enzyme for forming the anti-fingerprint coatings. *Id.* at 3:15–16 (“An example of an enzyme having an activity to hydrolyze ester bonds at room temperature is a lipase. The present invention is not limited to the kind or origin of the lipase, and thus any type of lipase may be used as the lipolytic enzyme.”).² And the patent discloses that the “invention is not particularly limited to a method of treating the substrate with the composition including a lipolytic

² According to the patent, “[t]o obtain a high degree of hydrolysis with respect to the triglyceride and wax monoester, which are the main components of the sebum, a lipase non-specifically acting at any position may be used.” Ex. 1001, 3:20–28 (identifying “commercially available” lipases).

enzyme, and thus any method known in the art will be used.” *Id.* at 4:24–27, 7:4–6 (“The present invention is not particularly limited to a method of introducing the anti-fingerprint coating to the product.”). As the patent also explains, methods of “immobilizing an enzyme [to a substrate/surface are] known in the art,” such as “by adsorption, covalent bonds or encapsulation.” Ex. 1001, 4:27–30.

C. Illustrative Claims

Petitioner challenges claims 1–8. Claim 1, the only independent claim, and claims 2, 3, and 5 are illustrative and read as follows:

1. A method of forming anti-fingerprint coating, comprising:
 providing a substrate which is selected from plastic or glass; and
 treating the substrate with a composition comprising a lipolytic enzyme to obtain an anti-fingerprint coating.
2. The method according to claim 1, wherein the lipolytic enzyme is a lipase.
3. The method according to claim 2, wherein the composition further includes at least one enzyme selected from the group consisting of a protease, an amylase, a cellulase, and a lactase.
5. The method according to claim 1, wherein the lipolytic enzyme is introduced to a surface of the substrate by adsorption, covalent bonds, or encapsulation.

Ex. 1001, 10:56–67, 11:6–8.

D. The Asserted Grounds of Unpatentability

Petitioner contends that claims 1–8 are unpatentable for obviousness based on the grounds set forth in the table below. Pet. 22–23.

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5	103	Wang ³
4	103	Wang, Schwenke ⁴
6	103	Wang, Eigler, ⁵ Schneider ⁶
7, 8	103	Wang, Schneider
1–5	103	Ho, ⁷ Pegg ⁸
6, 7	103	Ho, Pegg, Doppelfeld ⁹
8	103	Ho, Pegg, Kallury ¹⁰

Petitioner also relies on declarations from Dr. David Rozzell (Exs. 1012 and 1044), and other patents and publications, such as a publication by Buchanan¹¹ (Ex. 1015), among other evidence. Patent Owner responds with declarations from Jason Kolowski, Ph.D. (Exs. 2001 and 2032) and Darran Cairns, Ph.D. (Ex. 2033), among other evidence.¹²

³ Wang et al., US 2008/0119381 A1, published May 22, 2008 (Ex. 1004).

⁴ Schwenke, US 2007/0152896 A1, published July 5, 2007 (Ex. 1007).

⁵ Eigler et al., US 5,077,210, issued Dec. 31, 1991 (Ex. 1008).

⁶ Schneider et al., US 2005/0147579 A1, published July 7, 1995 (Ex. 1006).

⁷ Ho et al., US 4,506,015, issued Mar. 19, 1985 (Ex. 1005).

⁸ Pegg et al., US 5,279,955, issued Jan. 18, 1994 (Ex. 1009).

⁹ Doppelfeld et al., US 4,808,529, issued Feb. 28, 1989 (Ex. 1010).

¹⁰ Kallury et al., US 5,405,766, issued Apr. 11, 1995 (Ex. 1011).

¹¹ Michelle V. Buchanan et al., *Chemical characterization of fingerprints from adults and children*, in Forensic Evidence Analysis & Crime Scene Investigation, 2941 PROC. SPIE 89 (1997) (Ex. 1014).

¹² Patent Owner submits a second declaration from Dr. Cairns (Ex. 2036) primarily related to the proposed substitute claims. *See infra* Section IV.

III. ANALYSIS

A. *Overview of the Asserted References*

Petitioner presents seven grounds for challenging claims 1–8 of the ’717 patent, but those grounds fall within two broader categories:

- (i) grounds relying on Wang; and
- (ii) grounds relying on Ho in combination with Pegg.

See, e.g., Pet. 23–25, 26–29 (challenge to claim 1 over Wang), 40–46 (challenge to claim 1 over Ho and Pegg). Other references (*e.g.*, Schneider) are cited as teaching limitations added by some of the dependent claims.

We provide overviews of Wang, Ho, and Pegg below. The Petition identifies relevant teachings of the other prior art; we find the Petition has accurately identified and summarized those other teachings, and we apply but do not repeat them all here. Pet. 13–18, 30, 33–36, 39; *see, e.g.*, Ex. 1006 (Schneider) ¶¶ 258, 262 (describing anti-fouling coatings or compositions with enzymes added to surfaces by, for example, dipping).

1. Wang (Ex. 1004)

Wang “relates to compositions and a process in the field of self-cleaning system[s] using digestive proteins [i.e., enzymes].” Ex. 1004 Abstr., ¶¶ 5, 15 (“The object of the present invention is to provide self-cleaning composition and process containing digestive proteins for preventing and reducing stain accumulation.”). Wang’s self-cleaning compositions and process relate to “preventing and reducing surface stain accumulation due to bird droppings, bug wastes, food debris, and other stain causing materials.” *Id.* ¶ 2.

As Wang explains, “interior and exterior surfaces of [an] automobile, such as coatings, paints, and seat fabrics, are subject to contamination and

corrosions when they are under prolonged exposure to bird dropping, insect debris, resins of conifer, microbes, gums, etc.” *Id.* ¶ 4. Wang teaches that the “[i]nterior surfaces and coatings may also be easily [] stained with oil, protein, sugar and other ingredients in foods and beverages.” *Id.* Stains of interest include “those formed from broken bodies of bugs, animal (like bird) wastes, foods, milk and other beverages, and cosmetic and personal care products.” *Id.* ¶ 6. According to Wang, “the major components of stains that are adhesive to surfaces are proteins, polysaccharides, fats or oils.” *Id.*

Wang teaches “the incorporation of digestive proteins including lysozymes, proteases, lipases, cellulases, etc., onto surfaces such as paints and coatings.” Ex. 1004 ¶ 5; *see also id.* ¶ 17 (“The digestive proteins of the composition may include proteases which hydrolyze protein molecules, [and] lipases which hydrolyze lipids and fats.”), ¶ 30 (“The present invention specifically involves the incorporation of one or more digestive proteins including lysozymes, proteases, lipases, cellulases, etc.”), ¶ 42 (Table 1 listing enzymes (e.g., Lipase AK), stains targeted (e.g., fats, oils, cosmetics), and enzyme functions (e.g., hydrolysis of oils and fats)), claim 2 (identifying enzymes including proteases and lipases).

According to Wang, “catalytic activity of the digestive proteins enables ongoing self-cleaning to reduce and eliminate stain contaminations” and the mechanism of action is “mainly enzymatic.” *Id.* ¶ 5. “The compositions of the invention may be useful as a mechanism to prevent the accumulation of contacting stains and dirt by an ‘automatic’ enzymatic degradation reaction.” *Id.* ¶ 17.

Wang discloses that “[e]nzymes may be attached to surfaces of plastics.” Ex. 1004 ¶ 40. For example, Wang discloses enzyme attachment

“corresponding to ~100% surface coverage . . . with polystyrene particles with diameters [that] range from 100 to 1000 nm,” and that such particles may be used with paints or coatings “to functionalize the surfaces of materials.” *Id.* Wang teaches “[t]he same chemical bonding approach may be applied to coat enzymes onto preformed plastic parts, and thus form a protein coating on the parts’ surfaces.” *Id.*; *see also id.* at claims 12–14 (disclosing immobilizing enzymes to glass or plastic surfaces via a linker moiety (e.g., alcohols, aldehydes, etc.)).

Wang teaches “[t]here are several ways to incorporate the digestive proteins onto a substrate.” Ex. 1004 ¶ 33. According to Wang, “[o]ne” of those ways “involves the application of covalent bonds,” where “free amine groups of the digestive proteins may be covalently bound to an active group of the substrate,” such as “alcohol, thiol, aldehyde, [or] carboxylic acid” groups. *Id.*; *see also id.* ¶¶ 34, 38 (disclosing that the enzyme may be “uniformly dispersed” in a substrate or “entrapped in the coating substrate”), ¶¶ 43–44 (disclosing attachment by “physical adsorption”). In a preferred embodiment, Wang teaches that “a surface may be pretreated with a layer of polymer comprising one or more active groups” and a “digestive protein suspension may be spin coated onto the polymer layer with the active groups to form covalent bonds between the proteins and the polymer layer.” *Id.* ¶ 18; *see also id.* ¶ 43 (Example 3: describing application of the enzyme to a polymer-coated plate via layer-by-layer spin coating).

2. Ho (Ex. 1005)

Ho “relates to an immobilized composition of a biologically active material that can be prepared to have an unusually high amount of activity per unit volume.” Ex. 1005, 1:9–12. The biologically active material includes “proteinaceous materials, such as, for example, immunoreactants,

but especially, of enzymes.” *Id.* at 3:4–8. According to Ho, the term “immobilized” refers “to such an enzyme, or other biologically active material, fixed to any kind of carrier, i.e., organic or inorganic.” *Id.* at 1:40–43. Ho teaches that “[p]rocedures such as adsorption, encapsulation, and covalent bonding are routinely used [for immobilization] with many enzymes.” Ex. 1005, 1:29–30.

Ho, in examples, describes immobilizing multiple enzymes, including a lactase, a lipase, and a protease, to a carrier. *Id.* at 7:16–42; *see also id.* at 13:15–19, 13:25–35 (“Other enzymes that may be used . . . include, for example, cellulase, esterase . . . and other types of hydrolases; hydrase, pectinases, pepsin . . . and mixtures of these and other enzymes.”). Ho further teaches “[a] high activity immobilized enzyme composite is prepared by covalently bonding a second enzyme layer to a first enzyme layer that is immobilized to a carrier.” *Id.* at Abstr.

Ho teaches that “the carrier material is preferably in particulate form, . . . but in addition, may be in the form of fibers, tubes, sheets, beads, or porous glass.” *Id.* at 4:17–21. Also, Ho discloses, “[t]he carrier may be any chemically inert natural or synthetic material, such as, for example, a polymer that is capable of forming a gel in aqueous media.” *Id.* at 4:23–25; *see also id.* at 4:28–37 (“[A]ny material that has or can be formed to have a shape that makes processing practical in the desired end use, that offers a high surface area per unit volume, and that either has or can be treated to have active hydroxyl groups at its surface” may be the carrier material.).

3. Pegg (Ex. 1009)

Pegg relates to crosslinking agents for covalently attaching enzymes to plastics. Ex. 1009 Abstr.; *see also id.* at 1:9–11 (“This invention relates to a novel heterofunctional composition useful in immobilizing reagents on

plastic surfaces.”). According to Pegg, “[s]ubstrates are insoluble matrices for immobilization and can be plastic, glass, silica, carbon, cellulose, or other materials.” *Id.* at 1:20–22. Pegg explains that “[p]lastics are particularly useful substrates as they can be formed into a variety of shapes, such as cups, discs, . . . tubes, membranes, and particles,” in addition to plastics being biocompatible. *Id.* at 1:22–27. Pegg’s “[p]referred substrates are plastics derived from polymers of vinyl, ethylene, propylene, sulfone, carbonate, or a combination thereof.” *Id.* at 3:29–31.

B. Person of Ordinary Skill in the Art

Petitioner’s declarant proposes that the skilled artisan “would have had at least a bachelor’s degree plus 5 or more years of experience, or a Masters or PhD degree with 2 or more years of experience in chemistry, biochemistry, molecular biology, biochemical engineering, or a related discipline.” Ex. 1012 ¶ 32. Patent Owner’s declarants agree, but add that the skilled artisan “would have had, or had access to persons with, expertise in fingerprints, including their components and how they are deposited or behave on surfaces.” Ex. 2001 ¶ 22; Ex. 2033 ¶¶ 25–26.

Inasmuch as the declarants agree regarding the qualifications of the skilled artisan, we find that the proposals are consistent with the prior art. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that specific findings regarding ordinary skill level are not required where the prior art itself reflects an appropriate level and a need for testimony is not shown). Accordingly, we find that a person of ordinary skill in the art would have had at least a bachelor’s degree plus 5 years or more of experience, or a Masters or Ph.D. degree with 2 or more years of experience in chemistry, biochemistry, molecular biology, biochemical engineering, or a related

discipline. Given the '717 patent's description of problems encountered in the art, and the secondary references cited here (e.g., Ex. 1015, Ex. 1025 (Ramotowski)¹³), we further find that the skilled artisan would also have had some expertise (or access to persons with expertise) related to fingerprint components and how those components are deposited or behave on surfaces. Ex. 2001 ¶ 22; Ex. 2033 ¶¶ 25–26.

C. Claim Construction

In this *inter partes* review, we interpret claim terms based on the broadest reasonable construction in light of the specification of the patent in which those terms appear. 37 C.F.R. § 42.100(b) (2018); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142 (2016) (affirming the broadest reasonable construction standard in *inter partes* review proceedings).¹⁴ Under that standard, we presume a claim term carries its “ordinary and customary meaning,” which “is the meaning that the term would have to a person of ordinary skill in the art in question” at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). “[W]e need only construe terms in controversy, and only to the extent necessary to resolve that controversy.” *See Nidec Motor Corp. v. Zhongshan Broad*

¹³ Robert S. Ramotowski, *Advances in Fingerprint Technology* 63–104, (Henry C. Lee and R. E. Gaensslen, ed., CRC Press 2001) (Ex. 1025).

¹⁴ The Final Rule changing the claim construction standard in IPR proceedings does not apply to the claims here, as the Petition was filed before the rule's effective date, November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340, 51,340, 51,344 (Oct. 11, 2018). Nevertheless, we do not perceive on this trial record that the claim construction of the challenged claims would be different if the *Phillips*-style standard in the above-noted Final Rule were applied.

Ocean Motor Co., 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

1. “*anti-fingerprint coating*”

The phrase “anti-fingerprint coating” appears twice in claim 1: first in the preamble as “[a] method of forming *anti-fingerprint coating*,” and again at the end of the treating step, which recites “treating the substrate with a composition comprising a lipolytic enzyme to obtain an *anti-fingerprint coating*.” Ex. 1001, 10:55–61 (emphases added).

According to Petitioner, the ’717 patent discloses that the “invention relates to a novel use of a lipolytic enzyme for forming anti-fingerprint coating capable of providing a self cleaning function to a surface of a substrate.” Pet. 9 (quoting Ex. 1001, 1:17–19). Petitioner contends that, as described in the patent, this “‘self-cleaning’ is ‘a function of actively reducing transfer of fingerprints or decomposing fingerprints.’” Pet. 9 (quoting Ex. 1001, 1:57–59). Hence, Petitioner contends, the “anti-fingerprint coating” means:

at least one layer of material that consists of or comprises a lipolytic enzyme and that is capable of actively reducing transfer of fingerprints to a surface of a substrate on which the layer of such lipolytic enzyme containing material is provided or decomposing fingerprints deposited on a surface of a substrate on which the layer of such lipolytic enzyme containing material is provided or a combination thereof.

Pet. 10.

Patent Owner initially argued that “the term ‘anti-fingerprint coating’ means a “coating that decreases the visibility of residue transferred by a finger.” Prelim. Resp. 12–16. Patent Owner urges this same interpretation in the Patent Owner Response. PO Resp. 7. According to Patent Owner, “the term ‘anti-fingerprint coating’ should not be limited to the mechanism

of action advocated by Petitioner” and Patent Owner “maintains that the term should be construed as a ‘coating that decreases the visibility of residue transferred by a finger.’” *Id.* at 7–8 (citing Prelim. Resp. 10–16).

As explained at institution, we did not agree entirely with either parties’ proposed interpretations, but we found Petitioner’s proposal closer to the broadest reasonable interpretation of the “anti-fingerprint coating.” Paper 8, 16–19; *see also id.* at 19–24 (explaining the reasons for rejecting Patent Owner’s interpretation).¹⁵ Accordingly, we adopted a modified version of the claim construction proposed by Petitioner.

The Board’s construction of “anti-fingerprint coating” is:

a coating that is capable of providing a self-cleaning function, that is, a function of actively reducing transfer of a fingerprint or decomposing a fingerprint transferred to a surface of the coated substrate.

Paper 8, 19. Our reasoning in support of this construction, which we maintain for this Final Written Decision, is provided in pertinent part below.

We agree with the parties that “anti-fingerprint coating” requires further interpretation because the phrase, standing alone, might mean several different things, and evidence of record does not reveal any commonly understood meaning outside the ’717 patent. We look to the patent for guidance. *Poly-America, L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1137 (Fed. Cir. 2016) (“Ultimately, the only meaning that matters in claim construction is the meaning in the context of the patent.”).

Based on the Specification, “anti-fingerprint” does not mean that the coating must *prevent* any and all transfer of a fingerprint to a surface.

¹⁵ We agreed with Patent Owner that the word “coating” was used in its ordinary sense and did not require further interpretation. Paper 8, 15, 20–21.

Experimental Example 1 (one of several examples in the '717 patent), for instance, demonstrates that the coating may instead *reduce* a degree of transfer of the fingerprint compared to a control without the enzyme coating. *See, e.g.*, Ex. 1001, Fig. 1 and 8:18–22 (describing less contaminant transfer immediately after left (0 hr) with a lipase-coated glass versus a coated glass substrate without the lipase).

The '717 patent also confirms the presence of the anti-fingerprint coating by “confirm[ing] fingerprint decomposing performance.” *See, e.g., id.* at 9:5–20. For instance, Experimental Examples 2 and 3 describe assessing decomposition of “the main component, triglyceride, of a fingerprint” transferred to a control surface and a surface with the anti-fingerprint coating by testing for enzymatic/hydrolytic breakdown of the triglyceride (“triolein”) into fatty acids. *Id.* at 9:5–35. The Specification reports that “it was seen that an acid peak which did not appear from the reference (triolein) was observed from the lipase-coated slide.” *Id.* at 9:18–20 (“¹H-NMR analysis was performed to examine whether the triolein was decomposed or not”). The “anti-fingerprint coating” need not, however, completely decompose and remove all of a fingerprint contamination from the surface. *See, e.g., id.*, at 9:37–55 (Experimental Example 4), Figs. 6–7 (showing decomposition and a reduction in relative haze of the contaminant to about 30–40% in the experimental sample over time).

The '717 patent discloses that the “anti-fingerprint coating” is different from a coating that merely provides an “easy cleaning function”—“no hiding, or wiping of” the fingerprint is necessary. Ex. 1001, 2:26–27, 2:40–43. The patent purports to distinguish the anti-fingerprint coating from known anti-contamination coatings that the patent states are “not associated with decomposition of the fingerprint contaminant” or that may only provide

for easier cleaning or wiping off of a contaminant. Ex. 1001, 1:36–39, 1:59–60, 2:6–18.

Instead, the '717 patent repeatedly and consistently confirms that the “anti-fingerprint” property relies on a “self-cleaning function.” *See, e.g.*, Ex. 1001, 2:41–43 (describing the “Technical Solution” as “forming anti-fingerprint coating capable of providing a self-cleaning function, not simply forming an anti-contamination coating providing easy cleaning”); *see supra* Section II(B). And, importantly, the patent further explains what this means: “a self-cleaning function, that is, a function of actively reducing transfer of fingerprints or decomposing fingerprints.” Ex. 1001, 1:57–59; *see also id.* at 2:31–33 (“The present invention is also directed to a method of forming anti-fingerprint coating which may reduce transfer of fingerprints and have a fingerprint decomposing property.”), 6:26–28 (“[T]he substrate including the anti-fingerprint coating to which a lipolytic enzyme is immobilized according to the method exhibits an anti-fingerprint characteristic because of decomposition of fingerprints and a decrease in transfer of fingerprints.”).

For the reasons above, we conclude that “anti-fingerprint coating” is interpreted, for purposes of this Final Written Decision, as “a coating that is capable of providing a self-cleaning function, that is, a function of actively reducing transfer of a fingerprint or decomposing a fingerprint transferred to a surface of the coated substrate.”

As we explained previously, this construction of “anti-fingerprint coating” also requires a frame of reference. Paper 8, 19. This frame of reference addresses the question, “actively reducing transfer of a fingerprint or decomposing a fingerprint” compared to what? So, we conclude that the “reducing” or “decomposing” is relative to the same fingerprint transferred to a substrate without the anti-fingerprint coating, which is consistent with

how the patent demonstrates that reduced transfer or decomposition is present. *See, e.g.*, Ex. 1001, Fig. 1, 8:7–31 (Experimental Example 1 (describing reduced fingerprint transfer to the lipase-coated substrate versus the substrate without that coating)); *id.* at 9:37–55 (Experimental Example 4 (describing decomposition of fingerprint on a lipase-coated substrate “compared to a lipase-free sample”)).¹⁶

We rejected Patent Owner’s “decreases the visibility of residue transferred by a finger” interpretation at institution, and we do so again now. Prelim. Resp. 10–16; PO Resp. 7–8 (citing Prelim. Resp. 10–16); Paper 8, 19–24; PO Sur-Reply 2–4. After addressing Patent Owner’s principal proposed construction, we will then turn to Patent Owner’s alternative claim construction for “anti-fingerprint coating.” *See, e.g.*, PO Resp. 9–15.

According to Patent Owner, the claimed anti-fingerprint coating is not limited to any “particular mechanism” of action, much less the “mechanism of action advocated by Petitioner” and adopted by the Board. PO Resp. 7–8; Prelim. Resp. 10–11. Patent Owner argues that “there are other variables, such as thickness, moisture, . . . [that] contribute to the anti-fingerprint functionality.” Prelim. Resp. 10–11. Patent Owner contends there is also “no basis to read a conditional limitation ‘capable of’ into the claims because it would result in a construction where the coating may not have the inventive anti-fingerprint functionality.” Prelim. Resp. 10 n.7. And, in support of its “visibility” interpretation, Patent Owner contends “the problem identified in the ’717 patent is the visible contamination on everyday devices caused by residue transferred by a finger.” *Id.* at 15; PO

¹⁶ Petitioner urges a further modification to “clarify” this frame of reference. Pet. Reply 2–4. We address Petitioner’s contention on that issue below.

Resp. 9, 13 (contending the Board’s construction “fails to construe the claim term in accordance with its essential function of decreasing the visibility of fingerprints”). Patent Owner identifies “embodiments” and “working examples that demonstrate the purpose of the invention is to decrease the problem of visible fingerprint residue contamination.” Prelim. Resp. 15–16 (arguing that, in examples, “haze values . . . are being used as a surrogate to quantitate the relative visibility of a contaminant”); *see also* PO Resp. 13–15 (same; contending the ordinarily skilled person would have understood that decreased visibility is necessary).

Patent Owner’s argument that an “anti-fingerprint coating” should not be interpreted as requiring a mechanism of action is unavailing. PO Resp. 7. “Anti-fingerprint” according to the ’717 patent does not embrace any and all conceivable ways to address, reduce, or remove a fingerprint on the coated substrate. As already explained, the patent does not describe coatings that wholly resist the transfer of a fingerprint, or that merely enable a contaminant to be more easily wiped off. *See, e.g.*, 2:26–28 (“The present invention is directed to a technique of removing, with no hiding or wiping of, fingerprints *by decomposing components of a transferred fingerprint using an enzyme.*”) (emphasis added). Rather, the patent is specific in disclosing that the mechanism of action is a self-cleaning function, and indicates what that entails. Ex. 1001, 1:57–59, 2:31–33, 6:26–28. It is an active reduction in the transfer or decomposition of fingerprints. *Id.*

While we heed the caution against reading limitations into the claims, we must also interpret the claims in light of the Specification—recognizing what the invention is, and what it is not. Patent Owner’s proposal would encompass decreased visibility no matter how it occurs, yet Patent Owner directs us to no mechanism by which such result may occur (beyond active

reduction in transfer or enzymatic decomposition of the fingerprint) that provides sufficient context and meaning to the phrase “anti-fingerprint coating,” and which is adequately supported by the Specification.¹⁷

Patent Owner asserts that “variables” beyond the lipolytic enzyme may “contribute to the anti-fingerprint functionality,” but those variables relate to more specific embodiments and are not required by claim 1.

Prelim. Resp. 11. As discussed, the ’717 patent states that the invention is broader than its embodiments or examples. *Supra* Section II(B). Also, the patent discloses that a lipolytic enzyme “alone” may be immobilized to a substrate “with no use of an additional treatment process,” suggesting a lipolytic enzyme, without additional “variables” or treatments, can provide the claimed anti-fingerprint property. Pet. 9; Ex. 1001, 4:34–37; *see also id.* at 4:24–30 (disclosing that any immobilization technique known in the art may be used). In examples, the *only* distinguishing feature between coatings with and without the anti-fingerprint property is the presence of a lipolytic enzyme (i.e., a lipase). *See, e.g.*, Ex. 1001, 8:7–30. As for moisture being a “variable,” the patent discloses that moisture is provided by a fingerprint itself. *Id.* at 3:61–63 (“[M]oisture is required for a lipolytic enzyme to hydrolyze lipids. Since the fingerprint includes moisture in addition to the lipid, there is no need to supply the moisture.”).

As for Patent Owner’s argument that there is no basis for including the phrase “capable of” in the construction because it “would result in a

¹⁷ While the patent repeatedly discloses that the invention is not limited to any particular lipolytic enzyme, product, substrate, method of treating the substrate, or embodiment (*supra* Section II(B)), we find no comparable disclosure suggesting the anti-fingerprint functionality is broader than one that relies on reducing transfer of or decomposing fingerprint components.

construction where the coating may not have the inventive anti-fingerprint functionality,” we disagree. Prelim. Resp. 10 n.7. The phrase “capable of” is supported by the patent in the way it is used in our construction. *See, e.g.*, Ex. 1001, 1:17–19 (“forming anti-fingerprint coating capable of providing a self cleaning function”), 2:40–43. Contrary to Patent Owner’s argument, the anti-fingerprint coating as construed does not lack an “anti-fingerprint functionality”—the functionality is there in the coating and would, upon contact with a fingerprint, react. The nature of this anti-fingerprint property is that it is *capable of* functioning if and when the coating is exposed to a fingerprint. And, we note, claim 1 is a method of forming the coating and does not require, as an active step, *actually* transferring, reducing, or decomposing a fingerprint on the coated substrate.

We also do not agree with Patent Owner’s proposal that “anti-fingerprint coating” means a “coating that decreases the visibility of residue transferred by a finger.”¹⁸ Prelim. Resp. 12. Claim 1 does not recite any

¹⁸ Patent Owner’s position that the residue is transferred “by a finger” is incorrect because the patent discloses that the contaminant may be transferred from other parts of the hand, such as a palm. *See, e.g.*, Ex. 1001, 6:56–61, 9:37–55 (“a fingerprint . . . transferred from a palm”). Moreover, as we pointed out at institution, another problem with Patent Owner’s “decreases the visibility” interpretation was whether it embraced visibility judged by the naked eye, or the hazemeter and microscope technique described in the patent, as well as the fact that, insofar as haze is the alleged proxy for visibility, haze also decreased in the control slides. *See* Paper 8, 23–24. We do, however, agree with Patent Owner that evidence here shows that skilled artisans generally knew how haze measurements could be taken on, for example, transparent substrates (Ex. 2005 (ASTM standard)), and that, in the context of the ’717 patent, hazemeter measurements were used to illustrate the degree of fingerprint residue on certain substrates over time. *See, e.g.*, PO Sur-Reply 5–6 (citing Ex. 2033 ¶¶ 2–7, 42, Ex. 1045 (Cairns dep. testimony), 19:10–20:2, 74:6–15).

required decrease in visibility due to the “anti-fingerprint coating.” True, as Patent Owner points out, the ’717 patent does describe “clearly visible” contaminations left by fingerprints, but that disclosure is provided as background with respect to certain products—“various display devices, [and] high-glossy electronic devices or building materials.” Ex. 1001, 1:25–31. As noted, however, the patent states expressly that the invention is not limited to any particular type of product or substrate that may be treated with the lipolytic enzyme. *Id.* at 4:7–9 (“any type of substrate is applicable”), 6:59–61 (“the present invention is not particularly limited to the kind of the product”). Claim 1 merely requires that the treated substrate is plastic or glass and, thus, is not limited to “display devices,” but would extend to opaque substrates. Pet. Reply 8–9; Ex. 1045, 26:17–27:10, 29:24–31:9 (testifying that haze (as a proxy for visibility) could not be directly assessed on opaque samples).

Under sections of the ’717 patent on the “Technical Problem” and “Technical Solution,” the patent describes the anti-fingerprint functionality as reducing fingerprint transfer or decomposing the fingerprint but does not specify that fingerprint visibility must be decreased. Ex. 1001, 2:24–3:7. So too, some of the examples confirm the anti-fingerprint function by testing for active decomposition, without assessing visibility. *Id.* at 9:5–35 (Experimental Examples 2 and 3); *see also id.* at 6:26–28 (disclosing that, in embodiments, “the method exhibits an anti-fingerprint characteristic *because of* decomposition of fingerprints and a decrease in transfer of fingerprints”) (emphasis added). Patent Owner cites examples where it alleges visibility

(haze) was examined, but again, the patent states that the invention is not limited to its examples, nor to particular products.¹⁹ *Id.* at 7:44–50.

For the above reasons, we are not persuaded that Patent Owner’s “visibility” construction of “anti-fingerprint coating” is the correct, broadest reasonable interpretation for claim 1.

We turn now to Patent Owner’s backup interpretation for “anti-fingerprint coating.” According to the Patent Owner, “to the extent the Board deems it necessary to include functions” in the construction of “anti-fingerprint coating,” it should be interpreted as follows:

[a] coating that reduces the transfer of a fingerprint **and** decomposes a fingerprint, and decreases the visibility of a fingerprint on a substrate without wiping off the fingerprint.

PO Resp. 12 (emphasis added).²⁰

Patent Owner “agrees the claimed anti-fingerprint coatings are self-cleaning,” but argues our construction is wrong for “restricting the claimed

¹⁹ We do not rule out that the anti-fingerprint coating may result in or encompass decreased visibility of a fingerprint when used, especially on certain products. We are not, however, persuaded on this record that such an end result is required as a matter of interpreting claim 1.

²⁰ Patent Owner’s proposed substitute claims amend the claim language to, *inter alia*, recite explicitly several elements that Patent Owner otherwise argues are required in its alternative construction. *See* PO Resp. 12–13 (proposed construction of “anti-fingerprint coating”); *see also* PO MTA, Appendix A (claim 9 as the substitute for claim 1). To that end, substitute claim 9 recites, among other features, a decomposition of the fingerprint, reduction of fingerprint transfer, and decreased visibility of the fingerprint as assessed by measured haze values. *See* PO MTA, Appendix A. Substitute claim 9 also specifies that the substrate is a surface of a “display device” (or substrate for adherence to a display device’s surface) and that the “coating decreases the visibility of the fingerprint on a display device without wiping off the fingerprint.” *Id.*

anti-fingerprint coating's function to a narrow definition of 'self-cleaning.'" *Id.* at 9–10. Patent Owner argues the interpretation requires the function of reducing transfer *and* decomposing a fingerprint. *Id.*; PO Sur-Reply 11–13.

Patent Owner's argument is unpersuasive. As between the Board's interpretation and Patent Owner's alternative, it is Patent Owner that is arguing for the narrower one—where the coating must *both* reduce fingerprint transfer *and* decompose a fingerprint. Plainly, the '717 patent supports a broader interpretation where the self-cleaning to which the claimed anti-fingerprint coating is directed may include either functionality.

The patent expressly discloses that, unlike the claimed anti-fingerprint coating, other known coatings do not provide “a self-cleaning function, that is, a function of actively reducing transfer of fingerprints or decomposing fingerprints.” Ex. 1001, 1:57–59 (emphasis added). The patent then goes on to explain that the invention is “directed to a method of forming [an] anti-fingerprint coating which may reduce transfer of fingerprints and have a fingerprint decomposing property.” *Id.* at 2:31–33 (emphasis added). That the claimed “anti-fingerprint coating” may include both functions does not translate to both functions being required. Indeed, nowhere does the patent disclose that both functions *must* be provided in a coating to define an “anti-fingerprint” property of the “anti-fingerprint coating.” Even if, as Patent Owner argues, some (or even all) of the working examples were to provide both reduced fingerprint transfer and fingerprint decomposition, that would not override the patent's broader disclosures, particularly where the patent states that its examples are not limiting. Ex. 1001, 7:48–49 (“the present invention is not limited to these examples”).

In any event, contrary to Patent Owner's argument, it is not shown that each of the '717 patent's examples provide both reduced transfer and

decomposition. The Example 1 coating, as tested in Experimental Examples 1 and 2, provides both reduced transfer (reduced relative haze initially transferred to the experimental slide versus the control slide) and a fingerprint decomposing function (e.g., decomposition of the triglyceride, triolein). *Id.* at 7:51–8:31, 9:5–21, Fig. 1. But other examples do not describe the coatings as reducing fingerprint transfer. Experimental Examples 3 and 4 test decomposition, not reduced transfer. *Id.* at 9:22–55. In Example 4, haze values were set to 100%. *Id.* at 9:49–51. And, as Patent Owner’s declarant acknowledges, “[t]his [setting] enabled the inventors to confirm decomposition effect, but prevents the decrease in haze due to reduction in transfer from being observed.” Ex. 2022 ¶¶ 45–46, 88–90.

Although Patent Owner would have us interpret the self-cleaning, anti-fingerprint property as “due to the coating’s ability to **both** reduce the transfer of fingerprints and decompose fingerprints,” the patent never says that is necessary. PO Sur-Reply 12. Quite the opposite, other disclosures in the patent specify that the claimed coatings “may” provide both functionalities, and otherwise describe self-cleaning as including reduced transfer “or” decomposing of fingerprints. Ex. 1001, 1:57–59, 2:31–32. The fact that the patent also (e.g., with respect to “exemplary embodiments”) describes coatings that are capable of providing both functionalities is not inconsistent with a broader interpretation. Ex. 1001, 6:21–28 (“the method exhibits an anti-fingerprint characteristic because of decomposition of fingerprints and a decrease in transfer of fingerprints”). Indeed, some examples possess both functionalities (*see* above on Experimental Examples 1 and 2). But those narrower descriptions fit within the ambit of the patent’s broader disclosures, which suggest either functionality is sufficient.

For the above reasons, we are unpersuaded that Patent Owner’s alternative construction is the broadest reasonable interpretation of the “anti-fingerprint coating.” Patent Owner’s alternative construction requires also that the coating “decreases the visibility of a fingerprint . . . without wiping off,” but we decline to adopt that interpretation for reasons explained with respect to Patent Owner’s “decreases the visibility” proposal, as we do not agree that a decreased “visibility” result should be read into claim 1.

Petitioner, in its Reply, asks that the Board further “clarify” the frame of reference discussed above and in the Institution Decision. Pet. Reply 2–4; Paper 8, 19. Petitioner contends that any reduced transfer or fingerprint decomposition should be judged “relative to a substrate treated with a material compound that enables immobilization of a lipolytic enzyme on the substrate.” Pet. Reply 4–5.

As best we can tell, Petitioner seeks this “clarification” so that it might offer an explanation why, in Experimental Example 1 of the patent, a higher amount of fingerprint material was transferred to the control slide compared to the experimental, lipase-coated glass slide. To that end, Petitioner asserts that the control slide may include unoccupied glutaraldehyde binding sites (i.e., sites not bound to lipase) and that proteins in the fingerprint may have become bound to those unoccupied sites and, thus, contributed to the haze values on the control slide. Pet. Reply 3–4 (citing, e.g., Ex. 1044 ¶ 69).

We agree with Patent Owner that there is no need or sufficient basis for Petitioner’s proposed clarification. PO Sur-Reply 13–14. As an initial matter, Petitioner’s “theory” about potential binding of fingerprint proteins on the control slide is speculative. *Id.* at 14; Ex. 2035 (Rozzell dep. testimony), 88:4–11 (“[Y]our theory here that functionalized glutaraldehyde

on the control slide . . . would bind free protein . . . [and] potentially affect the haze value of times zero is speculation, isn't it? A. Yes.”), 82:7–10 (“So to the extent that any protein would be bound, you don't know that it would change the haze value of the control slide. A. Correct.”). The key comparison, as noted above, is between a substrate with and without the anti-fingerprint coating. And, as Patent Owner contends, “if a lipolytic enzyme is not included in the composition used to treat a substrate, then an anti-fingerprint coating is not obtained.” PO Sur-Reply 14. This is consistent with the patent's experimental samples, which differed from their control counterparts merely by the presence of a lipase. *See, e.g.*, Ex. 1001, 8:6–31, Fig. 1 (Experimental Example 1 (comparing “Control glass (w/o lipase)” to “Lipase coated glass”)), 9:37–55, Figs. 6 and 7 (Experimental Example 4 (comparing substrate coated “w/lipase” and “w/o lipase”)).

2. “*fingerprint*”

To resolve a controversy here, the term “fingerprint” requires interpretation. As explained at institution, the disputed issue turned in pertinent part on whether a “fingerprint” includes lipids or, as Patent Owner argued, whether it may be lipid free.²¹ *Compare* Pet. 6–8, 18–19, 21, and Ex. 1012 ¶¶ 39, 41, 45–46, 85 (arguing that fingerprints include lipids), *with* Prelim. Resp. 12–13, 22 (“not every fingerprint contains lipids . . . as required by Petitioner's inherency theory”).

²¹ At institution, Patent Owner proposed that a “fingerprint” meant a “residue transferred by a finger.” Prelim. Resp. 12–14. Petitioner did not expressly propose a construction for “fingerprint,” but it was clear that Petitioner was interpreting “fingerprint” as including lipid components that will be hydrolyzed by the lipolytic enzyme. Paper 8 n.13; Pet. 6–8, 18–19, 21; Ex. 1012 ¶¶ 39, 41, 45–46, 85 (citing evidence that fingerprints include lipids, especially triglycerides and wax monoesters).

The Board interpreted “fingerprint” as “a contaminant or stain, mostly composed of lipids/sebum and including as a main component triglycerides, transferred to a surface from contact with a portion of a hand.” Paper 8, 26–27. We did not agree with Patent Owner’s position that a “fingerprint” of the ’717 patent encompassed lipid-free contaminants or stains. *Id.* at 25. In the discussion below, we recap our analysis from the Institution Decision, and then turn to the parties’ assertions on this issue during trial after institution.

We determined that the ’717 patent describes fingerprints that include, as their main component, lipids. We did so based on repeated disclosures in the patent on exactly this point. The patent states at least the following: “in consideration that the fingerprint is mostly composed of lipids;” the “major components of a fingerprint are sweat and sebum;” “it has been known that the main cause leaving stains on an appearance of a product such as an electronic device is sebum, which is composed of lipids, including triglycerides, was monoesters . . . ;” “triglyceride and wax monoester account for nearly 70% of the total content of sebum;” “triglyceride and wax monoester, which are the main components of the sebum;” and “using the main component, triglyceride, of a fingerprint.” Ex. 1001, 2:44–45, 2:52–62, 3:21–23, 9:13–14. We noted that, although the patent discloses that a fingerprint may *also* include additional components, such as dead skin cells (*id.* at 2:52–55), such disclosure was not inconsistent with the totality of the Specification, which makes clear that the fingerprints of the patent are *composed mostly of lipids*.

We determined that Patent Owner had cited to no disclosure in the ’717 patent of lipid-free fingerprints, nor provided any credible evidence in the patent or otherwise to explain how a coating treated with a lipolytic

enzyme could or would decompose lipid-free fingerprints. Paper 8, 26–27, 37. Further, we determined that the challenged claims themselves supported a conclusion that a “fingerprint” necessarily contains lipids because the claims recite “a lipolytic enzyme,” which, according to the patent, “includes any enzymes having a characteristic of hydrolyzing lipid components of a fingerprint such as triglycerides, wax monoesters, fatty acids, squalenes, cholesterol and cholesteryl esters.” Ex. 1001, 3:12–15.

We considered the extrinsic evidence cited by Patent Owner related to some circumstances (e.g., genetic disorders) where sebum lipids may not be present on a finger, but we pointed out that such extrinsic evidence could not change the scope and meaning of a “fingerprint” provided in the patent. Paper 8, 26; *see, e.g.*, Ex. 2001 ¶¶ 78–85.

In its Response, Patent Owner proposes that a “fingerprint” is “a contaminant or stain transferred to a surface from contact with a portion of a hand.” PO Resp. 16. Patent Owner recognizes the numerous disclosures from the ’717 patent cited by the Board about fingerprints including a substantial lipid component, but Patent Owner argues those disclosures do not rise to the level of lexicography. *Id.* at 16–17. Patent Owner, again relying solely on *extrinsic* evidence, argues that fingerprints do “not always contain lipids” and, even when they do, “the majority of those lipids are not triglycerides.” *Id.* at 18 (“there is no reasonable basis to construe the term ‘fingerprint’ to require triglycerides to be present as a majority component”).

In its Sur-Reply, Patent Owner lays bare the breadth of its “fingerprint” interpretation. PO Sur-Reply 15. According to Patent Owner, a fingerprint is a contaminant “without restriction to a specific composition.” *Id.* Patent Owner contends fingerprint components may come from human or non-human sources (e.g., cosmetics). *Id.* Patent Owner, thus, argues a

fingerprint “*encompasses all contaminants that could be deposited by a fingerprint, including those contaminants derived from sources external to a human.*” *Id.* (emphasis added).

Petitioner, for its part, contends that “Patent Owner’s construction wrongly encompasses any and all” stains that might be transferred from a hand, yet the ’717 patent makes clear that the “fingerprint” described and claimed must include “components capable of being hydrolyzed by a lipolytic enzyme.” Pet. Reply 13. To the extent the Board entertains any revision to the interpretation of “fingerprint,” Petitioner offers the following: “a contaminant or stain, comprising at least one component capable of being hydrolyzed by a lipolytic enzyme, transferred to a surface from contact with a portion of a hand.” *Id.*

Resolving the controversy in this proceeding does not require that we define the exact outer boundaries of what constitutes a “fingerprint” as claimed. Rather, we need only construe disputed terms to the extent required to resolve the controversy. *Nidec*, 868 F.3d at 1017.²² In the context relevant here, we need not determine every conceivable type of stain and all the chemical components in such stain that might represent the full scope of a “fingerprint” as claimed.

There are, however, some key characteristics that define a “fingerprint” of the ’717 patent. First, we are unpersuaded a “fingerprint” as described and claimed encompasses a lipid-free stain. There is simply no

²² See Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board (Final rule) referenced at Federal Register 83 Fed. Reg. 51,340 (Oct. 11, 2018), at 51,353 (explaining that “it also may not be necessary to determine the exact outer boundary of claim scope”).

support in the patent for interpreting a “fingerprint” as a contaminant or stain without any lipid component. All the intrinsic evidence is to the contrary. *See, e.g.*, Ex. 1001, 2:44–47 (“In detail, *in consideration that the fingerprint is mostly composed of lipids*, the present inventors have assumed that when a lipolytic enzyme is coated on a substrate, transferred fingerprints may be reduced by reaction of the enzyme.”) (emphasis added), 2:55–59 (“[I]t has been known that the main cause leaving stains on an appearance of a product . . . is sebum, which is composed of lipids including triglycerides, wax monoesters,” etc.). And, still now, there is no evidence or reasoning in this record to explain how a lipolytic enzyme—the only enzyme or compound recited in claim 1’s “treating” step—would provide any decomposition of a non-lipid stain transferred to a substrate’s surface. Hence, a “fingerprint” is a stain or contaminant transferred to a surface from contact with a portion of a hand, and includes at least some lipids.

Second, a “fingerprint” must include at least some lipids that can be hydrolyzed by the lipolytic enzyme (e.g., lipase). While Patent Owner urges a far broader interpretation in its briefing (*see, e.g.*, PO Sur-Reply 15), Patent Owner has since acknowledged that a “fingerprint” as claimed must include components on which the recited lipolytic enzyme can act. Tr. 52:6–23 (“[I]ndependent claim [1] requires a lipolytic enzyme to be present and so for the anti-fingerprint coating to exert its anti-fingerprint property, that fingerprint would have to be comprised of something that or be composed of something that a lipolytic enzyme is capable of acting on”). Patent Owner, thus, agrees with Petitioner’s interpretation of “fingerprint” in at least that respect. Pet. Reply 13.

And third, even if a “fingerprint” need not definitively require triglycerides (as a hydrolysable lipid component), a contaminant that is

substantially comprised of triglycerides is *encompassed* by the scope of a “fingerprint” as claimed. Indeed, that type of fingerprint is precisely what the ’717 patent describes. *See, e.g.*, Ex. 1001, 2:53–62 (disclosing that “major components of a fingerprint are sweat and sebum” and that, in “sebum, the triglyceride and wax monoester account for nearly 70% of the total content.”), 7:22 (describing decomposition test results (as shown in Figs. 2 and 3) of “major fingerprint components,” which are triglycerides), 9:27–30 (disclosing “fingerprint decomposing performance . . . using the main component of a fingerprint, a triglyceride”). This interpretation embraces, specifically, the triglyceride triolein, which is hydrolyzed by a lipase to produce oleic acid. *See, e.g.*, Ex. 1001, 2:64–66 (“When the ester bonds [in triglycerides] are broken down, the sebum is mainly decomposed into fatty acids, especially oleic acids”), 9:14–15 (“The triglyceride was a triolein, which was coated on a surface.”); Tr. 53:5–54:8 (agreeing that a contaminant with a substantial triglyceride/triolein component transferred by a hand is within the scope of claim 1’s “fingerprint”).

A “fingerprint” thus encompasses, even if not necessarily being limited to, a contaminant or stain that includes as a main lipid component triglycerides (e.g., triolein), transferred to a surface from contact with a portion of a hand.

D. Principles of Law

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

“[I]nherency may supply a missing limitation in an obviousness analysis.” *Par Pharm., Inc. v. TWi Pharm., Inc.*, 773 F.3d 1186, 1194–95 (Fed. Cir. 2014). The Federal Circuit has, however, “explained that the use of inherency . . . must be carefully circumscribed in the context of obviousness.” *Id.* at 1195. That is, “the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.” *Id.* at 1196. Moreover, properties of a claimed invention, even if inherent, may not have been expected. *Honeywell Int’l Inc. v. Mexichem Amanco Holding S.A. DE C.V.*, 865 F.3d 1348, 1354–55 (Fed. Cir. 2017).

E. Obviousness over Wang

Petitioner contends that claim 1 (and dependent claims 2, 3, and 5) are unpatentable under 35 U.S.C. § 103(a) as obvious over Wang. Pet. 26–29, 31. Petitioner argues Wang teaches, expressly and inherently, the subject matter of the challenged claims, and that the skilled artisan would have had a reason to combine Wang’s teachings and produce, for example, a lipase-coated plastic substrate that would hydrolyze (and, thus, enzymatically decompose) fats and lipids. Pet. 26–28. According to Petitioner, “hydrolysis of lipids and fats is characteristic of anti-fingerprint functionality of a coating,” and would be inherent and expected when a fingerprint is transferred to the enzyme-coated substrate taught by Wang. Pet. 27; *see also id.* at 18–22 (regarding inherent self-cleaning functionality).

Petitioner supports its positions with the teachings of the asserted prior art, disclosures in several secondary references, such as Buchanan,

Mong,²³ Ramotowski, Mizusawa,²⁴ and with Dr. Rozzell’s testimony. *See, e.g.*, Ex. 1012 ¶¶ 33–55 (regarding inherency, hydrolysis of fingerprint lipids, and production of lower molecular weight, more volatile decomposition components), 107–113 (claim 1 analysis), 121 (claim chart); *see also* Pet. Reply 15–17, 21–22 (“Lipids such as triglycerides and wax esters are well known to be found in fingerprint sweat residue and in food items that serve as a contaminant of a fingerprint”) (citing Ex. 1025, 76 (“evidence leads to the conclusion that the majority of free fatty acids present in sweat originate from hydrolysis of sebum triglycerides”)),²⁵ Ex. 1067, 1:61–62 (“olive oil is predominantly triolein”)); Ex. 1044 ¶¶ 14, 16, 27–31, 33, 87–90.

Patent Owner contends that Petitioner has not proved that Wang inherently discloses an anti-fingerprint coating. PO Resp. 19–29. Patent Owner contends that a lipase will not inevitably decompose “fingerprint” lipids. *Id.* at 20–21. Patent Owner argues that lipids of a fingerprint may, for example, include squalene and cholesterol, but “those compounds do not have an ester bond, and are not affected by a lipase.” *Id.* at 21 (citing, for example, Mong (Ex. 1021, A.1) and Dr. Rozzell’s testimony (Ex. 2022, 48:23–49:25)). Patent Owner argues that decomposition products are also not necessarily more volatile. PO Resp. 22–23. According to Patent Owner,

²³ G. M. Mong et al., *Advanced Fingerprint Analysis Project Fingerprint Constituents*, Technical Report, Pacific Northwest Laboratory (1999) (Ex. 1021).

²⁴ Mizusawa et al., US 6,265,191 B1, issued July 24, 2001 (Ex. 1027).

²⁵ Ramotowski discloses, *inter alia*, that “[l]ipolysis by enzymes derived from the epidermis or bacteria present in skin surface debris from human skin has a tendency to break down triglycerides and methyl esters,” and identifies the triglycerides “triolein” and “tristearin.” Ex. 1025, 76.

even if a lipase were to hydrolyze the lipids and produce lower molecular weight byproducts, in some instances those byproducts will be less volatile. *Id.* at 22 (identifying tripalmitin as ester-containing lipid found in sebum in which this phenomenon is alleged to be true). And, Patent Owner argues, Petitioner has not established that decomposition of fingerprint lipids will speed up evaporation or disappearance of a fingerprint. *Id.* at 23–29. Buchanan, which Patent Owner characterizes as the “centerpiece” of Petitioner’s theory, does not evidence such a result. *Id.* (contending, *inter alia*, that Buchanan merely offers an unconfirmed hypothesis for disappearance of fingerprints in a different context (forensic analysis)).

Patent Owner also argues the skilled artisan would not have expected Wang’s enzymatic coatings to have an “anti-fingerprint” characteristic. PO Resp. 30. According to Patent Owner, Wang’s “compositions do not reduce the transfer of stains (much less fingerprints), and do not remove stains without a manual cleaning [i.e., water-rinsing] step.” *Id.* at 31–32 (citing, for example, Ex. 2033 ¶ 99). Patent Owner contends the other references of record would not have led to an expectation of an “anti-fingerprint coating” because those references relate to different issues (i.e., visualizing fingerprints by forensic techniques, not enzymatic decomposition; or, use of enzymes in laundering applications). PO Resp. 34–37.

For reasons explained below, considering the argument and evidence on this trial record, we find Petitioner has established by a preponderance of the evidence that claims 1–3 and 5 are unpatentable over Wang.

1. *Claim 1*

a. Express or Inherent Disclosure of All Elements

Claim 1 is a method of forming an anti-fingerprint coating and recites just two steps: *providing* a plastic or glass substrate, and *treating* that

substrate with a composition that includes a lipolytic enzyme “to obtain an anti-fingerprint coating.” Ex. 1001, 10:55–61.

As shown by Petitioner, we find that Wang teaches the steps of providing a plastic (or glass) surface or substrate, and treating that substrate with a composition that includes one or more enzymes, including, in particular, a lipase.²⁶ Pet. 27–28; Ex. 1004 ¶¶ 18, 40 (“Enzymes may be attached to surfaces of plastics. . . . A digestive protein suspension may be spin coated onto the polymer layer with the active groups to form covalent bonds between the proteins and the polymer layer.”), ¶ 17 (“The digestive proteins [i.e., enzymes] of the composition may include . . . lipases which hydrolyze lipids and fats.”), ¶ 42 (“As shown below in Table 1, these [digestive] proteins were examined and tested in our initial screening tests.”), Table 1 (identifying “Lipase AK” as the enzyme, the targeted “Stains” as “Fats and oils, cosmetics” and the enzyme’s “Function[]” as “Hydrolysis of oils and fats”); *see also id.* at claims 12–14 (describing a process for self-cleaning where the digestive enzyme is immobilized to surfaces such as metal, glass, or plastic via a linker moiety (e.g., alcohol, aldehyde, or carboxylic acid)).

The reasons for making these lipase-coated substrates are articulated in Wang. The evidence persuades us that the skilled artisan would have been motivated to make Wang’s enzymatic, self-cleaning coatings on

²⁶ A lipase is the lipolytic enzyme of choice in the ’717 patent. *See supra* Section II(B); Ex. 1001, 3:12–20 (“An example of an enzyme having an activity to hydrolyze ester bonds at room temperature is a lipase. The present invention is not limited to the kind or origin of the lipase, and any type of lipase may be used.”), 10:62–63 (dependent claim 2 (“wherein the lipolytic enzyme is a lipase”)).

substrates to prevent or reduce stains from, for example, oils, fats, cosmetics, and personal care products on surfaces susceptible to them, such as plastic surfaces inside an automobile. *See, e.g.*, Ex. 1004 ¶¶ 2, 5–6, 17–20, 29–31, 40; Ex. 1012 ¶¶ 53–55. Patent Owner provides no persuasive evidence otherwise.

Patent Owner does not dispute that Wang teaches the “providing” and “treating” steps of claim 1. But Patent Owner maintains that performing those steps does not necessarily result in or “obtain” a coating with an “anti-fingerprint” property of claim 1. *See* PO Resp. 18–19; Ex. 1001, 10:55–61.

The disputed issue, therefore, is whether, by treating a plastic substrate with a composition including a lipolytic enzyme (i.e., lipase), as clearly taught in Wang, one would obtain an “anti-fingerprint coating” as interpreted above. Although Wang discloses that its enzymatic coatings provide an “ongoing” and “automatic” “self-cleaning” function, for preventing, reducing, and eliminating stain (e.g., fat, oil) accumulation on coated surfaces, Wang does not *expressly* describe those stains as being “fingerprints.” Pet. 26–27; Ex. 1004, ¶¶ 2–6, 17–20; *supra* Section III(A). Petitioner, acknowledging the same, invokes inherency. Pet. 18–22, 26–27; Ex. 1012 ¶¶ 39–55.

In support of inherency, Petitioner contends that “fingerprints contain lipids.” *See* Pet. 21; Pet. Reply 14–17. We agree. As explained above, a “fingerprint” as described and claimed in the ’717 patent must include lipids, at least some of which are hydrolysable by the lipolytic enzyme. *See* Section III(C)(ii) (interpretation of “fingerprint”).

That a “fingerprint” includes lipids is supported by a preponderance of the evidence of record. The patent itself discloses that fingerprints are “mostly composed of lipids,” and that the “main cause” of fingerprint stains

is “sebum, which is composed of lipids including triglycerides”—something the patent indicates was already “known.” Ex. 1001, 2:44–45, 2:55–60, 2:61–62 (“the triglyceride and wax monoester account for nearly 70% of the total content of the sebum”); Ex. 1012 ¶ 39. Ramotowski, Asano,²⁷ and Mong also teach that fingerprints contain substantial amounts of lipids having ester bonds (which, as discussed below, are hydrolyzed by lipases). Pet. 19; Pet. Reply 15–16; Ex. 1012 ¶¶ 41, 45; *see, e.g.*, Ex. 1025, 61, 74, 76, 81–82, 86 (describing sebaceous secretions as including triglycerides (e.g., 30–40%) and wax esters (e.g., 20–25%)), 90 (“compounds typically found in print residue, including cholesterol, triglycerides, fatty acids, wax esters, cholesterol esters”); Ex. 1026, 1.

Petitioner further contends that “the lipase would break down lipids placed on the [coated] surface into lower molecular weight components that exhibit higher volatility.” Pet. 21; Ex. 1012 ¶¶ 39–44, 52–54; Pet. Reply 14–16. We find Petitioner’s argument and evidence persuasive—at least as to some known fingerprint lipids, and to the fingerprints comprising those components.

The preponderance of the evidence shows that lipases will hydrolyze (i.e., enzymatically decompose) higher molecular weight lipids with ester bonds into lower molecular weight byproducts. Wang discloses that lipases will hydrolyze lipids, and suggests the use of such lipases to provide a self-cleaning function for reducing oil- and fat-based stains on coated substrates, such as plastic surfaces inside an automobile. Ex. 1004 ¶¶ 2, 6, 15, 17, 42; *see also id.* ¶ 8 (describing “enzymatically decomposing stain molecules in

²⁷ Keiji G. Asano et al., *Chemical Composition of Fingerprints for Gender Determination*, 47:4 J. FORENSIC SCI. 1–3 (2002) (Ex. 1026).

contact with the surface”). Petitioner provides evidence, which we find persuasive, showing that a lipase is, by definition, “[a]ny group of enzymes that catalyze the hydrolysis of fats into glycerol and fatty acids.” Ex. 1012 ¶ 42 (quoting Ex. 1023; *see also* Ex. 1027, 1:22–24 (“lipases function to hydrolyze the triacylglycerols [i.e., triglycerides] to yield free fatty acids and glycerol”), 3:55–60 (describing plastic surfaces that may be modified with a lipase to provide oil-removal properties)); Ex. 1012 ¶¶ 41–44, 52 (explaining how lipases will hydrolyze ester bonds in certain lipids to produce lower molecular weight decomposition products).²⁸

To further illustrate, Petitioner demonstrates that “hydrolyzing of triolein [a triglyceride] and certain wax esters by a lipase does inevitably result in decomposition products of higher volatility.” Pet. Reply 15–16. The evidence shows that triolein, or glycerol oleate, is a known compound routinely found in foods (i.e., olive oil) and sweat residues. *Id.* at 16; Ex. 1066, 1:64–66; Ex. 1067, 1:61–62; Ex. 1025, 76. Patent Owner admits that a triolein-based stain is encompassed by a “fingerprint” of the claims. Tr. 53:5–54:8.²⁹ The evidence supports, and we find, that hydrolysis of triolein by a lipase necessarily produces oleic acid and glycerol. *See, e.g.*, Ex. 1027, 1:18–31, 8:51–67; Ex. 1012 ¶ 43; Ex. 1044 ¶ 87. And, as demonstrated by Petitioner, the lower molecular weight decomposition

²⁸ This well-known lipase activity on, for example, triglycerides, happens to be the same hydrolytic reaction that the ’717 patent describes (i.e., triglycerides and wax esters have a structure in which fatty acids are bound by ester bonds that are hydrolyzed by a lipase, thus decomposing the lipids into lower molecular weight fatty acids). Ex. 1001, 2:62–67, 3:16–24.

²⁹ As noted above, the ’717 patent states that triglycerides are “the main component” of fingerprints, and uses “triolein” in examples to demonstrate decomposition. *Supra* Section III(C)(ii); Ex. 1001, 9:5–21.

products, particularly oleic acid, will have a much lower boiling point (and thus higher volatility) than the triglyceride/triolein starting material in the stain. Pet. Reply 16–17 (citing Ex. 1069, 159, Table 2; Ex. 1070, 3); Ex. 2032 ¶ 12 (Dr. Kolowski testifying that boiling points are commonly used to compare volatilities). Patent Owner provides no persuasive rebuttal argument or evidence that a triolein stain will behave in any way other than the manner described by Petitioner when exposed to a lipase, such as in Wang’s enzymatic coatings.

Petitioner also contends that lower molecular weight decomposition products will have higher volatility, and consequently will vaporize from a surface more quickly than the higher molecular weight starting material. Pet. 21; Ex. 1012 ¶¶ 33–55. Petitioner cites Buchanan in support. Pet. 21; Pet. Reply 18–19. Buchanan relates to a study on the disappearance of fingerprints left by adults and children. Ex. 1014, *passim*. According to Buchanan, “samples obtained from children contained higher levels of relatively volatile free fatty acids.” Ex. 1014, 89. Buchanan discloses that “fingerprints of children disappear from surfaces more quickly than those of adults,” which adult samples “were found to have higher concentrations of less volatile long chain esters of fatty acids.” *Id.* at 89, Fig. 3 (depicting a typical long-chain ester (from an adult sample) and a typical carboxylic acid (from a child sample)); *see also id.* at 91 (“The lower levels of higher molecular weight, less volatile materials in children’s fingerprints could explain the disappearance of fingerprints from crime scenes.”).

We are unpersuaded on this trial record that Buchanan shows that fingerprint lipids, once decomposed, will *necessarily* vaporize and disappear more quickly from a surface. As Patent Owner point outs, Buchanan offers a hypothesis on why certain fingerprints, having a greater proportion of

more volatile fatty acids, disappear faster from surfaces, but did not confirm whether that was the cause of such disappearance. PO Resp. 28; Ex. 2033 ¶¶ 142–143. Moreover, even accepting that lower molecular weight fatty acids (observed in the fingerprints of children as reported by Buchanan) are more volatile and susceptible to disappearance from a surface, Buchanan does not experimentally confirm that such lipids are the same as would be produced by enzymatic breakdown of the longer-chain, less volatile esters in adult fingerprints. PO Resp. 26 (“Buchanan failed to confirm this hypothesis by determining if the same effect was observed with the same long chain carboxylic acids that were observed in the adult fingerprints”); Ex. 2033 ¶¶ 142–143 (“This leaves open the explanation for the qualitative observation that child fingerprints behave differently from fingerprints of adults.”).

Claim 1 of the ’717 patent, however, does not recite that the fingerprint must “vaporize” from the coated surface.³⁰ As discussed above (Section III(C)), the claimed “anti-fingerprint” functionality encompasses a coating that is capable of actively reducing transfer of a fingerprint or decomposing a fingerprint transferred to a surface of the coated substrate. Accordingly, notwithstanding Buchanan’s shortcomings in evidencing inherent vaporization of enzymatically decomposed fingerprint components, we are unpersuaded this is fatal to Petitioner’s challenge. Rather, for

³⁰ The assertions on “vaporizing” components likely arose from Petitioner’s efforts to compare the claims challenged here with those in the Toyota IPR, which claims included a step of “facilitating the removal of a fingerprint by *vaporization* from the lipase associated substrate or coating when contacted by a fingerprint.” See Paper 8, 29 n.22 (reproducing claim 1 of the patent challenged in the Toyota IPR) (emphasis added).

reasons explained above, and given the overlap in the methods and coatings disclosed and claimed in the '717 patent and those in Wang, we find that Wang's lipase coatings inherently possess an anti-fingerprint property—that is, they would as a natural result necessarily be capable of enzymatically decomposing fingerprint lipids, including the triolein-based stains encompassed by a “fingerprint,” in the same way as the '717 patent discloses hydrolyzing and decomposing such stains with a lipase-coated substrate.³¹

From the standpoint of how the '717 patent broadly describes and claims forming the anti-fingerprint coating on a substrate, and Wang's “self-cleaning,” lipase-coated substrates, we find that the resulting coated substrates are materially indistinguishable, at least as to their capability to enzymatically decompose fingerprint stains as required by the “anti-fingerprint coating” of claim 1. Paper 8, 35; Pet. Reply 22. We explain below.

Wang discloses that the coated surfaces may be plastic or glass. *See, e.g.*, Ex. 1004 ¶¶ 4–6, 40, claim 14. The '717 patent's claim 1 recites that the substrate is plastic or glass, but the Specification discloses that the invention is applicable to “any type” of substrate or product. Ex. 1001, 4:7–

³¹ At oral argument, Patent Owner conceded that Wang discloses decomposing stains with a lipase and, if its proffered claim interpretation was not accepted, that Patent Owner would need to rely on its proposed substitute claims (which recite, *inter alia*, reduced fingerprint transfer, etc.). Tr. 43:7–45:12 (Judge Bonilla: “[I]n Wang they talk about removing a stain and if you're going to remove a stain using a lipase, wouldn't that necessarily decompose through the lipase action? [PO counsel]: I think that we would agree that it would involve a decomposition step. Judge Bonilla: So your position is it would decompose, it just wouldn't do the other thing [e.g., reduced transfer] that you're saying is in the claim? [PO counsel]: That's correct.”).

9, 6:55–61. Wang discloses the use of lipases to “hydrolyze fats and oils” through an “‘automatic’ enzymatic degradation reaction.” Ex. 1004 ¶¶ 17, 29, 30, 42 (Table 1). Claim 1’s enzyme reads on a lipase, the patent describes a lipase as the quintessential lipolytic enzyme, and discloses that “any type of lipase may be used.” Ex. 1001, 3:16–28, 9:37–55, claim 2. And, the patent explains that the action of the lipase is hydrolyzing ester bonds in lipids, particularly triglycerides and wax monoesters found in fingerprints, thus decomposing the lipids into lower molecular weight byproducts. *Id.* at 2:55–67, 3:16–28, 9:5–20. Wang discloses that the digestive enzymes can be immobilized to substrates (plastic or glass), creating an enzymatically-active coating, by covalent bonding, adsorption, and “entrap[ing]” the enzyme in a coating. Ex. 1004 Abstr., ¶¶ 18–20, 40, 42–44. Similarly, the ’717 patent describes and claims that the “enzyme may be introduced to the surface of the substrate by adsorption, covalent bonds or encapsulation,” but explains that those immobilization techniques are not limits on the invention, and “thus any method known in the art will be used.” Ex. 1001, 4:24–30, claim 5. The record, thus, demonstrates a substantial correspondence in the structure, formation, and activity of Wang’s coatings and those of the ’717 patent.

Wang does not mention a “fingerprint” by name. But that does not defeat a finding of inherency here. Wang need not have expressly described use of its coatings to decompose “fingerprints” for that property to be inherent in an obviousness context. Nor does Patent Owner’s description—even discovery—of an “anti-fingerprint” benefit with lipase-coated substrates automatically confer patentability. To the contrary, “[i]t is not invention to perceive that the product which others had discovered had qualities they failed to detect.” *Gen. Elec. Co. v. Jewel Incandescent Lamp*

Co., 326 U.S. 242, 249 (1945); *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981) (“[M]ere recitation of a newly discovered function or property, inherently possessed by things in the prior art, does not distinguish a claim drawn to those things from the prior art”); *In re Wiseman*, 596 F.2d 1019, 1023 (CCPA 1979) (rejecting position that “a structure suggested by the prior art, and, hence, potentially in the possession of the public, is patentable . . . because it also possesses an inherent, but hitherto unknown, function which [a Patent Owner] claim[s] to have discovered. This is not the law. A patent on such a structure would remove from the public that which is in the public domain by virtue of its inclusion in, or obviousness from, the prior art.”).

On this record, we find Wang’s coatings would, as a natural result, have an “anti-fingerprint” property as recited in claim 1. In short, compared to the ’717 patent, Wang teaches the same substrates (e.g., plastic), the same enzymes (lipase), the same chemical activity (hydrolytic decomposition of lipids by the lipase), and the same ways for treating the substrate with the enzyme to functionalize its surface (e.g., covalent bonding between enzyme and substrate). And, the ’717 patent dispels the notion that any particular “treatment,” beyond what is broadly recited in claim 1, is necessary or critical to obtaining a coating with the “anti-fingerprint” property. Pet. Reply 22–23; Ex. 1004, 4:24–30. Hence, we find that Wang’s coatings necessarily would, when contacted with triglycerides and wax monoesters, provide “self-cleaning,” as also described in the ’717 patent. Ex. 1004 ¶¶ 2, 5; Ex. 1001, 1:17–23, 57–60. Wang discusses lipase’s known and characteristic hydrolysis of the ester bonds and teaches the use of lipase coatings to hydrolyze and decompose oil and fat-based stains. *See, e.g.*, Ex. 1004 ¶¶ 15, 17, 42; Ex. 1012 ¶ 43.

In the case of a stain comprising a substantial triolein component that is transferred by a hand to a coated surface, which Patent Owner concedes is a “fingerprint,” Petitioner persuades us that Wang’s lipase-coatings would necessarily hydrolyze and actively decompose the triolein to produce lower molecular weight and more volatile fatty acids (oleic acid), i.e., decompose at least one type of fingerprint. *See* Pet. Reply 14–17 (citing, for example, Ex. 1012 ¶ 43; Ex. 1027, 8:51–67; Ex. 1067 1:19–21). We are unpersuaded more is needed to show that Wang discloses, expressly or inherently, a method for forming a coating with an “anti-fingerprint” property as claimed.

Patent Owner argues inherency cannot be shown because lipases will not inevitably decompose fingerprint lipids. PO Resp. 20–21. Patent Owner contends that Petitioner’s declarant admits that lipases are capable of not only breaking the ester bond found in certain lipids, but also creating such bonds. *Id.* at 20 (citing Ex. 2022, 46:3–17). The cited testimony, however, simply refers to a catalyzed chemical reaction at equilibrium. Ex. 2022, 46:3–17. The record makes it clear, when exposed to a fingerprint stain that includes a substantial amount of ester-bond containing lipids like triglycerides and wax esters, a lipase hydrolyses those lipids and produces fatty acids according to the well-known and characteristic activity of a lipase enzyme—just as explained in the ’717 patent and throughout this record. Ex. 1001, 3:17–28; Ex. 1012 ¶¶ 41–44; Ex. 1023; Ex. 1027, 1:22–24 (“lipases function to hydrolyze the triacylglycerols [i.e., triglycerides] to yield free fatty acids and glycerol”). The evidence, therefore, is consistent with our finding that Wang’s lipases coatings necessarily would behave as an “anti-fingerprint coating” as recited in claim 1, i.e., decompose a fingerprint stain that has a substantial triolein/triglyceride component.

Patent Owner also argues that Petitioner wrongly assumes that fingerprint lipids are only triglycerides or other ester-bond containing molecules on which a lipase would act. PO Resp. 21. According to Patent Owner, that is not so. *Id.* Fingerprints may, for example, include squalene or cholesterol. *Id.* (citing Ex. 1021, Table A.1). Because those lipids do not have an ester bond, Patent Owner contends they would not be affected by a lipase. PO Resp. 21–22.

This argument does not, however, undermine a finding of inherency. As explained previously, the '717 patent, and claim 1 specifically, do not *require* any enzymes beyond a lipase and no unique “treatment” is disclosed as necessary to attach the enzyme to the substrate. *Supra* Section II(A). Indeed, the patent describes and exemplifies coatings where a lipase is the only enzyme used. Those lipase-only coatings, while not limiting, are encompassed by the scope of claim 1. *See* Ex. 1001, 10:62–63 (dependent claim 2 reciting “wherein the lipolytic enzyme is a lipase”). That being the case, by Patent Owner’s own argument, the lipase-only coatings described, exemplified, and claimed in the patent would not decompose, for example, the squalene or cholesterol components of a stain because those lipids have no ester bonds. That Wang’s lipase coatings may be similarly incapable of decomposing non-ester-bond-containing lipids is not decisive.

Patent Owner contends inherency cannot be shown because lipid decomposition products are not inevitably more volatile. PO Resp. 22–23. According to Patent Owner, Petitioner’s declarant admits to exceptions to the rule about decomposition products being more volatile. *Id.* at 22; Ex. 2022, 21:2–13 (“Q: So there’s not a universal rule that a decomposition product will have a higher volatility? A. No, there’s a correlation, which is generally true, but there are exceptions.”). And, as evidence of such

exceptions, Patent Owner identifies tripalmitin and glycerol monostearate as ester-bond-containing lipids, which Patent Owner argues would produce lower molecular weight but *less volatile* byproducts if hydrolyzed by lipase. *Id.*; Ex. 2032 ¶¶ 12, 15.

This argument is similarly unavailing. We credit Patent Owner’s evidence as demonstrating that exceptions exist, and that some lipids, even when decomposed by a lipase, will produce less volatile byproducts. But an inability to produce more volatile compounds by decomposition in those instances with those lipid starting materials is a limitation that would also inhere in the lipase-only coatings that are described in the ’717 patent and covered by claim 1. In other words, Patent Owner argues that for Wang to be relevant to the obviousness inquiry, Wang’s lipase coatings must have a capability that coatings recited in claim 1 would not possess. Patent Owner directs us to no authority that compels such a paradoxical result. And, for reasons explained above, we conclude that Wang’s lipase coated substrates would, as a natural result, behave in the same manner as the lipase-only coatings of the ’717 patent—provide an “anti-fingerprint” decomposing property—upon contact with a fingerprint stain comprising, for example, triolein as a major lipid component.

Patent Owner maintains it is not enough to show that the anti-fingerprint coating is only sometimes present because inherency cannot be established by possibilities or probabilities. PO Resp. 19–20; *Cont’l Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1269 (Fed. Cir. 1991); PO Sur-Reply 15–16. The legal principle that inherency cannot be based on mere possibilities is settled; it is, however, not decisive here because our findings as to Wang do not rest on such possibilities. We find that Wang discloses forming lipase coated substrates according to the steps of claim 1,

and that Wang's coated surfaces would necessarily provide an "anti-fingerprint" property as claimed against at least some fingerprints (i.e., triolein-based) for reasons already discussed.

We find, therefore, that the prior art discloses at least one species of coated substrate inherently having an "anti-fingerprint coating" within the genus of coatings formed according to claim 1's method. Wang's coatings need not possess an "anti-fingerprint" decomposing property that acts against all conceivable components of a fingerprint in light of the breadth of claim 1. As discussed above, by Patent Owner's own argument, the lipase-only coatings described in the '717 patent and encompassed within the scope of claim 1 likewise would not decompose all conceivable components of a fingerprint.

Inherency does not require the prior art's disclosure be coextensive with and mirror claim 1's full scope. Claim 1 may cover methods of forming coatings that are capable of decomposing an even broader range of fingerprints compared to Wang.³² But that does detract from our finding that the art discloses at least one species of anti-fingerprint coating embraced by claim 1. *Cf. Toro Co. v. Deere & Co.*, 355 F.3d 1313, 1321 (Fed. Cir. 2004) (holding, in context of inherent anticipation, that "the [prior art] must have sufficiently described and enabled at least one embodiment that necessarily featured or resulted in the subject matter embraced by" the claim).

³² For example, the '717 patent suggests that a "lipolytic enzyme" may be selected to hydrolyze other fingerprint lipids like squalenes or cholesterol (lipids without ester bonds), though the patent does not specifically identify such lipolytic enzymes. Ex. 1001, 3:12–33.

Patent Owner cites *Asphalt Products Unlimited, Inc. v. Blackledge Emulsions, Inc.*, IPR2017-01241, Paper 64 (PTAB Oct. 23, 2018) (hereafter “*Asphalt Prods.*”)), yet that case does not demonstrate that inherency cannot be shown on the present record. PO Resp. 19 (citing *Asphalt Prods.* at 17–18). The invention in *Asphalt Prods.* related to use of a “tack coat” in a process of laying pavement. *Asphalt Prods.* at 8–9. The claims recited a “method for bonding a layer of asphalt pavement material” and included the disputed limitations of “an emulsified composition” including an “asphalt composition selected to provide a coating” with certain key parameters, in particular, “a penetration value less than about 20 dmm” and “a softening point greater than about 140°F. (60° C)” when cured. *Id.* at 8–9. The Board rejected the inherent anticipation challenge because, based on the evidence there, the prior art did not disclose a cured tack coat that necessarily met both parameters: a penetration value less than 20 dmm, and a softening point above 140° F. *Id.* at 17–18.

In that case, the Board observed the basic tenet that, if a recited property is only “likely” present in the prior art, that is not enough to show inherency. *Id.* (“Petitioner’s evidence tends to show that Pasquier’s asphalt emulsion, when cured, would **likely** exhibit penetration value and softening point within the claimed range, but does not establish that it would **inevitably** have those characteristics.”). That, however, does not contradict our finding that Wang’s coatings would, through a disclosed and well-defined lipase action, necessarily hydrolyze and decompose fat- and oil-based stains including, in particular, triolein stains encompassed by claim 1’s “fingerprint.”

Analogizing the breadth of a “fingerprint” to the ranges of the key parameters recited in the claims of *Asphalt Prods.*, the petitioner’s challenge

in that case did not fail because the art lacked an inherent disclosure of coatings with properties spanning the *entirety* of those claimed ranges. Rather, the Board was looking for at least one instance in the art where the tack coat would have necessarily possessed the rheological properties *within* the recited ranges. *Id.* at 18 (citing a table describing “typical” properties, and finding the “table does support that a typical 10/20 grade asphalt would have a softening point within the claimed range, but this is yet further evidence of what is typical or likely, not what is necessarily present”). Here, the preponderance of the evidence indicates that Wang’s lipase coatings would necessarily provide an “anti-fingerprint” property against at least some stains within the scope of a “fingerprint” of claim 1.

Before oral argument, Patent Owner submitted a citation to *Trintec Industries, Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292 (Fed. Cir. 2002) as allegedly being relevant to whether inherency can be established if a prior art coating necessarily provided an anti-fingerprint property against at least one type or species of “fingerprint” as claimed. Paper 42, 2; Tr. 54:1–56:10. The inherency issue in *Trintec* turned primarily on claim construction. The invention there related to methods of creating graphic instrument faces (such as on a clock face) and the relevant claim recited, *inter alia*, using a “color photocopier” in various steps. *Trintec*, 295 F.3d at 1294–95. The district court construed “color photocopier” as merely a “color printer” and, because the district court found that a prior art catalogue inherently disclosed use of a “color printer” to produce the color pictures/logos that the catalogue described, granted summary judgment on anticipation. *Id.* at 1295. But the Federal Circuit disagreed, explaining that a “color photocopier” was structurally and functionally distinct from a “color printer.” *Id.* at 1295–96 (holding “a color printer is not a color photocopier”). Having interpreted the

claims as requiring something different from, and more than, simply a “color printer,” the Federal Circuit reversed on anticipation because the catalogue did not disclose (expressly or inherently) a color photocopier. *Id.* at 1296.

Here, however, Patent Owner is not urging an interpretation of “fingerprint” that excludes the types or species of fingerprint that we find would be decomposed by Wang’s lipase-coated substrates. Patent Owner admits that a triolein stain transmitted by a hand is encompassed by a “fingerprint” as recited in the challenged claims. If anything, Patent Owner’s unrestricted interpretation of “fingerprint” would cover triolein stains but also essentially any type of contaminant that a hand could transfer. *See* PO Sur-Reply 15.³³ As for the conclusion Patent Owner sought to draw from *Trintec* at oral argument (Tr. 54:1–17) about a coating that decomposes triglycerides but not squalene in a hypothetical fingerprint, and such a coating not inherently providing an “anti-fingerprint” function, we disagree. We cannot square Patent Owner’s conclusion with the fact that the patent’s lipase-only coatings (described as “anti-fingerprint coatings” within the scope of the challenged claims) would similarly be capable of decomposing triglycerides but also incapable of decomposing squalene.

For all the above reasons, we find that the preponderance of the evidence demonstrates that all the elements of claim 1 are disclosed, expressly or inherently, in Wang.³⁴

³³ Patent Owner argues “cosmetics” can make up a substantial portion of a “fingerprint” stain. PO Sur-Reply 15. But Wang identifies “cosmetics” explicitly as among the stains for self-cleaning by a lipase (Ex. 1004 ¶ 42 (Table 1)), even if silent on how such stains are transferred to a surface.

³⁴ Patent Owner separately argues Wang does not disclose all claim 1’s limitations, if construed according to Patent Owner’s proposals. PO Resp. 38–41 (asserting, for example, “[n]othing in Wang suggests . . . its

b. Expectation of an “anti-fingerprint coating”

We turn to whether the skilled artisan would have expected an “anti-fingerprint” property in Wang’s lipase-coated substrates. *Cf. Honeywell*, 865 F.3d at 1354–55 (“What is important regarding properties that may be inherent, but unknown, is whether they are unexpected.”). Our findings on that issue track, to some degree, those already discussed above.

Based on the evidence before us, we are persuaded that a person of ordinary skill in the art would have expected that Wang’s lipase-coated substrate necessarily would have been capable of decomposing triglyceride-based oil stains transferred by part of a hand. Ex. 1012 ¶¶ 45–47 (opining that “it would be an inherent property of a lipase immobilized on a surface of a substrate from glass, plastic or fabric to degrade a triglyceride based oil stain”); *see also id.* ¶ 48 (“[I]t is unsurprising and expected that a lipolytic enzyme such as a lipase would degrade lipid and ester components of a fingerprint”). The evidence demonstrates that one would have understood that it was the characteristic, indeed definitional, activity of lipases—hydrolyzing ester bonds in lipids, such as triglycerides, to yield lower molecular weight byproducts. Ex. 1023; Ex. 1027, 1:22–24 (“lipases function to hydrolyze the triacylglycerols [i.e., triglycerides] to yield free fatty acids and glycerol”), 3:55–60 (describing plastic surfaces that may be modified with a lipase to provide oil-removal properties)); Ex. 1004 ¶ 17 (“lipases which hydrolyze lipids and fats”); Ex. 1012 ¶¶ 41–44, 52; Pet. 20–21; Pet. Reply 16–17. It is that very enzymatic ability to decompose lipids

coatings inherently reduce [fingerprint] transfer”). Because we did not agree with Patent Owner’s proposed constructions (*supra* Section III(C)), Patent Owner’s arguments are unavailing.

that Wang discloses and relies upon as a feature of its lipase coatings to provide for “self-cleaning” of oil- and fat- based stains. Ex. 1004 ¶¶ 4–6, 15, 17, 41.

We find that the skilled artisan, with knowledge that fingerprints contain a substantial lipid component, would have expected lipases, such as in Wang’s self-cleaning coatings, to decompose ester-bond-containing fingerprint lipids. Ex. 1012 ¶ 45; Ex. 2001 ¶ 54; Pet. 18–19. The ’717 patent discloses that “*it has been known* that the main cause leaving [fingerprint] stains on an appearance of a product such as an electronic device is sebum, which is composed of lipids including triglycerides, wax monoesters,” among other lipids. Ex. 1001, 2:55–60 (emphasis added) (citing a publication related to cosmetics); Pet. 7–8. And, the prior art confirms that sebum, which is routinely transferred to and from the hands, comprises lipids, especially triglycerides and wax esters. *See, e.g.*, Ex. 1025, 61, 74, 76, 81–82, 86 (describing sebum as including substantial amounts of triglycerides (e.g., 30–40%) and wax esters (e.g., 20–25%)), 90 (“compounds typically found in print residue, including cholesterol, triglycerides, fatty acids, wax esters, cholesterol esters”);³⁵ Pet. Reply 16–17.

³⁵ *See also* Ex. 1021, 2 (“Prior experiments conducted in the laboratory indicated that *the nature of normal fingerprints include a fair amount of sebaceous secretions*, so long as the individual has not recently washed their hands, and had presumably engaged in touching of other parts of the body which have sebaceous glands. . . . The *touching of the face is such a typical behavioral phenomenon* that this was included in order to create fingerprint transfers which were laden with *normal sebaceous secretions*.”) (emphases added); Ex. 2001 ¶ 82.

The claims do not require that the decomposed lipid byproducts be more volatile, nor that such byproducts will vaporize and disappear from a surface. We, nevertheless, further find that a skilled artisan would have reasonably expected that, by enzymatically decomposing triglycerides and wax esters in the fingerprint stain, the lower molecular weight reaction byproducts would exhibit greater volatility. The general rule about lower molecular weight byproducts showing greater volatility is supported by evidence in this trial record and, as explained above, we find the rule is followed and would have been expected with a lipase decomposing, at minimum, triolein to produce oleic acids. Ex. 1012 ¶¶ 36, 54; Ex. 1069, 159, Table 2; Ex. 1070, 3; Ex. 2032 ¶ 12; Ex. 1044 ¶¶ 87–88; Ex. 2022, 21:2–13 (Dr. Rozzell testifying on the general correlation); *see also* Pet. Reply 17 (“Mong’s GC retention time data [showing longer retention times for wax esters compared to, e.g., oleic acid] clearly shows that fingerprint constituent components do follow the rule – decomposition products exhibit higher volatility than the compound from which they are decomposed”); Ex. 1021, Table A.1.³⁶

Dr. Rozzell, further citing Buchanan among other evidence, testifies that lower molecule weight, more volatile, lipid components in a fingerprint will vaporize from a surface over time, even without enzymatic decomposition. Ex. 1012 ¶¶ 33–34, 53–55; *see also id.* ¶¶ 35–36 (citing

³⁶ Patent Owner’s alternative theory for the retention times (PO Sur-Reply 17–18), as possibly related to “affinities” with the GC column, in our view, does not outweigh Dr. Rozzell’s interpretation of Wong as being consistent with and illustrating the tendency for decomposition products to have higher volatility, and as supporting an expectation of such volatility. Ex. 1044 ¶¶ 87–88, 90.

Mong (Ex. 1021) as disclosing that children’s fingerprints include higher levels of “volatile” fatty acids); Ex. 1014, 91; Pet. 20–21; *see also* Ex. 1026 (“This study showed children’s fingerprints . . . had less non-volatile components, such as long chain fatty acid esters, than adult fingerprints.”). With a lipase, Dr. Rozzell testifies that one would have predicted that fingerprint lipids containing ester bonds would be decomposed to lower molecular weight byproducts (e.g., fatty acids) through the expected enzymatic action, and be more easily vaporized from a surface owing to the generally more volatile nature of the byproducts. Ex. 1012 ¶¶ 40–43, 49–55 (“Because these lower molecular weight breakdown products have generally greater volatility, this would naturally lead to an expectation of their more rapid disappearance by vaporization.”).

For the reasons explained above, the claims do not require or recite “disappearance by vaporization,” and therefore such a result need not have been “expected” as a claimed feature. *Intelligent Bio-Systems Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016) (holding that the correct inquiry is “a reasonable expectation of achieving what is claimed in the patent-at-issue”).³⁷ That aside, although we did not agree that Buchanan showed that disappearance by vaporization was *inherent* on this record, when considered with all the evidence, we find persuasive Petitioner’s argument and Dr. Rozzell’s testimony that production of

³⁷ Patent Owner does not argue the claims are patentable for any particular “unexpected results” (objective indicia of nonobviousness). In its Preliminary Response, by contrast, Patent Owner did argue specific, alleged “unexpected and surprising results.” Prelim. Resp. 42–43. We addressed in the Institution Decision why we found that argument unavailing. Paper 8, 40–41. Patent Owner did not make that argument in its Patent Owner Response, so it is waived and not considered here. Paper 9, 5.

generally more volatile byproducts (fatty acids) by lipolytic decomposition (as disclosed in Wang) would have been expected to increase the tendency for those byproducts to evaporate from a surface.

We find that Buchanan supports this tendency for more volatile lipids (e.g., fatty acids) to evaporate from a surface, and it need not speak to decomposition of ester-bond-containing fingerprint lipids by a lipase, because that is taught by other prior art and evidence of record. Ex. 1014, 91 (“lower molecular weight, volatile carboxylic acids . . . would tend to evaporate from the surface,” but “the alkyl esters . . . would remain on the surface longer.”); *see, e.g.*, Ex. 1004 ¶¶ 17, 41; Ex. 1027, 1:22–24. As Dr. Rozzell testifies, Buchanan teaches that fingerprints with a higher proportion of fatty acids, which Buchanan describes as more volatile, disappeared from a surface faster than those that did not. *See, e.g.*, Ex. 1012 ¶ 34 (“The author found that when fingerprints [with more volatile fatty acid components] were subjected to mild heating . . . , the rate of their disappearance was faster . . . as would be expected from a vaporization mechanism”); Ex. 1014, 91 (“This difference in the content of these lipids may account for the observed differences in the disappearance of latent fingerprints from surfaces.”). In those respects, we find the skilled artisan would reasonably expect more volatile decomposition products, such as oleic acids produced when Wang’s lipase-coatings hydrolyze triglyceride-based stains, to evaporate more quickly than undecomposed, less volatile triglycerides (e.g., triolein). This finding further indicates that the skilled artisan would have expected Wang’s lipase-coatings, when placed on a substrate such as plastic or glass, necessarily to be capable of decomposing fingerprint stains containing lipids.

Patent Owner asserts that it was unknown before the '717 patent that an anti-fingerprint coating could be obtained by treating glass or plastic substrates with a lipolytic enzyme. PO Resp. 29–30 (asserting that any expectation is based on hindsight). Patent Owner contends that Wang does not suggest that immobilized enzyme compositions will have the “unknown” anti-fingerprint characteristic and that no expectation of it is supplied by Wang. *Id.* at 30–31. According to Patent Owner, Wang is aimed at a different problem (i.e., difficult to remove stains) and the similarities in Wang’s coatings and those in the '717 patent are exaggerated. *Id.* at 31–32; PO Sur-Reply 21–22 (arguing that processing differences can lead to different properties). Moreover, Patent Owner contends, Wang “always utilizes a water-rinsing step to remove the decomposition products produced by its immobilized enzyme.” PO Sur-Reply 23; PO Resp. 31–32.

We do not agree with Patent Owner’s contentions. Wang does not explicitly mention “fingerprints” as already discussed. Nevertheless, Wang teaches explicitly that lipases can be used to form “self-cleaning” coatings that will hydrolyze and decompose fat- and oil-based stains—the same enzymatic action by which the '717 patent’s lipase coatings are said to be capable of decomposing oils and fats (i.e., triglycerides and wax esters) in sebum. Ex. 1001, 2:55–67, 3:16–24. This comparison is not hindsight. It is, rather, just the known and expected enzymatic action of lipases, and the recognition of substantial ester-containing compounds (e.g., triglycerides) that appear in oils, fats, and sebum specifically. Ex. 1027, 1:22–24; Ex. 1067, 1:61–62; Ex. 1044 ¶¶ 14, 16, 27–31, 33, 87–90; Ex. 1025, 61, 74, 76, 81–82, 86, 90. There is little basis on this record to find that the skilled artisan would not have expected Wang’s lipase-coated substrates to enzymatically decompose triglycerides and wax monoesters in a stain

(whether transferred by a hand or otherwise) by the same action reported in the '717 patent. To conclude otherwise ignores the mechanism by which Wang teaches its “‘automatic’ enzymatic degradation reaction” works to reduce and eliminate stain contaminations. Ex. 1004 ¶¶ 5, 15, 17, 42.

Patent Owner contends the similarities between Wang and the '717 patent's coatings are overstated. PO Sur-Reply 22. But this contention hinges on considering only some of Wang's teachings compared with one working example cited in the '717 patent. Ex. 1045, 125:23–126:22 (re-direct of Dr. Cairns comparing Example 1 of the '717 patent and Example 3 of Wang); *see also* Ex. 2036 ¶¶ 27–29 (same). The prior art's teachings are not, however, limited to only preferred embodiments. *Merck & Co. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807 (Fed. Cir. 1989) (holding that all disclosures in the art, even unpreferred embodiments, must be considered in an obviousness inquiry). Neither are the disclosures of the patent so limited—as the patent states expressly. Ex. 1001, 7:48–49 (“[T]he present invention is not limited to these examples.”); *see also id.* at 4:24–30.

Patent Owner contends that Dr. Rozzell admits to differences in Wang's and the '717 patent's methods, which can lead to differences in the coatings' properties. PO Sur-Reply 22 (citing Ex. 2035, 113:7–11). As Dr. Rozzell clarified, however, the “differences” arise from a comparison of some examples only. Ex. 2035, 113:7–17 (“A Well, just – in his explicit examples – Q Sure. Okay. A – the language is directed towards other methods that could also be employed to create similar materials”).

Moreover, even if there are some differences in the ways in which the enzymes are immobilized to substrates in those examples,³⁸ the notion that Wang’s lipase coatings would be incapable of hydrolyzing oils and fats (i.e., triglycerides) by reason of those differences is inconsistent with Wang’s teachings and objective. *See, e.g.*, Ex. 1004 ¶¶ 35–36 (“A layer of digestive proteins delivers enough coverage and digesting activity even though the digestive proteins may be randomly arranged on a surface”). Indeed, there is no persuasive evidence here to support a conclusion that Wang’s coatings would not enzymatically decompose such lipids in a stain in essentially the same manner as the lipase-only coatings in the ’717 patent. Ex. 2036 ¶¶ 27–30 (Patent Owner’s declarant citing a possible effect on the ability to “reduce the transfer of a fingerprint” through the allegedly different processing steps, but no mention of any effect on decomposition).

Patent Owner contends that Wang does not describe stains as being vaporized from a surface, and requires manual cleaning to remove the stain. PO Resp. 31–32. Patent Owner is correct that Wang does not mention “vaporization.” To the extent expectation of such an (unclaimed/unrecited) action for certain stain components is needed, however, it is supplied by other evidence discussed above. In addition, evidence before us does not indicate that Wang necessarily requires water rinsing or wiping to provide its “self-cleaning” as a way to reduce or eliminate stains. *See, e.g.*, Ex. 1004 ¶ 5 (“catalytic activity of the digestive proteins enables *ongoing self-*

³⁸ Example 3 of Wang adds the enzyme by covalent bonding through spin-coating (creating three layers that include the enzyme) whereas Example 1 of the ’717 patent adds the enzyme by covalent bonds through dipping, and both methods use glutaraldehyde as a cross-linking agent. *Compare* Ex. 1001, 7:50–8:4, *with* Ex. 1004 ¶ 43.

cleaning to reduce and eliminate stain contaminations” according to the “mainly enzymatic” action of the digestive proteins (e.g., lipase)) (emphasis added); Pet. Reply 23–24 (explaining why such an interpretation is inconsistent with Wang’s disclosures). Dr. Kolowski, Patent Owner’s declarant, cited instances where rinsing is noted in Wang, but acknowledged that Wang does not describe rinsing as mandatory. Pet. Reply 24 (citing Ex. 1046, 85:3–10); *see, e.g.*, Ex. 1004, dependent claim 7 (reciting that a decomposed end product of the stain is removable by water rinsing); Ex. 2022:86:20–87:23 (Dr. Rozzell, testifying that rinsing is described in a sampling procedure).

Inasmuch as Patent Owner further contends that the “supplementary” references do not advance the evidence in support of an expectation of an “anti-fingerprint” property with Wang’s coatings, this contention is unavailing. PO Resp. 34–36. That, for example, Buchanan and Asano may relate to forensic study of fingerprint components (and not enzymatic decomposition, specifically) does not detract from their teachings and contribution to the body of knowledge possessed by the skilled artisan.³⁹ *Id.* (arguing the references “seek[] to visualize fingerprints” on surfaces and “do not address enzymes or coatings of any kind”). To the contrary, those references are very much the type of evidence one would be aware of and/or consider based on Patent Owner’s own proffered description (which we

³⁹ Mizusawa, which Patent Owner also criticizes, is relevant, at minimum, to further evidence that lipases will (and would have been expected to) hydrolyze triglycerides and remove oil-based stains, even if Mizusawa applied that knowledge preferably in laundering applications. PO Resp. 36–37; Ex. 1027 Abstr., 1:18–37, 2:16–20, 3:48–55 (teaching that lipases can be immobilized on fabrics, but also “glass, plastic, and metal[s]” to remove, retard, or prevent oil stains).

adopted) of the skilled artisan’s qualifications as including expertise with “fingerprints, including their components and how they are deposited or behave on surfaces.” Ex. 2001 ¶ 22; Ex. 2033 ¶ 26; Paper 8, 12–13; *see supra* Section III(B); *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985) (explaining that the skilled artisan “is presumed to be aware of all pertinent art”).

For all the reasons explained above, we find that the skilled artisan would have expected Wang’s lipase coated substrates to exhibit an “anti-fingerprint” property as claimed. We conclude, based on a preponderance of the evidence on this trial record, that Wang discloses all of the limitations of claim 1, either expressly or inherently, and that the skilled artisan would have had sufficient reason to form Wang’s lipase-coated substrates as proposed with a reasonable expectation of success in arriving at the claimed subject matter.

2. *Dependent claims 2, 3, and 5*

Petitioner argues that Wang teaches or suggests the limitations that dependent claims 2, 3, and 5 add, respectively, to claim 1. Pet. 29, 31; Ex. 1012 ¶¶ 114–121. Claim 2 adds that the lipolytic enzyme is a lipase; claim 3 depends from claim 2 and requires at least one additional enzyme (e.g., protease); and claim 5 adds that the enzyme of claim 1 is introduced by adsorption, covalent bonding, or encapsulation. Ex. 1001, 10:63–67, 11:6–8. Patent Owner’s arguments on claim 1 are addressed above, and Patent Owner did not provide additional argument during trial related to the dependent claims.

For the reasons recited in the Petition, with which we agree and adopt here, we determine that Petitioner has shown by a preponderance of the evidence that Wang teaches or suggests all the limitations of claims 2, 3, and

5, and that the skilled artisan would have combined Wang's disclosures with a reasonable expectation of success. Pet. 29, 31; *See* Ex. 1004 ¶¶ 4–6, 17–19 (attachment by covalent bonds), 30 (use of proteases and lipases), 33, 42–44; Ex. 1012 ¶¶ 46–48, 51, 56–81, 114–121. For example, in relation to dependent claim 3, Wang teaches that interior surfaces or coatings of an automobile may be easily stained with proteins and oils, and suggests that proteases (which hydrolyze protein molecules) may be used in addition to lipases to reduce and eliminate such stains through a self-cleaning action. Ex. 1004 ¶¶ 4–5, 17, 30, 42. Thus, having considered the argument and evidence on this trial record, we conclude that claims 2, 3, and 5 are unpatentable over Wang.

F. Other Wang Combinations (Dependent Claims 4 and 6–8)

Petitioner contends that claim 4 is obvious over Wang and Schwenke; claim 6 is obvious over Wang, Eigler, and Schneider; and claims 7 and 8 are obvious over Wang and Schneider. Pet. 29–30, 32–40; Ex. 1012 ¶¶ 122–163. Claim 4 depends from claim 1, and recites the type of plastic (e.g., polyester, polycarbonate, or PMMA). Ex. 1001, 11:1–5. Claims 6–8 depend from claims 1 and 5, and relate to techniques for covalently bonding or encapsulating the enzyme for immobilization to the substrate. *Id.* at 11:9–23. For claim 4, Petitioner contends it would have been obvious to use certain plastics, such as polycarbonates disclosed in Schwenke, with Wang's coatings because Schwenke discloses that such plastics are suitable substrates for forming windows and other surfaces in automobiles. *See, e.g.*, Ex. 1007 ¶¶ 4, 7; Ex. 1012 ¶¶ 127–129. For claims 6–8, Petitioner contends that it would have been obvious to use the methods from Schneider and/or Eigler in combination with Wang, because Schneider and Eigler's methods

reflect known and analogous techniques for immobilizing enzymes to a substrate. Pet. 36–40; Ex. 1012 ¶¶ 139–142, 145–148, 154–157, 159–162.

Patent Owner’s arguments on claim 1 are addressed above, and Patent Owner does not provide additional argument in relation to dependent claims 4 or 6–8, or as to combinations of Wang with additional cited prior art. *See* PO Resp. *passim* (no discussion or argument as to any particular dependent claim or the additional cited prior art, such as Schwenke).

Having considered Petitioner’s argument and evidence supporting its challenge to the dependent claims with which we agree and apply here, and with no separate rebuttal from Patent Owner regarding those claims, we find Petitioner has demonstrated by a preponderance of the evidence that: claim 4 would have been obvious over Wang and Schwenke; claim 6 would have been obvious over Wang, Eigler, and Schneider; and claims 7 and 8 would have been obvious over Wang and Schneider. Pet. 29–30, 32–40; Ex. 1012 ¶¶ 122–163; Ex. 1012 ¶¶ 127–129, 139–142, 145–148, 154–157, 159–162; Ex. 1006 ¶¶ 224, 258, 262; Ex. 1007 ¶¶ 4, 7; Ex. 1008, 3:46–64. Claim 4 recites a list of several plastics that may be used as the substrate (e.g., polycarbonate) and claims 6–8 relate to various means of introducing the enzyme to the substrate (e.g., dipping). Ex. 1001, 11:1–5, 11:9–23. The evidence indicates that use of such plastic substrates (in, for example, vehicles) and the recited means for attaching enzymes to glass or plastic substrates were all well-known in the art. *See, e.g.*, Ex. 1007 (“Plastic materials, such as polycarbonate . . . are currently being used in manufacturing of numerous automotive parts and components,” such as headlamps and window assemblies); Ex. 1006 ¶¶ 258, 262 (“The [enzymatic] composition and/or coating . . . can be applied by any of the techniques known in the art including brushing, spraying, roll coating,

dipping, and combinations thereof.”). *KSR*, 550 U.S. at 416–17 (holding that a combination of familiar elements according to known methods is obvious absent evidence of unpredictability). And, as already explained, the ’717 patent states expressly that the “anti-fingerprint” feature is not limited to the type of substrate (“any substrate is applicable”) or method of introducing the enzyme to the substrate (“any method known in the art will be used”). Ex. 1001, 4:7–9, 4:24–27. On this record, we conclude claims 4 and 6–8 are unpatentable.

G. Obviousness over Ho and Pegg / Remaining Grounds

Petitioner challenges claims 1–8 on alternative grounds, based on the combination of Ho and Pegg (which are further combined with Doppelfeld or Kallury for dependent claims 6–8). Pet. 23, 40–62.

As discussed above, we determine that Petitioner has shown by a preponderance of the evidence that the same claims are unpatentable over Wang (and Wang in combination with other cited prior art references). Therefore, we do not reach the challenges that are based on the Ho and Pegg combination. *Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (holding that once a dispositive issue is decided, there is no need to decide other potentially dispositive issues); *see, e.g., Formlabs Inc. v. Envisiontec, Inc.*, IPR2017-01258, Paper 41 at 17 (PTAB Oct. 5, 2018).

IV. PATENT OWNER’S CONTINGENT MOTION TO AMEND

Under 35 U.S.C. § 316(d)(1) and 37 C.F.R. § 42.121(a), Patent Owner moves to replace claims 1–8 of the ’717 patent with substitute claims 9–16. PO MTA 1. The motion is contingent on our determination that claims 1–8 are unpatentable. *Id.* Because we determined claims 1–8 have been shown

to be unpatentable for the reasons explained above (*see* Sections II–III), we address Patent Owner’s Motion to Amend.

A. Proposed Substitute Claims

Patent Owner submits the following substitute claims 9–16:

9. A method of forming an anti-fingerprint coating for a display device, comprising:

providing a substrate which is selected from plastic or glass, wherein the substrate is a surface of the display device or is a substrate capable of being adhered to the surface of the display device; and

treating the substrate with a composition comprising a lipolytic enzyme to obtain an anti-fingerprint coating that reduces the transfer of a fingerprint and decomposes the fingerprint;

wherein the anti-fingerprint coating decreases the visibility of the fingerprint on a display device without wiping off the fingerprint;

wherein the visibility of the fingerprint on the display device is decreased when (i) a first haze value attributable to a fingerprint transferred to the substrate with the anti-fingerprint coating is lower than a second haze value attributable to a fingerprint transferred to a substrate without the anti-fingerprint coating, and (ii) the first and second haze values are measured at the same predetermined time point following fingerprint transfer.

10. The method according to claims [[1]] 9, wherein the lipolytic enzyme is a lipase, the predetermined time point is within four hours following fingerprint transfer, and the first haze value at the predetermined time point is approximately 42-63% lower than the second haze value.

11. The method according to claim [[2]] 10, wherein the composition further includes at least one enzyme selected from the group consisting of a protease, an amylase, a cellulose, and a lactase.

12. The method according to claim [[1]] 9, wherein the plastic includes at least one polymer selected from the group consisting

of polyester, polypropylene, polyethyleneterephthalate, polyethylenenaphthalate, polycarbonate, triacetylcellulose, olefin copolymers, and polymethylmethacrylate.

13. The method according to claim [[1]] 9, wherein the lipolytic enzyme is introduced to a surface of the substrate by adsorption, covalent bonds, or encapsulation.

14. The method according to claim [[5]] 13, wherein the covalent bond is formed through a process including treating the surface of the substrate having at least one functional group selected from the group consisting of amino, amide, carboxyl, aldehyde, hydroxyl and thiol groups with a solution including a bifunctional cross-linker; and dipping the substrate in a buffer including the lipolytic enzyme.

15. The method according to claim [[5]] 13, wherein the covalent bond is formed through a process including dipping the substrate having an epoxy group at a surface thereof in a buffer including the enzyme.

16. The method according to claim [[5]] 13, wherein the encapsulation is performed by coating the surface of the substrate with a gel matrix, a microcapsule, a hollow fiber or a membrane, and introducing the lipolytic enzyme.

PO MTA, Appendix A (indentation added/modified for clarity).

B. Procedural Requirements

“Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121.” *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 (PTAB Feb. 25, 2019) (precedential) (“*Lectrosonics*”).⁴⁰

⁴⁰ Petitioner challenges the substitute claims on the basis of enablement, indefiniteness, and obviousness, but does not challenge Patent Owner’s

First, we consider whether the Motion to Amend proposes a reasonable number of substitute claims. 35 U.S.C. § 316(d)(1)(B). “There is a rebuttable presumption that a reasonable number of substitute claims per challenged claim is one (1) substitute claim.” *Lectrosonics* at 4–5 (citing 37 C.F.R. § 42.121(a)(3)). The Petition challenges 8 claims, and Patent Owner proposes 8 substitute claims. PO MTA 1–2. Thus, Patent Owner has proposed a reasonable number of substitute claims here.

Second, we consider whether the proposed substitute claims respond to a ground of unpatentability involved in this trial. *Lectrosonics* at 5–6. The proposed substitute claims, and particularly independent claim 9, amends the language of claim 1 to recite a number of additional features and properties as part of the anti-fingerprint coating formed according to the claimed method. Substitute claim 9 now expressly requires, *inter alia*, that the coating is for a “display device” and that it “reduces the transfer of a fingerprint and decomposes the fingerprint.” *See supra* Section IV(A). Patent Owner asserts that the proposed substitute claims are patentable over the instituted grounds and references at issue in this proceeding. PO MTA 11–25. We conclude that the amended language of the proposed substitute claims is responsive to grounds of unpatentability involved in this trial because Patent Owner adds limitations in a manner intended to address the prior art cited by Petitioner in relation to originally challenged claims.

Third, we consider the breadth of the substitute claims because “[a] motion to amend may not present substitute claims that enlarge the scope of the claims of the challenged patent or introduce new subject matter.”

assertions that its motion and proposed substitute claims meet the statutory and regulatory requirements set forth in § 316(d) and Rule 42.121.

Lectrosonics at 6–8; 35 U.S.C. § 316(d)(3); 37 C.F.R. § 41.121(a)(2)(ii).

The amendment limits independent substitute claim 9, in particular, as to the features or properties of the anti-fingerprint coating that is formed. Indeed, the amendment adds claim language that we declined to read into claim 1 (as discussed *supra*, Section III(C)) and therefore claim 9 and its dependent claims (claims 10–16) are narrower than their corresponding original claims.

Patent Owner asserts that the proposed substitute claims are described and supported by the '717 patent's application and priority application. PO MTA 3 (citing Ex. 2023 ("the '855 Application") and Ex. 2024 ("KR '587 Application")). Patent Owner identifies where, in those applications, the amended claim language derives support. *Id.* at 3–11. For example, Patent Owner explains that "Figure 1 shows the haze value of a substrate with the anti-fingerprint coating is decreased relative to a substrate without the anti-fingerprint coating following fingerprint transfer to the substrates." *Id.* at 6; Ex. 2023 ¶ 45; Ex. 2024, Fig. 1. Patent Owner cites the testimony of Dr. Cairns to further buttress its analysis. *See, e.g.*, PO MTA 6 (citing Ex. 2033 ¶¶ 64, 66, 69 (explaining disclosure related to reducing contamination and improving appearances of display devices)). Considering Patent Owner's assertions and evidence on these points (unopposed by Petitioner), we find on this record that the substitute claims are adequately supported and introduce no new matter.

Finally, the Motion to Amend includes the required claim listing. PO MTA, Appendix A; 37 C.F.R. § 42.121(b); *Lectrosonics* at 8.

Based on the above, we find that Patent Owner's Motion to Amend meets the requirements of 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121. Therefore, we analyze whether Petitioner has met its burden of persuasion on the alleged unpatentability of the substitute claims. *See Lectrosonics* at 4

(stating that “the burden of persuasion ordinarily will lie with the petitioner to show that any proposed substitute claims are unpatentable by a preponderance of the evidence”); *see also Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc) (holding the Board must assess the patentability of proposed substitute claims “without placing the burden of persuasion on the patent owner”). In the analysis below, we assess whether the substitute claims “are unpatentable by a preponderance of the evidence based on the entirety of the record” before us. *Lectrosonics* at 4.

C. Claim Construction

Patent Owner states that it “does not believe that any of the limitations added to the substitute claims require construction.” PO MTA 12.

Petitioner neither contests Patent Owner’s statement nor provides its own, proposed construction for the substitute claims. *See generally* MTA Opp.

The interpretation of “anti-fingerprint coating” from above (*see* Section III(C)(i)) is impacted in a notable way by the narrowing language of the substitute claims, which now explicitly require several additional limitations (e.g., “reduces the transfer . . . and decomposes the fingerprint,” “decreases the visibility of the fingerprint on a display device [as determined by comparative haze value assessments] without wiping off the fingerprint”) that further define the characteristics of the anti-fingerprint coating formed—limitations that we declined to import into the phrases “anti-fingerprint” or “anti-fingerprint coating” as recited in claim 1. We maintain the interpretation of “fingerprint” from above as the amended language of

the proposed substitute claims do not include any further limitation on what constitutes a “fingerprint.” *See* Section III(C)(ii).⁴¹

D. Whether the Substitute Claims are Non-enabled or Indefinite

Petitioner argues, in Section II(A) of its Opposition, that the substitute claims are not “[c]ommensurate with [e]nablement.” MTA Opp. 1–6 (emphasis omitted). In Section II(B), Petitioner argues that those claims are indefinite for not “particularly point[ing] out and distinctly claim[ing] the subject matter which [Patent Owner] regards as his invention.” *Id.* at 6–12.

As an initial matter, Petitioner’s arguments in Section II(A) of its Opposition appear to confuse the fact that enablement and indefiniteness arise from two separate statutory provisions, and are two distinct legal requirements. For example, Petitioner writes, “[s]ubstitute claims 9-16 are indefinite under 35 U.S.C. 112(a) and 35 U.S.C. 112 (pre-AIA), first paragraph.” MTA Opp. 1. In the very next sentence, Petitioner cites *In re Wands*, 858 F.2d 731 (Fed. Cir. 1988), which enumerates factors relevant to whether the claims require “undue experimentation” and, if so, fail the enablement requirement. *Id.* at 1–2. After arguing that undue experimentation would be required to practice the claimed subject matter, Petitioner concludes: “[t]hus, Substitute Claim 9 and all claims dependent thereon are unpatentable *as being indefinite*.” *Id.* at 2–4 (emphasis added); *see also id.* at 5–6 (same, concluding that dependent claims 15 and 16 are “indefinite” after purporting to argue lack of enablement).

⁴¹ We also apply, in deciding the Motion to Amend, Patent Owner’s unopposed supplement to the definition of the ordinarily skilled person, adding that such person “also would have had experience in the preparation of coatings for display devices.” PO MTA 12; Ex. 2033 ¶ 27.

Indefiniteness arises under 35 U.S.C. § 112(b) or § 112, second paragraph (pre-AIA)—not § 112(a) or § 112, first paragraph, as Petitioner writes. MTA Opp. 1. The statutory requirement for enablement arises under § 112(a) (or § 112, first paragraph (pre-AIA)) and the *Wands* factors are relevant to enablement, not indefiniteness. Notwithstanding the blending in Petitioner’s argument of these distinct statutory provisions, we treat Petitioner’s argument in Section II(A) of its Opposition as directed to an alleged lack of enablement, and its argument in Section II(B) of its Opposition as directed to the alleged indefiniteness.

1. Enablement

Petitioner argues that substitute claim 9 is non-enabled because it potentially reads on use of a broad class of lipolytic enzymes, types of glass or plastic substrates, and enzyme-immobilization techniques to obtain an anti-fingerprint coating with the recited properties. MTA Opp. 2–5. Petitioner argues it “would require an undue burden of experimentation for a skilled artisan to determine exactly which combination[s] . . . are capable of achieving the claimed coating.” *Id.* at 2. According to Petitioner, there is “no guidance” on all the enzymes that would provide the coating with the properties claimed. *Id.* at 3. And, Petitioner contends, the art recognizes that enzymes are diverse and susceptible to instability (e.g., denaturing) under certain conditions. *Id.* at 3–4.

Patent Owner counters that the claims are enabled and Petitioner’s argument should be rejected for lack of evidence. MTA Reply 1–2. According to Patent Owner, the ’717 patent provides guidance in the form of working examples that explain, for instance, how to select and test suitable substrates, enzymes, and treatment techniques to produce the claimed anti-fingerprint characteristics. *Id.* at 1–2; Ex. 2036 (Cairns testimony) ¶¶ 40–48.

Moreover, Patent Owner contends, the substitute claims themselves specify that the coating is for a display device, and skilled artisans know what types of substrates would be acceptable for such devices and be able to make the coatings as claimed without undue experimentation. *Id.* at 2; Ex. 2036 ¶ 48.

Petitioner fails, on this record, to provide persuasive evidence sufficient to meet its burden and demonstrate that claim 9 is non-enabled. The factors relevant to whether undue experimentation is required include, *inter alia*, “the quantity of experimentation necessary,” “the presence or absence of working examples,” the “predictability or unpredictability of the art,” and the “breadth of the claims.” *Wands*, 858 F.2d at 737. Petitioner argues “an undue burden of experimentation” is required to practice the claims. MTA Opp. 2–4. But attorney argument is not evidence. *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997); *Meitzner v. Mindick*, 549 F.2d 775, 782 (CCPA 1977) (stating that “[a]rgument of counsel cannot take the place of evidence lacking in the record”). Critically lacking is *evidence* from Petitioner that demonstrates, from the skilled artisan’s perspective, why the quantity of experimentation needed would be undue, especially in view of the guidance provided in the patent itself.⁴² *Ajinomoto Co. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345 (Fed. Cir. 2000) (explaining that “[e]nablement is determined from the viewpoint of persons of skill in the field” at the time of the invention).

As Patent Owner points out, the ’717 patent describes, in at least one working example, an anti-fingerprint coating with the properties as recited in the substitute claims. Ex. 1001, 7:50–8:30 (Example 1, Experimental

⁴² Petitioner, for example, fails to cite any testimony from its declarant to support its assertions on lack of enablement. *See generally* MTA Opp.

Example 1).⁴³ The patent also provides additional working examples that describe several other ways of immobilizing hydrolytic enzymes, including lipases, proteases, or both, to substrates. *See, e.g., id.* at 8:31–9:3 (Examples 2 and 3), 10:16–44. Even if all the now-recited properties of the coatings were not tested or confirmed with data in these other working examples, Petitioner does not provide persuasive evidence sufficient to show why it would involve undue experimentation to do so.

The '717 patent further explains that varied methods of immobilizing enzymes to substrates are well known in the art, and describes exemplary techniques as involving “a relatively simple method . . . [that] thus can be applied to almost all substrates requiring the anti-fingerprint characteristic.” *Id.* at 4:24–5:7, 10:40–44. Furthermore, the '717 patent provides additional guidance on optimizing optical properties by adjusting the coating's thickness, as well as reducing fingerprint transfer by controlling the surface energies of the enzymatic coating. *Id.* at 6:21–54; Ex. 2036 ¶ 46. On balance, the evidence suggests that the use of appropriate enzymes, substrates, and immobilization techniques does not require more than ordinary, routine skill over the guidance provided by the patent itself. Some experimentation may be required. But we do not agree with Petitioner's assertions here that it has shown that the experimentation would be “undue.” Indeed, “[a] claim is sufficiently enabled even if ‘a considerable amount of experimentation’ is necessary, so long as the experimentation ‘is merely

⁴³ *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1565 (Fed. Cir. 1996) (“Where the specification provides guidance in selecting the operating parameters that would yield the claimed result, it is fair to conclude that the experimentation required to make a particular embodiment is not ‘undue’”) (internal citation and quotation marks omitted).

routine, or if the specification in question provides a reasonable amount of guidance with respect to the direction in which the experimentation should proceed.” *Vasudevan Software, Inc. v. MicroStrategy, Inc.*, 782 F.3d 671, 684 (Fed. Cir. 2015) (quoting *Wands*, 858 F.2d at 737).

In reply, Petitioner argues that only Experimental Example 1 enables reduced fingerprint transfer, and criticizes Patent Owner’s declarant as lacking experience with immobilization of enzymes. MTA Sur-Reply 1–3 (“[I]t is not surprising that Dr. Cairns would not recognize or understand the challenges in selecting enzymes and substrate treatment techniques.”). Petitioner’s arguments are, however, unpersuasive. First, specific guidance, including actual working examples and other disclosures on how to form and test the coatings as claimed, is provided in the ’717 patent as explained above. And, we are persuaded that the ’717 patent sufficiently indicates that enzyme selection and immobilization involves routine and reasonably predictable considerations, contrary to Petitioner’s assertions. *See, e.g.*, Ex. 1001, 3:12–60, 4:24–5:13, 6:21–54. Even if the skilled artisan would face some challenges, there is insufficient persuasive evidence on this record to demonstrate that it would require undue experimentation to overcome them.⁴⁴ Second, Petitioner—not Patent Owner—bears the burden on the enablement issue presented here. Because we find that the preponderance of the evidence does not support Petitioner’s assertions, Petitioner does not satisfy that burden to show lack of enablement.

⁴⁴ Petitioner fails, for example, to explain why more than ordinary skill is required to address or avoid conditions that are known or would be expected to denature proteins. *See* Ex. 2036 ¶ 47 (Dr. Cairns testimony that “a POSA would not expose the lipolytic enzyme to those [known] conditions”).

Petitioner also argues that dependent claims 15 and 16 are non-enabled for “various reduction to practice considerations.” MTA Opp. 5–6. These arguments similarly fail for lack of evidence. For instance, that one of the ’717 patent’s working examples immobilizing the enzyme composition via gel matrix encapsulation did not provide “data” characterizing fingerprint transfer does not represent evidence to show why it would involve more than routine experimentation to generate such data and make the assessment as to fingerprint transfer. *Id.* at 5.

For the reasons above, we find that Petitioner has not met its burden to show, by a preponderance of the evidence on this record, that substitute claims 9–16 are non-enabled.

2. *Indefiniteness*

Petitioner argues that substitute claim 9 is indefinite because it includes the language “reduces the transfer of a fingerprint,” which Petitioner alleges is a “relative term.” MTA Opp. 7–8. According to Petitioner, the only “standard” for assessment of reduced fingerprint transfer is in Experimental Example 1 of the ’717 patent. *Id.*

Petitioner’s indefiniteness argument is unpersuasive. As Patent Owner notes, relative terms and “[t]erms of degree are not per se indefinite when the context of the invention provides enough certainty to a POSA.” MTA Reply 2–3; *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370 (Fed. Cir. 2014) (holding that such claim language “has long been found definite where it provided enough certainty to one of skill in the art when read in the context of the invention”).

On this record, we agree with Patent Owner that “a POSA would readily understand that the reduction in transfer is partially responsible for the decrease in visibility of a fingerprint relative to a substrate without the

anti-fingerprint coating.” MTA Reply 3. Indeed, as explained above (Section III(C)(1)), we reached the conclusion that the frame of reference for purposes of assessing whether the coatings are capable of reducing transfer or decomposing the fingerprint is a comparison against a substrate without the anti-fingerprint coating (e.g., without a lipase). That, in fact, is how the ’717 patent makes the relevant comparison. *See, e.g.*, Ex. 1001, Fig. 1, 8:7–31 (Experimental Example 1 (describing reduced fingerprint transfer to the lipase-coated substrate versus the substrate without the lipase coating)). And, the substitute claims now set forth the comparison more explicitly—reciting, a comparison of haze values on a display device with and “without the anti-fingerprint coating.”⁴⁵ PO MTA, Appendix A.

Petitioner urges that there is no “objective boundary” related to this comparison, and thus, the claims are indefinite. MTA Sur-Reply 5–6 (now arguing that the claim phrase “without the anti-fingerprint coating” contributes to indefiniteness). Petitioner quotes a portion of *Interval Licensing* that it contends supports its assertion. *Id.* (quoting *Interval Licensing*, 766 F.3d at 1370–1371).

To be sure, there are circumstances where it is possible to state a “standard” or ascribe some meaning to a claim term, yet that is not enough to satisfy the definiteness requirement. For example, in *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1351 (Fed. Cir. 2005) (cited in the excerpt from *Interval Licensing* quoted by Petitioner) there was arguably a

⁴⁵ Petitioner cites *Liberty Ammunition, Inc. v. United States*, 835 F.3d 1388 (Fed. Cir. 2016). MTA Opp. 7–8. That case, however, supports the conclusion that the claims here are not indefinite because, like the claims there, the intrinsic evidence provided sufficient detail on the relevant comparison. *Liberty*, 835 F.3d at 1395–98.

standard against which the claimed invention (a customized kiosk screen interface with a plurality of graphic elements) was to be judged. There, however, the standard recited in the claim—whether the arrangement of screen elements provided an “aesthetically pleasing look and feel”—itself lacked objectivity and reasonable boundaries. *Datamize*, 417 F.3d at 1349–50 (holding that the claims lacked a sufficiently “workable objective standard” and invoked imprecise “subjective” assessments).

We are, however, unpersuaded the phrases “reduces the transfer of a fingerprint” or “without the anti-fingerprint coating” lack sufficient objective boundaries such that the skilled artisan would not understand the substitute claims with reasonable certainty or that meaning of those phrases would be unclear to those with skill in the art. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014) (“[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.”); *see also In re Packard*, 751 F.3d 1307, 1311 (Fed. Cir. 2014) (holding that claims are indefinite when it contains words or phrases whose meaning is “unclear in describing and defining the claimed invention”). The claims themselves indicate how reduced transfer is assessed—via a comparison of haze values—as also described and exemplified in the ’717 patent Specification. PO MTA, Appendix A (claim 9, final wherein clause, reciting comparisons between first and second measured haze values, and the timing of that measurement); Ex. 1001, 8:6–30 (Experimental Example 1, using a microscope and measuring haze values), Fig. 1 (showing reduced haze as a function of time).

As explained above, “without the anti-fingerprint coating” includes, consistent with the ’717 patent’s working examples, coatings without a lipolytic enzyme. *Supra* Section III(C). This would encompass, as in Experimental Example 1, a substrate having a glutaraldehyde-functionalized surface *without* the lipase as a control as Petitioner argues. MTA Sur-Reply. 6–7. We are not, however, persuaded that a potential “control” surface for comparison *must* be functionalized with glutaraldehyde exactly in the manner described in Experimental Example 1 as Petitioner implies. MTO Opp. 7–8; MTA Sur-Reply 4–7. Insofar as the patent indicates that an enzymatic composition can be added to a substrate via adsorption with no additional treatment process (Ex. 1001, 4:24–39), a control might encompass a non-functionalized, untreated surface of a substrate. In that respect, the potential comparisons may be broader than the narrower frame of reference urged by Petitioner, but “[b]readth is not indefiniteness.” *In re Gardner*, 427 F.2d 786, 788 (CCPA 1970). And, on this record, Petitioner fails to persuade us the potential comparisons embraced by the claims lack reasonable, objective boundaries.

Petitioner next argues that the ’717 patent “fails to provide any disclosure that any and all function . . . can decrease the visibility of a fingerprint on a display device without wiping off the fingerprint or otherwise.” MTA Opp. 8–9. This argument fails to persuade us that the proposed substitute claims are indefinite. The evidence demonstrates sufficiently that a reduced fingerprint transfer and a decomposition of the fingerprint components is capable of reducing haze on the coated surface. MTA Reply 3–4; Ex. 2036 ¶¶ 59–60; Ex. 1001, 6:23–28. Reduced haze, in turn, is used and reasonably understood on this record as a surrogate for decreased visibility of the contaminant or stain. Ex. 2036 ¶¶ 59–60. Those

parameters are all set forth expressly in substitute claim 9 and there is no persuasive evidence from Petitioner showing that the skilled artisan would conclude that those parameters lack sufficient clarity, or fail to understand them, or the claim overall, with a reasonable level of certainty.

Petitioner contends the claims are also indefinite because “it is not clear . . . how the claimed coating on the substrate would be able to decrease the visibility of a fingerprint on any and all portions of the display device – even those without the claimed coating.” MTA Opp. 9. This argument presumes an incorrect reading of certain claim elements while ignoring the Specification and the invention as a whole, which plainly attributes the “anti-fingerprint” property to the coating on coated portions of the substrate. *See, e.g.*, Ex. 1001, Abstr. (“The anti-fingerprint coating can reduce contamination of display devices, appearances of electronic devices or building materials by fingerprints.”); 2:19–22 (“[T]here is no technology of anti-fingerprint coating in the self-cleaning sense, which can be used to provide an anti-fingerprint property to the [coated] surface of a display device.”), 8:18–30 (“[I]t was seen that the lipase-coated substrate shows a lower haze value than the control glass . . . [and] it was seen that the lipase-immobilized surface had a lower degree of transfer of fingerprint.”). Accordingly, as argued by Patent Owner, a “POSA would understand from the [substitute] Claims as a whole that the claimed anti-fingerprint coating decreases the visibility of fingerprints applied to the portions of the display device covered by the coating.” MTA Reply 4; Ex. 2036 ¶ 61.

Petitioner’s final indefiniteness argument is that there is no correlation between haze and fingerprint visibility in the ’717 patent. MTA Opp. 9–11; MTA Sur-Reply 7–10. According to Petitioner, its declarant “confirms” that the Specification is silent on this issue. MTA Opp. 10–11 (asserting no

“correlation [of haze values] to visibility of an actual fingerprint to the naked eye”); Ex. 1044 ¶¶ 34–45; MTA Sur-Reply 9–10 (asserting that a means of correlation, such as photographs or naked eye verification, is necessary). Petitioner contends that Patent Owner’s declarant, Dr. Cairns, provides only “conclusory statements” in support of the correlation. MTA Opp. 10. And, Petitioner asserts, other evidence suggests that various attributes of fingerprint visibility “result in haze value not correlating well with the actual visibility of a respective fingerprint by the naked eye.” *Id.* at 10–12.

Petitioner’s argument about there being no correlation between haze and visibility is unavailing. Substitute claim 9, in the final wherein clause, expressly recites that decreased visibility is determined on the basis of comparing measured haze values of a fingerprint transferred to the substrate. That is a reasonably objective measurement and the claims simply do not require any “naked eye” assessment or correlation as Petitioner’s argument presumes.

Moreover, as to a correlation between haze and fingerprint visibility, such correlation is corroborated by evidence in this record, including prior art submitted and relied on by Petitioner. *See, e.g.*, Ex. 1051 (“Amin”) ¶ 78 (“After coating with fingerprint oil . . . the haze for both coated and non-coated surfaces was approximately the same. . . . However, after wiping the coated glass shows a much faster recovery of optical clarity (haze reduction) than does the non-coated glass.”);⁴⁶ *see also* Ex. 2033 ¶¶ 42, 73 (“This measurement [i.e., haze] is widely used, and there are specific and accepted standards for how to make this measurement” (citing Ex. 2005)), 74 (“In my experience working with touch screens and display devices, the un-scattered

⁴⁶ Amin et al., US 2009/0197048 A1, published Aug. 6, 2009 (Ex. 1051).

transmission of light through a substrate is vital . . . [and] a POSA would know that the lower the haze value the better the clarity.”), 75–77; Ex. 2036 ¶¶ 64–65.

Petitioner’s criticisms of Dr. Cairns’s opinions as allegedly being “conclusory” lack merit. Dr. Cairns has relevant expertise in this area, whereas Petitioner’s declarant, Dr. Rozzell, does not. Ex. 2035 (Rozzell dep.), 128:15–20 (“[Y]ou are not a person of ordinary skill in the art as it pertains to the use of haze values to assess visibility, are you? A. No.”); Ex. 2033 (Cairns Decl.) ¶¶ 2–9 (describing, *inter alia*, Dr. Cairns’s many years of experience working with and researching specialized coatings for display and touch-sensor applications and optical properties for such devices). Accordingly, Dr. Cairns’s testimony about there being a recognized and sufficiently definite correlation between haze and contaminant (including fingerprint) visibility on display devices is entitled to greater weight than Dr. Rozzell’s opinions on the topic. *See, e.g.*, Ex. 2036 ¶¶ 62–67 (analyzing portions of the patent and prior art to support the opinion that haze is correlated to visibility); Ex. 2035 (Rozzell dep.) 125:1–16 (“[W]hatever familiarity you have acquired with respect to the utilization of haze as a measurement of visibility has been acquired in the context of this IPR; correct? A That’s correct.”). Dr. Cairns’s opinions are also not conclusory as argued, but are supported with evidence from the patent and the prior art as noted. Ex. 2036 ¶¶ 62–67.

For all the above reasons, we are unpersuaded that a preponderance of the evidence on this record supports Petitioner’s challenge to the substitute claims for indefiniteness.

E. Whether the Substitute Claims Would Have Been Obvious

Petitioner submits that substitute claims 9–16 are unpatentable as obvious. MTA Opp. 12–25. Petitioner contends the prior art teaches anti-fingerprint coatings with a self-cleaning function for display devices, and “would have served for a POSA as a roadmap to the claimed coating of the ’717 Patent.” *Id.* at 12–15. More specifically, Petitioner argues that the substitute claims would have been obvious over (i) Amin in view of Wang, or (ii) over Wang. *Id.* at 15–25.

1. Over Amin and Wang

Petitioner argues that “[t]he disclosures of Amin in combination with the disclosures of at least Wang render Substitute Claims 9–19 [sic, 9–16] obvious.” MTA Opp. 16–24.

Starting with claim 9, Petitioner argues that Amin teaches the preamble, as well as the “providing” and “treating” steps, which Petitioner has labeled “Element [A1]” and “Element [B1].” *Id.* at 16–17. Petitioner contends that Amin discloses forming a display device protective cover glass having an “anti-fingerprint” coating. *Id.* (citing, for example, Ex. 1051 ¶¶ 3, 9, 14, 63, 65). Moreover, Petitioner contends Amin specifically describes transparent cover plates for “touch screen applications.” *Id.* (citing Ex. 1051 ¶¶ 2, 3, 9, 40). According to Petitioner, Amin also discloses treatments that “obtain an anti-fingerprint coating that ‘minimize[s] the transport of oils from finger to the glass (fingerprints).’” *Id.* at 17 (quoting Ex. 1051 ¶ 9); *see also* Ex. 1051 ¶ 36 (“For fingerprint oils and debris associated with fingerprints, bonding and thus adhesion are minimized.”).

To the extent Amin does not disclose coatings with an “anti-fingerprint” decomposing property, Petitioner cites to Wang and its use of enzymes, such as a lipase, to decompose oil-based stains. MTA Opp. 17

(citing, for example, Ex. 1004 ¶¶ 2, 4, 18, 37, and its arguments related to Wang from the Petition).

Petitioner argues it would have been obvious to combine Amin and Wang because the references are related to providing easy-to-clean or self-cleaning properties to surfaces, and both are directed to mitigating lipid-based contaminations of those surfaces. MTA Opp. 18. “One motivation” cited by Petitioner for combining the references is “that Amin and Wang are directed to solving the problem of mitigating the [stains that] adversely impact appearance and function.” *Id.*; *see also id.* at 18–19 (citing alleged other motivations). According to Petitioner, “[c]ombination of the enzyme-immobilized coating compositions of Wang with the anti-fingerprint coatings of Amin would amount to nothing more than combining prior art elements according to known methods to yield predictable results.” *Id.* at 19 (citing Ex. 1044 ¶¶ 78–84).

For the final two “wherein” clauses of substitute claim 9, which relate to forming a coating that “decreases the visibility of the fingerprint . . . without wiping off,” and assessing the decrease in visibility by comparison of “first” and “second haze values,” Petitioner contends those limitations are disclosed in the Amin and Wang combination. MTA Opp. 20–22 (Petitioner annotates the final two wherein-clause limitations as “Element [C1]” and “Element [D1]”).⁴⁷

Patent Owner responds with several arguments of its own. MTA Reply 5–9. According to Patent Owner, obviousness requires a reasonable

⁴⁷ To the extent the “haze value” limitations of “Element [D1]” are alleged to not appear in Amin, Petitioner contends they are disclosed in “Koyama” (Ex. 1053). MTA Opp. 22–23.

expectation of success in combining the prior art to arrive at the claimed subject matter, yet Petitioner “fails to make even a cursory attempt at explaining why a POSA would have a reasonable expectation of success in combining Amin and Wang.” *Id.* at 5. Critically, Patent Owner argues, Petitioner failed to provide evidence about how the Amin and Wang coatings could be combined while retaining their respective functions. *Id.* In fact, Patent Owner contends, Amin’s and Wang’s coatings are chemically and physically incompatible—defeating any reasonable expectation that they could be successfully combined to produce the subject matter of substitute claim 9. *Id.* at 6–8. For similar reasons, Patent Owner argues the ordinarily skilled person would not have been motivated to combine Amin and Wang. *Id.* at 8. And, even if they did, Patent Owner contends, the claim elements are still not met because both Amin and Wang require a “wiping” step. *Id.* at 8–9.

We agree with Patent Owner, on this record, that Petitioner has not established that substitute independent claim 9 would have been obvious over Amin and Wang. As argued by Patent Owner, Petitioner fails to demonstrate with persuasive evidence how the coatings of Amin and Wang could have been and would have been combined to produce the claimed subject matter with a reasonable expectation of success. We explain below.

Wang immobilizes digestive enzymes, such as a lipase, on its substrate’s surface. Ex. 1004 ¶¶ 30, 35. Amin, on the other hand, discloses forming coatings with an anti-fingerprint function by coating the substrate’s entire surface with terminal fluorine groups that limit bonding or adhesion of other compounds to the surface. *See, e.g.*, Ex. 1051 ¶¶ 14, 36, Figs. 1–3; Ex. 2036 ¶¶ 7, 10; Ex. 2035 (Rozzell dep.), 18:18–19:3 (“Q And so there’s not going to be expected to be free surface area [in Amin] that could be

modified in some way; isn't that correct? A That's what he implies, yeah. Yeah.').

Although Petitioner asserts that an ordinarily skilled person might have wanted to combine Amin's and Wang's coatings, Petitioner simply does not provide an adequate, evidence-backed analysis of how such person would have predictably done so. As Patent Owner points out, the evidence on this record raises doubts that the two coatings could have been successfully combined. MTA Reply 6–8. Specifically, evidence of record supports Patent Owner's argument that a skilled artisan would not have reasonably expected "that the digestive enzymes of Wang could be successfully immobilized on the fluorine-coated surface of Amin." *Id.*; Ex. 2036, ¶¶ 6–10; Ex. 2035, 15:5–19:2. Notably, the testimony of Petitioner's own declarant supports the conclusion that the combination Petitioner proposes would not have been reasonably predictable—if even possible at all. When Dr. Rozzell was asked if there were other materials (like enzymes) that could be adhered to the surface of Amin's coatings, he did not know. Ex. 2035: 15:16–17:13 ("[Y]ou don't know what any of those materials [that might adhere] are, sitting here today? A Not without doing some research on my end.") ("So turning back to our discussion of immobilizing an enzyme on this [Amin's coating], you don't know of a way, today, that you could immobilize an enzyme on top of a fluorine-coated layer. A Well, I've personally not done exactly that type of experiment, but I can imagine that there would be approaches that would allow you to do that. Q But you don't know any of them today? A I can't tell you one as I'm sitting here today. Q Okay. And you've not recalled seeing this in a publication? A No.').

And, when asked if he was aware of any evidence demonstrating how coatings like in Amin and Wang would have been combinable, or whether he had explained how the coatings could have been combined as part of his analysis in this case, Dr. Rozzell answered “no.” Ex. 2035, 40:1–11 (“[Y]ou don’t know of any precedent for combining such coatings? A Sitting here today, I don’t know of any precedent for this. Q And you didn’t address this in your declaration, did you? A I don’t remember that I did, no. Q Okay. So your declaration doesn’t describe how the coatings could be combined and retain function; correct? A Not explicitly, no.”).⁴⁸ These admissions from Dr. Rozzell notably undercut Petitioner’s challenge based on Amin and Wang. Petitioner provides no persuasive evidence to rebut those admissions or to rebut evidence provided by Patent Owner indicating that person of ordinary skill in the art would not have reasonably expected to successfully combine the coatings of Amin and Wang. MTA Sur-Reply 10–12; MTA Reply 5–8.

Because Petitioner has not provided persuasive evidence to show how Amin’s and Wang’s coatings would have been combined, its challenge to substitute claim 9 over those references is fatally flawed. Petitioner has not met its burden to demonstrate that the teachings of Amin and Wang could have been and would have been combined with a reasonable expectation of

⁴⁸ These are only some of the admissions from Dr. Rozzell that raise questions about whether or how the Amin and Wang coatings would have been combined. For instance, on the at least “thousandfold difference in size” of the particles of Wang versus the coating thickness of Amin, Dr. Rozzell testified that “[y]ou wouldn’t be able to” incorporate the particles in Amin’s coating and, if you somehow did, it would create a “bulge . . . sticking out.” Ex. 2035, 37:11–38:10; *see also id.* 39:4–20 (“[T]here are experimental hurdles that one would have to overcome”).

success. Hence, the record before us fails to persuade us that claim 9 is unpatentable as obvious over Amin in view of Wang.

Petitioner's argument as to substitute claims 10–16 depends on Petitioner first establishing that substitute claim 9 (the only independent substitute claim) is unpatentable over Amin and Wang. MTA Opp. 23–24; *Alcon Research, Ltd. v. Apotex Inc.*, 687 F.3d 1362, 1367 (Fed. Cir. 2012) (“It is axiomatic that a dependent claim cannot be broader than the claim from which it depends.”). So, we also determine that Petitioner has not met its burden in showing by a preponderance of the evidence on this record that dependent substitute claims 10–16 are unpatentable over Amin and Wang.

2. *Over Wang*

Petitioner contends that substitute claims 9–16 are obvious over Wang. MTA Opp. 24–25. Petitioner devotes a single paragraph to this challenge to the substitute claims. *Id.*

According to Petitioner, “Wang alone and in combination with one or more secondary references renders obvious the original [claim] language [(citing the Petition, Section VI.A)]⁴⁹” and “[n]one of the amended claim language of the Substitute Claims is patentably distinguishing over Wang.” *Id.* at 24. Petitioner argues “the claimed coating and coatings in Wang . . . have substantially identical composition,” and “products of identical chemical composition cannot have mutually exclusive properties.” *Id.* Hence, Petitioner argues, to the degree that the claimed coating includes all

⁴⁹ This portion of the Petition relates to the challenge to the original claims over Wang, and the Wang combinations (i.e., with Schwenke, Eigler, and/or Schneider). *See supra* Section III(E)–(F).

the recited properties, Wang's lipase-immobilized coatings "would similarly be capable of providing such limitations." *Id.* at 24–25.

Petitioner's argument is unavailing on this record. Wang does not describe its lipase-coated substrates as providing any *reduced transfer* of fingerprints or oil-based stains, more generally. It discloses decomposing such stains, as we discuss above. *Supra* Section III(E)(1)(a). The substitute claims now require more than decomposing a fingerprint's lipid components. They further require a coating that "reduces the transfer of a fingerprint," among other limitations. Yet Petitioner provides no sufficiently persuasive theory or evidence to show that Wang's coatings inherently possess this reduced-transfer functionality or other new features now recited in substitute independent claim 9. At best, the record before us indicates that Wang's coatings may or may not exhibit the reduced-transfer functionality. *See, e.g.*, Ex. 2036 ¶¶ 29–30 (opining that "process differences could result in different surface energies, which may affect the ability of the coating to reduce the transfer of a fingerprint"); Ex. 2035 (Rozzell dep.), 113:18–22 (agreeing that differences in methods utilized could lead to different properties), 120:14–121:1 (same). As Patent Owner notes, "it cannot simply be assumed that the Wang coating has identical properties" to all of those recited in substitute claim 9. MTA Reply 11; Ex. 2036 ¶¶ 27, 29, 30. For instance, Petitioner introduces no adequate evidence of "the ability of Wang to reduce the transfer of a fingerprint." MTA Reply 10-11.

To the extent Petitioner reasons that an "identical chemical composition cannot" have different properties (MTA Opp. 24–25), Petitioner must establish a substantial identity between Wang and what is described and now claimed. Relevant to the challenge here, the coating formed according to Experimental Example 1 of the '717 patent appears to

possess the newly-recited limitations of substitute claim 9, but Petitioner does not show that Wang describes an identical process or coating to that example in the '717 patent. Indeed, the evidence on this record indicates that, while there are many similarities, there are differences in the methods for making the coatings of Wang versus a coating as in substitute claim 9.⁵⁰ *See, e.g.*, Ex. 2035, 113:7–11; Ex. 1045, 125:18–127:2; Ex. 2036 ¶¶ 27–30. And Petitioner provides no further and sufficient evidence, such as testing of coatings made based on Wang's teachings, which might demonstrate that such coatings are capable of reducing fingerprint transfer notwithstanding the lack of an identical process for forming them.

For at least the above reasons, we determine that Petitioner has not met its burden to demonstrate by a preponderance of the evidence that substitute claim 9 (or dependent claims 10–16) would have been obvious over Wang.⁵¹

⁵⁰ With respect to fingerprint decomposition, as discussed with the original claims, we did not find that the differences in Wang's example versus Experimental Example 1 of the patent to be sufficient to undermine a finding that Wang's lipase coatings, irrespective of the enzyme immobilization technique of Wang used, would still inherently be capable of decomposing lipid-based components and stains encompassed by a "fingerprint" as claimed. *Supra* Section III(E)(1)(a). That finding was based, in part, on the fact that Wang described the identical hydrolytic mechanism of action for decomposing ester-bond-containing lipids with a lipase as compared to the patent. *Id.*

⁵¹ In Petitioner's Sur-Reply, Petitioner asserts that "Wang anticipates" the claimed composition of substitute claim 9. MTA Sur-Reply 10. Claim 9 is not a composition, but a method of forming a coating having several recited properties. Petitioner has not shown on this record that Wang's coatings include all those properties as already explained.

V. CONCLUSION⁵²

Based on the information presented, we conclude Petitioner has shown by a preponderance of the evidence on this record that claims 1–8 of the '717 patent are unpatentable. However, because we also determine that Petitioner has not shown by a preponderance of the evidence that substitute claims 9–16 are unpatentable, we grant Patent Owner's Contingent Motion to Amend. Thus, we conclude that it is appropriate to replace claims 1–8 with substitute claims 9–16.

Claim(s)	35 U.S.C. §	Reference(s) / Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 5	103	Wang	1–3, 5	
4	103	Wang, Schwenke	4	
6	103	Wang, Eigler, Schwenke	6	
7, 8	103	Wang, Schneider	7, 8	
1–5	103	Ho, Pegg		
6, 7	103	Ho, Pegg, Doppelfeld		
8	103	Ho, Pegg, Kallury		

⁵² Should Patent Owner wish to pursue further amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

Overall Outcome			1–8	
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Motion to Amend Outcome	Claims
Original Claims Cancelled by Amendment	1–8
Substitute Claims Proposed in the Amendment	9–16
Substitute Claims: Motion to Amend Granted	9–16

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, claims 1–8 of U.S. Patent No. 8,932,717 B2 are held unpatentable;

FURTHER ORDERED that Patent Owner’s Contingent Motion to Amend Claims is granted as to proposed substitute claims 9–16; 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.

IPR2018-01520
Patent 8,932,717 B2

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