UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

REACTIVE SURFACES LTD., LLP

Petitioner

v.

TOYOTA MOTOR CORPORATION

Patent Owner

CASE: To Be Assigned

Patent No. 8,394,618 B2

PETITION FOR *INTER PARTES* REVIEW OF

U.S. PATENT NO. 8,394,618 B2

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EXHIBIT LIST

Ex. 1001 U.S. Patent No. 8,394,618 B2 to Buthe et al. ("the '618 Patent")

Ex. 1002 U.S. Patent Application Publication No. 2011/0312057 A1 for U.S. Patent Application Serial No. 12/820,063 of Buthe et al. ("the '063 Application")

Ex. 1003 Printed Publication entitled "ENZYME IMMOBILIZATION INTO POLYMERS AND COATINGS" by Géraldine F. Drevon ("Drevon")

Ex. 1004 U.S. Patent Publication No. 2005/0147579 A1 of Schneider ("Schneider")

Ex. 1005 U.S. Patent No. 5,868,720 to Van Antwerp ("Van Antwerp")

Ex. 1006 U.S. Patent Publication No. 2005/0176905 A1 of Moon *et al.* ("Moon")

Ex. 1007 U.S. Patent No. 6,150,146 to Hamade *et al.* ("Hamade")

Ex. 1008 U.S. Patent Publication No. 2004/0109853 A1 of McDaniel ("McDaniel")

Ex. 1009 Printed Publication (December 1992) entitled "EFFECTIVE METHODS OF IN-LINE INTRAVENEOUS FLUID WARMING AT LOW TO MODERATE INFUSION RATES" by Lt. Col. C. Carl Bostek ("Bostek")

Ex. 1010 Declaration of Dr. David Rozzell, Ph.D. ("Rozzell Declaration")

Ex. 1011 **Office Action dated August 14, 2012 in the ’063 Application (“the ’063 OA”)**

Ex. 1012 **Office Action Response filed October 22, 2012 in the ’063 Application (“the ’063 OAR”)**

EX. 1013 **Printed Publication (December 4, 1996) entitled “CHEMICAL CHARACTERIZATION OF FINGERPRINTS FROM ADULTS AND CHILDREN” by Michelle V. Buchanan et al. (“Buchanan”)**

I. INTRODUCTION

Pursuant to 35 U.S.C. §311 and 37 C.F.R. §42.100, Reactive Surfaces LTD. LLP ("Petitioner") petitions for *inter partes* review of claims 1-11 of U.S. Pat. No. 8,394,618 B2 (the '618 Patent, Ex. 1001). The '618 Patent issued from U.S. Patent Application Serial No. 12/820,063 of Buthe *et al*., which published as U.S. Patent Application Publication No. 2011/0312057 A1 (the '063 Application, Ex. 1002).

This Petition shows that there is a reasonable likelihood that Petitioner will prevail with respect to at least one of the claims 1-11 of the '618 Patent. These claims are unpatentable under at least 35 U.S.C. §103. The Office is respectfully requested to institute a trial for *inter partes* review and to cancel claims 1-11 of the '618 Patent.

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(B)

A. REAL PARTY IN INTEREST

Reactive Surfaces Ltd., LLP is the real party in interest.

B. RELATED MATTERS

Petitioner submits that there are no related judicial or administrative matter that would affect, or be affected by, a decision in the proceeding. The cases identified below, which have been ***dismissed without prejudice***, were previously filed by Petitioner against Patent Owner seeking a declaratory judgment with regards to certain rights in U.S. Patent No. 8,394,618 B2:

1. Cause No. 1-13-CV-1098-LY; *Reactive Surfaces Ltd. LLP v. Toyota Motor Engineering & Manufacturing North America, Inc. et al;* In The United States District Court For The Western District of Texas –Austin Division, and

2. Cause No. 1:14-CV-1009-LY; *Reactive Surfaces Ltd. LLP v. Toyota Motor Corporation*, In The United States District Court For The Western District of Texas –Austin Division.

C. NOTICE OF COUNSEL AND SERVICE INFORMATION

Pursuant to 37 C.F.R. §42.8(b)(3) and 37 C.F.R. §42.10(a), Petitioner designates counsel as indicated in Table 1 below. Please address all correspondence and service to counsel at the address provided in Table 1 below.

Table 1 - DESIGNATION OF COUNSEL

Lead Counsel	**Back-up Counsel**
David O. Simmons Reg. No. 43,124 IVC Patent Agency P. O. Box 26584 Austin, Texas 78755 7637 Parkview Circle Austin, Texas 78731 Ph: (512) 345-9767	Jonathan D. Hurt Reg. No. 44,790 McDaniel & Associates, PC 300 West Avenue, #1316 Austin, Texas 78701 Ph: (512) 472-8486 Fax: (512) 472-8181 jhurt@technologylitigators.com

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Petitioner consents to electronic service by email for all correspondence at: dsimmons@ivcpatentagency.com, jhurt@technologylitigators.com, and ReactiveSurfaces@wattsguerra.com.

Pursuant to 37 C.F.R. §42.10(b), a Power of Attorney executed by Petitioner for appointing the above-designated counsel is concurrently filed herewith.

D. PAYMENT OF FEES – 37 C.F.R §42.103

Petitioner authorizes the Patent and Trademark Office to charge Deposit Account No. 50-1085 for the fees set in 37 C.F.R §42.15(a) for this Petition and further authorizes payment for additional fees to be charged to this Deposit Account.

III. REQUIREMENTS FOR *INTER PARTES* REVIEW

This Petition complies with all requirements under 37 C.F.R. §42.104.

A. GROUNDS FOR STANDING

Pursuant to 37 C.F.R. §42.104(a), Petitioner hereby certifies that the '618 Patent is available for *inter partes* review and that Petitioner is not barred or estopped from requesting *inter partes* review challenging claims of the '618 Patent.

B. IDENTIFICATION OF CHALLENGE

Pursuant to 37 C.F.R. §42.104(b), the precise relief requested is that the Board cancel claims 1-11 of the '618 Patent.

1. Claims Challenged

Claims 1-11 of the ’618 Patent are challenged in this Petition.

2. The Prior Art

The prior art references relied upon are Drevon (Ex. 1003), Schneider (Ex. 1004), Van Antwerp (Ex. 1005), Moon (Ex. 1006), Hamade (Ex. 1007), McDaniel (Ex. 1008) and Bostek (Ex. 1009). See Exhibit List and Section V.A for detailed description of each prior art reference.

3. Supporting Evidence Relied Upon For The Challenge

The declaration by Dr. David Rozzell, Ph.D. (the Rozzell Declaration, Ex. 1010) and other supporting evidence in the Exhibit List are filed herewith.

4. Statutory Ground(s) Of Challenge And Legal Principles

The review of the ’618 Patent is governed by pre-AIA 35 U.S.C. §102 and §103 that were in effect before March 16, 2013. Further, 35 U.S.C. §§311 - 319 that took effect on September 16, 2012 govern this *inter partes* review.

5. Claim Construction

The ’618 Patent is an unexpired patent. In *inter partes* review, a claim in the ’618 Patent “shall be given its broadest reasonable construction in light of the specification of the patent in which it appears.” 37 C.F.R. §42.100(b).

6. How Claims Are Unpatentable Under Statutory Grounds Pursuant to 37 C.F.R. §42.104 (b)(2)

Section VI provides an explanation of how and why claims 1-11 of the ’618 Patent are unpatentable under pre-AIA 35 U.S.C. §103, including the identification of where each element of the claim is found in the prior art patents, published patent applications, and/or printed publications.

IV. OVERVIEW OF THE ’618 PATENT

A. PRIORITY DATE OF THE CLAIMS OF THE ’618 PATENT

The ’063 Application, from which the ’618 Patent issued, was filed on June 21, 2010. The ’063 Application did not claim priority to any prior-filed application(s). Therefore, the earliest effective filing date for the ’618 Patent is the filing date of the ’063 Application (*i.e.*, June 21, 2010).

B. SUMMARY OF THE ’618 PATENT

As an initial matter, it is important to understand that the invention of the ’618 Patent is not restricted to any particular intended applications or products. In this regard, it is disclosed in the ’618 Patent that, “The following description of embodiment(s) of the invention is merely exemplary in nature and is in no way intended to limit the scope of the invention, its application, or uses, which may, of course, vary.” (the ’618 Patent [Ex. 1001] at 2:25-28). Moreover, there is no element or limitation in any of the claims that would necessarily limit the claimed invention to a particular application or product. To the contrary, the claimed invention of the ’618 Patent reads on a broad collection of applications and products,

including but not limited to consumer applications and products, medical applications and products, industrial application and products, etc. Specific examples of such products include, but are not limited to, automobiles, medical devices and supplies, electronic devices, eyewear, and any other devices and articles that can come into contact with a bioorganic stain that is capable of being enzymatically degraded by a lipase.

Turning now to specific aspects of the ’618 Patent, “a composition and method for fingerprint removal from a substrate surface is disclosed. The method includes associating a lipase with a substrate or a coating such that the lipase is capable of enzymatically degrading a component of a fingerprint.” (*Id.* at 1:47-51). “The composition includes a substrate or coating containing a lipase. The composition optionally includes an organic crosslinkable or non-crosslinkable polymer resin.” (*Id*. at 1:59-61). See section IV.E for Patentee’s definition of “fingerprint”.

The present invention of the ’618 Patent is based on “the catalytic activity of a lipase enzyme to selectively degrade and volatilize components of fingerprints, thus, promoting active fingerprint removal. Fingerprint stains typically include components of sweat gland secretion and sebum which includes lipids, wax, and cellular debris. Several of the substances of sebum are lipophilic and have low volatility such as squalene and wax esters.” (*Id*. at 2:34-42). “The

lipase that is either immobilized in coatings or substrates catalyzes the hydrolysis, esterification, or transesterification of lipids including triacylglycerols, cholesterol esters, and other fingerprint components into smaller molecules. The smaller molecules may have higher volatility than their precursors and more easily vaporize[1] at ambient or elevated temperatures thereby allowing for complete stain removal." (*Id*. at 2:43-50).

It is disclosed that, "When a surface which is optionally a substrate or a coated substrate, is contacted with a fingerprint, the lipase enzyme or combinations of enzymes contact the fingerprint, or components thereof. The contacting allows the enzymatic activity of the substrate or coating to interact with and enzymatically alter the components of the fingerprint improving their removal from the substrate or coating. It is appreciated that the inventive methods of facilitating fingerprint removal will function at any temperature

[1] While enablement challenges under 35 U.S.C. §112(a) or pre-AIA 35 U.S.C. §112, 1st paragraph are not at issue in this Petition, petitioner notes that the products of a triacylglycerol lipase's enzymatic action on a triacylglycerol lipid as would be found in a fingerprint produces glycerols and fatty acids. See Ex. 1010, ¶35. At 760 mmHg pressure glycerol's boiling point is 290°C, and the boiling point of the smallest fatty acid called propanoic acid which has only 3 carbons is 141°C (CRC Handbook of Chemistry and Physics. 76th ed. CRC Press: Boca Raton, FL, 1995-1996; pp. 3-1, 3-278, 3-279).

whereby the lipase is active." (*Id*. at 10:36-45). "The presence of lipase combined with the material of a substrate or a coating on a substrate, optionally, with applied heat, breaks down fingerprint stains for facilitated fingerprint removal." (*Id*. at 11:4-7).

C. SUMMARY OF PROSECUTION FILE HISTORY

Examination of the '063 Application included one (1) Non-Final Office Action (*i.e*., Office Action dated August 14, 2012 ("the '063 OA" - Ex. 1011)), one (1) Applicant-Initiated Examiner Interview and one (1) Office Action Response (*i.e*., Office Action Response filed October 22, 2012 ("the '063 OAR" – Ex. 1012)). The Examiner Interview was held after the mailing of the '063 OA and the '063 OAR was filed following the Examiner Interview. As presented in the '063 OAR, the substantive content of the Applicant-Initiated Examiner Interview included Applicant's assertion that "the references are silent on the use of any material taught therein to facilitate fingerprint removal as well as no indication in any known reference that a lipase could be used for this purpose when associated with a coating or substrate material." ('063 OAR at pg. 6, ln. 6-8). A Notice of Allowability dated November 15, 2012, which did not include any reasons for allowance, was issued following the '063 OAR being filed.

In the '063 OA, as-filed claims 1-11 of the '063 Application were rejected under 35 U.S.C. 103(a) as being unpatentable over Yang *et al.* (Biotechnol Lett.

2010 Jul;32(7):951-6. Epub 2010 Mar 8; PTO 892) ("Yang *et al.*") in view of US Patent Application 20080119381 (05/22/2008; IDS filed 06/21/2010) ("Wang *et al.*"), Chen et al. (Biomacromolecules. 2008 Feb;9(2):463-71. Epub 2008 Jan 16; PTO 892) ("Chen *et al.*"), and Yu et al. (Biotechnol Lett. 2004 Apr;26(8):629-33; PTO 892) ("Yu *et al.*"). The '063 OA stated that 1.) "Yang *et al.* teach the lip2 gene encoding the Lip2 lipase from *Aspergillus niger* having an amino acid sequence that is 100% identical to SEQ ID NO: 1 of the instant application;" 2.) Wang *et al.* "teach linking moiety for covalently attaching proteins to the substrate or coating;" 3.) "Chen et al. teach covalently immobilizing lipase B onto epoxy-activated macroporous poly(methyl methacrylate) Amberzyme beads and nanoparticles with a poly(glycidyl methacrylate) outer region;" and 4.) "Yu et al. teach immobilizing lipase from *Candida rugosa* on three commercially available macroporous adsorptive resins for kinetic resolution of ibuprofen." ('063 OA at pg. 6, ln. 1-10).

The '063 OA further stated that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the references to arrive at the claimed method by covalently attaching the Lip2 lipase of Yang et al. to substrate or coating comprising a crosslinkable expoxy-activated polymer resin as taught by Chen et al., US Patent Application 20080119381, and/or Yu et al and then fingerprints with the said lipase associated on the said substrate or coating thereby facilitating the removal

of the fingerprint. One of ordinary skill in the art at the time the invention was made would have been motivated to combine the references in order to obtain a simple method that can remove fingerprints." ('063 OA at pg. 6, ln. 12-19).

In responding to the '063 OA in the '063 OAR, Applicant of the '063 Application ("'063 Application Applicant" i.e., Toyota Motor Corporation *et al.*) made several assertions and admission in arguing patentability in view of the cited prior art. These assertions and admission included:

1.) none of "the teaching of any of the cited reference suggest that one would be capable of using a lipase associated coating or substrate to facilitate vaporative fingerprint removal;"

2.) "no teaching is found in Yang et al. that a lipase when associated with a substrate or a coating will be capable of facilitating the removal of a fingerprint from that substrate or coating after contact with the fingerprint;"

3.) "Wang merely teach associating a lipase with a coating" and "there is no suggestion of using the materials taught in Wang to facilitate removal of a fingerprint,"

4.) "Chen et al. merely teach a lipase associated with an Amberzyme bead;"

5.) while this [a lipase associated with an Amberzyme bead] "may be interesting with respect to the beads use as a catalyst for polyester synthesis, it is submitted that the synthesis of polyesters does not suggest removal of a fingerprint

or degradation of any fingerprint component;"

6.) "Yu et al., similar to Chen et al., merely teach associating a lipase with a resin material … used to kinetically resolve ibuprophen;" and

7.) "as ibuprophen is not a component of a fingerprint, it is submitted that this reference [Yu] is limited to teaching association of a lipase with a substrate."

('063 OAR at pg. 9, ln. 6-pg. 10, ln. 4).

Additionally, the '063 Application Applicant made the further assertions and admissions:

1.) "the cited references when taken together as a whole are limited to teaching association of a lipase with a substrate material;"

2.) "no teaching of fingerprint removal is present in any cited reference such that the combination of the references similarly fails to suggest using such a lipase associated material to facilitate fingerprint removal;"

3.) "the new use of facilitating fingerprint removal is not taught by any cited reference;" and

4.) "Wang and Yang however, merely teach degradation of substrate molecules by a lipase in solution or associated with a coating, not that such a degradation can and will facilitate vaporative fingerprint removal."

('063 OAR at pg. 10, ln. 5-8, 10-11, and 16-19). As can be seen, with respect to the cited prior art, '063 Application Applicant 1.) admits that the prior art teaches

associating a lipase with a substrate, 2.) has asserted that non-obviousness is based on removal of a fingerprint or degradation of any fingerprint component, and 3.) has asserted that patentability is based on "the new use of facilitating fingerprint removal." ('063 OAR at pg. 10, ln. 10-11)

In alleging that facilitation of vaporative fingerprint removal is unexpected, '063 Application Applicant makes the following assertions and admissions: 1.) "merely degrading a substrate molecule into component parts does not necessarily result in their removal from a surface by vaporization" and 2.) "there is no expectation of success that the activity of a lipase associated coating or substrate will actually promote removal of the fingerprint as opposed to merely degrading one of more component parts and leaving those component parts on the surface of the material." ('063 OAR at pg. 10, ln. 20 to pg. 11, ln. 1). The '063 Application Applicant goes on to assert that "Applicants' lipase associated coatings or substrates promote fingerprint removal by vaporization, e.g. without the need for physical washing such as with water," making the admission that "the presently claimed invention provides for the first time a method of facilitating passive removal of fingerprints from any surface." ('063 OAR at pg. 11, ln. 22 to pg. 12, ln. 2). In this regard, '063 Application Applicant has admitted that the resulting removal of a fingerprint from a substrate or coating having a lipase associated therewith that is capable of enzymatically degrading a component of a fingerprint is a "passive" result

of an inherent property of such lipase. '063 Application Applicant's assertion contradicts its own disclosure that such removal of fingerprints from any surface is facilitated in an "active" manner (see '618 Patent at 2:54-56).

D. LEGAL PRECEDENT RELEVENT TO THE '618 PATENT

Petitioner submits that it is well-known that lipases in general will hydrolyze, and thereby degrade, various lipid-based compounds and that lipases will degrade triglycerides and other lipids, wax esters, other fatty acid esters, cholesterol esters, and similar compounds, which are well-known to be among the components of fingerprints. Petitioner also submits that it is unsurprising and completely expected that a lipase would degrade lipid and ester components of a fingerprint, and therefore the degradation of fingerprint components by a lipase would have been obvious to a person of ordinary skill in the art ("POSITA") at the time of the invention. See Ex. 1010, ¶¶35-41.

As presented above in section IV.C, during prosecution of the '063 Application, Applicant thereof admitted that associating a lipase with coating is taught by prior art (e.g., by Wang *et al*. ('063 OAR at pg. 9, ln. 18; pg. 10, ln. 16-18)). '063 Application Applicant also admitted that a substrate or coating having a lipase capable of enzymatically degrading a component of a fingerprint associated therewith facilitates removal of a fingerprint from a surface having such lipase associated therewith in a manner that is passive. ('063 OAR at pg. 11, ln. 23-pg. 12,

ln. 3)

Moreover, the ’618 Specification discloses the following:

> “The present invention is based on the catalytic activity of a lipase enzyme to selectively degrade and volatilize components of fingerprints, thus, promoting active fingerprint removal. Fingerprint stains typically include components of sweat gland secretion and sebum which includes lipids, wax, and cellular debris. Several of the substances of sebum are lipophilic and have low volatility such as squalene and wax esters.” (’618 Patent at 2:34-42)
>
> …
>
> “The lipase that is either immobilized in coatings or substrates catalyzes the hydrolysis, esterification, or transesterification of lipids including triacylglycerols, cholesterol esters, and other fingerprint components into smaller molecules. The smaller molecules may have higher volatility than their precursors and more easily vaporize at ambient or elevated temperatures thereby allowing for complete stain removal. Without being limited to one particular theory, it is believed that the resulting degradation products may have lower boiling points or reduced adhesion promoting increased vaporization either upon heating or incubation at ambient temperatures. Thus, the invention has utility as a composition and method for the active removal of fingerprints from surfaces.” (’618

Patent at 2:43-56)

As indicated by the disclosures made in the ’618 Patent, ’063 Application Applicant admits that it is known that a lipid is a component of a fingerprint. It is further admitted by ’063 Application Applicant, that it is an inherent functionality of a lipase enzyme on lipids (e.g., triacylglycerols, cholesterol esters, and other fingerprint components) that provides for the degradation of a component of a fingerprint resulting in removal of a fingerprint from a surface. Thus, this inherent functionality was well known prior to the filing of the ’063 Application. See Rozzell Declaration [Ex. 1010], ¶¶34-41.

In this respect, such “passive” fingerprint removal functionality in accordance with the claimed invention of the ’618 Patent is inherently present in such a lipase associated substrate or coating because a component of a fingerprint is well known to be degraded (e.g., rapidly converted to smaller chemical products) by a lipase in a manner that supports its vaporization when in an environment that would support such vaporization. More simply stated, the lipase of the claimed lipase associated substrate or coating acts on a component of a fingerprint in the same manner in which a lipase inherently acts on such component. This inherent functionality of the recited lipase associated substrate or coating is consistent with *In re Spada*, 15 USPQ 2d 1655 (1990), which holds that products of identical chemical composition cannot have mutually exclusive properties.

E. CLAIM TERM LEXICOGRAPHER

As provided for by MPEP 2111.01, "an applicant is entitled to be his or her own lexicographer and may rebut the presumption that claim terms are to be given their ordinary and customary meaning by clearly setting forth a definition of the term that is different from its ordinary and customary meaning(s) in the specification at the time of filing." See *In re Paulsen,* 30 F.3d 1475, 1480, 31 USPQ2d 1671, 1674 (Fed. Cir. 1994) (holding that an inventor may define specific terms used to describe invention, but must do so "with reasonable clarity, deliberateness, and precision" and, if done, must "'set out his uncommon definition in some manner within the patent disclosure' so as to give one of ordinary skill in the art notice of the change" in meaning) (quoting *Intellicall, Inc. v. Phonometrics, Inc.,* 952 F.2d 1384, 1387-88, 21 USPQ2d 1383, 1386 (Fed. Cir. 1992)).

Petitioner submits that '063 Application Applicant has served as its own lexicographer in defining the term "fingerprint" as recited in independent claim 1. Specifically, the '618 Specification discloses the following:

> "A fingerprint as defined herein is a bioorganic stain, mark, or residue left behind after an organism touches a substrate or coating. A fingerprint is not limited to marks or residue left behind after a substrate is touched by a finger. Other sources of bioorganic stains are illustratively, palms, toes, feet, face, any other skin surface area, hair, stains from fats

used in cooking such as cis-fatty acids, or fatty acids from any other source." ('618 Patent at 3:1-9)

In being its own lexicographer, Petitioner submits that '063 Application Applicant has defined what a "fingerprint" is and what a fingerprint is not. A fingerprint has been defined to be more then only marks or residue left behind after a substrate is touched by a finger. Conversely, a fingerprint has been defined to be a bioorganic stain, mark, or residue left behind after an organism touches a substrate or coating, wherein sources of such bioorganic stains are illustratively, palms, toes, feet, face, any other skin surface area, hair, stains from fats used in cooking such as cis-fatty acids, or fatty acids from any other source. Moreover, the disclosure of "fatty acids from any other source" in conjunction with the invention of the '618 Patent not being restricted to any particular intended applications or products (see section IV.B) clearly support that the term "fingerprint" has been given a substantially broader and different meaning than the plain and ordinary meaning of a mark left behind after a surface is touched with a finger.

F. CLAIM SCOPE SUPPORTED BY THE DISCLOSURE

A first consideration regarding claim scope supported by the disclosure is the test procedure for verifying removal of a fingerprint. The disclosures of the '618 Patent are limited to use of visual verification for making a determination that a fingerprint has been removed from a substrate or coating having a lipase associated

therewith in accordance with the disclosures of the '618 Patent. For example, the '618 Patent discloses, "The surface temperature is optionally raised to such a level that the breakdown products volatilize to the point of no visual material remaining on the substrate within 24 hours. Optionally, the temperature is raised to such a level that the breakdown products are removed to the point of no visual material remaining on the substrate within 0.5 to 3 hours, inclusive" (*Id*. at 10:56-62) and "Heat is optionally applied until the breakdown products volatilize to the point of no visual material remaining on the substrate" (*Id*. at 10:66-11:1). In this regard, the '618 Patent presents no disclosure other than visual observation for scientifically verifying that any component of a fingerprint has been enzymatically degraded by a lipase associated with a substrate or coating and subsequently has been removed by vaporization from such lipase associated substrate or coating[2].

A second consideration regarding claim scope supported by the disclosure is incubation temperature. The '618 Patent presents various information relating to the vaporization of breakdown products[3] at stated temperatures and ranges of

[2] As disclosed in Buchannan [Ex. 1013], it is well-established that fingerprints disappear from surfaces over time without having been contacted with an enzyme such as a lipase, and that the mechanism of this disappearance is by vaporization. See Ex. 1010, ¶¶32-34 and 40-41.

[3] The term "breakdown products" is not explicitly defined in the written description. Petitioner believes that breakdown products is a term that is analogous to the recited term "degradation products" (*Id*. at 2:51), which refers to the resulting products from lipase catalyzing the hydrolysis, esterification, or transesterification of lipids (*Id*. at 2:43-47).

temperatures. (*Id*. at 10:43-11:3). However, the only temperatures at which lipase associated substrates/coatings in accordance with the disclosures of the ’618 Patent were evaluated in working examples are room temperature[4] (RT) and 65º C. (*Id*. at 12:12-21 and 12:29-33). It is also important to note that room temperature is not quantitatively defined in the ’618 Patent.

Although it is disclosed that the claimed “fingerprint removal” from a lipase associated substrate or coating can take place at “any temperature whereby the lipase is active,” 4°C, 25°C, ambient temperature, and “between 40°C and 120°C” (*Id*. at 2:43-54; 10:43-49), Petitioner suggests that the working examples do not support such an assertion. For example, with respect to working Example 2 and referring to FIG. 1, the ’618 Patent discloses, “Fingerprinted panels are incubated at room temperature for at least 24 hours. A control panel is coated with the coating of Example 1 that is free of enzyme. After this first incubation period, the coated substrate is incubated in an oven at a temperature of 65° C or higher for 1 to 6

[4] The term ambient temperature is also referred to in the disclosure describing one of the working examples. (*Id*. at 12:30). However, in FIG. 2, which shows results of one of the working examples, it is indicated that an associated portion of the experimentation of such working example was carried out at room temperature (RT). Thus, the disclosures of the ’618 Patent imply that ambient temperature and room temperature are (RT) are the same. Lipases and other enzymes have also been entrapped in polymers, or adsorbed on polymeric surfaces. Immobilizing, entrapping, or otherwise associating a lipase with a surface, polymer, substrate, or coating was well-known at the time of the ‘618 Patent invention. See Ex. 1010, ¶¶87-88

hours. FIG.1 demonstrates that incubation of the enzyme coated panels at 65° C for two hours facilitates complete removal of fingerprints. (B: control; L: lipase; LA: combined lipase and amylase in coating.)" (Id. at 12:12-21). The test results shown in FIG. 1 of the '618 Patent provide no evidence that any amount of fingerprint removal occurred at room temperature because there is no test sample from before and after being incubated at room temperature for at least 24 hours. Similarly, in FIG. 2, there is no evidence that any amount of fingerprint removal occurred at room temperature because there is no test sample from before and after being incubated at room temperature for 3 days. See Ex. 1010, ¶¶82-84.

Moreover, FIG. 2 of the '618 Patent shows evidence that fingerprint removal only occurred after the room temperature incubated test samples were subsequently incubated at 65° C. Specifically, as shown in FIG. 2, there is no visual indication of evidence at 3 days of initial incubation (i.e., reaction period) and at 0 days of incubation at 65° C that any amount of fingerprint removal has occurred at room temperature. It is only after the test samples are incubated at 65° C for 2.5 hours that there is less visual material remaining on the test panels than at earlier periods of time. Thus, Petitioner submits that the working examples only provide evidence of fingerprint removal from a lipase associated substrate or coating after being exposed to heat at 65° for at least 2.5 hours. It is important to note that in any event such chemical and physical characteristics are inherent

to both the starting substrates of as well as the products of lipase degradation of lipids. See Ex. 1010, ¶¶85-86.

G. FLAWED ANTECEDENT BASIS IN CLAIM 1

Petitioner submits that the third clause of independent Claim 1 is not functionally tied to either the first or second clauses and that only structural language ties the third clause of independent Claim 1 to the first and second clauses. Specifically, independent Claim 1 recites:

> providing a substrate or a coating;
> associating a lipase with said substrate or said coating such that said lipase is capable of enzymatically degrading a component of a fingerprint, and
> facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint.

('618 Patent at col. 15, lines 20-26.)

As can be seen, the second clause and the third clause have a structural relationship with each other through "the lipase associated substrate or coating", which is recited in the third clause and finds antecedent basis in the second clause through "associating a lipase with said substrate or said coating". However, the third clause's recited limitation of "facilitating the removal of a fingerprint by vaporization" has no functional linkage to the first or second clauses because

none of this recited limitation finds antecedent basis in the first or second clauses and because the remaining language in the third clause is limited to the aforementioned structural relationship with the first and second clauses. In contrast, the functional language in the second clause is "enzymatically degrading a component of a fingerprint." Thus, it is "a component" of a fingerprint that is being enzymatically degraded, not a fingerprint.

The recited "removal of a fingerprint by vaporization" does not find antecedent basis in a fingerprint being enzymatically degraded. Thus, the third clause is not necessarily functionally dependent on the functionality in the second clause (i.e., vaporization of a fingerprint is not recited as necessarily being dependent on enzymatic degradation of a component of a fingerprint).

H. PROPOSED CLAIM CONSTRUCTION

"facilitating the removal of a fingerprint by vaporization": Based at least partially on the considerations discussed above in sections IV.C-IV.G, Petitioner submits that the proposed construction for "facilitating the removal of a fingerprint by vaporization" is enabling a bioorganic material deposited by an organism through touching a lipase associated substrate or coating to transition from an initial quantity of visually apparent bioorganic material being on such substrate or coating to a lesser quantity of visually apparent bioorganic material being thereon.

V. THERE IS A REASONABLE LIKELIHOOD THAT AT LEAST ONE CLAIM OF THE '618 PATENT IS UNPATENTABLE

Claims 1-11 are unpatentable under 35 U.S.C. §103(a) for merely reciting predictable and obvious combinations of elements/limitations that were well known many years prior to the filing date for the '618 Patent and that were taught or suggested by the cited prior art in this Petition.

A. IDENTIFICATION OF THE REFERENCES AS PRIOR ART

As detailed below, the cited prior art references relied upon herein are within the same or closely related technical field as the claimed subject matter of the '618 Patent. All of the cited prior art references relied upon herein were published more than one year prior to the June 21, 2010 filing date of the application from which the '618 Patent issued (i.e., the '063 Application) and, therefore, are prior art under 35 U.S.C. §102(b). As prior art under 35 U.S.C. §102(b), the cited references cannot be sworn behind by a declaration under 37 C.F.R. §1.131. In addition, none of the cited references in this Petition were cited and relied upon during original examination or prosecution of the '063 Application.

Drevon ([Ex. 1003] Printed Publication; published December 3, 2002) describes "strategies to immobilize enzymes into various polymer and coatings. Three categories of bioplastic matrices were investigated. The first type of bioplastics was prepared by irreversibly incorporating di-isopropylfluorophosphatase (DFPase) into polyurethane (PU) foams." (*Id.* at 3:5-

8). "Biopolymers were also prepared via atom transfer radical polymerization (ATRP) using acrylic and sulfonate-derived monomers. ATRP ensured the covalent and multi-point immobilization of enzyme within polymer matrices." (*Id.* at 3:15-17). "Enzyme-containing PU- and Michael adduct (MA)-based coatings correspond to the last category of bioplastics that was investigated. DFPase was irreversibly incorporated into PU coatings." (*Id.* at 4:1-3).

With reference to attaching enzymes to solid supports, Drevon discloses that "Immobilization refers to the preparation of insoluble biocatalytic derivatives and involves the coupling of enzymes to solid supports that are either organic or inorganic. It has been increasingly used in industrial applications as it facilitates the separation of biocatalysts from the effluents and, hence, the recovery and purification of the products. Moreover, solid biocatalysts offer the major advantage of being reusable. The large variety of matrices that can be used ranges from natural and synthetic polymers to silica beads. Covalent immobilization often proceeds by the reaction of specific functionalities at the support surface with amino acid side chains that are readily available on the enzyme surface. The covalent coupling may induce drastic changes in the enzymatic kinetics especially when it occurs near the active site. Another important effect is to reduce the enzyme flexibility. As the number of linkages between the enzyme and the support increases, so does the enzyme rigidity. By providing a maximum rigidity, multi-point covalent

immobilization is likely to prevent enzyme unfolding upon heating or in the presence of a denaturant. A non-conventional strategy to achieve multi-point covalent immobilization within a polymer network is by copolymerizing the enzyme with monomers capable of a chemical reaction with specific functionalities on its surface. During polymerization, the enzyme acts as a monomer and is, thus, expected to be uniformly distributed within the resulting biopolymer." (*Id.* at 18:7-19:4).

Drevon discloses that "waterborne polyurethane (PU) coatings result from the polymerization of aqueous polyester-based polyol dispersions and water dispersible aliphatic polyisocyanates. As the film is cured at room temperature, water evaporates and cross-linking occurs through the condensation between hydroxyl groups and isocyanate functionalities (Figure 10). Cross-linking provides water resistance to the coatings. Two-component waterborne polyurethanes are increasingly used in industrial applications, and they exhibit properties similar to those of solvent borne polyurethane coatings. Waterborne polyurethane coating represents a potentially ideal polymeric matrix for multipoint and covalent immobilization of enzymes. Given our depth of understanding of monolith polyurethane-enzyme composites, we believe that an enzyme added to the aqueous phase of a two-component system prior to polymerization can act as a monomer during coating curing. The immobilization process would rely on the ability of amines at the enzyme surface to react with isocyanate functionalities at a faster rate than hydroxyl groups on the polyol (Figure

10). A similar approach has been used for the insertion of enzyme into hydrophobic acrylate polymer coatings." (*Id.* at 101:2-17).

Schneider ([Ex. 1004] U.S. Appl. Pub. No. 2005/0147579 A1; published July 7, 2005) discloses, "a coating composition comprising at least one enzyme capable of acting on a compound, wherein said action results in the formation of an antifouling species comprising an antifouling activity, and wherein said compound does not form part of said coating composition. The coating composition preferably comprises at least one oxidase capable of acting on a compound, such as a substrate for said oxidase, wherein said action results in the formation of an antifouling species including an antimicrobial species comprising an antimicrobial activity. More preferred, the oxidase comprises an activity which results in the formation of a peroxide. The oxidase can be present in said coating composition in combination with one or more additional enzymes including, but not limited to, an esterase, including a lipase, an amidase, including a protease, and a polysaccharide degrading enzyme, wherein said one or more additional enzyme(s), alone or in any combination, can be included in the presence or absence of one or more substrates for one or more of said enzymes." (*Id.* at Abstract:1-20).

With respect to antimicrobial activity, Schneider discloses, "As the technology for keeping the interior environment of hospitals, etc., against

bacteria and fungi, it is common practice to apply a coating containing a compound having antibacterial/antifungul activity to the surface of the interior walls, fixtures, furnishings, upholstery, etc." (*Id.* at 0009:1-5) and "The coating compositions of the invention are capable of reducing and/or eliminating fouling in the form of microbial growth and/or the formation of bio-film on objects coated with the composition. The microbial organisms can be e.g. bacteria, vira, fungal cells and slime molds." (*Id.* at 0125:1-5).

Van Antwerp ([Ex. 1005] U.S. Patent No. 5,868,720; published February 9, 1999) discloses, "An improved indwelling catheter adapted for long-term usage includes a stable enzyme coating to prevent occlusion of the catheter lumen. The enzyme coating includes a fibrinolytic and/or lipolytic enzyme incorporated in a catheter coating to resist or control proteolytic degradation, thereby maintaining the enzyme in an active state for dissolving clots and occlusions within the catheter lumen over an extended period of time." (*Id.* at Abstract 1-8). "The catheter 10 includes a stable, substantially immobilized enzyme-containing coating 14 as depicted, for example, in FIG. 6, for preventing and/or dissolving occlusions." (*Id.* at 3:44-47). "[T]he catheter 10 is commonly constructed from a polymeric material, such as medical grade silicone rubber, polyethylene, or the like." (*Id.* at 3:65-67). "Alternatively, a lipolytic enzyme such as phospholipase may be used for dissolving a lipid-based occlusion. A

combination of such fibrinolytic and lipolytic enzymes may also be used." (*Id.* at 4:18-21).

As shown and discussed in reference to FIGS. 3 and 4, a catheter having an enzyme composition coating on its interior and exterior surfaces is provided. To this end, Van Antwerp discloses, "FIG. 3 illustrates immersion of catheter 10 into a prepared enzyme slurry or emulsion 20. In this regard, the enzyme is commonly available in particulate form, having a particle size ranging on the order of one to fifteen microns. The enzyme particles are mixed in a liquid carrier such as water to produce the emulsion 20 shown in FIG. 3. Upon withdrawal of the catheter 10 from the enzyme emulsion 20, the catheter surface is allowed to dry resulting in adherence of the enzyme to the catheter in a micellar array of microsphere particles 21, as shown in exaggerated form in FIG. 4." (*Id.* at 4:36-46).

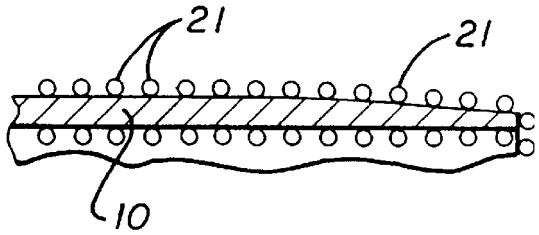

FIG. 4

Moon ([Ex. 1006] U.S. Appl. Pub. No. 2005/0176905 A1; published August 11, 2005) discloses, "an antimicrobial polymeric resin composition in which one or more antimicrobial polymers selected from the group consisting of the antimicrobial

monomer compound of formula 1, the antimicrobial homopolymer of formula 4, the antimicrobial copolymer compound of formula 5, the compounds of formula 6 to 9, and the acrylic copolymer of formula 10 are uniformly mixed with an ordinary polymeric resin." (*Id.* at 0115:1-8). "The acrylic copolymer of formula 10 of the present invention can be manufactured by the radical reaction of the compound of formula 11 with the compound of formula 12 below," (*Id.* at 0109:1-4). "It is preferred that the compound of formula 12 has an acrylic monomer, which is the hydrocarbon chain attributed to an acrylic acid or methacrylic acid, as a main chain. More preferably, it is a monomer having an acrylic acid, acrylic acid alkyl ester, methacrylic acid, or methacrylic acid alkyl ester. The acrylic acid alkyl ester and methacrylic acid alkyl ester preferably include a C_1~ C_{18} alkyl. Examples of such acrylic acid alkyl ester include methylacrylate, ethylacrylate, n-propylacrylate, isopropylacrylate, cyclohexylacrylate, t-butylcyclohexylacrylate, stearylacrylate, and laurylacrylate. Also, the acrylic monomer can comprise a reactive functional group, and as examples of such functional groups, there are an amide group, a hydroxyl group, an epoxy group, a silanol group, and an aldehyde group." (*Id.* at 0112:1-14). With respect to polymer resin composition in accordance with the invention, Moon discloses, "They are particularly useful for medical supplies, that is, medical devices/products for insertion into the human body such as catheters for medical purposes, prostheses, and products for

repairing bones, or blood transfusion bags for medical purposes." (*Id.* at 0059:12-16).

Hamade ([Ex. 1007] U.S. Patent No. 6150146; published November 21, 2000) discloses, "a novel method for sustained release of compounds having antimicrobial activity and a coating composition capable of releasing a safe and effective compound having antimicrobial activity at a controlled rate." (*Id.* at 0002:49-53). "[T]he coating composition according to the present invention comprises a film-forming resin, an enzyme, and a substrate, said enzyme being capable of reacting with said substrate to produce a compound having antimicrobial activity." (*Id.* at 0007:31-35). With respect to enzyme selection, Hamade discloses, "There is no particular limitation on an enzyme-substrate combination capable of producing such a carboxyl group-containing compound. Typical are the case in which the enzyme is an esterase and the substrate is an ester bond-containing compound and the case in which the enzyme is an amidase and the substrate is an amide bond-containing compound. The esterase is not particularly restricted in kind but includes esterases such as carboxylesterase, arylesterase, acetylesterase, etc.; lipases such as triacylglycerol lipase, lipoprotein lipase, etc.; and proteases such as subtilisin, chymotrypsin, tripsin, elastase, cathepsin, papain, chymopapain, pepsin, etc., and so forth." (*Id.* at 0004:5-18).

McDaniel ([Ex. 1008] U.S. Appl. Pub. No. 2004/0109853, published June 10, 2004) is directed to compositions and methods for their use as components of surface treatments such as coatings. McDaniel discloses, "compositions and methods for incorporating biological molecules into coatings in a manner to retain biological activity conferred by such biological molecule." (*Id.*at 0021:4-6). Such compositions comprise "a bioactive molecule such as an enzyme composition that retains activity after being admixed with paint. In addition, it still retains activity after the paint is applied to a surface, and renders the surface bioactive." (*Id.* at 0023:2-6). "In some embodiments, the coating comprises a paint. In other embodiments, the coating comprises a clear coating. In some aspects, the clear coating comprises a lacquer, a varnish, a shellac, a stain, a water repellent coating, or a combination thereof. In general aspects, the coating comprises a binder, a liquid component, a colorant, an additive, or a combination thereof." (*Id.* at 0046:1-7).

Bostek ([Ex. 1009] Printed Publication; published December 1992; American Association of Nurse Anesthetists Journal, (60(6):561-6) discloses infusing intravenous (IV) fluid that is heated above room temperature into a patient through a catheter and that such infusing can be for a period of at least 2 hours. (*Id.* at pg. 564, col. 1, ln. 13-16; pg. 564, col. 2, ln. 1-10; pg. 564, col. 2, ln. 14-pg. 565, ln. 12).

B. SUMMARY OF GROUNDS OF UNPATENTABILITY

The cited prior art references relied upon herein disclose all the limitations of

claims 1-11 of the ’618 Patent and render each claim as a whole obvious and unpatentable under 35 U.S.C. §103(a). Petitioner requests IPR of the claims 1-11 of the ’618 Patent on the grounds set forth in Table 2, shown below, and requests that claims 1-11 be found unpatentable. An explanation of unpatentability under the statutory grounds identified below is provided in the form of detailed descriptions that follow, indicating where each element can be found in the cited prior art, and the relevance of that prior art.

TABLE 2 – GROUNDS OF UNPATENTABILITY

Ground	‘618 Patent	Basis for Invalidity
Ground 1A (G1)	1-3	Obvious under §103(a) over Van Antwerp
Ground 1B (G2)	4, 5	Obvious under §103(a) over Van Antwerp in view of Bostek
Ground 1C (G3)	6-9	Obvious under §103(a) over Van Antwerp in view of Moon
Ground 1D (G4)	10, 11	Obvious under §103(a) over Van Antwerp in view of Hamade
Ground 2A (G5)	1-8, 10-11	Obvious under §103(a) over Schneider
Ground 2B (G6)	9	Obvious under §103(a) over Schneider in view of McDaniel
Ground 3A (G7)	1-9	Obvious under §103(a) over Drevon

Ground 3B (G8)	10, 11	Obvious under §103(a) over Drevon in view of Schneider

C. DIFFERENT INVALIDITY POSITIONS AGAINST CLAIMS ARE INDEPENDENT, DISTINCTIVE AND NOT REDUDANT

This Petition uses eight (8) references to form three (3) independent and distinct invalidity positions and the grounds of unpatentability thereof against claims 1-11 of the ’618 Patent. The basis of the first invalidity position is Van Antwerp [Ex. 1006], the basis of the second position is Schneider [Ex. 1004], and the basis of the third position is Drevon [Ex. 1003]. These invalidity positions are selected because they are non-redundant. For example, each one of the invalidity positions provides a uniquely different perspective upon which the limitations and elements of the claimed invention are disclosed with respect to application, product, and/or method of use. Specifically, Van Antwerp is from the perspective of an application-specific medical device, Schneider is from a general-use antifouling/antimicrobial coating perspective, and Drevon is from an analytical/academic research perspective. In this respect, these invalidity positions provide the Office and the public with a fuller view of the prior art landscape that was not discussed or duly considered during the original examination of the application from which the ’618 Patent issued (*i.e.*, the ’063 Application).

With regard to the basis of the first invalidity position (*i.e.*, Van Antwerp), the

claimed invention as a whole in the single independent claim and several of the dependent claims is rendered obvious by the disclosures of Van Antwerp, with the additional disclosure of secondary references of Bostek, Moon and Hamade each providing disclosure that renders one or more respective dependent claims obvious. With regard to the basis of the second invalidity position (*i.e.*, Schneider), the claimed invention as a whole in the single independent claim and several of the dependent claims is rendered obvious by the disclosures of Schneider alone, with the additional disclosure of secondary reference of McDaniel providing disclosure that renders one or more respective dependent claims obvious. With regard to the basis of the third invalidity position (*i.e.*, Drevon), the claimed invention as a whole in the single independent claim and several of the dependent claims is rendered obvious by the disclosures of Drevon alone, with the additional disclosure of secondary reference of Schneider providing disclosure that renders one or more respective dependent claims obvious.

In the spirit of 37 C.F.R. §42.1(b) to facilitate "just, speedy and inexpensive Resolution," Petitioner has diligently minimized the number of references, out of myriad highly relevant references, and the number of invalidity positions. Thus, Petitioner respectfully submits that the invalidity positions presented herein are non-redundant and are the minimum number required to facilitate such just, speedy and inexpensive resolution in this matter.

Rule 37 C.F.R. §42.1(b) also requires just resolution of the unpatentability issues. In this regard, Petitioner respectfully reminds the Office that the absence of full and proper prior art references being cited and applied during the original examination is the underlying reason that led to the issuance of claims 1-11 of the ’618 Patent. Claims 1-11 of the ’618 Patent fail to meet the statutory requirements for patentability over available prior art. This Petition is a remedial measure for correcting the absence of full and proper prior art references being cited and applied during the original examination of the ‘063 Application and is necessitated to prevent the improper enforcement of invalid patent claims.

Petitioner respectfully submits that the need for just resolution of the unpatentability issues urges the full adoption of all proposed invalidity positions and their associated respective grounds of unpatentability.

VI. DETAILED EXPLANATION OF GROUNDS OF UNPATENTABILITY OF CLAIMS 1-11

A. Basis of Van Antwerp

A POSITA would have been motivated, or would have found it obvious, at the time that the invention of the’618 Patent was made to combine embodiments and/or disclosure in Van Antwerp and/or the disclosure of Van Antwerp with the disclosure of one or more other references cited in relation to Van Antwerp (e.g., Moon and/or Hamade) because such embodiments and disclosures are directed to the same technical field, address similar technical disclosure relating to lipase

associated substrates and/or coatings, and presents motivating and/or suggesting disclosure for such combinations. See Table 2 and Ex. 1010, ¶¶103-104.

CLAIM 1 Preamble [P1] recites: "A method of facilitating the removal of a fingerprint on a substrate or a coating comprising:" Van Antwerp discloses providing a lipolytic enzyme coating on an article for the purpose of enzymatically dissolving a lipid-based substance that may come into contact with such article. (Van Antwerp [Ex. 1006] at 4:8-21; FIG. 4:enzyme 21 on exterior surface). See also sections IV. D IV.E above.

Element [A1] recites: "providing a substrate or a coating;" Van Antwerp discloses a catheter made from a polymeric material (*Id.* at 3:41-44; 3:65-67), which is a substrate upon which a coating can be provided.

Element [B1] recites: "associating a lipase with said substrate or said coating such that said lipase is capable of enzymatically degrading a component of a fingerprint." Van Antwerp discloses providing a stable and substantially immobilized enzyme coating on interior and exterior surfaces of the catheter (*Id.* at 2:34-42; FIG. 4:enzyme 21 on exterior surface), that the enzyme can be a lipolytic enzyme (*Id.* at 2:38-42) and that the lipolytic enzyme can be phospholipase (*Id.* at 4:18-20). Van Antwerp discloses that the lipolytic enzyme is capable of dissolving a lipid-based substance, (*Id.* at 4:8-21; 6:14-18; FIG. 4:enzyme 21 on exterior surface), such dissolving being a form of enzymatic

activity. (*Id.* at 4:18-26). Such lipid-based substance is known to be a bioorganic substance. Lipases and other enzymes have also been entrapped in polymers, or adsorbed on polymeric surfaces. Immobilizing, entrapping, or otherwise associating a lipase with a surface, polymer, substrate, or coating was well-known at the time of the '618 invention. See sections IV.D and IV. E above and Ex. 1010, ¶45.

Element [C1] recites: "facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint." Van Antwerp does not explicitly disclose facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint. However, Van Antwerp discloses that the purpose of the lipolytic enzyme coating on the polymeric catheter is dissolving a lipid-based substance, (*Id.* at 4:8-21; 6:14-18; FIG. 4:enzyme 21 on exterior surface), such dissolving being a form of enzymatic degradation. (*Id.* at 4:18-26). Such lipid-based substance is known to be a bioorganic substance. As such, at the time the invention of the '618 Patent was made, a POSITA would have found it obvious that a phospholipase coated polymeric catheter as disclosed by Van Antwerp is capable of facilitating the removal of a bioorganic stain (i.e., a fingerprint) by vaporization when such phospholipase coated polymeric catheter is present in an environment that supports vaporization of the enzymatically degraded component(s) of the bioorganic stain. (See also sections IV. E and IV.H above)

The "passive" fingerprint removal functionality in accordance with the claimed invention of the '618 Patent is inherently present in a lipase associated substrate or coating (e.g., the phospholipase coated polymeric catheter of Van Antwerp) because one or more components of the bioorganic stain is well-known to be enzymatically degraded by a lipase in a manner that allows for its vaporization when in an environment that would support such vaporization (e.g., an ambient environment consisting of air). See section IV.D above and Ex. 1010, ¶¶35-41, 94-96.

CLAIM 2 recites: "wherein said lipase is covalently attached to said substrate or to said coating." Van Antwerp discloses that enzymes can be coated onto the catheter in a well-known manner (e.g., "The capsules **26** are then bonded to the polymeric catheter material by silicone chemistry") whereby such enzyme is covalently attached to the catheter. (*Id.* at 5:29-43; 5:59-6:9). See also Ex. 1010, ¶42.

CLAIM 3 recites: "wherein said lipase is non-covalently adhered to or admixed into said substrate or said coating." Van Antwerp discloses that enzyme can be coated onto the catheter in a well-known manner (e.g., "immersion of catheter 10 into a prepared enzyme slurry or emulsion 20. In this regard, the enzyme is commonly available in particulate form, having a particle size ranging on the order of one to fifteen microns. The enzyme particles are mixed in a liquid carrier such

as water to produce the emulsion 20 shown in FIG. 3. Upon withdrawal of the catheter 10 from the enzyme emulsion 20, the catheter surface is allowed to dry resulting in adherence of the enzyme to the catheter in a micellar array of microsphere particles 21") whereby such enzyme is non-covalently adhered to the catheter. (*Id.* at 4:36-47; 2:46-50). See also Ex. 1010, ¶43.

CLAIM 4 recites: "comprising heating said substrate or said coating or applying heat to a surface of said substrate or said coating subsequent to being contacted by a fingerprint." Van Antwerp discloses that the catheter is used for delivering medical fluids to or drawing body fluids from a patient. (*Id.* at 1:21-23). Van Antwerp does not explicitly disclose heating said substrate or said coating or applying heat to a surface of said substrate or said coating subsequent to being contacted by a fingerprint. However, Bostek discloses infusing intravenous (IV) fluid that is heated above room temperature into a patient through a catheter and that such infusing is performed for a period of at least 2 hours (Bostek [Ex. 1009] at pg. 564, col. 1, ln. 13-16; pg. 564, col. 2, ln. 1-10; pg. 564, col. 2, ln. 14-pg. 565, ln. 12), which would result in heating of the catheter (i.e., Bostek's catheter heating functionality).

In view of these disclosures of Van Antwerp and Bostek, a POSITA would have found it obvious at the time of the invention of the '618 Patent was made to combine the disclosures of Van Antwerp with Bostek's catheter heating

functionality. One motivation for a POSITA to make such a combination is that Van Antwerp teaches the underlying use of using catheters to deliver medical fluids into a patient and Bostek provides specific examples of implementing such use of a catheter. See Ex. 1010, ¶¶107-110.

CLAIM 5 recites: "wherein said heating is for at least 30 minutes." As discussed above in reference to Claim 4, Van Antwerp discloses a catheter is used for delivering medical fluids to or drawing body fluids from a patient (*Id.* at 1:21-23) and that a catheter can be in use for an extended period of time which may range from several days to several years (*Id.* at 1:37-40), and Bostek discloses infusing intravenous (IV) fluid that is heated above room temperature into a patient through a catheter for a period of at least 2 hours (Bostek [Ex. 1009] at pg. 564, col. 1, ln. 13-16; pg. 564, col. 2, ln. 1-10; pg. 564, col. 2, ln. 14-pg. 565, ln. 12). See Ex. 1010, ¶¶107-110.

CLAIM 6 recites: "wherein said substrate or said coating comprises an organic crosslinkable polymer resin." Van Antwerp discloses that the catheter can be made from a polymeric material and that polyethylene is an example of such a polymeric material. (*Id.* at 3:65-67). Polyethylene is well known to be an organic crosslinkable polymer resin.

CLAIM 7 recites: "wherein said organic crosslinkable polymer resin comprises a functional group of acetoacetate, acid, amine, carboxyl, epoxy,

hydroxyl, isocyanate, silane, vinyl, or combinations thereof." Although Van Antwerp discloses that the catheter can be made from an organic crosslinkable polymer resin (see Claim 6 above), Van Antwerp does not explicitly disclose that the organic crosslinkable polymer resin comprises a functional group of acetoacetate, acid, amine, carboxyl, epoxy, hydroxyl, isocyanate, silane, vinyl, or combinations thereof.

However, Moon discloses polymeric resin compositions suitable for use in medical supplies such as a catheter that provide improved antimicrobial characteristics (Moon [Ex. 1006] at 0059: 1-2, 0059:12-16; 0115:1-8), and that polymeric resins that may be used in the composition can include a functional group of isocyanate, hydroxyl, or epoxy (*Id*. at 0119:1-12, 112:1-25).

In view of these disclosures of Moon, a POSITA would have found it obvious at the time of the invention of the '618 Patent was made to modify the polymeric material of Van Antwerp to include at least one of the isocyanate, hydroxyl, or epoxy functional group of Moon. One motivation for such modification is that Moon discloses that the polymer resins thereof can be used for making medical supplies such as a catheter (*Id*. at 0059: 1-2, 0059:12-16). Another motivation for such modification is seeking a polymeric material that exhibits improved antimicrobial characteristics. See Ex. 1010, ¶¶118-119.

CLAIM 8 recites: "wherein said organic crosslinkable polymer resin is

aminoplasts, melamine formaldehydes, carbamates, polyurethanes, polyacrylates, epoxies, polycarbonates, alkyds, vinyls, polyamides, polyolefins, phenolic resins, polyesters, polysiloxanes, or combinations thereof." Van Antwerp discloses that the catheter can be made from a polymeric material and that polyethylene is an example of such a polymeric material. (*Id.* at 3:65-67). Polyethylene is well known to be a polyolefin.

CLAIM 9 recites: "wherein said organic crosslinkable polymer is a hydroxyl-functionalized acrylate resin." Van Antwerp discloses that the catheter can be made from a polymeric material (*Id.* at 3:65-67), which can be an organic crosslinkable polymer (e.g., polyethylene). Van Antwerp does not explicitly disclose that such polymeric material is a hydroxyl-functionalized acrylate resin.

However, Moon discloses polymeric resin compositions suitable for use in medical supplies such as a catheter that provide improved antimicrobial characteristics (Moon [Ex. 1006] at 0059:1-2, 0059:12-16; 0115:1-8) and that such antimicrobial polymeric resin compositions can be a hydroxyl-functionalized acrylate resin (*Id*. at 0112:1-25; 0115:1-8; 0120:1-0122:6).

In view of these disclosures of Moon, a POSITA would have found it obvious at the time of the invention of the '618 Patent was made to modify the polymeric material of Van Antwerp to be a hydroxyl-functionalized acrylate resin of Moon. One motivation for such modification is that Moon discloses

that the polymer resins thereof can be used for making medical supplies such as a catheter (*Id*. at 0059: 1-2, 0059:12-16). Another motivation for such modification is seeking a polymeric material that exhibits improved antimicrobial characteristics. See Ex. 1010, ¶¶122-123.

CLAIM 10 recites: "wherein said lipase is lipoprotein lipase, acylglycerol lipase, hormone-sensitive lipase, phospholipase Al, phospholipase A2, phospholipase C, phospholipase D, phosphoinositide phospholipase C, a lyso-phospholipase, or a galactolipase." Van Antwerp discloses providing a stable and substantially immobilized enzyme coating on interior and exterior surfaces of the catheter (*Id.* at 2:34-42; FIG. 4: enzyme 21 on exterior surface), that the enzyme can be a lipolytic enzyme (*Id.* at 2:38-42) and that the lipolytic enzyme can be phospholipase (*Id.* At 4:18-20). Although Van Antwerp discloses that the enzyme can be phospholipase, Van Antwerp does not explicitly disclose that the enzyme is lipoprotein lipase, acylglycerol lipase, hormone-sensitive lipase, phospholipase Al, phospholipase A2, phospholipase C, phospholipase D, phosphoinositide phospholipase C, a lysophospholipase, or a galactolipase.

However, Hamade discloses a coating composition comprising a film-forming resin, an enzyme, and a substrate, said enzyme being capable of reacting with said substrate to produce a compound having antimicrobial activity. (Hamade [Ex. 1007] at 7:31-35). Hamade further disclose that the enzyme can

be a lipase such as triacylglycerol lipase or lipoprotein lipase. (*Id*. at 4:7-15).

It would have been obvious to a POSITA at the time that the invention of the '618 Patent was made to modify the enzyme of the enzyme-coated catheter disclosed by Van Antwerp to be lipoprotein lipase disclosed by Hamade. One motivation for such modification is the POSITA seeking enzymes the exhibit enzymatic activity against various lipids and lipoprotein lipase being well known to enzymatically degrade components of bioorganic stains such as, for example lipids, fats, cellular debris and the like (e.g., phospholipase disclosed by Van Antwerp is well known to have comparable performance as lipoprotein lipase with respect to enzymatically degrading lipid-based substances.) See also Ex. 1010, ¶¶44, 131-133 regarding it being obvious to a POSITA to select a lipase from any of the known lipases to hydrolyze and degrade lipid components of a fingerprint.

CLAIM 11 recites: "wherein said lipase is a triacylglycerol lipase." Van Antwerp discloses providing a stable and substantially immobilized enzyme coating on interior and exterior surfaces of the catheter (*Id.* at 2:34-42; FIG. 4: enzyme 21 on exterior surface), that the enzyme can be a lipolytic enzyme (*Id.* at 2:38-42) and that the lipolytic enzyme can be phospholipase (*Id.* At 4:18-20). Although Van Antwerp discloses that the enzyme can be phospholipase, Van Antwerp does not explicitly disclose that the enzyme is triacylglycerol lipase.

However, Hamade discloses a coating composition comprising a film-

forming resin, an enzyme, and a substrate, said enzyme being capable of reacting with said substrate to produce a compound having antimicrobial activity. (Hamade [Ex. 1007] at 7:31-35). Hamade further disclose that the enzyme can be a lipase such as triacylglycerol lipase or lipoprotein lipase. (*Id*. at 4:7-15).

It would have been obvious to a POSITA at the time that the invention of the '618 Patent was made to modify the enzyme of the enzyme-coated catheter disclosed by Van Antwerp to be triacylglycerol lipase disclosed by Hamade. One motivation for such modification is the POSITA seeking enzymes the exhibit enzymatic activity against various lipids and triacylglycerol lipase being well known to enzymatically degrade components of bioorganic stains such as, for example lipids, fats, cellular debris and the like (e.g., phospholipase disclosed by Van Antwerp is well known to have comparable performance as triacylglycerol lipase with respect to enzymatically degrading lipid-based substances.) See also Ex. 1010, ¶¶44, 131-133 regarding it being obvious to a POSITA to select a lipase from any of the known lipases to hydrolyze and degrade lipid components of a fingerprint.

B. Basis of Schneider

A POSITA would have been motivated, or would have found it obvious, at the time that the invention of the'618 Patent was made to combine embodiments and/or disclosure in Schneider with the disclosure of one or more other references cited in relation to Schneider (e.g., McDaniel) because such embodiments and

disclosures are directed to the same technical field, address similar technical disclosure relating to lipase associated substrates and/or coatings, and presents motivating and/or suggesting disclosure for such combinations. See Table 2 and Ex. 1010, ¶135.

CLAIM 1 Preamble [P1] recites: "A method of facilitating the removal of a fingerprint on a substrate or a coating comprising:" Schneider discloses "methods for treating a surface contacted by fouling organisms or a surface at risk of such contact, said method comprising the steps of contacting the surface with a composition according to the invention with an effective amount of said composition or coating composition, wherein said contacting results in eliminating said fouling or at least reducing said fouling." (Schneider [Ex. 1004] at 0266:1-7). Schneider discloses fouling to be "microbial growth and/or the formation of a bio-film on objects coated with the composition." (*Id*. at 0125:3-4). Schneider discloses that cell wall lipids and other lipid associated macromolecules are components of microbial organisms (*Id*. at 0072:1-5). See also sections IV. D and IV.E above.

Element [A1] recites: "providing a substrate or a coating;" Schneider discloses coatings to be applied to a surface of an article for providing antifouling (e.g., antimicrobial) activity. (*Id.* at 0050:1-8; 0125:1-5; 0247:1-4; 0248:1-3, 253:1-13; 0262:1-4, 0269:1-4).

Element [B1] recites: "associating a lipase with said substrate or said coating such that said lipase is capable of enzymatically degrading a component of a fingerprint," Schneider discloses that the coating compositions include at least one enzyme and that the at least one enzyme can be a lipase. (*Id.* at 0050:1-4; 0052:1-8; 0074:1-3; 0088:1-0090:3; 0096:1-3). Schneider also discloses that lipases are capable of degrading cell wall lipids and other lipid associated macromolecules at the surface of microbial organisms. (*Id.* at 0072:1-5). Lipases and other enzymes have also been entrapped in polymers, or adsorbed on polymeric surfaces. Immobilizing, entrapping, or otherwise associating a lipase with a surface, polymer, substrate, or coating was well-known at the time of the '618 invention. See Ex. 1010, ¶45.

Element [C1] recites: "facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint." Schneider does not explicitly disclose facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint. However, Schneider discloses that lipases are capable of degrading cell wall lipids and other lipid associated macromolecules at the surface of microbial organisms. (*Id.* at 0072:1-5). As such, at the time the invention of the '618 Patent was made, a POSITA would have appreciated that the enzyme-associated coating as disclosed by Schneider is capable of facilitating the

removal of a bioorganic stain (i.e., a fingerprint) by vaporization when such enzyme is the disclosed lipase and such lipase -coating is present in an environment that supports vaporization of the enzymatically degraded component(s) of the bioorganic stain. See also sections IV. E and IV.H above.

The "passive" fingerprint removal functionality in accordance with the claimed invention of the '618 Patent is inherently present in a lipase associated substrate or coating (e.g., the enzyme-associated coating of Schneider) because one or more components of the bioorganic stain is well-known to be enzymatically degraded by a lipase in a manner that allows for its vaporization when in an environment that would support such vaporization. See section IV.D above and Ex. 1010, ¶¶35-41, 142-144.

CLAIM 2 recites: "wherein said lipase is covalently attached to said substrate or to said coating." Schneider discloses immobilization of enzymes within the coating (*Id.* at 0110:1-12, 0247:1-4) and, as discussed in reference to Claims 1, that the enzyme can be a lipase. For example, Schneider explicitly discloses that immobilization includes enzymes immobilized on polymer matrices, among other forms. (*Id.* at 0110:8-12) In view of the disclosures of Schneider with respect to immobilization of enzymes, a POSITA would understand that the lipase enzyme of the coating of Schneider can be covalently attached to one or more elements of such a coating (e.g., a binder thereof) and

would understand that the lipase enzyme would be covalently attached to the coating of Schneider. See also Ex. 1010, ¶42.

CLAIM 3 recites: "wherein said lipase is non-covalently adhered to or admixed into said substrate or said coating." Schneider discloses that the at least one enzyme of the disclosed coatings can be admixed into such coating (*Id.* at 0263:1-4; 0110:1-12). See also Ex. 1010, ¶43.

CLAIM 4 recites: "comprising heating said substrate or said coating or applying heat to a surface of said substrate or said coating subsequent to being contacted by a fingerprint." Schneider discloses use of the enzyme containing coating in applications such as outdoor wood work and external surface of a central heating system (*Id.* at 0249:1-3) and a pipe for ventilation (*Id.* at 0269:1-4). It would have been well-known to a POSITA at the time the invention of the '618 Patent was made that articles in such applications (e.g., outdoor wood work and external surface of a central heating system) can be subjected to bioorganic stains and reside in and/or operate under conditions in which surfaces thereof upon which the coating of Schneider can be applied become heated. For example, a wood table exposed to sunlight and/or ambient air can become heated for several hours each day, surfaces of a central heating system can be exposed to heated air for several hours each day, and a ventilation pipe for exhausting cooking fumes can be exposed to heated (and cooking oil/fatty acid laden) air

for several hours each day. See also Ex. 1010, ¶149.

CLAIM 5 recites: "wherein said heating is for at least 30 minutes." See Claim 4 above for disclosure rendering Claim 5 obvious.

CLAIM 6 recites: "wherein said substrate or said coating comprises an organic crosslinkable polymer resin." Schneider discloses that compositions and/or paints thereof (i.e., enzyme-containing polymeric coatings) may be polymeric, oligomeric, monomeric, and may contain cross-linkers or cure promoters as needed. (*Id.* at 0225:1-3). Schneider also discloses that the enzyme-containing polymeric coatings thereof can comprise one or more of drying oils, alkyd resins, epoxy resins, urethane resins, polyester resins, vinyl resins, and phenolic resins (*Id.* at 0253:1-13), all of which are well known to be an organic crosslinkable polymer resin. See also Ex. 1010, ¶151.

CLAIM 7 recites: "wherein said organic crosslinkable polymer resin comprises a functional group of acetoacetate, acid, amine, carboxyl, epoxy, hydroxyl, isocyanate, silane, vinyl, or combinations thereof." Schneider discloses that the enzyme-containing polymeric coatings thereof can comprise epoxy resins, urethane resins, polyester resins, vinyl resins, drying oils, alkyd resins, and phenolic resins, derivatives and mixtures thereof (Id. at 0253:1-13). In view of these disclosures of Schneider, a POSITA would have found it obvious at the time of the invention of the '618 Patent was made that such enzyme-containing polymeric

coatings can be an organic crosslinkable material that comprises a functional group including at least one of acid, amine, carboxyl, epoxy, hydroxyl, and isocyanate, given that epoxy resins, urethane, and phenolic resins typically comprise epoxy, isocyanate, and hydroxyl functional groups, respectively. See also Ex. 1010, ¶153.

CLAIM 8 recites: "wherein said organic crosslink- able polymer resin is aminoplasts, melamine formaldehydes, carbamates, polyurethanes, polyacrylates, epoxies, polycarbonates, alkyds, vinyls, polyamides, polyolefins, phenolic resins, polyesters, polysiloxanes, or combinations thereof." Schneider discloses that the enzyme-containing polymeric coatings thereof can comprise one or more of epoxy resins, urethane resins, polyester resins, vinyl resins, and phenolic resins (*Id.* at 0253:1-13).

CLAIM 9 recites: "wherein said organic crosslinkable polymer is a hydroxyl-functionalized acrylate resin." Schneider discloses that compositions and/or paints thereof (i.e., enzyme-containing polymeric coatings) may be polymeric, oligomeric, monomeric, and may contain cross-linkers or cure promoters as needed (*Id.* at 0225:1-3) and that the enzyme-containing polymeric coatings thereof may have any suitable surface coating material incorporated therein and can comprise acrylic resins and methacrylate resins, epoxy resins, urethane resins, polyester resins, vinyl resins, and phenolic resins, and derivatives and mixtures thereof (*Id.* at 0253:1-13). However, Schneider does

not explicitly disclose that the enzyme-containing polymeric coatings thereof include an organic crosslinkable polymer that is a hydroxyl-functionalized acrylate resin.

McDaniel discloses enzyme-containing polymeric coatings (McDaniel [Ex. 1004] at 0023:1-6; 0046:1-9; 0379:1-4, 0094:1-4) and that such enzyme-containing polymeric coatings include an organic crosslinkable polymer that is a hydroxyl-functionalized acrylate resin (*Id.* at 0379:1-4; 0503:1-16; -0504:1-20; 0454:1-6; 0510:2-18; 0512:2-8).

A POSITA would have found it obvious at the time the invention of the '618 Patent was made to combine the enzyme-containing polymeric coatings of Schneider with the hydroxyl-functionalized acrylate resin of McDaniel. One motivation for such combination is that Schneider provides the suggestion for such combination through its disclosure of other functional groups for polymeric resins and associated benefits thereof and the POSITA would seek material compositions that are well-known to provide desirable performance for enzyme-containing polymeric coatings and a hydroxyl-functionalized acrylate resin is well-known to provide desirable performance for enzyme-containing polymeric coatings. See also Ex. 1010, ¶¶162-163

CLAIM 10 recites: "wherein said lipase is lipoprotein lipase, acylglycerol lipase, hormone-sensitive lipase, phospholipase Al, phospholipase A2,

phospholipase C, phospholipase D, phosphoinositide phospholipase C, a lyso-phospholipase, or a galactolipase." Schneider discloses that the lipase of the enzyme-containing polymeric coatings thereof can be lipoprotein lipase. (*Id*. at 0074:1-3).

CLAIM 11 recites: "wherein said lipase is a triacylglycerol lipase." Schneider discloses that the lipase of the enzyme-containing polymeric coatings thereof can be triacylglycerol lipase. (*Id*. at 0074:1-3).

C. Basis of Drevon

A POSITA would have been motivated, or would have found it obvious, at the time that the invention of the'618 Patent was made to combine embodiments and/or disclosure in Drevon with the disclosure of one or more other references cited in relation to Drevon (e.g., Schneider) because such embodiments and disclosures are directed to the same technical field, address similar technical disclosure relating to lipase associated substrates and/or coatings, and presents motivating and/or suggesting disclosure for such combinations. See Table 2 and Ex. 1010, ¶166.

CLAIM 1 Preamble [P1] recites: "A method of facilitating the removal of a fingerprint on a substrate or a coating comprising:" Drevon discloses enzyme immobilization into polymers and coatings (Drevon [Ex. 1003] at pg. 3:Abstract; pg. 77:ln. 5-12, pg. 19;ln. 16 to pg. 20:ln. 3) and that immobilization refers to the preparation of insoluble biocatalytic derivatives and involves the coupling of

enzymes to solid supports that are either organic or inorganic (*Id.* at pg. 18:ln. 7-8). Drevon also discloses that such enzyme can be a lipase that retains enzymatic activity once immobilized. (*Id.* at pg. 79:ln. 7-14; Table 1: Lipase; pg. 214:1-4). Moreover, Drevon discloses that the development of coatings or films with biocatalytic properties is of major interest for antifouling. (*Id.* at pg. 74:ln. 15-17). See also sections IV. D and IV.E above.

Element [A1] recites: "providing a substrate or a coating;" Drevon discloses solid supports and coatings to which enzymes are coupled such as by immobilization. (*Id.* at pg. 18:ln. 7-8; pg. 19:ln. 5-19; pg. 20:ln.1-3; pg. 70:ln. 6-9; pg. 77:ln. 5-12; pg. 169:3-8).

Element [B1] recites: "associating a lipase with said substrate or said coating such that said lipase is capable of enzymatically degrading a component of a fingerprint," Drevon discloses associating enzymes with coatings and polymer films (*Id.* at pg. 77:ln. 5-12; pg. 19;ln. 16 to pg. 20:ln. 3), immobilizing enzymes by coupling them to solid supports (*Id.* at pg. 18:ln. 7-8; pg. 70:ln. 1-9; pg. 169:3-6), and that at least one of the enzymes can be a lipase that retains enzymatic activity once immobilized (*Id.* at pg. 79:ln. 7-14; Table 1: Lipase; pg. 214:1-4). Lipases and other enzymes have also been entrapped in polymers, or adsorbed on polymeric surfaces. Immobilizing, entrapping, or otherwise associating a lipase with a surface, polymer, substrate, or coating was well-known at the time of the '618

invention. See Ex. 1010, ¶45.

Element [C1] recites: "facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint." Drevon does not explicitly disclose facilitating the removal of a fingerprint by vaporization from the lipase associated substrate or coating when contacted by a fingerprint. However, Drevon discloses that the development of coatings or films with biocatalytic properties is of major interest for antifouling (*Id.* at pg. 74:ln. 15-17). As such, at the time of the invention of the '618 Patent, a POSITA would have appreciated that an enzyme immobilized solid support as disclosed by Drevon is capable of facilitating the removal of a bioorganic stain (i.e., a fingerprint) by vaporization when such enzyme is the disclosed lipase and such lipase immobilized solid support is present in an environment that supports vaporization of the enzymatically degraded component(s) of the bioorganic stain. See also sections IV. E and IV.H above.

The "passive" fingerprint removal functionality in accordance with the claimed invention of the '618 Patent is inherently present in a lipase associated substrate or coating (e.g., the lipase immobilized solid support of Drevon) because one or more components of the bioorganic stain is well-known to be enzymatically degraded by a lipase in a manner that allows for its vaporization when in an environment that would support such vaporization (e.g., an ambient environment

consisting of air). See section IV.D above and Ex. 1010, ¶¶35-41, 172.

CLAIM 2 recites: "wherein said lipase is covalently attached to said substrate or to said coating." Drevon discloses that enzymes can be immobilized on a solid support by covalent attachment. (*Id.* at pg. 18:ln. 13-15; pg. 57:ln. 18-19; pg. 58:ln. 4-21). See also Ex. 1010, ¶42.

CLAIM 3 recites: "wherein said lipase is non-covalently adhered to or admixed into said substrate or said coating." Drevon discloses that enzymes can be coupled to a solid support by non-covalent adherence (*Id.* at pg. 56:ln. 11-pg. 57:ln. 1; pg. 76:ln. 11-13; pg. 18:ln.1-4) and can be admixed into a coating that is provided on a solid support (*Id.* at pg. 76:ln. 14- pg. 77:ln. 4). See also Ex. 1010, ¶43.

CLAIM 4 recites: "comprising heating said substrate or said coating or applying heat to a surface of said substrate or said coating subsequent to being contacted by a fingerprint." Drevon discloses heating of the enzyme immobilized solid support (*Id.* at pg. 18:ln. 18-20; pg. 58:ln. 13-15).

CLAIM 5 recites: "wherein said heating is for at least 30 minutes." Although Drevon discloses heating of the enzyme immobilized solid support (*Id.* at pg. 18:ln. 18-20; pg. 58:ln. 13-15), and Drevon discloses enzymes immobilized in coating polymers at differing temperatures for periods greater than 30 minutes (*Id.* at Table 2: pg. 98:OPH, Pronase, ln. 18-20; pg. 58:ln. 13-15), Drevon does

not explicitly disclose said heating of lipase is for at least 30 minutes. However, at the time the invention of the '618 Patent was made, it would have been well-known to a POSITA that consumer products such as cell phones, touch-screens of devices, door handles of automobiles, and the like were subject to frequent contact with hands and fingers and that residue of fingerprints often leave unpleasant marks (i.e., bioorganic stains) on the surface. (see '618 Patent 1:16-20; 3:1-8) It would have also been well-known to a POSITA at the time the invention of the '618 Patent was made that substrate surfaces and coating surfaces of such consumer products that are exposed to bioorganic stains are routinely subjected to heating for at least 30 minutes during their routine use (e.g., an automobile being exposed to sunlight, electrical powering of cell phone electrical components, charging of batteries of a cell phone, electrical powering of a device having a touchscreen, outdoor furniture and the like being exposed to sunlight and elevated ambient temperatures, and the like). See also Ex. 1010, ¶¶178-179.

CLAIM 6 recites: "wherein said substrate or said coating comprises an organic crosslinkable polymer resin." Drevon discloses that the solid support material can be a polyurethane resin (*Id.* at pg. 70:ln. 5-11; pg. 106:ln. 5-13; pg. 68:ln. 5-11; pg. 169:3-6) or an acrylic resin or acrylate polymer coating (*Id.* at pg. 77:ln. 5-9; pg. 101:ln. 13-17) or polyacrylate (*Id.* at pg. 169:3-6), all of which

are well known to be an organic crosslinkable polymer resin, and Drevon teaches cross-linking of a polyurethane coating (*Id.* at pg. 106:5-10). See also Ex. 1010, ¶182.

CLAIM 7 recites: "wherein said organic crosslinkable polymer resin comprises a functional group of acetoacetate, acid, amine, carboxyl, epoxy, hydroxyl, isocyanate, silane, vinyl, or combinations thereof." Drevon discloses that organic crosslinkable materials from which the solid support or coating is made can comprise a functional group (*Id.* at pg. 58:ln. 4-10) including at least one of amine, hydroxyl, and isocyanate. (*Id.* at pg. pg. 68:ln. 5-13; pg. 70:ln. 9-20; pg. 101:ln. 2-16; pg. 106:ln. 5-10). In view of these disclosures of Drevon, a POSITA would have found it obvious at the time of the invention of the '618 Patent was made that the solid support to which the disclosed lipase enzyme is immobilized can be an organic crosslinkable material that comprises a functional group including at least one of amine, hydroxyl, and isocyanate. See also Ex. 1010, ¶183.

CLAIM 8 recites: "wherein said organic crosslink- able polymer resin is aminoplasts, melamine formaldehydes, carbamates, polyurethanes, polyacrylates, epoxies, polycarbonates, alkyds, vinyls, polyamides, polyolefins, phenolic resins, polyesters, polysiloxanes, or combinations thereof." Drevon discloses that solid supports upon which an enzyme such as the disclosed lipase

enzyme can be immobilized can be made from polyacrylate and polyurethane (*Id.* at pg. 68:ln. 5-13; pg. 70:ln. 9-20; pg. 169:ln. 3-6) and coatings to which enzymes can be immobilized can be polyurethane. (*Id.* at pg. 101:ln. 2-16)

CLAIM 9 recites: "wherein said organic crosslinkable polymer is a hydroxyl-functionalized acrylate resin." Drevon discloses that polymers such as polystyrene, polyacrylate, polymethacrylate, and polyurethanes have been shown to be viable matrices for the irreversible and multi-point immobilization of enzymes. (*Id.* at pg. 169:ln. 3-6). Drevon also discloses hydroxyl functional groups in the context of a polyol cross-linking with polyisocyanates to produce an enzyme polyurethane coating and similar approach for enzyme acrylate polymer coating. (*Id.* at pg. 101:ln. 9-17, pg. 106:ln. 5-10). In view of these disclosures of Drevon, a POSITA would have found it obvious at the time the invention of the '618 Patent was made that the solid support to which the disclosed lipase enzyme is immobilized can be a hydroxyl-functionalized acrylate resin. See also Ex. 1010, ¶187.

CLAIM 10 recites: "wherein said lipase is lipoprotein lipase, acylglycerol lipase, hormone-sensitive lipase, phospholipase Al, phospholipase A2, phospholipase C, phospholipase D, phosphoinositide phospholipase C, a lyso-phospholipase, or a galactolipase." Drevon discloses immobilizing enzymes by coupling them to solid supports and coatings (*Id.* at pg. 18:ln. 7-8; pg. 19:ln. 5-

19; pg. 20:ln.1-3; pg. 70:ln. 6-9; pg. 77:ln. 5-12; pg. 169:3-8) and that at least one of the enzymes can be a lipase that retains enzymatic activity once immobilize (*Id.* at pg. 79:ln. 7-14; Table 1: Lipase; pg. 214:1-4). Drevon does not explicitly disclose that the enzyme is lipoprotein lipase, acylglycerol lipase, hormone-sensitive lipase, phospholipase Al, phospholipase A2, phospholipase C, phospholipase D, phosphoinositide phospholipase C, a lysophospholipase, or a galactolipase.

However, Schneider discloses "a coating composition comprising at least one enzyme, preferably an oxidase, capable of acting on a compound, such as a substrate for said oxidase, wherein said action results in the formation of an antifouling species including an antimicrobial species comprising an antimicrobial activity, and wherein said compound does not form part of said coating composition." (Schneider [Ex. 1004] at 0050:2-8). Schneider further disclose that "the oxidase can be present in said coating composition in combination with one or more additional enzymes including, but not limited to, an esterase, including a lipase," (*Id*. at 0052:1-4) and that the lipase can be lipoprotein lipase (*Id*. at 0074:1-3).

It would have been obvious to a POSITA at the time that the invention of the '618 Patent was made to modify the lipase of the lipase immobilized solid support disclosed by Drevon to be lipoprotein lipase disclosed by Schneider. One motivation

for such modification is the POSITA seeking enzymes that exhibit enzymatic activity against various lipids and lipoprotein lipase being well known to enzymatically degrade components of bioorganic stains such as, for example lipids, fatty acids and the like (e.g., lipase disclosed by Drevon is well known to have comparable performance as lipoprotein lipase with respect to enzymatically degrading lipid-based substances.) Another motivation for such combination is that Drevon discloses that antifouling is an application for the enzyme immobilized solid supports thereof and Schneider analogously discloses enzyme coatings, including immobilized enzymes (*Id*. at 0110:5-12), for antifouling applications and, more specifically, antimicrobial applications. (*Id*. at 0050:2-8, 0052:1-4, 0074:1-3). See also Ex. 1010, ¶¶44, 195-197 regarding it being obvious to a POSITA to select a lipase from any of the known lipases to hydrolyze and degrade lipid components of a fingerprint.

CLAIM 11 recites: "wherein said lipase is a triacylglycerol lipase." Drevon discloses immobilizing enzymes by coupling them to solid supports and coatings (*Id.* at pg. 18:ln. 7-8; pg. 19:ln. 5-19; pg. 20:ln.1-3; pg. 70:ln. 6-9; pg. 77:ln. 5-12; pg. 169:3-8) and that at least one of the enzymes can be a lipase that retains enzymatic activity once immobilize (*Id.* at pg. 79:ln. 7-14; Table 1: Lipase; pg. 214:1-4). Drevon does not explicitly disclose that the enzyme is triacylglycerol lipase.

However, Schneider discloses "a coating composition comprising at least one enzyme, preferably an oxidase, capable of acting on a compound, such as a substrate for said oxidase, wherein said action results in the formation of an antifouling species including an antimicrobial species comprising an antimicrobial activity, and wherein said compound does not form part of said coating composition." (Schneider [Ex. 1004] at 0050:2-8). Schneider further disclose that the oxidase can be present in said coating composition in combination with one or more additional enzymes including, but not limited to, an esterase, including a lipase" (*Id*. at 0052:1-4) and that the lipase can be triacylglycerol lipase (*Id*. at 0074:1-3).

It would have been obvious to a POSITA at the time that the invention of the '618 Patent was made to modify the enzyme of the enzyme-coated catheter disclosed by Drevon to be triacylglycerol lipase disclosed by Schneider. One motivation for such modification is the POSITA seeking enzymes the exhibit enzymatic degradation efficiency and triacylglycerol lipase being well known to enzymatically degrade components of bioorganic stains such as, for example lipids, fats and the like. Another motivation for such combination is that Drevon discloses that antifouling is an application for the enzyme immobilized solid supports thereof and Schneider analogously discloses enzyme coatings, including immobilized enzymes (*Id*. at 0110:5-12), for antifouling applications and, more specifically,

antimicrobial applications. (*Id*. at 0050:2-8, 0052:1-4, 0074:1-3). See also Ex. 1010, ¶¶44, 195-197 regarding it being obvious to a POSITA to select a lipase from any of the known lipases to hydrolyze and degrade lipid components of a fingerprint.

VII. CONCLUSION

This Petition demonstrates a reasonable likelihood that Petitioner will prevail in its challenge of patentability for claims 1-11 of the '618 Patent. It is respectfully requested that a trial for *inter partes* review of the '618 Patent be instituted and claims 1-11 thereof be canceled. This would prevent Patent Owner from claiming technology already known in the prior art before its belated patent filing, and from asserting invalid patent claims to exclude others.

Dated: September 30, 2016

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATION

Pursuant to 37 C.F.R. §42.24 *et seq*., the undersigned certifies that this Petition complies with the 14,000-word type-volume limitation. This Petition contains 13,796 words, excluding the parts of the Petition exempted.

Dated: September 30, 2016

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing Petition for *inter partes* review of U.S. Patent No. 8,394,618, including all Exhibits, was served on September 30, 2016 via United States Postal Service (U.S.P.S.) Express Mail delivery directed to the attorney of record for the '618 patent as shown in USPTO PAIR at the following address:

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