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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VF OUTDOOR, LLC,
Petitioner,

v.

COCONA, INC.,
Patent Owner.

Case No.: IPR2018-00190
Patent No.: 8,945,287

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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I. INTRODUCTION

The Board should render a Final Decision confirming that the challenged claims of U.S. Patent No. 8,945,287 (“the ’287 patent”) are anticipated by *Dutta* or *Halley*’s active particles and obvious over either reference in view of *Haggquist* because each discloses particles that perform the same function of adsorbing or trapping water. Therefore, the admittedly active particles of *Haggquist* are readily substituted for the *Dutta* or *Halley* particles under *KSR In’t Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). Patent Owner’s (“PO”) claim construction arguments are incorrect, and in any event, the challenged claims are unpatentable under either party’s construction. Finally, PO’s “teach away” and secondary considerations arguments against obviousness are legally and factually deficient.

II. CLAIM CONSTRUCTION

The Board’s initial construction of the disputed claim terms is reasonable based on the claims, specification and prosecution history of the ’287 patent.

A. “Active Particles”

The Board construed “active particles” as “particles that have the capacity to cause chemical reactions at the surface or physical reactions, such as, adsorb or trap substances.” (Paper 14, at 10.) PO argues that “active particles” are limited to “particles that adsorb or trap substances on their surface,” and that allowing the term to embrace particles that react by “absorption rather than adsorption ... has

the effect of reading the word ‘active’ right out of the claims.” (Paper 20, at 6, 8-9 (emphasis original).) To the contrary, and beyond the purported “typographical errors” in *Haggquist* (which PO revised by Certificate of Correction after this IPR was instituted and eleven years after the *Haggquist* patent issued), the ’287 patent explicitly identifies particles as “active” that a POSITA would understand act by absorption. (EX1001, 4:22-27; Paper 1, at 12-13; EX1044, ¶¶9-10, 13.)

Rather than requiring any particular mechanism of action – much less limiting that activity to the particle surface – the ’287 patent describes a wide variety of particles using a variety of mechanisms of action as “active particles.” The ’287 patent generally “relates to *active particle-enhanced membranes* ... [and] is also particularly applicable to *quick drying, odor-absorbing*, anti-static membranes.” (EX1001, 2:12-22 (emphasis added); Paper 1, at 11; EX1044, ¶¶11-13, fn. 1, 2.) Particles are “active” because they impart various enhancing properties to membranes – such as moisture vapor transport, ultraviolet light protection, chemical protection, and antimicrobial protection – by a variety of different mechanisms of activity. (EX1001, 3:61-4:5, 10:11-18, FIG. 5; EX1044, ¶11.) This is consistent with dependent claims, which claim a diverse group of “active particles” and conferred properties. (EX1001, claims 9, 10, 37; EX1044, ¶13.) Accordingly, a POSITA would appreciate that “active particles” has a

broader meaning than advocated by PO. (Paper 20, at 7, 12; EX2005, ¶32; EX1044, ¶¶13, 15.)

Contrary to PO's argument, the '287 patent does not require that particles be processed (or "activated") to "develop adsorptive properties" by creating pores or otherwise. (Paper 20, at 11; EX2005, ¶¶24-25.) While the '287 patent recites *activated* carbon and *activated* alumina among other active particles, the specification also teaches a wide variety of "active particles" that are not so "activated," but yet "enhance *performance activity* in a base material" (EX1001, 6:13-18 (emphasis added)), including those that trap water, odors, and even light, through various absorptive mechanisms (including baking soda, cinoxate, zinc oxide, and silica gel). (EX1001, 2:12-22; EX2006, ¶43; EX1044, ¶16.) *Haggquist* (incorporated by reference) also identifies active particles, e.g., volcanic rock, with naturally occurring pores. (EX1004, ¶28.)

Contrary to PO's argument, many of the '287 patent's admittedly "active particles" act by absorption. Even PO's expert, Dr. Daniels, admits that that silica gel (a '287 patent "active particle") is an "*absorbing substance* ... [that] imbibes a liquid such as water, causing the particles to swell microscopically to macroscopically." (EX2006, ¶43 (emphasis added); EX1001, 4:23, claim 37.) Thus, "active particles" are not limited to "particles that adsorb or trap substances on their surface." Indeed, Dr. Daniels' testimony supports construing "active

particles” as particles capable of a wide variety of physical reactions, including adsorbing, trapping, or absorbing substances, such as water. (Paper 1, at 13; EX1005, ¶¶45, 99; EX1044, ¶¶11, 14.) The inventor of the ’287 patent, Dr. Haggquist, also acknowledged that his definition of “active particle” did not rule out particles that could absorb, as well as adsorb. (EX1046, 115:14-117:1.)

Thus, a POSITA would not conclude, after reviewing the ’287 specification, claims, file history, and *Haggquist*, that active particles are limited to “particles that adsorb or trap substances on their surface,” as proposed by PO. (Paper 20, at 6, 8-9.) Rather, the Board’s construction of the term “active particles” aligns with the term’s broadest reasonable interpretation in view of the specification. (EX1044, ¶17, fn. 3.). However, as discussed below, even under PO’s narrow construction, the challenged claims are unpatentable.

B. “First Thickness”

The Board construed “first thickness” as “the thickness of a base material,’ which base material may include active particles.” (Paper 14, at 12.) PO argues that “first thickness” means a “first layer or membrane,” which *cannot* include any active particles. (Paper 20 at 15, 17-18.) Contrary to its plain language, PO says that claim 27 “is directed to a two-layer water-proof composition with the first layer being a liquid impermeable breathable cured base material, and the second

layer being active particles applied to the cured base material.” (Paper 20, at 14 (emphasis added), 16.) PO’s claim construction is incorrect. (EX1044, ¶¶18-19.)

The ’287 specification does not define the term “first thickness,” but does describe active particles that are mixed and suspended in a solution of base material prior to curing. (EX1001, 8:54-61 (Example 1: “protected activated carbon was suspended in the polyurethane solution ... [t]he mixture was dried and cured in an oven ... resulting in a membrane”); EX1005, ¶¶94-96.) The Abstract describes “active particles *incorporated in* the membrane [to] improve or add various desirable properties to the membrane.” (EX1001, Abstract (emphasis added); EX1001, 2:42-43.) Regarding Figure 1, the ’287 patent states: “base material solution and the active particles may be mixed together [such that] [t]he active particles may be dispersed throughout the base material solution to provide a mixture having a uniform consistency.” (EX1001, 6:65-7:1.) This “base material solution may include a material, which when converted into a non-solution state (*e.g., cured*), exhibits water-proof breathable properties.” (EX1001, 3:38-40.) This “cured mixture” of base material with embedded active particles is described as the “membrane,” which may be a “laminate” or a “self-supporting membrane” independent of a substrate. (EX1001, cols. 2:13-15, 7:16-22, 9:14-18; EX1044, ¶¶20-21.) PO’s proposed construction excludes these preferred embodiments and

therefore is incorrect. (*C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 865 (Fed. Cir. 2004); EX1044, ¶22, 26.)

The '287 prosecution history is consistent. In arguments distinguishing claim 27 (original claim 28) over the prior art, PO stated that active particles are “***used in*** such a membrane” having a “first thickness”:

[T]he *Example 1 membrane* comprises a thickness of about 1 mil, or about 25.4 microns (***the first thickness***) and ... the *activated carbon used in such a membrane* comprises Asbury5564™ powdered coconut activated carbon ... [with a] particle size ... [of] about 10 microns (***the second thickness***).

(EX1007, 17-18 (emphasis added).) Clearly, the Example 1 active particles are “in contact with” the “cured base material comprising a first thickness,” recited in claim 27, as they are “used in” the membrane. (EX1044, ¶¶23, 27.) Indeed, the argued Example 1 membrane is made *by suspending activated carbon in a polyurethane solution* and then *curing the mixture* in an oven. (EX1001, 8:54-61, 9:14-18, 28-31; EX1044, ¶23.) PO’s proposed construction improperly excludes this embodiment from the scope of claim 27.

PO’s proposed “two-layer” construction is premised on equating the cured base material with the “substrate” upon which active particles are applied. (Paper 20, at 15-16; EX1044, ¶28.) While the “substrate” may be a “PTFE substrate, polyurethane substrate, or knit material” (EX1001, 2:43-46), the '287 patent never states that this “substrate” arises from a base material solution (without active

particles) that is then cured (EX1044, ¶¶24-26). Rather, the “substrate” described in the ’287 patent is a separate and distinct component that *may* or *may not* be included in the waterproof composition of claim 27. (EX1001, FIG. 1, 7:10-15; Paper 14, at 13.) Had PO intended to claim the substrate in claim 27 – as it did in claim 50 – PO could have, but did not. (EX1044, ¶¶25-27, 29.) Nor does the claimed “first thickness” imply a structure of the base material is a “first layer or membrane.” (EX1044, ¶27.) Notably, neither of PO’s experts, Mr. Callan nor Dr. Daniels, could identify the alleged two-layer structure in the 2.5/1 to 10/1 ratio of first thickness to second thickness in the specification. (EX1047, 182:16 -183:3; EX1048, 97:11-15, 107:4-109:3; EX1044, ¶25.)

C. “Second Thickness”

The Board reasonably construed “second thickness” as “‘the thickness of a plurality of active particles,’ which may be the particle size of the active particles.” (Paper 14, at 13.) Based on PO’s argument during prosecution, the second thickness *is* the particle size of the active particles. (Paper 1, at 13-14; EX1007, at 17; EX1044, ¶30; *Arendi S.A.R.L. v. Google LLC*, 882 F.3d 1132, 1135 (Fed. Cir. 2018).)

PO asserts that the “second thickness” is a “second layer or membrane” in contact with the first thickness (i.e., the “first layer or membrane”). (Paper 20, at 19.) In contrast, PO defined the first and second thicknesses during prosecution,

stating “the Example 1 membrane comprises a thickness of about 1mil [sic], or about 25.4 microns (*the first thickness*)” and the activated carbon “*used in* such a membrane” has a “*particle size* ... [of] about 10 microns (*the second thickness*).” (EX1007, at 17 (emphasis added); Paper 1, at 13-14; EX1005, ¶¶90, 102; EX1044, ¶33.)

Claim 27 is not limited to the two-layer waterproof composition advocated by PO and makes no mention of layers, much less a “second layer” formed by a plurality of active particles. (EX1005, ¶103; EX1044, ¶¶31-34.) Though the ’287 specification does not define the “second thickness” (Paper 1, at 13; EX1005, ¶101), a POSITA would know exactly what “second thickness” means because the PO defined the term during prosecution (EX1007, at 17). Thus, while PO could have used a different term (EX2005, ¶47), PO defined the plurality of active particles using the term “second thickness” defined by the particle size of Asbury 5565™. (Paper 1, at 13-14; EX1005, ¶¶101-102; EX1044, ¶33.)

Importantly, when distinguishing the claims over the prior art, the PO argued based on “a membrane having a first thickness and *an active particle having a second thickness* with the first thickness being less than an order of magnitude larger than the second thickness.” (EX1007, at 18 (emphasis added).) During prosecution, PO repeatedly defined the “first thickness” as the thickness dimension

of a membrane (containing active particles), but defined the “second thickness” based on the size of the active particles. (*Id.*; EX1044, ¶34.)

Contrary to PO’s argument, a “second thickness” based on particle size does not remove the word “plurality” from the claim. (Paper 20, at 23.) “Comprising” is open-ended (meaning “including,” but not “excluding”). *Mars, Inc. v. H.J. Heinz Co.*, 377 F.3d 1369, 1376 (Fed. Cir. 2004). Therefore, the plurality of active particles “includes” a second thickness based on particle size. (EX1044, ¶35.) Consistently, Mr. Callan’s testimony repeatedly equated active particle size with the “second thickness” to provide support for the claimed 2.5 /1 to 10/1 ratio of first thickness to second thickness. (EX1048, 81:8-13; 82:18-83:4; 85:6-17; 90:5-91:10; 92:9-93:8; EX1044, ¶35.) Similarly, since it is unlikely that the 10-micron diameter particles could be laid down in a perfect monolayer on the 25.4-micron base material, the Board’s construction provides support for the claim and is more reasonable. (EX1047, 114:16-120:13; EX1048, 89:15-20; EX1044, ¶36.)

PO defined “second thickness” as the particle size of active particles incorporated into a cured base material in order to obtain allowance over the prior art, thereby surrendering any scope of “second thickness” attributable to plain and ordinary meaning. (EX1044, ¶¶35-37; *Arendi*, 882 F.3d at 1135.)

III. THE CHALLENGED CLAIMS OF THE '287 PATENT ARE UNPATENTABLE

A. The Challenged Claims Are Anticipated by *Dutta* (Ground 1)

Dutta discloses each limitation of the claims, including “active particles,” a “first thickness,” a “second thickness,” and the claimed ratio between the first and second thicknesses, and therefore anticipates the challenged claims. (Paper 1, at 21-37; EX1005, ¶¶109-132; EX1044, ¶37.)

1. *Dutta* discloses “active particles” under the Board’s and PO’s proposed construction

The '287 patent describes particles as “active” because they impart various enhanced properties to a membrane, but they are not limited to any specific mechanism of activity, such as adsorption. (EX1044, ¶¶11, 39.) In fact, the '287 patent discloses known *absorptive* particles as “active particles.” (EX1001, 4:22-27; Paper 1, at 12-13; EX2006, ¶43; EX1044, ¶¶11, 13-14.) Like the '287 patent active particles, *Dutta* discloses Sephadex, which enhances the membrane by increasing “WVTR through the non-porous film.” (EX1044, ¶¶39-40.) Additionally, Sephadex is a known molecular filter (a '287 patent “active particle”) (Paper 1, at 34; EX1001, 4:22-27; EX1024, 1:66-68), as acknowledged by both Dr. Daniels and Mr. Callan (EX1047, 58:24-59:10; EX1048, 171:6-14).

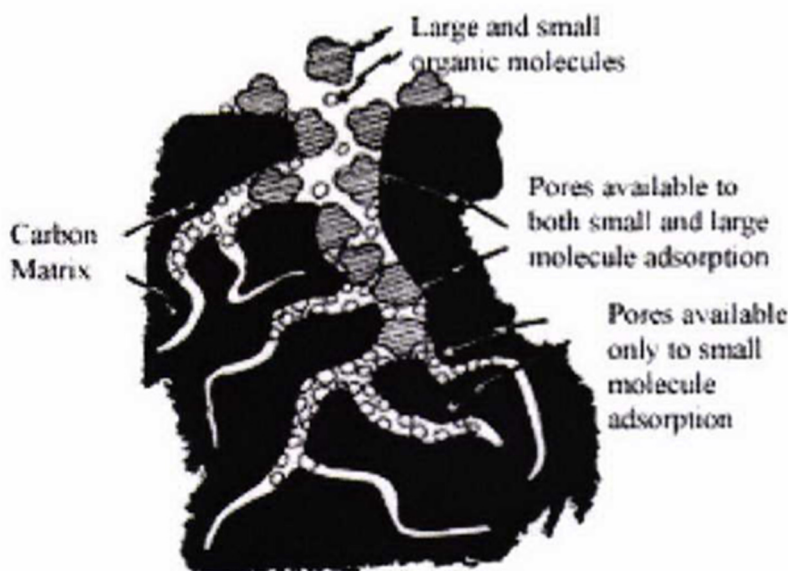
Moreover, Sephadex particles adsorb or trap substances, thus meeting the definition of active particles under the Board’s construction. (EX1002, 18:10-21,

23:3-10; EX1005, ¶¶117-125; EX1023, at 143, 1287; EX1027, at 7; EX1044, ¶39-40.) PO's expert Mr. Callan admits that Sephadex traps water. (EX1048, 157:5-8.)

In any event, even under PO's construction, *Dutta's* hydrophilic particles qualify as particles that "adsorb or trap substances on their surface." (EX1044, ¶39.) Sephadex particles are porous and known molecular sieves ("molecular filter type materials") that adsorb or trap water. (EX1001, 4:12-19; EX1005, ¶122; EX1023, at 1287; EX1027, at 7; EX1044, ¶41; EX1049, at 192.) Under PO's narrow construction, Sephadex particles can "adsorb or trap substances on their surface," per *Pavia*, which states that the "hydroxyl groups *on the* [Sephadex] *polymer* can *adsorb water*." (EX1050, at 717-18; EX1044, ¶42.)

Pavia also describes the adsorption mechanism of action between water (a polar compound) and hydroxyl groups on the polymer surface of Sephadex. (EX1050, 718.) *Texter* suggests the same mechanism of action between adsorbed water and Sephadex. (EX1049, at 206.) During deposition, Dr. Daniels suggested a similar mechanism of action across several active particles, including Sephadex. (EX1047, 37:3-39:1; 88:22-89:22.) Dr. Daniels agrees that the surface of Sephadex includes both the "exterior and interior" and that water adheres to Sephadex by "start[ing] on the outside and mov[ing] to the inside." (EX1047, 22:11-24).

Consistently, the surface of an activated carbon particle (acknowledged by Dr. Haggquist as a “reasonable depiction”) includes pores extending into its interior:



(EX1053, at 2; EX1046, 14:19-15:21.) *Marenco* also describes Sephadex as having the ability to “*trap water* both *within* the bead, and *on the surface* of the bead in a microfilm.” (EX1055, at 59.) Accordingly, both Sephadex and activated carbon bind water to exterior and interior surfaces. (EX1044, ¶¶43-44.)

The above references demonstrate that Sephadex is capable of adsorbing or trapping substances (e.g., water) on its surface and is therefore an “active particle” under PO’s narrow construction. (EX1044, ¶45.) Contrary to PO’s argument, Sephadex is not “completely different from a particle adsorbing water into its pores and surface topology” (EX2006, ¶¶84-85), but is an active particle because it has many of the general properties of adsorptive particles outlined by PO’s expert Dr.

Daniels in his declaration. (EX2006, ¶¶39-40, 42, 47; EX1023, at 143; EX1049, at 203-04, Fig. 7; EX1047, 42:7-44:9, 80:18-81:22, 83:11-18, 84:22-85:23; EX1044, ¶¶46-49.)

While *Dutta*'s Sephadex particles swell in water, such swelling does not "creat[e] holes or channels that allow water vapor to move across the membrane," as argued by PO. (Paper 20, at 28; EX2005, ¶¶58-61; EX2006, ¶80; EX1044, ¶¶49-50.) Rather, *Dutta* explicitly warns against the creation of pinholes, microcracks and other membrane defects, which would lead to inappropriate air permeation through the film. (EX1002, 10:23-36.) Regardless of the terminology employed (i.e., hydrophilic absorbent particles) or the testing employed to measure MVTR (which is the same test used by the '287 patent), *Dutta*'s Sephadex particles would be covered under PO's construction of "active particles" because they were known to adsorb or trap water on their surfaces to improve MVTR. (EX1044, ¶¶44-52; EX1001, 9:7-13.)

2. *Dutta* discloses the "first thickness" and "second thickness" under the Board's construction and even under PO's narrow construction

As construed by the Board, *Dutta* discloses the "first thickness" and "second thickness." (Paper 1, at 21-22, 33-35.) Moreover, *Dutta* discloses a two-layer composition having a first thickness and a second thickness under PO's narrow claim interpretation. (EX1044, ¶¶53, 58.)

Contrary to PO's arguments, the water-proof composition need only have a cured base material *comprising* (including) a first thickness and a plurality of active particles *comprising* (including) a second thickness. (EX1001, claim 27; Paper 20, at 30.) While the water-proof breathable composition may have its own thickness, this overall thickness is not a claim limitation. (EX1044, ¶54.) Rather, *Dutta* discloses the water-proof composition cast from a solution of hydrophilic polyurethane and cross-linked Sephadex particles ("active particles") and cured into a film ("cured base material"), with an MVTR of 6730 g/m²/day, an improvement over the control. (EX1005, ¶¶126-132; EX1044, ¶55.)

The challenged claims are not limited to a two-layer composition, nor is it necessary for *Dutta* to disclose distinct first and second layers. (EX1044, ¶¶56-57; Paper 20, at 31-32.) As construed by the Board, the claims allow active particles to be included in a cured base material, which is shown in *Dutta*'s Example 1B. (EX1005, ¶¶114-117; EX1044, ¶57.) Nonetheless, "Dutta also discloses that 'a layered arrangement of the polymer resin and the absorbent particles[, which] can be used to fabricate useful products'." (Paper 1, at 22, 34; EX1005, ¶65; EX1002, 12:26-27, 4:20-28.) *Dutta* teaches first forming a film of a polymer resin, and then "uniformly distributing" particles "over the film." Indeed, *Dutta*'s Example 6 teaches a two-layer composition under PO's narrow construction, which exhibits an improved WVTR within the claimed range. (EX1002, 22:4-25; EX1044, ¶56.)

Thus, *Dutta* anticipates the challenged claims, and does so even under the PO's narrow construction of "first thickness" and "second thickness." (EX1044, ¶58.)

B. The Challenged Claims Are Obvious over *Dutta* and *Haggquist* (Ground 2)

Dutta in view of *Haggquist* discloses each limitation of the challenged claims, even under PO's claim interpretations, and a POSITA would have had several reasons to combine the two references. (Paper 1, at 37-50; EX1005, ¶¶138-188; EX1044, ¶¶59, 65.) Regardless of the precise mechanism, the *Dutta* and *Haggquist* particles perform the same function, i.e., adsorbing or trapping water and are thus readily substituted to achieve the result of improved MVTR of membranes, (EX1005, ¶¶147-150; EX1044, ¶60; KSR, 550 U.S. at 417.) Regarding claims 38-39, a POSITA would have been motivated to successfully utilize *Haggquist*'s encapsulant systems with *Dutta*'s active particles (Sephadex), or *Haggquist*'s encapsulated active particles in place of *Dutta*'s active particles, because *Haggquist*'s encapsulant was known to protect the performance enhancing characteristics of active particles (including molecular filters) from premature deactivation. (EX1005, ¶¶154, 178, 180-183; EX1044, ¶62.)

PO mischaracterizes the references in an attempt to undermine their combination. For example, Mr. Callan states, a "[POSITA] would not substitute the [so-called] super-hydrophilic swelling particles in Dutta ... with 'inert' particles

that Dutta ... identif[ies] as *not swelling*.” (EX2005, ¶72; Paper 20, at 32.) While *Dutta* characterizes particles such as talc, silica, calcium carbonate, carbon black, and titanium dioxide as “inert diluent particles” (EX1002, at 9-10), *Dutta* never discourages use of these particles in its compositions. Rather, *Dutta* encourages the addition of these particles into its films, along with other additives like UV stabilizers, antistatic agents, and odor absorbing agents, all of which are “active particles” according to the ’287 patent and *Hagguist*. (*Id.*; EX1001, 3:61-4:27; EX1044, ¶61.)

PO’s remaining arguments should be rejected. There is no requirement that the entire membrane be smooth. In one embodiment, *Dutta* merely says that “at least *one surface* of the film be substantially smooth by being free of particles.” (EX1002, 11:3-4 (emphasis added).) Thus, the other side may be rough. And *Dutta* discloses other embodiments where particles are “uniformly distributed over the film,” also creating at least one rough surface. (EX1002, 12:28-30; EX1044, ¶64.) Based on *Dutta*’s express encouragement to add silica and titanium dioxide (“active particles” according to *Haggquist*), PO’s arguments that such additions would be discouraged based on increasing film thickness is incorrect. (EX1044, ¶63.)

Both the admittedly active *Haggquist* particles and the *Dutta* Sephadex perform the same function of adsorbing or trapping water, and it was known in

Dutta that such particles improve MVTR. It would be obvious to a POSITA to substitute *Haggquist*'s admittedly "active particles" for *Dutta*'s Sephadex particles that perform the same function of adsorbing or trapping water to obtain the same result. (EX1004, ¶[0004]; EX1005, ¶157; EX1044, ¶62.) Thus, the challenged claims are obvious over *Dutta* in view of *Haggquist*. (EX1044, ¶65.)

C. The Challenged Claims Are Anticipated by *Halley* (Ground 3)

Halley discloses "active particles," a "first thickness," and a "second thickness," as well as the claimed ratio between the first and second thicknesses. (Paper 1, at 50-60; EX1005, ¶¶191-211; EX1044, ¶¶66-67.)

1. *Halley* discloses "active particles" under the Board's and PO's proposed construction

Halley discloses a "particulate solid" incorporated into a "water-vapour permeable polymer." (EX1003, 3:1-2.) A POSITA would recognize that *Halley*'s Black Pearls 2000 are "active particles" because they improve MVTR when incorporated into a polymer coating. (EX1044, ¶68.) PO's reliance on the '041 patent, which teaches the absorptive properties of polymeric films (e.g., polyurethane) *without active particles*, is misplaced. Indeed, the '041 patent is silent with respect to the mechanism of activity for any of *Halley*'s active particles and does not support the contention that *Halley* discloses improved MVTR using "solely absorptive particles." (Paper 20, at 38-39; EX2005, ¶94; EX1044, ¶72.)

Rather, while silent on the particular mechanism, *Halley* provides ample evidence that its particulate solids improve membrane MVTR. In *Halley*'s Example 1, different amounts of Black Pearls 2000 (0.3, 0.65, and 1.5 weight percent) were "intimately mixed" with polyurethane and coated onto a PTFE membrane. (EX1003, 7:17-23.) Table 3 illustrates that each weight percent provided an improvement in MVTR in the claimed range compared with a control, with similar improvements (albeit outside the claimed range) shown in Table 1. (EX1003, 8:6-10, 9:1-5; EX1005, ¶¶195, 203, 211.) The improvements in membrane MVTR illustrated by Tables 3 and 1 are prior art for all they disclose, notwithstanding different results in Table 2, which discloses the Table 1 membranes *further coated onto a face fabric*. (Paper 20, at 39; EX1003, 7:9-12, 8:11-15; EX1044, ¶70, fn. 6.)

Furthermore, *Halley*'s Black Pearls 2000 were known to adsorb water and, therefore, would be "active particles" under PO's claim interpretation. (EX1005, ¶203; EX1028, at 284.) For instance, *Wang* analyzed Black Pearls 2000, which were shown to have a surface area of 1501.8 m²/g and a pore volume of 2.67 cm³/g, revealing "larger pore volume as compared to Acetylene Black," and leading *Wang* to conclude that this increased porosity creates a "***high surface area and capability to adsorb water***." (EX1051, at 4911.) Thus, a POSITA would have recognized Black Pearls 2000 as "active particles" based on their high porosity, large surface

area, and adsorptive capacity for water. (EX1044, ¶71; EX2006, ¶43 (“[a]dsorption requires a material that has a large surface area in the form of pores”).)

And, in any event, while preferring carbon particles, *Halley* also discloses the addition of alternative particles, including titanium dioxide, zinc oxide aluminum oxide, and silica. (EX1003, 3:5-7.) Thus, *Halley* describes incorporating some of the same “active particles” disclosed in the ’287 patent (EX1001, 4:22-27), into a “water-vapour-permeable polymer.” (EX1003, 2:1-6, 3:1-7, 8:6-31; EX1005, ¶¶195, 201; EX1044, ¶68.)¹

2. *Halley* discloses the “first thickness” and the “second thickness”

As construed, *Halley* teaches the “first thickness” and “second thickness.” (Paper 1, at 51-52, 56.) Again, the claimed water-proof composition need only *comprise* a cured base material having a first thickness and a plurality of active particles having a second thickness. (EX1001, claim 27; Paper 20, at 40; EX1044, ¶53.) *Halley* discloses polyurethane films containing particulate solids such as Black Pearls 2000 (“water-proof compositions”), which are cured into a membrane and optionally applied to a fabric substrate. (EX1005, ¶¶126-132, 195-198, 201, 211; EX1044, ¶73.)

¹ The ’287 claims and specification do not require additional processing to create “active particles.” (EX1044, ¶¶11, 69.)

As shown above, the “first thickness” and “second thickness” are not required to be separate and distinct “layers” or “membranes,” as argued by PO. (Paper 20, at 41.) As construed, the challenged claims cover single-layer compositions of active particles incorporated into a cured base material, as embodied by the ’287 patent (EX1001, 8:54-61, 9:14-18, 28-31), as well as those described and exemplified in *Halley* (EX1003, 7:17-23). Accordingly, *Halley* anticipates the challenged claims. (EX1044, ¶¶74-75.)

D. The Challenged Claims Are Obvious over *Halley* and *Haggquist* (Ground 4)

Halley in view of *Haggquist* discloses each limitation of claims 38-39, even under PO’s claim constructions, and a POSITA would have had ample reasons to combine the references. (Paper 1, at 60-65; EX1005, ¶¶219-233; EX1044, ¶¶76, 80.)

Again, PO mischaracterizes the references in an attempt to undermine their combination. Mr. Callan states that “*Halley* requires ... ‘solely absorptive particles’ and *Haggquist* requires ... ‘active particles’ specifically banned by *Halley* science.” (EX2005, ¶94.) Rather, *Haggquist*’s explicitly “active particles,” including aluminum oxide, silica, zinc oxide, and titanium oxide (EX1004, ¶[0030]), are suggested alternatives to the carbon particles incorporated into *Halley*’s water-vapor-permeable films (EX1003, 3:1-7.) Contrary to Dr. Daniels’ assertion that *Halley* fails to teach “active particles [that] improve the [MVTR],”

Tables 1 and 3 of *Halley* disclose the opposite. (EX2006, ¶102; EX1003, Tables 1, 3.) Black Pearls 2000 need not be “activated” to “create” pores because these particles were known to adsorb water into their highly-porous structure and, thus, are “active particles.” (EX1044, ¶¶77-79; EX1051, at 4911.)

Also, *Halley*’s particulate solids are not “‘inert’ insofar as water vapor transmission is concerned.” (Paper 20, at 44; EX2006, ¶¶100-101.) Rather, detailed above, *Halley*’s particles are capable of adsorbing and trapping water to improve WVTR of a cured polymeric film. A POSITA would have been motivated to utilize *Haggquist*’s encapsulants with *Halley*’s Black Pearls 2000 to protect the performance-enhancing characteristics of the active particulate solids from deactivation. (EX1005, ¶227.) Thus, the challenged claims are obvious over *Halley* in view of *Haggquist*. (EX1044, ¶¶78, 80.)

IV. THE BOARD SHOULD REJECT PO’S EVIDENCE OF SECONDARY CONSIDERATIONS

Evidence of secondary considerations of non-obviousness should be considered in evaluating patent validity only when there is a “nexus” between the evidence and the patented invention. The asserted evidence of non-obviousness must be tied to a specific product, which must embody “the invention disclosed and claimed in the patent.” (*WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016).) The commercial success of the product must derive from the claimed invention and be “attributable to something disclosed in the patent that was not

readily available in the prior art.” (*Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580 (Fed.Cir.1983); EX1044, ¶81.)

Here, there is little, if any, connection between the analyzed samples, which are purportedly “TNF” samples,² i.e., “TNF Laminate Our Print” (“first sample”) and “TNF Jacket” (“second sample”), and the claims of the ’287 patent. Dr. Daniels does not even attempt to evaluate key limitations of the challenged claims; nor are Dr. Daniels’ testing protocols appropriate or sufficient to support the necessary nexus. (EX1044, ¶80.)

With respect to the litigation “infringement chart,” Dr. Daniels provides only a hand-waving analysis indicating his agreement. In deposition, however, he admitted that the “infringement” analysis does not demonstrate the particles are active; nor is picking a single thickness (rather than averaging multiple measurements) representative for establishing thickness (which Cocona did); nor did any data show an improved MVTR over a control (which “should” have been done). (EX1047, 212:20-215:8; EX1044, ¶¶81-86.)

² PO’s expert stated that Cocona gave a trademark license (as opposed to a patent license) to The North Face (“TNF”) for the Cocona technology. (EX1045, at 16:10-17.)

A. PO Failed to Conduct Appropriate Tests to Support the Conclusions

PO's evaluation of the alleged samples is fraught with conclusory and unsupported statements. For instance, with reference to the first sample, Dr. Daniels states, "I am told this is a product made by Cocona as one of the first prototypes of the '287 patented technology and was shown to TNF in connection with business discussions." (EX2006, ¶ 112.) Dr. Haggquist's Declaration, upon which Dr. Daniels relies, offers little more clarity. (EX2011, ¶¶ 14, 16, 19-20.) The complete lack of evidence regarding the origin of the first and second samples casts doubt over both the results and the conclusions provided by Dr. Daniels. (EX1044, ¶¶ 87-90.)

Additionally, the tests conducted by Dr. Daniels were largely inconclusive. For example, based on standard microscopy, Dr. Daniels concludes that the Figure 1 micrograph "shows a print layer (shown as the pattern of black dots) on top of a *cured* base[] material." (EX2006, ¶ 113 (emphasis added).) At most, Figure 1 illustrates black dots on a lighter-colored material, but there is absolutely no evidence that the lighter-colored material is "cured," e.g., as opposed to extruded. (EX1044, ¶¶ 91-92.)

Based on SEM images, Dr. Daniels states: "What is visible is a large number of porous particles, many of which are grouped together in the square dot. *Pores appear as the holes in the particles.*" (EX2006, ¶ 115 (emphasis added).) Because

the SEM images do not reveal which portions of the observed features are particles, polymeric binder, particles coated with binder, holes between particles, or pores, a POSITA cannot confirm that the particles are porous. (EX1044, ¶93.)

Dr. Daniels further alleges, “the raised features of small dots against a smoother layer directly beneath ... *is strong evidence of a layer of active particles on top of a layer of cured base material*” (EX2006, ¶116 (emphasis added)), and the first sample “had two distinct layers, each having its own thickness” (EX2006, ¶117). Rather, the SEM images show no evidence that the “raised features” are a distinct layer on top of another layer of material – much less a layer of “active” particles on top of a separate layer of “cured” base material. (EX1044, ¶94.) Moreover, Dr. Daniels fails to perform any measurements of the thicknesses of the purported layers – or the claimed ratio between them. (EX1047, 194:8-196:1; 204:15-25; EX1044, ¶95.)

Based on Energy Dispersive X-Ray Spectroscopy (EDS), Dr. Daniels concludes: “the porous particles in the print layer are activated charcoal particles, as the oxygen indicates the activation process.” (EX2006, ¶118.) While evidence of carbon and oxygen is shown, this is insufficient to prove that the print layer contains activated charcoal particles rather than other components (e.g., polymer binder, pigments) that also contain carbon and oxygen. (EX1044, ¶96.) Dr. Daniels even explains away some EDS peaks as “components that have been

adsorbed onto the active surface of the carbon particles from the surroundings.”

(EX2006, ¶118; EX1044, ¶97.)

The evidence falls far short of Dr. Daniels’ ultimate conclusion that the above testing provides “overwhelmingly support” that the first sample “consists of *at least two layers* of particles, the top layer of which contains ... *porous carbon particles* in a regular pattern.” (EX2006, ¶120 (emphasis added); EX1044, ¶¶91-98.) Dr. Daniels performed similar perfunctory testing on the second sample, also failing to provide proof of any thicknesses, the claimed ratio, or improved MVTR. (EX2006, ¶¶121-124; EX1044, ¶99.)

B. Dr. Daniels failed to Show Adequate Nexus Between the Tested Samples and the Claim Limitations

Dr. Daniels provides no evidence that the first or second samples include these emphasized claim limitations:

- “*cured* base material comprising a *first thickness*,”
- “plurality of *active* particles comprising a *second thickness*,”
- “first thickness ... *at least 2.5 times larger* than the second thickness *but less than an order of magnitude* larger than the second thickness,”
- “active particles *improve the moisture vapor transport capacity* of the composition,” and
- “*moisture vapor transmission rate* ... comprises *from about 600 g/m²/day to about 11000 g/m²/day*”

(EX1044, ¶100.)

While providing no evidence of sample preparation, Dr. Daniels simply asserts the base material was “cured.” Nor did Dr. Daniels test particle activity or any increase in MVTR based on the particles – much less the claimed MVTR range – but merely labeled them “active.” (EX1044, ¶101.)

Furthermore, Dr. Daniels failed to show that the samples met key limitations leading to allowance of the claims. As Dr. Daniels failed to measure the thicknesses of the alleged “print layer” and “base material layer,” or to determine whether the claimed ratio was met, Dr. Daniels failed to show the requisite nexus between the samples (specific product) and the claimed invention (recited by claim 27). (EX1044, ¶102.) PO admitted as much in litigation in its interrogatory responses, stating or implying that neither PO nor its licensees practice the claims of the ‘287 patent. (EX1052, at 21-22 (Pl.’s Resps. to Interrogs. 13, 14).)

As no nexus between a specific product and the claimed invention has been made, the Board should not consider PO’s evidence of secondary considerations.

V. CONCLUSION

For at least the above reasons, the challenged claims of the ’287 patent are unpatentable as anticipated and/or obvious over the references cited herein. Accordingly, Petitioner respectfully requests the Board to render a Final Decision confirming the challenged claims of the ’287 patent are unpatentable.

Respectfully submitted,

Date: January 11, 2019

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CERTIFICATE OF SERVICE ON PATENT OWNER

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on January 11, 2019, a complete and entire copy of this Reply Brief and the referenced Exhibits were served on the following counsel for Patent Owner:

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