

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VF OUTDOOR, LLC,
Petitioner,
v.

COCONA, INC.,
Patent Owner.

Case IPR2018-00190
Patent 8,945,287

DECLARATION OF CHARLES A. DANIELS

I, Charles A. Daniels, Ph.D., declare under penalty of perjury, that the following is true and correct.

I. INTRODUCTION

1. I am over the age of 18, of sound mind, competent to testify, and make the following declaration based upon my own personal knowledge.

2. In this declaration, I am providing my expert opinions regarding the above-captioned petition for *inter partes* review (“IPR”) of U.S. Patent No. 8,945,287 (“the ’287 Patent”) filed by VF Outdoor, LLC (“Petitioner” or “VF”), which challenges the patentability of claims 27, 28, 30, 32, 33, 35, 36, 37, 38, and 39 of the ’287 Patent.

3. I submit this declaration as a statement of opinions I intend to express in this matter and the bases therefor. I have personal knowledge of the following facts and would and could testify competently regarding the following statements if called as a witness.

4. The opinions stated in this declaration are based on information currently available to me. I reserve the right to continue my investigation and study, which may include a review of documents and information not yet produced, as well as deposition testimony from depositions for which transcripts are not yet available and that may not yet have been taken in this case. Therefore, I reserve the right to expand or modify this report as my investigations and study continue, and to

supplement my opinions in response to any additional information that becomes available to me, to any matters raised by the Petitioner, or to other opinions provided by the Petitioner's expert(s). I also reserve the right to rely on all other documents, including declarations and expert reports related to *Cocona, Inc. v. Columbia Sportswear Co.*, Case No. 1:16-cv-2703-CMA (D. Colo 2016).

5. During my testimony at trial, hearing, or deposition, I expect to rely upon exhibits, visual aids, and/or demonstratives prepared to depict and explain the information contained in this declaration, or as rebuttal to testimony by the Petitioner's witnesses. Examples of such exhibits, visual aids, and/or demonstratives may include, for example, claim charts, patent drawings, excerpts from patent specifications, file histories, interrogatory responses, deposition testimony and exhibits, as well as charts, diagrams, videos and animated or computer-generated video. Any such exhibits, visual aids, and/or demonstratives will be prepared and identified at the appropriate time.

II. COMPENSATION

6. I am being compensated in this matter at the rate of \$350 per hour, which in no way depends upon its outcome. Compensation for travel will be charged at the same rate and other reasonable expenses are expected to be reimbursed. I have been retained by the firm Kutak Rock LLP to provide expert testimony in this matter.

All my conclusions, opinions and observations stated in this declaration are based on my training, experience, and education, and on the matters I personally reviewed.

III. QUALIFICATIONS

7. I hold a Ph. D. from Case Western Reserve University, Cleveland, OH. I earned that degree in Chemistry and Polymer Science in 1969. I hold a Master's Degree in Chemistry and Polymer Science from Case Western Reserve University from Case Western Reserve University and I attained that degree in 1967. I hold a B.A. in Chemistry from Utica College of Syracuse University, and that I attained that degree in 1964. My curriculum vitae is attached hereto as Exhibit A.

8. I have been practicing in Chemistry and Polymer Science with emphasis on analyses of polymers and research and development rubber and plastics since 1969. During this time, I have worked for the BFGoodrich Company, the Geon Company, the PolyOne Company and Polymer Diagnostics Incorporated. Early in my career, I held several technical positions in the BFGoodrich Company. I was later appointed Manager of Research for the Elastomers Group, Manager of Research for the PVC Rein Group, Director of Technology of the Specialty Elastomers and Latex Groups all within the BFGoodrich Company. In the Geon Company, I was Director of Technology, and later Director of Technology Services. I was President of Polymer Diagnostics Incorporated until 2003. Since 2003, I have been the principal of Materials Performance Consulting LLC. My career has focused on analyses of

polymer compositions, development of polymer test technology, basic research and development, polymer failure analyses, commercial development of polymers, polymer and chemical laboratory management, process and product control technologies, and application of polymer mechanical and chemical testing to determine polymer material performance in use conditions.

9. I have taught in various colleges within the Northeast Ohio area over a period of 40 years, consisting of courses in polymer science, chemistry and mathematics. From 2003 to 2015, I had been an adjunct professor at Lorain County Community College in Elyria, OH, teaching classes in Chemistry and Mathematics. From the fall of 2010 to 2014, I had been developing instructional course modules and teaching courses at the University of Akron on the synthesis of rubber and on polymer physical chemistry. I am the author of a number of publications in the field of polymer science, co-author of one text, author of several chapters in rubber and plastics texts, and I have been awarded four patents.

10. I have been an assessor for the American Association of Laboratory Accreditation, specializing in auditing laboratories in the field of plastics and rubber testing. These laboratories seek accreditation to ISO 17025, the internationally recognized testing standard for both commercial and captive labs.

11. I have significant experience in polymer chemistry, analysis and characterization. I held this position from 2003 to my retirement in 2015. I also have

experience working with polymer formulations and failure analysis. In view of my experience set forth above, I am qualified to develop an opinion regarding the factors affecting the validity of the '287 Patent at issue in this case.

12. I have worked with polymer materials during my undergraduate and graduate training in a career spanning nearly 50 years.

13. My Master's degree and Ph.D. theses were based on how polymer materials interact with solvents, a critical step in which is the diffusion and swelling of polymers in the presence of solvents like water.

14. In my career in industry, I worked in the science of characterizing particulate substances, hydrophilic polymers, particulates used as fillers, and analytical methods based on adsorption of gasses and liquids.

15. For many years, I managed a laboratory which characterized particulate substances by a variety of specialized methods.

16. In that laboratory, technologies such as gas and liquid chromatography were also used, both of which use the principle of adsorption and desorption of materials as a way of separating components of mixtures.

17. In a major project to remove hazardous materials from ambient air streams in which I was involved, a technique using activated carbon was used to provide worker protection.

18. In a patent dispute case in which I was engaged as an expert witness (Medics Pharmaceutical Corporation, and DOW Pharmaceutical Sciences, Inc., Plaintiffs, v. Actavis Mid Atlantic, LLC, Defendant., Civil Action No. 1:11-CV-00409), I testified in deposition on the characterization and properties of hydrophilic polymers used in controlled release pharmaceuticals.

19. I understand from my training and experience the differences between absorption and adsorption, and the physical and chemical changes that distinguish each process.

IV. MATERIALS CONSIDERED AND SUMMARY OF OPINIONS

20. In preparing this document, I have relied on:

- U.S. Pat. No. 8,945,287 (Ex. 1001)
- U.S. Pat. Pub. No. 2004/0018359 A1 (Haggquist) (Ex. 1004)
- Patent Cooperation Treaty Pub. No. WO 2000/70795 A1 (Halley) (Ex. 1003)
- Dutta Patent WO95/33007, December 7, 1995. Filed June 24 1994 (Ex. 1002)
- Petition For Inter Partes Review of U.S. Pat. No. 8,945,287, Case IPR2018-00190 (Paper No. 1)

- Declaration of Abigail Oelker, Ph.D. In Support of Petition for Inter Partes Review of U.S. Pat. No. 8,945,287, Case IPR2018-00190 (Ex. 1005)
- Institution Decision in the matter of VF Outdoor, LLC, Petitioner, v. Cocona, Inc., Patent Owner. Case IPR2018-00190 (Paper No. 14)
- Deposition of Abigail Oelker, Ph.D. (Ex. 2007)
- Errata sheet to the Deposition of Abigail Oelker, Ph.D. (Ex. 2008)
- ASTM E96 vs F1294, Mocon Inc., May 16, 2017 (Ex. 2009)
- <http://www.cabotcorp.com/solutions/products-plus/carbon-blacks-for-elastomer-reinforcement> (Ex. 2010)

21. Based on my review and analysis of these materials, and including any additional materials referenced herein, and my education and experience in the field, my opinions are as follows:

- 22. Claims 27-28, 30, 32, and 36-37 are not anticipated by Dutta;
- 23. Claims 27-28, 30, 32, and 35-39 would not have been obvious over Dutta in view of Haggquist;
- 24. Claims 27-28, 30, 32-33, and 35-37 are not anticipated by Halley; and
- 25. Claims 38-39 would not have been obvious over Halley in view of Haggquist.

26. The basis and reasons for my opinions, as well as the facts considered in forming them, are set forth in this document. I reserve the right to supplement or amend this document to address any information obtained, or positions taken, based on any new information that comes to light.

A. Legal Standards

27. This section provides my understanding of the appropriate legal standards.

Burden of Proof

28. I understand that it is Petitioner's burden in an *Inter Partes* Review proceeding to establish unpatentability by a preponderance of the evidence.

Anticipation Under 35 U.S.C. § 102

29. I understand that anticipation means that each and every element of a claim can be shown to have existed literally or through inherency together in exactly the same situation and united in the same way in a single reference; and that that reference qualifies as prior art under the applicable patent laws. If even a single element or step recited by the claim is not disclosed in exactly the same way, arranged as in the claim, there is no anticipation.

30. With respect to an inherent disclosure, I am informed and understand that when a prior patent or publication does not expressly disclose in words one or more elements of a patent's claims, that prior patent or publication may nevertheless

anticipate the claim if a person of ordinary skill in the art (“POSITA”) would understand the prior patent or publication as disclosing the missing element.

31. I understand that if a claim is patentable, then any claim that depends from that claim is also patentable.

Obviousness Under 35 U.S.C. § 103

32. I understand that obviousness is a question of law based on underlying factual findings: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective indicia of non-obviousness.

33. I understand that a claim in a patent is rendered invalid as obvious only if the differences between the claimed subject matter and the references used to challenge it are such that the claimed subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the claimed subject matter pertains. Patentability is never lost by the manner in which the invention was made; in other words, it makes no difference if the invention resulted from a flash of genius or the sweat of the brow.

34. I understand that a patent claim composed of several elements is not rendered obvious just because each of its elements was, independently, known in the prior art. Most, if not all, inventions rely on building blocks of prior art. Even when all claim limitations are found in prior art references, one must still analyze what the

prior art teaches, whether prior art teaches away from the claimed invention, and whether there was some reason or motivation to combine teachings from the separate references. Thus, I understand that it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. That is, for a claim to be rendered invalid for obviousness by a combination of references there must have been an apparent reason to combine those references to produce the claimed invention. There must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.

35. I understand that a combination of known elements is not obvious unless the motivation for combining existed at the time of the invention. I understand that an “obvious to try” theory is insufficient to demonstrate obviousness unless it indicates that the possible options skilled artisans would have encountered were finite, small, or easily implemented, and that skilled artisans would have had a reason to select the route that produced the claimed invention. Thus, if the prior art, at best, gives only general guidance as to the particular form of the claimed invention or how to achieve it, relying on an obvious-to-try theory to support an obviousness finding is impermissible.

36. I understand that a prior art reference must be considered as a whole, including any aspects that discourage or teach away from the claimed invention,

which may rebut a showing of obviousness. I understand that it is impermissible to use hindsight to arrive at the claimed invention. I understand that, often, the inventive contribution lies in the identification or definition of a new problem, and that where someone is the first to identify a problem, it is impermissible to use hindsight to determine whether the solution to that problem was obvious. Thus, I understand that it is impermissible to look back using the inventor's structure as a template and to then select elements from references to reconstruct the claimed invention.

Broadest Reasonable Interpretation

37. I understand that the terms of the '287 Patent claims should be construed according to their broadest reasonable interpretation ("BRI") in light of the specification, and that the words of the claims should be given their plain and ordinary meaning unless that meaning is not consistent with the specification. I further understand that the claim terms should be construed from the perspective of a person of ordinary skill in the art at the time of the filing of the '287 Patent. For the purposes of this analysis, I have applied and analyzed the '287 Patent claims according to their plain and ordinary meaning.

38. I also understand that the Board preliminarily construed the following terms: "active particles"; "first thickness"; "second thickness." The scope and meaning of these terms are disputed by the parties.

V. OVERVIEW OF ABSORPTION AND ADSORPTION

39. For the discussion and analysis below, a basic understanding of absorption versus adsorption is helpful. These two processes produce different end points, mass changes, and degrees of reversibility. Absorption is a process in which a fluid is dissolved by a liquid or a solid. Adsorption, on the other hand, is a process in which atoms, ions, or molecules from a substance (e.g., gas, liquid, or dissolved solid) adhere to a surface of the adsorbent. Adsorption is a surface-based process wherein a film of adsorbate is created on the surface while absorption involves the entire volume of the absorbing substance.

40. There is scientifically supportable evidence that, by definition, discriminates between processes that proceed by absorption versus adsorption. Adsorption is a process controlled by the surface activity and pore volume of the active substance. The active substance has a defined limit of its adsorptive capacity. By contrast, an absorptive substance often has an infinite capacity for the substance absorbed. Its capacity is not controlled by its surface area or pore volume, but rather by the thermodynamics of the interaction of the polymer with the absorbed and dissolved vapor or liquid.

41. Absorption is the assimilation of molecular species throughout the bulk of the solid or liquid; adsorption is the accumulation of the molecular species at the surface rather than in the bulk of the solid or liquid. Some key differences assist in articulating these differing processes: absorption is a bulk phenomenon, whereas adsorption is a surface phenomenon; absorption is the same throughout a material, whereas adsorption is concentrated at the surface of the adsorbent.

42. The processes of absorption and adsorption are fundamentally different. Absorption can be, in polymer systems, either endo or exothermic, depending upon the physical state of the polymer. Adsorption is always exothermic. Absorption proceeds at a rate that depends upon the concentration difference between the vapor being absorbed, and the amount already absorbed. Equilibrium is never reached, since there always exists a driving force for absorption. By contrast, adsorption reaches equilibrium.

43. Adsorption and absorption require different materials to be active processes. Adsorption requires a material that has a large surface area in the form of pores. Materials such as activated carbon particles and porous aluminum oxide (alumina) can be activated by heat and chemical treatment to alter the surface chemistry to act as adsorbing species. Upon interaction with substances that adsorb, the base material does not change chemically. Contrastingly, an absorbing substance such as silica gel or a crosslinked polyacrylic acid substance imbibes a liquid such as water, causing the particles to swell microscopically to macroscopically. A significant volume change in the particles that absorb is frequently observed, both at the molecular level and at the macroscopic level, whereas in an adsorbing substance, volume changes are not seen.

44. As an example, an adsorptive process can be used to remove water and organic materials from a vapor stream, and the active substance can be regenerated in its original particulate physical form.

45. An adsorptive activated material depends upon its surface area for capacity and rate of activity.

46. By contrast, an absorptive material will change in free volume and increase in mass orders of magnitude larger than an adsorptive material. In particular, a hydrophilic polymer will additionally change in shape, whereas an absorptive particle will not.

47. An absorptive material will not be capable of regeneration to its original physical particulate form without a secondary step of size reduction (e.g. pulverizing) which has little chance of producing its initial particle size and particle size distribution.

VI. THE ‘287 PATENT

A. Claims 27, 28, 30, 32, 33 and 35-39 of the ‘287 Patent

48. The ‘287 Patent was issued on February 3, 2015. Independent claim 27 is reproduced below. For ease of reference, I have assigned claim identifiers. Claims 28, 30, 32, 33, and 35-39 depend from Claim 27, include all of the limitations of Claim 27, and are tabulated below with Claim 27.

Claim Identifier	Claim Language
27 [preamble]	A water-proof composition comprising:
27a	a liquid-impermeable breathable cured base material comprising a first thickness;
27b	a plurality of active particles in contact with the liquid-impermeable breathable cured base material, the plurality of active particles comprising a second thickness; and wherein,
27c	the first thickness comprises a thickness at least 2.5 times larger than the second thickness but less than an order of magnitude larger than the second thickness,
27d	the active particles improve the moisture vapor transport capacity of the composition, and
27e	a moisture vapor transmission rate of the water-proof composition comprises from about 600 g/m ² /day to about 11000 g/m ² /day.

Claim Identifier	Claim Language
28	The composition of claim 27, wherein the active particles comprise about 0% to about 75% of the total weight of the composition.
30	The composition of claim 27, wherein the active particles comprise about 0% to about 30% of the total weight of the composition.
32	The composition of claim 27, wherein the active particles comprise about 0% to about 50% of the total weight of the composition.
33	The composition of claim 27, wherein the composition possesses anti-static properties at least in part due to the active particles.
35	The composition of claim 27, wherein the composition possesses odor absorbance properties at least in part due to the active particles.
36	The composition of claim 27, wherein the composition possesses quick drying properties at least in part due to the active particles.
37	The composition of claim 27, wherein the active particles are selected from the group consisting of: activated carbon, aluminum oxide (activated alumina), silica gel, soda ash, aluminum trihydrate, baking soda, p-methoxy-2-ethoxyethyl ester cinnamic acid (cinoxate), zinc oxide, zeolites, titanium dioxide, molecular filter-type materials, and any suitable combination thereof.
38	The composition of claim 27 further comprising: at least one removable encapsulant in an amount effective to prevent at least a substantial portion of the active particles from being deactivated prior to removal of the removable encapsulant, and wherein the removable encapsulant is removable to reactivate at least a portion of the active particles to improve the moisture vapor transport capacity of the composition.

Claim Identifier	Claim Language
39	The composition of claim 38, wherein the at least one removable encapsulant is selected from the group consisting of: water-soluble surfactants, surfactants, salts, polymer salts, polyvinyl alcohols, waxes, photo-reactive materials, degradable materials, bio-degradable materials, ethoxylated acetylenic diols, starches, lubricants, glycols, corn starch, mineral spirits, organic solvents, paraffinic solvents, and any suitable combination thereof.

B. The Specification of the ‘287 Patent

49. The ‘287 Patent relates to active particle-enhanced membranes. The ‘287 Patent explains that active particles can provide desirable properties, including moisture vapor transport, odor adsorption, and anti-static properties. Ex. 1001 at Abstract (“The active particles incorporated in the membrane may improve or add various desirable properties to the membrane, such as for example, the moisture vapor transport capability, the odor adsorbance, the anti-static properties, or the stealth properties of the membrane”).

50. U.S. Patent Application No. 2004/0018359 (“Haggquist”) is incorporated by reference in the ‘287 Patent. Ex. 1004. I have been informed that this means that Haggquist is part of the specification of the ‘287 Patent. Haggquist discusses adsorptive properties of active particles extensively.

51. The specification further explains that adsorptive properties of active particles define the “active” component of active particles:

These particles may provide such properties because they are “active.” That is, the surface of these particles may be active. Surface active particles are active because they have the capacity to cause chemical reactions at the surface or physical reactions, such as, adsorb or trap substances, including substances that may themselves be a solid, liquid, gas or any combination thereof.

Ex. 1001 at 4:4-10. (Emphasis added).

Certain types of active particles (such as activated carbon) have an adsorptive property because each particle has a large surface area made up of a multitude of pores (e.g., pores on the order of thousands, tens of thousands, or hundreds of thousands per particle). It is these pores that provide the particle or, more particularly, the surface of the particle with its activity (e.g., capacity to adsorb). For example, an active particle such as activated carbon may adsorb a substance (e.g., butane) by trapping the substance in the pores of the activated carbon.

Id. at 4:12-21. (Emphasis added).

These particles can provide such properties because they are “active”. Active particles are active because they have the capacity to adsorb or trap substances, including substances that may themselves be a solid, liquid, and/or gas, for example, pollen, water, butane, and ambient air. Active particles have an adsorptive property because each particle has a multitude of pores (e.g., pores on the order of thousands, tens of thousands, or hundreds of thousands per particle). It is these pores that provide the active particle with its capacity to adsorb. For example, an

active particle such as activated carbon can adsorb a substance (e.g., butane) by trapping the substance in the pores of the activated carbon.

Haggquist (Ex. 1004) at ¶ 28. (Emphasis added).

Active particles are particles that have pores or traps, and have the capacity to adsorb substances in solid, liquid, and/or gas phases, and combinations thereof. These pores can vary in size, shape, and quantity, depending on the type of active particle. For example, some particles naturally have pores, such as volcanic rock, and other particles such as carbon may be treated with extreme temperature and an activating agent such as oxygen to create the pores.

Id. at ¶ 28. (Emphasis added).

52. The specification of the ‘287 Patent discloses numerous embodiments that involve a two-layer invention where active particles (which may be in a base solution) are applied to a substrate or base material. *See, e.g.,* ‘287 Patent at Abstract (“The membrane may be applied to a substrate, or may be used independent of a substrate.”); *Id.* at 2:12-15 (“The present disclosure relates to active particle-enhanced membrane and methods for making and using the same. The membrane can be a self-supporting membrane or a coating on a substrate.”); *Id.* at 2:42-46 (“In some embodiments, the membrane may include polyurethane and solid particles. The membrane may be applied to a substrate such as a woven, non-woven, PTFE (treated or untreated) substrate, PTFE substrate, polyurethane substrate, or knit material, or may be used independent of a substrate.”); *Id.* at Figure 1 at steps 130,

140 (disclosing that active particles and base solution at 130 may be applied to a substrate at step 140).

53. Haggquist (Ex. 1004) which is incorporated by reference into the ‘287 Patent also discloses numerous two-layer embodiments consistent with the rest of the ‘287 Patent and the claim language. Haggquist refers to the substrate as the “embedding substance.” *See, e.g.*, Ex. 1004, ¶ 67 (“The principles of the present invention can be incorporated into an air dispersion method for treating an embedding substance ... and (d) fixes the active particles to the embedding substance.”); *Id.* at ¶ 68 (“The fixing step, referred to above at step (d), is the step that permanently attaches the particles to the embedding substance. In one approach, this step may be implemented by using a solution that contains a binding agent and a solvent (e.g., water). This solution is applied to bind the particles to the embedding substance. The binding agent serves as the “glue” that secures the particles to the embedding substance, but the water serves as the “carrier” for carrying the binding agent through the embedding substance to the particles.”); *Id.* at ¶ 71 (“The principles of the present invention can be incorporated into a padding method that is used to treat an embedding substance. The padding method involves passing a material (e.g., yarn, fabric, etc.) through a bath of active particles.”); *Id.* at ¶ 72 (“The active particles can be permanently attached to the embedding substance through application of a binding agent. The binding agent is typically applied to the

embedding substance as a solution either before or after the embedding substance passes through the padding chamber.”); *Id.* at ¶ 71 (“This combined mixture is sometimes referred to as a liquid suspension. This suspension can, for example, be sprayed onto the embedding substance, can be applied to the embedding substance by a roller or other applicator, or can be used as a bath in which embedding substance can be submersed.”); *Id.* at ¶ 78 (“The principles of the present invention can also be incorporated into a xerographic method for treating an embedding substance. The xerographic method uses the principles of electrostatic or magnetic attraction to transfer a toner formulation from a hopper to a drum assembly.”); *Id.* at claim 5 (reciting “A method for incorporating active particles into an embedding substance”); *Id.* at claim 11 (reciting “an air dispersion process, a padding process, a xerographic process, and a solution preparation process”).

54. A person of ordinary skill in the art would understand that the ‘287 Patent discloses, both in its own text and in the text of Haggquist, which is incorporated by reference, a two-layer invention. A POSITA would also readily understand consistent with those embodiments that claim 27 recites a two-layer invention with the first layer being the “cured base material” and the second layer being the “plurality of active particles in contact with the ... cured base material.” The “cured base material” or first layer has a physical dimension called the “first thickness” because it has been cured (*e.g.*, is in solid form) prior to being placed in

contact with the “plurality of active particles.” Likewise, the “plurality of active particles” (which may be in a solution as disclosed in Figure 1 of the ‘287 Patent) are placed “in contact” with the cured base materials and have a second dimension called the “second thickness.” That is, claim 27 recites placing the plurality of active particles in contact with a base layer that is *already* cured, *e.g.*, that is solid. Claim 27 does not say that the active particles are placed in the cured base material, and *then* that the entire composition is cured.

55. The conclusions and claim constructions offered by the Petition and Dr. Oelker are incorrect because they ignore the claim language and the numerous two-layer embodiments disclosed by the ‘287 Patent. In an effort to minimize these embodiments, Dr. Oelker erroneously conflates the “base solution” that carries the active particles with the “base material” recited by claim 27. Ex. 1005, Oelker at para 94-95, 103. This is incorrect. Figure 1 of the ‘287 Patent, for example, distinguishes the “base solution” carrying active particles from the “substrate” to which the mixture is applied. ‘287 Patent, Figure 1. Moreover, Dr. Oelker’s statement that “As such, the active particles do not form a discrete layer that has a measureable thickness” is wrong. Ex. 1005, Oelker at para 103. A person of ordinary skill in the art knows that the base solution containing active particles is eventually cured (*e.g.*, made into a laminate layer, such as on a jacket) and so can be readily measured as the “second thickness.” *See, e.g.*, Ex. 1001, ‘287 Patent at 3:37-

40 (“At step 110, a base material solution is provided. The base material solution may include a material, which when converted into a non-solution state (e.g., cured), exhibits water-proof breathable properties.”).

56. The specification also discusses “performance activity” of active particles, referencing the adsorptive properties of active particles. Ex. 1001 at 5:59-65 (“In the case of adsorptive activity and moisture management, when a removable protective substance is introduced to the active particle prior to exposure of the active particle to a deleterious event or other adsorptive performance limiter, the active particle is placed in a protected or deactivated state, limiting performance adsorption of the active particle for the time when premature deactivation is to be avoided”); Ex. 1004, ¶ 5 (“Exposing the active particles to a substance can prematurely deactivate the active particles by blocking or inhibiting the pores, thus reducing the adsorptive capacity of the active particles.”). The extensive and specific discussion of adsorptive properties of active particles and concomitant absence of reference to absorptive properties evidences that the claimed invention is limited to adsorptive active particles as opposed to absorptive ones.

C. Person of Ordinary Skill in the Art (“POSITA”)

57. In the field relevant to the ‘287 Patent, I understand that the Board determined that a POSITA would have had an advanced degree (Master’s or Ph.D.) or a bachelor of science degree in a relevant field combined with practical experience

in one of the following: (1) chemical materials, including polymers and materials that undergo sorption; (2) light and its interaction with matter; and (3) waterproof, breathable materials and garments. Four-year college degrees in Chemistry, Chemical Engineering, Polymer Chemistry, or Physics would be appropriate, or, at a minimum, the completion of courses in chemistry, organic chemistry, physical chemistry, polymer science, or proto-physical chemistry.

58. I consider myself a person of ordinary skill in the art with respect to the ‘287 Patent.

D. Claim Terms

1. Active particles

59. Claim 27 of the ‘287 Patent recites “a plurality of active particles in contact with the liquid-impermeable breathable cured base material, the plurality of active particles comprising a second thickness...”

60. The specification confirms that the “active particles” are surface-active particles that work by adsorbing or trapping substances on their surfaces. *See, e.g.*, Ex. 1001 at 2:56-59; 3:64-4:3, 4:4-21, 4:28-38, 5:1-10, 5:11-22, 5:25-33, 5:43-46, 5:59-6:3, 6:13-28, 8:10-12, 8:17-19; *see also* Ex. 1004 at Fig. 1, ¶¶ 4-5, 7, 28-29, 32, 37-38, 80, 84, 92, 99. In light of the description of active particles being described by their adsorptive properties throughout the specification, a POSITA would have understood that the “plurality of active particles” of claim 27 are characterized for the purposes of the claimed invention by their adsorptive properties.

61. Because of the fundamental distinction between absorption versus adsorption and in view of the specification's consistent description of active particles as adsorptive, I agree that Cocona's proposed construction of "active particles" as "particles that adsorb or trap substances on their surface" is consistent with the broadest reasonable interpretation in view of the '287 Patent.

62. The Board's Decision also noted the absence of reference to absorption relative to active particles in the specification of the '287 Patent. Paper 14 at 8.

63. Further, Dr. Oelker stated (Ex. 1005 at ¶ 99): "Given that a claim term is given the broadest reasonable interpretation in view of the specification, the definition of a plurality of "active particles" means particles capable of causing chemical reactions at their surface or capable of physical reactions, including the ability to adsorb, absorb, or trap substances." Dr. Oelker improperly broadens the definition of "active particles" to include all particles, including absorptive particles. This is directly contrary to the '287 Patent as understood by a POSITA.

64. 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. While better than Petitioner's proposed construction, it is erroneously interpreted by the Board to include absorptive particles. *Id.* at 16-17, 23-24. A correct reading of the phrase "Surface active particles are active because they have the capacity to cause chemical reactions at the

surface or physical reactions” (Ex. 1001, ‘287 Patent, 4:6-8) in the context of the ‘287 Patent makes clear that it should be interpreted as “Surface active particles are active because they have the capacity to cause chemical or physical reactions at the surface.” *See, e.g.*, Ex. 1001 at 4:4-21, 4:28-38, 5:30-33, 6:13-17; *see also* Ex. 1004 at Fig. 1, ¶¶ 4-5.

65. The Petition and Dr. Oelker support their unreasonably broad interpretation of “active particles” based on obvious typographical errors or mistakes in Haggquist. Pet. at 12 (citing Ex. 1004, claim 1, ¶ 14); Ex. 1005 at ¶¶ 98-99. The references in Haggquist to absorption are clearly typographical errors when the ‘287 Patent and Haggquist are viewed as a whole. There is no suggestion in the ‘287 Patent or Haggquist that the inventor intended the surface-active particles of his invention to encompass absorptive particles. Additionally, I reviewed the Haggquist Declaration (Ex. 2001 at ¶¶ 12-13) and agree that references in Haggquist to “absorption” or “absorptive” particles are clear typographical errors.

66. Dr. Oelker’s opinion is premised on this obvious error. Ex. 1005 at ¶¶ 98-99. It is clear that Haggquist relates to surface-active particles and not absorptive particles. Haggquist discusses encapsulation to protect the pores of surface-active particles, not absorptive particles which do not rely on surface porosity. *See, e.g.*, Haggquist at para 13 (“The objects of the invention are accomplished by deactivating active particles with a removable substance (e.g., encapsulant) for protection against

premature deactivation. The removable substance, as used on or with the active particles, deactivates the active particles by blocking or inhibiting the pores of the active particles.") (Emphasis added). No reasonable POSITA would conclude in view of the numerous references to surface-action and adsorption that Haggquist meant to extend the meaning of active particles to absorptive particles. It simply makes no sense to discuss deactivating absorptive particles by blocking their surface pores.

67. The intrinsic record of the '287 Patent makes clear that the "active particles" of Claim 27 are surface-active particles that adsorb or trap substances on their surface, not absorptive particles that work by an entirely different process. Based on the plain language of the claim in view of the intrinsic record, "active particles" should be limited to "particles that adsorb or trap substances on their surface." Expanding the meaning of "active particles" to include non-adsorptive particles such as absorptive particles would contravene the scope of the invention as disclosed in the '287 Patent.

2. First thickness

68. Claim 27 includes the limitation "a base material comprising a first thickness." Ex. 1001 at 12:2-3.

69. The specification of the '287 Patent discloses embodiments of a two-layer configuration, as discussed above. For example, the Abstract states, "The

membrane may be applied to a substrate, or may be used independent of a substrate.” Ex. 1001 at Abstract. This means that a second layer (e.g., active particles in a base solution) is applied to a first layer (e.g., to a cured substrate) as shown for example in Figure 1. *Id.* at Figure 1 at steps 130, 140 (disclosing that active particles and base solution at 130 may be applied to a substrate at step 140). *See also, e.g., id.* at 2:12-15 (“The present disclosure relates to active particle-enhanced membrane and methods for making and using the same. The membrane can be a self-supporting membrane or a coating on a substrate.”); *Id.* at 2:42-46 (“In some embodiments, the membrane may include polyurethane and solid particles. The membrane may be applied to a substrate such as a woven, non-woven, PTFE (treated or untreated) substrate, PTFE substrate, polyurethane substrate, or knit material, or may be used independent of a substrate.”); Ex. 1004 at ¶¶ 67-71, 78. The “cured base material” of claim 27 is cured and so it has a measurable width (“first thickness”) that does not include the active particles.

70. Accordingly, I agree that Cocona’s proposed construction of “first thickness” as “first layer or membrane” is consistent with the broadest reasonable interpretation in view of the ‘287 Patent.

71. The Board construed the term “first thickness” as “‘the thickness of a base material’, which base material may include active particles.” Paper 14 at 12. I respectfully disagree with the Board because the numerous two-layer embodiments

in the ‘287 Patent make clear that the “cured base material” (*e.g.*, substrate) in claim 27 does not include the claimed plurality of active particles. Rather, the claimed active particles are applied to (*e.g.*, “in contact with”) the cured substrate. *See, e.g.*, ‘287 Patent at Figure 1. Based on the specification, the portion outside the quotation marks (*i.e.*, “which base material may include active particles”) should be omitted from any construction, since the specification of the ‘287 Patent makes clear that in the 2-layer embodiments the plurality of active particles comprise the membrane layer separate and apart from the base layer/substrate with the “first thickness.” In essence, the portion after the quotation marks conflicts with a POSITA’s understanding of the claimed invention in view of the intrinsic record.

3. **Second thickness**

72. Claim 27 includes the limitation “the plurality of active particles comprising a second thickness.” Ex. 1001 at 12:5-6.

73. I agree that Cocona’s proposed construction of “second thickness” as “second layer or membrane” is consistent with the broadest reasonable interpretation in view of the ‘287 Patent. As discussed above, the ‘287 Patent discloses numerous embodiments where there are two layers: (1) a first layer or substrate corresponding to the “cured base material” in claim 27; and (2) a second layer of active particles (which may be carried in “base solution”) in contact with the “cured base material.” *Id.* at 7:10-25. The base solution with active particles applied as a “layer or film”

on a substrate has a physical thickness that can be measured. This is the “second thickness.” *See, e.g., Id.* at 7:20-21 (“The cured mixture may be referred to herein as a membrane.”).

74. The Board 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. While I agree that the “second thickness” includes the active particles, a POSITA would not interpret it as the size of a single particle. Doing so is inconsistent with the language of the claims and the ‘287 Patent. First, the plain language of the claim indicates that the “second thickness” is a dimension of the plurality of active particles, not of an individual particle. I understand that every word of a claim should be given meaning, and that it would not be correct to remove the word “plurality” from the claim. The Petitioner’s and the Board’s interpretation, however, removes the word “plurality” from the claim by treating the “second thickness” as the thickness of a single active particle. Nothing in the ‘287 Patent limits or defines a “plurality” to a single particle. Accordingly, the Board’s interpretation is inconsistent with the broadest reasonable interpretation standard, which focuses on the language of the claims and the specification of the patent.

75. The Board’s and the Petitioner’s interpretation of “second thickness” is also inconsistent with numerous embodiments in the ‘287 Patent and in Haggquist that disclose a two-layer invention. *See, e.g., Ex. 1001, ‘287 Patent at Claim 27*

(reciting a “cured base material” and a “plurality of active particles in contact with the ... cured base material”; *see also Id.* at Abstract (“The membrane may be applied to a substrate, or may be used independent of a substrate.”); *Id.* at 2:12-15 (“The present disclosure relates to active particle-enhanced membrane and methods for making and using the same. The membrane can be a self-supporting membrane or a coating on a substrate.”); *Id.* at 2:42-46 (“In some embodiments, the membrane may include polyurethane and solid particles. The membrane may be applied to a substrate such as a woven, non-woven, PTFE (treated or untreated) substrate, PTFE substrate, polyurethane substrate, or knit material, or may be used independent of a substrate.”); *Id.* at Figure 1 at steps 130, 140 (disclosing that active particles and base solution at 130 may be applied to a substrate at step 140); Ex. 1004 at ¶¶ 67-71, 78.

76. The ‘287 Patent clearly discloses active particles (which may be carried in “base solution”) in contact with a substrate or “cured base material.” *See, e.g., Id.* at 7:10-25 (discloses a base solution carrying active particles that forms a “layer or film” or “laminate” that can be applied to a substrate, and further explains that the cured active particle mixture can be called a “membrane”). That “layer or film” contains the plurality of active particles and has a physical dimension that can be readily measured as the “second thickness.” *See, e.g., Id.* at 7:20-21 (“The cured mixture may be referred to herein as a membrane.”).

77. For these same reasons I disagree with Dr. Oelker that the “second thickness” is allegedly “not discussed in the specification and therefore not defined therein.” Ex. 1005, Oelker at para 101. On the contrary, as discussed above there are numerous two-layer embodiments involving a “layer or film,” “laminate,” or “membrane” of active particles in contact with a substrate. Ex. 1001, ‘287 Patent at 7:10-22. A POSITA would readily understand that an active particle “layer or film,” “laminate,” or “membrane” has a thickness that can be measured. A POSITA reading the claims and the ‘287 Patent does not need an express definition of “second thickness” because it is readily apparent that the active particle layer has a physical thickness that can be measured. Dr. Oelker’s statement that “As such, the active particles do not form a discrete layer that has a measureable thickness,” Ex. 1005, Oelker at para 103, is contrary to the two-layer embodiments disclosed in the patent specification.

VII. REFERENCES CITED

A. Claims 27, 28, 30, 32, and 36-37 are not Anticipated by Dutta

78. It is my opinion that Dutta in Ground 1 does not disclose each element of Claims 27, 28, 30, 32, and 36-37 of the '287 Patent for at least the reason that Dutta does not disclose “active particles,” a “first thickness,” and a “second thickness” as those terms are properly construed.

79. Dutta relates to water vapor permeable films that contain hydrophilic absorbent particles. Dutta at 1:8-12; *Id.* at 4:20-24 (“It has now surprisingly been discovered that the water vapor transmission rate (WVTR) of a nonporous polymeric film can be increased by incorporating into it hydrophilic absorbent particles. Particles that absorb water are not known for an ability to increase water vapor transmission rates.”); *Id.* at 5:10-11 (“...by ‘hydrophilic absorbent’ particles is meant that the particles absorb water.”).

80. The fact that hydrophilic absorbent particles in Dutta absorb water is only half the story. The hydrophilic absorbent particles swell “to several thousand times their own weight” with water. *See* Dutta at 9:15-18 (“The hydrophilic absorbent particles, as used in the present invention, are particles capable of swelling by absorbing a large volume of an aqueous liquid and assuming the form of a gel several times to several thousand times its own weight.”) (Emphasis added). This swelling—or large change in particle size—is the key to how the invention of Dutta

works. A POSITA understands that, in Dutta, the hydrophilic particles swell and thereby stretch the membrane, creating holes or channels that allow water vapor to move across the membrane. The fundamental science of Dutta relies on super-hydrophilic particles swelling with water to create holes in the membrane.

81. Dutta also explains that the increase in WVTR caused by the use of hydrophilic parties was “surprising [].” *Id.* at 1:12 *Id.* at 4:20-24 (“Particles that absorb water are not known for an ability to increase water vapor transmission rates.”); *see also* Ex. 1005 at ¶ 58. Besides his “surprising” use of super-swelling absorbent particles at the heart of his invention, Dutta actively discouraged the use of non-absorbent particles for the purpose of increasing WVTR.

In addition to hydrophilic absorbent particles, the polymer used to make the films may contain other inert diluent particles as fillers. Talc, silica, calcium carbonate, carbon black, titanium dioxide, are examples of such filler particles.

Dutta at 9:36-10:1. (Emphasis added).

82. The science of Dutta relies on swelling hydrophilic absorbent particles, and Dutta teaches that non-hydrophilic absorbent particles are “inert” and play no role in water vapor transport. *Id.* This makes sense because non-absorbent particles (including adsorptive particles) do not swell and thus do not create holes in the membrane for increased water vapor transport.

83. As discussed above, the “active particles” of the ‘287 Patent are surface-active adsorbent particles that trap water on their surface. Adsorptive

particles do not absorb water and do not swell “to several thousand times [their] own weight” like the hydrophilic absorptive particles in Dutta. *See* Dutta at 9:15-18 (“The hydrophilic absorbent particles, as used in the present invention, are particles capable of swelling by absorbing a large volume of an aqueous liquid and assuming the form of a gel several times to several thousand times its own weight.”) (Emphasis added). This key principle fundamentally distinguishes the science of the ‘287 Patent from the science of Dutta.

84. As discussed above, a POSITA would construe “active particles” to mean “particles that adsorb or trap substances on their surface.” Dutta does not contain a single reference to the use of surface-active adsorbent particles to increase water vapor transport, and would not do so because active particles do not swell “to several thousand times [their] own weight.” Ex. 1002 at 9:15-18. Dutta in claims 4 and 5 recites hydrophilic absorptive materials which are completely different from a particle adsorbing water into its pores and surface topography. Dutta teaches the use of swelling hydrophilic absorbent particles, and teaches away from everything else as “inert.” Dutta at 9, lines 36-38.

85. Dutta describes his invention in terms of absorptive super-swelling particles, and thus his invention operates using a fundamentally different scientific principle from the ‘287 Patent. Even Dutta’s water vapor transmission testing measured weight gain due to water absorption, and he specifically references an

absorption capacity, which emphasizes the fundamental distinction between Dutta and the ‘287 Patent. *Id.* at 16:30-23:10. Dutta actually describes two methods: weight gain by ASTM D570 and MVTR by ASTM E96, in some of the examples. ASTM D570 is not a permeation test and should not be used to predict MVTR. As a matter of fact, the preferred test for high sensitivity MVTR data is ASTM F1249, which Dutta does not use.

86. The claims are also not anticipated in Ground 1 because the Petition does not show how Dutta meets the “first thickness” and the “second thickness” elements of claim 27. As discussed above, claim 27 recites a two-layer invention. (See ¶¶ 52-55, above.) The Petition fails to establish, or even allege, that Dutta discloses the two-layer invention of claim 27. *See* Petition at 11, 34 (Petitioner asserts unpatentability on the basis that claim 27 recites a one-layer invention with the “plurality of active particles” in “cured base material”); Oelker Decl at ¶ 95 (same). Accordingly, the Petition has not established that claim 27 is anticipated by Dutta under a correct interpretation of the claims.

B. Claims 27, 28, 30, 32, and 35-39 are not Obvious over Dutta and Haggquist

87. It is my opinion that the combination of Dutta and Haggquist proposed by Petitioner in Ground 2 does not disclose each element of Claims 27, 28, 30, 32, and 35-39 of the '287 Patent. It is also my opinion that a person of ordinary skill in the art would not be motivated to combine Dutta and Haggquist and arrive at the claimed inventions, as discussed below, for at least the reasons that Dutta actively teaches away from using adsorbent particles to increase the water vapor transmission rate as recited by claim 27.

88. I have been informed that a purported combination of prior art references may not make a claimed invention obvious if the prior art indicates that the invention would not have worked for its intended purpose or if it teaches away from the claimed invention. I have been further informed that a reference teaches away from a claimed invention when a person of ordinary skill in the art, on reading the reference, would be led away from the claimed invention.

89. Dutta actively teaches away from the '287 Patent in a number of aspects. First, a POSITA understands that the fundamental science behind Dutta leads away from the invention of the '287 Patent. Dutta relies on swelling hydrophilic absorbent particles to create holes in a membrane. See ¶ 79, above (citing Dutta at 9:15-18). Dutta actively discouraged the use of non-absorbent particles for the purpose of increasing WVTR.

In addition to hydrophilic absorbent particles, the polymer used to make the films may contain other inert diluent particles as fillers. Talc, silica, calcium carbonate, carbon black, titanium dioxide, are examples of such filler particles.

Dutta at 9:36-10:1. (Emphasis added).

90. Dutta teaches that non-absorbent particles are “inert” and play no role in water vapor transport. *Id.* This makes sense because non-absorbent particles would not swell and make holes in a membrane for increased water vapor transport. Dutta’s characterization of non-absorbent particles as “inert” actively discourages a person of ordinary skill in the art from using non-absorbent particles. The “active particles” of the ‘287 Patent are surface-active adsorbent particles that trap water on their surface and do not absorb water to swell “to several thousand times [their] own weight” like the hydrophilic absorptive particles in Dutta.

91. A person of ordinary skill would not start with Dutta and be motivated to swap Dutta’s super-swelling hydrophilic absorbent particles with particles that do not swell. *See* Dutta at 9:15-18 (“The hydrophilic absorbent particles, as used in the present invention, are particles capable of swelling by absorbing a large volume of an aqueous liquid and assuming the form of a gel several times to several thousand times its own weight.”) (Emphasis added).

92. Dr. Oelker’s opinion that a person of ordinary skill would be motivated to combine Dutta and Haggquist, Ex. 1005 at ¶¶ 145-58, completely ignores the science behind Dutta, namely Dutta’s use of swelling hydrophilic absorbent

particles. See, e.g., Dutta at 9:15-18 (“The hydrophilic absorbent particles, as used in the present invention, are particles capable of swelling by absorbing a large volume of an aqueous liquid and assuming the form of a gel several times to several thousand times its own weight.”) Dr. Oelker also fails to credit the clear teachings of Dutta that lead away from the use of “inert” or non-absorptive particles. Dutta at 9:36-10:1.

93. The Petition also fails to provide a motivation to combine Dutta and Haggquist because the Petition fails to show how Dutta discloses a “first thickness” and a “second thickness” as recited in claim 27. See, e.g., Ex. 1001, ‘287 Patent at Claim 27 (reciting a “cured base material” and a “plurality of active particles in contact with the ... cured base material”; see also *Id.* at Abstract (“The membrane may be applied to a substrate, or may be used independent of a substrate.”); *Id.* at 2:12-15 (“The present disclosure relates to active particle-enhanced membrane and methods for making and using the same. The membrane can be a self-supporting membrane or a coating on a substrate.”); *Id.* at 2:42-46 (“In some embodiments, the membrane may include polyurethane and solid particles. The membrane may be applied to a substrate such as a woven, non-woven, PTFE (treated or untreated) substrate, PTFE substrate, polyurethane substrate, or knit material, or may be used independent of a substrate.”); *Id.* at Figure 1 at steps 130, 140 (disclosing that active particles and base solution at 130 may be applied to a substrate at step 140).

94. For point of reference, the error in the measurements in Dutta, although not disclosed for his set of data, are cited in ASTM for both D570 and E96 as ranging from about 5% to 15%, and sometimes higher, depending upon thickness of films studied. So the differences between measurements on Examples 1A and 1B could be meaningless and within the error of the measurement. It however defies the principle that more absorbent material results in more absorbed water vapor, unless you take into account the critical factor that the solubility of the water in the two different materials is the reason. This would not occur if you were comparing adsorbent materials, where more surface area always results in more adsorbed moisture. Thus, the explanation by Petitioner and Dr. Oelker are inconsistent with established methods, and do not support their ultimate conclusions.

95. Dutta also claimed a structure in his absorbent material which is a film that is “substantially smooth.” *See* Ex. 1002 at 11:1-4. Haggquist in his patent application publication, figure 5, shows a structure which has a non-smooth, rough surface from exposing active particles on the surface. *See* Ex. 1004 at Figs. 2-5. This structure is carried forward in the ‘287 Patent. This is another reason why Dutta teaches away from the claimed invention.

C. Claims 27, 28, 30, 32, 33, and 35-37 are not Anticipated by Halley

96. The Halley application, Ex. 1003, “is directed to a composite material which comprises a substrate and a continuous polymer coating applied to the substrate, the polymer containing a particulate solid and being imbibed into the face of the porous substrate; and the solid particles being distributed non-uniformly through [*sic*] depth of the polymer coating.” Ex. 1003 at Abstract. The focus of Halley is to improve abrasion resistance, although Halley states that its invention may also have “other desirable properties.” Ex. 1003 at 1 (“Field of Invention”), ll. 8-10.

97. Halley incorporates a particulate solid such as carbon (carbon black) particles into a hydrophilic polymer coating for improved tensile strength and abrasion resistance, Ex. 1003 at 2 (“Description of the Invention”), ll. 15-16; *id.* at 7:17-20 (regarding carbon black), and teaches that this hydrophilic film is used to coat a porous substrate – *i.e.*, a “porous expanded PTFE membrane.” Ex. 1003 at 7. Halley specifically discloses the use of “finely dispersed carbon particles, especially soot particles,” Ex. 1003 at 1:26-28, in the coating layer.

98. It is my opinion that Halley does not disclose each element of Claims 27, 28, 30, 32, and 35-37 of the '287 Patent for at least the reason that Halley does not disclose “active particles,” “first thickness,” and “second thickness” as those terms are properly construed, nor does it disclose a composition where “active particles improve the moisture vapor transport capacity of the composition.” First, contrary to statements by Dr. Oelker, *see* Ex. 1005 at ¶¶ 201-03, a POSITA reading Halley would understand that the carbon soot and other particles disclosed in Halley are not “active particles” as the term is properly construed, which is to mean “particles that adsorb or trap substances on their surface.” With specific regard to the carbon (*e.g.* carbon black or soot) which is disclosed in Halley, which is called out by Dr. Oelker, this is not activated carbon and does not exhibit adsorptive properties. *Id.* at 7:17-20. Carbon and “activated carbon” are two very different things. Carbon (without activation) is not an active particle and does not adsorb or otherwise cause a reaction at the surface of the particle. Halley does not disclose or discuss any activation of particles, surface-active particles, or adsorption. Indeed, a POSITA understands that carbon soot is too small to be processed into activated carbon, and Dr. Oelker fails to acknowledge this highly-relevant fact.

99. Second, a POSITA would understand Halley, like Dutta, to involve hydrophilic matter (a hydrophilic coating) that operates solely by absorption and swelling, but with the addition of particulate solids added for strength and abrasion resistance. *See, e.g.*, Ex. 1003 at 2:24-27 (regarding the hydrophilic coatings); *id.* at 2:15-16, 3:1-7 (for addition of particulate solids for strength and abrasion resistance). None of the particulate solids disclosed in Halley is identified as “active” or “activated.”

100. Significant and fundamental differences between Halley and the ‘287 Patent are evident in, among other things, Halley’s examples. Halley describes several examples made with the hydrophilic coating of U.S. Patent 4,194,041 (“the ‘041 patent”), with the addition of Black Pearls 2000 Carbon Black in various percentages. *See* Ex. 1003 at 7:4-24 (examples 1-3). The ‘041 patent, which is Petitioner’s Ex. 1025 here, teaches a hydrophilic film that the patent expressly says operates solely by absorption. As it explains the film used in Halley:

The term “Hydrophilic film” used in this invention is restricted to continuous films, including closed cell, foamed film. These films do not allow the flow of gases or liquids through open pore channels in the materials but do transfer substantial amounts of water through the film by absorbing water on one side of the film where the water vapor concentration is high, and desorbing [*sic*] or evaporating it on the opposite side of the film where the water vapor concentration is low.

If a continuous film of hydrophilic material is exposed to air containing substantial water vapor on one side of the film, and to air containing less water vapor on the other side, the side of the film exposed to the higher water vapor concentration will absorb water molecules which

diffuse through the film and are desorbed or evaporated on the side exposed to the lower water vapor concentration....

The hydrophilic materials of this invention are selective in absorbing and transporting water and not surface active agents and organic materials generally, nor do they allow gases such as oxygen and nitrogen to flow through them readily under hydrostatic pressure. They are also resistant to hydraulic flow of liquids, including water. These continuous, hydrophilic films are unique in transporting water solely by the absorption evaporation mechanism.

Ex. 1025 at 3:22-56 (emphasis added). To the extent that Halley teaches any water vapor transmission, it is accomplished by this hydrophilic film through the process of absorption – not through any active (*i.e.* adsorptive) particles as called for by claim 27.

101. Moreover, the addition of the carbon black to the membrane in Halley does not affect water vapor transmission; it certainly does not improve it. *See* Ex. 1003 at Table 2 (showing a decrease in water vapor transmission rates with the addition of carbon black as compared to the Control). Halley would show these carbon black particles to be “inert” insofar as water vapor transmission is concerned. This is exactly what is taught in Dutta. *See* Ex. 1002 at 9:36-10:1.

102. In this regard, Dr. Oelker’s analysis on this point reflects an incorrect understanding of active particles apparently stemming from an incorrect understanding of absorption versus adsorption. In citing to Halley (Ex. 1005 at ¶ 75), Dr. Oelker does not cite to any reference to adsorbent particles, but instead

argues that the reader should assume that Halley's discussion of carbon particles and/or other particulate solids must mean activated particles. Halley, however, never says that, and the other details (soot, absorption, etc.) show that it is not the case. Carbon can be treated in a multitude of ways to exhibit a multitude of desired properties. Without a specific teaching of carbon that is activated to have adsorbent properties, Halley simply does not disclose the technology of the '287 Patent – at least in the respect that the carbon particles are not “active particles” and there are not “active particles [that] improve the moisture vapor transport capacity of the composition,” as required by Claim 27. Ex. 1001 at 12:1-16.

103. Dr. Oelker's reliance on the Halley Table 3 data for support is misplaced. The fact that Halley does not disclose its experimental conditions, error rates, repeatability, reproducibility, or methods for measurements means that Table 2 must be considered at least as relevant as the Table 3 data cited by Dr. Oelker, and shows that the addition of carbon black, itself, does not improve MVTR/WVTR. Dr. Oelker's lack of understanding of error in the Halley reference calls into question her ultimate conclusions regarding the '287 Patent and the references cited.

104. As to the first and second thicknesses of Claim 27 of the '287 Patent, Halley makes no mention of the criticality of the ratio of the dimensions of the composite structure layers. These ratios are described as imperatives in the '287

Patent. Thus, Halley fails to teach the first thickness and second thickness, as well as other elements of claim 27 of the '287 Patent.

D. Claims 38-39 are not Obvious over Halley and Haggquist

105. It is my opinion that the combination of Halley and Haggquist proposed by Petitioner does not disclose each element of Claims 38-39 of the '287 Patent. It is also my opinion that a person of ordinary skill in the art would not be motivated to combine Halley and Haggquist and arrive at the claimed inventions for at least the reason that Halley teaches away from using adsorbent particles to increase the water vapor transmission rate as recited by claim 27, and instead teaches water transmission using non-active particles and operating solely by absorption, as discussed above.

106. The idea that both Halley and Haggquist teach introducing particles to a substrate to enhance performance, and that that would make them compatible or make elements of their teachings interchangeable, is just wrong. Halley teaches a hydrophilic film used to transport water “solely by the absorption evaporation mechanism” with the addition of other (inert/non-active) particles for abrasion resistance. Haggquist teaches using active particles to transport water by adsorption. A POSITA with knowledge of these references at the time of the '287 invention would clearly understand that these are diametrically opposed scientific pathways and principles. To a polymer scientist, these are in the category of “never the twain

shall meet.” There would not be a motivation to combine teachings between these references; in fact, there would be every motivation against combining these teachings.

107. Moreover, there is no teaching or suggestion that substituting carbon black or soot with activated carbon would maintain the abrasion resistance properties taught by Halley. Ex. 1003 (“A preferred particulate solid is carbon particles”). There is no teaching or suggestion that Halley would work for its intended purpose if the inactivated carbon disclosed by Halley was swapped with activated carbon. Dr. Oelker’s report fails to provide *any* evidence or reasoning that Halley modified with activated carbon would work for its intended purpose, or that a POSITA would have a reasonable expectation of success for such a modification.

108. Haggquist’s teachings on encapsulants, in particular, would not be applied to Halley in order to improve water vapor transmission. Haggquist’s encapsulants are intended to fill the surface pores of the active particles to prevent premature deactivation. Non-activated particles – *i.e.*, the absorbent particles in Halley – cannot be deactivated. It makes no sense to encapsulate something to protect it from premature deactivation, when it is/was not activated. Indeed, the non-activated particles of Halley would not have surface pores to fill according to the encapsulant process of Haggquist.

109. In summary, Halley (1) does not disclose active particles that operate by adsorption, (2) does not disclose first and second thicknesses or the claimed ratios between the layers, (3) operates by absorption, which is incompatible with the adsorption operations and adsorptive particles disclosed in Haggquist; and (4) does not disclose “active particles [that] improve the moisture vapor transport capacity of the composition.” Moreover, it would be contrary to well-understood and accepted scientific principles to try to combine the two and expect them to work together to increase water vapor transmission rates or for any purpose.

VIII. TECHNICAL ANALYSIS OF SAMPLE PRODUCTS

110. I conducted and directed microscopic analysis on certain samples in connection with my work on this matter. Under my direction and supervision, both samples were analyzed with a high magnification optical microscope, as well as a scanning electron microscope. For both materials, this allowed me to see the layered molecular-structures. I also conducted a chemical analysis which identified the chemistry of a base layer with a second layer in contact with the base layer, the second layer being a print layer of activated carbon particles.

111. Based on my analysis as well as other information provided to me and my years of experience with materials analysis and elemental analysis, it is my opinion that both samples practice Claim 27 of the ‘287 Patent.

A. TNF Laminate Our Print

112. First, I analyzed a sample labelled “TNF Laminate Our Print.” 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 with TNF, which is information confirmed by the Second Declaration of Greg Haggquist. Ex. 2011, ¶ 19. Looking at the sample under the microscope at approximately 175 times magnification, as well as with a scanning electron microscope (SEM), I could identify the elements of Claim 27 of the ‘287 Patent.

113. This is a high magnification optical micrograph of the TNF Laminate Our Print sample, which shows a print layer (shown as the pattern of black dots) on top of a cured based material:

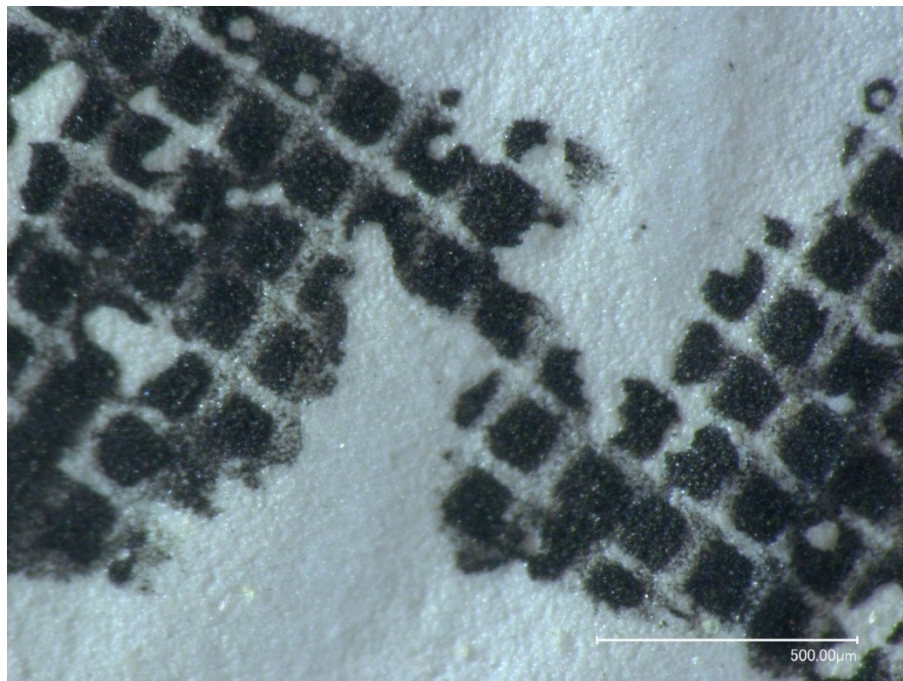
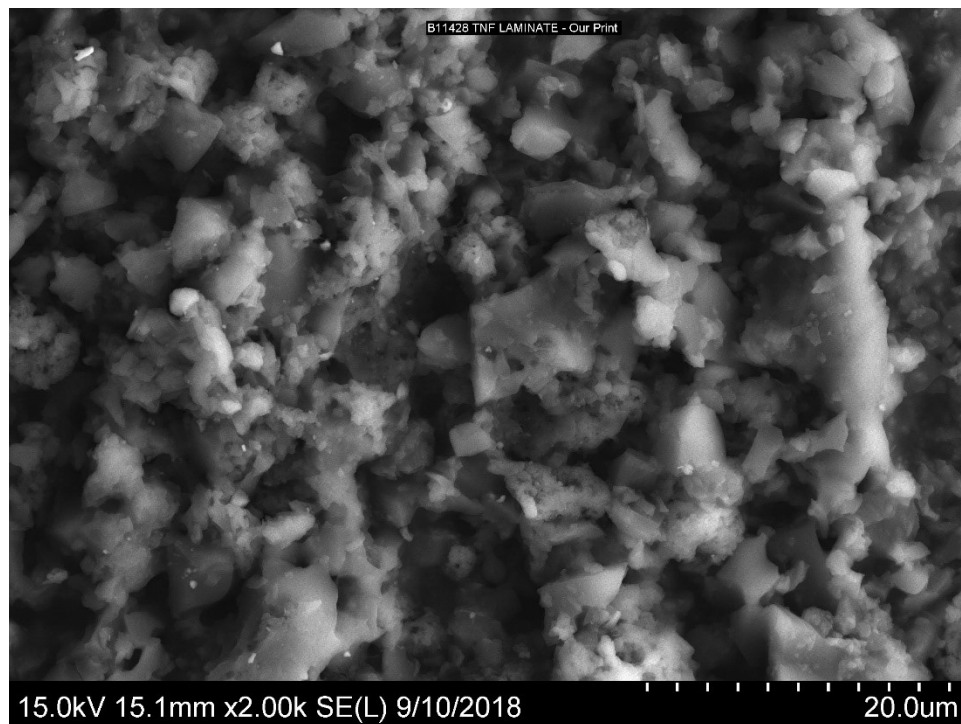


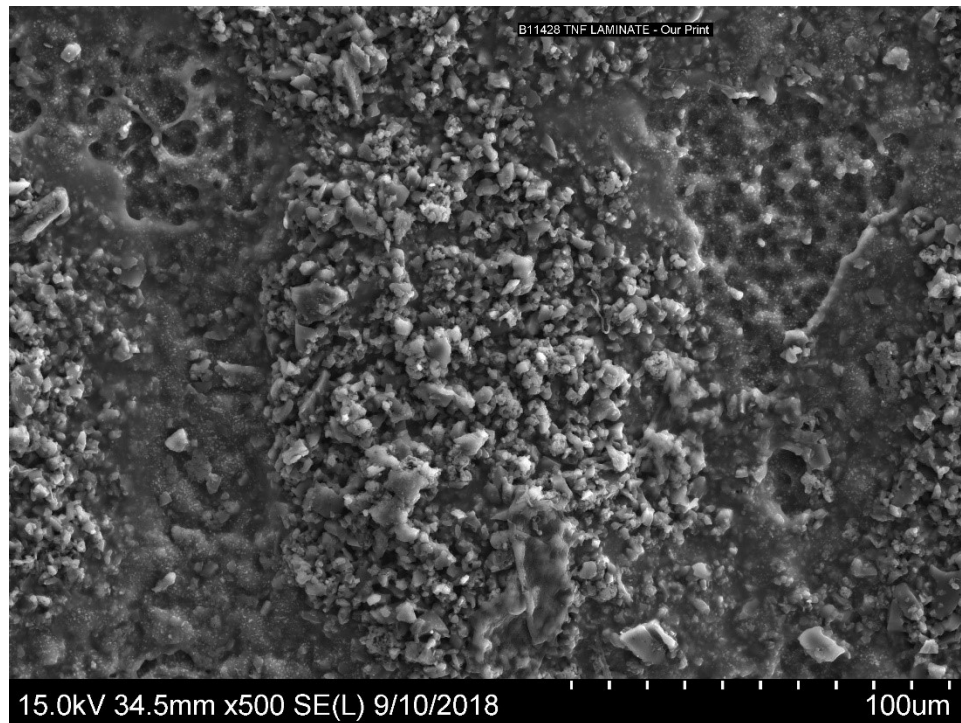
Figure 1. TNF Laminate Our Print

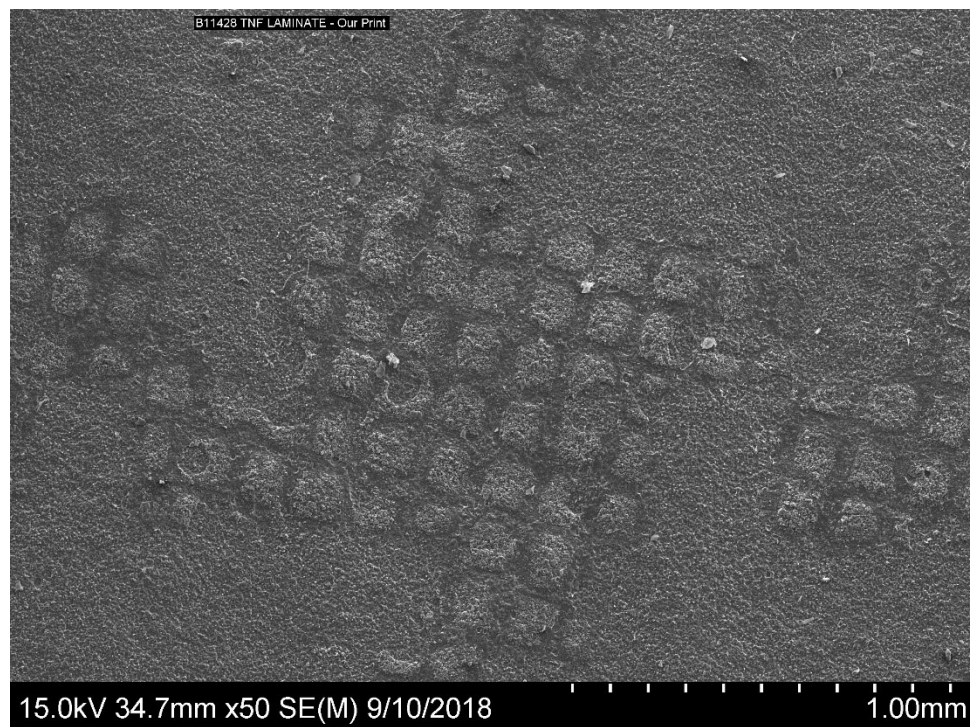
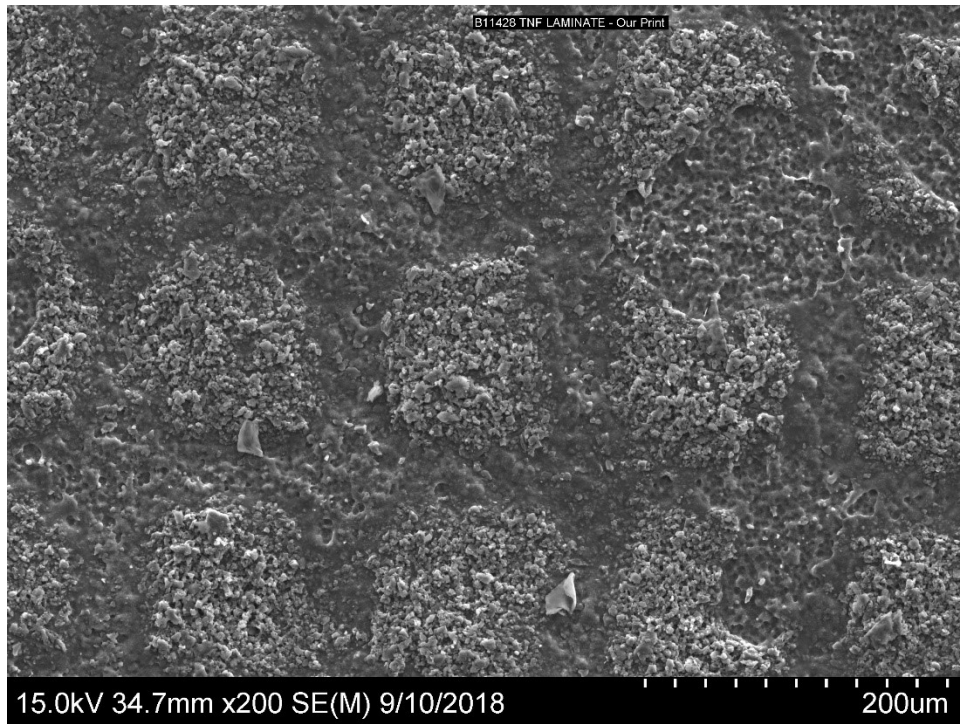
114. I have reviewed the Second Declaration of Gregory Haggquist, in which Mr. Haggquist states that the TNF Laminate Our Print material was made with a cured base layer of a polyurethane polymer with an applied print layer made of activated carbon and zeolite. From my experience with polyurethane polymers and activated carbon, I know that each, when cured, would be liquid-impermeable breathable materials and together would form a water-proof composition.

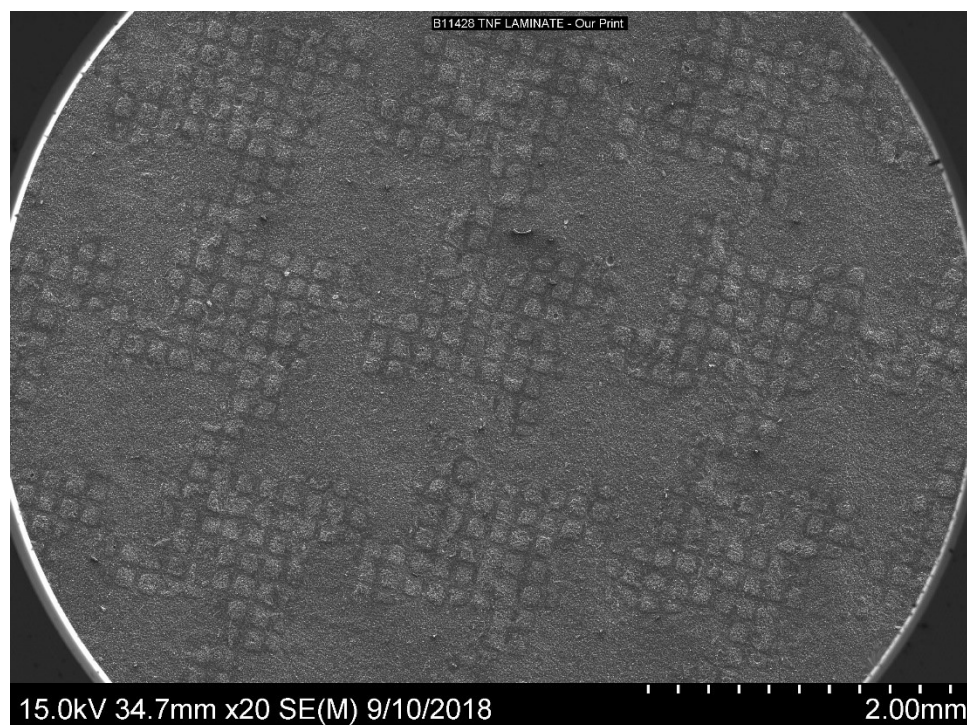
115. Looking at the TNF Laminate Our Print fabric with the SEM, I was able to see the particles of the pattern from the active layer (the print layer) on the fabric piece. What is visible is a large number of porous particles, many of which are grouped together in the square dot. Pores appear as the holes in the particles:



116. With a lower magnification photo from the SEM experiment, I was able to capture the raised features of the small dots against a smoother layer. Below are low-magnification photos from the SEM experiment (x500, x200, x 50, and x20 magnification, respectively) showing the raised features of small dots against a smoother layer directly beneath. This is strong evidence of a layer of active particles on top of a layer of cured base material. In some respects, the lower the magnification, the better the perspective:



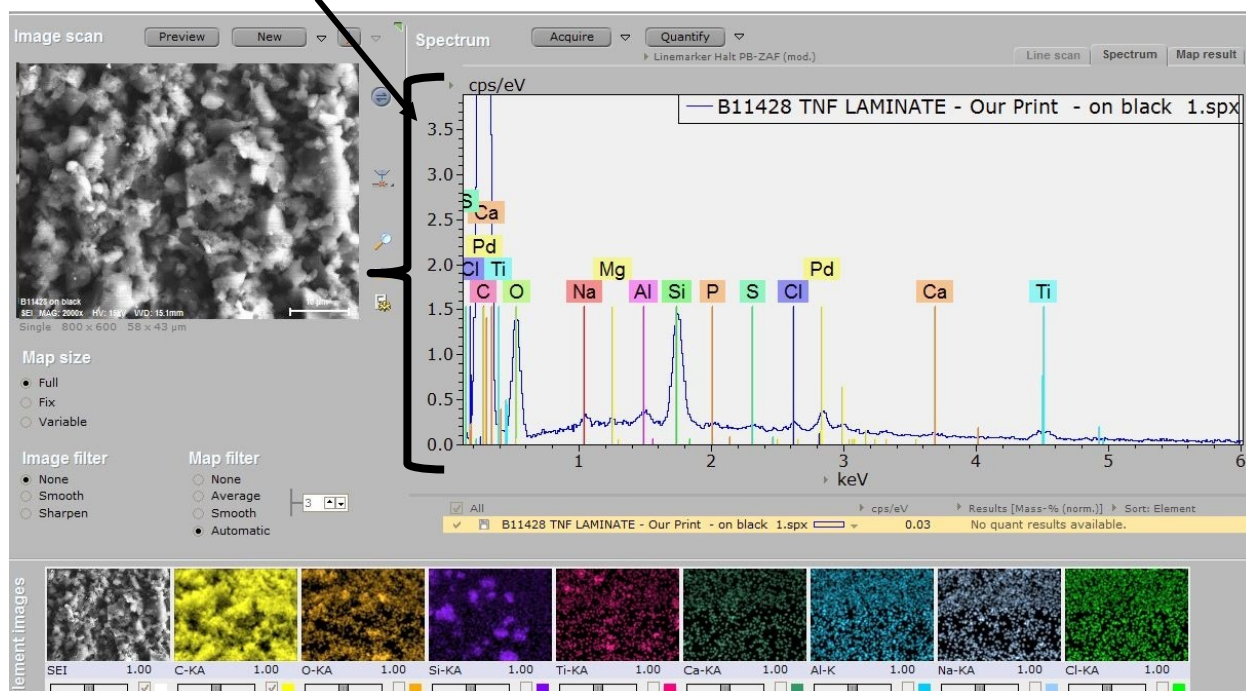




117. Consistent with claim 27, the TNF Laminate Our Print sample had two distinct layers, each having its own thickness.

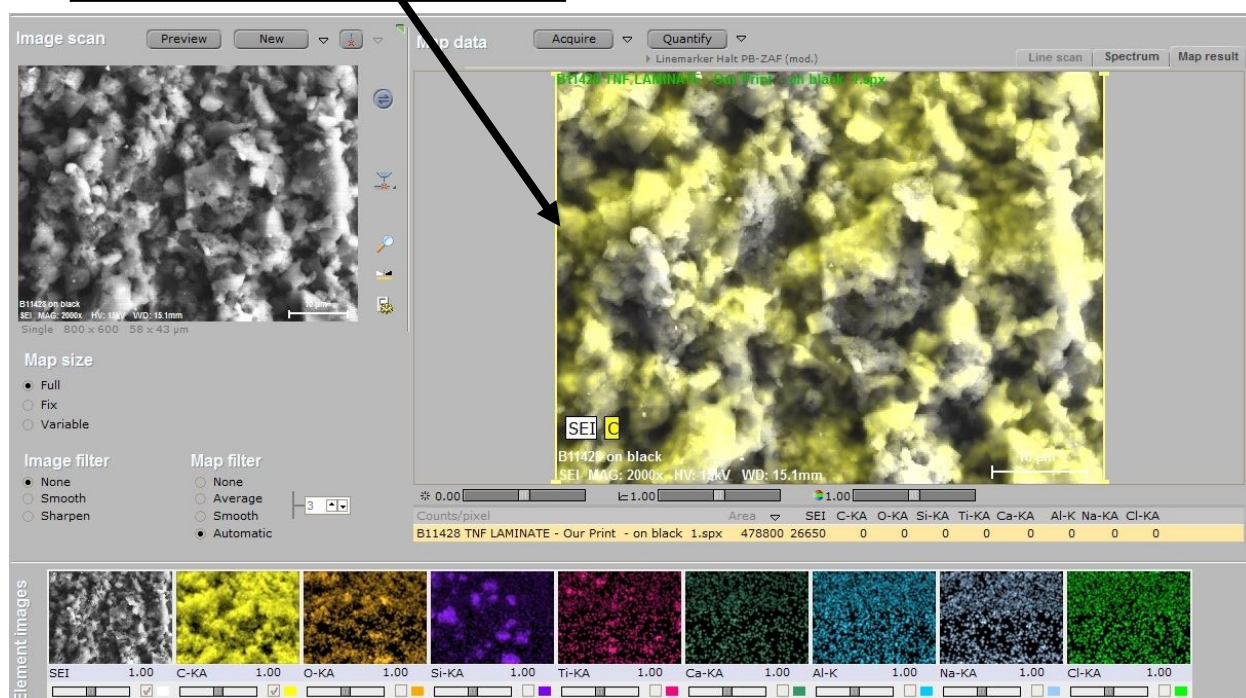
118. From there, I conducted an elemental analysis of the sample, using Energy Dispersive X-Ray Spectroscopy. This analysis demonstrated that the particles shown in the inset photo of the print layer contained lots of carbon, along with other elements such as oxygen. This indicated to me that the porous particles in the print layer are activated charcoal particles, as the oxygen indicates the activation process. There may also be components that have been adsorbed onto the active surface of the carbon particles from the surroundings that the material encountered. The yellow area shown below is the predominant carbon map; I have annotated the following slide accordingly.

The elements detected are indicated by the relative heights of the peaks; the heights of the peaks correspond to the amount of each element present.



119. Below is a repeat of the above experiment with the same results, presented here as another way of trying to display the elements and their location.

The yellow area in the photo shows where much of the carbon is being detected by the instrument.



120. The combined teachings of the high magnification optical microscopic examination, the SEM experiment, and the elemental analysis overwhelmingly support that the TNF Laminate Our Print fabric consists of at least two layers of particles, the top layer of which contains dot like structures of porous carbon particles in a regular pattern. Based on the location of the pores at the surface of the particles and presence of oxygen particles, it is my opinion that the carbon particles of the print layer are surface-active particles of the type taught in the '287 Patent and are in contact with a cured base material. I also understand that this sample was manufactured at the direction of Cocona to meet the thickness ratio and MVTR range

of claim 27. Ex. 2011, ¶ 19. Accordingly, the TNF Laminate Our Product sample practices at least claim 27 of the ‘287 Patent.

B. TNF Jacket

121. After analyzing the TNF Laminate Our Print sample, I performed the same analysis on a sample labelled “TNF Jacket,” a high magnification optical micrograph of which – as with the TNF Laminate Our Print – shows a print layer (shown as the pattern of black dots) on top of a cured based material:

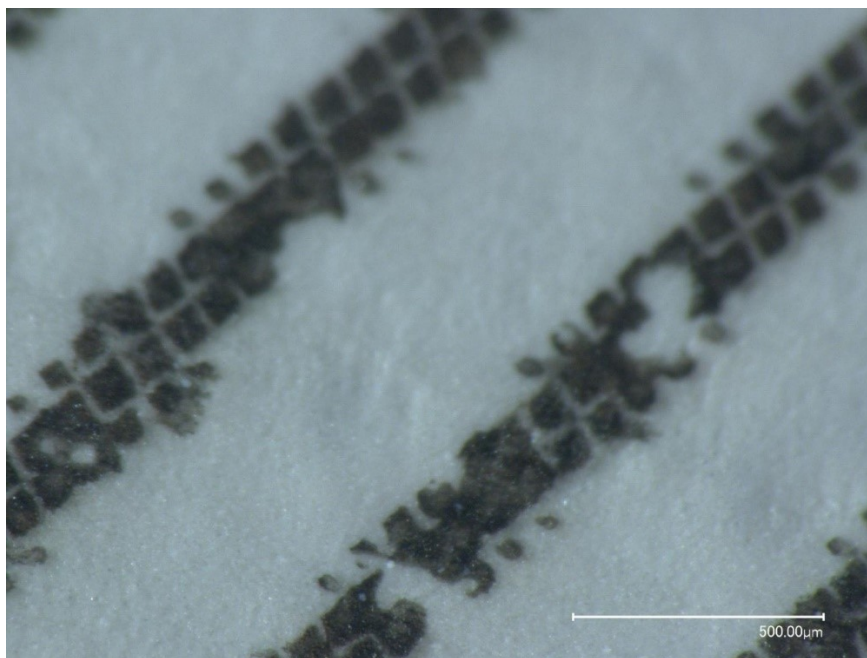


Figure 2. TNF Jacket

The shape and size of the dots is a little different in this product compared to the TNF Laminate Our Product, but it appears to be a very similar printed pattern of material.

122. As with the TNF Laminate Our Print fabric, I analyzed the TNF Jacket sample with SEM, which allowed me to see the particles of the pattern from the active layer (the print layer) on the fabric piece. This again showed a large number of porous particles, with many particles grouped together in the square dot. Pores appeared as the holes in the particles.

123. I used lower magnification to see the raised features of the small dots against a smoother layer – the same structure as with TNF Laminate Our Print: two layers, with one being a cured base material, and the second being a print layer of activated carbon particles in a print pattern.

124. I also did an elemental analysis of the TNF Jacket material, which – like TNF Laminate Our Print and based on the concentrations of carbon and oxygen – showed the particles with surface pores in the print layer to be activated carbon particles. Indeed, for all practical purposes, other than a slight variation on the pattern of the print, the samples are very similar:

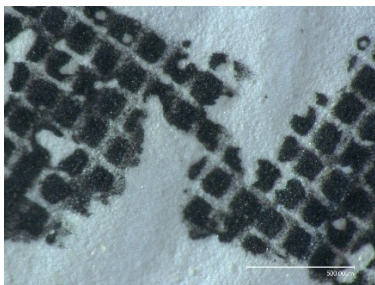


Figure 1. TNF Laminate Our Print

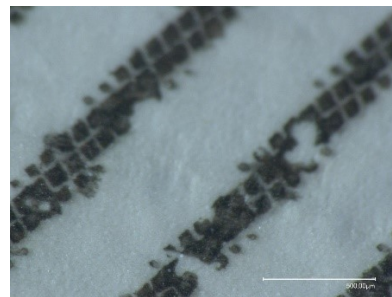


Figure 2. TNF Jacket

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Even the microstructure of the individual printed squares is nearly identical, with the exception that the “dots” in Figure 2 are smaller than the “dots” in Figure 1.

C. TNF’s DryVent 2.5L Products

125. I have reviewed Cocona’s “Infringement Claim Chart for U.S. Patent No. 8,945,287” (the “Infringement Contentions”) which the Petitioner produced as Exhibit 1026. I have been informed that for a product to infringe a patent claim, every element of that claim must be met by the accused product.

126. Based on my review of the Infringement Contentions as a POSITA, I find the analysis reasonable that the North Face “DryVent 2.5L” product meets the elements of claims 27, 35, 36, and 36 of the ‘287 Patent when the terms of those claims are given their ordinary meaning. Moreover, the accused product is substantially similar to the TNF samples I tested. The drawings accompanying the Infringement Contentions are consistent with my testing of the TNF samples. For example, the image of the laminate dots on page 31 are substantially similar to the laminate dots in the TNF samples discussed above.

127. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I declare under penalty of perjury that the foregoing is true and correct.

Dated: 10/5/2018


Dr. Charles A. Daniels, PhD

EXHIBIT A

CHARLES A. DANIELS, Ph D.
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SKILLS:

Accomplished Technology Leader with Plastics/Polymers Expertise: Broad scientific and technical skills, proven critical thinker and excellent communicator. Strong track record of identifying process and performance issues and implementing standards and solutions to meet customer needs.

EXPERIENCE:

Materials Performance Consulting, LLC: President, 2003 –present. Consulting services to the materials industry, specializing in polymer materials:

- Product and process diagnosis and resolution.
- Structure property relationships in polymer materials.
- Failure Analysis of Polymer materials
- Expert witness testimony plastics and polymers.

Legal and Technical Consultant, Polymer Diagnostics, Inc., 2007-present.

Comprehensive research and testing facility, providing consultative and expert witness services in the fields of polymer materials, and their applications in areas such as automotive, medical, construction, packaging, electronics and consumer items.

Adjunct Professor Chemistry Lorain County Community College, 2003 - 2015.

Education Module Developer and Instructor, Elastomers Synthesis and Physical Chemistry of Elastomers, Akron University High Institute for Elastomer Industries, Polymer Science Division, 2010-2014.

President, Polymer Diagnostics, Inc, 1997- 2003. Responsible for establishing Polymer Diagnostics, Inc. as a leading international R&D and consulting company through exploration of new, more profitable markets, technologies and applications.

- Led corporate formation, including development of business model and strategic plan.
- Grew revenues by 10% year over year, and staff by 50% over 4-year period.
- Developed a client base of over 400 companies, including every major global polymer producer.
- Achieved a customer satisfaction index of over 95% from 1997 to the present.

Geon Company: The world's largest producer of Vinyl Compounds with sales of over \$1.8 billion.

Director of Technology, 1993-1997. Responsible for reorganizing and staffing polymer analytical organizations to ensure successful formation of the new Geon company upon its

separation from the BFGoodrich Company. Selected key staff and facilities to support organizational and customer needs.

- Led organization in achieving national accreditation and ISO registration.
- Standardized all manufacturing QC laboratory procedures.
- Successfully resolved key environmental hazard assessment issues.
- Recruited and hired world-class key scientific assets that broadened the organization's skill sets.

B.F. Goodrich Company: One of the world's largest tire, rubber, plastics, specialty chemicals and aerospace companies.

Director of R&D, 1985-1993. Reported directly to the Division President, leading R&D programs for the Specialty Elastomers and Latex Division from 1985-1989, and BFG's largest operating unit, the Geon Vinyl Division, from 1989 to 1993. Responsible for the design and execution of all Research and Development programs, including the Vinyl Division's new product programs and the Elastomers and Latex R&D and technical service programs. Recruited, hired and developed key technical resources to support divisions' sales, marketing and manufacturing initiatives.

- Achieved two US patents for new products.
- Increased product revenues 25% in the first year, representing 130% of target.
- Developed several new vinyl products, resulting in the commercialization of the industry's first heat resistant vinyl compounds.
- Developed several new elastomer materials for the automotive, aerospace, adhesives and plastics modifications markets.
- Developed several value added dispersion products for the paper saturants, automotive, textile, adhesives and coatings industries.
- Responsible for \$20M research budget.

Manager, R&D, 1975-1985. Led four key research groups in plastics characterization, general purpose and specialty elastomers and PVC resin technology that developed and introduced new vinyl resins for the film, automotive and construction markets.

- Improved reproducibility of elastomer manufacturing process from 40% to over 95% in two years.
- Restructured research efforts in each business area; streamlined project management by instituting rigorous accountability procedures and project teams focused on well-defined objectives.
- Drove new efficiencies and quality measures, resulting in significant product uniformity, and more rapid development of new products by forming cross-functional teams with clear division objectives.

R&D Scientist, 1969-1975. Responsible for supporting company wide R&D efforts by utilizing modern polymer analytical methods to solve customer problems.

- Developed new polymer characterization methods for key BFG products.
- Led key technical initiatives on two company-wide strategic programs in developing technology to remove vinyl chloride from process streams and to solve critical performance issues delaying the transfer of new resin technology from R&D.
- Developed methods for prediction of process behavior of vinyl resins, a key component leading to BFG's worldwide licensing of monomer removal technology.

- Developed lab-scale methods and computer models to predict behavior of post polymerization behavior of vinyl resins in world-scale manufacturing plants.
- Granted two US patents on new products and process technology

TEACHING EXPERIENCE:

- Instructor, Lorain County Community College, 1985-87; Developmental Education
- Adjunct Professor CSU, 1972-3, Polymer Science
- Adjunct Professor, John Carroll University, 1970-1; Polymer Science
- Adjunct Professor, Lorain County Community College, 2003-2015; General, Organic and Biochemistry ;Mathematics
- Education Module Developer and Instructor, Elastomers Synthesis and Physical Chemistry of Elastomers, Akron University High Institute for Elastomer Industries, Polymer Science Division, 2010-2015.

PUBLICATIONS and PATENTS:

- Four Patents and 30 technical publications on Polymer Solution Thermodynamics, Characterization and Rheology
- Chapters in 3 texts on Polymer Materials
- Co-author, Handbook of Polyvinyl Chloride, with Charles E. Wilkes and James W. Summers, Hanser Publications.

EDUCATION:

Case Western Reserve University, Cleveland, OH, Ph. D. Chemistry and Polymer Science, 1969

Case Western Reserve University, Cleveland, OH, M. S. Chemistry and Polymer Science, 1967

Utica College of Syracuse University, Utica, NY, B.A. Chemistry, 1964

ACTIVITIES, MEMBERSHIPS:

Professional: Past member of Association for the Advancement of Medical Instrumentation and the Composites Fabricators Association; Past member of the Society of Plastics Engineers and the American Chemical Society; Member of the Council for Chemical Research, the Industrial Research Institute and the Chlorine Chemistry Council; Member of the Board of Trustees, Miami University Paper Committee (1985-1987); Certified Assessor for ISO 17025 for the American Association for Laboratory Accreditation. Recipient of the SPE Vinyl Division Award for Outstanding Contribution to the Science of PVC.

Community: Vice President, Neighborhood House Association, 2001- 2008; Co-Chairman of the Avon Lake Board of Education Levy Committee (2001); Chairman, Avon Lake Board of Education Bond Committee (1999); Chairman of the Geon Company United Way Campaign Committee, 1998; Chairman of the Board of Trustees of the Lorain County Access to Education Organization, 1996-2001; founder of BF Goodrich/Geon Company/PDI Outstanding Science Scholar Internship Award for top science and math student in Avon Lake and Lorain, Ohio high schools.