Filed on behalf of Petitioner VF OUTDOOR, LLC

By: Marianne R. Timm-Schreiber, Esq.
MERCHANT & GOULD P.C.
1801 California Street, Suite 3300
Denver, CO 80202
mtimm@merchantgould.com
Main Telephone: (303) 357-1204
Main Facsimile: (612) 332-9081

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VF OUTDOOR, LLC,
Petitioner,

v.

COCONA, INC.,
Patent Owner.

Case No.: Unassigned
Patent No.: 8,945,287

DECLARATION OF ABIGAIL OELKER, PH.D. IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF PATENT NO. 8,945,287

I, Abigail Oelker, Ph.D., hereby state the following:

I. INTRODUCTION

1. In this declaration, I am providing my expert opinions in support of 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.

2. This Declaration sets forth the bases and reasons for my opinions.

3. This Declaration is based on information currently available to me. I reserve the right to continue my investigation and analysis, which may include a review of documents and information not yet produced. I further reserve the right to expand or otherwise modify my opinions and conclusions as my investigation and study continues, and to supplement my opinions and conclusions in response to any additional information that becomes available to me.

II. BACKGROUND AND EXPERIENCE

4. I received a B.S. in Chemical Engineering from Lehigh University in 2003 and a Ph.D. in Chemistry from Boston University in 2009. I also worked as Postdoctoral Associate in the Department of Chemical Engineering at Massachusetts Institute of Technology (MIT) from 2009 to 2012.

5. While at Boston University, I synthesized and characterized a variety

of polymers for use as surgical adhesives and implants. More specifically, I formed hydrogels from polymer constituents with various architectures and functional groups and evaluated the resulting chemical, physical and mechanical properties of these materials. I studied the influence of polymer characteristics on the performance of the resulting hydrogels as *in situ*-curing adhesives for use in closing eye wounds. In addition, I designed a hydrogel system for use as a corneal implant. I found that the *in vitro* response of biological systems to these materials could be modulated by inclusion of bioactive molecules on the hydrogel surface.

6. While at MIT, I developed polypeptide hydrogel substrates with independently tunable stiffness, permeability, and ligand presentation for the study of disease mechanics and *in vitro* therapeutic testing. More specifically, I synthesized glutamate-based polymers that were amenable to functionalization using a highly efficient “click” chemistry reaction. I studied the influence of polymer architecture on the physical properties of the resulting hydrogels, including water uptake and transport of a model protein within the hydrogels.

7. To date, my research has resulted in 6 publications in peer reviewed journals; and 8 presentations.

8. While conducting research at Boston University and MIT, I regularly used active particle techniques including thin layer chromatography (TLC) to analyze the progress of chemical reactions and the purity of products. TLC is a

well-known technique used in the field of chemistry for such purposes. It utilizes active particles as molecular filters to separate mixtures of compounds based on their size, charge and other properties. I also taught this and similar techniques to undergraduate students in my capacity as a teaching assistant at Boston University.

9. I am currently a Senior Scientist at Exponent, which is a multi-disciplinary engineering and scientific consulting firm. While at Exponent, I have assisted clients in the design and characterization of their products, including performance sportswear. Specifically, I have assisted clients in improving textile coating technology, designing new textile dyes, analyzing textile composition and structure, and analyzing the performance of competing products. I have analyzed textiles based on performance metrics such as water vapor transmission rate (WVTR), dry heat transport rate, insulation value, infrared (IR) absorbance, and stiffness.

10. My *curriculum vitae,* which lists in further detail my relevant professional experience, is attached as Ex. 1006.

11. I am competent to make this declaration based upon my personal knowledge and expertise in the area of chemical engineering, chemistry, polymeric materials and textiles.

III. COMPENSATION AND RELATIONSHIP TO THE PARTIES

12. In 2017, Exponent charges for my time at a rate of $275/hour. No portion of my compensation is dependent on the outcome of this matter. I expect to be reimbursed for reasonable expenses associated with travel, including lodging, transportation, and other expenses incurred in connection with this matter.

13. It is my understanding that the Patent Owner, Cocona, Inc. ("Cocona" or "Patent Owner"), is the assignee of the '287 Patent. Prior to this matter, I have not worked for Cocona or the Petitioner or had any vested interest in Cocona or the Petitioner or its related entities. I own no stock or ownership interest in Cocona or the Petitioner or its related entities and I am aware of no other financial interest I have with those companies.

IV. MATERIALS CONSIDERED

14. I have reviewed and considered the following documents and information:

EXHIBIT	DESCRIPTION	FILED
Ex. 1001	U.S. Patent No. 8,945,287 ("the '287 Patent")	☒
Ex. 1002	Patent Cooperation Treaty Pub. No. WO 1995/33007 to Dutta ("*Dutta*")	☒
Ex. 1003	Patent Cooperation Treaty Pub. No. WO 2000/70975 to Halley et al. ("*Halley*")	☒
Ex. 1004	U.S. Patent Pub. No. 2004/0018359 to Haggquist ("*Haggquist*")	☒
Ex. 1006	Expert Curriculum Vitae	☒

EXHIBIT	DESCRIPTION	FILED
Ex. 1007	Prosecution History: Reply to Office Action filed on June 5, 2013	☒
Ex. 1008	Prosecution History: Office Action dated July 3, 2013	☒
Ex. 1011	Prosecution History: Response filed on April 13, 2010	☒
Ex. 1012	Prosecution History: Response filed on December 10, 2010	☒
Ex. 1013	Prosecution History: Response filed on June 29, 2011	☒
Ex. 1014	Prosecution History: Office Action dated March 3, 2011	☒
Ex. 1015	U.S. Patent No. 6,028,019 to Spijkers ("*Spijkers*")	☒
Ex. 1016	Prosecution History: Office Action dated July 16, 2012	☒
Ex. 1017	Prosecution History: Response filed on December 17, 2012	☒
Ex. 1018	Prosecution History: Office Action dated February 1, 2013	☒
Ex. 1019	Prosecution History: Response filed on October 7, 2013	☒
Ex. 1020	Prosecution History: Examiner-Initiated Interview Summary dated October 25, 2013	☒
Ex. 1021	Prosecution History: Notice of Allowance dated October 25, 2013	☒
Ex. 1022	Prosecution History: Office Action dated January 6, 2012	☒
Ex. 1023	HANDBOOK OF THIN-LAYER CHROMATOGRAPHY (Joseph Sherma & Bernard Fried eds., 3d ed. 2003).	☒
Ex. 1024	U.S. Patent No. 4,479,937 to Sato et al. ("*Sato*")	☒
Ex. 1025	U.S. Patent No. 4,194,041 to Gore et al. ("*Gore*")	☒
Ex. 1026	Infringement Claim Chart (Case No. 1:16-CV-2703 CMA (D. Colo.)) from the related district court	☒

EXHIBIT	DESCRIPTION	FILED
	litigation between Petitioner and the Patent Owner ("Litigation").	
Ex. 1027	SEPHADEX – GEL FILTRATION IN THEORY AND PRACTICE (Pharmacia Fine Chemicals, Inc., 1966).	☒
Ex. 1028	Xin Wang et al., *Electrochemical Characterization of Binary Carbon Supported Electrode in Polymer Electrolyte Fuel Cells*, 96 J. OF POWER SOURCES. 282-287 (2001).	☒
Ex. 1029	Cocona Exhibit A, Response to VF Outdoor's Exhibit B Invalidity Contentions, (Case No. 1:16-CV-2703 CMA (D. Colo.)) from the Litigation.	☒
Ex. 1030	*Pharmacia Fine Chemicals Inc.*, 38(04) ANAL. CHEM. 86A–86A (1966).	☒
Ex. 1031	*Sephadex G-25 media and pre-packed columns: Data File*, PHARMACIA BIOTECH (1996).	☒
Ex. 1032	Per Flodin, *The Sephadex Story*, 38:8 POLYMER ENGINEERING AND SCI. (1998)	☒
Ex. 1033	Phillip Gibson et al., *Transport properties of porous membranes based on electrospun nanofibers*, 187-188 COLLOIDS AND SURFACES A: PHYSICOCHEMICAL AND ENGINEERING ASPECTS, 469-481 (2001).	☒
Ex. 1034	Tetsuya Takahashi, *Moisture sorption of propylene-ethylene random copolymer fiber containing collagen powder*, 52.10 J. OF THE TEXTILE MACHINERY SOCIETY OF JAPAN. 47-57 (1999).	☒
Ex. 1035	Mitumasa Saito, *Antibacterial, deodorizing, and UV absorbing materials obtained with zinc oxide (ZnO) coated fabrics*, 23 J. OF COATED FABRICS.150-164 (1993).	☒
Ex. 1036	J. W.McCurry, *Coconuts activate activewear*, 112.1335 KNITTING INTERNATIONAL. 38-9 (2006).	☒
Ex. 1037	D. A. Skoog et al., *Principles of Instrumental Analysis*, BROOKS/COLE (1998).	☒

EXHIBIT	DESCRIPTION	FILED
Ex. 1038	R. Shishoo, *Textiles in Sport*, ELSEVIER SCI. (2005).	☒
Ex. 1039	*Test Method*, 88 AATCC TECHNICAL MANUAL. 195-2012 (2013).	☒
Ex. 1040	A. Merriam-Webster, WEBSTER'S NINTH NEW COLLEGIATE DICTIONARY, (Merriam Webster Inc. 1983).	☒
Ex. 1041	J. E. Brady & F. Senese, *Chemistry: matter and its changes*, WILEY. (2004).	☒
Ex. 1042	*"Best Inventions 2005: Thin Skins" profile of Traptek technology*, TIME MAGAZINE, Nov. 13, 2005.	☒

15. I am also aware of information generally available to, and relied upon by, persons of ordinary skill in the art at the relevant times. Some of my statements below are expressly based on such awareness.

16. I reserve the right to supplement my opinions to address any information obtained, or positions taken, based on any new information that comes to light throughout this proceeding.

V. LEGAL STANDARDS

17. I am not an attorney. I do not expect to offer any opinions on the law. I have been informed, however, of certain legal principles relating to standards of patentability that I relied on in forming the opinions set forth in this report.

A. Legal Principles of Claim Construction

18. I understand that a primary step in determining validity of patent claims is to properly construe the claims to determine claim scope and meaning.

19. I understand that, in an IPR proceeding, claims are to be given their broadest reasonable interpretation in light of the patent's specification (see 37 C.F.R. § 42.100(b)). The United States Supreme Court recently concluded that the Patent Office properly adopted that standard for construing claims in an IPR in *in re Cuozzo Speed Technologies, LLC.*, 579 U. S. 136 (2016).

20. I also understand that the claim language, the patent specification, and the prosecution history are the most significant sources of the legally operative meaning of disputed claim language.

B. Legal Principles of Anticipation

21. I understand that, once the claims of a patent have been properly construed, a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis is required to determine anticipation of a patent claim.

22. I understand that a claimed invention is unpatentable as anticipated if a prior art reference contains each element of a claim, either expressly or inherently.

23. I understand that a patent is anticipated if before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it. I also understand that a patent is anticipated if the invention was patented or described in a printed publication in

this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States.

24. I understand that anticipation must be shown by a preponderance of the evidence in an IPR, and I have written this report accordingly.

C. Legal Principles of Obviousness

25. I understand that a claimed invention is unpatentable if the differences between the invention and the prior art are such that the subject matter of the claim as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the art ("POSITA") to which the subject matter pertains.

26. It is also my understanding that obviousness is a question of law based on underlying factual issues including (1) the scope and content of the prior art, (2) the differences between the prior art and the asserted claims, (3) the level of ordinary skill in the pertinent art, and (4) the existence of secondary considerations such as commercial success, long-felt but unresolved needs, failure of others, etc.

27. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a reason to combine them, but other times, the reason to combine two or more prior art references is based on ordinary skill and common sense. I further understand that an obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a

motivation to combine references may be supplied by the direction of the marketplace.

28. I understand that if a technique has been used to improve one product, and a POSITA would recognize that it would improve similar products in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

29. I also understand that practical and common sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a POSITA looking to overcome a problem can often fit together the teachings of multiple publications. I understand that obviousness therefore takes into account the inferences and creative steps a POSITA would employ under the circumstances.

30. I understand that a particular combination may be proven obvious merely by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

31. I also understand that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield

predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variation of it, either in the same field or a different one. If a POSITA can implement a predictable variation, the patent claims are likely obvious.

32. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a POSITA, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

33. I further understand that whether there is a reasonable expectation of success in combining references in a particular way is also relevant to the analysis.

34. My analysis of the prior art is determined at the time the invention was made.

35. I understand that secondary indicia of non-obviousness may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) commercial success of processes covered by the patent; (3) unexpected results achieved by the invention; (4) praise of the invention by others skilled in the art; (5) taking of licenses under the patent by others; (6) deliberate copying of the invention; (7) failure of others to find a solution to the long felt need; and (8) skepticism by experts.

36. I also understand that there must be a nexus between any such secondary considerations and the invention.

37. In sum, my understanding is that prior art teachings are properly combined where a POSITA having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor, would have been led to make the combination of elements recited in the claims.

VI. Level Of Ordinary Skill In The Art

38. It is my understanding that the ’287 Patent is to be interpreted based on how it would have been read by a POSITA at the time of the effective filing date of the earliest application to which the ’287 Patent claims priority. I was familiar with the technology at issue and the state of the art as of the earliest priority date of the ’287 Patent, May 9, 2006.

39. I believe a POSITA at the time the ’287 Patent was filed 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. I consider myself to have had at least such ordinary skill in the art with respect to the subject matter of the ’287 Patent both now and at the priority date of the ’287 Patent

VII. THE ’287 PATENT

40. The ’287 Patent describes a water-proof composition with active particles in contact with a liquid-impermeable breathable cured base material. (Ex. 1001 at Abstract.)

A. Priority Date

41. I understand the earliest priority date for the ’287 Patent is May 9, 2006. (Ex. 1001.)

B. The ’287 Patent

42. The ’287 Patent is entitled “Active Particle-Enhanced Membrane And Methods For Making And Using The Same.” (*Id*.)

43. The ’287 Patent describes an active particle-enhanced membrane. (Ex. 1001 at Abstract.)

44. The ’287 Patent states that “[i]t is well-known that certain particles may be used to add performance properties to materials in different forms… [and that t]hese particles may have properties that are suitable for odor adsorption [and] moisture management…” (Ex. 1001 at Col. 3:63-66.) I agree. It was well known in the prior art that particles can be added to membranes to provide performance

properties, such as odor adsorption and moisture management. (Ex. 1004, ¶¶ 3-4 & 30; Ex. 1037, pp. 761-62; Ex. 1023, pp. 17-18, 78, & 83-84; Ex. 1038, p. 167; Ex. 1033; Ex. 1034; Ex. 1035; Ex. 1036; Ex. 1042.)

45. The ’287 Patent further discloses that “[a]ctive particles may include, but are not limited to, 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 other suitable materials.” (Ex. 1001 at Col. 4:22-27.) I agree. It is well known that the particles listed above are active particles given the definition of active particles discussed in more detail below. In short, the ’287 patent says that “active particles” “adsorb or trap substances,” including “water.” (Ex. 1001, col. 4, ll. 4 – 12).

46. The ’287 Patent states that U.S. Patent Publication No. 2004/0018359 to Haggquist (“*Haggquist*”) (Ex. 1004) is incorporated by reference in its entirety. (Ex. 1001 at Col. 6:56-60.) Therefore, I understand that any disclosure in *Haggquist* is also present in the ’287 Patent. *Haggquist* discloses the same active particles as the ’287 patent. (Ex. 1004 at ¶ 30.) It also discloses “graphite” as an active particle. (Ex. 1004 at ¶ 30.) Graphite is a form of elemental carbon in which atoms are arranged in layers consisting of fused hexagonal rings. (Ex. 1041 at p. 587.)

47. Independent claim 27 of the ’287 Patent recites a “[a] water-proof composition comprising: a liquid-impermeable breathable cured base material comprising a first thickness; 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, 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, the active particles improve the moisture vapor transport capacity of the composition, and 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.” (Ex. 1001 at Col. 12:1-16.)

48. Claim 28 depends from claim 27 and adds the element “wherein the active particles comprise about 0% to about 75% of the total weight of the composition.” (*Id*. at Col. 12:17-19.)

49. Claim 30 depends from claim 27 and adds the element “wherein the active particles comprise about 0% to about 30% of the total weight of the composition.” (*Id*. at Col. 12:23-25.)

50. Claim 32 depends from claim 27 and adds the element “wherein the active particles comprise about 0% to about 50% of the total weight of the composition.” (*Id*. at Col. 12:29-31.)

51. Claim 33 depends from claim 27 and adds the element “wherein the

composition possesses anti-static properties at least in part due to the active particles." (*Id*. at Col. 12:33-35.)

52. Claim 35 depends from claim 27 and adds the element "wherein the composition possesses odor absorbance properties at least in part due to the active particles." (*Id*. at Col. 12:39-41.)

53. Claim 36 depends from claim 27 and adds the element "wherein the composition possesses quick drying properties at least in part due to the active particles." (*Id*. at Col. 12:42-44.)

54. Claim 37 depends from claim 27 and adds the element "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-ethoxy-ethyl ester cinnamic acid (cinoxate), zinc oxide, zeolites, titanium dioxide, molecular filter-type materials, and any suitable combination thereof." (*Id*. at Col. 12:45-51.)

55. Claim 38 depends from claim 27 and adds the element "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." (*Id*. at Col. 12:52-59.)

56. Claim 39 depends from claim 38 and adds the element "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." (*Id*. at Col. 12:60-67.)

VIII. BACKGROUND AND OVERVIEW OF THE PRIOR ART

57. Contrary to the claims of the '287 Patent, active particle enhanced water-proof membranes were not novel in May, 2006. In fact, as disclosed in *Dutta* (published December 7, 1995) and *Halley* (published November 30, 2000), it was known in the prior art to use active particles, such as Sephadex, carbon, zinc oxide, silica, aluminum oxide, and titanium dioxide, to absorb, adsorb or trap water to improve water vapor transmission rate ("WVTR") also known as moisture vapor transmission rate ("MVTR"), both of which are expressed in grams of water per square meter of material per day ("g/m²/day" or "g/m²/24 hours"). (Ex. 1002 at Abstract, p. 18, ll. 10-21 & p. 23, ll. 3-10; Ex. 1003 at Abstract, p. 1, ll. 8-10; p. 2, ll. 13-15 & 24-34; p. 4, ll. 20-28; p. 5, ll. 5-22; p. 6, ll. 27-28; & p. 9, ll. 1-5.) A POSITA would understand that WVTR and MVTR can be used interchangeably to refer to the amount of water or moisture vapor

transmitted through a material over a given period of time. (Ex. 1038 pp. 160-161; Ex. 1039 p. 381.) In addition, this is evident given the above disclosures in the '287 Patent, *Dutta* and *Halley*. (Ex. 1001, Fig. 2 & col. 8, l. 65 – col. 9, l. 1; Ex. 1002 at Abstract, p. 18, ll. 10-21, and p. 23 ll. 3-10; Ex. 1003 at Abstract, p. 1, ll. 8-10, p. 2, ll. 13-15 & 24-34, p. 4, ll. 20-28, p. 5, ll. 5-22, p. 6, ll. 27-28, and p. 9, ll. 1-5;

A. Dutta

58. Over ten years before the '287 patent was filed, *Dutta* disclosed "[i]t 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." (Ex. 1002 at p. 4, ll. 20-22.)

59. *Dutta* discloses the use of cured based materials. ("…cast into films…; …the film is cured by reaction…; … the film is dried by removing the organic solvent…") (*Id*. at p. 12, ll. 11-20.)

60. *Dutta* also discloses that "[t]he water vapor permeable polymer film of this invention … form[s] useful articles like two-dimensional films, coatings or laminates and three-dimensional molded articles that are breathable, waterproof and air impermeable." (*Id*. at p. 10, ll. 8-12.)

61. *Dutta* further discloses that "[t]he material of the invention can be in the form of a waterproof, air permeable, water vapor permeable non-porous

polymer film or sheet made of a polymer resin…" (*Id.* at Abstract.)

62. *Dutta* discloses that:

> The particular technique used to make the polymer film of this invention will depend on the physical form of the polymer resin. In case of moisture curing prepolymer resins that are liquid under ambient conditions, the absorptive particles can be dispersed into the liquid prepolymer and the resulting liquid dispersion can be converted into a film.

(*Id.* at p. 11, ll. 9-14.)

63. *Dutta* further discloses with regard to Example 1B:

> To 36.8 grams of the hydrophilic polyurethane solution SOLUCOTE TOP 932, 1.55 grams (10 phr) of cross-linked dextran particles (Sephadex G-200-50 from Sigma Chemical Co., with a particle size of 20-50 micrometers, and an absorption capacity of about 24 gm./gm.) was added and stirred to uniformly disperse the particles into the solution.

(*Id.* at p. 18, ll. 10-21.)

64. Table 1 of *Dutta* demonstrates in Example 1B that when hydrophilic Sephadex particles are added to a water-proof membrane, WVTR is improved to 6730 g/m²/day compared to a control sample which reported a WVTR of 5583 g/m²/day (Example 1). (*Id.* at p. 23 ll. 3-10.) Table 1 is reproduced below:

TABLE 1

Polymer Resin:Hydrophilic polyurethane (SOLUCOTE TOP 932)

Physical Form Used:Solution

(about 42% by weight in toluene/dimethylformamide mixture)

Example	Absorbent Particle	Amount of Particle (phr)	Film Thickness (inches)	Average WVTR Of Three Test Areas	Air Permeability	Waterproofness, (WP2)
Comparative Example 1	———	0.0	0.0027	5583	Impermeable	Pass
Example 1A	Nalco® 1181	5.0	0.0032	7194	Impermeable	Pass
Example 1B	Sephadex G-200-50	10.0	0.0030	6730	Impermeable	Pass

(Id. at p. 23))

65. *Dutta* also discloses that "a layered arrangement of the polymer resin and the absorbent particles can be used to fabricate useful products." (*Id.* at p. 12, ll. 26-27.)

66. *Dutta* discloses that "[t]he size of the absorbent-type particles are within a broad range of 0.1 to 300 micrometers when dry. Preferably, the particle size range of the water-swellable particles is 0.1 to 100 micrometers, depending on the film thickness needed for a given application." (*Id.* at p. 9, ll. 18-22.)

67. *Dutta* discloses that:

> When the absorbent particles are dispersed in a polymer resin, the size of the particles plays an important role in obtaining the polymer film of this invention. In order for the polymer film to be air impermeable, it is necessary that the hydrophilic absorbent particles are at least partially embedded in the polymer resin such that at least one surface of the film is substantially smooth by being free of the particles. Therefore, the minimum thickness of the polymer film is controlled by the size of the particles. Larger the size of the hydrophilic particles used, higher would be the minimum thickness of the polymer film that will be air impermeable.

(*Id.* at pp. 10-11, ll. 37-8.)

68. *Dutta* also discloses that "depending on the particular end use, the polymer can also contain functional ingredients like odor-absorbing agents, anti-bacterial agents, fragrances, antifungal agents, hemostatic agents and wound-healing agents." (*Id.* at p. 10, ll. 4-7.)

B. Halley

69. *Halley* discloses that "[t]he present invention relates to a composite material, especially a water-resistant water-vapour-permeable material which has improved abrasion resistance and other desirable properties." (Ex. 1003 at p. 1, ll. 8-10.)

70. *Halley* also defines "liquid water resistant" as "material [that] is

waterproof at a water pressure of 13.8 kN/M^2." (*Id.* at p. 6, ll. 27-28.)

71. *Halley* discloses that "[t]he present invention is directed to a composite material which comprises a substrate and a continuous polymer coating applied to the substrate..." (*Id.* at Abstract.)

72. *Halley* discloses that "[t]he polymer applied as a continuous coating to the substrate is generally a water-vapour-permeable hydrophilic polymeric material which allows the passage of water vapour therethrough without being permeable to liquid water." (*Id.* at p. 2, ll. 24-27.)

73. *Halley* discloses that "[g]enerally, the coating has a thickness of 5 to 100 microns." (*Id.* at p. 2, l. 34.)

74. *Halley* discloses that:

> In a still further preferred embodiment of the present invention, a discontinuous pattern of abrasion-resisting polymeric material may be provided on the coating, … may be any suitable pattern, such as a pattern of dots or lines, …Each dot generally has a height in the range 10-200 microns, preferably 70-140 microns and particularly 80-100 microns.

(*Id.* at p. 5, ll. 5-20.)

75. *Halley* discloses that:

> According to the present invention, a particulate solid is incorporated into the water-vapour-permeable polymer, generally before the polymer coating is applied onto the substrate. A preferred particulate

> solid is carbon particles. Other particulate solids include inorganic particulate materials, pigments, metal oxides, metal salts or metal particles. Further particulate solids include particles of titanium dioxide, zinc oxide, iron oxide, aluminum oxide, silica, talc, mica, tin or silver.

(*Id.* at p. 3, ll. 1-7.)

76. *Halley* discloses that "[s]uitable polymers include hydrophilic polyurethanes, polyesters, polyethers… [and that p]articularly preferred polyurethanes are disclosed in US patents 4,194,041 and 4,532,316." (*Id.* at p. 2, ll. 27-31.)

77. *Halley* discloses that:

> The primary particle size of the particulate solid has been found to be of particular significance in the present invention. The primary particle size is generally less than 50,000nm, particularly less than 5,000nm, especially less than 500nm, more especially less than 200nm and most especially less than 50nm. The particle size of the primary particle may be determined as set out herein. The primary particle size is the particle size of the smallest discreet particle, it being understood that primary particles may cluster together to form aggregates (typically 1 to 100, 1 to 20 or 1 to 5 microns median particle size).

(*Id.* at p. 3, ll. 8-15.)

78. Table 3 of *Halley* discloses an improved MVTR of 6924 to 7736 g/m²/day in test samples containing added carbon particles over a control sample

without carbon particles (6344 g/m²/day):

TABLE 3 (fabric & membrane & dots)

Sample	Particle % wt	MVTR (mean) g/m²/d	Wash to leak hr	Abrasion to leak cycles	Handle (mean)
Control	-	6344	504-672	87500 (1500)	46.8 (2.69)
1	0.3	7736	504-864	140,000 (23094)	47.9 (1.25)
2	0.65	7736	672-864	120,000 (23094)	45.0 (1.18)
3	1.5	6924	504-672	110,000 (47610)	42.3 (2.32)

(*Id.* at p. 9, ll. 1-5.)

C. Haggquist

79. *Haggquist* discloses that "[i]t is well known that certain particles can be used to add performance properties to materials in different forms… [and that t]hese particles can provide such properties because they are "active". Active particles are active because they have the capacity to adsorb or trap substances..." (Ex. 1004 at ¶ 3-4.)

80. *Haggquist* discloses that 97% of the "[t]he activated carbon used in this example… had a diameter of less than 10 microns." (*Id.* at ¶ 85.)

81. *Haggquist* discloses:

> Active particles can provide performance enhancing properties such as odor adsorption, moisture management, ultraviolet light protection, chemo-protective properties, bio-hazard protective properties, fire retardance, antibacterial protective properties, antiviral protective properties, antifungal protective properties, antimicrobial protective properties, and combinations thereof.

(*Id.* at ¶ 30.)

82. *Haggquist* discloses:

> The active particles can include, but are not limited to, activated carbon, graphite, aluminum oxide (activated alumina), silica gel, soda ash, aluminum trihydrate, baking soda, p-methoxy-2-ethoxyethyl ester Cinnamic acid (cinoxate), zinc oxide, zealites, titanium dioxide, molecular filter type materials, and other suitable materials.

(*Id.* at ¶ 30.)

83. *Haggquist* discloses:

> The invention relates to preserving the properties of active particles through use of an encapsulant which may be removable. The encapsulant may protect the active particles against premature deactivation. If desired, the encapsulant may be removed to rejuvenate the active particles. Various processes can be implemented to introduce encapsulated particles to embedding substances which may be used in various products.

(*Id.* at Abstract.)

84. *Haggquist* discloses:

> The encapsulant can include, but is not limited to, water-soluble surfactants, surfactants, salts (e.g., sodium chloride, calcium chloride), polymer salts, polyvinyl alcohols, waxes (e.g., paraffin, carnauba), photo-reactive materials, degradable materials, biodegradable materials, ethoxylated acetylenic diols, and any other suitable substances.

(*Id.* at ¶ 33.)

IX. PROSECUTION HISTORY OF THE ’287 PATENT

85. U.S. Patent Application No. 11/801,647, which became the ’287 Patent, was filed on May 9, 2007. Counsel for Petitioner has brought the following relevant portions of the prosecution history of the ’287 Patent to my attention, upon which I rely.

86. In response to a restriction requirement, Applicant elected claims 1-41 and withdrew claims 42-62, which were later canceled upon allowance. (Ex. 1011, Ex. 1012; Ex. 1021 at p. 4.) Claim 28, as originally filed, matured into and issued as claim 27 after amendment.

87. In a Response filed on June 29, 2011 to the First Final Office Action (Ex. 1014.), the Applicant amended claim 28 to recite a “water-proof” composition and a “liquid-impermeable breathable cured” base material (Ex. 1013 at p. 6.) in order to overcome a 35 U.S.C. § 102(b) rejection over *Haggquist* (Ex. 1004.) The Applicant argued:

> Haggquist discloses the use of active particles in a yarn, fiber, foam, and fabric. Furthermore, FIG. 3 discloses a process to create fibers having active particles. Haggquist's disclosure of yarns, fibers and like describes the use of active particle in knits and wovens, which operate differently than the current specification's disclosure of membranes.

(Ex. 1014 at p. 12.) The Applicant did not assert that *Haggquist's* active particles or their properties were different from the '287 Patent active particles or their properties. (*Id.* at 12.) While the Examiner found the above argument persuasive and withdrew the 35 U.S.C. § 102(b) rejection over *Haggquist* (Ex. 1022 at p. 2.), it should be noted that *Haggquist* is not limited to yarn, fiber, foam and fabric as argued by the Patent Owner. In contrast, *Haggquist* teaches that the base material may be a wide variety of materials, including "***polyacrylic***, thermoplastics, PTFE (e.g., Teflon®) … crosslinking-polymers, polymers…or any other suitable materials." (Ex. 1004 at ¶ 35 (*emphasis added*).) Similarly, the '287 Patent recites that the base material may include a cured "polyacrylic solution." (Ex. 1001 at Col. 3:36-45.). Further, the end products of *Haggquist* specifically lists "plastics (e.g., bags…)," a group of materials that a POSA would understand to include membranes. (Ex. 1004 at ¶ 57).

88. The claims were further amended in the Response filed on May 7, 2012 to recite "a moisture vapor transmission rate of the water-proof composition comprises from about 600g/m^2/day to about 11000g/m^2/day," in order to

overcome a 35 U.S.C. § 102(b) rejection over U.S. Pat. No. 6,028,019 to Spijkers ("*Spijkers*") (Ex. 1015.) and a 35 U.S.C. § 103(a) rejection over *Spijkers* (Ex. 1015.) in view of *Haggquist* (Ex. 1004.). The Examiner did not find the Applicant's arguments and amendment persuasive and made the same rejections in a Final Office Action on July 16, 2012. (Ex. 1016.) In response to this Final Office Action, the Applicant filed a Response on December 17, 2012 that did not make any new amendments, but instead presented new arguments. (Ex. 1017.) In this response, the Applicant argues that while *Spijkers* discloses the use of carbon particles and carbon soot, *Spijkers* "fails to disclose or allude, expressly or inherently that the carbon soot particles may be activated carbon particles." (*Id*. at p. 16.) The Applicant argued:

> Additionally, the carbon soot particle disclosed in Spijkers comprises an "average size of 5 to 40 nm." This soot is extremely small in comparison to the Spijkers disclosed membrane "thickness of 5-50 μm"…the activated carbon would also be buried in the polymer and not exposed at the polymer surface. Since the active surface of the particles would be buried, the active particles would become inactivated and therefore, the membranes would not be enhanced by the particles. Also, larger active particles would not work properly with the small membrane size of Spijkers because the larger active particles would poke holes in the membrane. Such holes would create leaks and diminish the waterproof features of any such membrane.

(*Id*. at p. 16-17.)

89. In response to above arguments, the Examiner issued the same 35 U.S.C. § 103(a) rejection over *Spijkers* (Ex. 1015.) in view of *Haggquist* (Ex. 1004.) in the Non-Final Office Action mailed on February 1, 2013. (Ex. 1018.) The Examiner recited:

> Applicants argue that the small (i.e. 5-40 nm) particle size of Spijkers would fail to impart the recited moisture vapor transmission rate to the disclosed membrane. However, the examiner does not agree. It is initially noted that Applicants' disclosure is silent as to the specific sizes of the active particles used to manufacture the membrane. Furthermore, there is nothing on the record to show that the particle size disclosed by the Spijkers reference would fail to impart the recited moisture vapor transmission rate on the disclosed membrane, especially since the particle loading rate overlaps to instantly claimed loading rate. While some of the carbon will be "buried" in the membrane, other particles will be located at or near the outer edge. Additionally, Applicants' comment regarding larger active particles being incompatible with the "small membrane size" of Spijkers is not understood in view of the fact that both the instant membrane and the Spijkers membrane have approximately the same thickness. As was noted in the prior Office action, the instant membrane has a thickness of 1 mil (25.4 μm) (see instant Example 1) while the Spijkers membrane has a thickness of 5-50 μm or 20-50 μm) (see col. 5, lines 36-49 of Spijkers et al.). While the reference membrane can have a thickness as small as 5 μm in a non-preferred embodiment, it can likewise have a thickness almost twice the thickness of the instant membrane. Thus using a larger particle size

would not render the Spijkers membrane inoperable.

(*Id*. at 3.)

90. In its June 5, 2013 response to the above rejection, the Applicant amended claim 28 to recite a base material, "comprising a first thickness," "the plurality of active particles comprising a second thickness," and "the first thickness is less than an order of magnitude larger than the second thickness." (Ex. 1007 at p. 6-7.) In this response, the Applicant stated:

> Support for these claim amendments may be found at, for example, Paragraph 0049, which states that the Example 1 membrane comprises a thickness of about l mil, or about 25.4 microns (the first thickness) and Paragraph 0050, which states that the activated carbon used in such a membrane comprises Asbury5564™ powdered coconut activated carbon. As seen in the attached Product Data Sheet for Asbury 5564™ powdered coconut activated carbon, the particle size for the Asbury 5564™ powdered coconut activated carbon comprises about 10 microns (the second thickness). Therefore, the first thickness is less than an order of magnitude larger than the second thickness.

(Ex. 1007 at p. 17.) Therefore, by virtue of its arguments pointing to support in the specification for the new amendment, the Applicant equated the "first thickness" to the overall membrane thickness (including the base material plus the active particles) and the "second thickness" to the particle size of the active particle. (Ex. 1007 at p. 17.)

91. The Examiner mailed a final rejection on July 3, 2013 in response to

above amendments and rejected claim 28 and its dependent claims under U.S.C. § 112 for indefiniteness and lack of enablement. (Ex. 1008.) The Examiner stated:

> [T]he only dimensions mentioned in the disclosure are at Example 1 in which the first thickness is disclosed as 1 mil (25.4 μm) and the second thickness is disclosed as 10 μm. See paragraphs [0049]-[0050] of the specification and the arguments filed 5 June 2013 at page 17, lines 15-22. This single data point is insufficient to enable the entire instantly claimed range of the first thickness being less than 10 times larger than the second thickness (i.e. an order of magnitude).

(Ex. 1008 at p. 3.) Accordingly, the Examiner stated that an "order of magnitude larger" equates to 10 times larger and stated that the disclosure of single data point is insufficient to enable a range. In its Response filed on October 8, 2013, the Applicant replied to this argument by amending claim 28 to remove and replace the previously added "order of magnitude" limitation with a limitation wherein the first thickness "comprises a thickness at least 2.5 times" larger than the second thickness. (Ex. 1019 at pp. 6-7.)

92. Next, the Examiner initiated an interview on October 21, 2013, where the Examiner suggested adding the "order of magnitude" limitation back into the claims, which was accepted by the Applicant. (Ex. 1020.) Accordingly, the Examiner amended claim 28 to recite "but less than an order of magnitude larger than the second thickness," and issued a Notice of Allowance on October 25,

2013. (Ex. 1021.)

X. CLAIM CONSTRUCTION

93. Claim 27 of the ’287 Patent recites a “**cured base material**,” which means a non-solution form of a substrate that was converted from a solution state via any conventional curing technique. (Ex. 1001 at Col. 3:38-40 & Col. 7:10-33.) Based on the ’287 Patent and the prior art, a POSITA would understand that a dried and heated polyurethane solution is an example that would be included in the foregoing broad definition of “**cured base material**”.

94. Claim 27 of the ’287 Patent recites a liquid-impermeable breathable cured base material including “**a first thickness**.” The first thickness of the liquid-impermeable breathable cured base material is not specifically discussed in the specification and is, therefore, not defined by the specification. However, the first thickness was explicitly discussed and defined during the prosecution history in the Response filed on June 5, 2013 (Ex. 1007 at 17.) to provide support for an added amendment. In the Response filed on June 5, 2013, the Applicant argued that “[s]upport for these claim amendments may be found at, for example, Paragraph 0049, which states that the Example 1 membrane comprises a thickness of about l mil, or about 25.4 microns (the first thickness).” (*Id.*) The membrane referred to in Example 1 includes both the base material and the active particles. (Ex. 1001 at Col. 8:51-61.)

95. Accordingly, the Applicant equates the thickness of the entire membrane (including the base material and the active particles) with the first thickness. As such, "**first thickness**" means the thickness of the membrane, which includes the base material and the active particles.

96. This definition is necessary given my understanding of how the composition is made based on the disclosure in the '287 Patent. The '287 Patent discloses that the active particles are mixed with and suspended in the base solution before curing. (*Id.* at Col. 8:54-64.) As such, the thickness of the cured base material in the '287 Patent includes the base material and the active particles.

97. Claims 27, 28, 30, 32, 33, and 35-38 of the '287 Patent recite a plurality of "**active particles**." The '287 Patent recites:

> 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***.

(*Id.* at Col. 4:4-10 (emphasis added).) Further, the '287 Patent recites:

> The present disclosure relates to ***active particle-enhanced membrane*** and methods for making and using the same. …The present disclosure is also particularly applicable to quick-drying, ***odor-absorbing***, anti-static ***membranes*** …and methods for making and using the same.

(*Id.* at Col. 2:12-22 (emphasis added).) Additionally, the ’287 patent recites that “[a]ctive particles may include, but are not limited to, 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 other suitable materials.” (*Id.* at 4:22-27.)

98. Further, the specification of the ’287 Patent incorporates the disclosure of *Haggquist* (Ex. 1004.) in its entirety by reference. (Ex. 1001 at Col. 6:56-60.) The background of *Haggquist* (Ex. 1004.) recites, “[a]ctive particles are active because they have the capacity to adsorb or trap substances...” (*Id.* at ¶ 4.) Further, claim 1 of *Haggquist* claims “[a]n encapsulated active particle comprising an active particle that is at least partially encapsulated by at least one encapsulant that inhibits ***absorption by said active particle***.” (*Id.* at claim 1 (*emphasis added*).) Additionally, *Haggquist* discloses that “the ***particles*** can deactivate before having an opportunity to adsorb desirable substances. Premature deactivation can include deactivation on account of ***absorption occurring at an undesirably early time*** whether or not the ***absorbed*** substance was deleterious, non-deleterious or even the intended target.” (*Id.* at ¶ 14 (*emphasis added*).) As such, *Haggquist* teaches that the active particles are capable of absorption, which could lead to their premature deactivation. (*Id.* at ¶ 14.)

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. This definition encompasses all of the specific active particles listed above in paragraph 45 as well as graphite, which is disclosed in *Haggquist*.

100. Further the definition of active particles cannot be limited to adsorptive particles, since the '287 Patent discloses other activity in addition to adsorption. (Ex. 1001 at Col. 6:4-10.) For example, the '287 Patent recites:

> With respect to the use of active particles to enhance performance activity in a base material (***whether the activity is adsorptive, anti-microbial, dependent upon exposure of the surface of the particle to an environmental target of interaction, or simply an activity that is inhibited and/or enhanced through use of a removable protective substance***), use of at least one removable encapsulant also enables use of fewer active particles in the embedding substance or matter (or in a resultant article) to achieve effective active performance, thereby reducing potential degradation of other physical properties (for example, strength or feel) of the embedding substance, matter or resultant article.

(*Id.* at Col. 6:13-24 (emphasis added).) Similarly, the '287 Patent further recites:

> Introduction and removal of the protective substance results in ***enhanced active performance, such as for example, enhanced***

adsorption, moisture management, anti-microbial functionality, anti-fungal functionality, anti-bacterial, and catalytic interaction as compared to performance of the active particles if the protective substance had not been introduced.

(*Id.* at Col. 5:13-19 (emphasis added).)

101. Claim 27 of the ’287 Patent recites a plurality of active particles comprising a “**second thickness**.” The “second thickness” of the plurality of active particles is also not discussed in the specification and therefore not defined therein. However, the “second thickness” was explicitly discussed and defined during the prosecution history in the response filed on June 5, 2013 to provide support for an added amendment. (Ex. 1007 at 17.)

102. In the Response filed on June 5, 2013, the Patent Owner argued that while the “second thickness” limitation found support in the specification based on “the attached Product Data Sheet for the Asbury 5565TM powdered coconut activated carbon, the particle size for the Asbury 5564TM powdered coconut activated carbon comprises about 10 microns (second thickness).” (*Id*.) Thus, the Patent Owner argued that the second thickness meant the particle size of the activated carbon. (*Id*.) Accordingly, “**second thickness**” means the particle size of the active particles.

103. This definition is also necessary given my understanding of how the composition is made based on the disclosure in the ’287 Patent. As discussed

above, in Example 1 the ’287 Patent discloses that the active particles are mixed with and suspended in the base solution before curing. (Ex. 1001 at Col. 8:54-66.) As such, the active particles do not form a discrete layer that has a measureable thickness. (*Id.* at Col. 8:54-66.)

104. Claim 27 of the ’287 Patent recites an “**order of magnitude**.” The order of magnitude element is not discussed or defined in the specification. In a 35 U.S.C. § 112 rejection, the Examiner proposed a definition for the “order of magnitude” that was not challenged by the Patent Owner. (Ex. 1008 at 3.) The Examiner stated “[t]his single data point is insufficient to enable the entire instantly claimed range of the first thickness being less than 10 times larger than the second thickness (i.e. an order of magnitude).” (*Id.*) As such, an “**order of magnitude**” larger means “ten (10) times” larger. (*Id.*)

105. Further, this definition is consistent with a POSITA’s understanding of what an “**order of magnitude**” means. (Ex. 1040 p. 831.)

106. Claim 35 of the ’287 Patent recites that the “**composition possesses odor absorbance properties at least in part due to the active particles**.” The ’287 Patent does not discuss what this claim means. Accordingly, I give it its plain meaning in view of my definition of “active particles” above. Therefore, the term means that the composition is capable of absorbing, adsorbing or trapping odors at least in part due to the active particles. Further, I understand that the Patent Owner

has taken the position in related district court litigation (Case No. 1:16-cv-2703-CMA (D. Colo.)) that if "active particles" are present in the claimed composition, the claimed composition will, by definition, have "odor absorbance properties at least in part due to the active particles." (Ex. 1026 at p. 4.) Indeed, in its infringement claim chart, the Patent Owner sought to map claim 35 to the accused product by arguing that "silicon, oxygen, titanium, calcium, aluminum, and carbon elements are known to possess odor absorbance properties." (*Id.* at p. 4.) As such, the above definition must encompass compositions with particles of silicon, oxygen, titanium, calcium, aluminum, and carbon. (*Id.* at p. 4.)

107. Similarly, Claim 36 of the '287 Patent recites that the "**composition possesses quick drying properties at least in part due to the active particles**." Again, the term is not discussed or defined in the specification. Accordingly, I give it its plain meaning in view of my definition of "active particles" above. Therefore, the term means that the composition is capable of quick drying at least in part due to the active particles. Additionally, in the district court litigation, the Patent Owner argued that because a product has an improved MVTR due to the inclusion of active particles, this product must necessarily possess quick drying properties. (*Id.* at pp. 4-5.) As such, the above definition must encompass compositions with increased moisture vapor transport capacity due to the inclusion of activated particles. (*Id.* at pp. 4-5.)

XI. GROUNDS FOR INVALIDITY

108. In my opinion, claims 27, 28, 30, 32, and 36-37 are anticipated by *Dutta*. In my opinion, claims 27, 28, 30, 32, 33 and 35-37 are anticipated by *Halley*. In the alternative, in my opinion, claims 27, 28, 30, 32, and 35-37 are obvious over *Dutta* in view of *Haggquist* as it would have been obvious to a POSITA before May 9, 2006 to substitute the active particles disclosed in *Haggquist* with the Sephadex particles utilized in Example 1B of *Dutta*. Further, claims 38-39 are obvious over *Dutta* or *Halley* in view of *Haggquist* as it would have been obvious to a POSITA to also add a removable encapsulant as disclosed in *Haggquist* to the particles utilized in the compositions disclosed in *Dutta* or *Halley* (or *Haggquist*) to substantially prevent premature deactivation of the active particles.

A. Claims 27, 28, 30, 32, and 36-37 Of The '287 Patent Are Anticipated by *Dutta*

109. The water-proof composition as recited in claims 27, 28, 30, 32, and 36-37 is anticipated by *Dutta*. To clarify the basis of my opinion, I will address each of claims 27, 28, 30, 32, and 36-37 below.

1. Independent Claim 27

110. Claim 27 recites:

A water-proof composition comprising:

a liquid-impermeable breathable cured base material comprising a first

thickness;

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, 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,

the active particles improve the moisture vapor transport capacity of the composition, and

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.

(Ex. 1001 at Col. 12:1-16.)

111. *Dutta* discloses all of the above claim limitations for the water-proof composition in at least Example 1B. (Ex. 1002 at p. 18, ll. 10-21 and p. 23 ll. 3-10.)

112. *Dutta* discloses a "water-proof composition." For example, *Dutta* recites that "[t]he material of the invention can be in the form of a ***waterproof***, air permeable, water vapor permeable non-porous polymer film or sheet made of a polymer resin…" (*Id.* at Abstract.) (Emphasis added).

113. Liquid-impermeable breathable cured base materials were well known to a POSITA at least as early as May 9, 2006. (Ex. 1002 at p. 11, ll. 9-14, p. 18, ll. 11-21, and p. 23 ll. 3-10; Ex. 1025 at Abstract, p. 8, ll. 7-31.) Further, it is well known to a POSITA that liquid-impermeable breathable cured base materials can

be formed from the curing of a polyurethane solution. (*Id*.)

114. *Dutta* discloses a "liquid-impermeable breathable cured base material" because *Dutta* discloses creating polymer membranes by curing a polyurethane solution and that these membranes are both waterproof and water vapor permeable. (*Id*. at p. 11, ll. 9-14, p. 18, ll. 11-21, and p. 23 ll. 3-10.)

115. For example, *Dutta* discloses, with regard to Example 1B, "[a] film was then cast from this mixture [of polyurethane solution and Sephadex G-200-50]… and ***dried*** under ambient conditions. The dried film was ***then heated*** in an oven at 155°C for 5 minutes ***to post-cure the film*** ..." (*Id*. at p. 18, ll. 11-21 (*emphasis added*).) *Dutta* also discloses:

> The particular technique used to make the polymer film of this invention will depend on the physical form of the polymer resin. In case of ***moisture curing prepolymer resins*** that are liquid under ambient conditions, the absorptive particles can be dispersed into the liquid prepolymer and the resulting liquid dispersion can be converted into a film.

(*Id.* at p. 11, ll. 9-14 (*emphasis added*).)

116. *Dutta* discloses a "first thickness" for the film since *Dutta* discloses a film thickness in Example 1B. (*Id.* at p. 23 ll. 3-10.) In particular, Table 1 in *Dutta* discloses a film thickness of 0.0030 inches (76.2 microns) for Example 1B. (*Id.* at p. 23 ll. 3-10.) Table 1 of *Dutta* is reproduced below:

TABLE 1

Polymer Resin:Hydrophilic polyurethane (SOLUCOTE TOP 932)

Physical Form Used:Solution

(about 42% by weight in toluene/dimethylformamide mixture)

Example	Absorbent Particle	Amount of Particle (phr)	Film Thickness (inches)	Average WVTR Of Three Test Areas	Air Permeability	Waterproofness, (WP2)
Comparative Example 1	———	0.0	0.0027	5583	Impermeable	Pass
Example 1A	Nalco® 1181	5.0	0.0032	7194	Impermeable	Pass
Example 1B	Sephadex G-200-50	10.0	0.0030	6730	Impermeable	Pass

(*Id.* at p. 23 ll. 3-10.)

117. *Dutta* discloses "a plurality of active particles in contact with the liquid-impermeable breathable cured base material since *Dutta* discloses mixing Sephadex particles with a polyurethane solution and then curing the mixture to form a composition. (*Id*. at p. 18, ll. 11-21.)

118. It was well known to a POSITA at least as early as May 9, 2006 that Sephadex particles are active particles since Sephadex particles are a porous, molecular filter-type material that have absorbent and adsorbent properties.

119. Sephadex particles are comprised of crosslinked-dextran, a polysaccharide derived from bacteria. (Ex. 1032.) Sephadex is prepared via reaction of dextran with epichlorohydrin to form a crosslinked dextran gel. (Ex. 1031; Ex. 1032.) Originally, the bulk gel was dehydrated and ground to form particles, which were sieved to isolate particle size ranges. (Ex. 1032.) Sephadex in bead form is prepared from emulsion-based reverse phase polymerization, which offers tighter control of particle size. (Ex. 1032.) Sephadex has been utilized as a molecular filter or sieve in gel filtration methods since at least as early as 1959. (Ex. 1032.)

120. For example, U.S. Patent No. 4,479,937, issued to *Sato* in 1984 disclosed that Sephadex is a known molecular filter. (Ex. 1024 at Col. 1:66-68.) In particular, *Sato* recites, "using a molecular filter such as Sephadex". (*Id*.)

121. Further, in 2003, editors Joseph Sherma and Bernard Fried published a book entitled "Handbook of Thin-Layer Chromatography" (hereinafter "*Sherma*") that discussed the properties of Sephadex, including adsorption of water. (Ex. 1023.) In particular, *Sherma* provides a table illustrating the capacity for adsorption of water of various types of Sephadex. (Ex. 1023 at p. 143, Table 7.)

122. It was well known to a POSITA at least as early as May 9, 2006 that Sephadex particles are porous, as disclosed by use of Sephadex particles in gel

filtration as discussed in *Sherma* (Ex. 1023 at p. 1286 ("Gel filtration uses a ***polydextran*** gel high cross-linked polymer, silica gel or other porous medium and an aqueous mobile phase."), pp. 983 and 989 (*emphasis added*).); and as disclosed by the booklet "Sephadex® - gel filtration in theory and practice" (Ex. 1027 at p. 7 ("Molecules larger than the largest pores of the swollen Sephadex, i.e., above the exclusion limit, cannot penetrate the gel particles and therefore they pass through the bed in the liquid phase outside the particles."); and as disclosed in Analytical Chemistry 86A (Ex. 1030.)).

123. In 1994, *Dutta* disclosed that Sephadex particles are hydrophilic absorbent particles. (Ex. 1002 at p. 4. ll. 20-28, p. 9. ll. 15-18 and p. 18. ll. 10-16.)

124. It was well known to a POSITA at least as early as May 9, 2006 that particles of molecular filter-type materials are active particles. (Ex. 1004 at ¶ 30.)

125. As such, it was well known to a POSITA at least as early as May 9, 2006 that Sephadex particles are "active particles." (*Id.* at ¶ 30.)

126. Example 1B of *Dutta* recites "[t]o 36.8 grams of the hydrophilic polyurethane solution …, 1.55 grams…of cross-linked dextran particles (***Sephadex*** G-200-50…) ***was added and stirred to uniformly disperse the particles into the solution***." (Ex. 1002 at p. 18, ll. 10-21 (emphasis added).) Example 1B goes on to state that "[a] film was then cast from this mixture…, dried under ambient conditions… [and] then heated in an oven … to post-cure the

film…" (*Id.* at p. 18, ll. 10-21). As such, *Dutta* discloses active particles (Sephadex particles) in contact with a liquid-impermeable breathable cured base material (cured polyurethane solution).

127. *Dutta* discloses "the plurality of active particles having a second thickness" because *Dutta* recites the particle sizes for Sephadex. (*Id.* at p. 18, ll.11-21.)

128. In particular, Example 1B in *Dutta* recites that the Sephadex particles have "a particle size of 20-50 micrometers." (*Id.* at p. 18, ll. 11-21.)

129. *Dutta* also discloses that "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." This thickness ratio is shown in Example 1B and Table 1 in *Dutta*. (*Id.* at p. 18, ll. 11-21 and Table 1.)

130. As discussed above, the first thickness, based on the thickness of the film in Example 1B, is 0.0030 inches (76.2 microns) and the second thickness, based on the Sephadex particle size, is from 20-50 microns. As such, any particles sized from 20-30 microns within the 20-50 micron range meet the claimed thickness ratio. For example, 76.2 microns is more than 2.5 times 20-30 μm (50-75 μm) and less than 10 times larger than 20-30 μm (200-300 μm).

131. *Dutta* discloses in Table 1 that "the active particles improve the moisture vapor transport capacity of the composition" and a MVTR "from 600

g/m^2/day to about 11000 g/m^2/day," as required by Claim 27 of the '287 Patent. (*Id.* at Table 1.)

132. In particular, Table 1 of *Dutta* shows that the moisture vapor transmission rate (MVTR or WVTR) of Example 1B is 6730 g/m^2/day, which is within the claimed range, and has an improved WVTR when compared to the Control Example 1 (5583 g/m^2/day) that does not include any particles. (*Id.* at p. 23 ll. 3-10.)

2. Dependent Claims 28, 30, 32, and 36-37

133. Claim 28 depends from claim 27 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 75% of the total weight of the composition.

(Ex. 1001 at Col. 12:17-19.) *Dutta* discloses, "To 36.8 grams of the hydrophilic polyurethane solution SOLUCOTE TOP 932, 1.55 grams (10 phr) of cross-linked dextran particles (Sephadex G-200-50 from Sigma Chemical Co...) was added and stirred to uniformly disperse the particles into the solution." (Ex. 1002 at p. 18, ll. 10-17.) As such, *Dutta* discloses that Sephadex particles were 4% (1.55 grams divided by 36.8 grams plus 1.55 grams, or 38.4 grams) of the total weight of the composition. (*Id.* at p. 18, ll. 10-17.) Accordingly, *Dutta* discloses the above limitations since *Dutta* discloses a total weight percentage of Sephadex particles (4%) within the claimed range of about 0% to about 75%. (*Id.* at p. 18, ll. 10-17.)

134. Claim 30 depends from claim 27 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 30% of the total weight of the composition.

(Ex. 1001 at Col. 12:23-25.) *Dutta* discloses, "[t]o 36.8 grams of the hydrophilic polyurethane solution SOLUCOTE TOP 932, 1.55 grams (10 phr) of cross-linked dextran particles (Sephadex G-200-50 from Sigma Chemical Co...) was added and stirred to uniformly disperse the particles into the solution." (Ex. 1002 at p. 18, ll. 10-17.) As such, *Dutta* discloses that Sephadex particles were 4% (1.55 grams divided by 36.8 grams plus 1.55 grams, or 38.4 grams) of the total weight of the composition. (*Id.* at p. 18, ll. 10-17.) Accordingly, *Dutta* discloses the above limitations since *Dutta* discloses a total weight percentage of Sephadex particles (4%) within the claimed range of about 0% to about 30%. (*Id.* at p. 18, ll. 10-17.)

135. Claim 32 depends from claim 27 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 50% of the total weight of the composition.

(Ex. 1001 at Col. 12:29-32.) *Dutta* disclose, "To 36.8 grams of the hydrophilic polyurethane solution SOLUCOTE TOP 932, 1.55 grams (10 phr) of cross-linked dextran particles (Sephadex G-200-50 from Sigma Chemical Co...) was added and stirred to uniformly disperse the particles into the solution." (Ex. 1002 at p. 18, ll. 10-17.) As such, *Dutta* discloses that Sephadex particles were 4% (1.55 grams

divided by 36.8 grams plus 1.55 grams, or 38.4 grams) of the total weight of the composition. (*Id.* at p. 18, ll. 10-17.) Accordingly, *Dutta* discloses the above limitations since *Dutta* discloses a total weight percentage of Sephadex particles (4%) within the claimed range of about 0% to about 50%. (*Id.* at p. 18, ll. 10-17.)

136. Claim 36 depends from claim 27 and recites:

> The composition of claim 27, wherein the composition possesses quick drying properties at least in part due to the active particles.

(Ex. 1001 at Col. 12:42-44.) As discussed above, this limitation means that the composition is capable of quick drying at least in part due to the active particles. Additionally, based on the Patent Owner's arguments in district court, the above definition must include compositions with increased moisture vapor transport capacity due to the inclusion of activated particles. (Ex. 1026 at pp. 4-5.) *Dutta* recites the use of Sephadex particles, which are known active particles that increase the WVTR (MVTR) of a composition. (Ex. 1002 at p. 23, ll. 3-10.) As such, *Dutta* discloses the above limitations since *Dutta* discloses that Sephadex particles increase the WVTR of a composition. (Ex. 1002 at Table 1.)

137. Claim 37 depends from claim 27 and recites:

> 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.

(Ex. 1001 at Col. 12:45-51 (emphasis added).) As discussed above, *Dutta* discloses the use of Sephadex particles, which are a known molecular filter material. (Ex. 1024 at Col. 1:66-68; Ex. 1032.) As such, *Dutta* discloses the above limitation since *Dutta* discloses the use Sephadex particles, which are a known molecular filter-type material. (Ex. 1024 at Col. 1:66-68; Ex. 1032.)

B. Claims 27, 28, 30, 32, and 36-39 Of The '287 Patent Are Obvious Over *Dutta* In View Of *Haggquist*

138. It would have been obvious for a POSITA to make the water-proof compositions recited in claims 27, 28, 30, 32, and 35-39. I am not aware of any secondary considerations that would render claims 27, 28, 30, 32, and 36-39 of the '287 Patent non-obvious. To clarify the basis of my opinion, I will address each of claims 27, 28, 30, 32, and 35-39 below.

1. Independent Claim 27

139. As discussed above, claim 27 is anticipated by *Dutta*. I understand that the Patent Owner has argued in the related district court litigation that Sephadex is not an "active particle." (Ex. 1029 at pp. 2-4.) Based on the definition of "active particles," I disagree. Further, for the reasons discussed below, it would have been obvious to a POSITA to substitute the activated particles of *Haggquist*

for the Sephadex particles of *Dutta* to arrive at the "active particles" limitation of claim 27.

140. *Haggquist* is incorporated by reference into the '287 Patent. (Ex. 1001 at Col. 6:56-60.) As such, the active particles listed in *Haggquist* (Ex. 1004 at ¶ 30.) are by definition "active particles" as claimed in the '287 patent.

141. *Haggquist* further discloses that the carbon particles utilized in Example 1 have a diameter of less than 10 microns. (Ex. 1004 at ¶ 85.)

142. Based on the definition of second thickness above, active particle sizes of less than 10 microns disclosed by *Haggquist* meet this limitation.

143. *Dutta* in view of *Haggquist* discloses the required thickness ratio for the first and second thickness based on the disclosure in Example 1B and Table 1 of *Dutta* and the disclosure of Example 1 in *Haggquist*.

144. As discussed above, the first thickness in Example 1B of *Dutta* is 0.0030 inches (76.2 microns) and the second thickness is less than 10 microns from Example 1 in *Haggquist*. As such, any particles sized from 8-9 microns within the "less than 10 microns" range (presumably a range of greater than zero microns, but less than 10 microns) of *Haggquist* meets the claimed thickness ratio. For example, 76.2 microns is more than 2.5 times as thick as 8-9 microns (20-22.5 microns) and less than 10 times larger than 8-9 microns (80-90 microns).

i. Reason to Combine Dutta and Haggquist

145. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist*.

146. Prior to May 9, 2006, a POSITA interested in enhancing the performance capabilities of a membrane would have a reason to combine the teachings of *Dutta* and *Haggquist* to substitute the Sephadex particles disclosed in Example 1B of *Dutta* with the active particles disclosed in *Haggquist*. (Ex. 1002 at Abstract; and Ex. 1004 at ¶ 3.)

147. A POSITA would have had several reasons to combine the teachings of *Dutta* and *Haggquist* before May 9, 2006 because: (1) both references teach adding particles to a substrate to add performance enhancing characteristics, such as moisture management, to garments, such as clothing; (2) both references use porous particles with the ability trap water to add performance enhancing characteristics to garments. (Ex. 1023 at p. 143, 983, 989, and 1286; Ex. 1002 at p. 4-5; Ex. 1004 at ¶ 4.); (3) a POSITA would also be motivated to combine *Dutta* and *Haggquist* because, as shown in *Dutta*, hydrophilic Sephadex particles are utilized interchangeably with other similar type particles, such as Nalco 1181 (Ex. 1002 at pp. 17-18 and 23); (4) *Haggquist* discloses that "molecular filter-type materials" are suitable activated particles and the Sephadex particles in *Dutta* are molecular filter-type materials (Ex. 1002 at p. 18 and 23; Ex. 1024 at Col. 1:66-68; and Ex. 1004 at ¶ 30.); and (5) *Haggquist* discloses systems and methods for

protecting the performance enhancing characteristics of active particles, including moisture management (Ex. 1002 at Abstract; and Ex. 1004 at ¶ 3.).

148. *Dutta* and *Haggquist* are analogous art. Both *Dutta* and *Haggquist* add particles to a substrate to provide performance enhancing characteristics to the substrate, such as moisture management. (Ex. 1002 at Abstract; Ex. 1004 at ¶ 3.) For example, *Dutta* recites that "[t]he water vapor transmission rate (WVTR) of a nonporous polymeric film can be increased by incorporating into it hydrophilic absorbent particles." (Ex. 1002 at Abstract.) And *Haggquist* discloses that "[i]t is well known that certain particles can be used to add performance properties to materials," such as moisture management. (Ex. 1004 at ¶ 3.)

149. Further, both *Dutta* and *Haggquist* disclose that these added performance properties can be utilized to improve clothing and other outdoor protective gear. (Ex. 1002 at p. 14, l. 32 to p. 15, l. 4; Ex. 1004 at ¶ 81.) For example, *Dutta* recites "[t]hese functional properties make these products particularly useful as materials for articles of protective clothing providing comfort as well as protection from influences such as outdoor weather..." (Ex. 1002 at p. 14, l. 32 to p. 15, l. 4.) And *Haggquist* recites: "The treated materials can also be used in clothing ... In addition, hunting gear can be made using the treated materials of the present invention." (Ex. 1004 at ¶ 81.)

150. Furthermore, the particles in *Dutta* and *Haggquist* perform the same

function. For instance, *Haggquist* discloses that its active particles, such as activated carbon particles, are porous particles that chemically and/or physically react with and/or trap water in their pores to provide moisture management properties. (Ex. 1004 at ¶ 30.) *Dutta* discloses utilizing hydrophilic water absorbing Sephadex particles with a strong affinity for water to improve the WVTR of a substrate. (Ex. 1002 at Abstract; p. 18. ll. 10-21.) And, as known by a POSITA and described in more detail above, Sephadex traps water in its pores, as do activated particles. Further, *Dutta* discloses the use of Sephadex particles, which are known porous and adsorptive particles that behave as molecular filters and can trap water. (*Id.* at Abstract, p. 23, ll. 3-10.; Ex. 1023 at p. 143, 983, 989, and 1286; and Ex. 1024 at Col. 1:66-68.) Thus, whether acting through an adsorptive mechanism of action, or an absorptive mechanism of action, the porous, hydrophilic Sephadex particles physically react with and/or trap water (Ex. 1002 at Abstract, p. 23:3-10.; Ex. 1023 at p. 143, 983, 989, and 1286; and Ex. 1024t Col. 1:66-68.), which is the same function performed by the porous, activated particles disclosed in *Haggquist*. (Ex. 1004 at ¶ 30.) As such, both *Dutta* and *Haggquist* disclose use of particles that both perform the function of trapping water in their pores to improve moisture management. It would be obvious to a POSITA to substitute the porous water-trapping particles of *Haggquist* for the porous water-trapping particles of Sephadex in *Dutta*.

151. The Sephadex particles are provided as an example of possible particles that would work, like the Nalco 1181 particles. (Ex. 1002 at p. 17-18.) As such, a POSITA would know or find it obvious to try other similar particles to achieve similar results.

152. Both *Dutta* and *Haggquist* disclose the use of molecular filter type materials to provide moisture management. The Sephadex particles utilized in Example 1B of *Dutta* are known molecular filter particles. (Ex. 1024 at Col. 1:66-68.) *Haggquist* discloses the use of molecular filter-type materials, such as silica gel particles. (Ex. 1004 at ¶ 30; Ex. 1023 at pp. 981, 989, and 1286.) As such, a POSITA would be motivated to try other molecular filter-type materials or other particles that trap water to achieve the same or maybe even better results, such as the silica gel or activated carbon particles disclosed in *Haggquist*.

153. Additionally, as known by a POSITA, Sephadex particles are already utilized interchangeably with other admittedly active particles in other industries. (Ex. 1023 at pp. 983, 989, and 1286.) Specifically, gel filtration uses a ***polydextran*** gel high cross-linked polymer, ***silica gel or other porous*** particles. (Ex. 1023 at pp. 983 and 1286 (emphasis added).) Both the ’287 Patent and the prior art *Haggquist* reference disclose silica gel particles as active particles. (Ex. 1001 at Col. 4:22-23; Ex. 1004 at ¶ 30.) Further, other porous particles, such as Sephadex particles (also known as dextran particles) are commonly utilized for gel

filtration. (Ex. 1023 at pp. 983, 989, and 1286.) Both silica gel and Sephadex particles are known molecular filter particles. (Ex. 1023 at pp. 3, 5, 8, 11, 12, 15, 17, 18, 19, 983, 989, and 1286.) As such, a POSITA before May 9, 2006 would know that the Sephadex particles disclosed in *Dutta* could be replaced with other types of molecular filter materials, including admittedly active particles such as the silica gel particles disclosed in *Haggquist*.

154. Lastly, a POSITA would be motivated to substitute the active particles as disclosed in *Haggquist* with Sephadex particles disclosed in *Dutta* because *Haggquist* discloses systems and methods (encapsulants) for protecting the performance enhancing characteristics of its particles, including moisture management. (Ex. 1004 at Abstract, ¶ 3, 30.) A POSITA would want to protect the performance enhancing characteristics of the utilized particles. As such, the use of *Haggquist's* particles would allow a POSITA to protect the performance enhancing characteristics of chosen particles.

155. As such, a POSITA would have a reason to substitute the active particles listed in *Haggquist* with the Sephadex particles listed in *Dutta*.

ii. *Reasonable Expectation of Success*

156. A POSITA would have a reasonable expectation of success in arriving at the claimed invention of claim 27 through the substitution of the active particles disclosed in *Haggquist*, such as activated carbon or silica gel, with the Sephadex

particles disclosed in *Dutta* since both references disclose the use of porous particles that trap and/or adsorb water. (Ex. 1004 at Abstract, ¶ 30; Ex. 1002 at p. 23, ll. 3-10; and Ex. 1023 at pp. 42, 341, 143, 983, 989, and 1286.)

157. Both *Dutta* and *Haggquist* disclose performance enhancement due to the addition of particles that interact with and trap water. For instance, *Haggquist* discloses that its active particles, such as activated carbon or silica gel particles, are porous particles that chemically and/or physically react with and/or trap water in their pores to provide moisture management properties. (Ex. 1004 at ¶ 30.) *Dutta* discloses utilizing water absorbent particles that trap water to improve the WVTR of a substrate. (Ex. 1002 at Abstract.) Further, *Dutta* discloses the use of Sephadex particles, which are known porous, molecular filter, and adsorptive particles that trap water. (*Id.* at Abstract, p. 23, ll. 3-10.; Ex. 1023 at p. 143, 983, 989, and 1286; and Ex. 1024 at Col. 1:66-68.) Thus, whether acting through an adsorptive mechanism of action, or an absorptive mechanism of action, the porous Sephadex particles physically react with and/or trap water (Ex. 1002 at Abstract, p. 23, ll. 3-10.; Ex. 1023 at p. 143, 983, 989, and 1286; and Ex. 1024 at Col. 1:66-68.), which is the same function performed by the porous, activated carbon and/or silica gel particles disclosed in the *Haggquist*. (Ex. 1004 at ¶ 30.) As such, both *Dutta* and *Haggquist* disclose use of the same types of particles to provide similar performance enhancing characteristics to a garment. A POSITA would reasonably

expect the active particles listed in *Haggquist* to be successful when they are substituted for the Sephadex particles utilized in Example 1B of *Dutta*.

158. Further, a POSITA before May 9, 2006 would have reasonably expected the substitution of the active particles disclosed in *Haggquist* with the Sephadex particles disclosed in *Dutta* to achieve success because it was known that Sephadex particles could be replaced with admittedly active particles, such as silica gel. (Ex. 1023 at pp. 983, 989, and 1286.) Specifically, *Sherma* recites during the definition of gel filtration, "[g]el filtration uses a ***polydextran*** gel high cross-linked polymer, ***silica gel or other porous medium*** and an aqueous mobile phase." (Ex. 1023 at p. 983 and 1286 (*emphasis added*).) The '287 Patent and *Haggquist* disclose that silica gel particles are active particles. (Ex. 1001 at Col. 4:22-23; Ex. 1004 at ¶ 30.) However, other porous particles may be utilized for gel filtration, such as polydextran or Sephadex particles. (Ex. 1023 at pp. 3, 5, 8, 11, 12, 15, 17, 18, 19, 983, 989, and 1286.) Both silica gel and Sephadex particles are known molecular filter particles. (Ex. 1023 at pp. 983, 989, and 1286.) As such, a POSITA before May 9, 2006 would know that replacing the Sephadex particles disclosed in *Dutta* with admittedly active particles, such as the silica gel particles disclosed in *Haggquist* would be successful since this replacement succeeded in other fields, such as gel filtration. (*Id.* at 983, 989, and 1286.)

2. Dependent Claims 28, 30, 32, and 35-39

159. Claim 28 depends from claim 27 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 75% of the total weight of the composition.

(Ex. 1001 at Col. 12:17-19.) *Dutta* discloses "[t]o 36.8 grams of the hydrophilic polyurethane solution SOLUCOTE TOP 932, 1.55 grams (10 phr) of cross-linked dextran particles (Sephadex G-200-50 from Sigma Chemical Co...) was added and stirred to uniformly disperse the particles into the solution," which would result in a particle loading level of 4% by weight. (Ex. 1002 at p. 18, ll. 10-17.) As shown in Table 6, reproduced below, *Haggquist* discloses utilizing several different loading levels of carbon particles:

Sample	Sample Weight (grams)	Carbon Weight in Sample (grams)	Butane Weight Gain (grams)	Butane Activity	CCl4 Activity	Activity Retained
SA-30	1.4522	0.7288	0.0720	9.88%	25.19%	100.00%
(1% SA-30) unwashed	2.6089	0.0261	-0.0066	0%	0%	0%
(1% SA-30) washed	2.5517	0.0255	0.0025	9.80%	24.98%	99.17%
(2% SA-30) unwashed	2.4670	0.0493	-0.0033	0%	0%	0%
(2% SA-30) washed	2.7523	0.0550	0.0031	5.63%	14.36%	57.00%
(3% SA-30) unwashed	2.8219	0.0847	0.0007	0.83%	2.11%	8.37%
(3% SA-30) washed	3.3179	0.0995	0.0027	2.71%	6.92%	27.46%
(4% SA-30) unwashed	3.0040	0.1202	-0.0006	0%	0%	0%
(4% SA-30) washed	3.1480	0.1259	0.0050	3.97%	10.13%	40.19%

FIG. 6

(Ex. 1004 at FIG. 6.) As such, *Haggquist* discloses that carbon particles are either

1%, 2%, 3%, or 4% of the total weight of the composition. (Ex. 1004 at FIG. 6 and ¶ 91.) Accordingly, *Haggquist* in view of *Dutta* discloses a total weight percentage of carbon particles (1-4%) within the claimed range of about 0% to about 75%. (Ex. 1002 at p. 18, ll. 10-17; Ex. 1004 at FIG. 6 and ¶ 91.)

i. Reason to Combine Dutta and Haggquist

160. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 28, as explained above for independent claim 27.

ii. Reasonable Expectation of Success

161. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 28, as explained above for independent claim 27.

162. Claim 30 depends from claim 27 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 30% of the total weight of the composition

(Ex. 1001 at Col. 12:23-25.) *Dutta* discloses "[t]o 36.8 grams of the hydrophilic polyurethane solution SOLUCOTE TOP 932, 1.55 grams (10 phr) of cross-linked dextran particles (Sephadex G-200-50 from Sigma Chemical Co...) was added and stirred to uniformly disperse the particles into the solution." (Ex. 1002 at p. 18, ll. 10-17.) As shown in Tables 6 and 7, *Haggquist* discloses utilizing several different

amounts of carbon particles with different sample weights. (Ex. 1004 at FIGS. 6-7.) As such, *Haggquist* discloses that carbon particles are 1-4% of the total weight of the composition. (Ex. 1002 at p. 18, ll. 10-17; Ex. 1004 at FIGS. 6-7 and ¶ 91.) Accordingly, *Haggquist* in view of *Dutta* discloses a total weight percentage of carbon particles 1-4% within the claimed range of about 0% to about 30%. (Ex. 1002 at p. 18, ll. 10-17.)

iii. Reason to Combine Dutta and Haggquist

163. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 30, as explained above for independent claim 27.

iv. Reasonable Expectation of Success

164. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 30, as explained above for independent claim 27.

165. Claim 32 depends from claim 32 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 50% of the total weight of the composition.

(Ex. 1001 at Col. 12:29-32.) *Dutta* discloses "[t]o 36.8 grams of the hydrophilic polyurethane solution SOLUCOTE TOP 932, 1.55 grams (10 phr) of cross-linked dextran particles (Sephadex G-200-50 from Sigma Chemical Co...) was added and

stirred to uniformly disperse the particles into the solution." (Ex. 1002 at p. 18, ll. 10-17.) As shown in Tables 6 and 7, *Haggquist* discloses utilizing several different amounts of carbon particles with different sample weights. (Ex. 1004 at FIGS. 6-7.) As such, *Haggquist* discloses that carbon particles are 1-4% of the total weight of the composition. (Ex. 1002 at p. 18, ll. 10-17; Ex. 1004 at FIGS. 6-7 and ¶ 91.) Accordingly, *Haggquist* in view of *Dutta* discloses a total weight percentage of carbon particles (1-4%) within the claimed range of about 0% to about 50%. (Ex. 1002 at p. 18, ll. 10-17.)

v. Reason to Combine Dutta and Haggquist

166. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 32, as explained above for independent claim 27.

vi. Reasonable Expectation of Success

167. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 32, as explained above for independent claim 27.

168. Claim 35 depends from claim 27 and recites:

> The composition of claim 27, wherein the composition possesses odor absorbance properties at least in part due to the active particles.

(Ex. 1001 at Col. 12:39-41.) As discussed above, "odor absorbance properties"

means that the composition is capable of absorbing, adsorbing or trapping odors at least in part due to the active particles. (*Id.* at Col. 4:13-21.) This definition includes compositions that utilize particles of silicon, oxygen, titanium, calcium, aluminum, and carbon as would be understood by a POSITA. (Ex. 1026 at p. 4.) *Haggquist* discloses that the active particles are capable of odor-absorption. (Ex. 1004 at ¶ 19.) Additionally, *Haggquist* recites, "[t]he active particles can include, but are not limited to, activated carbon, graphite, aluminum oxide (activated alumina), silica gel…aluminum trihydrate…zinc oxide...titanium dioxide, molecular filter type materials, and other suitable materials." (Ex. 1004 at ¶ 30.) As such, *Haggquist* discloses the above limitation.

vii. Reason to Combine Dutta and Haggquist

169. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 35, as explained above for independent claim 27.

viii. Reasonable Expectation of Success

170. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 35, as explained above for independent claim 27.

171. Claim 36 depends from claim 27 and recites:

The composition of claim 27, wherein the composition possesses quick

drying properties at least in part due to the active particles.

(Ex. 1001 at Col. 12:42-44.) As discussed above, this limitation means that the composition is capable of quick drying at least in part due to the active particles. Additionally, based on the Patent Owner's arguments in district court, the above definition must include compositions with increased moisture vapor transport capacity due to the inclusion of activated particles. (Ex. 1026 at pp. 4-5.) *Haggquist* discloses that active particles have moisture management properties, as is disclosed by the '287 Patent. (Ex. 1004 at ¶ 30.) Further, *Haggquist* is incorporated by reference into the '287 Patent. (Ex. 1001 at Col. 6:56-60.) And the active particles listed in *Haggquist* are identical to the active particles listed in the '287 Patent. (Ex. 1004 at ¶ 30.) As such, a POSITA would understand that the active particles listed in *Haggquist* meet the limitations of claim 36. Further, Table 1 of *Dutta* discloses an increased WVTR (MVTR) for compositions with included Sephadex particles. (Ex. 1002 at p. 23 ll. 3-10.) Given the similarity between Sephadex particles disclosed in *Dutta* and the other active particles' ability to trap water, a POSITA would understand that the active particles as disclosed in *Haggquist* would exhibit a performance in terms of WVTR that is similar to those disclosed in *Dutta*. (*Id.* at p. 23, ll. 3-10; Ex. 1004 at ¶ 30.). Therefore, a POSITA would understand that the combination of the *Haggquist* particles into the *Dutta*

membrane would possess quick drying properties at least in part due to the active particles.

172. For instance, Example 1 of the ’287 Patent shows that combining activated carbon with a cured polyurethane solution provides an increased MVTR. (Ex. 1001 at Col. 8:51 to Col. 9:46.) As such, activated carbon is capable of increasing the MVTR when applied to a cured polyurethane solution. (*Ex.* 1001 at Col. 8:51 to Col. 9:46.) *Haggquist* discloses applying activated carbon to different base layers. (Ex. 1004 at ¶ 84-85.) As such, if the activated carbon disclosed in *Haggquist* replaces the Sephadex particles in the cured polyurethane solution in Example 1B of *Dutta,* a POSITA would understand that the formed composition would provide an increased moisture vapor transport capacity. As such, *Dutta* in view of *Haggquist* discloses an improved moisture vapor transport capacity due to the active particles. And since *Haggquist* discloses an improved moisture vapor transport capacity due to the active particles, *Haggquist* discloses the above “quick-drying” limitation.

ix. Reason to Combine Dutta and Haggquist

173. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 36, as explained above for independent claim 27.

x. Reasonable Expectation of Success

174. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 36, as explained above for independent claim 27.

175. Claim 37 depends from claim 27 and recites:

> 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.

(Ex. 1001 at Col. 12:45-51 (emphasis added).) *Haggquist* discloses the exact same list of active particles as claimed above, and also graphite. (Ex. 1004 at ¶ 30.) As such, the combination of *Dutta* and *Haggquist* disclose the above claimed limitation.

xi. Reason to Combine Dutta and Haggquist

176. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 37, as explained above for independent claim 27.

xii. Reasonable Expectation of Success

177. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 37, as explained above for

independent claim 27.

178. Claim 38 depends from claim 27 and recites:

> 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.

(Ex. 1001 at Col. 12:52-59.) The ’287 Patent recites that *Haggquist* is incorporated by reference to provide a detailed explanation of the above claimed process. (*Id.* at Col. 6:56-60.) For example, *Haggquist* discloses:

> The invention relates to preserving the properties of active particles through use of an encapsulant which may be removable. The encapsulant may protect the active particles against premature deactivation. If desired, the encapsulant may be removed to rejuvenate the active particles. Various processes can be implemented to introduce encapsulated particles to embedding substances which may be used in various products.

(Ex. 1004 at Abstract.) While *Haggquist* does not explicitly recite that its use of a removable encapsulant improves MVTR, *Haggquist* does say that use of the removable encapsulant protects the performance enhancing properties, including moisture management. And *Haggquist* discloses the exact same list of active

particles with the exact same list of properties as disclosed in the ’287 Patent. (Ex. 1001 at Col. 4:4-27; Ex. 1004 at ¶ 30.) As such, a POSITA would understand that the use of removable encapsulant protected active particles disclosed in *Haggquist* would be able to provide an improved MVTR. Further, *Dutta* discloses that active particles, specifically Sephadex particles, are capable of providing increased WVTR. (Ex. 1002 at Table 1.) As such, the combination of *Dutta* and *Haggquist* discloses the above limitation.

xiii. Reason to Combine Dutta and Haggquist

179. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 38 as explained above for independent claim 27.

180. Additionally, a POSITA would have been further motivated to utilize the encapsulant systems and methods as disclosed in *Haggquist* with the active particles, because *Haggquist* discloses that the encapsulant protects the performance enhancing characteristics of active particles from premature deactivation. (Ex. 1004 at ¶ 13.)

181. A POSITA would want to protect the performance enhancing characteristics of active particles with known methods. As such, a POSITA before May 9, 2006 would have been motivated to combine *Dutta* with *Haggquist* to

provide clothing with performance enhancing characteristics. (*Id*. at ¶¶ 93-96, 116.)

xiv. Reasonable Expectation of Success

182. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 38, as explained above for independent claim 27.

183. Further, a POSITA before May 9, 2006 understood the importance of protecting active particles from premature deactivation. (Ex. 1004 at Abstract.) And there would be a reasonable expectation of success that the combination of the encapsulant method disclosed in *Haggquist* with the Sephadex particles utilized in *Dutta* would work because *Haggquist* recites that this encapsulant method works on active particles and active particles include adsorbent, absorbent, and molecular filter particles. (Ex. 1004 at Abstract and ¶ 30.) Since both *Dutta* and *Haggquist* disclose the use of the active particles with similar properties, the encapsulant method disclosed in *Haggquist*, there is a reasonable expectation of success that the combination would work to improve the performance characteristics of the active particles disclosed in *Dutta* and/or in *Haggquist*. (Ex. 1002 at p. 23 ll. 3-10; Ex. 1004 at Abstract and ¶ 30.)

184. Claim 39 depends from claim 38 and recites:

> 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.

(Ex. 1001 at Col. 12:360-67.) As discussed above, the '287 Patent recites that *Haggquist* is incorporated by reference to provide a detailed explanation of the above claimed process. (*Id.* at Col. 6:56-60.) *Haggquist* discloses the exact same list of removable encapsulants as claimed above. (*Id.* at ¶ 33.) As such, the combination of *Dutta* and *Halley* discloses the above limitation.

xv. Reason to Combine Dutta and Haggquist

185. A POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 39, as explained above for independent claim 27.

186. Additionally, a POSITA would have had a reason to combine the disclosures in *Dutta* and *Haggquist* to arrive at claim 39, as explained above for dependent claim 38.

xvi. Reasonable Expectation of Success

187. There is a reasonable expectation of success in combining the

disclosures of *Dutta* and *Haggquist* to arrive at claim 39, as explained above for independent claim 27.

188. There is a reasonable expectation of success in combining the disclosures of *Dutta* and *Haggquist* to arrive at claim 39, as explained above for dependent claim 38.

C. Claims 27, 28, 30, 32, 33, and 35-37 Are Anticipated by *Halley*

189. The water-proof composition as recited in claims 27, 28, 30, 32, 33, and 35-37 is anticipated by *Halley*. To detail the basis of my opinion, I will address each of claims 27, 28, 30, 32, 33, and 35-37 below.

1. Independent Claim 27

190. Claim 27 recites:

> A water-proof composition comprising:
> a liquid-impermeable breathable cured base material comprising a first thickness;
> 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, 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,
> the active particles improve the moisture vapor transport capacity of the composition, and
> 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.

(Ex. 1001 at Col. 12:1-16.)

191. *Halley* discloses all of the above claim limitations for the water-proof composition. (*See* Ex. 1003; Ex. 1004.)

192. *Halley* discloses a water-proof composition. (Ex. 1003 at p. 1, ll. 8-10; p. 2, ll. 24-33, and p. 6, ll. 27-28.)

193. For example, *Halley* recites that "[t]he present invention relates to a composite material, especially a water-resistant water-vapour-permeable material which has improved abrasion resistance and other desirable properties." (Ex. 1003 at p. 1, ll. 8-10.) Additionally, *Halley* further recites "[b]y 'liquid water resistant' is meant that the material is ***waterproof*** at a water pressure of 13.8 kN/M^2." (*Id.* at p. 6, ll. 27-28 (*emphasis added*).)

194. Liquid-impermeable breathable cured base materials were well known to a POSITA at least as early as May 9, 2006. Further, it is well known to a POSITA that liquid-impermeable breathable cured base materials can be formed from the curing of a polyurethane solution. (Ex. 1025 at Abstract, p. 8, ll. 7-31.)

195. *Halley* states that, in Example 1, "[a] porous expanded PTFE membrane coated with a water-vapour-permeable hydrophilic coating was produced according to US Patent 4,194,041." (*Id.* at p.7, ll. 6-8.) In 1980, U.S. Patent No. 4,194,041 was filed by *Gore* that disclosed creating a waterproof and

breathable article (Ex. 1025 at Abstract.) In particular, *Gore* discloses that these articles can be created from curing a polyurethane solution. (*Id*. at p. 8, ll. 7-31.)

196. *Halley* discloses a liquid-impermeable breathable cured base material because *Halley* discloses utilizing a water-vapor-permeable hydrophilic polymeric material, such as polyurethane. (Ex. 1003 at p. 2, ll. 24-33.)

197. For example, *Halley* discloses that "[t]he present invention is directed to a composite material which comprises a substrate and a continuous polymer coating applied to the substrate." (Ex. 1003 at Abstract.) *Halley* also discloses that "[t]he polymer applied as a continuous coating to the substrate is generally a water-vapour-permeable hydrophilic polymeric material which allows the passage of water vapour therethrough without being permeable to liquid water." (*Id.* at p. 2, ll. 24-33.)

198. Additionally, *Halley* discloses that "[s]uitable polymers include hydrophilic polyurethanes, polyesters, polyethers… Particularly preferred ***polyurethanes*** are disclosed in US patents 4,194,041 and 4,532,316." (*Id.* at p. 2, ll. 24-33 (*emphasis added*).)

199. *Halley* discloses a first thickness for the film since *Halley* discloses a thickness for a coating imbedded with particulates. (*Id* at p. 2, l1. 1-7, 34 and p. 3 ll. 1-7.)

200. For example, *Halley* recites that "[g]enerally, the coating has a

thickness of 5 to 100 microns." (*Id.* at p. 2, l. 34.) *Halley* also recites that "a discontinuous pattern of abrasion-resisting polymeric material may be provided on the coating, … may be any suitable pattern, such as a pattern of dots or lines, …Each dot generally has a height in the range 10-200 microns, preferably 70-140 microns and particularly 80-100 microns." (*Id.* at p. 5, ll. 5-22.)

201. *Halley* discloses active particles that are in contact with the liquid-impermeable breathable cured base material because *Halley* discloses incorporating carbon, silica, aluminum oxide, titanium dioxide, and zinc oxide particles into a polymer coating. (*Id.* at p. 2 ll. 1-5 and p. 3 ll. 1-7.)

202. It was well known to a POSITA at least as early as May 9, 2006 that carbon, silica, aluminum oxide, titanium dioxide, and zinc oxide particles are active particles. (Ex. 1004 at ¶30.)

203. *Halley* recites these same particles:

> According to the present invention, a particulate solid is incorporated into the water-vapour-permeable polymer, generally before the polymer coating is applied onto the substrate. A preferred particulate solid is carbon particles. Other particulate solids include inorganic particulate materials, pigments, metal oxides, metal salts or metal particles. Further particulate solids include particles of titanium dioxide, zinc oxide, iron oxide, aluminum oxide, silica, talc, mica, tin or silver.

(Ex. 1003 at p. 3, ll. 1-7.). *Halley* also discloses that the addition of carbon black

particles (Black Pearls 2000 Carbon Black) increases the MVTR of a composition. (Ex. 1003 at p. 7, ll. 17-20 and p. 9, ll. 1-5.) Carbon black particles, such as the Black Pearls 2000 used in *Halley*, are known to adsorb or trap water and function as molecular filters and therefore are known active particles. (Ex. 1028 at p. 284.)

204. *Halley* discloses active particles with a second thickness because *Halley* recites the particle sizes for the added particulates. (*Id.* at p. 3, 8-20.)

205. For example, *Halley* recites:

> The primary particle size of the particulate solid has been found to be of particular significance in the present invention. The primary particle size is generally less than 50,000nm, particularly less than 5,000nm, especially less than 500nm, more especially less than 200nm and most especially less than 50nm. The particle size of the primary particle may be determined as set out herein. The primary particle size is the particle size of the smallest discreet particle, it being understood that primary particles may cluster together to form aggregates (typically 1 to 100, 1 to 20 or 1 to 5 microns median particle size).

(*Id.* at p. 3, ll. 8-15.)

206. Based on the definition of second thickness above, the particle sizes of the active particles as disclosed by *Halley* teach the second thickness.

207. *Halley* discloses the required thickness ratio for the first and second thickness. (*Id.* at p. 3, ll. 8-15, pg. 2, l. 34, and p. 5, ll. 5-22.)

208. As discussed above, the first thickness is 5-200 μm (*Id.* p. 2, l. 34 and

p. 5, ll. 5-22.) and the second thickness is less than 50,000 nm (50 µm). (*Id.* at p. 3, ll. 8-12.)

209. Given the range of particle sizes and polymeric material thickness ranges, several different particle sizes and polymeric material thicknesses are provided that meet claimed size relationships between two thicknesses. For example, a polymeric film thickness of 70-140 microns or 80-100 microns, which are two of the four disclosed ranges in *Halley*, meets the claimed thickness relationship of being 2.5 times greater, but less than an order of magnitude greater than a particle size of, for example, 20 µm, which falls within two of the three different particle size ranges disclosed in *Halley*.

210. *Halley* discloses that the active particles improve the moisture vapor transport capacity of the composition and that the MVTR of the composition meets the limitation of "about 600 g/m^2/day to about 11000 g/m^2/day," as required by Claim 27.

211. Table 3 of *Halley* shows that the MVTR of Examples 1-3 are 7736 or 6924 g/m^2/day, which are within the claimed range and have an improved MVTR when compared to the Control that does not include particles. (*Id.* at p. 9, ll. 1-5.) Table 3 from *Halley* is reproduced below:

TABLE 3 (fabric & membrane & dots)

Sample	Particle % wt	MVTR (mean) g/m²/d	Wash to leak hr	Abrasion to leak cycles	Handle (mean)
Control	-	6344	504-672	87500 (1500)	46.8 (2.69)
1	0.3	7736	504-864	140,000 (23094)	47.9 (1.25)
2	0.65	7736	672-864	120,000 (23094)	45.0 (1.18)
3	1.5	6924	504-672	110,000 (47610)	42.3 (2.32)

(Ex. 1003 at p. 9, ll. 1-5.)

2. Dependent Claims 28, 30, 32, 33, and 35-37

212. Claim 28 depends from claim 27 and recites:

The composition of claim 27, wherein the active particles comprise about 0% to about 75% of the total weight of the composition.

(Ex. 1001 at Col. 12:17-19.) With specific attention drawn to the examples displayed in Table 3, reproduced below, *Halley* discloses utilizing 0.3%, 0.65 %, and 1.5 % carbon particles relative to the total weight of the composition:

TABLE 3 (fabric & membrane & dots)

Sample	Particle % wt	MVTR (mean) g/m²/d	Wash to leak hr	Abrasion to leak cycles	Handle (mean)
Control	-	6344	504-672	87500 (1500)	46.8 (2.69)
1	0.3	7736	504-864	140,000 (23094)	47.9 (1.25)
2	0.65	7736	672-864	120,000 (23094)	45.0 (1.18)
3	1.5	6924	504-672	110,000 (47610)	42.3 (2.32)

(Ex. 1003 at p. 9, ll. 1-10.)

As such, *Halley* discloses the above limitations, since *Halley* discloses a total weight percentage of carbon particles (0.3%, 0.65 %, and 1.5 %) within the claimed range of about 0% to about 75%. (*Id.* at p. 9, ll. 1-10.)

213. Claim 30 depends from claim 27 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 30% of the total weight of the composition

(Ex. 1001 at Col. 12:23-25.) With specific attention drawn to the examples displayed in Table 3, reproduced below, *Halley* discloses utilizing 0.3%, 0.65 %, and 1.5 % carbon particles relative to the total weight of the composition:

TABLE 3 (fabric & membrane & dots)

Sample	Particle % wt	MVTR (mean) g/m²/d	Wash to leak hr	Abrasion to leak cycles	Handle (mean)
Control	-	6344	504-672	87500 (1500)	46.8 (2.69)
1	0.3	7736	504-864	140,000 (23094)	47.9 (1.25)
2	0.65	7736	672-864	120,000 (23094)	45.0 (1.18)
3	1.5	6924	504-672	110,000 (47610)	42.3 (2.32)

(Ex. 1003 at p. 9, ll. 1-10.)

As such, *Halley* discloses the above limitations since *Halley* discloses a total weight percentage of carbon particles (0.3%, 0.65 % and 1.5 %) within the claimed range of about 0% to about 30%. (*Id.* at p. 9, ll. 1-10.)

214. Claim 32 depends from claim 27 and recites:

> The composition of claim 27, wherein the active particles comprise about 0% to about 50% of the total weight of the composition.

(Ex. 1001 at Col. 12:29-32.) With specific attention drawn to the examples displayed in Table 3, reproduced below, *Halley* discloses utilizing 0.3%, 0.65 % and 1.5 % carbon particles relative to the total weight of the composition:

TABLE 3 (fabric & membrane & dots)

Sample	Particle % wt	MVTR (mean) g/m²/d	Wash to leak hr	Abrasion to leak cycles	Handle (mean)
Control	-	6344	504-672	87500 (1500)	46.8 (2.69)
1	0.3	7736	504-864	140,000 (23094)	47.9 (1.25)
2	0.65	7736	672-864	120,000 (23094)	45.0 (1.18)
3	1.5	6924	504-672	110,000 (47610)	42.3 (2.32)

(Ex. 1003 at p. 9, ll. 1-10.)

As such, *Halley* discloses the above limitations since *Halley* discloses a total weight percentage of carbon particles (0.3%, 0.65 % and 1.5 %) within the claimed range of about 0% to about 50%. (*Id.* at p. 9, ll. 1-10.)

215. Claim 33 depends from claim 27 and recites:

> The composition of claim 27, wherein the composition possesses anti-static properties at least in part due to the active particles.

(Ex. 1001 at Col. 12:32-35.) *Halley* states that "[w]hen the particulate solid is carbon, it is found that the material exhibits electrical conductivity at surprisingly low carbon contents (around 1% by weight). This is valuable in providing a material having antistatic properties." (Ex. 1003 at p. 3, ll. 31-34.) *Halley* further recites that "the carbon-loaded material will be useful where electrical conductivity and antistatic properties are desirable." (*Id.* at p. 5, ll. 27-29.) Accordingly, *Halley*

discloses the above limitation since *Halley* discloses utilizing carbon particles that provide antistatic properties to a composition. (*Id.* at p. 3, ll. 31-34 and p. 5, ll. 27-29.)

216. Claim 35 depends from claim 27 and recites:

> The composition of claim 27, wherein the composition possesses odor absorbance properties at least in part due to the active particles.

(Ex. 1001 at Col. 12:39-41.) As discussed above, "odor absorbance properties" means a composition that is capable of absorbing, adsorbing or trapping odors at least in part due to the active particles. (*Id.* at Col. 4, ll. 13-21.) This definition includes compositions that include particles of activated carbon, aluminum oxide, silica gel, and titanium dioxide. (Ex. 1001 at Col. 4:22-27; Ex. 1004 at ¶¶ 3, 19, 30, 80, and 84; Ex. 1026 at p. 4.) *Halley* recites the use of carbon particles, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, and/or silica particles, which are known active particles. (Ex. 1003 at p. 3, ll. 1-7.) As such, *Halley* discloses the above limitation since *Halley* utilized active particles that contain silicon, oxygen, titanium, calcium, aluminum, and carbon, which the Patent Owner argued in district court had odor absorbance properties. (Ex. 1003 at p. 3, ll. 1-7; Ex. 1026 at p. 4.)

217. Claim 36 depends from claim 27 and recites:

> The composition of claim 27, wherein the composition possesses quick drying properties at least in part due to the active particles.

(Ex. 1001 at Col. 12:42-44.) As discussed above, this limitation means that the composition is capable of quick drying at least in part due to the active particles. Additionally, based on the Patent Owner's arguments in district court, the above definition must include compositions with increased moisture vapor transport capacity due to the inclusion of activated particles. (Ex. 1026 at pp. 4-5.) *Halley* recites the use of carbon, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, and/or silica particles, which are known active particles. (Ex. 1003 at p. 3, ll. 1-7.) *Halley* also discloses that the addition of carbon black particles increases the MVTR of a composition. (Ex. 1003 at p. 7, ll. 17-20 and p. 9, ll. 1-5.) Carbon black particles are known to adsorb or trap water and function as molecular filters and therefore are known active particles. (Ex. 1028 at p. 284 Col. 1; Ex. 1023 at p. 42, 341.) *Halley* discloses the above limitation since *Halley* discloses use of carbon black particles to increase the MVTR of a composition. (Ex. 1003 at p. 7, ll. 17-20 and p. 9, ll. 1-5; Ex. 1026 at p. 4-5.). Since the composition has an improved MVTR, it has quick drying properties.

218. Claim 37 depends from claim 27 and recites:

> 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.

(Ex. 1001 at Col. 12:45-51.) As is previously discussed above, *Halley* recites the use of carbon, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, and/or silica particles. (Ex. 1003 at p. 3, ll. 1-7.) As such, *Halley* discloses the above claimed limitations.

D. Claims 38-39 Are Obvious Over *Halley* In View Of *Haggquist*

219. It would have been obvious for a POSITA to make the water-proof composition as recited in claims 38-39. I am not aware of any secondary considerations that would render claims 38-39 of the ’287 Patent non-obvious. To clarify the basis of my opinion, I will address each of claims 38 and 39 below.

1. Claim 38 depends from claim 27 and recites:

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.

(Ex. 1001 at Col. 12:52-59.) The ’287 Patent recites that *Haggquist* is incorporated by reference to provide a detailed explanation of the above claimed process. (*Id.* at Col. 6:56-60.) For example, *Haggquist* discloses:

> The invention relates to preserving the properties of active particles through use of an encapsulant which may be removable. The encapsulant may protect the active particles against premature deactivation. If desired, the encapsulant may be removed to rejuvenate the active particles. Various processes can be implemented to introduce encapsulated particles to embedding substances which may be used in various products.

(Ex. 1004 at Abstract.)

Haggquist discloses that use of the removable encapsulant protects the performance enhancing properties, including moisture management. And *Haggquist* discloses the exact same list of active particles with the exact same list of properties as disclosed in the ’287 Patent including activated carbon. (Ex. 1001 at Col. 4:4-27; Ex. 1004 at ¶ 30.) And *Halley* discloses that active particles, in particular, carbon black particles, are capable of providing increased MVTR. (Ex. 1003 at p. 7, ll. 17-20 and. 9, ll. 1-5.) As such, *Halley* in view of *Haggquist* discloses the above limitation.

i. Reason to Combine Halley and Haggquist

220. Before May 9, 2006, a POSITA would have had a reason to combine the disclosures in *Halley* and *Haggquist* to arrive at claim 38.

221. A POSITA would have had a reason to combine the teachings of *Halley* and *Haggquist* before May 9, 2006 because both references teach adding particles to a substrate to add performance enhancing characteristics, such as moisture management, for garments, such as clothing, and both references use the same active particles (e.g., carbon, silica, titanium dioxide, zinc oxide, and aluminum oxide) to add performance enhancing characteristics to garments. (Ex. 1003 at p. 2, ll. 1-5; Ex. 1004 at ¶ 3.)

222. *Halley* and *Haggquist* are analogous art. Both *Halley* and *Haggquist* add particles to a substrate to provide performance enhancing characteristics to the substrate. (Ex. 1003 at p. 2, ll. 1-5; Ex. 1004 at ¶ 3.) For example, *Halley* recites, "According to the present invention it has now been surprisingly discovered that the incorporation of a particulate solid (particularly in low concentrations) in a polymer coating improves the abrasion-resisting properties of the polymer coating." (Ex. 1003 at p. 2, ll. 1-5.) *Halley* also teaches that the added particulate solid can be utilized to increase the MVTR of a composition. (Ex. 1003 at p. 8:1-10.) *Haggquist* recites that "[i]t is well known that certain particles can be used to add performance properties to materials in different forms such as gases, liquids, and solids … that are suitable for odor adsorption, moisture management …" (Ex. 1004 at ¶ 3.)

223. Further, *Halley* and *Haggquist* disclose that these added performance properties can be utilized to improve clothing and other outdoor protective gear. For example, *Halley* recites that "[t]he composite material may further take the form of a garment, a tape, a tent, a sleeping bag, or other forms where a lightweight, waterproof water-vapour-permeable material is desirable." (Ex. 1003 at Abstract.) For instance, *Haggquist* recites: "The treated materials can also be used in clothing…In addition, hunting gear can be made using the treated materials of the present invention." (Ex. 1004 at ¶ 81.)

224. Additionally, both *Halley and Haggquist* disclose use of the same types of particles. *Halley* specifically discloses utilizing particles of carbon, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, silica, talc, mica, tin or silver to improve the MVTR and abrasion-resistance of a substrate. (Ex. 1003 at p. 3, ll. 1-7.) *Haggquist* discloses the use of active particles, including activated carbon, graphite, aluminum oxide (activated alumina), silica gel, zinc oxide, titanium dioxide, molecular filter type materials, and other suitable materials, to provide odor adsorption, moisture management, ultraviolet light protection, chemical protection, bio-hazard protection, fire retardance, among other properties, to garments. (Ex. 1004 at ¶ 30.) As such, both *Halley and Haggquist* disclose use of the same particles to provide performance enhancing characteristics to a garment.

225. As would be known by a POSITA, *Haggquist* discloses several properties of active particles. (Ex. 1004 at ¶ 30.) Further, *Haggquist* explicitly recites that these properties of these types of particles are well known in the art. (*Id.* at ¶ 3.) For example, the Background of *Haggquist* recites:

> ***It is well known*** that certain particles can be used to add performance properties to materials in different forms such as gases, liquids, and solids. These particles can have properties that are suitable for odor adsorption, moisture management, ultraviolet light protection, chemical protection, bio-hazard protection, fire retardance, antibacterial protection, antiviral protection, antifungal protection, antimicrobial protection, and other factors, and combinations thereof. (*Id.* at ¶ 3 (*emphasis added*).)

226. As such, a POSITA before May 9, 2006 that made the composite material disclosed in *Halley* would know that the carbon, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, and/or silica particles of the particulate solid are active particles.

227. Further, a POSITA would have been motivated to utilize the encapsulant systems and methods as disclosed in *Haggquist* with the active particles utilized in *Halley*, because *Haggquist* discloses that the encapsulant protects the performance enhancing characteristics of the active particles from premature deactivation, and lists several of the exact same particles that are utilized in *Halley*. (Ex. 1004 at Abstract, ¶¶ 13 and 30.)

228. A POSITA would want to protect the performance enhancing characteristics of active particles with known methods. As such, a POSITA before May 9, 2006 would have been motivated to combine *Halley* with *Haggquist* to provide clothing with protected performance enhancing characteristics. (*Id*. at Abstract, ¶¶ 13 and 30.)

ii. Reasonable Expectation of Success

229. There is a reasonable expectation of success in combining the disclosures of *Halley* and *Haggquist* to arrive at claim 38 because *Haggquist* and *Halley* discuss the use of the exact same particles.

230. A POSITA before May 9, 2006 understood the importance of protecting active particles from premature deactivation. (*See, e.g.*, Ex. 1004 at Abstract, ¶ 30.) There would be a reasonable expectation that the combination of the encapsulant method disclosed in *Haggquist* with the carbon, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, and/or silica particles utilized in *Halley* would succeed, because *Haggquist* recites these exact same particles as active particles. (*Id*. at ¶ 30) Since carbon, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, and/or silica particles are listed in *Haggquist* as active, the encapsulant method disclosed in *Haggquist* would work to protect the performance characteristics of the carbon, titanium dioxide, zinc oxide, iron oxide, aluminum oxide, and/or silica particles utilized in composition of *Halley*.

231. Claim 39 depends from claim 38 and recites:

> 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.

(Ex. 1001 at Col. 12:60-67.) As discussed above, the ’287 Patent recites that *Haggquist* is incorporated by reference to provide a detailed explanation of the above claimed process. (*Id.* at Col. 6:56-60.) *Haggquist* discloses the exact same list of removable encapsulants as claimed above. (Ex. 1004 at ¶ 33.) As such, *Halley* in view of *Haggquist* discloses the above claimed limitations.

iii. Reason to Combine Halley and Haggquist

232. A POSITA would have had a reason to combine the disclosures in *Halley* and *Haggquist* to arrive at claim 39, as explained above for dependent claim 38.

iv. Reasonable Expectation of Success

233. There is a reasonable expectation of success in combining the disclosures of *Halley* and *Haggquist* to arrive at claim 39, as explained above for dependent claim 38.

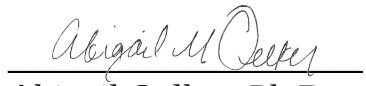
XII. CONCLUSION

234. For the reasons presented above, it is my opinion that the applied references render claims 27, 28, 30, 32, 33, and 35-39 of the '287 Patent anticipated and/or obvious to a POSITA.

235. In signing this Declaration, I understand that it will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the USPTO. I acknowledge that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

236. 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 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.

Dated: November 15, 2017



Abigail Oelker, Ph.D.