

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JIANGSU FAVORED NANOTECHNOLOGY CO., LTD.,
Petitioner

v.

P2I LTD.,
Patent Owner

IPR2024-00380
US Patent 11,041,087

**DECLARATION OF DR. JAY J. SENKEVICH
IN SUPPORT OF PATENT OWNER'S RESPONSE TO PETITION**

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I, Jay J. Senkevich, declare that:

I. ASSIGNMENT

1. I have been retained by counsel for Patent Owner, P2i, Ltd. (“P2i,” or “Patent Owner”) as an independent expert testifying in this matter against Petitioner, JIANGSU FAVORED NANOTECHNOLOGY CO., LTD. (“Favored” or “Petitioner”).

2. I understand that the Patent Trial and Appeal Board (“PTAB” or “Board”) has instituted an *inter partes* review (“IPR”), based on a Petition filed by Favored, of Patent Owner’s U.S. Patent No. 11,041,087 (Ex. 1001; the “’087 Patent”) designated as IPR2024-00380.

3. I have been asked to consider the arguments raised by the Petition regarding the validity of certain claims in the ’087 Patent in these proceedings.

4. In this Declaration, I describe my anticipated testimony regarding Petitioner’s Declaration of Karen Gleason, Ph.D. (Ex. 1002; “Gleason Dec.”) regarding the validity of certain claims of the ’087 Patent.

5. Specifically, I have been asked to opine on the subject of the alleged obviousness of certain claims of the ’087 Patent in light of the grounds at issue in this proceeding.

6. I understand that a patent claim is invalid if it is obvious. I have been informed that the question of obviousness is resolved on the basis of underlying

factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness.

7. It is my understanding that the asserted grounds of obviousness are as follows:

Ground	References	Basis	Claims Being Reviewed
1	Cohen and Legein	35 U.S.C. § 103 (Obviousness)	1-3, 5, 7, 9-14
2	Francesch and Legein	35 U.S.C. § 103 (Obviousness)	1-4, 7, 9-14

8. In forming my opinions as set forth in this declaration, I have relied upon my education, research, training, and experience in the area of plasma physics, the plasma deposition of thin films and coatings, polymer chemistry and polymer physics, as well as the state of the art at the time of the priority date for the '087 Patent.

9. I have also relied on my review and analysis of the alleged prior art and information provided to me in connection with this case.

10. I am being compensated for my work as an expert with respect to this *inter partes* review, but my compensation is not contingent in any way on the content of my opinions or the outcome of this proceeding.

II. QUALIFICATIONS

11. My curriculum vitae (“CV”) is attached hereto (Ex. 2008) and provides an accurate identification of my background and experience.

12. In 1993, I received a Bachelor of Science degree in Chemistry from California Polytechnic State University.

13. I received a Master of Science degree in Metallurgical Engineering from the University of Nevada, Reno in 1994.

14. I received a Doctor of Philosophy degree from the Rensselaer Polytechnic Institute in Engineering Science (Surface Physics/Chemistry). My dissertation research concerned Atomic Layer Deposition of Metals, Chemical Vapor Deposition of Polymers, Plasma Modification of Dielectric Surfaces, Self-Assembled Chemical Systems, and Silane Chemistries, Molecular Layer CVD.

15. Since 2008, I have been affiliated with Massachusetts Institute of Technology (“MIT”) as a Visiting Scientist, Research Scientist and Research Affiliate.

16. From 2004-2007, I conducted research funded by Senate appropriations funds (Phase III commercialization) to develop chemical vapor depositable coatings to generate new jobs in the State of Missouri.

17. From 2002-2004, I was a professor of physics at Rensselaer Polytechnic Institute. My area of research was the vapor deposition of polymer

coatings.

18. I have authored or co-authored nearly 100 papers in the fields of chemistry and physics. Many of these papers focused on thin films and coatings.

19. Several of my publications have focused on different aspects of the plasma enhanced chemical vapor deposition of polymer coatings.

20. I am named an inventor on seven patents in the area of the vapor deposition of polymer coatings. I have invented many new chemical vapor deposited polymers. One of which has found commercial success (parylene F).

21. Although I am more qualified than a person having ordinary skill in the art, I have experience in the level of understanding of such a person, as I have worked with students and colleagues who fit the description of a person having ordinary skill in the art for over 20 years. I agree that such persons would have a bachelor's degree in chemistry, chemical engineering, or a similar discipline, and at least two years of experience with plasma-polymerization techniques.

III. MATERIALS CONSIDERED

22. The materials I considered include the '087 Patent (Exhibit 1001), the Gleason Declaration in support of the Petition (Exhibit 1002), the Alleged Prior Art References – Cohen (Exhibit 1004; U.S. Patent No. 2,716,638), Legein (Exhibit 1005; International Patent Application Publication No. WO 2014/026967), and Francesch (Exhibit 1006; a scientific journal article published in *Plasma Processes*

and Polymers), and the Petition.

23. I also considered the following materials that I refer to and that I cite in this declaration:

24. M. Mozetic, A. Vesel, G. Primc and R. Zaplotnik, “Chapter 2 - Introduction to Plasma and Plasma Diagnostics” *Non-Thermal Plasma Technology for Polymeric Materials* (2019) (Exhibit 2009).

25. Y. Yin, M.M.M. Bilek and D.R. McKenzie, "The Origins of self-bias on dielectric substrates in RF plasma processing" *Surface and Coatings Technology* (2006) (Exhibit 2010).

26. J. Kadir Khanov, C.-L. Yang, Z.-X. Chang, R.-M. Zhu, C.-Y. Pan, Y.-Z. You, W.-J. Zhang and C.-Y. Hong, “In situ cross-linking polymerization-induced self-assembly not only generates cross-linked structures but also promotes morphology transition by the cross-linker” *Polymer Chemistry* (2021) (Exhibit 2011).

27. F. Loyer, S. Bulou, P. Choquet and N.D. Boscher, “Pulsed plasma initiated chemical vapor deposition (PiCVD) of polymer layers – A kinetic model for the description of gas phase to surface interactions in pulsed plasma discharges” *Plasma Processes and Polymers* (2018) (Exhibit 2012).

28. B. Tonpheng, J. Yua and O. Andersson, “Effects of cross-links, pressure and temperature on the thermal properties and glass transition behaviour of

polybutadiene” *Physical Chemistry Chemical Physics* (2011) (Exhibit 2013).

29. T. Takeichi, N. Furukawa, “5.25 - Epoxy Resins and Phenol-Formaldehyde Resins” *Polymer Science: A Comprehensive Reference*, Volume 5 (2012) (Exhibit 2014).

IV. SUMMARY OF MY OPINIONS

30. It is my opinion that the Challenged Claims of the '087 Patent are patentable, and that Petitioner has not established otherwise. A person of ordinary skill in the art (“POSITA”) at the time of the invention would not have looked to the references cited nor combined the references in the manner suggested by Petition and by Dr. Gleason.

31. On the contrary, a POSITA would *not* have looked to or been motivated to combine the references. Further, even had a POSITA been so motivated, the combination would have been very different than that suggested by Petitioner and Dr. Gleason. Finally, even assuming, without support, that a POSITA had been motivated to combine the references in the manner suggested, the result would not have met the claim language.

32. Petitioner and Dr. Gleason have created combinations that are the result of hindsight - the result of using the '087 Patent as a roadmap to select various portions of prior art references and attempting to combine them without a sufficient reason (outside the '087 Patent) for doing so.

33. Additionally, in several instances Dr. Gleason overstates the knowledge and abilities of the relevant POSITA in 2015. As I outline below, the POSITA (who, Dr. Gleason concedes, possesses only an undergraduate degree and limited work experience) would have nowhere near the breadth *and* depth of knowledge in *multiple* disciplines necessary to arrive at the combinations proposed in the Petition. Indeed, even experts in the field (who, as I understand it, are *not* the POSITA) would be challenged to arrive at the invention disclosed in the '087 Patent.

34. My opinions in this Declaration are based on my review of the materials described in Section III above. I also draw upon my experience and knowledge of polymer chemistry, polymer physics, plasma physics and plasma-enhanced chemical vapor deposition.

V. UNDERSTANDING OF PATENT LAW

35. In the discussions below, I explain my understanding of specific aspects of patent law that I have been given by counsel. In addition, I have been advised by counsel of the following general principles of patent law, which I have applied to my analysis:

- a. I understand that “prior art” to the '087 Patent would include material patents and printed publications in the relevant art that predate the priority date of the inventions recited in the '087 Patent.

- b. I understand that a claim is invalid if it is made obvious by prior art. I have been instructed that a patent claim is unpatentable if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art (“POSITA”) to which said subject matter pertains. The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness.
- c. I understand that one should not look at the invention knowing what persons of ordinary skill in the art know today. Rather, you must place yourself in the shoes of a POSITA in the field of the technology of the patent at the time of the filing of the patent application.
- d. I understand that obviousness should be considered in light of the problem facing the inventor(s) and the complexity of the alternatives for solving the problem. A patent claim composed of

several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. It is important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. One should therefore also consider whether there was a teaching, suggestion or motivation to combine the references. The evaluation of a motivation to combine references allows recourse to logic, judgment, and common sense, but any such motivation to combine references must still avoid the improper application of hindsight. There must be some logical reason apparent from concrete evidence that justifies a combination of the references.

- e. I understand that it is improper to combine references where the references teach away from their combination. A reference may be said to teach away when a person of ordinary skill would be discouraged from following the path set out in the reference or would be led in a direction divergent from the path that was taken by the inventor. A reference teaches away, for example, if (1) the combination would produce a seemingly inoperative result, or (2) the references leave the impression that the product would

not have the property sought by the inventor or would no longer achieve the intended purpose(s) of the references being modified or combined.

- f. I understand that a “dependent” claim incorporates all of the limitations of the claim upon which it depends.
- g. I understand that the terms set forth in the patent claims in an IPR are interpreted in light of the specification as it would be interpreted by a POSITA.
- h. I further understand that in an *inter partes* review a petitioner carries the burden of proof of showing unpatentability by a preponderance of the evidence.

VI. STATE OF THE ART AT THE TIME OF THE PRIORITY DATE

36. I understand that the '087 Patent was filed on August 22, 2019. But it is my understanding from counsel that the relevant date for determining prior art for the purposes of this proceeding is the filing date of the ‘parent’ foreign (European) patent application that ultimately resulted in the '087 Patent. I understand from counsel and from the face of the '087 Patent that the date on which this ‘parent’ European application was filed is June 9, 2015. I have been asked to explain the state of the relevant art in 2015.

37. The state of the relevant art preceding the European application filed

on June 9, 2015, was the following: The plasma-enhanced chemical vapor deposition (PECVD) of organic coatings was common. The companies and persons (POSITAs) working in this field typically used a low-density continuous wave radio frequency plasma to deposit hydrocarbon, fluorocarbon and siloxane polymers.

38. It was also common for plasma polymerization to coat a range of surfaces. For instance, plasma polymerization coatings have been used to create water-proof or water-resistant fabric, such as for sports outerwear. Exhibit 1004 at 5:2-8. In another example, plasma polymerization coatings have been deposited on silicon wafers in pursuit of fabrication of bioactive surfaces in the field of biology. Ex. 1006 at 606-607, 610-611. Additionally, water protection of handheld devices such as cell phones included the printed circuit boards contained within the device, the external microphone, and other exposed components was common in the art. However, it was very uncommon then (and even now) for a laptop to be coated with protective coatings against water, salt water and aggressive organics.

39. It was well known at this time that the hallmark of chemistry is the ability to write a chemical reaction on a dry erase board. There is a predictability of combining reactants to make a product or products because the energies involved in a chemical system are low, typically a fraction of an electron volt. A plasma is the fourth state of matter, and the energies contained in a plasma are orders of magnitude higher than a typical chemical bond such that when reactants (or precursors) are

placed in a plasma, many bonds are broken and the bonds that reform on the substrate surface to make a coating are not predictable *a priori* as is the case of classical chemistry (organic, inorganic, or polymer).

40. For the relevant POSITA, the *modus operandi* in 2015 was, for example, to add a fluorocarbon to the plasma deposition tool to deposit a fluorocarbon coating, then test the coatings for its properties. This iterative approach was repeated until the properties were optimized while adjusting the parameters of the plasma deposition tool. This approach is time-consuming, lengthy, and often did not achieve complete success in creating a coating with optimized properties.

VII. SUMMARY OF THE '087 PATENT

41. The '087 Patent (Ex. 1001) is entitled "Coatings" and includes 1 independent claim and 14 total claims. '087 Patent 18:24-21:13. I understand that Claim 1 is the only independent claim, and the remaining claims depend from Claim 1 because they refer back directly or indirectly to Claim 1 and incorporate all of its requirements.

42. The '087 Patent states that the invention particularly relates to providing an electronic or electrical device or component thereof having a cross-linked polymeric coating obtained by exposing the device to a plasma comprising a monomer compound and a crosslinking reagent. Ex. 1001, Abstract. The '087 Patent claims an electronic or electrical device (or electronic or electrical component

thereof) having a protective coating obtained by exposing the device to a plasma comprising a particular monomer compound and crosslinking reagent.

43. The '087 Patent describes the difficulties in obtaining plasma-derived protective coatings on electronic devices, such as mobile phones. Ex. 1001 1:30–2:4.

44. The inventors of the '087 patent discovered that they could obtain improved protective nanoscale coatings and also increase the range of suitable plasma processing conditions by adding particular crosslinking reagents to the monomer introduced during the plasma polymerization process. *Id.* 2:49–55. The cross-linked co-polymer protective coating could be obtained by low energy pulsed plasma processing. *Id.* 2:56–64; 16:58–17:19.

45. The '087 Patent states that the coating formed according to the invention is a protective layer, in that it prevents damage by contact with water or other liquids and may provide protective functionality by forming a liquid repellent layer and/or a physical barrier layer. *Id.* 3:8–11. The '087 Patent explains that a coating with a water contact angle (WCA) of at least 90 degrees is typically a water repellent layer. *Id.* 4:26–30. The inventive coatings, particularly when thicker than 50 nm, act as physical barrier coatings, which provide a barrier to mass and electron transport and restrict diffusion of water, oxygen, and ions. *Id.* 3:3–11.

46. Accordingly, the coatings of the '087 Patent are particularly

advantageous for protecting electronic devices like mobile phones, including the internal electronic components thereof. *Id.* at 1:5–13; 14:30–58. The '087 Patent explains that these barrier coatings may be electrically insulating while remaining sufficiently compliant or alterable to allow electrical connections to be made to the device without needing to remove the coating, e.g., to allow the device to be connected to a charging cable. *Id.* 3:47–54.

47. The '087 Patent describes that electrical devices having the barrier coating will typically have an electrical resistance of at least 1×10^7 Ohms and allow the coated device to be submerged in water of up to 1m for 30 minutes while powered on, which is sufficient to pass the IPX7 test. *Id.* 3:55–4:6. The inventors also discovered that the barrier coatings were significantly more electrically resistant than the coating formed without the crosslinking reagent. *Id.* 16:46–54, FIG. 5, 18:10–23. Example 5 shows an increase in resistance of the coating from 2.1×10^7 to 9.2×10^9 Ohms when 10% DVA crosslinking reagent was added to PFAC6 monomer. *Id.* at 18:10–23.

48. The '087 patent specifies a variety of monomers and crosslinking reagents that may be used. *Id.* at 4:36–13:6.

49. The '087 Patent also discusses a crosslinking reagent with two or more unsaturated bonds such as alkyne groups, attached by one or more linker moieties. *Id.* at 4:38–41. The monomer compound and the crosslinking reagent utilized are

described in further detail in claim 1. *Id.* at 18:24-20:11.

50. To apply the coating to the electronic device, the '087 patent discusses placing the device in a plasma deposition chamber, igniting a glow discharge with the chamber, and applying voltage as a pulsed field. *Id.* at 13:18-21. "Pulsed" here means that the plasma cycles between off-state and an on-state, which can be between a lower limit and an upper limit of plasma emission, or between substantially no plasma emission and a particular amount of plasma. *Id.* at 13:17-38. The monomer and/or the crosslinking reagent is preferably in a gaseous state in the plasma, and are preferably miscible, but the monomer may be combined with a carrier gas. *Id.* at 13:63-14:2. The monomer and/or the crosslinking reagent may be delivered into the chamber via an aerosol device. *Id.* at 14:3-5. The '087 patent discloses multiple parameters for optimization, including but not limited to the sequence of the on/off pulsed cycle, the power density of the plasma, the time and power of the application of voltage, the rate at which the precursors are fed into the chamber, and the amount (v/v) of the crosslinking reagent used. *Id.* at 13:23-14:36.

A. The '087 Patent Claims

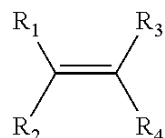
51. Independent Claim 1 of the '087 Patent recites:

An electronic or electrical device or electronic or electrical component thereof comprising a protective cross-linked polymeric coating on a surface of the device or component;

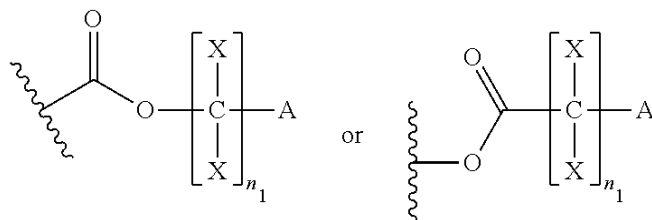
wherein the protective cross-linked polymeric coating is

obtained by exposing the device or component to a plasma comprising a monomer compound and a crosslinking reagent for a period of time sufficient to allow formation of the protective cross-linked polymeric coating on a surface thereof,

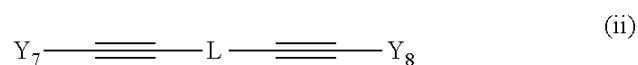
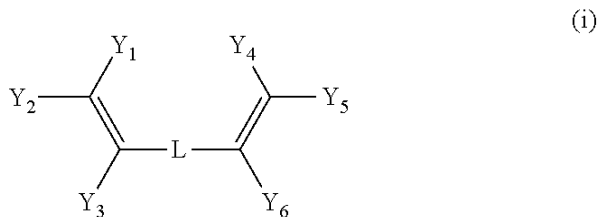
wherein the monomer compound has the following formula:



where R_1 , R_2 and R_4 are each independently selected from hydrogen, optionally substituted branched or straight chain C_1 - C_6 alkyl or halo alkyl or aryl optionally substituted by halo, and R_3 is selected from:

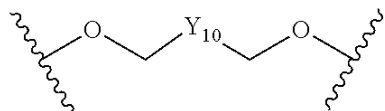
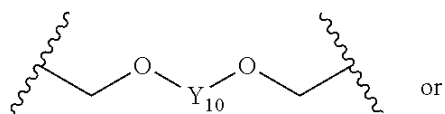


where each X is independently selected from hydrogen, a halogen, optionally substituted branched or straight chain C_1 - C_6 alkyl, halo alkyl or aryl optionally substituted by halo; where A is aryl optionally substituted by halo; and n_1 is an integer from 0 to 27; and wherein the crosslinking reagent comprises two or more unsaturated bonds attached by means of one or more linker moieties and has a boiling point of less than 500°C . at standard pressure the crosslinking reagent having one of the following structures:



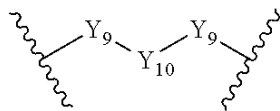
where Y_1 , Y_2 , Y_3 , Y_4 , Y_5 , Y_6 , Y_7 and Y_8 are each independently selected from hydrogen, optionally substituted cyclic, branched or straight chain C_1 - C_6 alkyl or aryl; and L is a linker moiety;

wherein for compound (i) L is of formula A having one of the following structures:



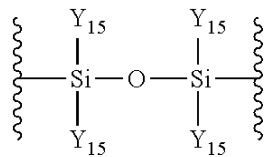
and Y_{10} is selected from optionally substituted cyclic, branched or straight chain C_1 - C_8 alkylene and a siloxane group;

or wherein for compound (i) L is of formula B having the following formula:



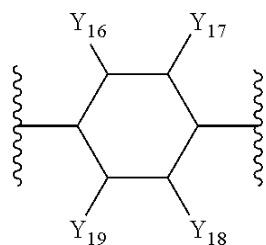
where each Y_9 is independently selected from, a bond, $-O-$, $-O-C(O)-$, $-C(O)-O-$, $-Y_{11}-O-C(O)-$, $-$

C(O)—O—Y₁₁—, —OY₁₁—, and Y₁₁O—, where Y₁₁ is an optionally substituted cyclic, branched or straight chain C₁-C₈ alkylene; and wherein Y₁₀ has the following formula:



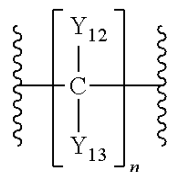
and each Y₁₅ is independently selected from optionally substituted branched or straight chain C₁-C₆ alkyl;

or wherein Y₁₀ has the following formula:



and Y₁₆ to Y₁₉ are each independently selected from H and optionally substituted branched or straight chain C₁-C₈ alkyl or alkenyl

or wherein Y₁₀ has the following formula:



and each Y₁₂ is fluoro and each Y₁₃ is fluoro, and n is an integer from 1 to 10.

Id. at 18:24-20:11.

VIII. PERSON OF ORDINARY SKILL IN THE ART

52. It is my understanding that a person of ordinary skill in the art (“POSITA”) at the time of the effective filing date of the European application that led to the ’087 Patent is someone who would have had a bachelor’s degree in

chemistry, chemical engineering, or a similar discipline, and at least two years of experience with plasma-polymerization techniques. A POSITA would have at least a general knowledge of plasma polymerization. An advanced degree in these fields may be substituted for professional experience and vice-versa.

53. I determined the level of skill of a person of ordinary skill in the art by reviewing the '087 Patent and considering the type of problems encountered in the art. I was given the Petitioner's definition of a POSITA, and largely agree.

54. When considering the alleged prior art, I thought about the students and colleagues I work with that have the skills of a person having ordinary skill in the art and tried to put myself in their shoes.

IX. PETITIONER'S PROPOSED GROUNDS DO NOT SHOW THE CLAIMS OF THE '087 PATENT ARE OBVIOUS

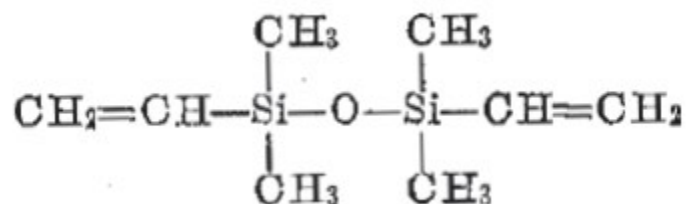
55. As outlined below, in 2015, a POSITA would not have looked to the references cited in the Petition. Nor would a POSITA been motivated to combine the references in the manner Dr. Gleason proposes and would not have achieved any success in reaching the claimed invention when only looking to the prior art without hindsight bias.

A. Asserted Prior Art

56. Petitioner asserts that Cohen and Legein render the claimed invention obvious under Ground 1. Petitioner also asserts that Francesch and Legein render the claimed invention obvious under Ground 2.

1. Cohen (Exhibit 1004)

57. Cohen describes a monomer divinyltetramethyldisiloxane (DVTMDS or disiloxane) created by the inventor and polymerization products produced therewith. Ex. 1004 at 1:15–20. Cohen describes DVTMDS as having the formula:



Id. 1:27–30.

58. Cohen does not disclose plasma polymerization processes to form protective coatings for electronic devices. It discloses how to formulate DVTMDS, as well as conventional polymerization processes to form copolymers using DVTMDS. *Id.* 1:34–44; 2:70–3:50. Cohen explains:

For example, the disiloxane with the other copolymerizable material may be dissolved in a *suitable inert solvent*, for example, an aromatic hydrocarbon solvent (such as benzene, toluene, xylene, etc.) and polymerization of the mixture effected. Another method which may be employed in preparing copolymers the instant claimed invention includes the preparation of an intimate mixture of the monomeric materials by preparing *suspensions or emulsions* of the disiloxane and the copolymerizable material in a liquid medium as, for example, water.

Id. at 1:34–44. (emphasis added). As the above passage reflects, Cohen discloses effecting polymerization in an inert solvent or in an emulsion.

59. Cohen discloses that copolymers made using DVTMDS may be used as a dielectric material in a capacitor, a cable or electrical coil impregnant, and a filling compound in potheads and cable joints. *Id.* 5:1–21.

60. In my opinion, a POSITA would not look to Cohen to improve a plasma-formed protective coating for an electronic device. Cohen is not directed to the same field as the '087 Patent, i.e., plasma polymerized protective coatings for electronic devices. Cohen also does not pertain to the particular problem that the inventors of the '087 were engaged with, i.e., improving plasma polymerized protective coatings for electronic devices.

61. Dr. Gleason focuses on the allegations that a POSITA would have recognized DVTMDS from Cohen as a suitable crosslinking reagent, that copolymers containing DVTMDS could be prepared using “any known polymerization technique,” that Cohen “specifically identified two aryl monomers that could be copolymerized with DVTMDS,” and that such DTVMDS copolymers were “suitable for use as insulating materials for electronic devices.” Exhibit 1002 ¶ 37.

62. Dr. Gleason does not discuss the extremely lengthy list of parameters that would affect how the plasma polymerization would affect the final surface

coating product, the difference between PECVD methods, and the unpredictability of the PECVD of the coating, and indeed appears to ignore the state of the art in her obviousness analysis.

63. Instead, using hindsight, she appears to assume, without support, that the patented invention would be created simply by putting a known copolymer through “any” plasma polymerization technique, such as using free radical initiators like the stated “vinyl polymerization catalysts” listed in Cohen, to result in the claimed coatings. Exhibit 1002 ¶ 80.

64. Additionally, using hindsight, she appears to assume, again without support, that Cohen discloses that its polymers had “protective dielectric properties associated with high electrical resistance” and that these polymers disclosed in Cohen “could be used in numerous electrical applications, including to treat or fill an electrical device.” Exhibit 1002 ¶ 66.

65. However, the internal components of an electric device, such as a printed circuit board, are often composed of three fundamentally different types of surfaces that are non-porous. These surfaces include namely polymeric surfaces, metal-oxide containing surfaces, and noble metal surfaces (Au).

66. Cohen is concerned with coating porous, fibrous materials, a far simpler task than coating polymeric, metal-oxide, or noble metal surfaces. For example, Cohen states, “[p]aper-insulated capacitors wherein *paper impregnated with a*

composition comprising a polymer of divinyltetramethyldisiloxane constitutes the dielectric material is a more specific example of the use of a composition of our invention in electrical applications.” Ex. 1004 5:12-17 (emphasis added).

67. Water repellency, or a hydrophobic coating, is a primary concern with paper or textiles. But it is generally inadequate for modern electronic devices, which can often be immersed in water or water can penetrate the device such that water diffusion is of primary concern.

68. As such, the purpose of Cohen was not water diffusion as generally needed for electronic devices. A POSITA, therefore, would not be able to make that distinction in order to apply Cohen to reach the current invention.

69. Moreover, Cohen does not describe using DVTMDS in a plasma nor does it describe that DVTMDS would be used to create cross-linked polymers having oil or water repellant properties. Instead, Cohen describes that copolymers made using DVTMDS could be used “alone or in combination with other insulating materials.” *Id.* at 5:2–7.

70. Dr. Gleason also ignores the fundamental notion that different types of PECVD methods, with variations in the below-mentioned parameters, result in coatings with largely different properties.

71. For example, pulsed plasma may result in the deposition of linear chain polymers, whereas a continuous wave plasma would result in cross-linked polymer

coatings, and as such there would be no reason to add a crosslinking reagent when using a continuous wave plasma. For each type of PECVD method utilized, parameters such as the flow rate of the precursors (noble gas, monomer, initiator, crosslinking reagent), the type of plasma (ICP, ECR, or capacitively coupled), the plasma power, plasma power density, type of process gases and their flow, processing pressure or working pressure of the plasma deposition tool, the placement of the substrate (such as on the working or grounded electrode), pulsed or continuous plasma, and if pulsed plasma, the duty cycle, would all affect the resulting polymer and its resulting properties.

72. Additionally, a solution-based polymer, as disclosed by Cohen, and discussed by Dr. Gleason (Ex. 1002 ¶¶ 80, 151, 173), has little correlation with a PECVD polymer coating. A central theme of chemistry is that reactions are predictable, i.e. bonds are broken, and new products are made in predictable ways.

73. With PECVD, the plasma vacuum deposition tool is a “black box.” Precursors go in and a coating is produced, but there is no *a priori* predictability. This is because the plasma energy is orders of magnitude higher than bond energies, so too many bonds are broken, and the chemical reaction sequence does not follow general chemical thermodynamics. *See* Ex. 2009 at 23-65.

74. However, a combination of using a low-density plasma and pulsing the plasma can get back to *some* of the predictability of chemical reaction *a priori*. This

predictability is not the same as general chemical thermodynamics, however it is much closer when using low-density plasma and pulsing the plasma. A POSITA in 2015 could not make that connection between plasma techniques and predictability.

75. While there was a clear market incentive to protect electronic devices in 2015, Petitioner argues that a POSITA would have been motivated to pursue benzyl acrylate and benzyl methacrylate by narrowing down the 63 identified compounds listed in Cohen as suitable for copolymerization with DVTMDS. Petition at 32-33. Petitioner also argues that a POSITA would have known that Legein “specifically identified acrylate and methacrylate monomers as preferred for use together with organosilanes for applying protective coatings to electronics.” *Id.* at 33. Alternatively, Petitioner argues that a POSITA would have been “further motivated to select benzyl acrylate and benzyl methacrylate” due to their aryl groups, stating a POSITA would know these aryl groups to be “advantageous for achieving barrier properties and water repellency in the finished coatings” due to their hydrophobic properties. *Id.* at 34.

76. In my opinion, Petitioner’s and Dr. Gleason’s reasoning are fundamentally flawed. As further explained below, the POSITA may have known of the eight specifically disclosed candidates for precursors from Cohen and may have even been specifically motivated to use benzyl acrylate and benzyl methacrylate as a precursor, but it would *not* have been “well within the ordinary skill in the art for

a POS[IT]A to prepare and test DVTMDS copolymers with each of those compounds *via pulsed plasma polymerization*” and apply those to an electronic device, as argued by Petitioner. Petition at 34.

77. This is because the variability in PECVD methods and parameters are simply too great, and the process simply too unpredictable, to allow a POSITA with merely a bachelor’s degree in the relevant field to apply Cohen and stumble upon the claimed invention.

2. Legein (Exhibit 1005)

78. Dr. Gleason focuses on Legein’s disclosure of polymer coatings and “a plasma polymerization” technique used to apply protective polymer coatings to electronics, and suggested doing so using acrylate, methacrylate, and organosilane compounds. Ex. 1002 ¶¶ 63-64, 66.

79. Furthermore, Dr. Gleason alleges that Legein discloses “a plasma polymerization technique” which includes “exposing the electronic-device substrate to the plasma treatment for a sufficient time to form a coating on a surface of the substrate.” *Id.* at ¶ 68. As an example of this method, Dr. Gleason states that Legein described polymerization times of “30 seconds to approximately 30 minutes [...] and [t]he longer the polymerization time the thicker the resultant polymer coating.” *Id.*

80. This is an extreme oversimplification of any number of plasma

polymerization techniques. Polymerization time is just one of many parameters, as described above, and can be carried out via multiple PECVD methods. A POSITA would not be able to apply the bare instructions of Legein to create a polymer coating for an electronic device, as there would be too much unpredictability due to the many variables and “black box” nature of PECVD.

81. Moreover, Legein only discloses utilization of “low power and/or low pressure plasma polymerization.” Ex. 1005 6:10-11; 9:12-13; 11:15; 35:18-19. But Legein is relatively silent on *how* this “low power and/or low pressure plasma polymerization” technique would be carried out, listing only a few of the numerous parameters needed to carry out such a sophisticated and complicated technique. A POSITA would not be able to look to Legein and know how to carry out this technique to achieve any of the products disclosed in the claimed invention.

82. The '087 Patent discloses using a pulsed plasma. Ex. 1001 at 1:36-42; 2:64-3:3; 13:18-38. In which case there could be a slightly higher correlation between the precursor (monomer) and the resulting polymer, as opposed to a highly fragmented monomer resulting in a highly cross-linked polymer that one would get from a higher-energy PECVD technique. Taken one step further, a monomer could be added with a crosslinking reagent under the same mild conditions using pulsed plasma such that there could be a higher correlation between the structure of the polymer and the properties of the resulting coating. This is not a simple process of

combining chemicals but recognizing how the plasma interacts with the precursor chemistries and the surface of the object, which would be wholly unpredictable to a POSITA as described.

83. Legein also discloses depositing coatings via PECVD *without* the addition of a crosslinking reagent because the plasma fragments the precursor molecule and results in a cross-linked polymer, especially in continuous wave plasma polymerization (such as one of the types used in Legein). Ex. 1005 at 39:13-14. Even in pulsed plasma deposition, Legein does not list adding an additional crosslinking reagent, despite the lower fragmentation of the precursor molecule. This fragmentation process occurs because an electrical/DC self-bias (a difference in potential between the plasma and the surface being coated), in rf as well as other high-frequency plasmas, develops. This self-bias then results in an acceleration of ions toward the coating surface, resulting in the aforementioned cross-links. Ex. 2010 at 3670-3674. A POSITA would not be motivated to add a crosslinking reagent, as required to produce the coating of the claimed invention, by looking to Legein.

84. Additionally, Legein does disclose use of pulsed plasma polymerization, Ex. 1005 at 22:4-5, but the only parameters provided for pulsed plasma polymerization are the “applied power,” the “pulse repetition frequency” the “flow direction” of the precursors, and the “coating time”. *Id.* at 22:24-24:21. This

would not be nearly enough to allow a POSITA to utilize the disclosed pulsed plasma polymerization technique to achieve the product as claimed in the '087 Patent using specific precursors, due to the numerous other parameters that must be considered when using PECVD, and the unpredictability of the properties of the resulting product, despite following these few lists of parameters disclosed in Legein.

85. In part because of the undue experimentation required and the large variability in the factors affecting the “low power and/or low pressure plasma polymerization” technique disclosed in Legein, and the lack of the required crosslinking reagent, a POSITA would not have been motivated to combine Cohen and Legein.

86. Moreover, even if they were somehow motivated to combine Cohen and Legein, they would be unable to produce the claimed invention through “trial and error” as claimed by Petitioner because of the large variability and unpredictability in PECVD methods.

3. Francesch (Exhibit 1006)

87. Francesch is an article entitled “Fabrication of Bioactive Surfaces by Plasma Polymerization Techniques Using a Novel Acrylate-Derived Monomer.” Francesch discloses the fabrication of bioactive surfaces using a new monomer pentafluorophenyl methacrylate (PFM) synthesized by the authors. Ex. 1006 at 605. The resulting coatings “leave the labile pentafluorophenyl group on the surface,

enabling a rapid reaction with an amino-terminated biotin ligand and allowing layer-by-layer self-assembly of biotin-streptavidin.” *Id.*

88. Francesch describes that the novel PFM monomer can be deposited alone or can be copolymerized with 1,7-octadiene or 1,4-butanediol divinyl ether (BDVE) as crosslinking reagents to form the bioactive surface. *Id.* at 606. Such bioactive surfaces have application in tissue engineering and therefore are unrelated to protective coatings for electronic devices. *Id.* at 605, 610–11. Francesch does not disclose or suggest the use of BDVE with the specific monomers claimed in the '087 Patent.

89. In my opinion, a POSITA would not look to Francesch to improve a protective coating for an electronic device. Francesch is not directed to the same field as the '087 Patent, i.e., plasma polymerized protective coatings for electronic devices. Francesch also does not pertain to the particular problem that the inventors of the '087 were engaged with, i.e., improving plasma polymerized protective coatings for electronic devices.

90. Dr. Gleason focuses on Francesch's disclosure of the PFM monomer and copolymerizing the PFM monomer with a BDVE crosslinking reagent. Ex. 1002 ¶ 84.

91. Unlike Legein, Francesch does disclose utilization of a crosslinking reagent, but it provides no explanation as to why adding a crosslinking reagent

provides any benefit to the coating. Dr. Gleason alleges that the resulting coatings with crosslinking reagents “improved durability in terms of solvent resistance.” Exhibit 1002 at ¶ 99. However, adding a crosslinking reagent does not always increase the barrier layer performance. This is because the primary function of the crosslinking reagent is to eliminate molecular mobility. Ex. 2011 at 1768-1775. This is especially true if the polymer has a near room temperature glass transition temperature. As a barrier coating, beyond the reduction in molecular motion, there isn't another obvious benefit. Dr. Gleason’s “improved durability” argument is ill-defined, as “durability in terms of solvent resistance” itself is ill-defined in the realm of polymer chemistry. “Durability in terms of solvent resistance” can include multiple types of resistance, including abrasion resistance. A POSITA would not know which material property to aim for when trying to “improve durability.” The addition of a crosslinking reagent in Francesch does not appear to improve the properties of their coatings, so like in Legein, a POSITA would not look to Francesch and be motivated to add a crosslinking reagent, as in the '087 Patent.

92. Additionally, the addition of a small amount of crosslinking reagent eliminates the glass transition temperature (T_g) (the temperature transition between when the polymer is in a rigid state and its transition into a rubbery, malleable material) and as such makes a better barrier layer, *above* the temperature of its former T_g . Cross-linking makes tie points between the polymer chains essentially

eliminating the T_g . Ex. 2013 at 1504-1505. The thermo-mechanical properties of the polymer change drastically as the temperature is increased past the material's T_g . *Id.* The polymer could have a T_g below room temperature such that cross-linking is *necessary* to retain a rigid structure vital towards making a water diffusion barrier. Without the crosslinking reagent, the deposited polymer might have a lot of low molecular weight fractions contained in it, and these areas with a lot of low molecular weight fractions would allow for molecular motion and thus water diffusion. However, by adding a cross-linker, these low molecular weight fractions would be locked into place and thus be made to be a good barrier layer.

93. Moreover, in polymer chemistry, there are linear chain polymers and network formers. In network formers, such as phenol-formaldehyde polymers (phenolic resins), cross-linking agents are required to prevent formation of a mess of gel. Crosslinking reagents are typically in the 1-5% range v/v when added to a linear chain polymer, but when used in a network formers they can be 50% v/v, such as in two-part epoxy glues. Ex. 2014 at 723-751. Neither Francesch nor any other cited references state how much crosslinking reagent would be beneficial to reach the optimal properties.

94. As such, a POSITA would not be motivated by Francesch to add BDVE as a crosslinking reagent in the manner recited in the Challenged Claims of the '087 Patent. This is because a POSITA in 2015 would not know how to optimize the

above-mentioned parameters to create a suitable barrier layer like that claimed in the '087 Patent.

B. No Motivation to Combine Cohen and Legein (Ground 1)

95. Dr. Gleason opines that it would have been obvious to combine Cohen and Legein. Exhibit 1002 ¶ 161. I disagree. The combination would not have been obvious to a POSITA, for several reasons.

96. I understand from counsel that there must be some motivation to combine references in the manner proposed in the Petition.

97. Dr. Gleason claims that it would have been obvious to combine Cohen and Legein because “a POS[IT]A would have been motivated to use copolymers for electronic applications prepared from DVTMDS and a monomer including benzyl acrylate or benzyl methacrylate, as disclosed by Cohen, and to apply those polymers to electronic devices via plasma polymerization, as disclosed by Legein.” Ex. 1002 ¶ 161.

98. Based on my experience in the field at the time and my review of the cited references, I disagree.

99. I understand from counsel that to establish obviousness there must be some teaching or suggestion to combine references. I further understand from counsel that hindsight bias cannot be used to find this motivation, teaching, or suggestion to combine references.

100. At the time that the ‘parent’ European application to the ’087 Patent was filed (June 9, 2015), a POSITA would not have been motivated to combine Cohen and Legein in the manner proposed in the Petition.

101. While plasma polymerization was “routine” in 2015 (Exhibit 1002 ¶ 176), *pulsed* plasma polymerization (as disclosed in the ’087 Patent), used in such a way to achieve the specific named properties of the products in the ’087 patent that make them suitable for the coating of electronic devices, was not. Ex. 1001 at 2:64-3:3.

102. Pulsed plasma polymerization results in being able to use the principles of polymer chemistry and more easily predicting the products, as pulsing the plasma (with a short on-cycle, and long off-cycle) would deposit linear chain polymers. Ex. 2012 at 1-13. However, the continuous plasma deposition as disclosed in Legein is more of an unpredictable “black box” in which the precursors go in, and a coating results, but the properties of these resulting coatings were, in 2015 and still today, unknown in the art. A POSITA would not know this distinction, nor the difference in unpredictability, in the various plasma deposition methods, nor how to remedy the various levels of unpredictability using the few listed parameters in Legein.

103. Additionally, this pulsed plasma polymerization technique is well outside the field of the relevant POSITA (which, per Dr. Gleason, would have only a bachelor’s degree in chemistry, chemical engineering, or related field; Ex. 1002 ¶

29). Instead, the pulsed plasma polymerization technique encompassed by the claims of the '087 Patent could, at best, only be accomplished by highly sophisticated physicists and engineers with far more training and/or experience.

104. Thus, contrary to Dr. Gleason's assertion (Exhibit 1002 ¶ 161), in 2015 a POSITA would *not* have been motivated to combine Cohen and Legein in the manner proposed in Ground 1 of the Petition.

105. Instead, based on my review of the references, the only motivation to combine Cohen and Legein I can identify is retrospective, i.e., once the POSITA already possessed knowledge of the disclosure of the '087 Patent.

106. But, as noted above, it is my understanding from counsel that relying on the disclosure of the '087 Patent would constitute "hindsight bias" and cannot be relied upon as a basis to combine references in the context of this proceeding.

107. Dr. Gleason opines that it would have been obvious to pick benzyl acrylate or benzyl methacrylate monomers, as disclosed in Cohen, because a POSITA would understand that those monomers would be expected to have hydrophobic properties. *See, e.g.*, Exhibit 1002 ¶ 170.

108. I disagree, and in fact it is my opinion that a POSITA seeking to implement a coating to protect a sensitive electronic device, or the printed-circuit board contained therein, would not simply deposit a *hydrophobic* coating, as Dr. Gleason suggests. Instead, to protect a sensitive electronic device or printed-circuit

board (as in Claim 1 of the '087 Patent), it would be essential to deposit a *barrier* coating. This is because water permeability (rather than hydrophobicity) is the critical parameter in protecting electronic devices or components thereof, as explained above.

109. Cohen only discloses that the addition of a crosslinking reagent “increased heat resistance and can be readily machined and worked, [and such products] tend toward increased insolubility and infusibility as the per cent of the div[n]yl or diallyl compounds increase.” Ex. 1004 at 2:52-57. And Legein does not discuss the addition of a separate crosslinking reagent.

110. Thus, in 2015, the relevant POSITA could not (and would not) look to Legein or Cohen and understand the situations in which a crosslinking reagent would be advantageous to create the barrier coating, and which and how much crosslinking reagent to use. As such, the POSITA would not have been motivated to add a crosslinking reagent to reach the claimed invention simply from looking to Cohen and Legein.

111. Moreover, setting aside the above deficiencies in Dr. Gleason’s analysis, I disagree with Dr. Gleason that a POSITA would have had a reasonable expectation of success in combining Cohen and Legein.

112. As discussed above, the deposition of PECVD coatings is complex. It is not as simple as combining chemistries together to achieve a desired effect, i.e. a

coating with desirable properties. Two companies could start with the same precursor chemistries and end up with very different coatings. The literature is not clear on *how* to deposit a superior barrier coating, and with what precursors.

113. Therefore, a POSITA would only be able to deposit a superior barrier coating through extremely lengthy “trial and error” process with many unknown variables and a large amount of unpredictability as to the properties of the resulting coating. And even then, such a POSITA would be unlikely to arrive at the claimed invention of the '087 Patent. In my opinion, no POSITA familiar with Cohen would have any reasonable expectation of success by combining Legein’s plasma polymerization techniques.

114. Finally, even were the POSITA to engage in the level of experimentation needed to adapt Legein’s plasma polymerization technique to deposit Cohen’s copolymers as a coating onto an electronic device, the POSITA still would not have had a reasonable expectation of success for the reason I discussed at length above: the complexities of the various plasma polymerization methods, the parameters affecting the products of each of the plasma polymerization methods, and the unpredictability of the resulting products, despite utilizing known monomers.

115. Moreover, Cohen fails to teach use of the claimed crosslinking reagent in connection with producing a protective coating for an electronic device via a

plasma polymerization process. As discussed above, the structure of a coating obtained by plasma polymerization is inherently unpredictable and variable based on numerous parameters and the varied interactions between different precursors and these numerous parameters, a POSITA would not have a reasonably expected to succeed in combining the crosslinking reagents identified by Petitioner from these references with the precursors disclosed in Cohen to produce a protective coating via a plasma polymerization process.

116. Therefore, in my opinion, a POSITA would not have been motivated to use copolymers for electronic applications prepared from DVTMDS and a monomer including benzyl acrylate or benzyl methacrylate, as disclosed by Cohen, and to apply those polymers to electronic devices via plasma polymerization, as disclosed by Legein, as this would be well outside the capabilities of a POSITA.

C. No Motivation to Combine Francesch and Legein (Ground 2)

117. Dr. Gleason opines that it would have been obvious to combine Francesch and Legein. Ex. 1002 ¶ 208. I disagree. The combination would not have been obvious, for several reasons.

118. Francesch involves the fabrication of bioactive surfaces using plasma polymerization of a monomer, PFM, which is not disclosed in the '087 Patent, with and without a crosslinking reagent. Ex. 1006 at 605. Francesch does not describe that the crosslinking reagent could be used to obtain a protective coating for an

electronic device. Rather, Francesch focuses on properties such as the surfaces' ability to bind biological molecules. *Id.* at 605, 610. It does not discuss properties, such as water contact angle or coating resistance, which the '087 Patent considers relevant to producing an effective protective coating for an electronic device. Ex. 1001 3:55–4:35. Francesch also fails to show how use of the crosslinking reagent with the claimed monomer compounds could be used to obtain a protective coating for an *electronic device*. Accordingly, a POSITA would not have a reasonable expectation of success in combining Francesch with Legein to arrive at the invention of Claim 1 the '087 Patent.

119. Dr. Gleason claims that Francesch discloses a PFM-based, crosslinked copolymer using the plasma deposition with “easy reaction conditions,” and therefore a POSITA would have “viewed Francesch’s coatings as compatible with Legein’s teachings and offering the same benefits associated with application to electronics through plasma polymerization.” Exhibit 1002 ¶ 212. Based on my experience in the field at the time and my review of the references, I disagree that a PHOSITA would view Francesch’s coatings as compatible with Legein’s teachings, because a PHOSITA would not know *how* to modify these “easy reaction conditions” in Francesch to make them compatible at Legein’s teachings. In fact, there are no real “easy reaction conditions” in plasma polymerization, due to the numerous parameters and unpredictability discussed above.

120. At the time that the ‘parent’ European application to the ’087 Patent was filed (June 9, 2015), a POSITA would not have been motivated to combine Francesch and Legein in the manner proposed in the Petition.

121. This is so because the ’087 Patent involves pulsed plasma deposition with a monomer and a crosslinking reagent and teaches that this combination *with the optimized plasma parameters* can result in a PECVD coating to protect PCBs from moisture.

122. But neither Francesch nor Legein comes close to making this a reality. A POSITA in 2015 would not have been motivated to combine the monomer (PFM) and crosslinking reagent (BDVE) disclosed in Francesch, with the rudimentary plasma polymerization technique disclosed in Legein, to arrive at the claimed PECVD coating because a POSITA would be completely overwhelmed by the numerous parameters not listed in Legein that would affect the properties of the product, the complexity and unpredictability of the pulsed plasma polymerization technique, and the lack of any teaching, suggestion, or motivation in Legein or Francesch on how a POSITA would optimize these parameters or overcome this complexity and unpredictability of the resulting properties of the products.

123. Additionally, there are three parameters which control the efficacy of a barrier coating: its density, its polarity, and its glass transition temperature. Ex. 2012 at 1-13. A higher density results in a superior barrier. If the barrier coating is trying

to be resistant towards water diffusion, then it should not be polar (as polar coatings will drive more water through them) and the glass transition temperature should be above the working temperature of the device (practically speaking, greater than 40 degrees Celsius).

124. Neither Legein nor Francesch teach the creation of a successful barrier coating for an electronic device or component therein by optimizing these three parameters discussed above. It would not be obvious to a POSITA which polymers, utilizing which PECVD method, each with numerous possible parameters, should be combined to result in optimizing these properties. For example, phenyl containing moieties need to align properly such that a higher density coating results. The phenyl moiety is less hydrophobic than a methyl group; however, it would be more effective as a barrier coating.

125. Dr. Gleason also omits discussion of the damage caused by the electrical/DC self-bias in rf as well as other high-frequency plasmas, and lack of retainment of the resulting chemical structure when utilizing the plasma polymerization technique of Legein, and indeed appears to ignore the state of the art in her obviousness analysis.

126. Instead, using hindsight, she appears to assume, without support, that Legein calls for preparing a protective coating using a class of monomers including PFM (disclosed by Francesch, Ex. 1006 at 606), and that a POSITA seeking to

protect electronics using plasma polymer coatings would have been “motivated to use Francesch’s polymer coatings” because they “had been demonstrated to be suitable for plasma-mediated deposition, and had been successfully applied onto silicon wafer substrates, which are common substrates found in many electronics.” Exhibit 1002 ¶ 106-07.

127. In my opinion, Dr. Gleason’s reasoning is fundamentally flawed. As further explained below, it would not have been obvious to a POSITA in 2015 to look to the cited references, nor to create the kinds of combinations suggested by Dr. Gleason due to (a) the wide variety of plasma polymerization techniques, (b) the parameters affecting those techniques, (c) the lack of motivation to add a crosslinking reagent, and (d) the unpredictable damage from the resulting electrical/DC self-bias in rf as well as other high-frequency plasmas.

128. Thus, contrary to Dr. Gleason’s assertion that a POSITA would have “viewed Francesch’s coatings as compatible with Legein’s teachings and offering the same benefits associated with application to electronics through plasma polymerization,” Ex. 1002 ¶ 212, in 2015 a POSITA would *not* have been motivated to combine Francesch and Legein in the manner proposed.

129. Instead, based on my review of the cited references, the only motivation to combine Francesch and Legein I can identify is retrospective, i.e., once the POSITA already had knowledge of the disclosure of the ’087 Patent.

130. But, as noted above, it is my understanding from counsel that relying on the disclosure of the '087 Patent would constitute “hindsight bias” and cannot be relied upon as a basis to combine references in the context of this proceeding.

131. Moreover, setting aside the above deficiencies in Dr. Gleason’s analysis, I also disagree with Dr. Gleason that a POSITA would have had a reasonable expectation of success in combining Francesch and Legein. Ex. 1002 at ¶ 216.

132. As I discussed above, there are no “easy reaction conditions” for PECVD that would allow a POSITA to arrive at the claimed invention. In my opinion, no POSITA familiar with Francesch would have expected success by combining Legein, due to the unpredictability of the products, the numerous unknown variables, and the lack of knowledge on how to optimize the above-mentioned parameters. This would all be beyond the knowledge of a POSITA.

133. Finally, a POSITA also would understand that, even if they were to engage in the level of experimentation needed to adapt Francesch’s PFM-based, cross-linked copolymer to the product claimed by the '087 patent, the POSITA still would not have had a reasonable expectation of success in combining Legein for the reason I discussed at length above: it is simply too unpredictable and variable, with knowledge requirements that are outside the capabilities of a POSITA.

134. Therefore, in my opinion, a trial-and-error approach to combine

Francesch and Legein in the manner proposed in the Petition would be extremely lengthy and would be well outside the capabilities of a POSITA.

X. CONCLUSION

135. I declare that all statements made herein of my knowledge are true, that all statements made on information and belief are believed to be true, and that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I reserve the right to modify my opinions as additional information becomes available to me.

Dated: September 30, 2024

Jay J. Senkevich
Jay J. Senkevich (Sep 30, 2024 16:39 CDT)
Jay J. Senkevich