

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JIANGSU FAVORED NANOTECHNOLOGY CO., LTD.,

Petitioner

v.

P2I LTD.,

Patent Owner

**Case No. IPR2024-00380
U.S. Patent No. 11,041,087**

PATENT OWNER'S RESPONSE TO PETITION

35 U.S.C. § 316(a)(8), and 37 C.F.R. § 42.120

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LIST OF EXHIBITS

EXHIBIT NO.	TITLE
2007	Declaration of Jay J. Senkevich, Ph.D.
2008	<i>Curriculum vitae</i> of Jay J. Senkevich, Ph.D.
2009	Mozetic, A. Vesel, G. Primc and R. Zaplotnik, “Chapter 2 - Introduction to Plasma and Plasma Diagnostics” <i>Non-Thermal Plasma Technology for Polymeric Materials</i> (2019)
2010	Y. Yin, M.M.M. Bilek and D.R. McKenzie, "The Origins of self-bias on dielectric substrates in RF plasma processing" <i>Surface and Coatings Technology</i> (2006)
2011	J. Kadirhanov, 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” <i>Polymer Chemistry</i> (2021)
2012	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” <i>Plasma Processes and Polymers</i> (2018)
2013	B. Tonpheng, J. Yua and O. Andersson, “Effects of cross-links, pressure and temperature on the thermal properties and glass transition behaviour of polybutadiene” <i>Physical Chemistry Chemical Physics</i> (2011)
2014	T. Takeichi, N. Furukawa, “5.25 - Epoxy Resins and Phenol-Formaldehyde Resins” <i>Polymer Science: A Comprehensive Reference</i> , Volume 5 (2012)

I. STATEMENT OF RELIEF REQUESTED

Jiangsu Favored (“Petitioner”) filed a Petition for *Inter Partes* Review (“IPR”), challenging Claims 1-5, 7, and 9-14 (the “Challenged Claims”) of U.S. Patent No. 11,041,087 (Ex. 1001; the “’087 Patent”). Paper 1 (“Petition”; Pet.). The Board instituted IPR. Paper 9 (“Decision”).

Patent Owner P2i hereby requests that the Board now issue a final written decision rejecting all grounds of challenge and confirming that the Challenged Claims are not unpatentable.

II. INTRODUCTION AND OVERVIEW OF ARGUMENT

A petitioner in an *inter partes* review bears the unshifting burden of proving unpatentability. Here, Petitioner fails to meet this burden as to both asserted Grounds.

As a threshold matter, both Grounds in the Petition fail because each impermissibly relies on non-analogous art. As explained below, the ’087 Patent relates to plasma polymerized protective coatings for electronic devices. Yet two (of three) references Petitioner relies on are far afield from this endeavor.

Specifically, Ground 1 relies on Cohen which concerns conventional polymerization reactions involving a particular disiloxane monomer (DVTMDS). As explained below, this has no relevance to protective coatings for electronic devices formed by plasma polymerization (as in the ’087 Patent). Likewise, Ground

2 relies on Francesch which also relates to a field (plasma derived coatings for *bioactive surfaces*) also unrelated to that of the '087 Patent.

This deficiency alone resolves all Grounds in the Petition. But even were the Board to consider the substance of each Ground, the Petition would still fail. This is so because, as explained below, Petitioner grossly overestimates the knowledge and abilities of the relevant POSITA in 2015. Such a POSITA would have nowhere near the breadth *or* depth of knowledge and experience necessary to combine the references in the manner proposed. Instead, Petitioner's Grounds (at best) improperly rely on hindsight bias and must therefore be rejected.

For these reasons, and others presented below, all of Petitioner's Grounds of challenge must be denied.

A. The '087 Patent

The '087 Patent discloses and claims an electronic or electrical device (or electronic or electrical component thereof) having a novel protective coating obtained by exposing the device to a plasma comprising a particular monomer compound and particular crosslinking reagent.

The inventors encountered difficulties in obtaining plasma-derived protective coatings suitable for electronic devices, such as mobile phones. Such coatings must be highly hydrophobic yet stable, tack-free, and resistant to smearing. '087 Patent 1:26–2:13.

In particular, applying lower powers to the monomer 1H, 1H, 2H, 2H-perfluorooctyl acrylate (PFAC6) to form a plasma resulted in a more hydrophobic (i.e., water resistant) coating, but the coating was unstable in the presence of water and was tacky and easily smeared. *Id.* at 1:34–56. Applying higher powers resulted in coatings that were more crosslinked and resistant to smearing, but this process change decreased the hydrophobicity of the coating. *Id.* at 1:47–67, 16:4–10, FIGS. 1 and 2. Accordingly, the inventors recognized that the process conditions required for producing tack and smudge-free protective coatings for electronic devices were quite limited and caused the coatings to lack sufficient hydrophobicity. *Id.* 2:1–6.

The inventors unexpectedly 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.* at 2:49–55. The '087 Patent specification discloses that low energy pulsed plasma processing of certain combinations of monomers and crosslinking compounds resulted in co-polymer protective coatings that exhibited improved hydrophobicity while remaining tack and smudge-free. *Id.* 2:56–64, 16:58–17:19, *compare* FIGS. 2 and 4.

In addition, the inventors discovered that 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.* at

3:3–11. Such coatings are quite advantageous for protecting electronic devices like mobile phones as well as printed circuit boards, semi-conductor chips, and other internal electronic components thereof. *Id.* 1:5–13, 14:30–58.

These barrier coatings are electrically insulating while remaining sufficiently compliant to allow electrical connections to be made to the device, e.g., to allow the device to be connected to a charging cable. *Id.* 3:41-54; Ex. 2007 ¶ 46. The specification teaches that such barrier coatings can achieve an electrical resistance of at least 1×10^7 Ohms and sufficient water resistance to allow the coated device to be submerged in water of up to 1m in depth for 30 minutes while powered on, characteristics required to pass industry standard “IPX7 test.” Ex. 1001 at 3:55–4:6. The resulting barrier coatings were also significantly more electrically resistant than coatings formed without the identified crosslinking reagents. *Id.* at 16:46–54, FIG. 5, 18:10–23, showing increase in resistance from 2.1×10^7 to 9.2×10^9 Ohms when 10% DVA crosslinker added to PFAC6 monomer plasma.

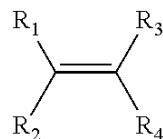
Claim 1 of the '087 Patent, the sole independent claim, recites:

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;

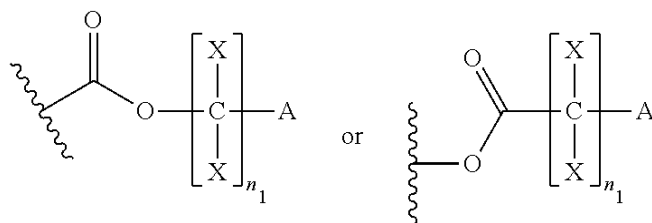
wherein the protective cross-linked polymeric coating is obtained by exposing the device or component to a plasma comprising a monomer compound and a crosslinking reagent for a period of time sufficient to allow formation of the protective cross-linked polymeric coating on a

surface thereof,

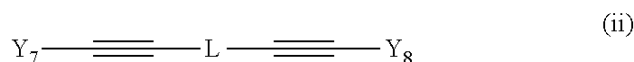
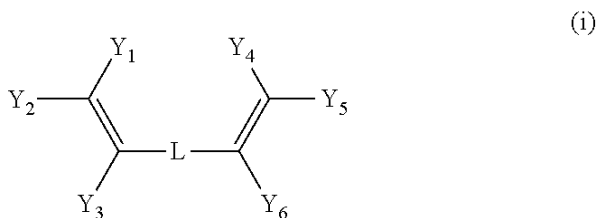
wherein the monomer compound has the following formula:



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:

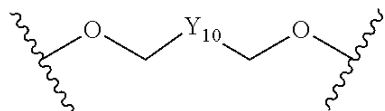
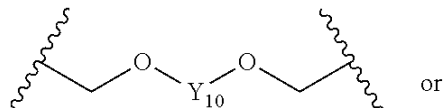


where each X is independently selected from hydrogen, a halogen, optionally substituted branched or straight chain C_1 - C_6 alkyl, halo alkyl or aryl optionally substituted by halo; where A is aryl optionally substituted by halo; and n_1 is an integer from 0 to 27; and wherein the crosslinking reagent 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:



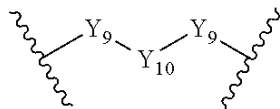
where $Y_1, Y_2, Y_3, Y_4, Y_5, Y_6, Y_7$ and Y_8 are each independently selected from hydrogen, optionally substituted cyclic, branched or straight chain C_1 - C_6 alkyl or aryl; and L is a linker moiety;

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

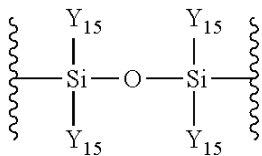


and Y_{10} is selected from optionally substituted cyclic, branched or straight chain C_1 - C_8 alkylene and a siloxane group;

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

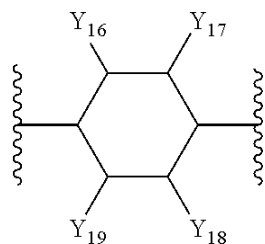


where each Y_9 is independently selected from, a bond, $-O-$, $-O-C(O)-$, $-C(O)-O-$, $-Y_{11}-O-C(O)-$, $-C(O)-O-Y_{11}-$, $-OY_{11}-$, and $Y_{11}O-$, where Y_{11} is an optionally substituted cyclic, branched or straight chain C_1 - C_8 alkylene; and wherein Y_{10} has the following formula:



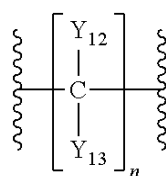
and each Y_{15} is independently selected from optionally substituted branched or straight chain C_1 - C_6 alkyl;

or wherein Y_{10} has the following formula:



and Y_{16} to Y_{19} are each independently selected from H and optionally substituted branched or straight chain C_1 - C_8 alkyl or alkenyl

or wherein Y_{10} has the following formula:



and each Y_{12} is fluoro and each Y_{13} is fluoro, and n is an integer from 1 to 10.

Id. at 18:26–19:57. The prior art of record shows that the claimed combination of monomers and crosslinking reagents was not previously known, used, or suggested for use in a plasma process to obtain a protective coating suitable for an electronic device.

III. OVERVIEW OF THE CITED REFERENCES

As explained above, the '087 Patent is directed to improved plasma polymerized protective coatings for electronic devices. But, as shown below, each of Petitioner's grounds for alleged obviousness relies on a reference that is non-analogous to the '087 Patent.

Specifically, Ground 1 relies on Cohen which focuses on conventional polymerization reactions involving a particular disiloxane monomer (DVTMDS).

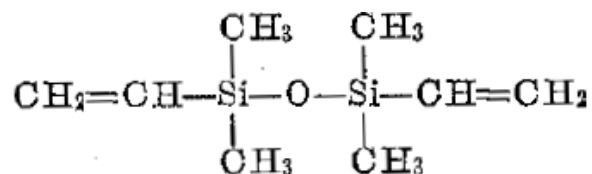
This has no relevance whatsoever to protective coatings for electronic devices formed by plasma polymerization (as in the '087 Patent).

Likewise, Ground 2 relies on Francesch which also relates to a field (plasma derived coatings for *bioactive surfaces*) wholly unrelated to that of the '087 Patent.

And though the secondary Legein reference does disclose plasma polymerization techniques, no POSITA would have been motivated to combine it with Cohen or Francesch, as detailed below.

A. Cohen (Ex. 1004)

Cohen issued as a U.S. patent in 1955 and relates to a then-new monomer divinyltetramethyldisiloxane (DVTMDS or disiloxane) and polymerization products produced therewith. Ex. 1004 at 1:15–20. Cohen describes DVTMDS as having the formula:



Id. at 1:27–30.

Cohen has nothing to do with 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.* at 1:34–44. 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. (emphasis added); *see also* Examples 1 and 2 at 2:70–3:50. As the above passage reflects, Cohen focuses on effecting polymerization in an inert solvent or in an emulsion.

Cohen fails to describe the use of DVTMDS with the specific monomers recited in Claim 1 of the '087 Patent. Ex. 2007 ¶¶ 66-69. Indeed, Cohen does not disclose the use of DVTMDS in a plasma polymerization process at all. Nor is Cohen directed to forming protective cross-linked polymeric coatings, whether for an electronic device or on any other substrate. Instead, Cohen discloses that copolymers made using DVTMDS may be used as a dielectric material in a capacitor, as well as a cable or electrical coil impregnant, or as a filling compound in potheads and cable joints. Ex. 1004 at 5:1–21.

B. Legein (Ex. 1005)

Legein discloses 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.

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.” Ex. 1005 9:15-27. 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.” Ex. 1002 ¶ 154

Legein only discloses utilization of “low power and/or low pressure plasma polymerization.” Exhibit 1005 6:10-11; 9:12-13; 11:15; 35:18-19. But Legein is silent on how this “low power and/or low pressure plasma polymerization” technique would be carried out. 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.

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 the coating that deposits is an electrical insulator, and as such, 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.

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.

C. Francesch (Ex. 1006)

Francesch is an article entitled “Fabrication of Bioactive Surfaces by Plasma

Polymerization Techniques Using a Novel Acrylate-Derived Monomer.” As the title suggests, Francesch relates to 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.* 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 crosslinkers to form the bioactive surface. *Id.* at 606.

Such bioactive surfaces have application in tissue engineering and bear no relation to protective coatings for electronic devices. *Id.* at 605, 610–11; Ex. 2007 ¶¶ 88-89. Francesch also does not disclose or suggest the use of BDVE with the specific monomers claimed in the '087 patent. *Id.* Contrary to Petitioner’s assertion, one of skill in the art would not look to Francesch to improve a protective coating or plasma coating process for an electronic device. *Id.*

Additionally, the addition of a crosslinking reagent in Francesch does not appear to improve the properties of the coatings as a barrier layer. Ex. 2007 ¶ 91. As such, a POSITA would not be motivated by Francesch to add BDVE to create a suitable barrier layer. *Id.* ¶ 94.

IV. POSITA

Petitioner contends that a person of ordinary skill in the art (“POSITA”) at the time of the priority date of the ’087 patent would have had at least a bachelor’s degree in a field such as chemistry, physics, or chemical engineering, as well as at least two years of experience with plasma-polymerization techniques. Pet. at 20.

For purposes of this proceeding, Patent Owner does not dispute this characterization of the level of ordinary skill in the art.

Notably, such person of ordinary skill, having only a bachelor’s degree and two years of experience in the relevant field, would *not* have the level of knowledge and insights that Dr. Gleason assumes when attempting to fill the gaps between the disparate teachings of the asserted prior art references. Ex. 2007 ¶ 33.

V. CLAIM CONSTRUCTION

The Petition assumes that the preamble of claim 1 – “an electronic or electrical device or electronic or electrical component thereof comprising” – is a claim limitation. Pet. at 24-25. For purposes of this proceeding, Patent Owner agrees.

A preamble limits the invention if it recites essential structure or steps, or if it is “necessary to give life, meaning, and vitality” to the claim. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999). Dependence on a preamble phrase for antecedent basis indicates a reliance on both the preamble and claim body to define the claimed invention. *Bell Commc’ns Research, Inc. v. Vitalink*

Commc'ns Corp., 55 F.3d 615, 620 (Fed. Cir. 1995).

The preamble of Claim 1 is necessary to give meaning to what the claimed invention is, i.e., an electronic/electrical device or electronic/electrical component. Furthermore, the body of the claim refers to a coating “on a surface of the device or component” and relies on the preamble for antecedent basis of that device or component. *See Pacing Technologies, LLC v. Garmin Intern., Inc.*, 778 F.3d 1021, 1024 (Fed. Cir. 2015) (“Because the preamble terms “user” and “repetitive motion pacing system” provide antecedent basis for and are necessary to understand positive limitations in the body of the claims in the ‘843 patent, we hold that the preamble to claim 25 is limiting.”).

Accordingly, for purposes of this proceeding, the preamble of Claim 1 limits the claims to an electronic/electrical device or component.

VI. APPLICABLE LEGAL STANDARDS

In an *inter partes* review, the petitioner bears the burden to prove unpatentability of the claims of the patent-at-issue by a preponderance of the evidence. 35 U.S.C. § 316(e); *Aqua Products v. Matal*, 872 F.3d 1290, 1303 (Fed. Cir. 2017) (en banc).

Under 35 U.S.C. § 103, Petitioner must prove that the claimed subject matter would have been obvious to a POSITA at the time of the invention. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007).

A complete analysis requires that the Board determine (1) the scope and content of the prior art; (2) differences between the prior art and the claims; (3) the level of ordinary skill in the art; and (4) relevant objective indicia of nonobviousness (also known as secondary considerations). *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17 (1966). Importantly, the obviousness inquiry must be undertaken without any “hint of hindsight.” *Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1375 (Fed. Cir. 2011).

An invention “composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418.

Moreover, Petitioner is required to show (but, here, does not) that its disparate references would have suggested to a POSITA that they should make the claimed invention and that they would have a reasonable expectation of success at the time of the invention in doing so. *In re NuVasive, Inc.*, 842 F.3d 1376, 1381–82 (Fed. Cir. 2016); *Intri-Plex Techs., Inc. v. Saint-Gobain Performance Plastics Rencol Ltd.*, IPR2014-00309, Paper 83 at 19 (PTAB Mar. 23, 2014).

It is insufficient to show that multiple references could be combined. Petitioner must show (but, here, does not) that a POSITA would have been motivated to pick out the asserted multiple references and combine them in the way the claimed invention does. *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993–94

(Fed. Cir. 2017); *Ariosa Diagnostics v. Verinata Health, Inc.*, IPR2013-00276, Paper 64 at 17– 18 (PTAB Aug. 15, 2016).

Petitioner must support its obviousness contentions with articulated reasoning and based on rational, factual underpinnings; conclusory statements of obviousness will not suffice. *KSR*, 550 U.S. at 418; *In re NuVasive*, 842 F.3d at 1382–83.

Similarly, any expert testimony must explain in detail how specific references could be combined, which combinations of elements in specific references would yield a predictable result, and how any specific combination would operate or read on the asserted claims. *Activevideo Networks, Inc. v. Verizon Commc 'ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012); *Ariosa*, IPR2013-00276, Paper 64 at 20.

In view of the above (and as more fully explained below), the Board must deny both Grounds in the Petition because each relies on non-analogous art and further because Petitioner has failed to prove why POSITA would be motivated to combine the cited references in the manner proposed, or how the proposed combination would predictably result in the improvement that allegedly motivated the combination.

VII. GROUND 1: COHEN IN VIEW OF LEGEIN DOES NOT RENDER THE CHALLENGED CLAIMS OBVIOUS

Patent Owner has submitted with its Response an expert declaration from Dr. Jay Senkevich, which explains, among other things:

(1) how Cohen is outside the field of endeavor of the '087 Patent and is not reasonably pertinent to the problem faced by its inventors;

(2) how Cohen and Legein use different (and incompatible) techniques for polymerization;

(3) why a POSITA would not be motivated to combine Cohen and Legein (including based on the lack of PECVD disclosure in Cohen, and the insufficient disclosure of PECVD in Legein); and

(4) how, to the extent Cohen and Legein are nevertheless combined, the resulting combination does not disclose every limitation of the Challenged Claims.

Ex. 2007.

As discussed in detail below, Dr. Senkevich's declaration and the related evidence, including the disclosures of Petitioner's cited references, warrant a final written decision finding that the Challenged Claims are not unpatentable over Cohen and Legein.

A. Ground 1 Fails Because it Relies Upon Non-Analogous Art (Cohen)

As a threshold matter, Ground 1 of the Petition fails because it impermissibly relies upon Cohen which is non-analogous art.

1. Legal Standard

In order for a reference to be proper for use in an obviousness rejection under

35 U.S.C. § 103, it must be analogous art to the claimed invention. *In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004); MPEP § 2141.01(A).

A reference is analogous art to the claimed invention only if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). *Id.*

In order for a reference to be “reasonably pertinent” to the problem, it must “logically[] have commended itself to an inventor's attention in considering his problem.” *In re Icon Health and Fitness, Inc.*, 496 F.3d 1374, 1379–80 (Fed. Cir. 2007) (quoting *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992)).

The relevant problem to consider is the problem faced by the inventor, as reflected—either explicitly or implicitly—in the specification. *In re Klein*, 647 F.3d 1343, 1348–51 (Fed. Cir. 2011).

2. The Field of Endeavor of the '087 Patent is Plasma Polymerized Protective Coatings For Electronic Devices

The '087 Patent's field of endeavor relates to plasma polymerized protective coatings for electronic devices. The specification and claims of the '087 patent confirm that the field of endeavor is plasma polymerized protective coatings for electronic devices.

The structure of the invention recited in Claim 1 requires an electronic device having a protective coating, obtained by exposing the device to a plasma. Ex. 1001 18:26–36. The Field of Invention in the '087 patent states “the present invention relates to protective coatings for electronic or electrical devices and components thereof, and methods for forming such coatings.” *Id.* 1:13–23. Each example in the '087 patent similarly involves plasma polymerized protective coatings for electronic devices. *Id.* 15:45–16:56; 16:58–17:19.

Thus, the descriptions of the inventive subject matter in the '087 Patent (as reflected in its specification and claims) clearly illustrate that the inventors' field of endeavor relates to plasma polymerized protective coatings for electronic devices.

3. The Problems Faced By The Inventors of the '087 Patent are Specific to Plasma Polymerized Protective Coatings for Electronic Devices

The '087 Patent explicitly describes the problems that the inventors were addressing: obtaining protective coatings that did not smear, were tack free, but also had sufficient protective qualities suitable for electronic devices. *Id.* 1:26–2:15. The inventors of the '087 patent were confronted with problems specific to plasma polymerization, and in particular in relation to known plasma derived coatings formed by PFAC8 and PFAC6.

In particular, the problems described in the Background section of the '087 Patent relate to the impact of power input to the *plasma* on the nature of the

polymerized coating—a problem specific to plasma polymerization. *Id.* 1:29–30. In plasma polymerized coatings, power of the plasma affects fragmentation the monomer, impacting properties of the coating such as water contact angle and resistance to smudging. *Id.* 1:30–42; 1:66–2:13. At the end of the Background section, the '087 patent explicitly provides that “it is an aim to solve one or more of the above-mentioned problems with the prior art coatings.” *Id.* 2:14–15.

The inventors of the '087 patent therefore expressly described the particular problems they faced, all of which involved plasma polymerized protective coatings for electronic devices.

4. Cohen is *Not* From the Same Field of Endeavor as the '087 Patent and is *Not* Reasonably Pertinent to the Problems Its Inventors Faced

Cohen is far afield from the field of endeavor of the '087 Patent. Cohen provides no information relevant to plasma polymerization or protective coatings for electronic devices obtained thereby. Cohen instead focuses on conventional polymerization reactions involving a particular disiloxane monomer (DVTMDS). Ex. 1004 1:31–63. Cohen aims to provide dielectric materials and filling compounds for use in devices such as capacitors and cable joints, not nanoscale protective coatings of the type relevant to the '087 patent. *Id.* 5:1–21.

Cohen is also not reasonably pertinent to the problem faced by the inventors of the '087 Patent—creating improved plasma polymerized protective coatings for

electronic devices. Cohen does not explicitly describe *any* problem it is attempting to solve. Instead, it describes a new compound (divinyltetramethydisiloxane), how it may be synthesized, and how it may be copolymerized with other compounds using conventional polymerization methods. Ex. 1004, Examples 1–5.

But none of this has any relevance to plasma polymerization or protective coatings for electronic devices formed by plasma polymerization. Thus, a POSITA would not have looked to Cohen when faced with problems specific to improving protective coatings formed via plasma polymerization processes. Ex. 2007 ¶¶ 59-60.

5. The Petition Fails to Argue Otherwise

Notably, *nothing* in the Petition is to the contrary: The Petition is wholly silent on this issue, and never so much as asserts (let alone establishes) that Cohen is an analogous reference to the '087 Patent. Likewise, the Petition never asserts (let alone establishes) that Cohen would have been reasonably pertinent to the problem faced by the inventors of the '087 Patent.

This alone is fatal to Ground 1 of the Petition because Petitioner has not – and cannot – show that Cohen is analogous art. *See* 35 U.S.C. § 316(e); *Aqua Products v. Matal*, 872 F.3d 1290, 1303 (Fed. Cir. 2017) (en banc) (petitioner bears the burden to prove unpatentability by a preponderance of the evidence).

6. Any Arguments to the Contrary Rely on Impermissible Hindsight

To the extent Petitioner asserts that a POSITA would have been drawn to

Cohen for guidance in developing plasma polymerized protective coatings for electronic devices (as in the '087 Patent), such a conclusion is imbued with impermissible hindsight. Ex. 2007 ¶¶ 63-64. The Federal Circuit has made clear, however, that the pertinence of the reference to the inventor's problem "must be recognizable with the foresight of a person of ordinary skill, not with hindsight of the inventor's successful achievement." *Airbus S.A.S. v. Firepass Corp.*, 941 F.3d 1374, 1382 (Fed. Cir. 2019) (citing *Sci. Plastic Prods, Inc. v. Biotage AB*, 766 F.3d 1355, 1359 (Fed. Cir. 2014) (citations omitted)).

Accordingly, because Cohen has nothing to do with plasma polymerized protective coatings for electronic devices or the problem the inventors of the '087 Patent were trying to solve (creating improved plasma polymerized protective coatings for electronic devices) Cohen is non-analogous art to the '087 Patent. It therefore cannot be applied in an obviousness combination as suggested in the Petition.

For this reason alone, Ground 1 necessarily fails as to Claim 1 (as well as to each of its challenged dependent claims).

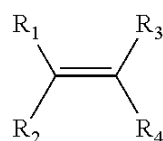
B. Petitioner Fails to Establish That a POSITA Would Have Combined Cohen and Legein under Ground 1

Even were Cohen found to be analogous art, Ground 1 of the Petition would fail for other, independent reasons: (a) a POSITA would not have been motivated to

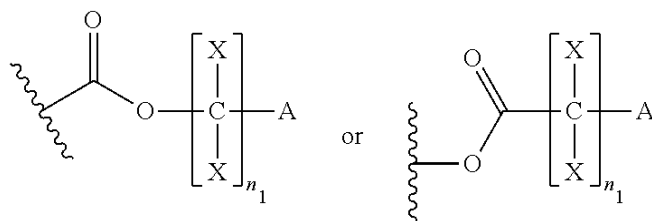
combine Cohen and Legein in the manner proposed and (b) the proposed combination does not teach each limitation of Claim 1.

The Petition relies on the combination of Cohen and Legein to disclose four elements in Claim 1 of the '087 Patent:

- “An electronic or electrical device or electronic or electrical component thereof comprising” ([Preamble] in the Petition; Pet. at 24);
- “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,” (element [1a] in the Petition; Pet. at 25-26);
- “wherein the monomer compound has the following formula:



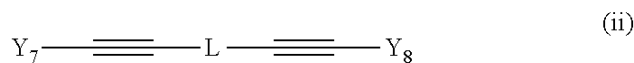
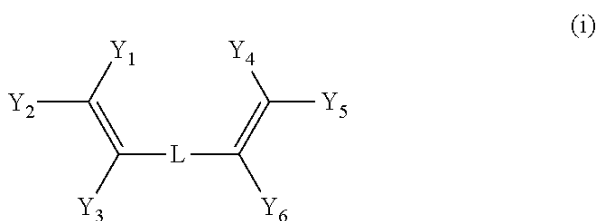
where R_1 , R_2 and R_4 are each independently selected from hydrogen, optionally substituted branched or straight chain C_1 - C_6 alkyl or halo alkyl or aryl optionally substituted by halo, and R_3 is selected from:



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” (element [1b] in the Petition; Pet. at 26); 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” (element [1c] in the Petition; Pet. at 28).

As explained below, and as described in Dr. Senkevich’s declaration (Ex. 2007), a POSITA would not be motivated to combine Cohen and Legein for the above elements. Moreover, even if the references were combined, the resulting combination would lack the above elements, including at least element [1a].

1. Petitioner Fails to Establish a Motivation to Combine Cohen with Legein For Element [1a]

Petitioner concedes that Cohen only teaches solution-based polymerization techniques. Pet. at 25. Petitioner relies on Legein for plasma polymerization. Pet. at 25-26.

In support of its argument, Petitioner alleges that a POSITA “would have been motivated to make polymer-coated electronics using Cohen’s disclosed copolymers, containing DVTMDS and benzyl acrylate or benzyl methacrylate, via plasma polymerization as taught by Legein.” Pet. at 36. But the reasons Petitioner offers fail to satisfy its burden:

Petitioner argues that a POSITA would have been motivated to use plasma polymerization as taught by Legein when adopting Cohen’s copolymer compositions to prepare protective coatings for electronic devices, because a POSITA would have “known that plasma polymerization is a dry process” which “avoids having to contact sensitive electronics with liquid polymer precursors as would be required when using older solution-based techniques like those described in Cohen.” Pet. at 35.

However, the type of plasma polymerization required to meet the claimed “protective cross-linked polymeric coating” (limitation of [1a]) would be pulsed plasma polymerization, with specific optimized parameters. Ex. 2007 ¶ 101. Yet a

POSITA would not know the distinction between the various plasma polymerization techniques, nor how to optimize the numerous parameters for their chosen plasma polymerization technique to achieve the “protective cross-linked polymeric coating” as disclosed in the ’087 Patent. *Id.* ¶¶ 102-103.

Moreover, Petitioner argues that a POSITA would have a reasonable expectation of success in combining Cohen and Legein because given the “known properties associated with benzyl acrylate, benzyl methacrylate, and DVTMDS [...] a POS[IT]A would have expected coatings formed of such crosslinked aryl acrylates to exhibit protective water-repellant and barrier properties.” Pet. at 37. However, Cohen only discloses that the addition of a crosslinking reagent “increased heat resistance” and such products “tend toward increased insolubility” (Ex. 1004 2:52-57), and Legein does not discuss the addition of a separate crosslinking reagent. As such, a POSITA could not look to Legein *or* Cohen to understand when adding a crosslinking reagent would be advantageous to the protective barrier polymeric coating, nor which and how much crosslinking reagent to use. Ex. 2001 ¶¶ 109-110.

Finally, a POSITA would only be able to deposit the claimed “protective cross-linked polymeric coating” (element [1a] of the ’087 Patent) through extensive trial-and-error process with many unknown variables and a large amount of unpredictability as to the properties of the resulting coating. *Id.* ¶¶ 111-113. But such a process would be wholly outside the capabilities of a POSITA. *Id.* ¶ 116. And even

were a POSITA to somehow go through this extensive process, they are unlikely to arrive at the claimed invention of the '087 Patent. *Id.* ¶ 114. This is so due to 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. *Id.*

Accordingly, a POSITA would not have been motivated to combine Cohen and Legein in the manner proposed in the Petition. And even were the references combined, the resulting combination would not teach every element of Claim 1.

As such, Ground 1 fails as to Claim 1 (as well as to each of its challenged dependent claims).

VIII. GROUND 2: FRANCESCH IN VIEW OF LEGEIN DOES NOT RENDER THE CHALLENGED CLAIMS OBVIOUS

Likewise, Dr. Senkevich's declaration explains, among other things:

(1) how Francesch is outside the field of endeavor of the '087 Patent and is not reasonably pertinent to the problem faced by its inventors;

(2) why a POSITA would not be motivated to combine Francesch and Legein based on the disclosures in each reference; and

(3) how, to the extent Francesch and Legein are combined, the resulting combination does not disclose every limitation of the Challenged Claims.

Ex. 2007.

As discussed in detail below, Dr. Senkevich's declaration and the related evidence, including the disclosures of Petitioner's cited references, warrant a final written decision finding that the Challenged Claims are not unpatentable over Francesch and Legein.

A. Ground 2 Fails Because it Relies Upon Non-Analogous Art (Francesch)

Ground 2 of the Petition also fails because it impermissibly relies upon non-analogous art (Francesch).

1. The Field of Endeavor of the '087 Patent is Plasma Polymerized Protective Coatings for Electronic Devices

As explained in detail above (with respect to Ground 1), a reference is analogous art to the claimed invention only if: (1) the reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or (2) the reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention). *Bigio*, 381 F.3d at 1325; MPEP § 2141.01(A).

As also explained above (with respect to Ground 1), the '087 Patent's field of endeavor relates to plasma polymerized protective coatings for electronic devices. The specification and claims of the '087 Patent confirm that its field of endeavor is plasma polymerized protective coatings for electronic devices. *See, e.g.*, Ex. 1001 18:26–36; 1:13–23; 15:45–16:56; 16:58–17:19.

2. The Problems Faced By The Inventors of the '087 Patent are Specific to Plasma Polymerized Protective Coatings for Electronic Devices

The '087 Patent explicitly describes the problems that the inventors were addressing: obtaining protective coatings that did not smear, were tack free, but also had sufficient protective qualities suitable for electronic devices, including hydrophobicity and/or electrical resistance. *Id.* 1:26–2:15. The inventors of the '087 Patent were confronted with problems specific to plasma polymerization, and in particular in relation to known plasma derived coatings formed by PFAC8 and PFAC6.

Specifically, the problems described in the Background section of the '087 Patent relate to the impact of power input to the *plasma* on the nature of the polymerized coating—a problem specific to plasma polymerization. *Id.* 1:29–30. In plasma polymerized coatings, power of the plasma affects fragmentation the monomer, impacting properties of the coating such as water contact angle and resistance to smudging. *Id.* 1:30–42; 1:66–2:13. At the end of the Background section, the '087 Patent explicitly provides that “it is an aim to solve one or more of the above-mentioned problems with the prior art coatings.” *Id.* 2:14–15.

The inventors of the '087 Patent therefore expressly described the particular problems they faced, all of which involved plasma polymerized protective coatings for electronic devices.

3. Francesch is *Not* From the Same Field of Endeavor as the '087 Patent and is *Not* Reasonably Pertinent to the Problems Its Inventors Faced

Francesch is also unrelated to plasma polymerized protective coatings for electronic devices. It relates to an entirely different field—plasma derived coatings for *bioactive surfaces*. Ex. 1006 at 605–606, 610. Francesch would not have commended itself to the attention of a POSITA considering the problem of creating improved hydrophobic and barrier coatings for electronic devices. Francesch addresses completely unrelated problems:

Targeting materials to specific cells, designing materials that can sense biochemical signals and developing materials with improved biocompatibility remain challenges in biomaterials development. Significant effort remains in increasing the cell recognition and attractiveness of biomaterial surfaces. Modified materials stimulate cell adhesion, growth and proliferation, while maintaining the mechanical attributes of the bulk material.

Id. at 605.

The problems addressed in Francesch—targeting cells, sensing biochemical signals, biocompatibility—are narrowly tailored to surface characteristics of substrates *for targeting cell adhesion* rather than to characteristics for providing water resistant and barrier coatings for protecting electronic devices.

For example, to provide a surface that binds bioactive molecules, Francesch

focuses on parameters like the extent to which a surface effectively binds biotin. *Id.* at 609–610.

Such properties are irrelevant to the problem addressed by the inventors of the '087 Patent. Thus, a POSITA would have no interest in a plasma process designed to provide bioactive surfaces when attempting to solve problems unique to providing improved protective barrier coatings for electronic devices. Ex. 2007 ¶¶ 87–89. And such a POSITA would therefore not have looked to Francesch when faced with problems specific to improving protective coatings formed via plasma polymerization processes. *Id.*

4. The Petition Fails to Argue Otherwise

As noted above (with respect to Ground 1), the Petition is silent on this issue, and never so much as asserts (let alone establishes) that Francesch is an analogous reference to the '087 Patent. Likewise, the Petition never asserts (let alone establishes) that Francesch would have been reasonably pertinent to the problem faced by the inventors of the '087 Patent.

This is likewise fatal to Ground 2 because Petitioner has not – and cannot – show that Francesch is analogous art. *See* 35 U.S.C. § 316(e); *Aqua Products*, 872 F.3d at 1303.

5. Any Arguments to the Contrary Rely on Impermissible Hindsight

To the extent Petitioner asserts that a POSITA would have been drawn to

Francesch for guidance in developing plasma polymerized protective coatings for electronic devices (as in the '087 Patent), such a conclusion is imbued with impermissible hindsight. Ex. 2007 ¶¶ 126–130. Yet the pertinence of a reference to the inventor's problem “must be recognizable with the foresight of a person of ordinary skill, not with hindsight of the inventor's successful achievement.” *Airbus*, 941 F.3d at 1382.

Accordingly, because Francesch has nothing to do with plasma polymerized protective coatings for electronic devices or the problem the inventors of the '087 Patent were trying to solve (creating improved plasma polymerized protective coatings for electronic devices) Francesch is non-analogous art to the '087 Patent. Ex. 2007 ¶¶ 87–89. It therefore cannot be applied in an obviousness combination as suggested in the Petition.

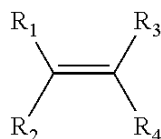
For this reason alone, Ground 2 necessarily fails as to Claim 1 (as well as to each of its challenged dependent claims).

B. Petitioner Fails to Establish That a POSITA Would Have Combined Francesch and Legein under Ground 2

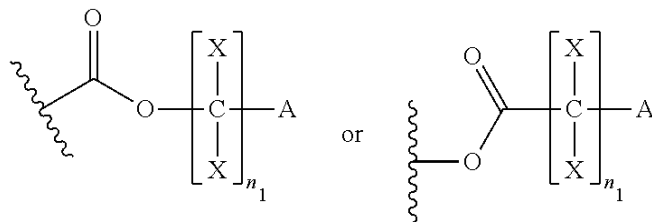
Even were Francesch found to be analogous art, Ground 2 of the Petition would fail for other, independent reasons: (a) a POSITA would not have been motivated to combine Francesch and Legein in the manner proposed and (b) the proposed combination does not teach each limitation of Claim 1.

The Petition relies on the combination of Francesch and Legein to disclose four elements in Claim 1 of the '087 Patent:

- “An electronic or electrical device or electronic or electrical component thereof comprising” ([Preamble] in the Petition; Pet. at 46);
- “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,” (element [1a] in the Petition; Pet. at 47).
- “wherein the monomer compound has the following formula:

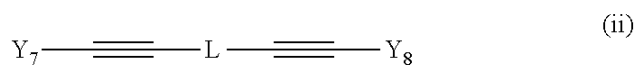
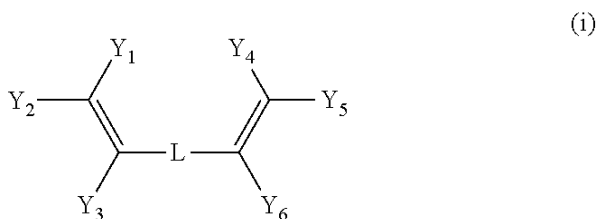


where R₁, R₂ and R₄ are each independently selected from hydrogen, optionally substituted branched or straight chain C₁-C₆ alkyl or halo alkyl or aryl optionally substituted by halo, and R₃ is selected from:



where each X is independently selected from hydrogen, a halogen, optionally substituted branched or straight chain C₁-C₆ alkyl, halo alkyl or aryl optionally substituted by halo; where A is aryl optionally substituted by halo; and n₁ is an integer from 0 to 27” (element [1b] in the Petition; Pet. at 47-49); 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 Y₁, Y₂, Y₃, Y₄, Y₅, Y₆, Y₇ and Y₈ are each independently selected from hydrogen, optionally substituted cyclic, branched or straight chain C₁-C₆ alkyl or aryl; and L is a linker moiety” (element [1c] in the Petition; Pet. at 49-50).

As explained below, and as described in Dr. Senkevich’s declaration, a POSITA would not be motivated to combine Francesch and Legein for the above elements. Moreover, even if the references were combined, the resulting combination would lack the above elements, including at least element [1a].

1. Petitioner Fails to Establish a Motivation to Combine Francesch with Legein for Element [1a]

Petitioner concedes that Francesch only teaches using plasma deposition to

apply crosslinked polymeric coatings to silicon wafers using PFM monomer and BDVE crosslinking reagent. Pet. at 47. Petitioner relies on Legein for applying coating to electronic devices via plasma polymerization. *Id.*

In support of its argument, Petitioner alleges that a POSITA would have been motivated to apply protective polymer coatings to electronic devices using plasma polymerization from Legein and would have been motivated to use Francesch's PFM monomer and BDVE crosslinking reagent. Pet. at 52. Petitioner alleges a POSITA would have been motivated to use Francesch's PFM-based polymer coating because, among other things, they "would have recognized PFM as a monomer that would yield highly water-repellent coatings," and that a POSITA would have known that the crosslinked coatings would "improve durability" of the coatings. Pet. at 52-53.

But the reasons Petitioner offers fail to satisfy its burden: Francesch does not disclose why adding a crosslinking reagent provides any benefit to the coating. Ex. 2007 ¶ 91. In fact, "improved durability" is ill-defined in the realm of polymer chemistry, and a POSITA would not be able to look to Francesch and be motivated to add a crosslinking reagent. *Id.*

Moreover – and contrary to the Petition's assertions to the contrary (Pet. at 53-54), a POSITA would *not* have been 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. Ex. 2007 ¶¶ 92-94.

Additionally, as noted above, 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*. As such, 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. Ex. 2007 ¶ 118.

Petitioner claims that Francesch discloses a PFM-based, crosslinked copolymer using the plasma deposition with “easy reaction conditions,” and therefore argues that a POSITA “would have been motivated to use Francesch’s cross-linked PFM/BDVE copolymer coatings on electronic devices.” Pet. at 53-54.

Not so. In 2015, the relevant a POSITA would *not* have viewed Francesch's coatings this way because such a POSITA would not know *how* to modify these "easy reaction conditions" in Francesch in the manner proposed in the Petition (particularly considering the numerous parameters and inherent unpredictability in plasma polymerization). Ex. 2007 ¶¶ 119-120.

Moreover, as explained above, 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. But neither Francesch nor Legein (even when combined) comes close to making this a reality. Ex. 2007 ¶¶ 121-122.

Instead – and, again, contrary to the assertions in the Petition (Pet. at 53-54) – the relevant 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. Ex. 2007 ¶ 122. This is so because such a POSITA would be 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. *Id.*

Additionally, neither Legein nor Francesch teach the creation of a successful barrier coating for an electronic device or component therein by optimizing the relevant parameters (density, polarity, and glass transition temperature). Ex. 2007 ¶¶ 123-124. It therefore would not have been obvious to a POSITA which polymers, utilizing which PECVD method – each with numerous possible parameters – should be combined to result in optimizing these properties. *Id.* For this reason as well, a POSITA would not have been motivated to combine Legein and Francesch in the manner proposed in the Petition.

Likewise, Petitioner argues that a POSITA “reasonably would have expected to succeed” with the proposed combination of Legein and Francesch “...because Francesch expressly disclosed [applying plasma polymerization] on silicon-wafer substrates.” Pet. at 54-55. But, in doing so, Petitioner overlooks the state of the relevant art, including 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. Ex. 2007 ¶ 125.

Instead, Petitioner improperly relies on hindsight, apparently assuming (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. Ex. 2007 ¶ 126.

Petitioner's reasoning fails. It would *not* have been obvious to a POSITA in 2015 to look to Francesch and Legein, nor combine them in the manner proposed in the Petition. Ex. 2007 ¶ 127. This is so in view of (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. *Id.* Thus, contrary to the Petition's arguments (Pet. at 53-55), a POSITA would *not* have viewed Francesch's coatings as compatible with Legein's teachings and would not have considered them as offering the same benefits associated with application to electronics through plasma polymerization. Ex. 2007 ¶ 128. A POSITA thus would *not* have been motivated to combine Francesch and Legein in the manner proposed (other than improperly relying on hindsight bias). *Id.* ¶¶ 128-130.

Likewise, a POSITA would *not* have had a reasonable expectation of success in combining Francesch and Legein. Ex. 2007 ¶¶ 131-132. This is so because, as explained above, there are no "easy reaction conditions" for PECVD that would

allow a POSITA to arrive at the claimed invention of the '087 Patent. As such, 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. *Id.* All of this would be beyond the knowledge of a POSITA. *Id.*

Finally, even were a POSITA 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. Ex. 2007 ¶ 133. This is so because, as discussed above, no POSITA (with otherwise limited relevant knowledge) 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. *Id.* Rather, the Petition's trial-and-error approach to combining Francesch and Legein would be extremely lengthy and would be well outside the capabilities and knowledge of the relevant POSITA in 2015. *Id.*

Accordingly, a POSITA would not be motivated to combine Francesch and Legein in the manner proposed in the Petition. And even were the references combined, the resulting combination would not teach every element of Claim 1. As such, Ground 1 fails as to Claim 1 (as well as to each of its challenged dependent

claims).

IX. CONCLUSION

For the foregoing reasons, the Board should issue a final written decision finding that Petitioner has not proven by a preponderance of the evidence that any of the Challenged Claims of the '087 Patent are obvious based on any of the Grounds asserted in the Petition.

Respectfully submitted,
BOCHNER PLLC

Dated: September 30, 2024

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CERTIFICATE OF WORD COUNT

The undersigned hereby confirms that the foregoing Patent Owner's Response complies with the type-volume limitation of 37 C.F.R. § 42.24(a). Excluding the items listed in 37 C.F.R. § 42.24(a) as not included in the word count, this Response contains less than 14,000 words, calculated by the word-processing system used to prepare it.

Dated: September 30, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned hereby certifies that the foregoing document was electronically served on September 30, 2024 on Petitioner, who has consented to service by electronic means.

Respectfully submitted,
BOCHNER PLLC

Dated: September 30, 2024

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