

Jiangsu Favored v. P2i
IPR2024-00380
U.S. Patent No. 11,041,087

Patent Owner's Presentation

Summary of Argument

- Petition **Fails** to Meet its Burden as to Ground 1 (Cohen + Legein)
 - Cohen is **Non-Analogous** Art
 - POSITA Would **Not** Have Been Motivated to Combine Cohen + Legein
 - Proposed Combination (Cohen + Legein) Would **Not** Teach Element [1a]
- Petitioner's "POSITA" is **Not Ordinary**
- Petition **Fails** as to Ground 2 (Francesch + Legein)
 - Francesch is **Non-Analogous** Art
 - POSITA Would **Not** Have Combined Francesch + Legein
 - Proposed Combination Would **Not** Teach Element [1a]

Field of Endeavor: '087 Patent

- Plasma Polymerized Protective Coatings For Electronic Devices

FIELD OF THE INVENTION

This invention relates to protective coatings. Specifically, the present invention relates to protective coatings for electronic or electrical devices and components thereof, and methods of forming such coatings. The coatings can protect by being hydrophobic and so resist the ingress of water-based liquid into electronic devices, or they can protect by forming a barrier coating and so provide electrical resistance between the electrical parts of the phone and water based liquid.

25 What is claimed is:
1. 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;
30 wherein the protective cross-linked polymeric coating is obtained by exposing the device or component to a plasma comprising a monomer compound and a cross-linking reagent for a period of time sufficient to allow formation of the protective cross-linked polymeric coating on a surface thereof,
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Ex. 1001 ('087 Patent) 1:13–23

'087 Patent, Claim 1

Problems Faced By The '087 Inventors (1)

- Problems specific to *plasma* polymerization:

BACKGROUND OF THE INVENTION

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The perfluoroalkyl chain monomers are also used for generating hydrophobic surfaces from pulsed plasma deposition processes (see WO 9858117 A1).

The power of the plasma initiated polymerisation affects the nature of the polymer produced. The higher average energy inputs of continuous wave plasmas lead to more fragmentation of the monomer, and so the polymer loses structural properties of the monomer. In the case of 1H,1H, 2H,2H-perfluorodecyl acrylate (PFAC8), there's less retention of the perfluoroalkyl chain and the contact angle of the surface coating is compromised. Higher plasma energies also lead to more crosslinking. For the lower average energy inputs of pulsed plasmas, there's better retention of monomer structure and less crosslinking. The greater retention of the perfluoro chain under low energy, pulsed plasma conditions leads to best levels of contact angles for the surface coating.

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'087 Patent 1:25–42

Problems Faced By The '087 Inventors (2)

When long chain perfluoroalkyl polymers are produced by high average power (continuous wave or CW) or low average power (pulsed wave or PW) plasmas, then because of the crystalline structure of the long chains, the polymers are non-stick to the touch and stable in the presence of water. 55 However, the feel and water stability of shorter chain polymer coatings is affected by the plasma power levels used. For example, when PFAC6 (1H,1H,2H,2H-perfluorooctyl acrylate) is polymerised in low power plasma conditions, the resulting polymer coating can have several 60 disadvantages. For example the coating can cause water drops to spread out a little (slump), be marked by the presence of a water drop on its surface, have a tacky feel, or can be easily smeared (for example on substrates of silicon wafer and ABS plastic). 65

'087 Patent 1:51-65 ('Background of the Invention')

Problems Faced By The '087 Inventors (3)

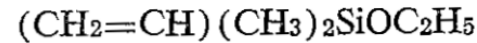
By increasing the power of the plasma used for polymerisation, the polymer becomes more crosslinked and becomes more resistant to smearing. However, increasing the power has the concomitant effect of decreasing the water contact angle through more monomer fragmentation (as described above). FIG. 1 shows the effect of increasing the power to monomer flow ratio for CW plasmas in a 125 litre chamber: at a ratio of 4 W/ μ l/min, the water contact angle is ~85-95 degrees and the coating is tack-free. However, as the ratio drops, the contact angle increases and the occurrence of tacky/smudgy coatings increases too. FIG. 2 shows the same effect for pulsed plasma conditions. These results show that the process window for producing tack and smudge-free coatings have a limited plasma processing range and the final coating has a compromised water contact angle.

Accordingly, it is an aim to solve one or more of the above-mentioned problems with the prior art coatings.

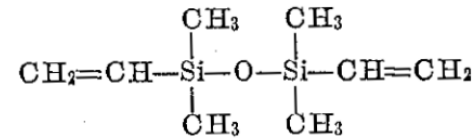
'087 Patent 1:66-2:15 ('Background of the Invention')

Cohen (Ex. 1004) (Ground 1)

In accordance with the practice of our invention, vinyl dimethylethoxysilane having the formula



is hydrolyzed to give divinyltetramethyldisiloxane having the formula 25



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This monomeric divinyltetramethyldisiloxane (hereinafter referred to as "disiloxane"), may be copolymerized with other copolymerizable materials using any of the methods now known in the art. For example, the disiloxane with the other copolymerizable material may 35 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 of the instant claimed invention includes the 40 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.

Ex. 1004 1:22-44

Cohen is **Not** Reasonably Pertinent

- Cohen is unrelated to *plasma* polymerization and protective coatings for electrical or electronic devices (or components thereof) obtained via plasma polymerization.

“The pertinence of the reference as a source of solution to the inventor's problem must be recognizable with the **foresight** of a person of ordinary skill, **not with the hindsight of the inventor's successful achievement.**”

Airbus S.A.S. v. Firepass Corp., 941 F.3d 1374, 1382 (Fed. Cir. 2019)

Legein (Ex. 1005) (1)

Ex. 1005 6:10-11: 10 Preferably, the method comprises the step of depositing the precursor monomer by means of low power and/or low pressure plasma polymerisation.

Ex. 1005 9:12-13: The method may apply the low power and/or low pressure plasma polymerisation in continuous wave (CW) or in pulsed power mode.

Ex. 1005 11:15: 15 Preferably, the coating is a result of the or each precursor monomer being polymerised and deposited by means of low power and/or low pressure plasma polymerisation.

Ex. 1005 35:18-19: - Low power continuous wave plasma polymerisation was used to deposit a polymer coating to the exposed surfaces of the mobile phone;

Legein (Ex. 1005) (2)

- Does **not** disclose addition of crosslinking reagent:

10. The method according to any preceding Claim, wherein the power is applied in continuous wave mode.

Ex. 1005 39:13-14

- **Does** disclose pulsed plasma polymerization (Ex. 1005 at 22:4-5)
 - **But** the only parameters provided are the “applied power,” the “pulse repetition frequency” the “flow direction” of the precursors, and the “coating time.” (Ex. 1005 22:24-24:21)
 - **Insufficient** for POSITA to achieve result claimed in '087 Patent. (Ex. 2007 ¶ 84)

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

- Petitioner claims POSITA would have been motivated to use Legein's plasma polymerization when adopting Cohen's copolymer compositions to prepare protective coatings for electronic devices. (Petition at 35.)
 - Because POSITA allegedly 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.” (*Id.*)

No Motivation to Combine Cohen and Legein (Ground 1) (2)

- But this would **not** result in Claim 1's "protective cross-linked polymeric coating" (limitation of [1a]):

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.

Ex. 2007 ¶¶ 102-103

No Motivation to Combine Cohen and Legein (Ground 1) (3)

- 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)
- Legein does **not** discuss the addition of a separate crosslinking reagent.
- **No reasonable expectation of success:**

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.

Ex. 2007 ¶¶ 109-110

No Motivation to Combine Cohen and Legein (Ground 1) (4)

- **Combination would **not** yield predicable result:**

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.

Ex. 2007 ¶ 114

Petitioner's "POSITA" is **Not Ordinary** (1)

- Dr. Gleason Spent Her Entire Academic Career at **MIT**:

Professional Experience

1/16/2020-present	Alexander and I. Michael Kasser Professor of Chemical Engineering, MIT, Emerita
7/2006–1/15/2020	Alexander and I. Michael Kasser Professor of Chemical Engineering, MIT
4/2014–6/2018	Associate Provost, MIT, with primary responsibilities for space allocation, planning, and management of the renovation budget, along with oversight of MIT's industrial engagements, Technology Licensing Office (TLO), and Industrial Liaison Program (ILP). Co-chair of the Information Technology Governance Committee (ITGC).
4/2008–1/2011	Associate Dean of Engineering for Research, MIT
7/2005–4/2008	Associate Director, Institute for Soldier Nanotechnologies, MIT
7/2001–6/2004	Executive Officer (Vice-chair), Department of Chemical Engineering, MIT
7/2000–6/2006	Professor, MIT
7/1993–6/2000	Associate Professor, MIT
6/1991–5/1995	Esther and Harold E. Edgerton Career Development Professor, MIT
9/1987–6/1993	Assistant Professor, MIT
9/1987–6/1990	Herman P. Meissner Career Development Professor in Chemical Engineering, MIT

Ex. 1003 p.1

Petitioner's "POSITA" is **Not Ordinary** (2)

9 Q. And so, fair to say, at least firsthand,
10 much, if not most, of your firsthand academic
11 experience would have been with MIT grad students;
12 right?

13 A. That's correct.

14 Q. Would it be fair to say, Dr. Gleason,
15 that MIT is one of the best known and regarded
16 research universities in the world?

17 A. Yes. We always are ranked well with U.S.
18 News and World Reports. We do -- actually, in our
19 department all of the graduate students did their
20 undergraduate work elsewhere.

21 Q. And would it be fair to say, Dr. Gleason,
22 in your experience, that one of the reasons MIT has
23 that high regard in the academic world and beyond is
24 due to the caliber of its students; right?

25 A. Yes. Our students are very important.

Ex. 2016 p.13

Petitioner’s “POSITA” is **Not Ordinary** (3)

“...the legal standard for obviousness... is to be determined from the viewpoint of a person of **ordinary, not extraordinary, skill**.... [S]ection 103 is not concerned with the actual skill of the inventors—whose skill may be extraordinary—but rather with the level of ordinary skill in the art.”

10x Genomics, Inc. v. Bio-Rad Labs, Inc., No. IPR2020-00087, Paper 40, at 9-10 (P.T.A.B. Apr. 26, 2021)
(citing *Stewart-Warner Corp. v. City of Pontiac, Mich.*, 767 F.2d 1563, 1570 (Fed. Cir. 1985))

Francesch (Ex. 1006) (Ground 2)

- **Different** Field of Endeavor (plasma derived coatings for *bioactive surfaces*):

Merging the versatility of plasma polymerization processes, via simple monomers and easy reaction conditions, with biological platforms that enable guidance of cell adhesion brings us closer to the ultimate goal of controlling cell function through structured surfaces for their application in tissue engineering.

Ex. 1006, p. 610-11

Francesch (Ex. 1006)

- Addresses **unrelated** problems:

Targeting materials to specific cells,^[1] designing materials that can sense biochemical signals^[2] and developing materials with improved biocompatibility remain challenges in biomaterials development.^[3] Significant effort remains in increasing the cell recognition and attractiveness of biomaterial surfaces. Modified materials stimulate cell adhesion, growth and proliferation,^[4] while maintaining the mechanical attributes of the bulk material.^[5-7] Cell

Ex. 1006, p. 605

Francesch is **Not** Reasonably Pertinent

- Francesch (directed to coatings for *bioactive* surfaces) is unrelated to protective coatings for electrical or electronic devices (or components thereof) obtained via plasma polymerization.

“The pertinence of the reference as a source of solution to the inventor's problem must be recognizable with the **foresight** of a person of ordinary skill, **not with the hindsight of the inventor's successful achievement.**”

Airbus, 941 F.3d at 1382

No Motivation to Combine Francesch and Legein (Ground 2) (1)

- Francesch **only** teaches using plasma deposition to apply crosslinked polymeric coatings to silicon wafers using PFM monomer and BDVE crosslinking reagent. (Petition at 47)
 - Petitioner relies on Legein for applying coating to electronic devices via plasma polymerization. (*Id.*)
- But Francesch does **not** disclose why adding a crosslinking reagent provides any benefit to the coating. (Ex. 2007 ¶ 91)
 - “Improved durability” is ill-defined in the realm of polymer chemistry; POSITA would **not** look to Francesch and be motivated to add a crosslinking reagent. (*Id.*)

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

- POSITA would **not** have been motivated by Francesch to add BDVE as a crosslinking reagent in the manner recited in the Challenged Claims:

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.

Ex. 2007 ¶¶ 92-94.

No Motivation to Combine Francesch and Legein (Ground 2) (3)

- **No reasonable expectation of success:**
 - Francesch involves the fabrication of bioactive surfaces using plasma polymerization of a monomer (PFM) **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.
 - Francesch does **not** discuss properties (e.g., water contact angle or coating resistance) that relevant to producing the claimed 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.
 - POSITA would **not** have a reasonable expectation of success in combining Francesch with Legein. Ex. 2007 ¶ 118.

No Motivation to Combine Francesch and Legein (Ground 2) (4)

- Combination would **not** yield predictable result:
- In 2015, POSITA would **not** know how to modify Francesch's "easy reaction conditions" as proposed (particularly considering the numerous parameters and inherent unpredictability in plasma polymerization). Ex. 2007 ¶¶ 119-120.
- '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.
 - **Neither** Francesch **nor** Legein (even when combined) teach this. Ex. 2007 ¶¶ 121-122.
- POSITA in 2015 would **not** have been motivated to combine Francesch's monomer (PFM) and crosslinking reagent (BDVE), with Legein's rudimentary plasma polymerization technique, to arrive at the claimed PECVD coating. Ex. 2007 ¶ 122.
 - POSITA would be **overwhelmed** by the many parameters not listed in Legein that would affect the product's properties, the complexity and unpredictability of pulsed plasma polymerization, 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.

No Motivation to Combine Francesch and Legein (Ground 2) (5)

- 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 ¶¶ 128-130.
- 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.
 - POSITA familiar with Francesch would **not** 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.*
 - Petition's trial-and-error approach to combining Francesch and Legein would be extremely lengthy and **well outside the capabilities and knowledge** of POSITA in 2015. *Id.*