

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: IPR2024-00380

Patent No. 11,041,087

**SUPPLEMENTAL DECLARATION OF DR. KAREN K. GLEASON
IN SUPPORT OF PETITIONER'S REPLY**

1. My name is Dr. Karen K. Gleason.
2. I have been engaged by Petitioner Jiangsu Favored Nanotechnology Co., Ltd. to investigate and opine on issues relating to claims 1-5, 7 and 9-14 of U.S. Patent 11,041,087 (Ex. 1001), which I will refer to here as the '087 patent.
3. I prepared a previous declaration in this matter. Ex. 1002.
4. My qualifications and experience are summarized in my previous declaration (Ex. 1002) and in my CV (Ex. 1003).
5. Here I will address certain assertions made in the Patent Owner's Response filed by P2i and the declaration of Jay J. Senkevich, Ph.D. (Ex. 2007).
6. This declaration is based on the information currently available to me. To the extent that additional information becomes available, I reserve the right to continue my investigation and study, which may include reviewing documents and information that may be produced, as well as testimony from depositions that may be taken.
7. I am being compensated for the services I am providing under my engagement with Favored Tech Corporation, including the preparation of this declaration. That compensation is not contingent upon my performance, the outcome of this *inter partes* review or any other proceeding, or any issues involved in or related to this *inter partes* review or any other proceeding.

A. Analogous Art

8. I understand from counsel that the scope of prior art for purposes of analyzing obviousness includes all “analogous art.” I further understand that there are two separate tests that define the scope of analogous prior art: (1) whether the art is from the same “field of endeavor” as the patent-at-issue, regardless of the problem addressed and, (2) if the reference is not within the field of the inventor’s endeavor, whether the reference nevertheless is “reasonably pertinent” to the particular problem with which the inventor is involved. Under the first test, I understand a patent’s field of endeavor is not limited to the specific point of novelty, the narrowest possible conception of the field, or the particular focus within a given field. I understand the second, reasonable pertinence test focuses on the extent to which the reference in question and the claimed invention relate to a similar problem or purpose.

9. P2i and Dr. Senkevich contend that the field of endeavor for the ’087 patent is “plasma polymerized protective coatings for electronic devices.” *See* Patent Owner Response at pp. 18-19; Ex. 2007 at ¶ 60. I disagree. In my opinion, the patent’s field of endeavor is “polymer coatings” or “protective coatings”—a field that includes Cohen, Legein, and Francesch. Although the ’087 patent does discuss using plasma polymerization, the focus of the patent is on monomers and crosslinking reagents that may be used to create protective coatings as opposed to

new or improved plasma polymerization techniques. The “Field of the Invention” section of the '087 patent focuses on “protective coatings” without mentioning plasma polymerization. Ex. 1001 at 1:12-22. Rather than strictly limiting the purported invention to electronic substrates, the '087 patent suggests the benefits are applicable to “a wide variety of substrates” Ex. 1001 at 14:38-40.

10. In my opinion, a POSA that was working on protective coatings for use in electronic devices would have reasonably consulted Cohen. Cohen describes DVTMDS, a crosslinker, and co-polymerizing DVTMDS with different monomers to create polymers useful for electrical applications. Ex. 1002, ¶¶ 78-81. As I discussed previously, a POSA would have expected co-polymerizing DVTMDS with certain monomers as suggested by Cohen would have resulted in a polymer with hydrophobic and barrier properties that would have made it suitable for coating applications in electronic devices. Ex. 1002, ¶¶ 163-164, 167-168, 177. As I also discussed previously, a POSA would have reasonably expected that the same co-polymers could be formed using plasma polymerization techniques which, like the older solution-based techniques described by Cohen, are chain polymerization techniques initiated by free radical species. Ex. 1002, ¶ 176; *see also* Ex. 1002, ¶¶ 32-44 (discussing plasma polymerization as a free radical-activated method for chain polymerization).

11. In my opinion, a POSA that was working on protective coatings for use

in electronic devices would also have reasonably consulted Francesch. Francesch describes plasma polymerizing pentafluorophenyl methacrylate (PFM) with crosslinkers such as 1,4-butanediol divinyl ether (BDVE) to deposit polymer coatings on silicon wafers. Ex. 1002, ¶¶ 83-85. As I discussed previously, a POSA would have expected Francesch's polymer coatings to be useful in the context of electronic devices because the coatings were crosslinked, had hydrophobic properties, had been demonstrated to be suitable for plasma-mediated deposition, and had been successfully applied to silicon wafer substrates which are commonly used in electronics. Ex. 1002, ¶¶ 208-213, 217-218.

B. Level of Ordinary Skill in the Art

12. Although P2i and Dr. Senkevich agree that a person of ordinary skill in the art ("POSA") would have had at least two years of experience with plasma polymerization techniques, they suggest a POSA would not have been capable of applying the teachings in the prior art or combining the teachings from different references. *See* Patent Owner Response at pp. 25-27; Ex. 2007 at ¶¶ 103, 113. During his deposition, Dr. Senkevich testified that a POSA would not know which parameters to adjust, how to adjust parameters, and whether a resulting coating was adequate or not. Ex. 1060 at 44:8-65:18. I disagree.

13. In my opinion, a POSA having two years of experience with plasma polymerization techniques would be more than capable of adjusting different

reaction parameters and analyzing the resulting coating (*e.g.*, contact angle testing, *see* Ex. 1002 at ¶¶ 182-183). When I began advising graduate student Scott J. Limb, he had a bachelor's degree in chemical engineering and no prior experience with plasmas. In his first year as graduate student, Scott designed and constructed a reactor for pulsed plasma polymers assembled from commercially available components. This was the first reactor ever constructed in my laboratory, as my previous area of expertise was nuclear magnetic resonance (NMR) spectroscopy. Scott reported the selection of a monomer from the literature, optimization of deposition conditions, including pulse cycle timing, and the analysis of the coatings his first journal publication Limb SJ, Edell DJ, Gleason EF, Gleason KK, "Pulsed plasma-enhanced chemical vapor deposition from hexafluoropropylene oxide: Film composition study," *Journal of Applied Polymer Science* 67(8), 1489–1502 (1998) (Ex. 1066), which is listed as #308 in the Publications in Referred Journals section of my CV (Ex. 1003). I also advised graduate student Catherine B. Labelle, Hilton Pryce Lewis, Kenneth K.S. Lau, and Brett Cruden, each selecting monomers, optimization of pulsed plasma polymer deposition and coating characterization in their first year as graduate students. These students also published on pulsed plasma as reflected on the list of publications in my CV. Each of these students had a bachelor's degree in chemical engineering and no prior experience with plasmas.

14. The '087 patent itself suggests that the conditions for forming an

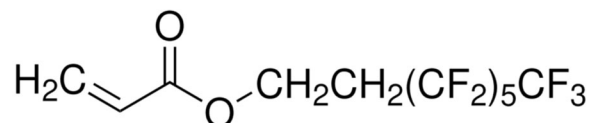
effective coating depend on factors such as the monomer compound used but “can be determined using routine methods”:

In all aspects of the invention, the precise conditions under which the protective polymeric coating is formed in an effective manner will vary depending upon factors such as, without limitation, the nature of the monomer compound, the crosslinking reagent, the substrate, as well as the desired properties of the coating. These conditions can be determined using routine methods or, preferably, using the techniques and preferred features of the invention described herein, which work in particular synergy with the invention.

Ex. 1001 at 14:66-15:7. The '087 patent also states that “The skilled person would understand that the (v / v) percentages are those which give a stable crosslinked polymer coating and the highest water contact angle.” Ex. 1001 at 14:34-36.

15. I also understand the law requires a patent's written description to be sufficient to allow a POSA to make and use the claimed invention. If the knowledge and abilities of a POSA were as limited as P2i and Dr. Senkevich suggests, the '087 patent itself would not provide sufficient guidance to make the claimed coating.

16. Claim 1 of the '087 patent requires a monomer with an aryl group that optionally includes halo substituents. '087 patent at 18:48-62. The '087 patent itself never discusses any such aryl monomer or specific reaction parameters that should be used to form an effective coating using aryl monomers. Each of the five numbered “examples” uses PFAC6 (1H,1H,2H,2H-perfluorooctyl acrylate):



This monomer includes no aryl group (with or without halo substituents).

17. I also disagree with P2i and Dr. Senkevich's characterization of pulsed plasma polymerization as unknown or insufficiently understood in 2015. As I discussed previously, pulsed plasma polymerization was a known alternative to continuous plasma polymerization and pulsed plasma polymerization had recognized benefits including less applied power and better preservation of the original monomer structure in the resulting plasma polymer coating. Ex. 1002 at ¶ 39; Ex. 1019 at 2035-36; Ex. 1023 at 8724. As further evidence, Exhibit 1061 is a paper published in 1977 that discusses pulsed plasma and compares properties of polymers formed using pulsed plasma and continuous plasma. The paper begins with a synopsis which notes that "the fragmentation of the monomer and free-radical formation in the substrate are less with the pulsed discharge." *Id.* at 81. Exhibit 1062 is an excerpt from a textbook published in 1985 that discusses pulsed plasma polymerization. Ex. 1062 at 103-114 (§ 6.4.4 titled "Effect of Pulsed Radio Frequency Glow Discharge").

18. The patent references mentioned by and incorporated into the '087 patent also discuss pulsed plasma polymerization. Ex. 1022 (WO 98/58117 published in 1998) at 9:26-29 ("The greater level of structural retention in the case

of pulsed plasma polymerisation can be attributed to free radical polymerisation occurring during the duty cycle off- time and less fragmentation during the on-time.”); Ex. 1063 (WO 03/101621 published in 2003) at 5:8-11 (“The pulsing of the excitation medium produces coatings that retain the chemical properties of the atomised coating forming material to a far greater extent compared to the conventional non-pulsing counterpart.”); Ex. 1064 (WO 03/097245 published in 2003) at 5:20-22 (“The pulsing of the exciting medium can result in a coating that significantly retains the chemical properties of the atomised coating forming material.”).

19. I also disagree with Dr. Senkevich’s suggestion that appropriate duty cycles for pulsed plasma polymerization were not understood prior to 2015. *See* Ex. 1060 at 118:15-120:15. Legein discloses “a duty cycle from approximately .05 to 50%” which equates to a ratio between 0.0005 and .05. Ex. 1005 at 8:1-3. Legein’s duty cycle range substantially overlaps with the duty cycles suggested by the ’087 patent. Ex. 1001 at 13:23-25 (“Optionally the voltage is pulsed in a sequence in which the ratio of the time on/time off is in the range of from 0.001 to 1”). Even the “one- to 200-type ratio” Dr. Senkevich suggested (Ex. 1060 at 119:11-14) falls within Legein’s disclosed range. As another example, the published patent application referenced in the background section of the ’087 patent discloses an exemplary sequence in which “the power is on for 20 μ s and off for from 10000 μ s

to 20000 μ s.” Ex. 1022 (WO 98/58117 published in 1998) at 9:4-5. This sequence would equate to a duty cycle .001 and .002 which also falls within the duty cycle range disclosed by the '087 patent itself. Ex. 1001 at 13:23-25. Another example is Francesch's report that for the pulsed plasma deposition of the aryl monomer pentafluoromethacrylate (PFM) that “the duty cycle was 50%” corresponding to a ratio of one for the on/off periods of plasma excitation, and the frequency was 15Hz. Ex. 1006 at 607.

I hereby declare that all the statements made in this declaration are of my own knowledge and true; that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I declare under the penalty of perjury that all statements made in this declaration are true and correct.

Date: 12/26/24

A handwritten signature in black ink, appearing to read 'Karen K. Gleason', written over a horizontal line.

Karen K. Gleason, Ph.D.