

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. JAY J. SENKEVICH
IN SUPPORT OF PATENT OWNER'S SUR-REPLY**

I, Jay J. Senkevich, declare that:

I. ASSIGNMENT & QUALIFICATIONS

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

2. I have been asked to consider Petitioner’s arguments regarding the validity of certain claims in U.S. Patent No. 11,041,087 (Ex. 1001; the “’087 Patent”)

3. I prepared a previous declaration in this matter. Ex. 2007.

4. My experience and qualifications are summarized in my previous declaration (Ex. 1007) and in my CV (Ex. 2008).

5. In this supplemental declaration, I will address assertions made by Petitioner in Petitioner’s Reply (“Pet. Reply”, Paper 14), and assertions made by Petitioner’s expert, Dr. Karen Gleason, in her Supplemental Declaration (Ex. 1059).

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

II. POSA KNOWLEDGE AND THE LEVEL OF SKILL IN THE ART

7. Both Patent Owner and Petitioner have agreed that the relevant POSA would have at least a bachelor’s degree in a field such as chemistry, physics, or

chemical engineering, and at least two years of experience with plasma-polymerization techniques. Pet. at 20; Patent Owner's Response at 13.

8. In her Supplemental Declaration (Ex. 1059 ¶ 13), Dr. Gleason provides the 1998 publication of her student Scott J. Limb (Ex. 1065) as an alleged example of the capabilities of the relevant POSA. I note that Mr. Limb graduated with a bachelor's degree in chemical engineering from the University of California Berkeley in 1991. Ex. 2018 (<https://ieeexplore.ieee.org/author/38180365500>). Dr. Gleason claims that "In his first year as graduate student, [Mr. Limb] designed and constructed a reactor for pulsed plasma polymers assembled from commercially available components." Ex. 1059 ¶ 13. Dr. Gleason also references Mr. Limb's first publication on the topic of pulsed plasma-enhanced chemical vapor deposition, published in 1998. *Id.* Dr. Gleason claims that the lengthy gap (seven years) between the start of Mr. Limb's research and the subsequent publication was due to "the pulsed plasma work [being]... put aside by Scott" due to work on another project (which modified the reactor to not use plasma). Ex. 2016 at 38. In my experience, seven years is a long period of time between the start of graduate school and the primary publication on his/her dissertation topic.

9. In my opinion, it is highly improbable that Mr. Limb completely disregarded the core mechanism of his publication (plasma polymerization) while utilizing the modified reactor for a different project in Dr. Gleason's lab. In fact, I

find it likely that Mr. Limb continued to study plasma polymerization during this multi-year gap (between the creation of the reactor and the release of his publication), in part due to the complex nature of plasma polymerization. To me, this confirms that Mr. Limb's knowledge of plasma polymerization (which Dr. Gleason highlights) would be well above that of the relevant POSA. It is also therefore reasonable to conclude that the plasma polymerization research Mr. Limb published in 1998 was informed by far more than two years of experience with plasmas. Mr. Limb's research, therefore, cannot be (and is not, in my opinion) a representative example of the capabilities of the relevant POSA in this case.

10. In my experience working with students in the fields of chemistry and physics at the Massachusetts Institute of Technology ("MIT") and Rensselaer Polytechnic Institute, many students with a focus in chemistry, physics, and chemical engineering would only in rare circumstances have had *any* knowledge about plasma physics or polymer chemistry.

11. In my experience working with graduate students (at MIT and other institutions), nearly all such students must take a minimum at least one year of classes before undertaking any laboratory research with a thesis advisor. In many such graduate programs, it is common for graduate students to take two years of classes, then take (and pass) their qualifying exams before choosing an advisor to undertake their thesis research. It is also customary for entering graduate students at

many universities to be supported by departmental funding for the first one to two years before being funded by their thesis advisor for the next three to four years.

12. Dr. Gleason lists four other graduate students (Catherine B. Labelle, Hilton Pryce Lewis, Kenneth K.S. Lau, and Brett Cruden) whom she claims “select[ed] monomers” and “optimiz[ed] pulsed plasma polymer deposition and coating characterization in their first year as graduate students” without prior knowledge of plasmas. Ex. 1059 ¶ 13.

13. Dr. Gleason’s only evidence that these graduate students did not have prior experience or coursework with plasmas is that she doesn’t “recall being excited that [Mr. Limb] had plasma experience, [... and she] would have been thrilled to find somebody who had plasma experience.” Ex. 2016 at 34. But Dr. Gleason fails to provide any transcripts, coursework, or resumes of these graduate students to show that these students lacked previous knowledge of plasmas. Based on my personal experience with first, second and even third year graduate students at MIT, these graduate students would certainly be familiar with the research conducted in their thesis advisor’s laboratory. But such students would rarely be able to undertake original research, publish and patent their work on their own without much supervision. In my experience, graduate students are most productive towards the end of their tenure (e.g., in their fourth and fifth year). It is at this time (but not often

before) when and if papers are written and presented and patentable work can be secured.

14. Further, MIT is one of the best-known and most highly regarded universities in the world. In fact, Dr. Gleason herself notes that MIT's Chemical Engineering graduate program is "one of the top 10 graduate programs." Ex. 2016 (Gleason Dep.) at 18. Indeed, as of 2024 MIT is rated the #1 Best Chemical Engineering Program (out of over 130 institutions) by U.S. News & World Report. Ex. 2017 (<https://www.usnews.com/best-graduate-schools/top-engineering-schools/chemical-engineering-rankings>). Dr. Gleason's experience with graduate students appears largely limited to her dealings with students at the *best* chemical engineering program in the nation (if not the world). Additionally, Dr. Gleason notes that these graduate students came to MIT from other highly-ranked undergraduate schools such as Stanford and Cornell. Ex. 2016 at 30-31.

15. The selectivity of admissions for such undergraduate programs (e.g., Stanford and Cornell), as well as the selectivity of admissions for MIT's graduate programs (specifically, its #1 ranked chemical engineering program), confirms the *exceptional* nature of the graduate students Dr. Gleason references. In my experience such graduate students (specifically, those at MIT) are, indeed, extraordinary, especially as compared to students at lower-ranked institutions. But such exceptional graduate students (like those Dr. Gleason highlights) cannot, by definition, be

examples of people of *ordinary* skill in the art. It is therefore, in my view, incorrect for Dr. Gleason to suggest that the abilities of her exceptional MIT chemical engineering graduate students reflect the capabilities of the relevant POSA. The supposed abilities of the graduate students Dr. Gleason references should therefore not be considered representative of the knowledge of the relevant POSA for the purposes of this *inter partes* review.

16. Additionally, considering that Dr. Gleason can only cite a handful of exceptional graduate students (at least some of which, like Mr. Limb, appear to have held *more than* two years of experience with plasmas) as examples of individuals who (supposedly) were able to select monomers, optimize parameters, and create a coating with specific characteristics utilizing plasma polymerization, it is my opinion that the examples of such students reinforce that the relevant POSA in 2015 would *not* have been able to arrive at the claimed coating of the '087 Patent.

III. YASUDA EXHIBITS

17. Second, Dr. Gleason provides two additional exhibits regarding pulsed plasma, in an attempt to show that pulsed plasma was not “unknown or insufficiently understood in 2015.” Ex. 1059 ¶ 17. These exhibits include a 1977 paper published by Yasuda (“Some Aspects of Plasma Polymerization Investigated by Pulsed R.F. Discharge;” Ex. 1061) and an excerpt from a textbook published in 1985 (“Effect of Pulsed Radio Frequency Glow Discharge;” Ex. 1062).

18. These exhibits do not prove Dr. Gleason's point because each one merely discusses *simplified* pulsed plasma deposition. Specifically, the 1977 paper discusses only "some aspects" of plasma polymerization of *organic* compounds only, which would not include electrical or electronic devices or components thereof, or how these different substrates would affect the numerous variables required to optimize the plasma polymerization. Ex. 1061 at 81.

19. Further, Yasuda (in Exs. 1061 and 1062) does not show any clear advantage of pulsing the plasma for the deposition of polymeric coatings. Such examples, would be the dielectric or chemical properties of the polymer. "Pulsing" (as used by Yasuda) thus becomes only a keyword without any significance.

20. It is often not merely enough to compare "pulsing" of the plasma to a continuous wave plasma in the context of the dielectric or chemical properties of the coating; but rather the pulse duty cycle should be varied, such that clear trends are observed.

21. Further, it is not reasonable to think, if all the parameters are fixed including the duty cycle of the plasma; and the chemical system is varied; that the same effects will be found. Chemical bonds all have different strengths and reactivities. This is a fundamental principle of chemistry. For example NaCl has a different bond strength compared to KCl, such that they will be affected differently in the same plasma environment.

22. Further, the 1985 textbook excerpt discusses the mechanisms of how free radicals in pulsed plasma polymerization, compared to continuous plasma polymerization, affect monomers with a triple bond, double bond, or aromatic structure. Ex. 1062 at 103-107. Some of the variables it discusses, in a highly simplified manner, include pressure of the monomer in pulsed versus continuous RF discharges, deposition rates in pulsed versus continuous RF discharges, and the resulting wetting contact angles of the deposited polymer. *Id.* at 108-111. These simplified variables are only a few of the numerous variables required to optimize the pulsed plasma deposition of a polymer coating for electrical or electronic devices, or components thereof. Therefore, even with the full knowledge and understanding of the 1977 paper (Ex. 1061) and the 1985 textbook excerpt (Ex. 1062), the relevant POSA in 2015 would *still* not sufficiently understand pulsed plasma polymerization to sufficiently combine Cohen and Legein (Ground 1), or Francesch and Legein (Ground 2), to render the challenged claims of the '087 Patent obvious.

IV. DISCLOSURE OF DUTY CYCLE RANGES

23. Finally, Dr. Gleason opines that appropriate duty cycles for pulsed plasma polymerization were understood prior to 2015 because “Legein’s duty cycle range substantially overlaps with the duty cycles suggested in the '087 patent.” Ex. 1059 ¶ 19. Dr. Gleason also argues that Francesch’s report that “the duty cycle was

50%” for the pulsed plasma deposition of the aryl monomer PFM provides enough information to show that a POSA would know the appropriate duty cycles for pulsed plasma polymerization disclosed in the ’087 Patent. *Id.* However, having an overlapping duty cycle may only provide a *range* for which the POSA would be able to experiment with to find the optimized duty cycle. But such an overlapping duty cycle would *not* simply provide a POSA with the exact duty cycle needed for the optimized characteristics of the resulting polymer they would be attempting to create. This also does not include the numerous other parameters that would need to be varied in order to achieve optimized characteristics of the resulting polymer, each affecting the duty cycle required to achieve the plasma polymerization encompassed by the challenged claims of the ’087 Patent.

V. LACK OF MOTIVATION TO COMBINE COHEN AND LEGEIN (GROUND 1)

24. The relevant POSA would not have been motivated to combine Cohen and Legein in the manner proposed in Ground 1 of the Petition, as the nuances of the claimed pulsed plasma technique would be well outside the field of knowledge of such a POSA. Further, Legein discloses only continuous plasma polymerization but does not discuss adding a separate crosslinker. And Cohen fails to teach use of the claimed crosslinking reagent. Therefore, the relevant POSA in 2015 would not look to Legein and Cohen to understand the advantages of adding a crosslinking reagent, how to optimize the pulsed plasma parameters to create the optimized

barrier coating, and how much of the crosslinking reagent to use during this plasma polymerization.

25. Additionally, even if the POSA did look to Legein and Cohen, such a POSA would have to endure extremely lengthy trial and error to deposit a superior barrier coating, and would not have a reasonable expectation of success combining Cohen and Legein, since neither reference teaches the required precursors (including monomers and crosslinkers) and the optimized variables for plasma polymerization as are found in the challenged claims of the '087 patent.

VI. LACK OF MOTIVATION TO COMBINE FRANCESCH AND LEGEIN (GROUND 2)

26. The relevant POSA would not have been motivated to combine Francesch and Legein in the manner proposed in Ground 2 of the Petition. Francesch is directed to the fabrication of bioactive surfaces using plasma polymerization of PFM (Ex. 1006 at 605-606). This monomer is not discussed in the '087 Patent. The relevant POSA would not have been motivated to combine the PFM monomer with the BDVE crosslinking reagent disclosed in Francesch, with the simplified plasma polymerization technique disclosed in Legein, to arrive at the coating recited in the challenged claims of the '087 Patent. As discussed in my previous declaration, there are numerous parameters not listed in Legein that would affect the properties of the coating deposited via plasma polymerization. Considering the complexity and unpredictability of the pulsed plasma polymerization technique, such optimized

parameters would be well outside the knowledge of the relevant POSA. Ex. 2007 ¶ 122-124.

27. Additionally, as a result of the unpredictability and complexity of the required variables, the relevant POSA would not have a reasonable expectation of success in combining Francesch and Legein. Such knowledge would be well outside the capabilities of the relevant POSA, as explained.

VII. CONCLUSION

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

Dated: February 4, 2025

Jay J. Senkevich
Jay J. Senkevich (Feb 4, 2025 18:38 CST)

Jay J. Senkevich