

**IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF TEXAS
FORT WORTH DIVISION**

MIDAS GREEN TECHNOLOGIES, LLC)	
)	
Plaintiff,)	Case No. 4:20-cv-00555-O
)	
v.)	Judge Reed O'Connor
)	
IMMERSION SYSTEMS LLC)	
)	
Defendant.)	

**DECLARATION OF DR. ISSAM MUDAWAR ON
DISPUTED CLAIM TERMS**

I. INTRODUCTION

1. I have been retained by Immersion Systems LLC (“Immersion”) through my consulting business, Mudawar Thermal Systems, Inc., in connection with the above captioned litigation (“Litigation”) brought by Midas Green Technologies, LLC (“MGT”).

2. I make this declaration (“Declaration”) based upon my personal knowledge. The statements herein include my opinions and the bases for those opinions.

3. I understand that in the Litigation, MGT has asserted claims of patent infringement of U.S. Patent No. 10,405,457 (the “‘457 Patent”) and U.S. Patent No. 10,820,446 (the “‘446 Patent,” collectively the “Patents-in-Suit”).

4. I understand that in the Litigation, MGT has asserted that Immersion has infringed upon Claims 1, 5, 6, 10, 11, and 14 of the ‘457 Patent, and Claims 1, 5, 6, and 10 of the ‘446 Patent (collectively, the “Claims-in-Suit”).

5. Immersion has requested that I provide this Declaration in support of certain of its claim construction positions with regards to the Claims-in-Suit within the Litigation, namely, how a person of ordinary skill in the art (“POSITA”) would interpret certain disputed terms in the

Claims-in-Suit. I reserve the right to supplement this Declaration if and when new information becomes available after this Declaration is signed, including, but not limited to, additional discovery or documents, opinions of the Court, and the opinions and testimony of other experts or witnesses in the Litigation, including in connection with claim construction. I reserve the right to respond to any opinions offered by other experts and to any testimony offered at trial. I reserve the right to create graphics or demonstratives to support my opinions if called to testify at a hearing.

6. I am being compensated for my time at my standard hourly consulting rate in 2021 of \$372.90 per hour, which is based upon a direct labor fee of \$200 per hour and multiplied by the overhead and general and administrative rates approved by the Department of Defense Contract Audit Agency (DCAA) which I apply to all engagements.

7. I do not have a conflict of interest with respect to Immersion or MGT.

8. I am over the age of eighteen and competent to make this Declaration.

II. QUALIFICATIONS

9. I am a mechanical engineer with over forty years of experience in fluid mechanics, thermodynamics, heat transfer, and immersion cooling. I received my BS in Mechanical Engineering in 1978 from the American University of Beirut. Subsequently, I received my MS in 1980 and my Ph.D. in 1984 from the Massachusetts Institute of Technology (MIT).

10. I joined the School of Mechanical Engineering at Purdue University in 1984 as an Assistant Professor. I was subsequently promoted to an Associate Professor in 1989 and a full Professor in 1993. In 2015 I was appointed as the Betty Ruth and Milton B. Hollander Family Professor of Mechanical Engineering, a career professorship named for outstanding research accomplishments.

11. Since joining Purdue University, I have founded two groups aimed at advancing the field of high-density electronics cooling through immersion cooling. In 1984 I founded the

Purdue University Two-Phase Flow Laboratory (PU-IECA), and the Purdue University International Electronic Cooling Alliance (PU-IECA).

12. During my time as a Professor, I have taught classes on the fundamentals of heat transfer, engineering design of cooling systems, and boiling and immersion cooling. I also have directly supervised over 75 Ph.D. and M.S. students and Visiting Scholars, as well as written 4 handbooks, 257 archival journal papers, 9 book chapters, and numerous conference papers and technical reports. The vast majority of the aforementioned publications are directed to immersion cooling of electronics.

13. My work in immersion cooling of high-power electronics in computers, data centers, hybrid vehicle power electronics, aircraft avionics, spacecraft avionics, and defense electronics has earned me numerous honors and awards, including: (a) the American Society of Gravitational Space Research (ASGSR) “Founder’s Award” in 2013, (b) the American Society of Mechanical Engineers (ASME) “Heat Transfer Memorial Award” in 2013, (c) 75th Anniversary Medal from the ASME Heat Transfer Division in 2013, (d) being named a Thomson Reuters “Highly Cited Researcher” and on Thomson Reuters’ list of “The World’s Most Influential Scientific Minds” in 2015, (e) American Institute of Aeronautics and Astronautics (AIAA) Space Processing Award in 2019, and (f) ASME Allan Kraus Thermal Management Medal in 2021.

14. I also am presently the President of Mudawar Thermal Systems Inc., which was founded in 1992, through which I provide consulting services primarily relating to: (a) research and development of liquid cooling systems for computer and aerospace electronics; (b) research and development of phase-change (boiling and condensation) devices and systems; (c) thermal testing and obtaining heat transfer data for customers; (d) modeling and analysis of complex

thermal systems; and (e) design, fabrication, and instrumentation of high-heat-flux heaters and thermal test facilities.

15. During my over forty years in the practice of research and development I have engaged in a number of projects which have provided me with relevant experience and expertise in the foundational technology and industry within the scope of the Patents-in-Suit.

16. For example, I have performed research and development in the area of immersion cooling of electronics for an array of different business and governmental entities, including, IBM, 3M Company, McDonnell Douglas, Raytheon, Ford, CTS Microelectronics, the National Science Foundation, the Naval Air Warfare Center, the Air Force Office of Scientific Research, the U.S. Department of Energy, NASA, the Air Force Research Laboratory, the Office of Naval Research, Motorola, Intel Corporation, Advance Micro Devices, Delta Design, Wakefield Engineering, Rolls-Royce, Northrop Grumman, the U.S. Navy, the Ballistic Missile Defense Organization, the Office of Secretary of Defense, the National Renewable Energy Laboratory, and the Missile Defense Agency.

17. During the previous 4 years, I have not served in any other cases or litigations as an expert at trial or by deposition.

18. A copy of my *Curriculum Vitae*, which contains further details on my education, experience, publications, including a list of all publications I have authored in the previous 10 years, and other qualifications to render an expert opinion, is attached as **Exhibit 1**.

III. MATERIALS CONSIDERED

19. In connection with this Declaration, I considered the following materials related to the Patents-in-Suit:

- A. The '457 Patent. (*See* MGT000853-867).
- B. The Prosecution History of the '457 Patent. (*See* MGT00001-579).

C. The ‘446 Patent. (*See* Dkt. 34-2).

D. The Prosecution History of the ‘446 Patent. (*See* MGT000580-698).

20. Finally, in forming my opinions in this Declaration, I also drew upon my research and experience in the field of art implicated by the Patents-in-Suit, including fluid mechanics, thermodynamics, heat transfer, and immersion cooling.

IV. STATEMENT OF OPINIONS

A. Level of Ordinary Skill in the Art

21. I have been asked to provide my opinion about the experience and background of a POSITA of the Patents-in-Suit at the time the claimed inventions were made, that is between the filing date of the first provisional application, December 14, 2012, and the filing date accorded to the ‘457 Patent on December 13, 2013.

22. As such, for the purposes of this Declaration, I consider December 2012–December 2013 to be the “Relevant Period.”

23. I considered several factors to determine the skill level of a POSITA of the Patents-in-Suit as of the Relevant Period including the types of problems encountered in the art, the solutions to those problems, the pace of innovation in the field, the sophistication of the technology, and the education level of active workers in the field.

24. In my opinion a POSITA, as of the Relevant Period, would have had either a (a) Bachelor’s degree in mechanical engineering, or an equivalent degree, with five years of liquid cooling systems experience including responsibility for designing such systems, or (b) Master’s Degree in mechanical engineering, or an equivalent degree, including liquid cooling systems research and system design. A POSITA would also have had, through education or experience, familiarity, in particular, with immersion cooling systems. Additional education could compensate for less practical experience and vice versa.



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