IRELL & MANELLA LLP
Morgan Chu (70446)
MChu@irell.com
Benjamin W. Hattenbach (186455)
BHattenbach@irell.com
C. Maclain Wells (221609)
MWells@irell.com
1800 Avenue of the Stars, Suite 900
Los Angeles, California 90067-4276
Telephone: (310) 277-1010
Facsimile: (310) 203-7199

Attorneys for Defendant
DEMARAY LLC

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

APPLIED MATERIALS, INC., Plaintiff, vs. DEMARAY LLC, Defendant.	Case No. 5:20-cv-05676-EJD **DECLARATION OF DR. RICHARD ERNEST DEMARAY IN SUPPORT OF DEMARAY LLC'S OPPOSITION TO APPLIED MATERIALS' MOTION FOR PRELIMNARY INJUNCTION**

I, Dr. Richard Earnest Demaray, hereby declare as follows:

1. I have personal knowledge of the facts contained in the declaration and, if called upon to do so, I could and would testify competently to the matters set forth herein.

2. I have been working in and with the semiconductor industry for more than fifty years since I began my training in chemical physics and experimental ultraviolet photoconductivity of materials. My doctoral work focused on cross-supersonic molecular and atomic beams with which I demonstrated lossless conversion of 1 molecular vibration to one photon of light in vacuum crossed atomic and molecular beams. During my post-doctoral fellowship, I designed and built some of the first pulsed excimer laser driven tunable dye lasers for resonant multiphoton photoionization of single molecular states in the cooled beams. That work became instrumental to understanding the photo-physics of the high lying electronic states of small and aromatic molecules now used routinely in semiconductor device manufacture.

3. Much of my work in industry has involved advances in thin film technology. In the 1980s, I worked as a senior physicist at BOC Group on electron beam evaporation technology used to deposit thermal barrier coatings. My work on adherent electron beam evaporation thermal barrier coatings revolutionized high-temperature jet engine performance, efficiency and longevity. My zirconia coatings are in worldwide production today on military, commercial and power generation turbine hot section blades and vanes. Later that decade and continuing into the early 1990s, I worked at Varian Associates, where I served as Varian's R&D Director for thin film systems, and developed full-face erosion and sputter physical vapor deposition manufacturing technology now used extensively in semiconductor manufacturing worldwide.

4. In the late 1990s, I helped form Applied Komatsu Technology, Inc. ("Applied Komatsu"), a joint venture between Applied and Komatsu Ltd., where I served as General Manager of the physical vapor deposition ("PVD") division and developed wide-area magnetron sputter machines. In 1998, Applied Komatsu decided to discontinue sales of PVD systems. As part of this shift, Applied Komatsu executed a reduction in force of their PVD staff including myself

5. To continue making new developments in thin film technologies, I formed Symmorphix, Inc. ("Symmorphix") shortly thereafter, where I served as Chief Technology Officer

and Chairman of the Board. Joining me at Symmorphix were several other individuals formerly employed at Applied Komatsu in the PVD division.

6. Given restrictive covenants in Applied Komatsu's employment agreements, among other issues, I approached Applied Komatsu with my plans to form Symmorphix. Symmorphix and Applied Komatsu entered into the Sales and Relationship Agreement on December 11, 1998. As part of the agreement, Applied Komatsu agreed to release me and the other former employees joining Symmorphix from assignment provisions in certain employment agreements.

7. On March 16, 2002, myself and three other Symmorphix employees, filed the application leading to U.S. Patent Nos. 7,544,276 ("the '276 patent") and 7,381,657 ("the '657 patent") (the "Demaray patents") reflecting innovations in advanced thin film deposition that we developed at Symmorphix. The patents generally relate to a method of depositing thin films, for example in semiconductor devices, by pulsed DC reactive sputtering in a PVD system using "a pulsed DC power supply coupled to the target" and "an RF bias power supply coupled to the substrate."

8. Magnetron sputtering is a PVD technique that, as practiced in modern commercial operations, generally involves the use of magnets behind the negative cathode in the reactor to create magnetic and electrical fields superimposed on the metal target. An inert gas, *e.g.*, Argon, can be introduced into the chamber to create a magnetically confined ionized plasma. The plasma may be located near the surface of the metal target such that the positively charged plasma ions collide with the negatively charged metal target material ejecting atoms from the metal target, which then deposit on the substrate. One form of magnetron sputtering is RF biased pulsed DC sputtering. As that process is practiced in semiconductor industry today, a DC power supply that provides alternating negative and positive voltages is generally applied to the metal target while an RF voltage is generally applied to the substrate.

9. The Demaray patents describe the use of "a narrow band-rejection filter that rejects at a frequency of the RF bias power supply coupled between the pulsed DC power supply and the target area" when using reactive magnetron sputtering. The narrow band rejection filter allows the

power sources to properly function, but prevents damaging feedback to the pulsed DC power source from the RF bias.

10. I founded Demaray LLC in order to focus on research, development, and commercialization of new product applications based on technologies I have developed, including technologies protected by the Demaray patents. Much of that work—which remains ongoing—relates to the production of low-defect thin films for advanced electronic devices.

11. During my continued work with the semiconductor industry, I discovered that Intel and Samsung were using the patented technology in the Demaray patents, without authorization, to manufacture thin films in electronic devices. Intel and Samsung semiconductor products consist almost entirely of layer-upon-layer of thin films engineered and processed to create a very large number of interconnected transistors that together form microprocessors, memories or other semiconductor devices.

12. The Demaray patents are directed generally at methods of depositing high quality thin films in products by using a particular PVD reactor configuration. They do not cover all PVD reactor configurations. For example, reactors provided by Applied Materials, Inc. have many configurations unrelated to bias pulsed DC sputtering. Neither I, nor anyone at Demaray LLC, has approached Applied Materials demanding that they take a license to the Demaray patents for their reactors or accused Applied of infringement of the Demaray patents.

I declare under the penalty of perjury that the foregoing is true and correct. Executed in Portola Valley, CA, on September 25, 2020

By: R. Ernest Demaray
Dr. Richard Ernest Demaray