

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN JOSE DIVISION

13	APPLIED MATERIALS, INC.,)	Case No. 5:20-cv-05676-EJD
)	
14	Plaintiff,)	DECLARATION OF DR. RICHARD
)	ERNEST DEMARAY IN SUPPORT OF
15	vs.)	DEMARAY LLC’S OPPOSITION TO
)	APPLIED MATERIALS’ MOTION FOR
16	DEMARAY LLC,)	PRELIMINARY INJUNCTION
)	
17	Defendant.)	
18)	

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

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

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

13 3. Much of my work in industry has involved advances in thin film technology. In the
14 1980s, I worked as a senior physicist at BOC Group on electron beam evaporation technology
15 used to deposit thermal barrier coatings. My work on adherent electron beam evaporation thermal
16 barrier coatings revolutionized high-temperature jet engine performance, efficiency and longevity.
17 My zirconia coatings are in worldwide production today on military, commercial and power
18 generation turbine hot section blades and vanes. Later that decade and continuing into the early
19 1990s, I worked at Varian Associates, where I served as Varian's R&D Director for thin film
20 systems, and developed full-face erosion and sputter physical vapor deposition manufacturing
21 technology now used extensively in semiconductor manufacturing worldwide.

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

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

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

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

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

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

25 9. The Demaray patents describe the use of "a narrow band-rejection filter that rejects
26 at a frequency of the RF bias power supply coupled between the pulsed DC power supply and the
27 target area" when using reactive magnetron sputtering. The narrow band rejection filter allows the
28

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

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

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

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

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

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22 By: *R. Ernest Demaray*
23 Dr. Richard Ernest Demaray
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