

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LAM RESEARCH CORP.,

Petitioner

v.

DANIEL L. FLAMM,

Patent Owner

U.S. Patent No. 6,017,221

Issued: January 5, 2000

Named Inventor: Daniel L. Flamm

Title: PROCESS DEPENDING ON PLASMA
DISCHARGES SUSTAINED BY INDUCTIVE COUPLING

**DECLARATION OF JOSEPH L. CECCHI IN SUPPORT OF PETITION
FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 6,017,221 UNDER 37
C.F.R. § 1.68**

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I, Joseph L. Cecchi, declare as follows:

I. INTRODUCTION

1. I am over 18 years of age and otherwise competent to make this Declaration.

2. I have been asked to provide my views regarding technical issues in connection with the above-captioned *inter partes* review of U.S. Patent No. 6,017,221 (“the ‘221 patent”). I opine only with respect to certain issues that are discussed in this declaration.

II. QUALIFICATIONS AND PROFESSIONAL EXPERIENCE

3. I am currently Dean of the School of Engineering and Professor of Chemical and Biological Engineering at the University of New Mexico (“UNM”). This is my second term as Dean, and the term began in February 2014. I have held my appointment as Professor since joining UNM in 1994.

4. From 2011 to 2012, while on leave from UNM, I served as Provost and Professor of Engineering at the Masdar Institute of Science and Technology in Abu Dhabi, United Arab Emirates.

5. My first appointment as Dean of the School of Engineering extended from 2000 to 2009. From 2004 to 2011, I was Chair of the Board of Directors of the Science and Technology Corp. at UNM, the university’s technology transfer organization responsible for patenting and licensing UNM’s intellectual property.

6. From 1994 until 2000, I was Chair of the Department of Chemical and Nuclear Engineering at UNM. Previously, I was a Lecturer with the rank of Professor in the Department of Chemical Engineering at Princeton University, where I also directed the Graduate Program in Plasma Science and Technology. I was associated with the Plasma Physics Laboratory at Princeton University for twenty-one years, as leader of the Plasma Processing Group (1987-1994); Principal Research Physicist (1984-1994); leader of the Materials Physics Group (1979-1987); Research Physicist (1978-1984); and Staff Physicist (1972-1978).

7. From 1991 to 1994, I was Director of the New Jersey SEMATECH Center of Excellence for Plasma Etching. This organization, which involved four universities and one industrial laboratory, was engaged in state-of-the-art research in plasma processing for semiconductor manufacturing.

8. From 1992 to 2001, I worked on three committees established by the Semiconductor Industry Association (“SIA”) to generate technology “roadmaps” for semiconductor manufacturing. Most recently, from 1998 to 2000, I was a member of the Interconnect Technical Working Group (“TWG”) for the SIA International Technology Roadmap for Semiconductors (“ITRS”).

9. I obtained my Ph.D. in physics from Harvard University in 1972. I also received a Master's degree in physics from Harvard University in 1969, a Bachelor's degree in physics from Knox College in 1968, and a Master's of

Business Administration (MBA) degree from the University of New Mexico in 2011.

10. I have had significant research experience in a number of areas pertaining to semiconductor devices and their manufacturing, including plasma physics, plasma chemistry, plasma etching, plasma enhanced chemical vapor deposition (PECVD), atomic layer deposition (ALD), which is a form of chemical vapor deposition, plasma-assisted ALD, and chemical-mechanical-polishing (CMP), sometimes called “chemical-mechanical-planarization”.

11. I have published over ninety papers in my fields of expertise. Among the eight United States patents on which I am an inventor, the following five patents are in the area of plasma technology for manufacturing semiconductors and other materials:

- “Method and Apparatus for Coupling a Microwave Source in an Electron Cyclotron Resonance System,” U.S. Patent No. 5,111,111, Issued September 30, 1991.
- “Apparatus and Method for Uniform Microwave Plasma Processing Using TE₁₁ and TM₀₁ Modes,” U.S. Patent No. 5,302,803, Issued April 12, 1994.
- “Apparatus and Process for Producing High Density Axially Extended Plasmas,” U.S. Patent No. 5,587,038, Issued December 24, 1996.

- “Method of Making Dense, Conformal, Ultra-Thin Cap layers for Nanoporous Low-k ILD by Plasma Assisted Atomic Layer Deposition,” U.S. Patent No. 7,947,579, Issued May 24, 2011.
- “Ultra-Thin Microporous/Hybrid Materials,” U.S. Patent No. 8,187,678, Issued May 29, 2012.

12. I have been elected as a fellow in AVS, The Society for the Science and Technology of Materials, Interfaces, and Processing.

13. I am aware of research and development activities ongoing in semiconductor manufacturing and devices since the 1980s time frame. As a result of my research experience in the plasma etching, deposition, and CMP areas, I am also familiar with other silicon semiconductor process technologies that directly impact these areas, including such things as lithography and cleaning techniques.

14. As a professor, I have taught courses in silicon semiconductor devices and process technology at undergraduate and graduate levels. Many of the students I have taught have gone on to work for companies engaged in semiconductor manufacturing. I have supervised the research of a number of students in semiconductor manufacturing as part of their work for their M.S. and Ph.D. degrees.

15. My *curriculum vitae* (CV) (Exhibit 1011) includes additional details about my experience and professional background.

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