UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.;

MICRON TECHNOLOGY, INC.; and

SK HYNIX INC.

PETITIONERS

V.

ELM 3DS INNOVATIONS, LLC

PATENT OWNER

CASE IPR2016-00386

PATENT No. 8,653,672

**DECLARATION OF ALEXANDER D. GLEW, Ph.D.
REGARDING PATENT OWNER RESPONSE FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,653,672**

I, Dr. Alexander D. Glew, hereby declare as follows:

1. I received a Bachelor of Science degree in Mechanical Engineering from University of California, Berkeley in 1985; a Master of Science degree in Mechanical Engineering from University of California, Berkeley in 1987; a Master of Science in Materials Science and Engineering from Stanford University in 1995; and Doctor of Philosophy degree in Materials Science and Engineering from Stanford University in 2003. A copy of my Curriculum Vitae ("CV") is attached to this report as **Exhibit A**.

2. The subject matter of my doctoral dissertation at Stanford University related to chemical vapor deposition ("CVD") of dielectric films. CVD generally consists of mixing two or more gases in a process reactor or chamber, and having the gases meet on the surface of a substrate to deposit a thin film. Many of the CVD films that I worked on were deposited on undoped silicon glass (SiO_2) and boron and phosphorous doped glass. For my doctoral dissertation, I constructed a CVD reactor. Then, I developed CVD processes for certain low-k dielectric films such as diamond like carbon and fluorinated amorphous carbon. Further, I characterized those thin films for their engineering properties, optical, electrical, and mechanical. Also, I analyzed the chemical composition of the thin films.

3. From 1987-1997, I was employed by Applied Materials, Inc. ("Applied Materials"), one of the world's largest and most advanced manufacturers of, among other things, CVD-related equipment. I was hired by the CVD division. The first process tool that I worked on was the Precision 5000 CVD tool. It was the first cluster tool, a tool with multiple CVD processing chambers. Because this tool demonstrated the major advance in tool architecture, multiple chambers attached to a central vacuum load lock chamber, resulting in the ability to process one workpiece at a time instead of in batch, it was eventually placed in the Smithsonian Institute, Natural History Museum.

4. From approximately 1987-1989, I was a Systems Engineer for Applied Materials. In this position, I designed semiconductor processing equipment, and worked with all aspects of the process tool. After a period of time, along with the product marketing manager, I signed off on every tool or machine that we shipped. My signature was required to ensure that the manufactured process tool and the chemical processes it produced matched what was required by the purchase order, and that it was built accordingly and safely.

5. Subsequent to being a Systems Engineer, from approximately 1989-1991, I was an Engineering Manager at Applied Materials responsible for customer engineering specials ("CES"). This included customization of equipment to meet

customer requests and specifications. The CES requests were diverse and covered nearly all aspects of the equipment, ranging from modifying process chambers, gas panels, wafer handlers/robotics, wafer storage elevators, sensors, vacuum systems, framing, and other. We worked on very tight schedules, and exercised disciplined project management. If our engineering work was not completed on time, and the materials not procured, then it would hold up the shipment of a multimillion dollar CVD process tool. Because we exercised disciplined project management, such delays rarely happened. We also had to accurately estimate the cost of our work, materials, and labor, because the CES projects were billed to the customer.

6. Next, I was the manager of the engineering design and support group for the CVD division of Applied Materials. In this capacity, I was in charge of all of the designers and drafters, generating all of the engineering drawings, and reviewing all of the engineering design work. I am intimately familiar with computer aided design ("CAD") and engineering documentation.

7. In the early 1990s, I was awarded the position of Core Technologist (one of only 15 in Applied Materials). My area of expertise was gas and chemical systems and components. The gas and chemical systems largely delivered ultra-high purity fluids to the process chambers and reactors. Components used in the systems included the following: valves, flow controllers, pressure regulators,

filters, purifiers, pressure transducers and related devices, and systems as a whole. As a core technologist, I was responsible for consulting with different divisions during the design of new products, testing fluid delivery components, reviewing invention disclosures, and reviewing papers written by Applied Materials personnel, holding meetings across the divisions for workers in the field, setting technology trends with suppliers, and reviewing technology trends with customers. Our different divisions included product lines such as at least CVD, ETCH, CMP, implant, TFT, and more. I also represented the company at industry consortium meetings. The core technology group met monthly with the president or other senior executives of the company.

8. From 1994-1996, I managed a project funded by SEMATECH[1] that I proposed to its factory working group. These efforts resulted in the publication of two SEMATECH technology transfer standards. The goal of this project was to develop industry standard methods to determine the effects of trace chemicals and contamination on semiconductor processing and on semiconductor equipment reliability. As part of this project, I designed, built, and tested gas delivery systems,

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[1] SEMATECH stands for "Semiconductor Manufacturing Technology," a non-profit consortium that performs research into semiconductor manufacturing.

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