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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION GLOBALFOUNDRIES U.S., INC.
AND MICRON TECHNOLOGY, INC.,

Petitioners

v.

DANIEL L. FLAMM,

Patent Owner

CASE IPR2017-00279¹
U.S. Patent No. RE40,264 E

**DECLARATION OF DANIEL L. FLAMM IN
SUPPORT OF PATENT OWNER'S RESPONSE**

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Alexandria, VA 22313-1450

^{1 1} Samsung Electronics Company, Ltd. Was joined as a party to this proceeding via a Motion for Joinder in IPR2017-01749

I, Daniel L. Flamm, Sc.D., hereby declare as follows:

1. I worked in academia, research, and industry in various roles for more than 50 years. My curriculum vitae, which includes a more detailed summary of my background, experience, and publication, is attached as Appendix A.
2. I have been a leading researcher and educator in the fields of semiconductor processing technology, air pollution control, materials science, and other areas of chemical engineering. My research has been funded by NASA, National Science Foundation, Environmental Protection Agency, and AT&T Bell Laboratories. While a Distinguished Member of Technical Staff at Bell Laboratories, I led a semiconductor processing research group comprised of research colleagues, visiting university scientists, post-doctoral associates, and summer students. I have also served as a technical consultant to various semiconductor device and processing equipment manufacturers.
3. I have published over one hundred and fifty (150) technical journal articles and books, and dozens of articles in conference proceedings, most of them in highly competitive referred conferences and rigorously reviewed journals. I am an inventor listed in more than 20 U.S. patents, a number of which have been licensed through the industry, and most being in the general field of semiconductor processing technology.
4. I had experience studying and analyzing patents and patent claims from the

perspective of a person having ordinary skill in the art (“PHOSTIA”) starting at least at the time of my employment at AT&T Bell Laboratories in 1977. At AT&T Bell Laboratories, I served as a member of the patent licensing review committee where I was responsible for reviewing hundreds of patents for potential utility and licensing potential. I have also served as a technical expert in patent disputes and litigation.

5. I was admitted to the patent bar as an Agent in 2003 and have been registered as a Patent Attorney since 2006. I am also a member of the California State Bar.

6. I am the inventor of U.S. Patent No. RE40,264E, in the name of Daniel L Flamm and titled “(“the ‘264 Patent”).

7. I have read the Petitioners Petition for *Inter Partes* Review in this matter and the various art cited therein, including, among other.,

8. Anderson fails to teach that “the thermal mass of the substrate holder is selected.” At best, the term “thermal mass” in Anderson means something completely different from that in the ‘264 patent. Petitioners completely misrepresent facts and the literal reading of Anderson. There is absolutely no mention that the thermal mass of the substrate holder is selected. Anderson’s abstract cited for thermal mass at [Ex. 1111, 25:1-6] teaches nothing about any thermal mass of a substrate holder as required by claim 13. The abstract does no more than mention the use of a hollow cavity to utilize phase change (latent heat

of vaporization) to extract heat from a wafer. Latent heat is not thermal mass. The same is true of Anderson col. 2:60-65 that discloses nothing about any thermal mass. The only place Anderson even mentions the term “thermal mass” is in the single sentence concerning a heater that is placed in the chuck, where he states “the preferred embodiment is capable of heating the chuck 11 from room temperature to an operating temperature of 100 to 500 C. in a matter of seconds [before the plasma is switched on], due to the low thermal mass heater employed.” The low thermal mass heater of Anderson is not the same as the claimed thermal mass of the substrate holder. I also note Anderson’s objective is to maintain the operating temperature (not change any temperature) and uses the latent heat of vaporization of the liquid [Ex. 1111 6:28-31] to achieve this objective. Anderson teaches *a thermal mass heater* can be useful to heat a wafer prior to any processing, but that it is not sufficient to maintain the wafer temperature when processing, never mind changing a wafer temperature during processing as required by the ‘264 patent. the objective of Anderson is to effectuate an extreme temperature change before any processing, not tight control while changing wafer temperature during processing as is required by the ‘264 patent. The purpose of low thermal mass for a heater in Anderson was to effectuate extreme temperature changes very rapidly before processing when tight control is unnecessary.

Given the above analysis, it is not well known to select a thermal mass for a

substrate holder in the manner claimed, and Anderson does not teach this feature. A PHOSITA would never combine Anderson and Muller to teach claim 13. In particular, a PHOSITA would conclude it would not have been obvious to use a substrate holder with a selected thermal mass of Anderson in the device of Muller. That is, Anderson has nothing to do with etching a substrate at two temperatures during processing, as taught by Muller. On the contrary, the object of Anderson was to rapidly heat or cool before processing, and perform processing at a single constant substrate temperature. (Ex. 1111 2:66-3:1-7, 3:30-33, also see 6:19-31) Anderson addresses the problems associated with initially heating or cooling a chuck before beginning a process, and aims to reduce that heating time so that overall throughput is increased. The process itself is performed while maintaining a single temperature.

9. Claim 13 also requires that the thermal mass of the substrate holder be selected for “a predetermined temperature change with a specific interval of time during processing.” Anderson fails to teach this element, and even suggests away from this element by only addressing the problems of initially heating or cooling a chuck before beginning a single constant temperature process, which stands in stark contrast to claim 13. To overcome the failure of Anderson, Petitioners attempt to rely on the remote art of Hinman to disclose this element. They argue that Hinman describes “how to preselect the thermal mass of a material in a

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