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Paper 12
Entered: December 11, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY, LTD.
and TSMC NORTH AMERICA CORPORATION,
Petitioners,

v.

ZOND, LLC,
Patent Owner.

Case IPR2014-00861
Patent 6,806,652 B1

Before KEVIN F. TURNER, JONI Y. CHANG, SUSAN L.C. MITCHELL, and JENNIFER M. MEYER, *Administrative Patent Judges*.

MITCHELL, *Administrative Patent Judge.*

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Taiwan Semiconductor Manufacturing Company, Ltd. and TSMC North America Corporation (collectively, "TSMC") filed a Petition requesting *inter partes* review of claims 18–34 of U.S. Patent No. 6,806,652 B1 ("the '652 patent"). Paper 2 ("Pet."). Zond, LLC ("Zond") filed a Preliminary Response. Paper 8 ("Prelim. Resp."). We have jurisdiction under 35 U.S.C. § 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides:

> THRESHOLD.—The Director may not authorize an inter partes review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.

Upon consideration of TSMC's Petition and Zond's Preliminary Response, we conclude that the information presented in the Petition demonstrates that there is a reasonable likelihood that TSMC would prevail in challenging claims 18–34 ("the challenged claims") as unpatentable under 35 U.S.C. § 103(a). Pursuant to 35 U.S.C. § 314, we hereby authorize an *inter partes* review to be instituted as to claims 18–34 of the '652 patent based on the specific grounds discussed below.

A. Related Matters

TSMC indicates that the '652 patent was asserted in *Zond, LLC v. Fujitsu*, No.1:13-cv-11634-WGY (D. Mass.), in which TSMC is a co-defendant. Pet. 1. TSMC also identifies other cases where Zond asserted

the claims of the ’652 patent against third parties, as well as other Petitions for *inter partes* review that are related to this proceeding. *Id.*

B. The ’652 patent

The ’652 patent notes several problems with known magnetron sputtering systems, such as poor target utilization resulting from a relatively high concentration of positively charged ions in the region that results in a non-uniform plasma. Ex. 1101, 4:23–28. The ’652 patent states that while increasing the power applied to the plasma may increase the uniformity and density of the plasma, doing so may significantly increase the probability of establishing an electrical breakdown condition of arcing. *Id.* at 4:31–37. The invention set forth in the ’652 patent, which is described as having a higher density of ions for a given input power than known plasma systems, involves a plasma generation method that provides independent control of two or more co-existing plasmas in a system. *Id.* at 4:62–64.

One embodiment of the ’652 patent is shown in Figure 2A set forth below.

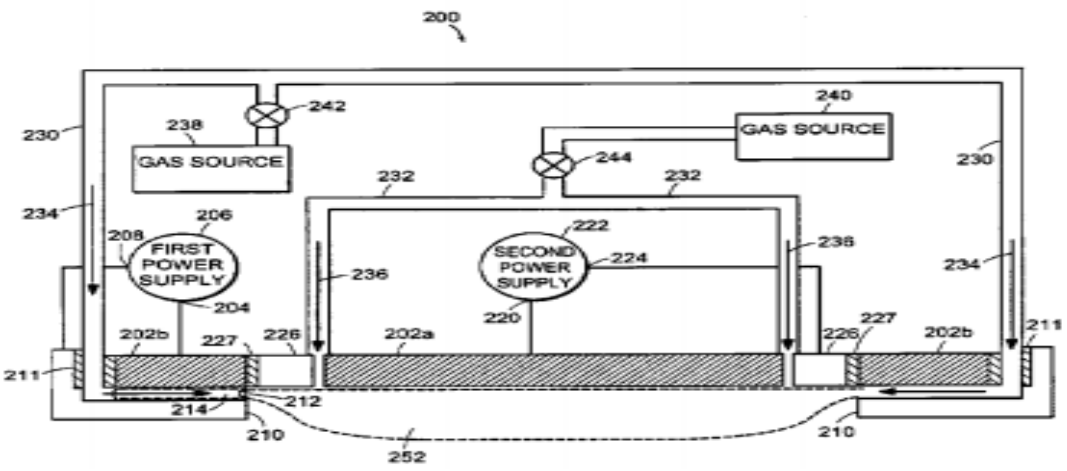

Figure 2A, reproduced above, shows a cross-sectional view of plasma generating apparatus 200 with segmented cathode 202. *Id.* at 5:43–45. Such segmented cathode has inner cathode section 202*a* and outer cathode section 202b. *Id.* at 5:45–47. Outer cathode 202*b* is coupled to first output 204 of first power supply 206, which can operate in a constant power mode or a constant voltage mode. *Id.* at 5:56–67. Second output 208 of first power supply 206 is coupled to first anode 210 that has insulator 211 to isolate it from outer cathode section 202*b*. *Id.* at 6:5–7.

Gap 212 is formed between first anode 210 and outer cathode section 202*b* that is sufficient to allow current to flow through region 214 within gap 212. *Id.* at 6:34–38. Gap 212 can be a plasma generator where plasma is ignited in gap 212 from feed gas 234, such as argon, fed from gas line 230. *Id.* at 6:59–61; 8:1–3, 10–11. Such an ignition condition and plasma development in the gap can be optimized by crossed electric and magnetic fields in gap 212 that trap electrons and ions improving the efficiency of the ionization process. *Id.* at 6:61–67. Gap 212 can be configured to generate excited atoms, which can increase the density of plasma, from ground state atoms. *Id.* at 6:44–46. "Since excited atoms generally require less energy to ionize than ground state gas atoms, a volume of excited atoms can generate higher density plasma than a similar volume of ground state feed gas atoms for the same input energy." *Id.* at 6:46–50.

Gap 212 facilitates high input power by having additional feed gas supplied to gap 212 that displaces some of the already developing plasma and absorbs any excess power applied to the plasma. *Id.* at 7:1–6. Such absorption prevents the plasma from contracting and terminating. *Id.* at 7:6–

9. Feed gases 234, 236 are introduced into the chamber from more than one feed source, such as feed source 238, 240, through gas lines 230, 232 that may include in-line gas valves 242, 244 to control gas flow to the chamber. *Id.* at 8:1–5. Pulsing the feed gas can help generate excited atoms, including metastable atoms, by increasing the instantaneous pressure in gap 212, while the average pressure in the chamber is unchanged. *Id.* at 8:23–28.

Second power supply 222 applies high power pulses between inner cathode section 202*a* and second anode 226 after an appropriate volume of initial plasma is present in region 252. *Id.* at 12:1–5. "The high-power pulses create an electric field 254 between the inner cathode section 202*b* and the second anode 226 that strongly-ionizes the initial plasma thereby creating a high-density plasma in the region 252." *Id.* at 12:5–9. These high power pulses from second power supply 222, which add additional power to an already strongly ionized plasma, super-ionizes the high-density plasma in region 252. *Id.* at 11:54–57. The '652 patent defines "super-ionized" to mean that "at least 75% of the neutral atoms in the plasma are converted to ions." *Id.* at 5:8–10.

Figure 2B, reproduced below, shows a more detailed cross-sectional view of the segmented cathode of Figure 2A.

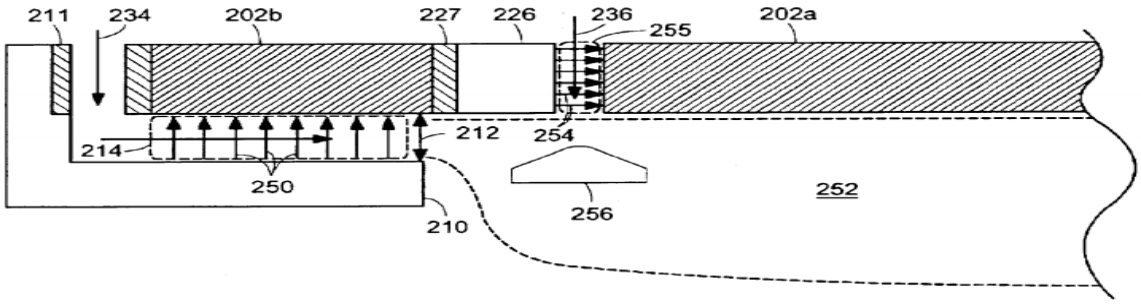

FIG. 2B

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