

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FUJITSU SEMICONDUCTOR LIMITED, FUJITSU SEMICONDUCTOR AMERICA, INC., ADVANCED MICRO DEVICES, INC., RENESAS ELECTRONICS CORPORATION, RENESAS ELECTRONICS AMERICA, INC., GLOBAL FOUNDRIES U.S., INC., GLOBALFOUNDRIES DRESDEN MODULE ONE LLC & CO. KG, GLOBALFOUNDRIES DRESDEN MODULE TWO LLC & CO. KG, TOSHIBA AMERICA ELECTRONIC COMPONENTS, INC., TOSHIBA AMERICA INC., TOSHIBA AMERICA INFORMATION SYSTEMS, INC., TOSHIBA CORPORATION, and THE GILLETTE COMPANY,
Petitioners,

v.

ZOND, LLC,
Patent Owner.

Case IPR2014-00782¹
Patent 7,147,759 B2

Before KEVIN F. TURNER, DEBRA K. STEPHENS, JONI Y. CHANG, SUSAN L.C. MITCHELL, and JENNIFER MEYER CHAGNON,
Administrative Patent Judges.

CHANG, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Cases IPR2014-00850, IPR2014-00986, and IPR2014-01059 have been joined with the instant *inter partes* review.

I. INTRODUCTION

Taiwan Semiconductor Manufacturing Company, Ltd. and TSMC North America Corporation (collectively, “TSMC”) filed a Petition requesting an *inter partes* review of claims 22–33, 37, 46, 48, and 50 of U.S. Patent No. 7,147,759 B2 (Ex. 1301, “the ’759 patent”). Paper 2 (“Pet.”). Patent Owner Zond, LLC (“Zond”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). We instituted the instant trial on October 1, 2014, pursuant to 35 U.S.C. § 314. Paper 11 (“Dec.”).

Subsequent to institution, we granted the revised Motions for Joinder filed by other Petitioners (collectively, “GlobalFoundries”) listed in the Caption above, joining Cases IPR2014-00850, IPR2014-00986, and IPR2014-01059 with the instant trial (Papers 14–16), and also granted a Joint Motion to Terminate with respect to TSMC (Paper 32). Zond filed a Response (Paper 28 (“PO Resp.”)), and GlobalFoundries filed a Reply (Paper 39 (“Reply”)). Oral hearing² was held on June 8, 2015, and a transcript of the hearing was entered into the record. Paper 47 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This final written decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, we determine that GlobalFoundries has shown, by a preponderance of the evidence, that claims 22–33, 37, 46, 48, and 50 of the ’759 patent are unpatentable under 35 U.S.C. § 103(a).

² The hearings for this review and the following *inter partes* reviews were consolidated: IPR2014-00781, IPR2014-00800, IPR2014-00802, IPR2014-00805, IPR2014-01083, IPR2014-01086, and IPR2014-01087.

A. Related District Court Proceedings

The parties indicate that the '759 patent was asserted in *Zond, LLC v. Advanced Micro Devices, Inc.*, No.1:13-cv-11577-DPW (D. Mass.), and identify other proceedings in which Zond asserted the '759 patent. Pet. 1; Paper 7; Ex. 1320.

B. The '759 Patent

The '759 patent relates to a high-power pulsed magnetron sputtering apparatus. Ex. 1301, Abs. At the time of the invention, sputtering was a well-known technique for depositing films on semiconductor substrates. *Id.* at 1:6–13. The '759 patent indicates that prior art magnetron sputtering systems deposit films having low uniformity and poor target utilization—the target material erodes in a non-uniform manner. *Id.* at 1:55–62. To address these problems, the '759 patent discloses that increasing the power applied between the target and anode can increase the amount of ionized gas and, therefore, increase the target utilization. *Id.* at 2:60–62. However, increasing the power also “increases the probability of establishing an undesirable electrical discharge (an electrical arc) in the process chamber.” *Id.* at 2:63–67.

According to the '759 patent, forming a weakly-ionized plasma substantially eliminates the probability of establishing a breakdown condition in the chamber when high-power pulses are applied between the cathode and anode. *Id.* at 7:17–21. Once the weakly-ionized plasma is formed, high-power pulses are applied between the cathode and anode to

generate a strongly-ionized plasma from the weakly-ionized plasma. *Id.* at 7:27–30, 7:65–66.

C. Illustrative Claims

Claims 22–33, 37, 46, 48, and 50 depend, directly or indirectly, from claim 20. Claims 20 and 32, reproduced below, are illustrative:

20. A method of generating sputtering flux, the method comprising:

a) ionizing a feed gas to generate a weakly-ionized plasma proximate to a sputtering target;

b) generating a magnetic field proximate to the weakly-ionized plasma, the magnetic field substantially trapping electrons in the weakly-ionized plasma proximate to the sputtering target; and

c) applying *a voltage pulse* to the weakly-ionized plasma, an amplitude and a rise time of the voltage pulse being chosen to *increase an excitation rate of ground state atoms* that are present in the weakly-ionized plasma to create a multi-step ionization process that generates a strongly-ionized plasma, which comprises ions that sputter target material, from the weakly-ionized plasma, *the multi-step ionization process comprising exciting the ground state atoms to generate excited atoms, and then ionizing the excited atoms within the weakly-ionized plasma without forming an arc discharge.*

Ex. 1301, 22:41–61 (emphases added).

32. The method of claim 20 wherein the peak plasma density of the weakly-ionized plasma is less than about 10^{12} cm^{-3} .

Id. at 23:33–35.

D. Prior Art Relied Upon

GlobalFoundries relies upon the following prior art references:

Wang US 6,413,382 B1 July 2, 2002 (Ex. 1305)

D.V. Mozgrin et al., *High-Current Low-Pressure Quasi-Stationary Discharge in a Magnetic Field: Experimental Research*, 21 PLASMA PHYSICS REPORTS 400–409 (1995) (Ex. 1303, “Mozgrin”).

A. A. Kudryavtsev and V.N. Skrebov, *Ionization Relaxation in a Plasma Produced by a Pulsed Inert-Gas Discharge*, 28(1) SOV. PHYS. TECH. PHYS. 30–35 (1983) (Ex. 1304, “Kudryavtsev”).

E. Grounds of Unpatentability

We instituted the instant trial based on the following grounds of unpatentability (Dec. 26):

Claims	Basis	References
22–26, 28–31, 37, 46, and 48	§ 103(a)	Wang and Kudryavtsev
27, 32, 33, and 50	§ 103(a)	Wang, Kudryavtsev, and Mozgrin

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see also In re Cuozzo Speed Techs., LLC*, No. 2014-1301, 2015 WL 4097949, at *5–8 (Fed. Cir. July 8, 2015) (“Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA,”³ and “the standard was

³ The Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284 (2011) (“AIA”).

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