

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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FUJITSU SEMICONDUCTOR LIMITED, FUJITSU SEMICONDUCTOR AMERICA, INC., ADVANCED MICRO DEVICES, INC., RENESAS ELECTRONICS CORPORATION, RENESAS ELECTRONICS AMERICA, INC., GLOBALFOUNDRIES 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  
Petitioner,

v.

ZOND, LLC,  
Patent Owner.

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Case IPR2014-00818<sup>1</sup>  
Patent 6,853,142 B2

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

TURNER, *Administrative Patent Judge.*

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

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<sup>1</sup> Cases IPR2014-00866, IPR2014-01012, and IPR2014-01075 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 1, 3–10, 12, 15, 17–20, and 42 of U.S. Patent No. 6,853,142 B2 (Ex. 1001, “the ’142 Patent”). Paper 1 (“Pet.”). Patent Owner Zond, LLC (“Zond”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). We instituted the instant trial on October 20, 2014, pursuant to 35 U.S.C. § 314. Paper 9 (“Dec.”).

Subsequent to institution, we granted the revised Motions for Joinder filed by other Petitioners (collectively, “GlobalFoundries”) listed in the Caption above, joining Cases IPR2014-00866, IPR2014-01012, and IPR2014-01075 with the instant trial (Papers 12–14), and also granted a Joint Motion to Terminate with respect to TSMC (Paper 34). Zond filed a Response (Paper 26 (“PO Resp.”)), and GlobalFoundries filed a Reply (Paper 42 (“Reply”)). Oral hearing<sup>2</sup> was held on June 12, 2015, and a transcript of the hearing was entered into the record. Paper 49 (“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 1, 3–10, 12, 15, 17–20, and 42 of the ’142 Patent are unpatentable under 35 U.S.C. § 103(a).

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<sup>2</sup> The hearings for this review and the following *inter partes* reviews were consolidated: IPR2014-00807, IPR2014-00808, IPR2014-00819, IPR2014-00821, IPR2014-00827, IPR2014-01098, IPR2014-01099, and IPR2014-01100.

*A. Related District Court Proceedings*

The parties indicate that the '142 Patent was asserted in numerous proceedings in Massachusetts: 1:13-cv-11570-RGS (*Zond v. Intel*); 1:13-cv-11577-DPW (*Zond v. AMD, Inc.*); 1:13-cv-11581-DJC (*Zond v. Toshiba Am. Elec. Comp. Inc.*); 1:13-cv-11591-RGS (*Zond v. SK Hynix, Inc.*); 1:13-cv-11625-NMG (*Zond v. Renesas Elec. Corp.*); 1:13-cv-11634-WGY (*Zond v. Fujitsu*); and 1:13-cv-11567-DJC (*Zond v. The Gillette Co.*). Pet. 1; Paper 5.

*B. The '142 Patent*

The '142 Patent relates to methods and apparatus for generating high-density plasma. Ex. 1001, Abs. At the time of the invention, sputtering was a well-known technique for depositing films on semiconductor substrates. *Id.* at 1:16–24. The '142 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 3:32–36. To address these problems, the '142 Patent discloses that increasing the power applied between the target and anode can increase the uniformity and density in the plasma. *Id.* at 3:37–44. However, increasing the power also “can increase the probability of generating an electrical breakdown condition leading to an undesirable electrical discharge (an electrical arc) in the chamber 104.” *Id.*

According to the '142 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 6:21–30. 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 7:23–36. The '142 Patent also discloses that the provision of the feed gas to the plasma allows for homogeneous diffusion of the feed gas in the weakly-ionized plasma and allows for the creation of a highly uniform strongly-ionized plasma. *Id.* at 6:31–35.

### *C. Illustrative Claim*

Of the challenged claims, claims 1 and 10 are the only independent claims. Claims 3–9, 12, 15, 17–20, and 42 depend, directly or indirectly, from claims 1 or 10. Claim 1, reproduced below, is illustrative:

1. An apparatus for generating a strongly-ionized plasma in a chamber, the apparatus comprising:

an ionization source that generates a weakly-ionized plasma from a feed gas, the weakly-ionized plasma reducing the probability of developing an electrical breakdown condition in the chamber;

a power supply that supplies power to the weakly-ionized plasma though an electrical pulse applied across the weakly-ionized plasma, the electrical pulse having a magnitude and a rise-time that is sufficient to increase the density of the weakly-ionized plasma to generate a strongly-ionized plasma; and

a gas line that supplies feed gas to the strongly-ionized plasma, *the feed gas diffusing the strongly-ionized plasma, thereby allowing additional power from the pulsed power supply to be absorbed by the strongly-ionized plasma.*

Ex. 1001, 20:35–52 (emphasis added).

*D. Prior Art Relied Upon*

Based on the instituted grounds, GlobalFoundries relies upon the following prior art references:

Lantsman	US 6,190,512	Feb. 20, 2001	(Ex. 1004)
Wang	US 6,413,382	July 2, 2002	(Ex. 1005)

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. 1003) (hereinafter “Mozgrin”).

*E. Grounds of Unpatentability*

We instituted the instant trial based on the following grounds of unpatentability (Dec. 23):

Claim(s)	Basis	References
1, 3–7, 9, 10, 12, 15, 19, 20, and 42	§ 103(a)	Wang and Lantsman
8, 17, and 18	§ 103(a)	Wang, Lantsman, 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*, 793 F.3d 1268, 1275–79 (Fed. Cir. 2015) (“Congress implicitly approved the broadest reasonable interpretation standard in

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