

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., 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.

Case IPR2014-00818¹
Patent 6,853,142 B2

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

¹ 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 hearing² 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).

² 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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