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Paper 47
Entered: September 25, 2015

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
Petitioner,

v.

ZOND, LLC,
Patent Owner.

Case IPR2014-00819[1]
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

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[1] Cases IPR2014-00867, IPR2014-01014, and IPR2014-01046 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 21, 24, 26–28, 31, 32, 37, and 38 of U.S. Patent No. 6,853,142 B2 (Ex. 1201, "the '142 Patent"). Paper 2 ("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 IPR2014-00867, IPR2014-01014, and IPR2014-01046 with the instant trial (Papers 12–14), and also granted a Joint Motion to Terminate with respect to TSMC (Paper 32). Zond filed a Response (Paper 26 ("PO Resp.")), and GlobalFoundries filed a Reply (Paper 39 ("Reply")). Oral hearing[2] was held on June 12, 2015, and a transcript of the hearing was entered into the record. Paper 46 ("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 21, 24, 26–28, 31, 32, 37, and 38 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, IPR2014-00818, 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. 1201, 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 Claims

Of the challenged claims, claims 21 and 31 are the only independent claims. Claims 24, 26–28, 32, 37, and 38 depend, directly or indirectly, from claim 21 or 31. Claims 21 and 31, reproduced below, are illustrative:

> 21. An apparatus for generating a strongly-ionized plasma, the apparatus comprising:
>
> an anode;
>
> a cathode that is positioned adjacent to the anode and forming a gap there between;
>
> an ionization source that generates a weakly-ionized plasma proximate to the cathode, the weakly-ionized plasma reducing the probability of developing an electrical breakdown condition between the anode and the cathode; and
>
> a power supply that produces an electric field across the gap, the electric field generating excited atoms in the weakly-ionized plasma and generating secondary electrons from the cathode, the secondary electrons ionizing the excited atoms, thereby creating the strongly-ionized plasma.
>
> 31. A method for generating a strongly-ionized plasma, the method comprising:
>
> ionizing a feed gas to generate a weakly-ionized plasma proximate to a cathode, the weakly-ionized plasma reducing the

probability of developing an electrical breakdown condition proximate to the cathode; and

applying an electric field across the weakly-ionized plasma in order to excite atoms in the weakly-ionized plasma and to generate secondary electrons from the cathode, the secondary electrons ionizing the excited atoms, thereby creating the strongly-ionized plasma.

Ex. 1201, 21:61–22:9, 22:40–50.

D. Prior Art Relied Upon

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

Wang US 6,413,382 July 2, 2002 (Ex. 1205)

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 (Jan. 1983) (Ex. 1204) (hereinafter, "Kudryavtsev").

E. Ground of Unpatentability

We instituted the instant trial based on the following ground of unpatentability (Dec. 22):

Claims	**Basis**	**References**
21, 24, 26–28, 31, 32, 37, and 38	§ 103(a)	Wang and Kudryavtsev

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

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