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Paper 9
Entered: October 20, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

ZOND, LLC,
Patent Owner.

Case IPR2014-00819
Patent 6,853,142 B2

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

TURNER, *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 21, 24, 26–28, 31, 32, 37, and 38 of U.S. Patent No. 6,853,142 B2 ("the '142 Patent"). Paper 2 ("Pet."). Zond, LLC ("Zond") filed a Preliminary Response. Paper 8 ("Prelim. Resp."). We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted "unless . . . 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 21, 24, 26–28, 31, 32, 37, and 38 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 21, 24, 26–28, 31, 32, 37, and 38 of the '142 Patent.

A. Related Matters

TSMC indicates that the '142 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 matters where Zond asserted the claims of the '142 Patent against third parties, as well as other Petitions for *inter partes* review that are related to this proceeding. *Id*.

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 independent, and the rest depend ultimately from those two claims. 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 and 22:40–50.

D. Prior Art Relied Upon

TSMC relies upon the following prior art references:

Wang US 6,413,382 B1 July 2, 2002 (Ex. 1205)

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. 1203) (hereinafter "Mozgrin").

A. A. Kudryavtsev and V.N. Skerbov, *Ionization Relaxation in a Plasma Produced by a Pulsed Inert-Gas Discharge*, 28 SOV. PHYS. TECH. PHYS. 30–35 (Jan. 1983) (Ex. 1204) (hereinafter "Kudryavtsev").

D.V. Mozgrin, *High-Current Low-Pressure Quasi-Stationary Discharge in a Magnetic Field: Experimental Research*, Thesis at Moscow Engineering Physics Institute (1994) (Ex. 1207) (hereinafter "Mozgrin Thesis").[1]

E. Asserted Grounds of Unpatentability

TSMC asserts the following grounds of unpatentability:

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

[1] The Mozgrin Thesis is a Russian-language reference. The citations to the Mozgrin Thesis are to the certified English-language translation submitted by TSMC (Ex. 1206).

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