

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

ZOND, LLC,
Patent Owner.

Case IPR2014-00782
Patent 7,147,759 B2

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

CHANG, *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 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.”); Paper 3. Zond, LLC (“Zond”), filed a Preliminary Response. Paper 9 (“Prelim. Resp.”).

We have jurisdiction under 35 U.S.C. § 314. The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides:

THRESHOLD.—The Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 shows that 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 the Petition and 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 22–33, 37, 46, 48, and 50 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 22–33, 37, 46, 48, and 50 of the ’759 patent.

A. *Related District Court Proceedings*

TSMC indicates that the ’759 patent was asserted in *Zond, LLC v. Fujitsu*, No.1:13-cv-11634-WGY (D. Mass.). Pet. 1. TSMC also identifies other proceedings in which Zond asserted the ’759 patent. *Id.*

B. Related Inter Partes Reviews

Intel Corporation (“Intel”) filed a Petition to institute an *inter partes* review in *Intel Corp. v. Zond, LLC*, Case IPR2014-00446, challenging the same claims based on the same grounds of unpatentability as those in the instant proceeding. Compare IPR2014-00446, Paper 4 (“’446 Pet.”), 2–60, with Pet. 3–60. On August 27, 2014, we instituted an *inter partes* review of claims 22–33, 37, 46, 48, and 50 of the ’759 patent in IPR2014-00446. The trial, however, was terminated in light of the Written Settlement Agreement, made in connection with the termination of the proceeding in accordance with 35 U.S.C. § 317(b) and 37 C.F.R. § 42.74(b), between Intel and Zond. In view of the termination of Intel’s proceeding, TSMC’s Motion for Joinder, seeking to join the instant proceeding with IPR2014-00445, is dismissed as moot, in a separate decision. Papers 8, 13.

The following Petitions for *inter partes* review also challenge the same claims based on the same grounds of unpatentability as those in IPR2014-00446 and in the instant proceeding: *Fujitsu Semiconductor Ltd. v. Zond, LLC*, Case IPR2014-00850; *The Gillette Co. v Zond, LLC*, Case IPR2014-00986; and *Advanced Micro Devices, Inc. v. Zond, LLC*, Case IPR2014-01059.

C. The ’759 patent

The ’759 patent relates to a high-power pulsed magnetron sputtering method. 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.

D. 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.

E. Prior Art Relied Upon

TSMC 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”).

F. Asserted Grounds of Unpatentability

TSMC asserts the following grounds of unpatentability:

Claims	Basis	References
22, 23, 37, 46, 48, 50	§ 103(a)	Mozgrin and Kudryavtsev
22–26, 28–31, 37, 46, 48	§ 103(a)	Wang and Kudryavtsev
27, 32, 33, 50	§ 103(a)	Wang, Kudryavtsev, and Mozgrin

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