

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GLOBALFOUNDRIES U.S., INC.,  
GLOBALFOUNDRIES DRESDEN MODULE ONE LLC & CO. KG,  
GLOBALFOUNDRIES DRESDEN MODULE TWO LLC & CO. KG, and  
THE GILLETTE COMPANY,  
Petitioner,

v.

ZOND, LLC,  
Patent Owner.

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Case IPR2014-01087<sup>1</sup>  
Patent 7,147,759 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.*

CHANG, *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> Case IPR2014-00984 has been joined with the instant *inter partes* review.

## I. INTRODUCTION

GLOBALFOUNDRIES U.S., Inc., GLOBALFOUNDRIES Dresden Module One LLC & Co. KG, and GLOBALFOUNDRIES Dresden Module Two LLC & Co. KG (collectively, “the GlobalFoundries entities”) filed a Petition requesting an *inter partes* review of claims 2, 3, 5–9, 13–16, 19, 41–43, and 45 of U.S. Patent No. 7,147,759 B2 (Ex. 1101, “the ’759 patent”). Paper 2 (“Pet.”). Patent Owner Zond, LLC (“Zond”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). Upon consideration of the Petition and Preliminary Response, we instituted the instant trial on October 10, 2014, pursuant to 35 U.S.C. § 314. Paper 9 (“Dec.”).

Subsequent to institution, we granted the revised Motion for Joinder filed by The Gillette Company (“Gillette”), joining Case IPR2014-00984 with the instant trial.<sup>2</sup> Paper 12. Zond filed a Response (Paper 23 (“PO Resp.”)), and GlobalFoundries filed a Reply (Paper 26 (“Reply”)). Oral hearing<sup>3</sup> was held on June 8, 2015, and a transcript of the hearing was entered into the record. Paper 34 (“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 2, 3, 5–9, 13–16, 19, 41–43, and 45 of the ’759 patent are unpatentable under 35 U.S.C. § 103(a).

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<sup>2</sup> In this Decision, we refer to the GlobalFoundries entities (the original Petitioner) and Gillette as “GlobalFoundries,” for efficiency.

<sup>3</sup> The hearings for this review and the following *inter partes* reviews were consolidated: IPR2014-00781, IPR2014-00782, IPR2014-00800, IPR2014-00802, IPR2014-00805, IPR2014-01083, and IPR2014-01086.

*A. Related District Court Proceedings*

The parties indicate that the '759 patent was asserted in *Zond, LLC v. Advanced Micro Devices, Inc.*, No.1:13-cv-11577-DPW (D. Mass.), and identify other proceedings in which Zond asserted the '759 patent. Paper 5; Ex. 1034.

*B. The '759 Patent*

The '759 patent relates to a high-power pulsed magnetron sputtering apparatus. Ex. 1101, 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.

*C. Illustrative Claims*

Claims 2, 3, 5–9, 13–16, 19, 41–43, and 45 depend, directly or indirectly, from claim 1. Claims 1 and 6, reproduced below, are illustrative:

1. A magnetically enhanced sputtering source comprising:

- a) an anode;
- b) a cathode assembly that is positioned adjacent to the anode, the cathode assembly including a sputtering target;
- c) an ionization source that generates a weakly-ionized plasma proximate to the anode and the cathode assembly;
- d) a magnet that is positioned to generate 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
- e) a *power supply generating a voltage pulse* that produces an electric field between the cathode assembly and the anode, the power supply being configured to generate the voltage pulse with an amplitude and a rise time that *increases 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. 1101, 21:22–48 (emphases added).

6. The sputtering source of claim 1 wherein the rise time of the voltage pulse is *chosen to increase the ionization rate* of the excited atoms in the weakly-ionized plasma.

*Id.* at 21:57–59 (emphasis added).

*D. Prior Art Relied Upon*

GlobalFoundries relies upon the following prior art references:

Wang                      US 6,413,382 B1                      July 2, 2002                      (Ex. 1105)

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. 1103, “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. 1104, “Kudryavtsev”).

*E. Grounds of Unpatentability*

We instituted the instant trial based on the following grounds of unpatentability (Dec. 28):

| Claims                          | Basis    | References                     |
|---------------------------------|----------|--------------------------------|
| 2, 3, 5–9, 13–15, 19, and 41–43 | § 103(a) | Wang and Kudryavtsev           |
| 16 and 45                       | § 103(a) | Wang, Kudryavtsev, 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*, No. 2014-1301, 2015 WL 4097949, at \*5–8 (Fed. Cir. July 8, 2015) (“Congress implicitly approved the broadest reasonable

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