

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 IPR2014-00805¹
Patent 7,811,421 B2

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

CHAGNON, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
Inter Partes Review
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Cases IPR2014-00851, IPR2014-00990, and IPR2014-01069 have been joined with the instant proceeding.

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that Petitioner has shown by a preponderance of the evidence that claims 3–7, 18–20, 31, 32, 36, 40, 41, 44, and 45 of U.S. Patent No. 7,811,421 B2 (Ex. 1101, “the ’421 patent”) are unpatentable.

A. *Procedural History*

Taiwan Semiconductor Manufacturing Company, Ltd. and TSMC North America Corp. (collectively, “TSMC”) filed a Petition (Paper 1, “Pet.”) seeking *inter partes* review of claims 3–7, 18–20, 31, 32, 36, 40, 41, 44, and 45 (“the challenged claims”) of the ’421 patent. TSMC included a Declaration of Uwe Kortshagen, Ph.D. (Ex. 1102) to support its positions. Zond (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”). Pursuant to 35 U.S.C. § 314(a), on October 6, 2014, we instituted an *inter partes* review of the challenged claims to determine if claims 3–5, 18–20, 36, 40, and 41 are unpatentable under 35 U.S.C. § 103 as obvious over the combination of Wang² and Kawamata³; if claims 6, 31, 44, and 45 are unpatentable under 35 U.S.C. § 103 as obvious over the combination of Wang and Lantsman⁴; and if claims 7 and 32 are unpatentable under

² U.S. Patent No. 6,413,382 B1, issued July 2, 2002 (Ex. 1104).

³ U.S. Patent No. 5,958,155, issued Sept. 28, 1999 (Ex. 1109).

⁴ U.S. Patent No. 6,190,512 B2, issued Feb. 20, 2001 (Ex. 1105).

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35 U.S.C. § 103 as obvious over the combination of Wang, Lantsman, and Kawamata. Paper 9 (“Inst. Dec.”).

Subsequent to institution, we granted revised Motions for Joinder filed by other Petitioners listed in the Caption above, joining Cases IPR2014-00851, IPR2014-00990, and IPR2014-01069 with the instant trial (*see* Papers 12, 13), and also granted a Joint Motion to Terminate with respect to TSMC (Paper 30).⁵ Patent Owner filed a Patent Owner Response (Paper 27, “PO Resp.”), along with a Declaration of Larry D. Hartsough, Ph.D. (Ex. 2015) to support its positions. Petitioner filed a Reply (Paper 41, “Reply”) to the Patent Owner Response, along with a Declaration of Lawrence J. Overzet, Ph.D (Ex. 1126). An oral hearing⁶ was held on June 8, 2015. A transcript of the hearing is included in the record. Paper 49 (“Tr.”).

B. Related Proceedings

The parties indicate that the ’421 patent was asserted against Petitioner, as well as other defendants, in seven district court lawsuits pending in the District of Massachusetts. Pet. 1; Paper 5.

C. The ’421 Patent

The ’421 patent relates to a method and apparatus for high-deposition sputtering. Ex. 1101, Abstract. At the time of the invention, sputtering was a well-known technique for depositing films on semiconductor substrates.

⁵ We refer to the remaining parties, listed in the Caption above, collectively, as “Petitioner” throughout this Decision.

⁶ The oral arguments for IPR2014-00781, IPR2014-00782, IPR2014-00800, IPR2014-00802, IPR2014-00805, IPR2014-01083, IPR2014-01086, and IPR2014-01087 were consolidated.

Id. at 1:15–16. As discussed in the '421 patent, prior art magnetron sputtering systems deposited films having low uniformity, poor target utilization (the target material erodes in a non-uniform manner), and relatively low deposition rate (low amount of material deposited on the substrate per unit time). *Id.* at 1:63–2:14. The '421 patent discloses that increasing the power applied to the plasma, in an attempt to increase the target utilization and sputtering yield, can also “increase[] the probability of establishing an undesirable electrical discharge (an electrical arc) in the process chamber.” *Id.* at 3:20–29.

The '421 patent further discloses that using pulsed power can reduce the probability of establishing an electrical breakdown condition, but that large power pulses still can result in undesirable electrical discharges. *Id.* at 3:30–38. According to the '421 patent, however, first 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 the anode.” *Id.* at 9:16–19. Once a 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 9:29–31, 10:8–9. The “probability of establishing a breakdown condition is substantially eliminated because the weakly-ionized plasma has a low-level of ionization that provides electrical conductivity through the plasma. This conductivity greatly reduces or prevents the possibility of a breakdown condition, even when high power is applied to the plasma.” *Id.* at 9:23–28.

D. Illustrative Claim

Each of the challenged claims depends from one of independent claims 1, 17, and 34, which are not challenged in the present Petition.

Claim 1 is illustrative, and is reproduced as follows:

1. A sputtering source comprising:

a) a cathode assembly comprising a sputtering target that is positioned adjacent to an anode; and

b) a power supply that generates a voltage pulse between the anode and the cathode assembly that creates a weakly-ionized plasma and then a strongly-ionized plasma from the weakly-ionized plasma without an occurrence of arcing between the anode and the cathode assembly, an amplitude, a duration and a rise time of the voltage pulse being chosen to increase a density of ions in the strongly-ionized plasma.

Ex. 1101, 22:14–24.

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 In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1275–79 (Fed. Cir. 2015). Claim terms generally are given their ordinary and customary meaning as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Significantly, claims are not interpreted in a vacuum but are part of, and read in light of, the specification. *United States v. Adams*, 383 U.S. 39, 49 (1966) (“[I]t is fundamental that claims are to be construed in the light of

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