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'421 Patent:

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,

v. Zond, LLC.

IPR2014-800[1]*, IPR2014-802*[2] *, and IPR2014-805*[3]

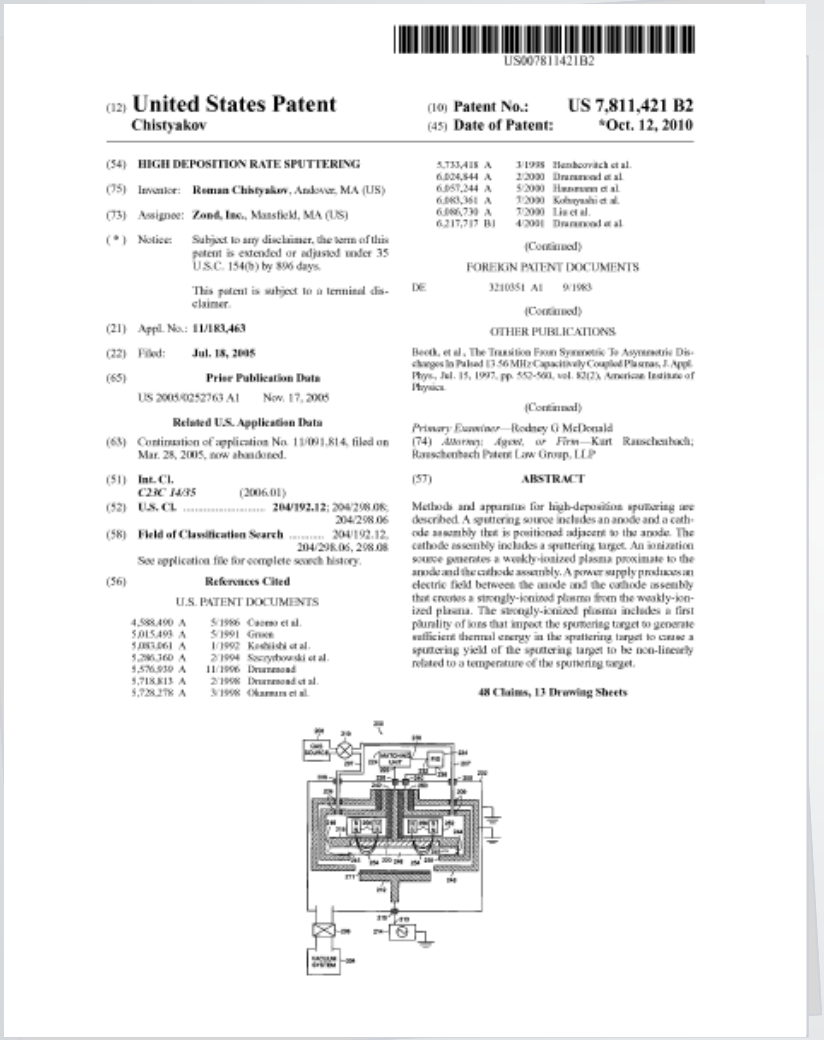
[1] *Cases* IPR2014-844, IPR2014-991, and IPR2014-1037 are joined with the 800
[2] *Cases* IPR2014-848, IPR2014-992, and IPR2014-1071 are joined with the 802
[3] *Cases* IPR2014-851, IPR2014-990, and IPR2014-1069 are joined with the 805

June 8, 2015

Overview

- Overview of '421 Patent
- Grounds Instituted
- Overview of Prior Art
- Summary of Disputes with Respect to Independent Claims
  - Claim Construction
  - Response to Patent Owner's Arguments
- Summary of Disputes and Responses Related to Dependent Claims

The '421 Patent



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(12) **United States Patent**
Chistyakov

(10) **Patent No.: US 7,811,421 B2**
(45) **Date of Patent: *Oct. 12, 2010**

(54) **HIGH DEPOSITION RATE SPUTTERING**

(75) Inventor: **Roman Chistyakov**, Andover, MA (US)

(73) Assignee: **Zond, Inc.**, Mansfield, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 896 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/183,463**

(22) Filed: **Jul. 18, 2005**

(65) **Prior Publication Data**

US 2005/0252763 A1 Nov. 17, 2005

Related U.S. Application Data

(63) Continuation of application No. 11/091,814, filed on Mar. 28, 2005, now abandoned.

(51) **Int. Cl.**
C23C 14/35 (2006.01)

(52) **U.S. Cl.** **204/192.12**; 204/298.08; 204/298.06

(58) **Field of Classification Search** 204/192.12, 204/298.06, 298.08

See application file for complete search history.

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(57) **ABSTRACT**

Methods and apparatus for high-deposition sputtering are described. A sputtering source includes an anode and a cathode assembly that is positioned adjacent to the anode. The cathode assembly includes a sputtering target. An ionization source generates a weakly-ionized plasma proximate to the anode and the cathode assembly. A power supply produces an electric field between the anode and the cathode assembly that creates a strongly-ionized plasma from the weakly-ionized plasma. The strongly-ionized plasma includes a first plurality of ions that impact the sputtering target to generate sufficient thermal energy in the sputtering target to cause a sputtering yield of the sputtering target to be non-linearly related to a temperature of the sputtering target.

48 Claims, 13 Drawing Sheets

(10) **Patent No.: US 7,811,421 B2**
(45) **Date of Patent: *Oct. 12, 2010**

(54) **HIGH DEPOSITION RATE SPUTTERING**

US Patent 7,811,421

The '421 Patent

Anode (238)

Cathode Assembly (216)

Pulsed Power Supply (234)

Magnets (256)

Plasma (246)

Feed Gas Source (208)

Substrate (211)

Bias Power Supply (214)

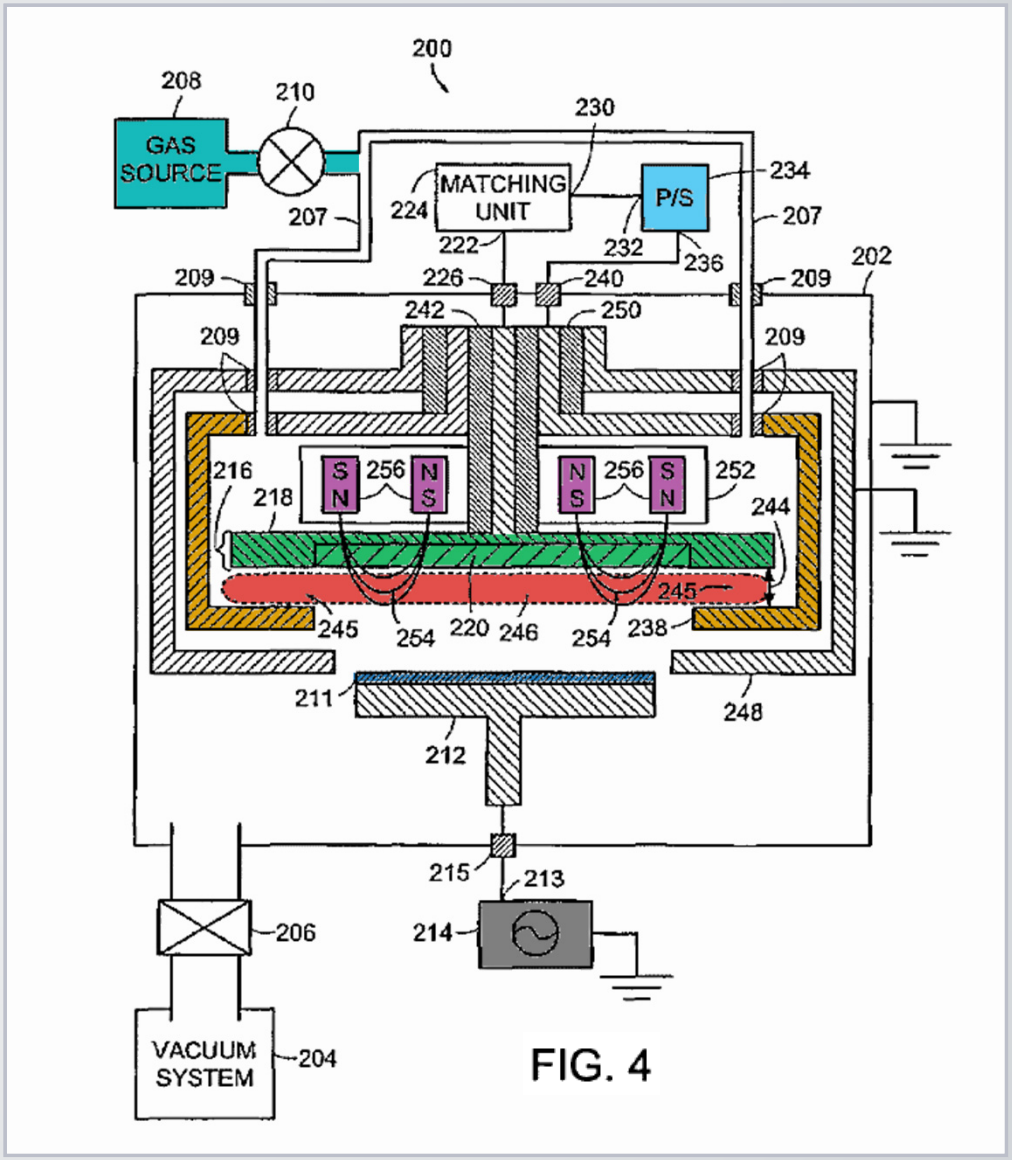

FIG. 4

'421 Patent, Fig. 4

Representative Claim

'421 Patent, Claim 1

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.

'421 Patent, Claim 1

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