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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.

IPR2014-800¹, IPR2014-802², and IPR2014-805³

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



US807811421B2

(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**

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Related U.S. Application Data

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

(51) Int. Cl. **C23C 14/05** (2006.01)

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

(58) **Field of Classification Search** **204/192.12, 204/298.06, 208.08**

See application file for complete search history.

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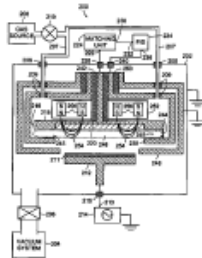
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(57) **ABSTRACT**

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 at 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



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(54) HIGH DEPOSITION RATE SPUTTERING

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The '421 Patent

Anode (238)

Cathode Assembly (216)

Pulsed Power Supply (234)

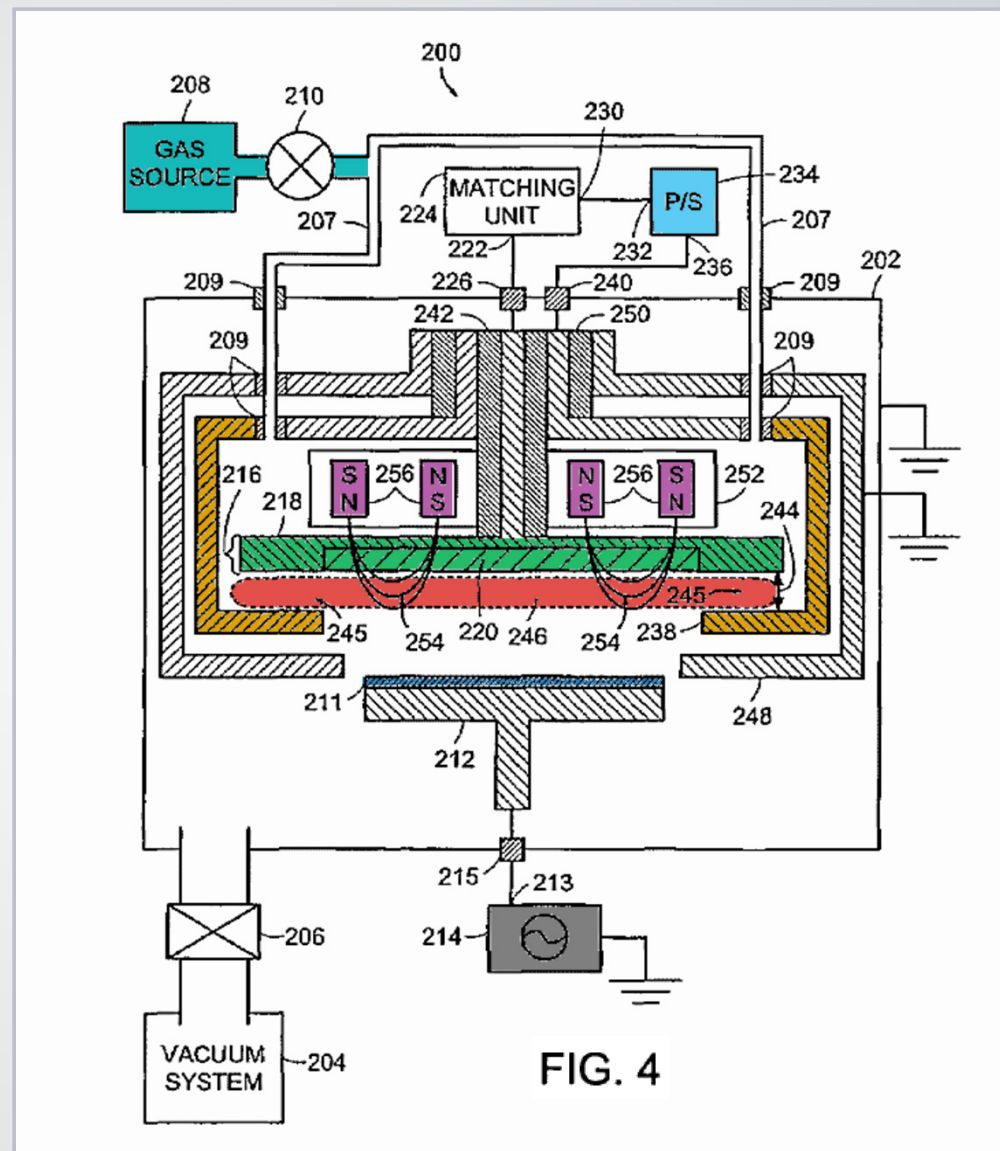
Magnets (256)

Plasma (246)

Feed Gas Source (208)

Substrate (211)

Bias Power Supply (214)



'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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