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United States Patent [19]
Pavate et al.

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- [54] TARGET FOR USE IN MAGNETRON SPUTTERING OF ALUMINUM FOR FORMING METALLIZATION FILMS HAVING LOW DEFECT DENSITIES AND METHODS FOR MANUFACTURING AND USING SUCH TARGET
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[73] Assignee: Applied Materials, Inc., Santa Clara, Calif.
[21] Appl. No.: 08/979,192
[22] Filed: Nov. 26, 1997
[51] Int. Cl. C23C 14/34
[52] U.S. Cl. 204/298.12; 204/298.13; 204/298.16; 204/298.21; 148/237; 420/528
[58] Field of Search 204/298.12, 298.13, 204/298.16, 298.19, 298.21; 148/237; 420/528

G.T. Murray, Preparation and Characterization of Pure Metals, Cubberley et al: "Metals Handbook, 9th Edition, vol. 2, Properties and Selection: Nonferrous Alloys and Pure Metals." Apr. 27, 1983, American Society for Metals, Oh, US XP002094554 86, pp. 709-713.
Abstract for JP 06-280005, Patent Abstracts of Japan, Oct. 1994.
Abstract for JP 03-064447, Patent Abstracts of Japan, Mar. 1991.
Derwent Abstract for JP 52-14519, Aug. 1993.
Abstract for JP 06-017246, Patent Abstracts of Japan, Jan. 1994.
A.S. Pokrovskaya-Soboleva, A.L. Shapiro, T.S. Borisova, L.K. Mazurova, V.I. Razgulayeva, "Electric Strength of Vacuum Gap With Electrodes Made of Carbographite Materials", Proceedings of the Sixth International Symposium on Discharges and Electrical Insulation in Vacuum, Swansea, UK, Jul. 1974, pp. 86-91.

Primary Examiner—Alan Diamond
Attorney, Agent, or Firm—Fliesler, Dubb, Meyer & Lovejoy

[56] References Cited

U.S. PATENT DOCUMENTS

Table with 4 columns: Patent No., Date, Inventor, and Reference No. (e.g., 5,242,566 9/1993 Parker 204/298.2)

FOREIGN PATENT DOCUMENTS

Table with 4 columns: Patent No., Date, Country, and Reference No. (e.g., 0 466 617 A1 1/1992 France)

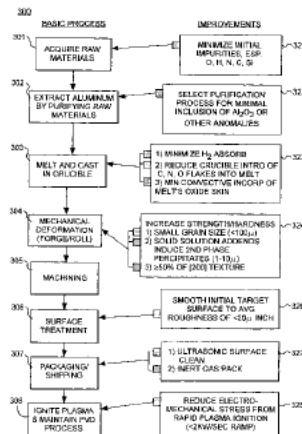
OTHER PUBLICATIONS

PCT Notification of Transmittal of the International Search Report from the International Searching Authority at the European Patent Office dated Mar. 16, 1999, 7 pages.

[57] ABSTRACT

Improved targets for use in DC magnetron sputtering of aluminum or like metals are disclosed for forming metallization films having low defect densities. Methods for manufacturing and using such targets are also disclosed. Conductivity anomalies such as those composed of metal oxide inclusions can induce arcing between the target surface and the plasma. The arcing can lead to production of excessive deposition material in the form of splats or blobs. Reducing the content of conductivity anomalies and strengthening the to-be-deposited material is seen to reduce production of such splats or blobs. Other splat limiting steps include smooth finishing of the target surface and low-stress ramp up of the plasma.

30 Claims, 5 Drawing Sheets



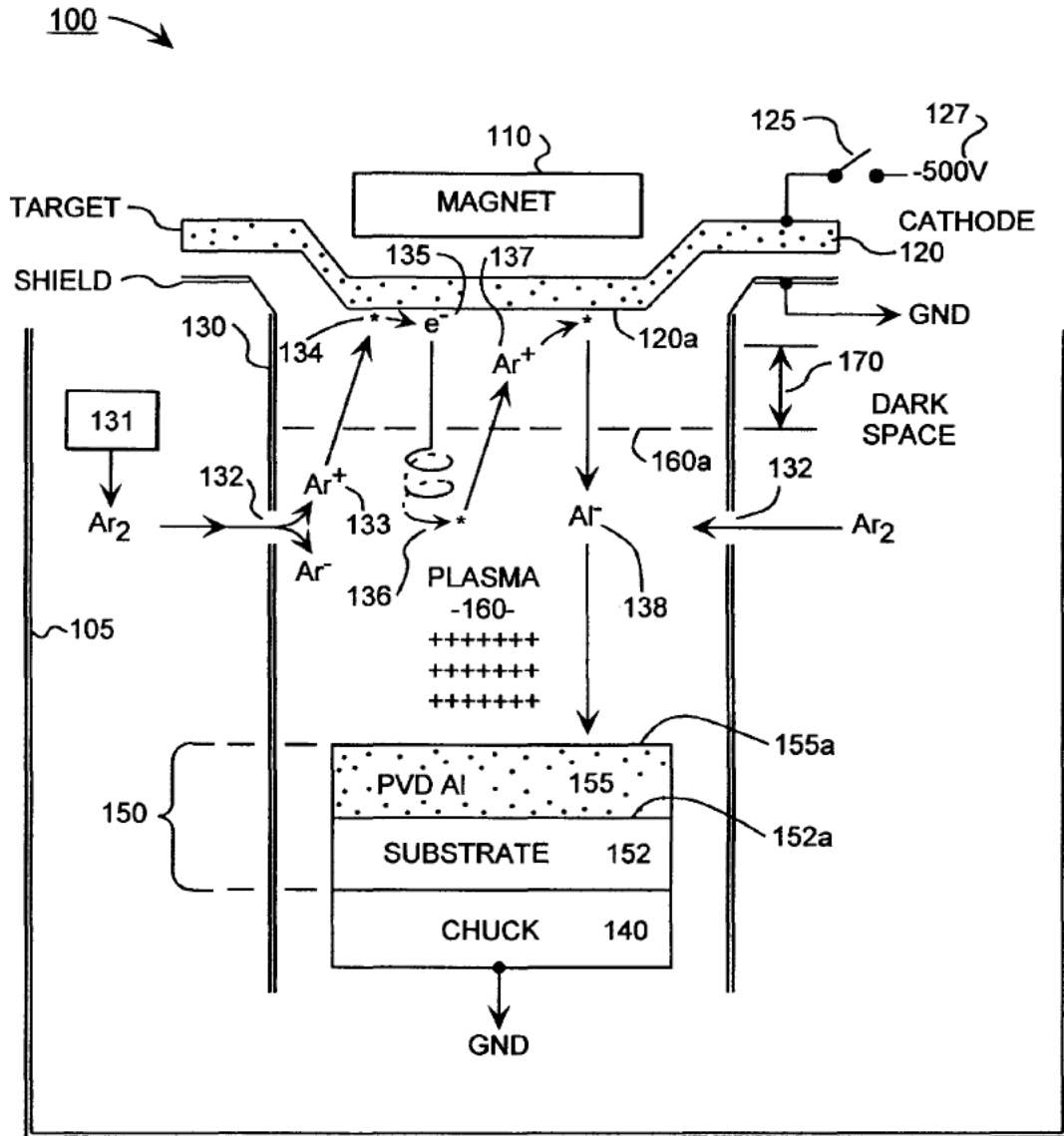


FIG. 1

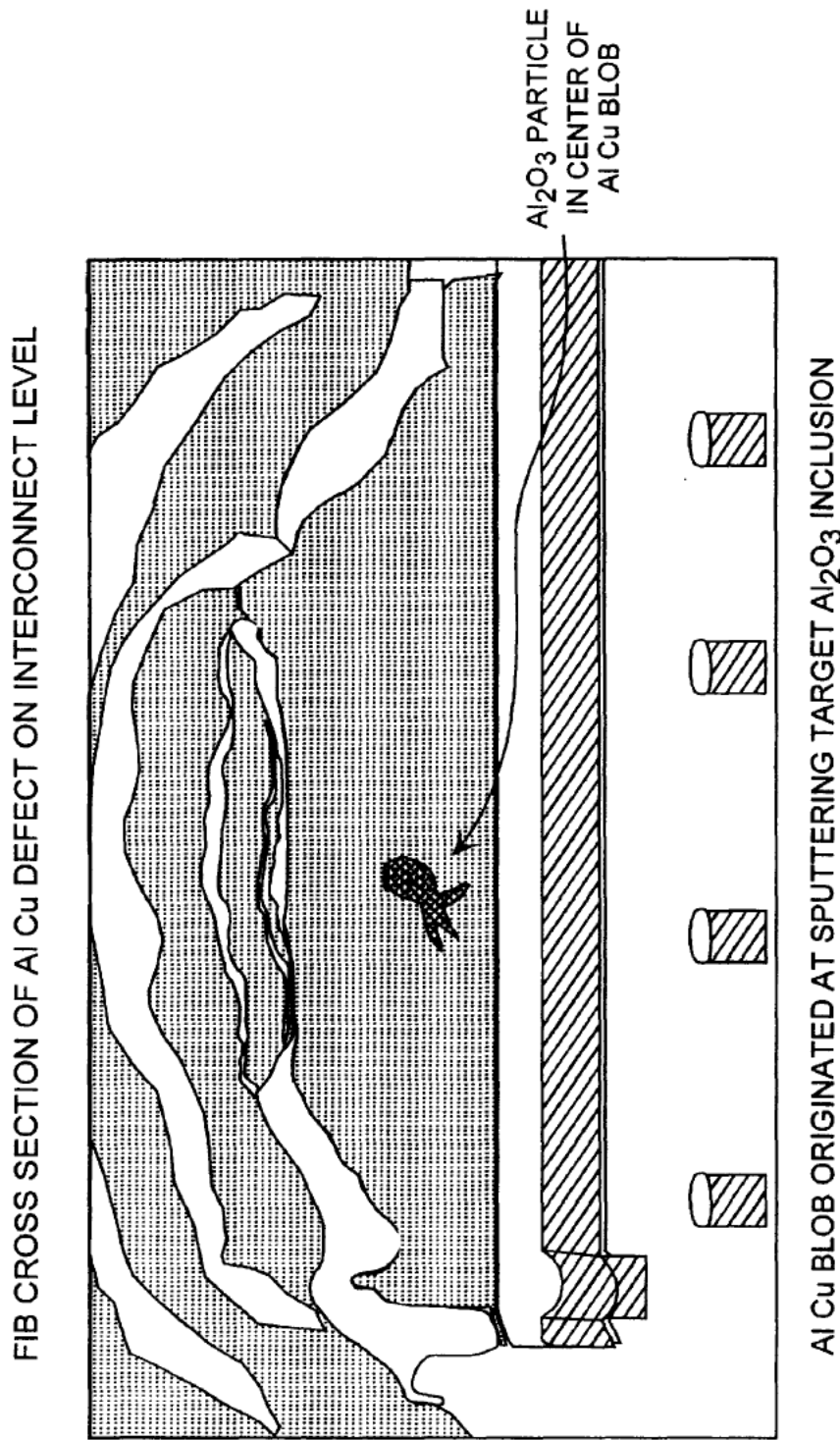


FIG. 2

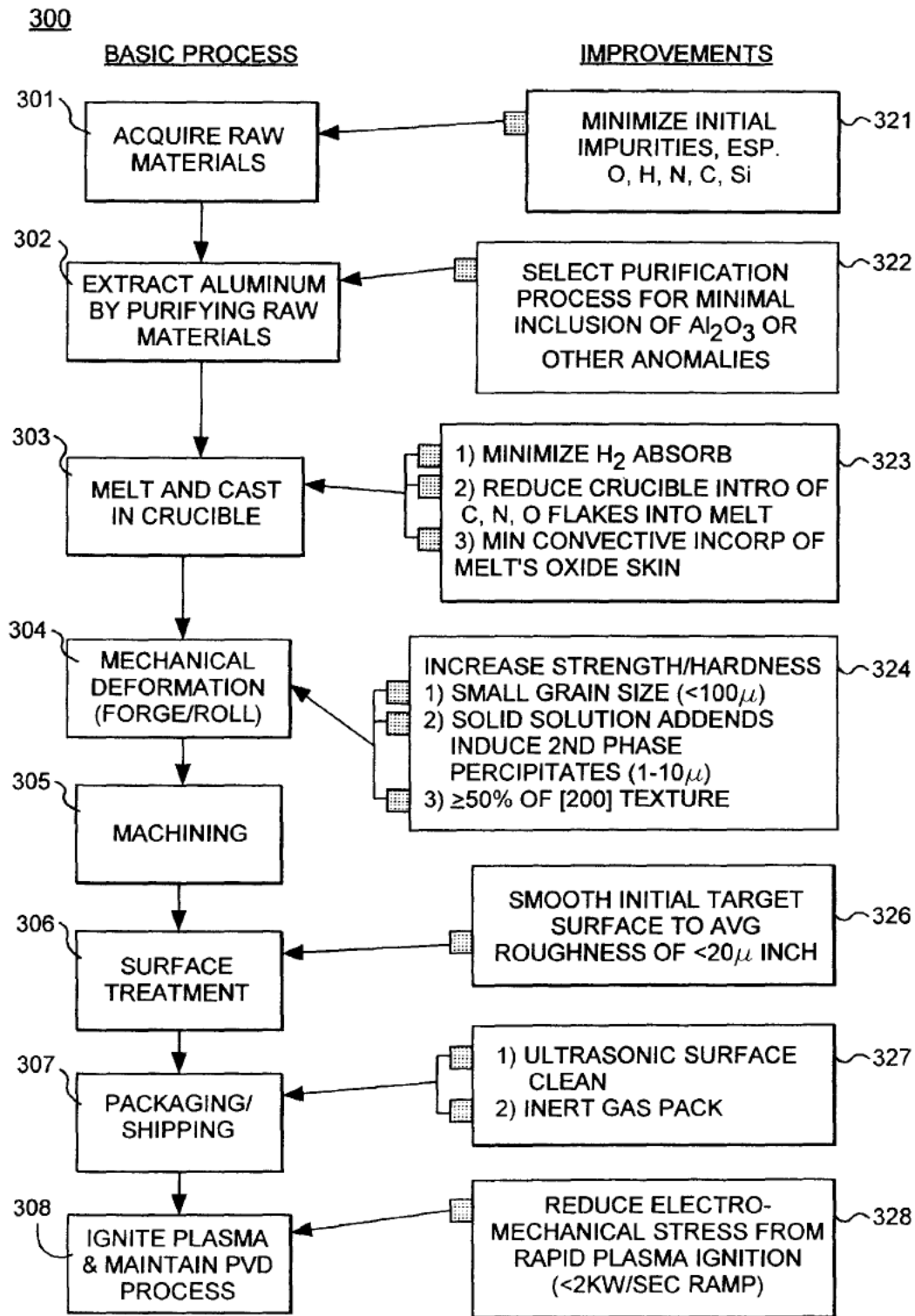


FIG. 3

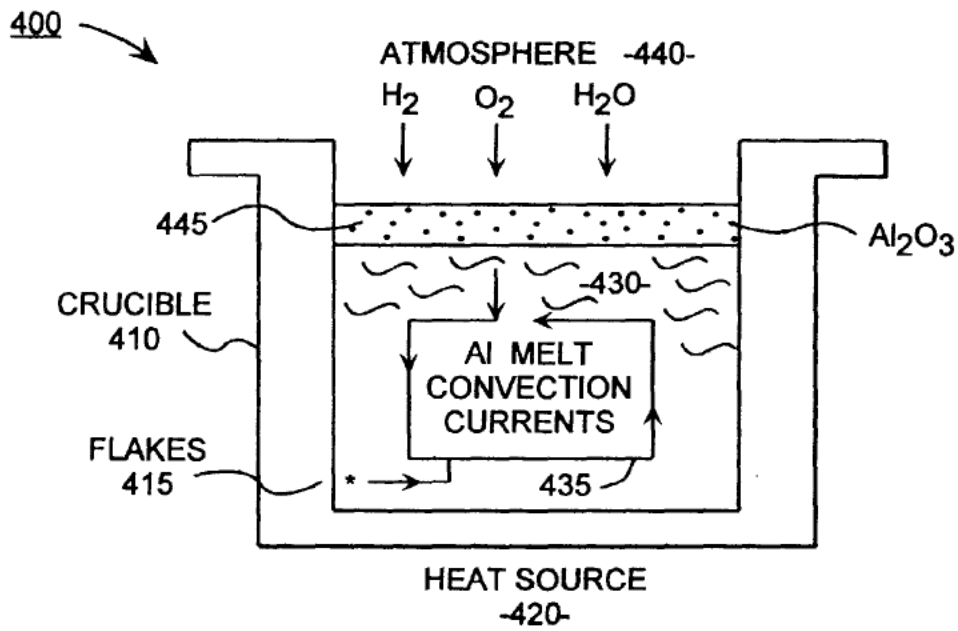


FIG. 4A

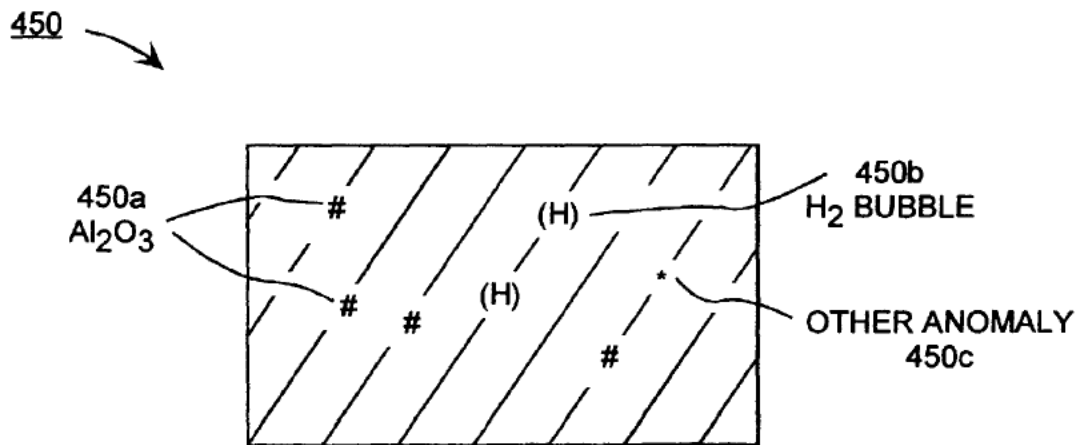


FIG. 4B

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