Title (en)

METHOD AND APPARATUS FOR IONIZED SPUTTERING OF MATERIALS

Title (de)

VERFAHREN UND GEREAT ZUR IONISIERTER MATERIALZERSTAUEBUNG

Title (fr)

PROCEDE ET DISPOSITIF DE PULVERISATION PAR BOMBARDEMENT IONIQUE SUR UN MATERIAU

Publication

EP 0978138 A1 20000209 (EN)

Application

EP 98915648 A 19980421

Priority

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Abstract (en)

[origin: WO9848444A1] An ionized physical vapor deposition apparatus (10, 10a, 10b) is provided with an RF element, preferably a helical coil (30), that surrounds space (11) within a vacuum chamber (12) between a target (16) and a substrate holder (14). RF energy, preferably at about 2 MHz or elsewhere in the 0.1 to 60 MHz range, is coupled into the space to form a secondary plasma (29) in a volume (26) of the space between the substrate holder and the main plasma that is adjacent the target. The secondary plasma ionizes sputtered material which is then attracted toward a substrate (15) on the support by a bias on the substrate and/or by an axial magnetic field to impart directionality to the moving ionized sputtered particles to render them perpendicular to the substrate at incidence, so as to coat the bottoms of narrow high aspect ratio features on the substrate. A window (60) of dielectric material such as quartz, either in the wall of the chamber or inside the chamber, or insulation (86) on the coil, protects the coil from adverse interaction with plasma. Shields (100, 200, 300) between the space and the dielectric material prevent sputtered particles coating the dielectric material. The shields are partitioned or slotted to prevent induced currents in the shields. The shields may be biased to control contamination and may be commonly or individually biased to optimize the uniformity of coating on the substrate and the directionality of the flux of ionized material at the substrate. The shield may be formed of a plurality of angled segments (302) that are spaced to facilitate communication of a secondary RF plasma from adjacent the window to the volume of the chamber where the sputtered material is ionized, with the sections angled and spaced to shadow at least most of the target from the window. Alternatively, electrically conductive shield (100) may be provided in close proximity to the window or insulation, preferably spaced therefrom less than the mean free path of gas atoms in the chamber, so that plasma will not form behind the shield. The shield (100) has at least one axial slit (103) therein to prevent azimuthal or circumferential currents from shorting the coupled energy.

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H01J 37/34; H01J 37/32

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