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(54) Title (EN): METHOD FOR PRODUCTION OF NANOMATERIAL IN VACUUM AND MAGNETRON SPATTERING DEVICE FOR ITS EMBODIMENT

(57) Abstract:
(EN): The method of production of nanomaterial and magnetron sputtering device for its embodiment are presented. The method involves the formation of an active sputtering zone on the disk target surface by means of a rotation magnetic field with a configuration of closed loop, consisting of the involutes of the circumference of a circle of specific radius; the formation of the gas discharge of the said loop shape and toroidal magnetron plasma over the active sputtering zone; ionization of atoms of working gas in the plasma region, their acceleration and bombardment of the target by the obtained ions to form and disperse the cathode spots on its surface; supply of the formed liquid material of the disk target to the plasma region, its cascading decay under conditions of recharging of liquid macrodroplets in the plasma and development of Rayleigh or capillary instability, and cooling and curing of formed nanoparticles outside the plasma region. The magnetron sputtering device contains the vacuum chamber (1) in which the anode (2), the cathode assembly (3) with the disk target (5), the magnetic system with groups of magnets (8) and its rotation rate control unit (15), and the system of liquid cooling of the cathode assembly (4) are located. The possibility of rotation of the magnetic system assisted by the coolant jet in the cooling system is provided. The like poles of each group are located along the corresponding closed loop, consisting of the involutes of the circumference of a circle of specific radius. The control unit contains the housing (16) which rotates along with the magnetic system, permanent magnets (17) and the brake ring (18), the fixed magnetic sensor (20) and piezoelectric elements (21).

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