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DEPOSITION AND PROPERTIES OF THIN BORON FILMS USING A PLANAR MAGNETRON*

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Boron thin films on the surface of metal substrates were obtained using planar magnetron sputtering with a pure boron target. Under normal conditions, boron has a high electrical resistance and ignition of a magnetron discharge with a boron target is impossible. However, since boron is a semiconductor, its resistance decreases as temperature increases. Thus, at the temperature of a boron target heated to 500 C or higher, the ignition of a stable magnetron discharge is already possible. We used a planar magnetron with a boron target heated in a DC discharge with a current of up to 50 mA at an argon and nitrogen pressure of 1 mTorr. Since the boron target was thermally insulated and the magnetron discharge voltage was about 600–700 V, the discharge power was about 30 W. At this power, the target did not crack due to thermal expansion, but it was sufficient to heat the target to an electrically conducting state. At the above discharge parameters, the deposition rate of boron coatings at a distance of 5 cm from a magnetron target of 5.1 cm in diameter was about 150 nm/h. Thin films of boron up to 1 μm thick were obtained and their surface morphology was studied. Structural-phase analysis of boron films was carry out at the "Anomalous Scattering Station" of channel #2 by synchrotron radiation from the electron storage ring VEPP-3 of the Siberian Center for Synchrotron and Terahertz Radiation of the Budker Institute of Nuclear Physics SB RAS. The boron film deposition techniques, as well as the properties of the films have been discussed.

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