CHARACTERISTICS OF THE DISCHARGE FOR HIGH RATE DC MAGNETRON SPUTTERING

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The work aims to study the features of gas discharge plasma used for high-rate sputtering processes for structural and functional coating production. A DC magnetron sputtering of copper target was carried out in argon plasma at an average power density from $10^1$ to $10^2$ W/cm$^2$. Current-voltage and current-pressure characteristics of the magnetron discharge in the buffer gas pressure range from 1 to 30 mTorr were measured. The intensity profiles of integral glow discharge and the optical emission spectra were obtained. A Monte Carlo model was developed for calculating the trajectories of electrons in crossed electric and magnetic fields (ExB), taking into account elastic and inelastic collisions of electrons with atoms of the buffer gas. For a number of typical values of the magnetic induction and electric potential the spatial distribution of ionization coefficients and excited electronic states of argon were calculated. The calculation results are consistent with the optical emission data.

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