Experimental study of diffuse vacuum arc plasma parameters by optical spectra

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For plasma separation technology, it is necessary to create a source that generates a flow of single-ionized plasma with a high ionization degree [1]. Such requirements can be met by a diffuse vacuum arc [2]. This research is devoted to this type of discharge with a cathode made of thermionic gadolinium in an axial magnetic field.

The discharge was initiated in a vacuum chamber at residual gas pressure of $\sim 10^{-5}$ Torr. A uniform magnetic field in the discharge gap was created by Helmholz coils. The cathode material was placed in a molibdenum crucible, which was heated using electron beam heating. During the experiment, power supplied to the cathode reached 2 kW, while the crucible temperature varied from 1800 to 2000 K, discharge voltage from 5 to 30 V. Discharge current varied from 30 to 50 A, external magnetic field from 0 to 500 G.

This study considers the influence of discharge voltage and external magnetic field on charge composition of generated plasma, electron temperature and ionization degree. The radial distribution of electron tempeture was also obtained.

The study was supported by Russian Science Foundation (No. 23-72-10073), https://rscf.ru/en/project/23-72-10073/

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