

THE GRIDLESS GENERATION SYSTEM OF A LOW-ENERGY ION BEAM BASED ON A GLOW DISCHARGE WITH A HOLLOW CATHODE AND EXTERNAL ELECTRON INJECTION

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An ion beam generation system based on a glow discharge with a hollow cathode and external electron injection has been developed (Fig. 1). The system is supposed for ion beam deposition of coatings based on aluminum, including its oxide. The system makes it possible to generate an ion flux with controlled energy up to 150 eV. A feature of the system is the absence of a structural element that acts as a stopper for the plasma boundary. The plasma boundary is limited by the formation of a double electrostatic layer between the plasma of the main and auxiliary discharges. The PINK device was used as an auxiliary discharge plasma generator [1]. The double electrostatic layer was localized near the emission window, through which the counter-reciprocal emission of electrons and ions was carried out. The main characteristics of the main and auxiliary discharges are studied depending on the conditions of their combustion. It is shown that the operating pressure range of the system is from 0.1 to 1 Pa, the main discharge current is a few Amperes. The possibility of controlling the potential difference on the electrostatic double layer by changing the burning voltage of the main glow discharge with a hollow cathode and external electron injection is also shown.

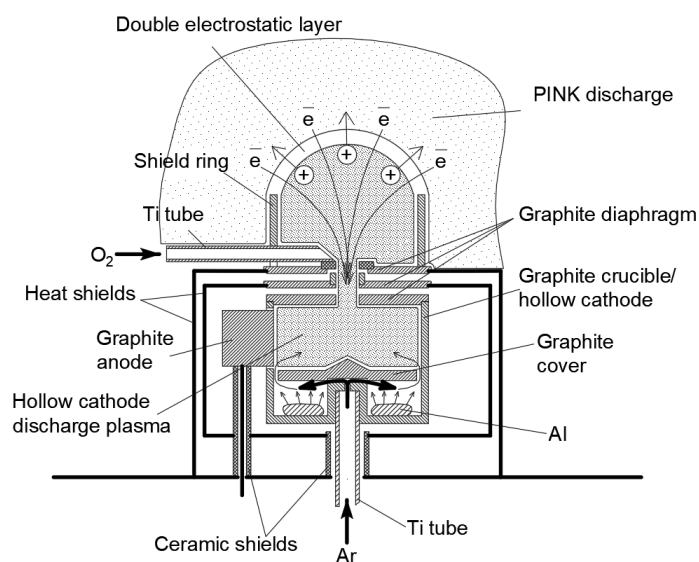


Fig.1. Schematic diagram of a gridless ion beam generation system.

REFERENCES

- [1] Lopatin I. V., Akhmadeev Yu. H., Koval N. N. Effect of thermionic cathode heating current self-magnetic field on gaseous plasma generator characteristics // Review of Scientific Instruments, 86, 103301, 2015.

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