

Bulk plasma generation based on high-current gaseous discharge with external electron injection

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Results of experimental study of low-pressure, high-current gaseous discharge with electron emitter based on constricted arc discharge are presented. Physical features of plasma generation in such system are discussed. Special features of the electron emitter design provide a long lifetime due to decrease of arc cathode erosion rate, as well as decrease of contamination of gaseous plasma by metal ions, atoms and particles. The main discharge voltage is 50–150 V and the main discharge current is up to 20 A in DC mode. It is shown that simultaneous operating of three discharge systems provides formation of uniform and stable gaseous plasma in the volume of 1 m³ with plasma density up to 10¹¹ cm⁻³ at operating gas pressure in the vacuum chamber of 10⁻³ Torr. The discharge system is characterized by high efficiency of energy utilization, plasma density uniformity, possibility to operate with chemically active gases, simplicity of set-up and maintenance and long lifetime.

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