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Experimental Investigation of Pseudospark Discharge Based Plasma Cathode Electron Source for the Generation and Propagation of High Density and Energetic Electron Beams

Content

Pseudospark discharge has attracted significant attention for the generation of high density, energetic and high brightness electron beams with fast current rise for the growing applications on extreme ultraviolet and X-ray radiation source, microwave and THz radiation generation, surface modification, etc. [1-2]. In this work, the investigation has been carried out for the generation and propagation of high density and energetic electron beams from the triggered multi-gap pseudospark discharged based plasma cathode electron (PD-PCE) source [3-5]. The proposed multi-gap PD-PCE source mainly consists of hollow cathode, trigger unit, multi-gap floating electrodes, anode and multi-ring annular collector. The properties of generated electron beams are mainly influenced by trigger location and energy, gases (Argon, Helium, Nitrogen) and pressures, electrode apertures and anode voltages (up to 40kV) [5]. The generated focused electron beam has been propagated > 100 mm in the ion focused regime without using any external magnetic field. The radial and axial profile of generated electron beam at different locations have been analyzed for different operating and circuit conditions. The electron beam of ~30kV and 103 A/cm² has been generated and propagated in the PD-PCE source. The design and characterization issues of the multi-gap PD-PCE source has also been presented.

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[4] Varun, et. al, IEEE Trans. Electron Devices, vol. 65, no. 10, pp. 4607-4613, 2018.

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Optional: Student Paper Competition

NO

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