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Scaning Effects of Applied Voltage to a Deceleration Electrode on the Ion Current Density Profile of Low-Energy and High-Current-Density Ion Beam Extracted through Concave Electrodes

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A high current density (~3.0 mA/cm^2) and low energy (60 - 170 eV) ion beam is extracted through three sets of electrodes (acceleration, deceleration and grounded electrodes) with concave shape (nominal focal length of ~350mm)[1-3]. The highly focused low energy ion beam is obtained with the ion charge compensation by the secondary electrons emitted from the grounded electrode on which an additional electron beam is irradiated[2-4]. To explore an optimum condition for acheiveing higher ion current density, the applied voltage to the deceleration electrode was scanned from -300 V to -2,500 V. The results indicate that ion beam current density has two mamimum peaks at around -500 V and -2,200 V, respectively. We will present the results of the applied voltage scanning with and without electron beam irradiation to the grounded electrode and discusse the possible mechanism of the beam profile modification.

References

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