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Particle-In-Cell Simulation of Closed Drift Type Linear Deposition SourceSeunghun Lee¹, Do-Geun Kim¹, Jong-Kuk Kim¹¹Korea Institute of Material Science, Changwon, South Korea

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Nowadays closed drift type linear ion source has been applied to the plasma treatment and deposition source in roll-to-roll system. To optimize the linear ion source for the deposition process, modifications are required at electrode design and magnetic field structure. An ion energy control and a high density plasma generation are important issues to achieve a film densification and a high dynamic deposition rate. In this work, two-dimensional particle-in-cell (PIC) simulation was used to predict the behaviors of ions and electrons in the linear deposition source. From a traditional structure of closed drift linear ion source, the design parameters of anode-cathode electrodes such as an aspect ratio, magnetism, and anode structure were investigated in the PIC simulation to predict an anode layer formation and electron trapping relating ion accelerations and plasma generations, respectively. The simulation showed plasma distributions and the energy distributions of emitting ions. Additionally the linear ion source with optimized design was fabricated and tested in diamond like carbon (DLC) film coating process.

Keywords

PIC

Deposition

Closed Drift

Linear Ion Source