

Abstract Submitted
for the GEC09 Meeting of
The American Physical Society

Charge separation in a magnetized plasma-sheath-lens EUGEN STAMATE, Risoe DTU, Technical University of Denmark — Most of plasma processing technologies are based on radical-assisted ion-induced surface-modification where ions accumulate energy in the sheath, and then strike the surface modifying its properties in a desirable way. Plasma-sheath-lens is a three-dimensional potential distribution of customized shape, formed by the space charge surrounding a biased electrode-insulator interface. The discrete and modal focusing effects have been revealed for this type of electrostatic structures formed in plasma [1] and several applications including sheath thickness evaluation, negative ion detection and extraction of positive or negative ion beams have been developed. A non-magnetized plasma-sheath-lens act as a kinetic energy separator, but it is not mass sensitive. However, a magnetized plasma-sheath-lens exhibits mass separation, so that ions of different mass will impact the electrode at different locations on the biased electrode surface. The mass spectrum can be measured as the radial distribution of the ion current density over the plasma-sheath-lens's electrode. Relevant fluid and particles simulations of the magnetized plasma-sheath-lens structures and ion trajectories within them are presented for different plasma parameters and magnetic field configurations. Practical aspects linked to the development of a new type of mass spectrometers are also investigated.

[1] E. Stamate and H. Sugai, Phys. Rev. Lett. (2005) 94, 125004

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Date submitted: 16 Jun 2009

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