Multichannel Elliptical Ion Lens for Merging Multiple Hyperthermal Ion Beams

A novel device uses a multichannel electrostatic elliptical lens to simultaneously merge and focus up to 20 ion beams, enabling high-flux deposition of materials for next-generation manufacturing and research applications.

Preparative mass spectrometry has been developed as a powerful tool for deposition of intact polyatomic ionic species with well-defined composition, charge state, kinetic energy and deposition pattern onto surfaces, which is also called ion soft landing. Current state of the art devices for ion soft landing lack the ability to merge more than two ion beams, which has limited further advancement of next-generation ion soft landing instrumentation.

Researchers at Purdue University have developed a device containing multichannel electrostatic elliptical lens with a precisely-defined electric field and a methodology to operate such a device. This technology is able to simultaneously merge and focus multiple, up to 20, hyperthermal ion beams with low ion loss to generate high-fluxes of polyatomic ions. An einzel lens is used after the elliptical lens to merge ion beams of 1-2000 eV kinetic energy. This technology is particularly valuable for depositing a wide variety of ionic species for conducting fundamental research to developing new materials and devices.

Advantages:

-Merge and focus multiple ion beams

-Low ion loss

-Deposition of multiple layers of different materials

Potential Applications:

-Material development

-Fundamental research

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Category

Materials Science & Nanotechnology/Advanced Functional Materials

Materials Science & Nanotechnology/Nanomaterial Characterization & Imaging Tools

Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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-Ion soft landing

-Analytical mass spectrometry instrumentation

TRL: 3

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