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Method and Apparatus for Surface Fabrication and Patterning using Beams of Mass-Selected Ions

Technology ID
2024-LASK-70705

Category
Materials Science & Nanotechnology/Nanomaterials & Nanostructures

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Researchers at Purdue University have developed a low-cost surface fabrication and patterning method with controllable electric fields to facilitate the deposition of mass-resolved ions into one- and two-dimensional ion surface patterns. The technology can simultaneously deposit multiple m/z species and be integrated into existing ion soft-landing instruments and mass spectrometers. Current ion soft-landing techniques use a single mass-to-charge (m/z) ratio filter for ion selection. However, this technique must be performed in sequence, significantly increasing deposition time and often resulting in ion loss. This novel method instead offers significant benefits to organizations looking to streamline the fabrication of precisely engineered surfaces, micro-electrochemical systems, sensor arrays, and diverse technological manufacturing applications.

Advantages

-Low-cost filters

-Virtually no ion loss

-Enables high-throughput surface fabrication

Applications

-Ion-soft Landing

-Mass Spectrometry

-Manufacturing

-Energy transfer devices

Technology Validation:

An IonCCDâ„¢ image of one-dimensional "line writing" illustrated the simultaneous parallel deposition of three organic dye species (m/z 253, 329,

and 470).

TRL: 3

Intellectual Property:

Provisional-Gov. Funding, 2024-05-31, United States

PCT-Gov. Funding, 2025-05-30, WO

Keywords: Mass-resolved ion deposition,Parallel ion soft-landing,High-throughput surface patterning,Multi-m/z ion fabrication,Controllable electric field deposition,Low-loss ion transfer,Microelectrochemical surface design,Mass spectrometry integration,Engineered ion surface arrays,Advanced sensor fabrication