PURDUE INNOVATES | Office of Technology Commercialization

A monolithic microfluidic probe for ambient mass spectrometry imaging of biological tissues

Researchers from Purdue University have developed a novel method for fabricating monolithic fused silica microfluidic probes (SLE-MFP) that improve the spatial resolution of nanospray desorption electrospray ionization (nano-DESI). By utilizing selective laser-assisted etching (SLE) to create a single-piece probe, the method eliminates the need to manually polish and grind the probe during fabrication. Integrated microfluidic probes (iMFPs) have recently been developed to simplify the setup of nano-DESI. However, despite iMFPs' many advantages, the manufacturing process remains time-consuming and costly. SLE-MFP instead enables seamless access to different probe designs, thereby offering a scalable and cost-effective solution for high-resolution biological imaging.

Technology ID

2024-LASK-70661

Category

Biotechnology & Life Sciences/Analytical & Diagnostics Instrumentation

Authors

Lixue Jiang

Julia Laskin

View online

Advantages

-High resolution ambient MSI

-Streamlined manufacturing process

-Cost-efficient

-Enables seamless access to different probe designs

-Reduces technical barriers when fabricating microfluidic devices for nano-DESI MSI

Applications

-Ambient Mass Spectrometry Imaging

-Pharmaceuticals

-Diagnostics

-Biotechnology

Technology Validation:

A mouse uterine tissue section was used to evaluate the performance of the SLE-MFP in MSI experiments. Results demonstrated that SLE-MFP performed at a scan rate of 250 Âµm/s, indicating the robustness of the probe at higher scan rates and its capability for imaging in a high-throughput manner.

Related Publications:

Jiang, L.-X., Polack, M., Li, X., Yang, M., Belder, D., & Laskin, J. (2023). A monolithic microfluidic probe for ambient mass spectrometry imaging of biological tissues. In Lab on a Chip (Vol. 23, Issue 21, pp. 4664â€“4673). Royal Society of Chemistry (RSC). https://doi.org/10.1039/d3lc00637a

TRL: 4

Intellectual Property:

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

Utility-Gov. Funding, 2025-05-30, United States

Keywords: Microfluidic mass spectrometry probe,Monolithic fused silica device,High-resolution nano-DESI imaging,Selective laser-assisted etching,Ambient mass spectrometry imaging,Scalable microfluidic fabrication,Cost-effective probe manufacturing,Biological tissue MSI,Diagnostics imaging platform,Pharmaceutical mass spectrometry