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Array-to-Array Transfer with Associated Chemical Transformation

A fully automated, high-throughput desorption electrospray ionization-mass spectrometry system accelerates drug discovery by rapidly characterizing candidate molecules and estimating purity without time-consuming chromatographic purification.

Researchers at Purdue University have developed a system utilizing high throughput desorption electrospray ionization-mass spectrometry (DESI-MS) to accelerate the process of drug discovery. The researchers leveraged the analytical and synthetic capabilities of this technology along with sophisticated controls to provide a single interconnected automated system. Standard drug discovery and characterization methods involve chromatographic purification of candidate molecules. However, these methods are tedious and create delays in the drug discovery process.

This technology helps pharmaceutical and biopharma companies rapidly generate drug candidates to determine chemical identities and estimate their purities. The system does not use chromatographic separation or purification, but instead maximizes the speed of the process and minimizes sample sizes. This technology is fully automated with high-precision and high-resolution movement. The contactless features of DESI allow for direct analysis of complex and salty biological mixtures without any sample workup. This technology improves the inefficient and unsynchronized process of drug discovery through its simplicity and automation compatibility.

Technology Validation:

Researchers conducted on-surface bioassays for the bioactivity evaluation of synthesized compounds. The procedure distinguished activity of various inhibitors at the same concentration, or different concentrations of the same inhibitors, which showed the availability of evaluating various products deposited on the surface. The synthesized products also demonstrated a variety of reactions and precursors, illustrating the wide scope of products to which this method is applicable.

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Category
Pharmaceuticals/Drug Discovery & Development
Robotics & Automation/Automation & Control
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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Advantages:

- Sample- and automation-compatible

- High throughput

- Provides access to extremely fast reactions

- Array-to-array synthesis

Applications:

- Pharmaceutical companies

- Biopharma companies

TRL: 3

Intellectual Property:

Provisional-Gov. Funding, 2022-11-29, United States | NATL-Patent, 2023-11-29, Europe | PCT-Patent, 2023-11-29, WO | NATL-Patent, 2023-11-29, Japan | NATL-Patent, 2025-05-22, United States

Keywords: DESI-MS, desorption electrospray ionization-mass spectrometry, high throughput, drug discovery, automated synthesis, rapid drug candidate generation, chemical identity determination, purity estimation, nanoscale synthesis, array-to-array transfer, microdroplet chemistry, label-free bioassays, automated analysis, bioassays, Chemical Synthesis, Chemistry and Chemical Analysis, desorption electrospray ionization, Drug Discovery, high throughput analysis, Mass Spectrometry, Pharmaceuticals, reaction screening