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Ion Manipulation in Air: Separations, Reactions, and Product Collection

A novel integrated mass spectrometry instrument performs ion analysis entirely in air, eliminating the need for a costly vacuum system and simplifying chemical analysis and ion manipulation.

According to Frost and Sullivan, affordable mass spectrometry systems remain unavailable for many laboratories. While the mass spectrometry market projects annual growth of 8 percent, with continuing launch of higher-end systems with greater sensitivity, speed, resolution, and overall performance; the price tag continues to increase as well. Unmet market opportunities need to be addressed. The essentials of mass spectrometry are ion formation, ion focusing, ion separation, and ion detection. Currently, all mass spectrometers use a vacuum system; obviating the need for a vacuum system, would further simplify and reduce the cost of mass spectrometry systems.

Researchers at Purdue University have developed a simple new instrument where all steps of ion formation, ion focusing, ion reaction, ion separation, and ion detection are performed in air. Ion transport and focusing was achieved with a zigzag system of curved electrodes. What differentiates this device from current solutions in the marketplace is the separation of ions of different mass/charge ratio in air, as well as, the use of a single integrated instrument to perform ionization in air, ion transport from the source to the detector in air while accomplishing ion focusing, and ionic reactions and ion detection in air. Eliminating the need for a vacuum system simplifies the mass spectrometer, providing the potential for cost reduction.

Advantages:

-Eliminates need for vacuum system

-Reduces cost of mass spectrometer

Potential Applications:

-Ion manipulation

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Category

Chemicals & Advanced Materials/Specialty & Performance Chemicals

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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-Chemical analysis/engineering

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Intellectual Property:

Provisional-Patent, 2014-06-16, United States | PCT-Patent, 2015-06-16, WO | NATL-Patent, 2016-12-09, United States | NATL-Patent, 2016-12-22, European Patent | CON-Patent, 2017-07-10, United States | CON-Patent, 2018-08-14, United States | CON-Gov. Funding, 2020-06-08, United States | DIV-Patent, 2022-02-09, European Patent | CON-Gov. Funding, 2022-06-03, United States | CON-Patent, 2023-12-04, United States | NATL-Patent, N/A, Canada

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