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Relay Electrospray and Sampling

A new electrospray ionization technique enables accurate, high-throughput analysis of ultrasmall volume samples by eliminating dead volume, carryover, and the need for time-consuming cleaning procedures.

Accurately assessing an extremely small quantity of a substance is a constant challenge for researchers in many fields, including biology and chemistry. Electrospray ionization is a well-established technique that has existed for decades and has applications in multiple fields, including mass spectrometry and material analysis/creation. The traditional method of electrospray ionization involves applying an electrical charge to a substance, which creates an aerosol of charged droplets of the substance that may then be analyzed. However, the electrical charge also creates opportunities for the solution to cling to the apparatus, creating dead volume, which may require time consuming cleaning procedures to eliminate carryover, making extremely small volume sampling difficult.

Researchers at Purdue University have developed a new method of electrospray for ultrasmall volume sampling and analysis known as the relay electrospray ionization technique. The design is focused upon the on-demand injection of electrically charged ions onto the outside surface of a nanocapillary. The resulting passage of electrical charge from the injected ions to the substance creates an immediate electrospray from the capillary, resulting in no dead volumes. By moving secondary capillaries in an automated fashion, high throughput sample screening and analysis is enabled. Thus, the problems of the solution clinging to the apparatus, dead volume creation, the need for time consuming cleaning procedures to eliminate carryover, and small volume sampling are dealt with under this new system.

Advantages:

-Samples exceptionally small amounts of matter accurately

-Integrated, simplified small volume analysis

-On-demand, controlled chemical reactions in the primary and relay ion sources

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Category
Materials Science & Nanotechnology/Nanomaterial Characterization & Imaging Tools
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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-Eliminates carryover and time consuming cleaning procedures

Potential Applications:

-Biology

-Chemical analysis

-Medical/Health

TRL: 4

Intellectual Property:

Provisional-Patent, 2015-03-09, United States | PCT-Patent, 2016-03-09, WO | NATL-Patent, 2017-09-07, United States | CON-Patent, 2019-02-01, United States | CON-Patent, 2019-07-22, United States

Keywords: relay electrospray ionization technique, ultrasmall volume sampling, mass spectrometry, material analysis, nanocapillary, electrospray, high throughput sample screening, chemical analysis, small volume analysis, dead volume elimination, Chemical Engineering, Chemistry and Chemical Analysis, Electrospray, Ionization, Mass Spectrometry