

Analysis of Liquid Samples by Desorption Electrospray Ionization-Mass Spectrometry (DESI-MS)

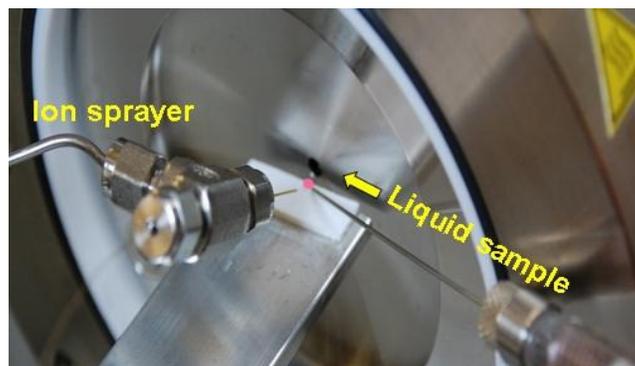
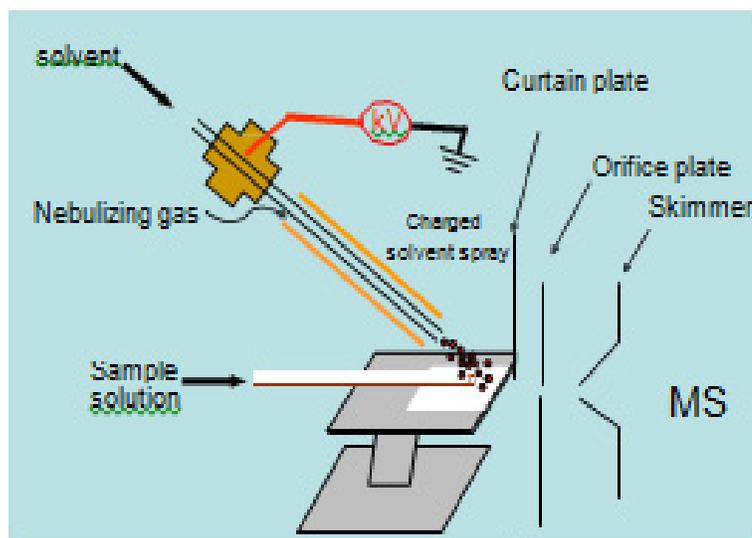
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Overview

Mass Spectrometry (MS) works by converting molecules into ions which can then be detected and analyzed. DESI-MS applications were previously restricted to analyzing solid samples on surfaces. Researchers at Ohio University have discovered a novel application of DESI by fostering the technology to analyze liquid samples. In this technique, titled as liquid sample desorption electrospray ionization mass spectrometry (LS-DESI-MS), liquid samples such as urine are driven to the surface where ionization occurs. In addition, the technology can be modified to provide a platform where ionic reactions occur and could be used with separation techniques such as electrophoresis and micro-fluids for widespread applications.

Commercial Application

The technology can have several beneficial applications in areas of chemical analysis that require a high degree of selectivity. DESI has been highly successful in analyzing a series of samples that may include pharmaceuticals, metabolites, drugs of abuse, explosives, chemical warfare agents and intact tissues. The current extended DESI-MS method has the added advantage of being able to directly analyze liquid samples including urine and blood in pharmaceuticals and forensics applications. The fabrication of a portable device using this technology can facilitate security operations at airports and other security-sensitive areas, especially for monitoring liquid products such as gel, beverages, and perfume. Mass Spectrometers have a \$2 billion share in the instrumentation market (2006 statistics). The global Bio-Informatics market is projected to grow at an annual growth rate of 15.8% into a



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Benefits

- Increase in the scope of the existing technology will be obtained in ionizing bio-fluids in their natural state and by the direct ionization of high mass proteins from solutions.
- Improved response time (in seconds), ionization efficiency and cost effectiveness of the sample analysis by the detection of biological samples without any sample preparation.
- Enhanced effectiveness and sensitivity of the proposed device due to the production of continuous ion signals.
- Enhancement in detection sensitivity of analysis is achieved by spraying a solution of reagents to selectively react with samples.
- Enable high throughput analysis

Inventor

Hao Chen, Ph.D. received his doctoral degree in Chemistry from Purdue University in 2005. He is an associate professor in chemistry at Ohio University. Dr. Chen performs research on organic and biological mass spectrometry for bioanalysis and instrument development. He has received over \$800,000 in research funding and has published over 60 journal papers.

Development

The new technique was successfully tested by using several types of amino acids, peptides, protein digests and proteins as well as drug-containing urine samples its high sensitivity, selectivity and speed for chemical analysis. Additional research activities may be needed to couple the proposed technique to chromatography, electrophoresis and microfluidics to facilitate high quality of separation in sample analysis. Chemical imaging using LS-DESI-MS is another sought after research area. The patent for the proposed technology is pending. Licensing opportunities are available.

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