PURDUE INNOVATES | Office of Technology Commercialization

Paper Spray Ionization Without Applied Voltage

A novel paper spray system enables voltage-free ionization for mass spectrometry, minimizing fragmentation and offering advantages for sensitive chemical analysis, including applications involving live subjects.

Mass spectrometry (MS) is a powerful analytical technique because of its high sensitivity, selectivity, and speed. Recent progress in MS has depended heavily on advances in methods of ion formation. Creation of stable molecular ions of complex molecules with minimum internal energy has been a primary goal of such experiments. The most widely used methods to achieve this use a high voltage source coupled to the probe to achieve ionization in an ambient environment. The application of high voltage can cause unwanted fragmentation of a target analyte during the ionization process.

Researchers at Purdue University discovered a system configuration that enables paper spray to generate ions for analysis without any voltage source (0 voltage paper spray). Solvent is supplied to a porous material, interacts with a sample within the porous material, and flows to the tip of the porous material. Given a short distance between the tip of the porous material and the inlet of the mass spectrometer, the solvent (now containing one or more analytes of the sample) flows from the porous material into the inlet of the mass spectrometer. Random charging during the breakup of droplets occurs, generating sample ions, which are analyzed within the mass spectrometer. In that manner, systems of the invention generate and analyze ions of a sample without the application of voltage to the porous material.

Advantages:

-Paper spray ionization without applied voltage

-Favorable for certain applications, for example those involving live subjects

Potential Applications:

Technology ID
2015-COOK-67074

Category
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

Authors
Soumabha Bag
Robert Graham Cooks
Yafeng Li
Thalappil Pradeep
Depanjan Sarkar
Michael Wleklinski

Further information
Dipak Narula
dnarula@prf.org

View online

-Mass spectrometry

-Chemical analysis

TRL: 3

Intellectual Property:

Provisional-Patent, 2014-12-05, United States | Provisional-Patent, 2015-01-26, United States | Utility Patent, 2015-12-03, United States | CON-Patent, 2017-09-07, United States | CON-Patent, 2019-02-20, United States

Keywords: mass spectrometry, paper spray ionization, 0 voltage, ambient ionization, chemical analysis, ion generation, porous material, analytical technique, solvent flow, zero voltage mass spec, Chemistry and Chemical Analysis, Mass Spectrometry, Paper Spray Ionization