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Available Technologies

Improved Ambient Ionization Source for Mass Spectrometry

SUMMARY

Ambient ionization, in which samples are ionized in air rather than in vacuum conditions, has become an increasingly popular technique for analysis of samples in real-world conditions. Applications of ambient ionization sources are very broad and include forensics, food product quality control, and medical studies. Although ambient ionization sources are becoming a useful analytical tool, the detection limits and efficiencies of existing ambient ionization sources can be improved.

This technology, which has been given the name nano-DESI, can provide increased sample utilization and lower levels of detection than existing ambient ionization sources. In this approach, the analyte deposited on a substrate is probed in an ambient environment by depositing droplets of charged solvent on a sample located below two capillaries as shown in the above figure. One primary capillary is used to create and maintain a charged droplet of solvent on the substrate while a second capillary operating within a high voltage electric field creates a self-aspirating nanospray of solvent containing dissolved analyte that is directed into the inlet of a mass spectrometer. Nano-DESI enables the efficient collection, ionization, and transfer of analyte resulting in a significant improvement of detection limits while retaining the most important tenets of DESI-MS: simplicity, no requirement for special sample preparation or pretreatment, and speed of analysis.

The utility of nano-DESI has been demonstrated for characterizing the molecular composition of both laboratory-generated and field-collected OA samples using only a small amount of material (less than 10 ng) on substrates. It does so by delivering very fine droplets of a solvent to a sample surface without the use of any nebulizing gas, a method known to produce “splashing” of the sample surface and a resulting reduction in sample utilization efficiency. The size of the contact area between the solvent and the sample surface can be made very small and be well controlled by sample flow rate. These features cause the new source to be ideally suited for surface imaging applications. The nano-DESI technique possesses distinct advantages over ESI and DESI ionization methods with respect to simplicity, ease of use, sensitivity, and signal stability.

Technology Portfolio(s)

- » Mass Spectrometry Instrumentation

Potential Industry Applications

- » Chemicals
- » Healthcare, Pharma, Biotech & Medical
- » Professional Services
- » Security

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