



Electrospray Ionization Ion Source with Tunable Charge Reduction

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WARF: P05387US

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved device for reducing the charge states of ions generated by ESI.

Overview

Analysis by mass spectrometry requires that molecules first be converted to gas-phase ions. Converting small molecules into ions is straightforward; however, it was not possible to ionize large molecules such as DNA or proteins until electrospray ionization (ESI) and matrix-assisted laser desorption-ionization (MALDI) techniques were developed.

Although ESI is more amenable to on-line analysis after separation (e.g., LC-MS) and it avoids fragmentation of analyte molecules that can occur with MALDI, ESI generates ions carrying multiple charges. The number of possible charge states increases with molecular size, resulting in mass spectra that tend to be extremely complex and difficult to interpret, especially for mixtures of large molecules. UW-Madison researchers previously described a device for reducing the charge states of ions generated by ESI by using either a polonium alpha-particle source or a corona discharge (see WARF reference numbers P99352US and P00311US).

The Invention

The researchers have improved the physical layout of that device by moving the corona discharge and its associated electromagnetic fields outside the charge reduction chamber, making it easier to collect the ions in the mass spectrometer for analysis. This device configuration also provides independent control over the conditions and processes involved in analyte and reagent ion formation, avoids perturbations in the trajectories of analyte ions and charged droplets caused by operation of the reagent ion source, and allows use of a wide range of reagent ion sources.

Applications

- Mass spectrometry analysis of large molecules

Key Benefits

- Device is simple to make and use.
- Offers adjustable control of the sample's ion charge state distribution
- Provides highly efficient analyte ion transmission and collection
- Ion streams can be negatively or positively charged.
- Causes minimal fragmentation of molecules during the ionization process
- Allows easier peak identification, quantification and assignment
- Can generate ions from many high molecular weight compounds, including peptides, proteins, oligonucleotides, carbohydrates, polysaccharides, glycoproteins and lipids

Additional Information

For More Information About the Inventors

- [Lloyd Smith](#)

Related Technologies

- [For the inventors' previous devices for reducing the charge states of ions generated by ESI, see WARF reference numbers:](#)
- [P99352US](#)
- [P00311US](#)

Tech Fields

- [Analytical Instrumentation, Methods & Materials : Mass spectrometry](#)
- [Research Tools : Detection](#)
- [Research Tools : Genomics & proteomics](#)

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854