

## Electrospray Ionization Ion Source with Tunable Charge Reduction

INVENTORS • Lloyd Smith, Brian Frey, Michael Westphall

WARF: P05387US

[View U.S. Patent No. 7,518,108 in PDF format.](#)

**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.



### THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.



## 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

### 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

Research Tools - Genomics & proteomics

Research Tools - Detection

Analytical Instrumentation - Mass spectrometry

## CONTACT INFORMATION

For current licensing status, please contact Jennifer Gottwald at [jennifer@warf.org](mailto:jennifer@warf.org) or 608-960-9854.

