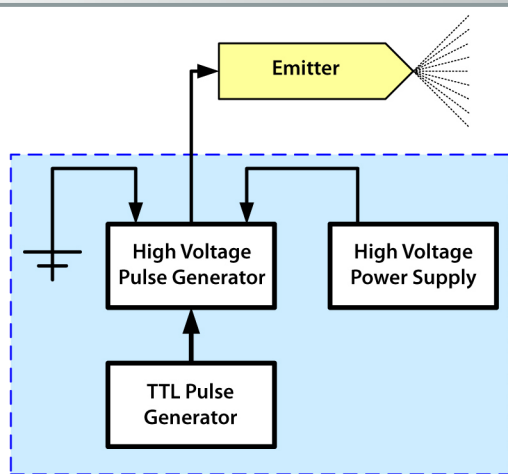


Pulsed Voltage Electrospray Ion Source for Mass Spectroscopy

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Technology Summary

For the first time, an electrospray ionization technique, invented at ORNL, has solved the longstanding problem of unwanted chemical reactions during mass spectroscopy analysis of a sample. In this invention, a pulsed high voltage is applied to the electrospray emitter to analyze the chemical molecules without altering the stability of the sensitive chemical samples under study.

Mass spectroscopy determines the composition of a sample by analyzing particle mass. The method reveals the chemical structure of molecules by ionizing chemical compounds to generate charged molecules or molecule fragments, and measuring their mass-to-charge ratios. Under common conditions, most analytes are not directly affected by the electrochemical process. However, electrochemical reactions can occur, altering the molecules so that they have a different mass, charge, or both, from the original.

The new method exclusively electrolyzes the solvent next to the electrode surface, and not the chemical analyte of interest. A finite amount of charge from a high voltage pulse is consumed by water on the electrode surface, avoiding analyte electrolysis. This pulse can be repeated as needed. The invention features an electrospray ion source with an emitter, a counter-electrode, and a power supply. The emitter includes a liquid conduit, a primary working electrode having a liquid contacting surface, and a spray tip. The liquid conduit and the working electrode are in liquid communication.

Advantages

- Provides a way to eliminate analyte electrochemistry
- Exclusively electrolyzes the solvent or other solution species, introducing only protons to the solution

Potential Applications

- Existing and future electrospray mass spectroscopy systems

Patent

Vilmos Kertesz and Gary J. Van Berkel, *Pulsed Voltage Electrospray Ion Source and Method for Preventing Analyte Electrolysis*, U.S. Patent Application 12/431,461, filed April 28, 2009.

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