



Micro Ion Trap Mass Spectrometer

Technical Concept



1-mm ion trap assembly with electron gun, trap electrodes, and microchannel plate detector

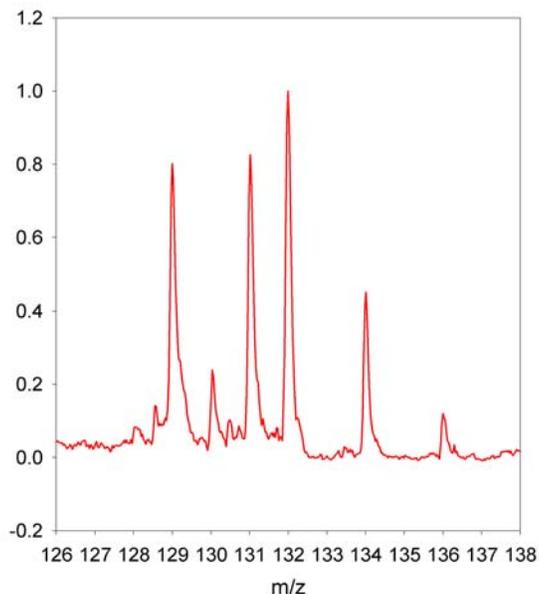
Mass spectrometers are usually considered to be laboratory instruments because of their size, weight, and power requirements. However, we have shown in this project that ion trap technology can be used to perform mass spectrometry using electrode structures of submillimeter dimension. In scaling down the trap dimensions, other parameters such as vacuum pumping requirements, operating voltages and frequency, and overall system size and weight all become more favorable, making possible a fieldable instrument that should be hand portable for use as a survey instrument. Other potential applications would be as a standalone monitor at a fixed location and UAV or projectile implementations for over-the-horizon or BDA effluent surveys. Initial target analytes are gaseous effluents such as rare gases for isotopic analysis, gases evolved during fuel reprocessing operations such as NO_x , and volatile organic compounds. A capability for particulate sample analysis could be added if desired.

Highlights

- 1-mm diameter trap assembly
- Electron impact ionization
- Microchannel plate detector
- 0.1-0.25 Dalton mass resolution
- Higher pressure, lower voltage, higher frequency than conventional ion trap

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Mass spectrum of xenon isotopes in 1-mm ion trap