

Cylindrical Toroidal Ion Trap Mass Analyzer

ID: 2012-008

Executive Statement:

A revolutionary cylindrical toroidal ion trap design that simplifies manufacturing and enhances miniaturization without sacrificing performance.

Technology Overview:

This technology introduces a novel design for a toroidal ion trap mass analyzer using cylindrical electrodes, offering a simplified approach to the construction and miniaturization of mass spectrometry equipment. By employing an asymmetric arrangement of four cylindrical/planar electrodes, it enables the creation of effective trapping fields, facilitating higher operating pressures and the use of simpler detection methods. The design includes innovative miniature versions, namely the Omega-trap and Rho-trap, which can be stacked, increasing the trapping volume without compromising the system's overall footprint.

Key Advantages:

- Easier machining and alignment of cylindrical electrodes compared to hyperbolic ones
- Improved electric field optimization for enhanced performance
- Allows for higher operating pressures and simpler detection methods
- Facilitates further miniaturization without losing functionality
- Potential for stacking miniature versions for increased volume

Problems Addressed:

- Complexity and field defects in traditional toroidal ion traps
- Difficulties in miniaturizing traditional designs without performance loss
- Challenges in machining and aligning hyperbolic electrodes

Market Applications:

- Compact and portable mass spectrometry devices
- Enhanced detection systems in chemical and biological analysis
- Advanced research tools in physics and chemistry laboratories
- Environmental monitoring and food safety testing