



New Scan Modes in Ion Trap Mass Spectrometers for Planetary Exploration

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Target: Surface/subsurface of Mars, Titan haze, other satellites and asteroids

Science:

- Implement full MS/MS capabilities in a single ion trap to enable survey scans for organics in a simple instrument
- Use ion secular frequency as basis for Hadamard operation of ion trap
- Signal-to-noise increase will improve performance of mass spectrometers

Objectives:

- Perform full set of MS/MS capabilities (product, precursor, and neutral loss scans) in a single ion trap
- Record MS/MS data to probe Mars-mimic samples for organic compounds
- Use MS/MS to identify functional groups
- Increase signal-to-noise ratios by Hadamard multiplexing in an ion trap
- Implement wet and dry ion sources for characterizing samples relevant to Mars, Titan

CoIs: Paul Mahaffy, NASA Goddard Space Flight Center

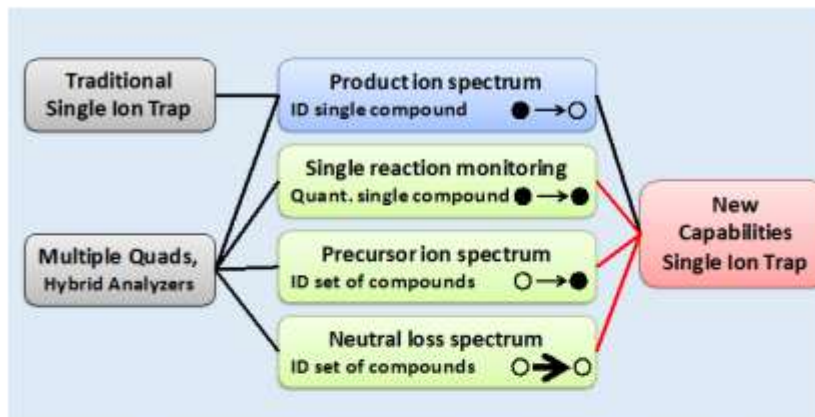


Fig. 1: Comparison of (grey boxes) capabilities currently available in single ion traps and multiple analyzer instruments and (red box) new scan modes proposed for single ion traps. Note the addition of single reaction monitoring, precursor scans, and neutral loss scans to the capabilities of a single ion trap.

Key Milestones:

- Implement precursor, neutral loss, and multiple reaction monitoring scans in a single ion trap
- Implement Hadamard multiplexing in an ion trap
- Compare MS/MS and Hadamard multiplexing on miniature instrument to benchtop instruments

TRL 1 to 3