

## Development of Orbitrap Mass Spectrometer for in-situ measurements in solar system explorations

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Previous mass spectrometry in solar system explorations has advanced our knowledge and understanding on the formation and evolution of planets, as well as the dynamics of space environment surrounding planets, moons, and other small bodies. Nonetheless, there are many important topics remaining to be addressed by higher-resolution mass spectrometry. Here we report our design of Orbitrap, which is a kind of Fourier-transform mass spectrometer, showing high mass resolution ( $m/dm \sim 10000$ ) based on numerical simulations. We propose a simple and miniaturized ion storage unit in front of the multi-reflectron region, utilizing the potential drop by the electron beam for ionization. Such a high-resolution mass spectrometer will provide significant information on elemental and isotopic compositions in, on, and around planets and other solar system objects. For instance, discrimination between  $N_2$  (28.0062 u) and CO (27.9949 u) in the Martian atmosphere, which is essential for discussing atmospheric escape in the present and past, will be enabled.

Keywords: Mass Spectrometer, High Mass Resolution, Orbitrap