# Development of a miniature Ion-trap Fourier-transform mass spectrometer for future space missions

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In-situ high-resolution (m/Δm > 10,000) mass spectrometry is playing an important role in planetary explorations. In particular, isotopic composition is a key for understanding the evolution of planetary bodies. However, most conventional high-resolution mass spectrometers (MSs) are large in volume and heavy. Therefore, the opportunity of high-resolution mass spectrometry is limited, despite their high performance. The aim of this study is to develop a compact high-resolution MS. Our design is based on OrbitrapTM, which has recently been used in ground facilities. This is an ion trap Fourier-transform MS with a small ion trap optics (<10×10×10 cm3) to gain long time of flight. Our numerical simulations showed high mass resolution (m/Δm ~ 10,000) can be achieved with a small size. For the ion trap Fourier-transform MS, it is the key to have ions bunched before injecting into the time-of-flight region. We implemented this bunching with ion resonation. Then we examined the performance of the newly developed resonator through test model experiments. The results were consistent with expectations from numerical calculations, in terms of gas pressure dependency and storage time dependency. Furthermore, we also started integration tests to obtain high-resolution mass spectra. We are going to give a presentation about details of these experimental tests.

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