Geophysical Research Abstracts
Vol. 14, EGU2012-5227, 2012
EGU General Assembly 2012

In Situ Composition Measurements of Minerals on Planetary Surfaces

M. Neuland, A. Riedo, S. Meyer, M. Iakovleva, M. Tulej, and P. Wurz
Institute of Physics, Space Research and Planetary Sciences, Sidlerstrasse 5, 3012 Bern, Switzerland

The knowledge of the detailed elemental composition of planetary bodies, moons, meteorites or other planetary objects is of particular importance for the investigation of the origin and evolution of the Solar System. Mass spectrometric approaches have the highest potential in such research because of their high sensitivity and their analytical performance [1].

A miniaturized Laser Ablation Time-of-Flight Mass Spectrometer was developed in our group to study the elemental composition of various samples [2,3]. The instrument's small size and light weight make it suitable for an application on a space mission to determine the elemental composition of a planetary surface for example.

To demonstrate the sensitivity and functionality of the instrument, samples of the Allende meteorite, the Galena mineral and Moon-analogue samples have been investigated with a high spatial resolution. A high dynamic range and mass resolution of the measurements allow detailed elemental composition studies. The high spatial resolution allows chemical mapping of the surface on spatial scales compatible with the grain size in the mineral. These approaches can be of considerable interest for in situ investigation of grains and inhomogeneous materials with high sensitivity.

References:

P. Wurz, D. Abplanalp, M. Tulej, M. Iakovleva, V.A. Fernandes, A. Chumikov, and G. Managadze, *In Situ Mass Spectrometric Analysis in Planetary Science*, Solar System Research, 2012, accepted.

U. Rohner, J. Whitby, and P. Wurz, *A miniature laser ablation time-of-flight mass spectrometer for in situ planetary exploration*, Measurement Science and Technology, 14, 2164(2003).

M. Tulej, M. Iakovleva, I. Leya, and P. Wurz, *A miniature mass analyser for in situ elemental analysis of planetary material: performance studies*, Analytical and Bioanalytical Chemistry, 399, 2185(2011).