Fundamental study of laser beam-minerals interaction and utilization of LA-ICP-MS in geology

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Laser Ablation-Inductively Coupled Plasma-Mass Spectrometry (LA-ICP-MS) is a frequently used analytical method for the characterization of solid-state materials in geology. Sampling *via* laser beam has many advantages over conventional solution methods. It also benefits high lateral resolution combined with low sample consumption and minimal sample preparation, and multi-elemental analysis with very low detection limits and high sensitivity, for instance. It is well known that ablated mass quantity and aerosol composition are affected by laser-beam properties, e.g. wavelength, pulse length, repetition rate, fluence, diameter of laser beam, and moreover, orientation of mineral grains.

This exploratory study was focused on investigation of the influence of mineral grains orientation on absorption of laser radiation. Experiments were performed using quadrupole-based ICP-MS connected with two different laser ablation systems operating at wavelenght of 213 nm and 193 nm, respectively. The influence of crystal axis position on interaction of laser beam and sample surface was tested for 44 elements from Li to U.

Time-profiles were investigated with respect to orientation of mineral grains. In this context, the effect of wavelength on the absorption of laser radiation and the signal intensity was observed in several different crystal axis orientations in analyzed minerals. Electron MicroProbe Analysis was used as a comparative method and for the purpose of quantification.

Acknowledgements

This work was supported by the Czech Science Foundation for grant GA14-13600S and Student Project Grant at Masaryk University – Category A (MUNI/A/1288/2017). This research has been financially supported by the Ministry of Education, Youth and Sports of the Czech Republic under the project CEITEC 2020 (LQ1601).