

LA-ICP-TOFMS for multi-element, multi-isotope studies

MARTIN RITTNER¹ AND YANNICK BUSSWEILER²

¹TOFWERK AG

²Tofwerk

Presenting Author: rittner@tofwerk.com

Laser Ablation Inductively-Coupled Plasma Mass Spectrometry allows for rapid major and trace elemental, as well as isotopic, micro-analysis of a wide range of solid and semi-solid materials at high spatial resolution (tens of μm to sub- μm). Recent instrumental developments are moving towards faster and higher-resolution spatial analysis for imaging applications. Higher laser shot repetition rates and faster analyte transport and wash-out from the ablation cells to the mass spectrometer imply only a very short analyte signal for each individual sampling location (image pixel), less than 1 ms on the newest laser ablation systems.

Common mass spectrometers measuring different masses of interest sequentially, like quadrupole and sector-field instruments, can not measure more than one, or very few isotopes at best, within this period of time. ICP-TOFMS overcomes the limitations by measuring the whole mass spectrum simultaneously and at sampling rates of many kHz (thousands mass spectra per second). Measuring all isotopes at the same time also allows for precise isotope ratio measurements at the same time as quantifying elemental concentrations in the sample.

Here, we present recent application examples of this technique, utilising state-of the art laser ablation systems coupled to the icpTOF line of mass spectrometers. We present the analytical workflow, instrument set-up, instrument and third-party software used, figures of merit, and the resulting images and data interpretation.