

A new ICP-TOFMS for the fast laser ablation analysis without compromises

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LA-ICP-MS is an important analytical tool for many geological applications such as dating, analysis of individual inclusions, and elemental mapping. Recently developed ablation chambers significantly reduce aerosol dispersion and allow single short analysis in only 10-100 ms [1] [2]. In combination with the high lateral resolution of lasers (1-10 μm) they can significantly improve the performance of LA-ICP-MS in terms of detection power, precision, and speed. However, the gain in speed in LA-technology demands for faster mass spectrometers. For transient signals shorter than 100 ms only simultaneously detecting instruments enable multi-element analysis without compromises.

We present a new ICP- time-of-flight (TOF)-MS with simultaneous detection of the whole mass range of elements and μs -time resolution. The instrument is a combination of an iCAPQ (Thermo Fisher Scientific, Waltham, USA) and a medium resolution TOFMS (TOFWERK AG, Thun, Switzerland) [3] with the sensitivity comparable to a quadrupole MS and a mass resolution of >3000 . This mass resolution and additional chemistry performed in the collision/reaction cell enable the detection of Fe, Ca, S, P, and Si free from polyatomic interferences. With this instrument LA conditions are not dictated by the mass analyzer speed and can be tuned freely for purpose. The laser signal does not need to be stretched to minimize analytical uncertainty. Quantitative element and isotope analysis of short transient signals is possible and measurement turnaround time can be reduced significantly. The capabilities of the ICP-TOFMS in combination with a 213 laser ablation system will be demonstrated on the analysis of standard materials, glass capillaries filled with standard element solutions, fluid inclusions, and on imaging of a meteorite.

[1] Wang *et al.* (2013), *Anal.Chem.* **85**, 10107-10116. [2] Van Malderen *et al.* (2015), *JAAS* **30**, 119-125. [3] Borovinskaya *et al.* (2013), *JAAS* **28**, 226-233.