High resolution, fast and more informative LA imaging with the icpTOF

O. Borovinskaya1, M. Tanner1, R. Belissont2, M.C. Boiron2, B. Luais2, L. Summerfield3, S. Van Malderen4, T. Van Acker4, F. Vanhaecke4
1TOFWERK, 2Université de Lorraine, 3ESI, 4University of Ghent
email: borovinskaya@tofwerk.com

► Fast and high resolution imaging is of growing interest for many geological and biological applications, but poses challenges to laser ablation (LA) units and mass spectrometers (MS).
► Recently developed Dual Concentric Injector (DCI) from ESI [1] and Aerosol Rapid Introduction System (Aris) from Teledyne [2] as add-ons to the existing ablation chambers enable rapid aerosol washout of <50 ms and increase imaging speed and signal to noise ratio.
► To utilize these these new systems for multi-element imaging a mass spectrometer with high acquisition speed and simultaneous detection is required.
► This work demonstrates the coupling of TOFWERK time-of-flight mass spectrometer icpTOF with NRW 213 nm laser/TwoVol2 cell/DCI (ESI) and with Analyte G2 laser/Helix cell/Aris (Teledyne) for fast and easy imaging at high spatial resolution.

Imaging concept

Continuous laser scan Fast transfer of LA plume Synchronized detection of all m/z per pixel Pixel-resolved images of all m/z

Sphalerite mapping with NRW 213/TwoVol2 cell/DCI Ceriodaphnia imaging with Analyte G2/Helix cell/Aris

Summary

► Rapid aerosol transfer systems resolve individual laser pulses at frequencies > 10 Hz, enabling sample scan at much higher speed than was earlier possible with standard configurations.
► icpTOF and laser synchronization on a single pixel basis simplify image reconstruction and provides sharp images with no pixel intermix.
► icpTOF measures several full mass spectra per every single pixel, providing higher information density about the sample.

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