

## **Major- and trace-element analysis of volcanic brines by cryo-LA-LIBS**

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Volcanic crater lakes and hydrothermal springs present excellent opportunities to study the underlying magmatic system, and monitor changes therein. However, these fluids are often highly acidic and have high total dissolved element loads that make them chemically challenging and labour intensive to analyse on a routine basis. Here we present a novel way to routinely analyse analytically challenging fluids with minimal sample preparation. The brines are pipeted onto a freezing stage, sampled by laser ablation and analysed simultaneously by LIBS and ICP-MS. Our instrument consists of a 213 nm pulsed laser and two spectrometers for detection of the optical signal. One spectrometer provides broadband capability and CCD detection, and the second has turnable gratings and ICCD detection for better sensitivity required for some of the elements of interest. The LIBS system is coupled to a quadropole ICP-MS. In this contribution we will present the methodology and application to acidic brines from Kawah Ijen crater lake and a shallow marine hot spring on Saba.