

## **Capabilities of spICPMS as a tool for the identification of colloidal mineral phases in natural samples. Sequential vs simultaneous acquisition.**

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Established techniques such as conventional Inductively Coupled Plasma Mass Spectrometry (ICP-MS), Secondary Electron Microscopy-Energy Dispersive Spectrometry (SEM-EDS) or X-Ray Diffraction (XRD) exist for the identification of the different mineral phases in natural samples. Although these methods are powerful, they present some drawbacks (*i.e.* bulk analysis, time and/or sample consuming, difficult size distribution characterization...).

In this study, using the capability of the ICP-MS for multi-elemental analysis and for single-particle measurement, two qualitative and/or quantitative methodologies are proposed. First, operating single-particle ICP - *sector-field* – MS, a sequential approach for the distinction of 2 different clay minerals at sub-femtomole per element (*i.e.* Al, Si, Fe, Ti, Mg, ...) per particle was achieved. Then, using an ICP – *time-of-flight* – MS, the simultaneous multi-elemental analysis allowed determining the distribution of multiple elements in individual colloids.

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**Additional keywords:** *single-particle ICP-MS, colloidal mineral phase, sector-field, sequential approach, time-of-flight, simultaneous analysis.*