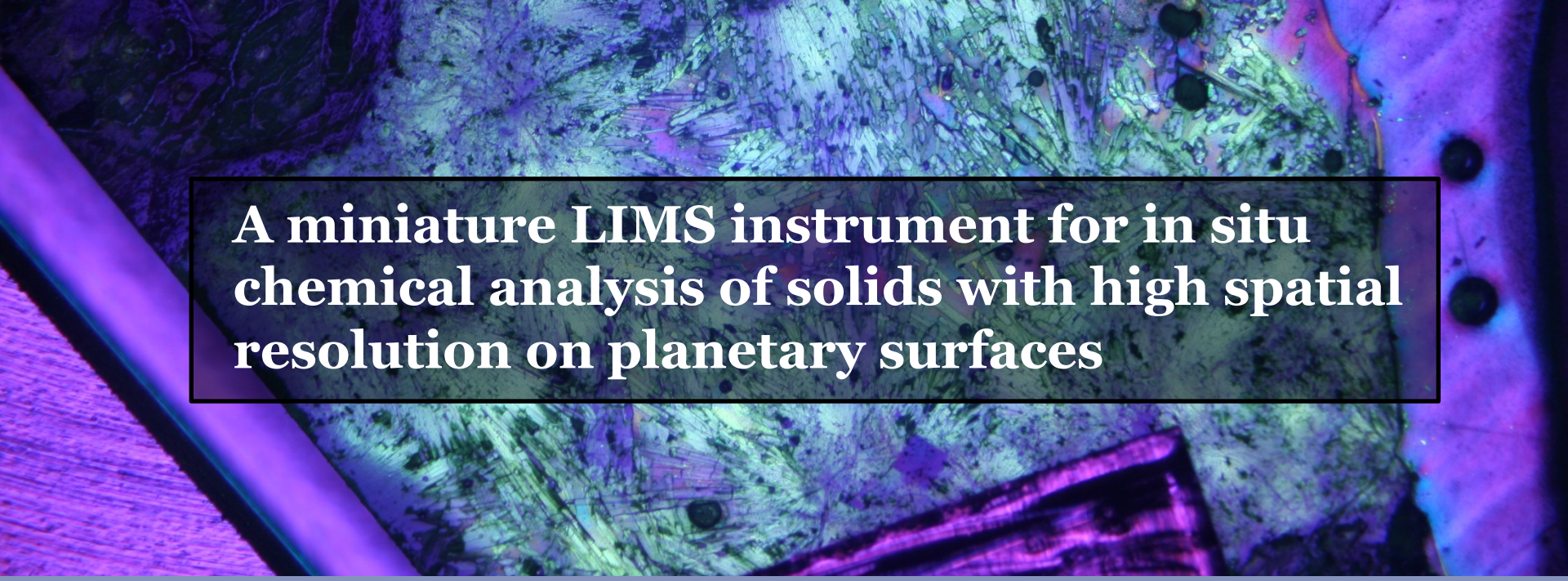

A miniature LIMS instrument for in situ chemical analysis of solids with high spatial resolution on planetary surfaces

Andreas Riedo, R. Wiesendanger, M. Tulej and P. Wurz

51st eslab symposium, December 2017

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MARIE CURIE ACTIONS

LMS
A miniature LIMS system

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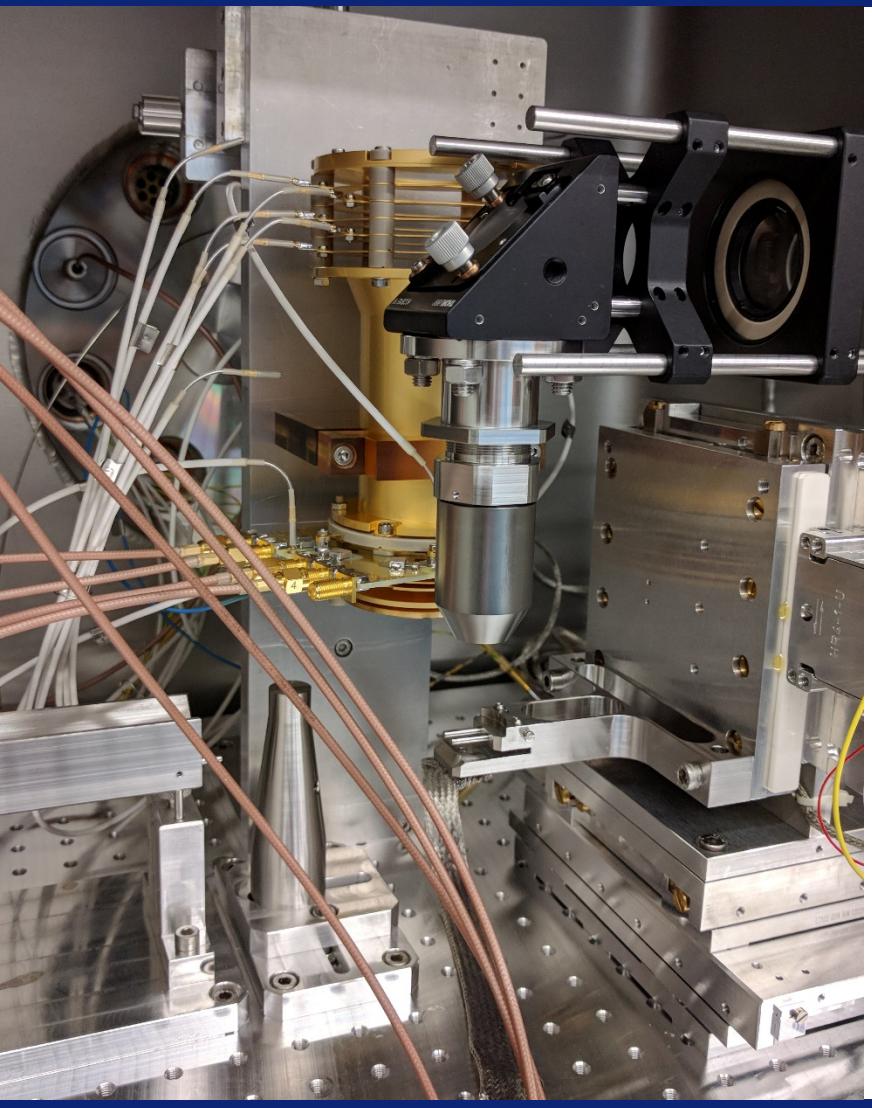

Instrument

- LIMS system designed for in-situ **elemental and isotope** analysis of solids
- Reflectron-type time-of-flight mass spectrometer
- A pulsed laser system is used for ablation and ionization of sample material
- Mass analyser: Ø 60 x 160 mm
- Flight design: ~2kg, mean ~15 – 25 W, ~2'600 cm^3

Figure of merits

- High detection sensitivity (~10 ppb, at. frac.)
- Dynamic range of about 10^8
- Quantitative
- High spatial resolution (lateral: 10 – 20 µm, vertical: nanometer)

LMS
Detection of µm-sized fossils

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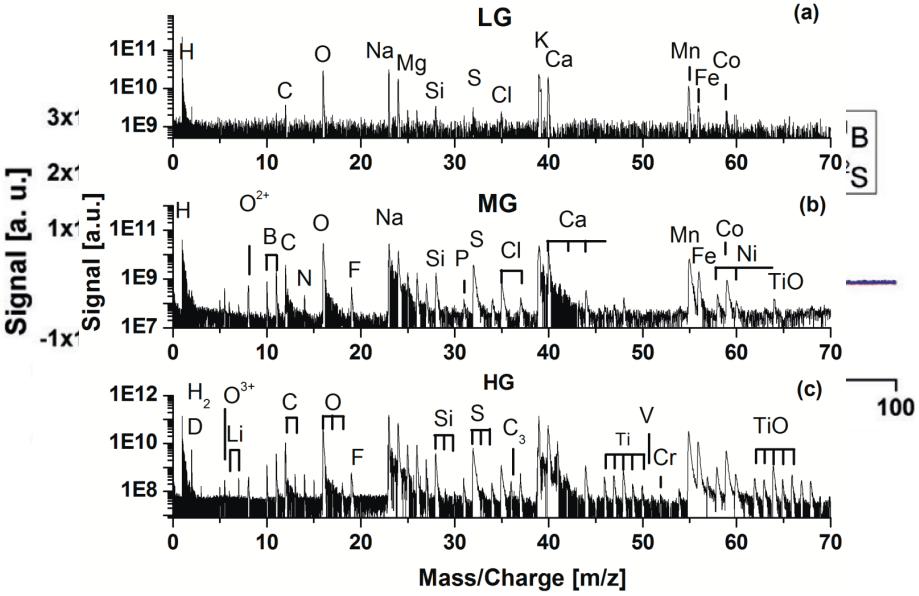
- Areas of (200 x 200) µm² containing fossil structures were investigated spot-wise
- By monitoring biorelevant elements the chemical depth profiling analysis of each spot allowed the identification of embedded fossil structures



Tulej et al., Astrobiol., 2015

LMS
Detection of mineral phases

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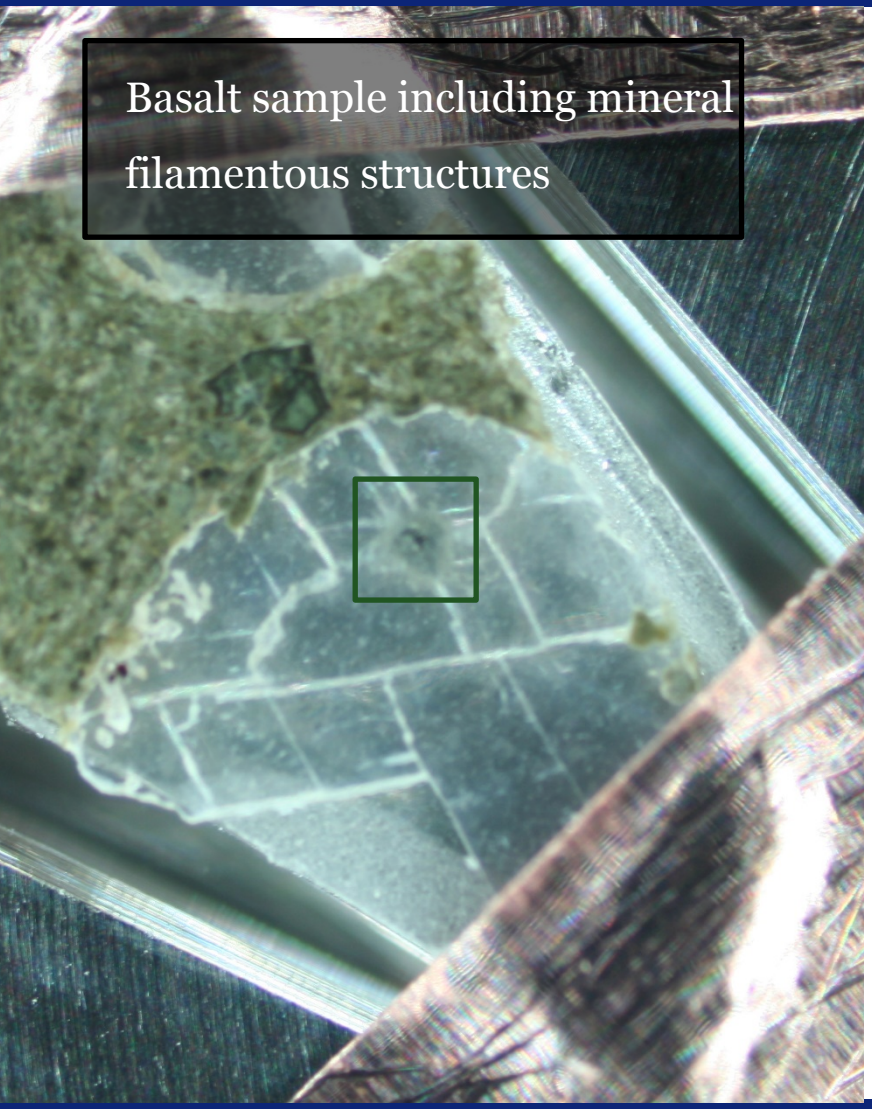
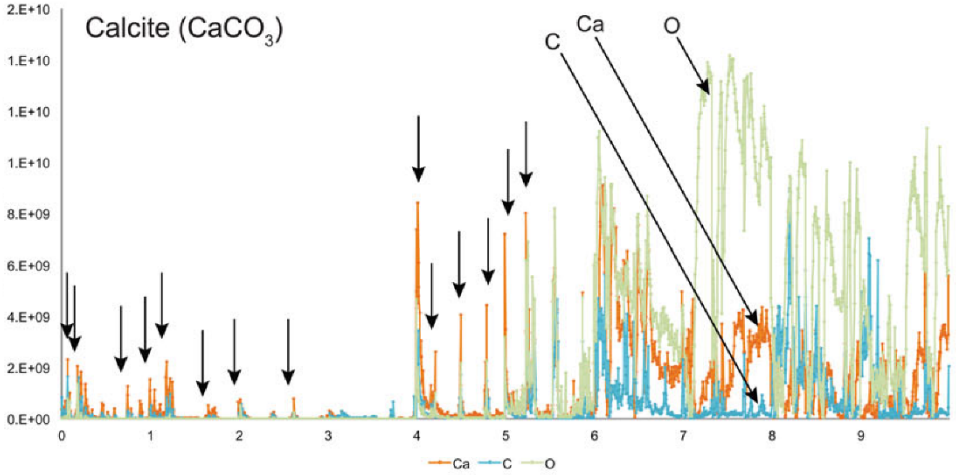


» Correlations of specific elements for the recognition of minerals, e.g. Ni and S for Millerite, Si and O for Quartz, or Ca, C and O for Calcite, can be realized.



» Allows to “zoom in” in locations of interest, to derive chemical composition analysis of these specific layers

Thank you for your attention

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