Studying lithium geochemical behaviour in reduced environments

The influence of pyrite formation on Li isotopes

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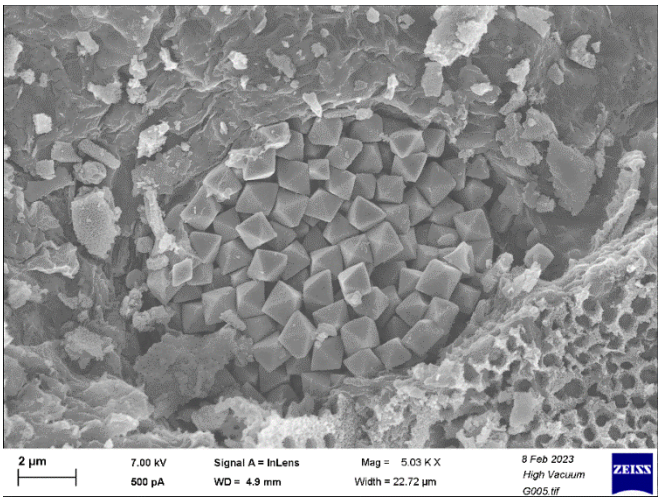
Project description



Non-traditional isotope systems, such as Li isotopes, have emerged as robust geochemical tools for tracing Earth surface processes in the past. Despite the extensive applications of this isotopic tool, there exists a fundamental knowledge gap regarding the underlying principles governing the geochemical behaviours of trace elements. One important aspect that remains under-addressed is the impact of iron-rich mineral on trace elements, particularly, related to the transformation of these materials. In marine and lacustrine sediments, iron minerals such as Fe-oxides can undergo transformation into pyrite (FeS) under reduced conditions. Pyrite can be a significant component of sediments during periods such as Oceanic Anoxic Events (OAEs). However, the influence of pyrite on geochemical signals has been largely overlooked in previous investigations of Earth's surface conditions during OAEs. Understanding trace element behavior under reduced conditions is essential to decipher geochemical fingerprints and to properly interpret Earth's past. The primary objective of this project is to quantify Li adsorption and incorporation by pyrite. This project encompasses three main components: (i) conducting literature reviews on the principles of Li isotopes and their behavior during OAEs; (ii) performing experiments to synthesize both Li-free pyrite and Li-rich pyrite; and (iii) analyzing fluid chemistry by measuring Li concentration and characterizing synthesized solids using techniques such as X-Ray Diffraction Analysis (XRD) and Scanning Electron Microscopy (SEM). This interdisciplinary project will be conducted under the supervision of the Petrology group and will involve collaboration with researchers from Geolab and Electron Microscope. Your will be involved in weekly group meetings. Through the experiments, discussions, and analyses, you will acquire knowledge in Earth science and geochemistry, as well as hands-on experience in laboratory work and various instrumentation.

Job requirements

- *Genuine interest in the project*
- *Basic knowledge in geoscience and chemistry*
- *Fundamental laboratory skills (can also be gained during lab training)*
- *Preferred knowledge: courses taken include introduction to electron microscopy and geochemistry and its related analytical processes.*