

Effect of magma oxidation state on iron isotope composition of magmatic-hydrothermal minerals

CHRISTINE WAWRYK* AND JOHN D. FODEN

Centre for Tectonics, Research and Exploration, University of Adelaide, South Australia, 5005

(*correspondence: christine.wawryk@adelaide.edu.au)

Do ore minerals precipitated from magmatic-hydrothermal solutions reflect the isotopic composition of the parent magma? We present new stable iron isotope compositions of sulfides from two deposits associated with fractionated, reduced magmas. The Renison tin deposit is associated with magmatic fluids exsolved from an S-type magma [1]. The Hillside deposit is an IOCG skarn associated with an A-type granite of the Hiltaba Suite [2]. Figure 1 compares isotopic composition of host intrusions, pyrite and chalcopyrite from Renison with published data from Grasberg [3] and Xinqiao [4].

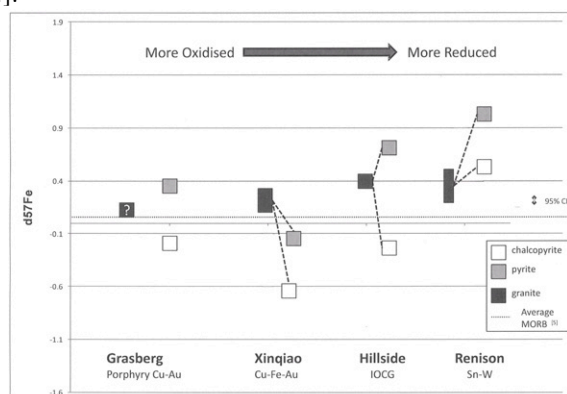


Figure 1. Comparison of $\delta^{57}\text{Fe}$ composition of host intrusions, pyrite and chalcopyrite.

Our results demonstrate that sulfides associated with the reduced Hillside and Renison Granites have, on average, heavier iron isotopic compositions than ore minerals associated with the oxidised GIC, and the Jitou Stock hosting Xinqiao. Our modelling of magma/fluid evolution considers variables such as $f\text{O}_2$, pressure and temperature.

[1] Patterson *et al.* (1981) *Econ Geol* **76** 393-438. [2] Conor *et al.* (2010) *Hydrothermal IOCG and Related Deposits* **3** 147-170 PCG Publ. [3] Graham *et al.* (2004) *Chem Geol* **207** 147-169. [4] Wang *et al.* (2011) *Ore Geol Rev* **43** 194-202. [5] Teng *et al.* (2013) *Geochim Cosmochim Acta* **107** 12-26.

Amino acid binding on oxide surfaces: Results from CTR and surface x-ray anomalous scattering

GLENN WAYCHUNAS¹, JOANNE STUBBS²
AND PETER ENG²

¹Lawrence Berkeley National Laboratory, Earth Sciences Division, Berkeley, CA, USA

²University of Chicago, Consortium for Advanced Radiation Sources, Argonne, IL, USA

The interaction and binding of organic species and amino acids with mineral surfaces is a large frontier in geochemistry. As opposed to inorganic sorbates, which interact with a surface by forming covalent and hydrogen bonds, organic structures may have partial or dominant hydrophobic interactions and reduced interaction with waters, multiple charges on a single molecule such as a zwitterion, and very complex multi-site interactions with surface functional groups. These considerations have limited the utility of many studies in the past, with the vast majority involving measurement of uptake concentrations without information on the actual binding geometry or mechanisms. We are developing a program to couple sum-frequency vibrational spectroscopy (SFVS), surface x-ray scattering methods, and computer simulations to characterize organic species topologic interactions with well-known mineral surfaces. Initial investigations examined ethanol as a single monolayer, and as a bulk liquid, on the corundum R-plane (1-102) surface using SFVS. Subsequent studies examining selenomethionine and other heavy atom-substituted amino acids are in progress. This approach enables x-ray surface scattering and anomalous scattering measurements to be correlated with SFVS vibrational information. The complexities and advantages of this approach will be described, as well as most recent results.