

192 - In situ characterization of environmental redox reactions using quick-scanning X-ray absorption spectroscopy (Q-XAS)

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Redox reactions at the mineral/water interface occur over time scales ranging from milliseconds to years and beyond. Traditional, *ex situ* analysis of redox reactions requires reactant separation, followed by sample analysis. Rapid initial reactions cannot be captured with traditional batch and flow techniques, which, for a number of sorption and redox processes, can comprise a significant portion of the total reaction process. In this presentation, we will describe the use of quick X-ray absorption spectroscopy (Q-XAS), at a subsecond time-scale, as an *in situ* technique to follow the initial rates (<30 s) of As(III) and Cr(III) oxidation by hydrous manganese(IV) oxide (HMO). We will show that chemical kinetics are being measured, as evidenced by calculated rate constants that do not change with concentration. In addition to using X-ray absorption near-edge structure (XANES) spectroscopy to follow Cr and As oxidation states, we have employed the extended portion of the spectra to characterize surface precipitates that may limit the extent of oxidation. Ultimately, this technique allows for time-resolved, *in situ* measurements of nearly any element on the periodic table.

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Spectroscopic Investigations of Metal Interactions at Mineral/Water/Microbial Interfaces (08:00 AM - 11:05 AM)

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