131 - Multiscale assessment of the kinetics and mechanisms of metal(loid) oxidation at the Mn-oxide/water interface

Donald L Sparks, *dlsparks@udel.edu, Brandon Lafferty, Matthew Ginder-Vogel, Gautier Landrot, Mengqiang Zhu, Jason Fischel, Matthew Fischel. Plant and Soil Sciences, University of Delaware, Newark, DE 19711, United States*

Manganese oxides in terrestrial and aquatic environments are powerful oxidants of contaminants such as As and Cr. While numerous studies have appeared on the kinetics of As(III) and Cr(III) oxidation on manganese oxides, the mechanisms of the reaction process are not well understood. In these studies, a multi-spatial and multi-temporal scale study was conducted, employing synchrotron-based quick X-ray absorption (Q-XAS) and bulk X-ray absorption (XAS) spectroscopy, molecular modeling, and macroscopic stirred-flow kinetics, to assess the mechanisms of As(III) and Cr(III) oxidation on manganese oxides. Time scales ranged from milliseconds to months. Q-XAS studies revealed that the oxidation process was rapid, occurring in a matter of a few seconds. With time, oxidation slowed due to passivation of the surface. These studies emphasize the importance of following the kinetics of important processes such as oxidation over a range of temporal and spatial scales.

Wednesday, March 19, 2014 01:30 PM
Advances in Understanding the Environmental Geochemistry of Manganese (Mn) Oxides (01:30 PM - 05:25 PM)
Location: Dallas Convention Center
Room: C150

Close Window