

The Complexation Structure of Cr(III) on SiO₂: An X-ray Absorption Spectroscopic Analysis. S.E. FENDORF*, M.G. STAPLETON, G. LAMBLE†, M.J. KELLEY, and D.L. SPARKS. *University of Delaware* and †*Brookhaven National Laboratory*.

The complexation structure of Cr(III) sorbed on amorphous SiO₂ was investigated using synchrotron based x-ray absorption spectroscopy (XAS). The extended x-ray absorption fine structure (EXAFS) was utilized to determine the coordination environment of Cr(III) on silica. In addition, high-resolution transmission electron microscopy (HRTEM), Fourier transform infrared (FT-IR) spectroscopy, and x-ray photoelectron spectroscopy (XPS) were used to confirm the results obtained by EXAFS analysis. Furthermore, the effects of sample distortions invoked from the different analytical environments of these techniques was investigated. Chromium(III) formed nucleated hydroxyl species with the γ -CrOOH structure on SiO₂; the extent of nucleation was dependent on the initial solution Cr(III) concentration and pH. Batch and flow methods were employed to react Cr(III) with SiO₂. These different surface loading methods allowed the total surface coverage and the initial Cr(III) concentration to be compared as to their effects on the degree of nucleation.

Scott Fendorf, (302) 831-1595