

Novel Techniques in Metal Ion Speciation*

S. Skanthakumar and L. Soderholm, *Actinide Facility and Chemistry Division, Argonne National Laboratory*

Friday, September 21, 2001

2:30 pm

APS Auditorium

The important role that colloids and aggregates play in the fate and transport of metal ions in the environment has only recently been recognized. Numerous physical properties, including redox and chemical behaviors of these metal atoms, as well as their interactions with mineral surfaces are dependent on speciation and the atomic-scale structure of the colloid. Atomic arrangements within aggregates have been difficult to quantify for various reasons, including particle stability and macroscopic particle concentration. The more standard structural techniques like x-ray or neutron diffraction have additional technical problems associated with very small particle size and the absence of long-range crystalline ordering. We present recent high-energy x-ray scattering data that demonstrate its potential for determining unique structural information, on the atomic scale, for aggregates in solution. The results of high-energy scattering are combined with results from x-ray absorption studies to elucidate the atomic structure of metal colloids in solution with dimensions up to 100 Å and greater.

*This work has benefited from the BESSRC-CAT and the APS and is supported by the U.S. DOE, OBES, Chemical Sciences, under contract W-31-109-ENG-38.