

# GEOC: Division of Geochemistry

## 164 - Macroscopic and microscopic investigation of adsorption and precipitation of Zn on $\gamma$ -alumina as affected by As

**Author Block:** Yujun Wang<sup>1</sup>, Tingting Fan<sup>1</sup>, Dongmei Zhou<sup>1</sup>, Wei Li<sup>2</sup>, Mengqiang Zhu<sup>3</sup>, Donald Sparks<sup>4</sup>

<sup>1</sup> Key Laboratory of Soil Environment and Pollution Remediation, Institute of Soil Science, Chinese Academy of Sciences, Nanjing, China; <sup>1</sup> Key Laboratory of Soil Environment and Pollution Remediation, Institute of Soil Science, Chinese Academy of Sciences, Nanjing, China; <sup>1</sup> Key Laboratory of Soil Environment and Pollution Remediation, Institute of Soil Science, Chinese Academy of Sciences, Nanjing, China; <sup>2</sup> University of Delaware, Newark, Delaware, United States; <sup>3</sup> Ecosystem Science and Management, University of Wyoming, Laramie, Wyoming, United States; <sup>4</sup> Interdisciplinary Sci Engr Lab, Univ of Delaware, Newark, Delaware, United States

**Abstract:** Zinc (Zn) and arsenate (As) often coexist in soils. However, little is known concerning the effects of coexisting As on Zn adsorption and precipitation on soil minerals. In this study, adsorption and precipitation of Zn on  $\gamma$ -alumina in the absence and presence of arsenate was investigated employing batch experiments and extended X-ray absorption fine structure (EXAFS) spectroscopy. Results indicated that Zn formed edge-sharing tetrahedral surface complexes at pH 5.5 and Zn-Al LDH-like (layered double hydroxide) precipitates at pH 7.0 on the surface of  $\gamma$ -alumina. The presence of arsenate significantly enhanced Zn sorption densities, and remarkably changed its bonding environment. At pH 7.0, when Zn was preequilibrated with  $\gamma$ -alumina prior to the As introduction, mixed Zn-Al LDH-like and adamite-like precipitates formed. However, when Zn and As were added simultaneously, only adamite-like precipitate was observed. Zn-arsenate precipitates could significantly decrease the concentration of Zn in aqueous solution and the bioavailability and mobilization of Zn in soils.