

**Title**

Direct Arsenic Speciation in Soils Using Macroscopic and Micro-focused Spectroscopic Techniques

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**Keywords**

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| FLOW CELL                | NICKEL & COPPER     |
| PYROPHYLLITE & AL-OXIDES | SORPTION MECHANISMS |

**abstract**

Arsenic (As) is recognized globally to be a very toxic element whose speciation in natural soil systems needs to be intimately understood in order to protect plants, wild life, and ultimately humans. This study therefore investigated the molecular scale speciation of As present in soils of varying geographic origin and arsenic contamination history. Two soils with a lead arsenate history and one soil with a chromated copper arsenate history were studied. Micro-focused x-ray fluorescence mapping (micro-XFM) and x-ray absorption fine structure spectroscopy (micro - XAFS) techniques were used to elucidate the speciation of As and other co-existing metals and oxyanions at beamline X-26A of the National Synchrotron Light Source (Brookhaven, NY). These studies are complimented by laboratory desorption studies and clay mineralogical analysis using x-ray diffraction. Micro-XFM showed that As hotspots (localized spots of high As concentration) coincide most prominently with zinc (Zn) and manganese (Mn), and to a lesser extent with copper (Cu) and chromium (Cr). Microwave digests, analyzed by ICP-AES, and micro-XFM showed that the underlying adsorbent is composed mostly of iron (Fe) and likely aluminum (Al), however, Fe and As hotspots did not coincide. Micro-XAFS showed that As is present as As (V) in all soils. More spectroscopic and other macroscopic data will be discussed.

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