Speciation of Arsenic in Soils

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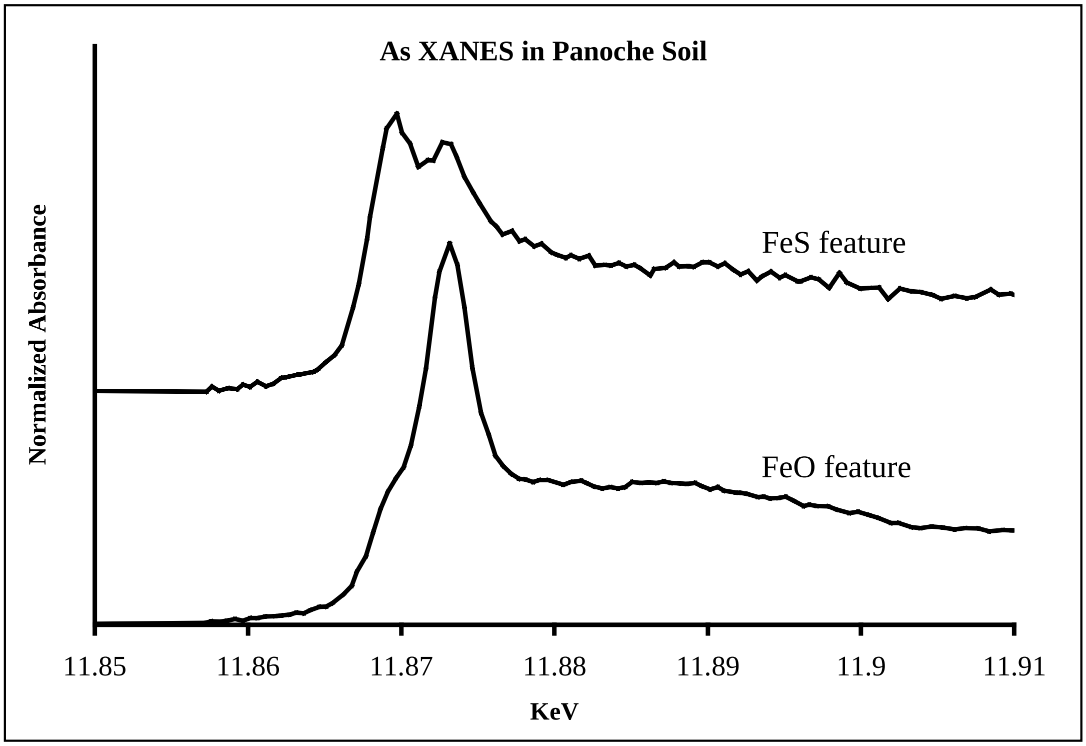
In this study we used beamline 10.3.2 to collect arsenic micro-XAFS spectra from a natural soil collected near Panoche Creek, California. By using the microprobe to scan the surface of a polished section of the soil, ~ 1 mm thick, two distinct iron containing areas were found (diameters < 200 µm) only 500 µm apart: one of the areas is dominated by iron and sulfur, while the other is dominated by iron oxide. The XANES spectra reveal that the speciation of arsenic in the two features is different, consisting of two arsenic oxidation states. Thus, by using the micro-XAFS technique, we are sampling two areas separated by a mere 500 microns, that are completely distinct in their chemical nature. This data clearly illustrates the power of this micro beam technique in its capacity to spatially resolve different chemical species. Such information cannot be determined using the more traditional bulk XAFS technique, which would give an average spectrum of the arsenic environment in the soil. This micro-XAFS technique yields the detailed information that is critical for modeling and managing arsenic in the environment.



As XANES collected from two distinct mineralogic features in soil. The FeS feature is a region in the soil less 200 µm in diameter that is relatively high in Fe and S. The FeO feature is a similar feature (500 µm away) in which S is not present. The step size in the spectra is 0.5 eV.

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