

Trying to make the connection: soil Ni speciation and plant accumulation. (S02-mcnejr.415428-oral)

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Abstract:

We investigated the speciation of Ni in smelter contaminated soils that had been previously remediated with lime and attempted to discern what effect this speciation has on plant metal availability and the mechanism of plant metal translocation and storage. Using a combination of macroscopic and microscopic techniques including SEM, and micro-x-ray absorption fine structure (XAFS) and x-ray fluorescence (XRF) spectroscopies, it was found that the primary phases present in the soil were NiO and Ni(OH)₂ with mixed metal surface precipitates as minor phases. To ascertain the effect of soil speciation on plant accumulation, a combination of micro-XRF, micro-XAFS and micro-tomography was used on selected portions of the plant *Alyssum murale*, a know nickel hyperaccumulator, that had been grown in the above soils. Tomographic results indicate a concentration of Ni on the periphery of the leaf with micro-XRF confirming this result as well as indicating an association of Ni with Mn at the base of the trichome. Micro-XAFS spectra were recorded from selected regions throughout freshly harvested plants with preliminary results identifying Ni-citrate and Ni-histidine complexes. Understanding how soil metal speciation affects plant metal availability and the mechanisms of metal accumulation will help when making decisions as to how to remediate a site enriched with heavy metals.

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