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Report:

EXAFS and XANES data at the Zn K-edge (9.659 keV) were recorded using a (220) monochromator at the ID26 beamline. Data were collected at 20K in fluorescence mode using Si-photodiodes and appropriate Cu and V filters to attenuate elastic scattering and Fe/Mn fluorescence respectively.
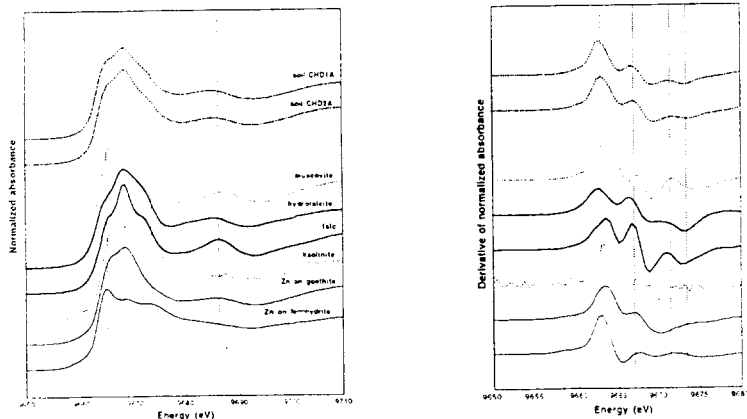

Figure 1. Zn K-edge XANES data of the <2 μm fraction smelter impacted soil CHD2A compared with experimental XANES data of model compounds. Note the high resolution of the edge features at the ID26 undulator beamline with a (220) monochromator.

Zinc speciation was investigated in smelter impacted soils from France, England and Switzerland. EXAFS and XANES data of raw clay fraction as well as of various model compounds are presented in Figures 1 and 2. The quality of the Zn K-edge XANES and EXAFS spectra recorded in «quickscan» mode attests for the excellent capabilities of ID 26 for studying diluted natural samples.
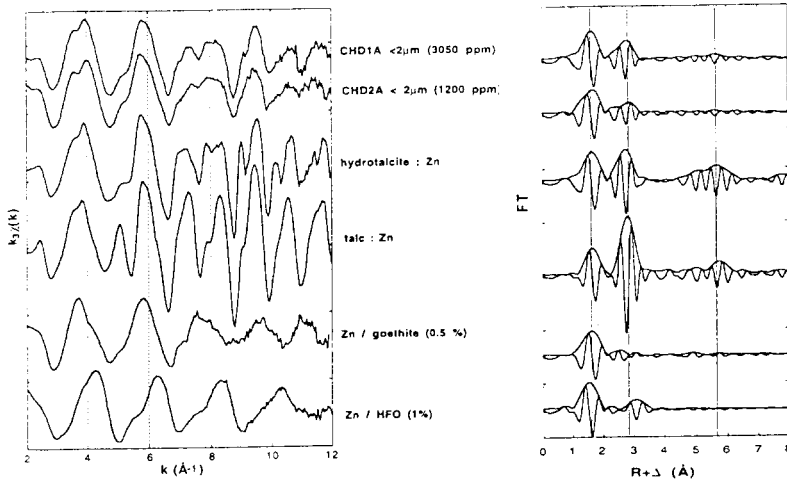

Figure 2. Zn-K EXAFS data at 20K of two smelter impacted soils (CHD1A & 2A) compared with experimental data of model compounds.

Linear least-squares fitting of the experimental EXAFS data using selected model compounds suggests that an Zn hydrotalcite component dominates Zn speciation in the <2 micron fraction of the soils studied (Figure 3). This is supported by preliminary data recorded on chemically treated samples. Minor components of Zn bearing clay minerals, Zn-organic complexes and Zn adsorbed onto hydrous ferric oxides were also identified. These data are still under interpretation and will be used for geochemical modeling.
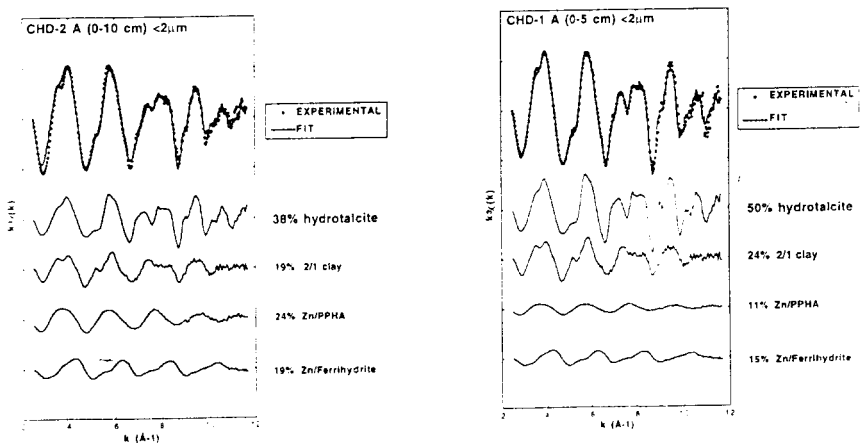

Figure 3. Linear least-squares fit of the Zn K-edge EXAFS data of <2 μm fractions of the CHD1A and CHD2A smelter impacted soils. Experimental EXAFS data of the 2/1 clay (150 ppm Zn in illite) and of Zn sorbed onto PPHA (1000 ppm) were recorded at SSRL