QUANTITATIVE TEXTURE ANALYSIS AND P-EXAFS EXPERIMENTS OF NONTRONITE THIN FILMS

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This communication reports on the new application of polarized extended X-ray absorption fine structure (P-EXAFS) spectroscopy to fine-grained layer silicates taking the Garfield nontronite as a case study. Up to now application of P-EXAFS to structural studies of layer silicates has been restricted to single phyllosilicate crystals, but we show here that P-EXAFS can be rigorously applied to self-supporting clay films without loss of spatial resolution. The quantitative analysis of P-EXAFS spectra requires however the preparation of highly oriented clay films, the orientation distribution of which being assessed by quantitative texture analysis (QTA).

The basic principles of the methodology are shown to example how important the texture strength has to be controlled during the elaboration of the films. It is shown that *ab initio* modeling quantitatively accounts for the angular dependence of measured EXAFS spectra. These calculations allow to identify the nature of single- and multiple-scattering paths of the photoelectron, and to interpret all spectral features observed up to 6.5 Å on the in-plane and out-of-plane radial structure functions of nontronite. In practice, P-EXAFS measurements allow the determination of the flattening angle of Fe-O octahedrons, the cations distribution in the octahedral sheet with an enhanced sensitivity, and to differentiate dioctahedral from trioctahedral structures.