2013-2014 Internship

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Proposed research

Incorporation of V, Mo, and Co in the structure of disordered lamellar Mn oxides: Crystal chemistry and environmental implications

Keywords: Trace metal elements, Environment, Mn oxides, biominerals, crystal chemistry, X-ray diffraction, crystal chemistry, Cobalt, Molybdenum, Vanadium.

Summary

Lamellar Mn oxide play a pivotal role in the (bio-)geochemical cycling of a variety of metallic and metalloid elements in surficial formations such as soils and sediments. These minerals originate essentially from biological activity (bacteria, fungi, superior plants) and occur as extremely reactive disordered nanocrystals. Their reactivity is directly related to their minute size and to their high density of defects.

Vanadium, Molybdenum, and Cobalt are frequently associated with Mn oxides in nature, and, from their ionic radii, can be incorporated in the octahedral framework of these Mn oxides. Understanding, at the atomic scale, the structural link between these elements and defective Mn oxides is a key to assess and model the impact of these defective minerals on the biogeochemical cycle of these elements.

The proposed work will involve the chemical (Mn oxidation degree) and structural (modelling of X-ray diffraction patterns) of biogenic Mn oxides obtained in the presence of various concentration of the three elements. It will aim at determining the crystal-chemistry of the metal-bearing Mn oxides, and more especially the possible incorporation of these elements in the oxide framework.