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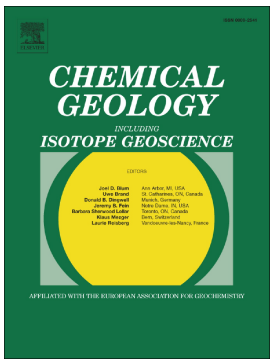

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A cryogenic XPS study of Ce fixation on nanosized manganite and vernadite: interfacial reactions and effects of fulvic acid complexation

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ABSTRACT

This study investigated interfacial reactions between aqueous Ce(III) and two synthetic nanosized Mn (hydr-)oxides (manganite: γ-MnOOH, and vernadite: δ-MnO_2) in the absence and presence of Nordic Lake fulvic acid (NLFA) at circumneutral pH by batch experiments and cryogenic X-ray photoelectron spectroscopy (XPS). The surfaces of manganite and vernadite were negatively charged (XPS-derived loadings of (Na+K)/Cl>1) and loaded with 0.42-4.33 Ce ions nm^{-2}. Manganite stabilized Ce-oxidation states almost identical to those for vernadite (approximately 75% Ce(IV) and 25% Ce(III)), providing the first experimental evidence that also a Mn(III) phase (manganite) can act as an important scavenger for Ce(IV) and thus, contribute to the decoupling of Ce from its neighboring rare earth elements and the development of Ce anomaly. In contrast, when exposed to Ce(III)-NLFA complexes, the