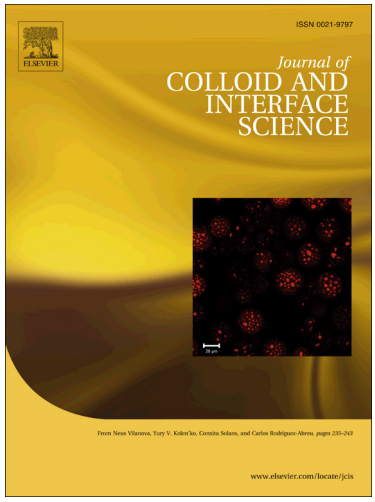

Regular Article

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FeOOH-Graphene Oxide nanocomposites for fluoride removal from water: acetate mediated nano FeOOH growth and adsorption mechanism

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ABSTRACT

Fluoride adsorption capacity in water matrices depends highly on the properties of each component of the adsorption system, the most important one of these is the physchemical properties of the adsorbent. Nanoparticle Goethite anchored onto graphene oxide (FeOOH+Ac/GO) and rice spike-like Akaganeite anchored onto graphene oxide (FeOOH/GO) were synthesized via an in-situ hydrolysis procedure and compared their fluoride adsorption performances in order to address the effect of crystalline structure growth induced by acetate sodium (NaAc), one important organic ligand in water and soil. The morphology, crystallinity, surface functional groups, elemental compositions and atomic percentage of the two hybrid graphene based nanocomposites were characterized. In order to evaluate fluoride adsorption capacity and reveal fluoride adsorption mechanism, adsorption kinetics and dynamics, effects of pH, effects of co-existing anions and mass transfer coefficients were comprehensively investigated for two adsorbents in water matrix. The results show that organic ligands like acetate greatly modify the crystalline structure of iron (oxy)hydroxide (FeOOH), thus altered its fluoride adsorption performance and adsorption mechanism. It would be very important to know the interface behaviors of mineral mediated by natural organic ligands in water or soil matrices.

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