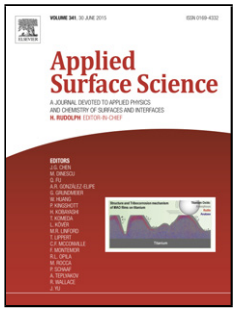

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The adsorption of oleate on powellite and fluorapatite: A joint experimental and theoretical simulation study

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Research Highlights

1. Flotation of powellite from fluorapatite at pH 2-7 using 50-80 mg/L sodium oleate can be achieved.
2. Oleate chemisorbs on powellite by interaction of carboxylate group with lattice Ca atoms.
3. Calcium dioleate precipitates can also adsorb on powellite surface.

Abstract: Flotation and adsorption performance of sodium oleate（NaOl）on powellite and fluorapatite were investigated in this work through micro-flotation tests, work of adhesion calculations, molecular dynamics simulation, micro-topography studies and FTIR measurements. The micro-flotation results show a similar flotation behaviors of powellite and fluorapatite under alkaline conditions, but a considerable difference in mineral recoveries in the pH range 2-7, which demonstrates the possibilities for separating powillite from fluorapatite under acidic conditions. The great difference in mineral recovery displays a good accordance with the obvious difference in the work of adhesion of powellite and fluorapatite at NaOl dosage range of 40-80 mg/L, obtained from flotation and contact angle measurements, respectively. The more negative interaction energy (ΔE) between NaOl and powellite/water interface from molecular dynamics simulation reveals a more easily adsorption of NaOl onto powellite than onto fluorapatite, which