Talk title

Energetics at the Nanoscale: Impacts for Geochemistry, the Environment, and Materials

Abstract

Using calorimetric techniques, we have shown that differences on surface energies of various phases lead to large changes in thermodynamic stability among phase assemblages, indeed sometimes startlingly, as small particles are stable in structures that are metastable in the bulk. These changes impact geochemical and biogeochemical processes, the transport of heavy metals in the environment, catalysis, and the optimization of materials for energy applications. Such effects will be illustrated in three families of materials: iron and manganese oxides, lithium battery cathode materials, and cluster compounds of elements ranging from aluminum to uranium.