Current Adventures in Mineral Thermochemistry – From Adsorbates on Mineral Surfaces to Deep Earth and Planetary Materials

ALEXANDRA NAVROTSKY[1]

[1]Peter A. Rock Thermochemistry Laboratory and NEAT, University of California, Davis, 4415 Chemistry Annex, One Shields Avenue, Davis, CA 95616 USA, anavrotsky@ucdavis.edu

Thermochemical studies elucidate the driving forces for geochemical processes from the Earth's surface to deep planetary interiors. Recent advances in calorimetry in the Peter A. Rock Thermochmistryt Laboratory at UC Davis have enabled the study of an increasingly wide range of problems. Here I summarize recent progress in three diverse areas. Relating mineralogy, geochemistry, and thermodynamics. The first is a comparison of the energetics of water and ethanol adsorption on mineral surfaces, especially silica and calcite.. This highlights new gas adsorption calorimetric methodology and is relevant to CO_2 sequestration and mineral reactivity in the surface and subsurface environment. The second is the energetics of nanodiamond and related carbon nanomaterials, relevant to the perhaps surprisingly ubiquitous occurrence of such nanophases in the mantle. The third is the thermodynamics of bastnaesite, a main rare earth ore whose stability as a function of the rare earth and F-OH substitution been poorly constrained till now.