Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Thermodynamic Investigation of Ar, CH_4, and D_2O Adsorption on ZnO surfaces SAMI CHANAA, M. FARINELLI, A. FREITAG, M. ROSS, University of Tennessee, JOHN Z. LARESE, Oak Ridge National Laboratory, University of Tennessee — ZnO nanoparticles of different shape and exposed crystal face have raised considerable interest in the recent past, because their potential use for electronic and photonic devices, etc. Understanding the relationship between the macroscopic particle shape and the surface morphology, structure and polarity will play a crucial role in developing technologically useful devices. Using a recently developed synthetic method we have been able to produce large quantities of high quality pure and doped ZnO nanomaterial with shapes including plates, nanowires and tetrapods as observed by TEM. High resolution adsorption isotherms were used to investigate the interaction of the nanoparticle surfaces with different probe molecules. The shape of the resulting adsorption isotherms varies as the distribution of nanoparticle shapes and surfaces used as substrate is changed. Results of thermodynamic investigation of argon and methane adsorption below the respective triple points show the formation of 3 distinct adsobate layers before the onset of bulk adsorbate formation. D_2O isotherms show weak evidence of different mono and multi layer capacities depending on previous exposure of the nanoparticle surface to UV radiation.

Sami Chanaa
University of Tennessee

Date submitted: 02 Dec 2005 Electronic form version 1.4