Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Magnetic and structural properties of CeO_2 nanoparticles[1] PRASANTA DUTTA, SUSMITA PAL, MOHINDAR SEEHRA, West Virginia University, G. TURPIN, R. ERNST, University of Utah, CONSORTIUM COLLABORATION — Nanoparticles of cerium oxide, CeO_2, have potential applications in catalysis, fuel cells, microelectronics etc [1]. In this work, we have investigated the magnetic and structural properties of 10%CeO_2 supported on SiO_2 aerogel with a BET surface area ≈ 700 m^2/g. X-ray diffraction (XRD) studies show cubic CeO_2 as the dominant phase with particle size ≈ 3 nm. Temperature variation (2K – 350K) of the magnetic susceptibility χ shows Curie-type variation with the Curie constant $C = 5.9 \times 10^{-5}$ emu K/g Oe. In electron magnetic resonance (EMR) studies from 5 K to 300 K at 9.28 GHz, an EMR line at $g \approx 2.1$ with linewidth $\Delta H \approx 100$ Oe is observed for $T <$ 40 K. Since Ce^{4+} in CeO_2 is diamagnetic, we tentatively suggest that the observed Curie variation of χ and the EMR line [2] are due to paramagnetic Ce^{3+} present in oxygen-lean CeO_2 nanoparticles. From the magnitude of C, the concentration of Ce^{3+} is estimated to be ≈ 3 %. Further studies are in progress. [1]. S. Sathyamurthy et al, Nanotechnol. 16, 1960 (2005). [2]. D. Schaniel et al, Phys. Rev. B 70, 144410 (2004).

[1]Supported by a grant from the U.S Department of Energy.

Mohindar Seehra
West Virginia University

Date submitted: 13 Dec 2005 Electronic form version 1.4