

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Origin of Structural Stability in Cubic ZrO<sub>2</sub> Nanocrystals Studied by EXAFS**<sup>1</sup> Y.L. SOO, S.L. CHANG, National Tsing Hua University, Taiwan, C.L. CHEUNG, R. SABIRIANOV, F. NAMAVAR, W.N. MEI, University of Nebraska, P. CHU, National Central University, Taiwan, J.F. LEE, NSRRC, Taiwan — Local environments surrounding Zr nanocrystalline powders and thin films of cubic zirconia prepared by sol-gel and ion beam assisted deposition (IBAD) methods were investigated by using extended x-ray absorption fine structure (EXAFS) technique. These materials have shown cubic long-range-order structure and high hardness without chemical stabilizers. To understand the origin of structural stability, the short-range-order local structural information obtained from EXAFS measurements is of central importance. Powder samples with different nanoparticle sizes prepared by different sol-gel processes were analyzed. Zr k-edge EXAFS, as well as N K-edge x-ray absorption near-edge structures (XANES), will also be presented to demonstrate the evolution of O vacancies and possible N impurities due to thermal annealing in the IBAD deposited films.

<sup>1</sup>This work has been supported by NSC in Taiwan.

Yun-Liang Soo  
National Tsing Hua University

Date submitted: 18 Nov 2008

Electronic form version 1.4