Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

$\beta-Si_3N_4/CeO_{2-x}$Interface Investigated via Atomic Resolution Z-contrast Imaging, Electron Energy-Loss Spectroscopy and First-Principles Methods[1] WERONIKA WALKOSZ, ROBERT F. KLIE, SERDAR OGUT, University of Illinois at Chicago, BILJANA MIKIJELJ, Ceradyne Inc., STEPHEN J. PENNYCOOK, Oak Ridge National Laboratory, JUAN C. IDROBO, University of Illinois at Chicago, Vanderbilt University, Oak Ridge National Laboratory — The addition of rare-earth oxides, typically forming intergranular glassy films in ceramics, has long been known to markedly affect toughness and creep resistance of Si_3N_4. The present work investigates the bonding characteristics of cerium at the interface between Si_3N_4grains and the secondary ceria phases with aberration-corrected scanning transmission electron microscopy techniques. The obtained Z-contrast images and the electron energy-loss spectra taken at the interface of Si_3N_4/CeO_{2-x} suggest that the arrangement of Ce at the interface depends on the thickness of the intergranular film, the electronic structure of the rare earth element, as well as the termination of Si_3N_4. Possible reasons for these observed structural and electronic variations at the interface, and their agreement with the theoretical predictions of two stoichiometric terminations of $Si_3N_4(10\bar{1}0)$ surface will be briefly discussed.

[1]Supported by NSF Grant No. DMR-0604964

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Date submitted: 21 Nov 2008 Electronic form version 1.4