Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Core/Shell Nanocrystalline Clusters in a Glass Matrix: A High Pressure Synchrotron X-Ray Diffraction Study[1] PATRICIA E. KALITA, High Pressure Science and Engineering Center, Dept. of Physics, UNLV, GINO MARIOTTO, Dipartimento di Fisica, Università di Trento, Italy, YOSHIMICHI OHKI, Dept. of Electrical Eng. and Bioscience, Waseda University, Tokyo, Japan, KRISTINA E. LIPINSKA-KALITA, Center for Nanoscale Device Research, Dept. of Electrical and Computer Eng. University of Nevada Las Vegas — Synchrotron x-ray diffraction studies up to 50 GPa were performed on an optically transparent composite with nanometer-sized $ZrTiO_4/LiAlSi_2O_6$ core/shell clusters embedded in a host glass. In the low-pressure range the shift and broadening of the x-ray diffraction lines was consistent with the densification of the $LiAlSi_2O_6$ shell phase. At higher pressures, the considerable diffraction line broadening pointed to a partial amorphization of the nanocrystalline phase. With pressure increase the x-ray patterns progressively revealed the presence of the $ZrTiO_4$ core phase. Upon decompression from 50 GPa to ambient conditions the pressure-induced changes were not fully reversible, however the diffraction pattern of the pressure-quenched material suggested that the decompressed structure carries the signature of the initial ambient $LiAlSi_2O_6$ phase.

[1]Use of the HPCAT facility was supported by DOE-BES, DOE-NNSA (CDAC), NSF, DODTACOM, and the W.M. Keck Foundation

Patricia E. Kalita
High Pressure Science and Engineering Center, Dept. of Physics, UNLV

Date submitted: 04 Dec 2005 Electronic form version 1.4