Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

X-ray Absorption Fine Structure Study of the Metal-Insulator Transition in Cr Doped V_2O_3[1] A.I. FRENKEL, Yeshiva University, D. PEASE, J. BUDNICK, P. SHANTHAKUMAR, T. HUANG, University of Connecticut, N. ABITBOL, Yeshiva University, P. METCALF, Purdue University — We have applied the polarized x-ray absorption fine structure (XAFS) spectroscopy to study the series of $(V_{1-x}Cr_x)_2O_3$ where x ranges from 0 to 0.052. At room temperature, the metal-insulator transition (MIT) between paramagnetic metal 1 (PM-1) and paramagnetic insulator (PI) phases occurs as x exceeds 0.01. At elevated temperatures, the second PM phase (PM 2) sets in the metallic samples ($x < 0.01$). We have obtained V K-edge and Cr K-edge spectra for the samples in the PM1, PM2 and PI phases at different concentrations (from 0.00365 to 0.0052) and temperatures (from 300 K to 673 K). V K-edge X-ray absorption near-edge structure (XANES) data show systematic changes across varies phase boundaries, both temperature and dopant-driven. Polarized Cr K-edge and V K-edge XANES and extended XAFS (EXAFS) data demonstrate, for the first time, that Cr enters the V_2O_3 lattice substitutionally, at all concentrations. Contrary to the Cr K-edge, the changes in the V K-edge XANES across the metal-insulator transition are strongly anisotropic. X-ray diffraction (XRD) and temperature dependent XANES and EXAFS results of Cr and V data will be discussed in terms of the possible percolative nature of the MIT in this system.

[1]DOE Grant No. DE-FG02-05ER36184

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Date submitted: 28 Nov 2005 Electronic form version 1.4