Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Fe K pre-edge of Fe_2O_3 at High Pressure[1] SHIBING WANG, Department of Applied Physics, Stanford University, WENDY MAO, Department of GES, Stanford University, Photon Science, SLAC National Accelerator Laboratory, YONG CAI, Brookhaven National Laboratory, NOZOMU HIRAOKA, HIROFUMI ISHII, National Synchrotron Radiation Research Center, Taiwan, YANG DING, YUMING XIAO, PAUL CHOW, HO-KWANG MAO, JINFU SHU, Geophysical Laboratory, Carnegie Institution of Washington, CHICHANG KAO, Brookhaven National Laboratory — Hematite (α-Fe_2O_3), as an archetypal 3d transition metal oxide and important earth mineral, undergoes a series of electronic transitions and structural changes at high pressure. At ambient conditions, Fe_2O_3 adopts the α-Al_2O_3 structure and is an antiferromagnetic Mott insulator, with five 3d electrons in the high-spin state. Upon increasing pressure, it transforms from a high-spin state to a low-spin state in the 40-70 GPa range. Here we report experimental results for the Fe K-edge spectra of Fe_2O_3 collected in-situ at high pressure using synchrotron x-ray absorption spectroscopy in partial fluorescence yield geometry. The pre-edge features give explicit information about the crystal field splitting energy (CFSE) of octahedrally coordinated Fe^{3+} in Fe_2O_3 as a function of pressure, mapping the electronic structure (high-spin to low-spin) transition. The K-α emission spectra at high pressure are also presented.

[1]S. Wang and W. Mao are supported by NSF and DOE-NNSA(CDAC).

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Date submitted: 21 Nov 2008 Electronic form version 1.4