

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Magnetic anisotropy probed by momentum-resolved EELS** YASUO ITO, YOSHIE MUROOKA, Northern Illinois University, RUSSELL COOK, MSD ANL, MICHEL VAN VEENENDAAL, Northern Illinois University, NANDA MENON, Gatan Inc., DEAN MILLER, MSD ANL — We present an investigation of the temperature induced MLD in microcrystalline antiferromagnetic  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> (hematite) particles, using the STEM-based momentum-resolved EELS [1] with a nanometer-scale electron probe in a 120kV TEM/STEM with the energy resolution lower than 0.7 eV. The focused incident beam was parallel to the *c*-axis of the (001) oriented microcrystalline. The difference between spectra obtained below and above 263K agrees with the calculated MLD spectrum based on the atomic multiplet calculation for the octahedrally coordinated Fe<sup>3+</sup> ion in  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>. The present result is also consistent with the result obtained by the synchrotron X-ray MLD experiment on a single crystal  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> [2]. [1] J. Yuan, N.K. Menon, J. Appl. Phys. 81, (1997) 5087 [2] P. Kuiper et al., Phys. Rev. Lett. 70 (1993), 1549. [3] This work is supported by the US Department of Education, State of Illinois under HECA, NIU URA program, and work at Argonne, carried out in the Electron Microscopy Center, is supported by the U.S. Department of Energy, Basic Energy Sciences-Materials Sciences, under Contract #W-31-109-ENG-38.

Yasuo Ito  
Northern Illinois University

Date submitted: 04 Dec 2004

Electronic form version 1.4