Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

High Resolution Far Infrared Study of Antiferromagnetic Resonance Transitions in $\alpha-Fe_2O_3$ (hematite) SHIN GRACE CHOU, DAVID F. PLUSQUELLIC, PAUL E. STUTZMAN, SHUANGZHEN WANG, EDWARD J. GARBOCZI, WILLIAM F. EGELHOFF[1], National Institute of Standards and Technology — In this study, we report high resolution optical measurements of the temperature dependence of the antiferromagnetic (AFM) transition in $\alpha-Fe_2O_3$ (hematite) between (0.5 and 10) cm^{-1}. The absorption peak position, over a large temperature range, is found to be in agreement with a modified spin-wave model at both the high and low temperature phases, where the temperature is above and below the Morin transition temperature, respectively. The high spectral resolution optical measurements as demonstrated in this study allow unprecedented zero-field spectral analysis of the zone center AFM magnon in a previously challenging spectral region, giving insights into the role of temperature and strain on the exchange and anisotropy interactions in the system. The results also suggest that the frequency-resolved measurement platform could be extended for room-temperature non-destructive examination and imaging applications for antiferromagnetic materials and devices.

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Date submitted: 10 Nov 2011 Electronic form version 1.4