

Abstract Submitted  
for the MAR17 Meeting of  
The American Physical Society

**Magneto-chromic Sensing in Iron Oxide Nanoparticles** KENNETH O'NEAL, University of Tennessee, JONATHAN PATETE, SUNY Stony Brook, PENG CHEN, University of Tennessee, RUHANI NANAVATI, SUNY Stony Brook, BRIAN HOLINSWORTH, University of Tennessee, JACQUELINE SMITH, CARLOS MARQUES, SUNY Stony Brook, JACK SIMONSON, Farmingdale State College, MEIGAN ARONSON, SUNY Stony Brook, STEVE MCGILL, National High Magnetic Field Laboratory, STANISLAUS WONG, SUNY Stony Brook, JANICE MUSFELDT, University of Tennessee — We combine optical and magneto-optical spectroscopies with complementary vibrational and magnetic property measurements to reveal finite length scale effects in nanoscale  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub>. Analysis of the d-to-d on-site excitations uncovers enhanced color contrast at particle sizes below approximately 75 nm due to size-induced changes in spin-charge coupling that are suppressed again below the super-paramagnetic limit. These findings provide a general strategy for amplifying magneto-chromism in  $\alpha$ -Fe<sub>2</sub>O<sub>3</sub> and other iron-containing nano-materials that may be useful for advanced sensing applications.

Kenneth O'Neal  
University of Tennessee

Date submitted: 11 Nov 2016

Electronic form version 1.4