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Size-dependent optical properties of α-Fe_2O_3 nanoparticles[1] K.R. O'NEAL, B.S. HOLINSWORTH, P. CHEN, J.L. MUSFELDT, University of Tennessee, J.M. PATETE, S.S. WONG, State University of New York at Stony Brook, S.A. MCGILL, National High Magnetic Field Laboratory — We investigated the variable temperature optical properties of nanoscale hematite (α-Fe_2O_3) with special attention to the parity-forbidden Fe^{3+} *d-d* excitation that is activated by hybridization and symmetry-breaking phonons. An oscillator strength analysis of the rhombohedra, cubes, and rice reveals that the energy of the coupling phonon scales as $(\text{size})^{-1}$. Moreover, preliminary work in high magnetic fields shows a field-induced color change. These findings are important for more deeply understanding finite length scale effects in this iconic material and other nanoscale transition metal oxides.

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