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Size Dependence of the Magnetic Properties of Cobalt Oxide Nanoparticles Mineralized In Protein Cages DAMON RESNICK, KEITH GILMORE, YVES IDZERDA, Dept. of Physics, Montana State Univeristy, Bozeman, MT, 59717, MICHAEL KLEM, MARK ALLEN, TREVOR DOUGLAS, Dept. of Chemistry and Biochemistry, Montana State Univeristy, Bozeman, MT, 59717, MARK YOUNG, Dept. of Plant Sciences, Montana State Univeristy, Bozeman, MT, 59717 — Monodisperse and highly uniform magnetic nanoparticle sized structures have been made more possible with the help of genetically engineered biological containers as constraining vessels. In this study different size protein cages were used to synthesize spherical Co_3O_4 nanoparticles from 3 nm to 30 nm in diameter, in an attempt to understand the mechanism for the change in the magnetic anisotropy, Néel temperature and other magnetic properties. For magnetic nanoparticles, as the number of atoms that make up the surface become of the order of the number that make up the remaining volume, the uncompensated spins on the surface compete with the bulk to form unusual magnetic properties. X-ray Absorption Spectroscopy (XAS) is used to study the electronic structure and Vibrating Sample Magnetometry (VSM) and Alternating Current Magnetic Susceptibility (ACMS) are used to determine the magnetic properties of the nanoparticles.

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