Particle Size *vs.* Sample Quality as Factors Determining Magnetic Properties in Nanoparticles

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It has often been suggested that reducing the particle size for a magnetic material will reduce the transition temperature and substantially suppress the magnetic transition. There are also numerous experiments that appear to verify that statement. We have made heat capacity measurements on several different samples of CoO with different particle sizes including an annealed single crystal, a bulk sample with micron size particles, a sample with 7 nm diameter particles, and a high purity 8 nm sample. Our results show that the quality and crystallinity of the sample governs the magnetic properties, and that particle size dependence is much weaker than previously supposed.