Magnetic properties of cobalt ferrite-silica nanocomposites prepared by a sol-gel autocombustion technique - DTU Orbit (09/01/2019)

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The magnetic properties of cobalt ferrite-silica nanocomposites with different concentrations (15, 30, and 50 wt %) and sizes (7, 16, and 28 nm) of ferrite particles have been studied by static magnetization measurements and Mossbauer spectroscopy. The results indicate a superparamagnetic behavior of the nanoparticles, with weak interactions slightly increasing with the cobalt ferrite content and with the particle size. From high-field Mossbauer spectra at low temperatures, the cationic distribution and the degree of spin canting have been estimated and both parameters are only slightly dependent on the particle size. The magnetic anisotropy constant increases with decreasing particle size, but in contrast to many other systems, the cobalt ferrite nanoparticles are found to have an anisotropy constant that is smaller than the bulk value. This can be explained by the distribution of the cations. The weak dependence of spin canting degree on particle size indicates that the spin canting is not simply a surface phenomenon but also occurs in the interiors of the particles. (c) 2006 American Institute of Physics.