

Nanomaterials, Environment, Nanotoxicology & Health

MIM.3.P043

Size effects on the Mossbauer and Magnetic properties of Cobalt ferrite nanoparticles

K. Bato¹

¹King Saud University, King Abdullah Institute for Nanotechnology, Riyadh, Saudi Arabia

Khalid.mujsam@gmail.com

Ferrimagnetic oxides may contain single or multi domain particles and they convert into superparamagnetic state near a critical size. To explore the existence of these particles $\text{CoFe}_{2-x}\text{Cu}_x\text{O}_4$ mixed ferrite nanoparticles of different sizes were prepared through citrate-gel method. The structural aspects of the samples were explored by a wide variety of experimental techniques namely, X-ray diffraction, field emission transmission electron microscopy, vibrational sample magnetometry and Mössbauer spectroscopy. XRD analysis confirmed that grown ferrite samples are in single phase without any additional undesirable phase corresponding to any structure. The high crystalline order of the samples was further confirmed by SAED pattern. The average crystallite size of the samples has been found in the range 23 to 42 nm. The magnetic and Mössbauer properties were found strongly dependent on size. The saturation magnetization (M_s) increased with the growth of the grain size while the coercivity decreased. The Mossbauer spectrum is fitted with two broad sextets confirming that Fe is in 3+ valence state in the grown nanoparticles.

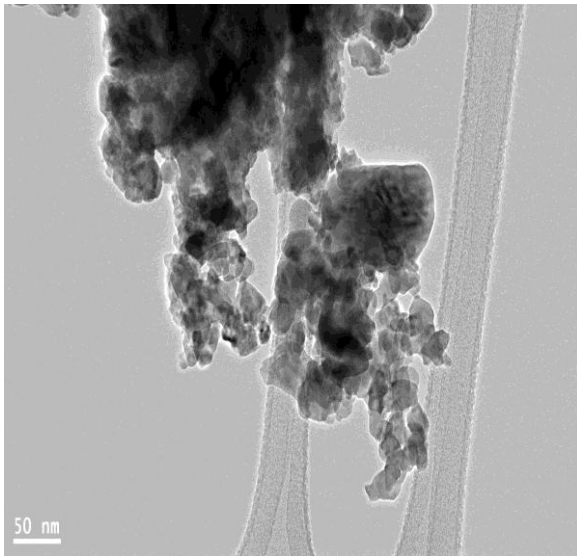


Figure 1.

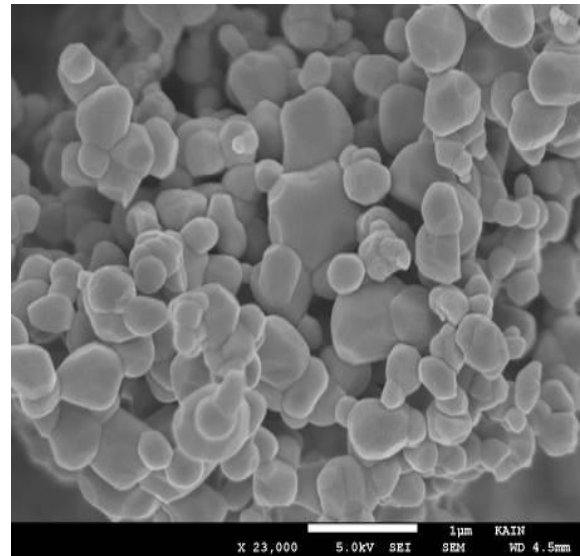


Figure 2.

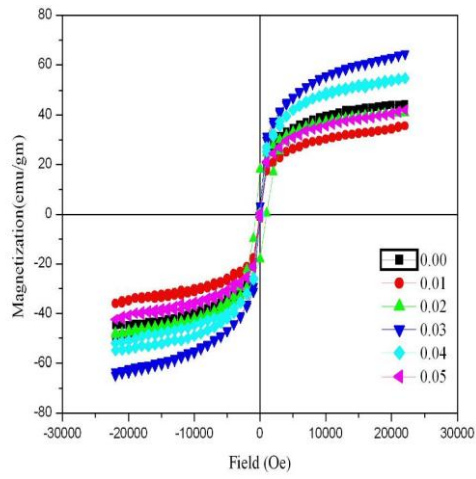


Figure 3.

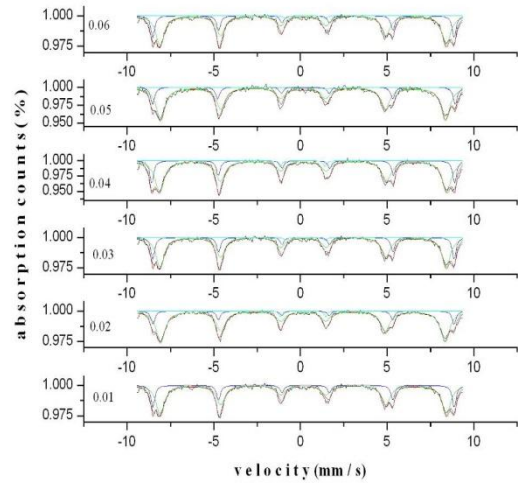


Figure 4.