



Contribution ID: 101

Type: not specified

Temperature and magnetic field dependent magnetization of nanoparticulate ZnFe_2O_4 produced by mechanochemical synthesis

ZnFe_2O_4 is basically a non-inverted ferrite which is enormously used as ferrofluids, magnetoelectric refrigeration and contrast agent for magnetic resonance imaging. A series of nanoparticulate ZnFe_2O_4 of average sizes $\Phi \sim 9$ nm to 90 nm with a range of inversion 0.008 to 0.35 has been produced by mechanochemical synthesis. The blocking temperature of the investigated samples has increased with increasing crystallite size and accordingly behaved as Curie-Weiss paramagnetic materials [1, 2]. The temperature dependent magnetic behavior of these nanoparticulates has been investigated over the temperature range from 5 K to 300 K at a magnetic field of 100 oe. DC magnetization over a magnetic field range of 0 oe to 10000 oe at 5 K, 150 K and 200 K has been observed which interpreted that the samples are superparamagnetic materials [3]. All the samples showed the normal magnetic hysteresis below blocking temperature which also shows that the coercivity increases with decreasing inversion [1]. The frequency dependent magnetic behavior of nanoparticulate ZnFe_2O_4 of 90 nm crystallite size has also been studied over a frequency range of 10 Hz to 10000 Hz which interpreted that with the increase of frequency the magnetization of this sample increased to saturation magnetization for all samples are approximately at 100 K temperature [4].

1. Qi Chen and Z. John Zhang, Applied Physics Letter 73 (1998) 3156 –3158.
2. S. J. Stewart et al. Journal of Alloys and Compounds 495 (2010) 506-508.
3. H. M. Widatallah et al. J. Magn. Magn. Mater. 320 (2008) 324-326.
4. M. Hoffman et al. Mater. Sci. Lett. 39 (2004) 5057-5065.

Primary author: Mrs NESA, Faizun (Bragg Institute, Australian Nuclear Science and Technology Organisation)

Co-authors: Mr WANG, Jianli (Institute for Superconductivity and Electronic Materials, University of Wollongong); Mr HOFMANN, Michael (FRM-II, TU München, Lichtenbergstrasse 1, Garching, Germany); Mr KENNEDY, Shane J (European Spallation Source, Lund, Sweden); Mr CAMPBELL, Stewart J (School of Physical, Environmental and Mathematical Sciences, The University of New South Wales); Mr WANG, Xiaolin (Institute for Superconductivity and Electronic Materials, University of Wollongong)

Presenter: Mrs NESA, Faizun (Bragg Institute, Australian Nuclear Science and Technology Organisation)