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MAGNETIC PROPERTIES FOR MFE_2O_4 NANOPARTICLES

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We have investigated in magnetic properties of spinel ferrite with a few nano-maters for bioapplications. MFe_2O_4 (M = Fe, Co, Ni, and Mg) nanoparticles were synthesized by a high temperature thermal decomposition method with Fe-acetylacetonate, Co-acetate, Ni-acetate, and Mg-acetate. Structural information of all samples was obtained from x-ray diffractometer (XRD) measurements. XRD results of MFe_2O_4 nanoparticles are showed a typical cubic spinel structure pattern, and the kinds of samples were characterized by Mössbauer spectroscopy. The average particle size of MFe_2O_4 was 4.5 nm and 6.2 nm for Fe_3O_4 (FE01 and FE02), 4.6 nm and 6.8 nm for $CoFe_2O_4$ (CF01 and CF02), 6.3 nm for $NiFe_2O_4$ (NF01), and 6.7 nm for $MgFe_2O_4$ (MF01) by using a high-resolution transmission electron microscopy (HRTEM). From the results of a vibrating sample magnetometer (VSM), the saturation magnetization of 6.2 nm Fe_3O_4 with a value of 59.7 emu/g is the highest and that of 6.3 nm $NiFe_2O_4$ with a value of 41.4 emu/g is the lowest. However, 6.2 nm Fe_3O_4 and 6.7 nm $MgFe_2O_4$ is the highest in the magnetic susceptibility at low magnetic fields. For bioapplications, it is necessary that the magnetic nanoparticles have a high magnetization in low magnetic field areas. Therefore, we suggest that 6.2 nm Fe_3O_4 and 6.7 nm $MgFe_2O_4$ are the most suitable as hyperthermia and magnetic carrier for bioapplications in our ferrite nanoparticles.

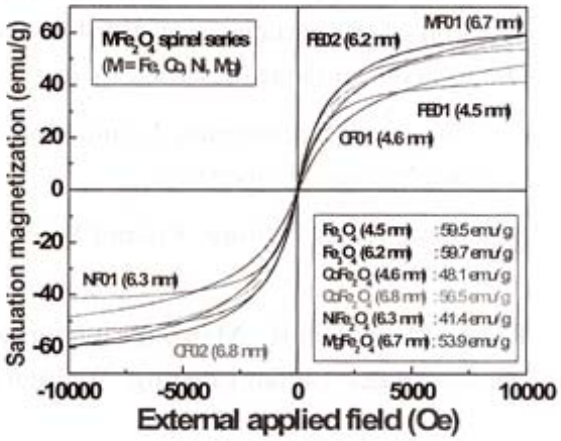

Fig. 1. Hysteresis loops of various spinel ferrite nanoparticles under a external applied field of 10 kOe at 295 K.

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☐Oral ■Poster ☐Invited Talk

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