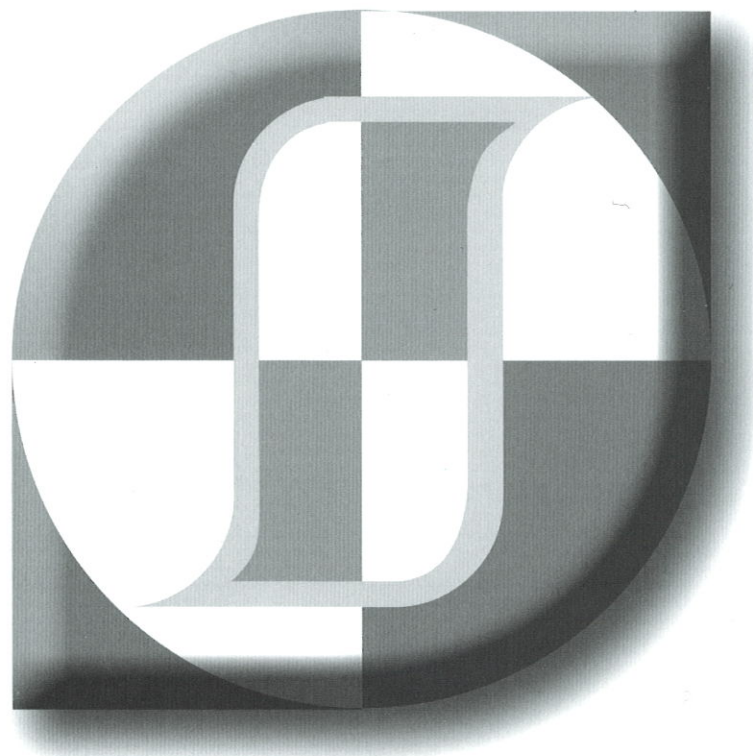


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ABSTRACTS



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Digests of the International Symposium on Magnetism and Magnetic Materials 2017
The Korean Magnetics Society

MD09	Poster	Temperature dependence of magnetizations in GdFe sublattice	110
		Jaegun Sim*, Jae-Hyeok Lee and Sang-Koog Kim	

○ Session SA[Sensor and Applications]

SA01	Poster	Improvement of Micro-Bead Detection Performance by Using Anisotropic Magnetoresistance Sensor	111
		Dong Young Kim*, Seok Soo Yoon, Jae Hoon Lee, Cheol Gi Kim	
SA02	Poster	Synchronization of parallel-connected spin-torque nano-oscillators	112
		Hee Gyum Park*, Chaun Jang, and Byoung-Chul Min	
SA03	Poster	Magnetic properties and anomalous Hall effect of CoFeB/MgO thin films on the amorphous magnetic FeZr buffer layer	113
		Ji Hoon An*, Sang Ho Lim	

○ Session SM[Soft-magnetic Materials]

SM01	Poster	Magnetic properties of cobalt based core-shell nanoparticles studied by Mössbauer spectroscopy	114
		Jeongho Park*, Hyunkyung Choi, Sam Jin Kim, Chul Sung Kim	
SM02	Poster	Anisotropic Exchange Stiffness Constant in Exchange Biased NiFe/MnIr Bilayers ...	115
		Dong Young Kim*, Seok Soo Yoon	
SM03	Poster	Spin Wave Modes in Out-of-Plane Magnetized NiFe Thin Film	116
		Dong Young Kim*, Seok Soo Yoon	
SM04	Poster	Magnetoresistance Properties of Superconductor Hybrid GMR-SV Films with Nb and YBCO Buffer Layers	117
		Woo-Il Yang, Jong-Gu Choi*, Sang-Suk Lee†	
SM05	Poster	Phase transition studies of the mixed olivine $\text{LiFe}_{0.8}\text{Zn}_{0.2}\text{PO}_4$ by Mössbauer spectroscopy	118
		Hyunkyung Choi*, Mun Hwan Kim, Chul Sung Kim	
SM06	Poster	Brownian Motion of Magnetic Cube Chain Under External Magnetic Field	119
		Sang-Hyuk Lee*, Seung-Young Park, You-Jin Lee, Gi-Ra Yi†, Stefano Sacanna, and Dong-Hyun Kim†	
SM07	Poster	Thermoelectric voltage of bulk- $\text{Y}_3\text{Fe}_5\text{O}_{12}$ (YIG) prepared by the sol-gel method	120
		Min-Sun Jang*, Ki-Suk Lee	
SM08	Poster	Taguchi Robust Design Considering the Tolerance for Electric Machine	122
		Kyu-seob Kim*, Kyu-Sik Kim†, Byeong-Hwa Lee, Bong-Hyun Lee, Su-Chul Kim	
SM09	Poster	Torque Ripple Reduction of Wound Rotor Synchronous Motor using Rotor Slits	124
		Byeong-Hwa Lee*, Kyu-Sik Kim†, Kyu-seob Kim, Bong-Hyun Lee, Su-Chul Kim, Da-yeon Lee	

Magnetic properties of cobalt based core-shell nanoparticles studied by Mössbauer spectroscopy

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We have investigated the magnetic properties of cobalt based core-shell nanoparticles (NP) of $\text{CoFe}_2\text{O}_4@\text{MgFe}_2\text{O}_4$ and $\text{CoFe}_2\text{O}_4@\text{AlFe}_2\text{O}_4$ prepared by the HTTD method. The core-shell NPs has been investigated by X-ray diffraction, vibrating sample magnetometer, hyperthermia and Mössbauer spectroscopy. According to XRD analyzation by Rietveld refinement method, the nanoparticles has single phase and cubic spinel structure with space group $Fd-3m$. The lattice constants were found to be 8.3686 Å for $\text{CoFe}_2\text{O}_4@\text{MgFe}_2\text{O}_4$, 8.4207 Å for $\text{CoFe}_2\text{O}_4@\text{AlFe}_2\text{O}_4$. The size and morphology of the $\text{CoFe}_2\text{O}_4@\text{MgFe}_2\text{O}_4$ nanoparticles were confirmed by HR-TEM and using Scherrer's formula. The $\text{CoFe}_2\text{O}_4@\text{MgFe}_2\text{O}_4$ and $\text{CoFe}_2\text{O}_4@\text{AlFe}_2\text{O}_4$ saturation magnetization were 77.9 emu/g and 52.2 emu/g, respectively. The self-heating temperatures of $\text{CoFe}_2\text{O}_4@\text{MgFe}_2\text{O}_4$ and $\text{CoFe}_2\text{O}_4@\text{AlFe}_2\text{O}_4$ were had intermediate values of the materials used as core and shell. The increase in the self-heating temperature of core-shell nanoparticles was observed to be considerable over the first 100 s. The magnetic field was fixed at 250 Oe with a frequency of 112 kHz. The Mössbauer spectra of cobalt based core-shell NPs were performed taken at 4.2 K–295 K. The cobalt based nanoparticles can be considered to have soft-magnetic properties and confirmed by hyperthermia experiments. The core/shell nanoparticles structure investigated in this study has high saturation magnetization and moderate thermal property.

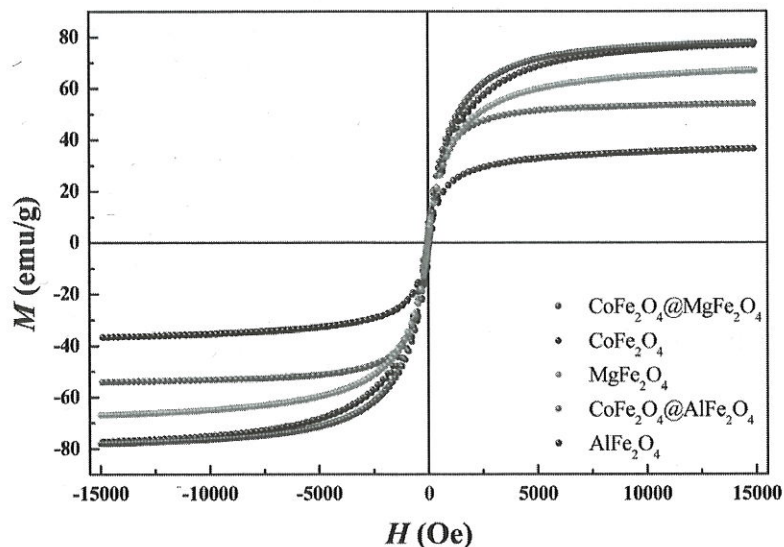


Fig. 1. Hysteresis loops measured at room temperature for the nanoparticles.