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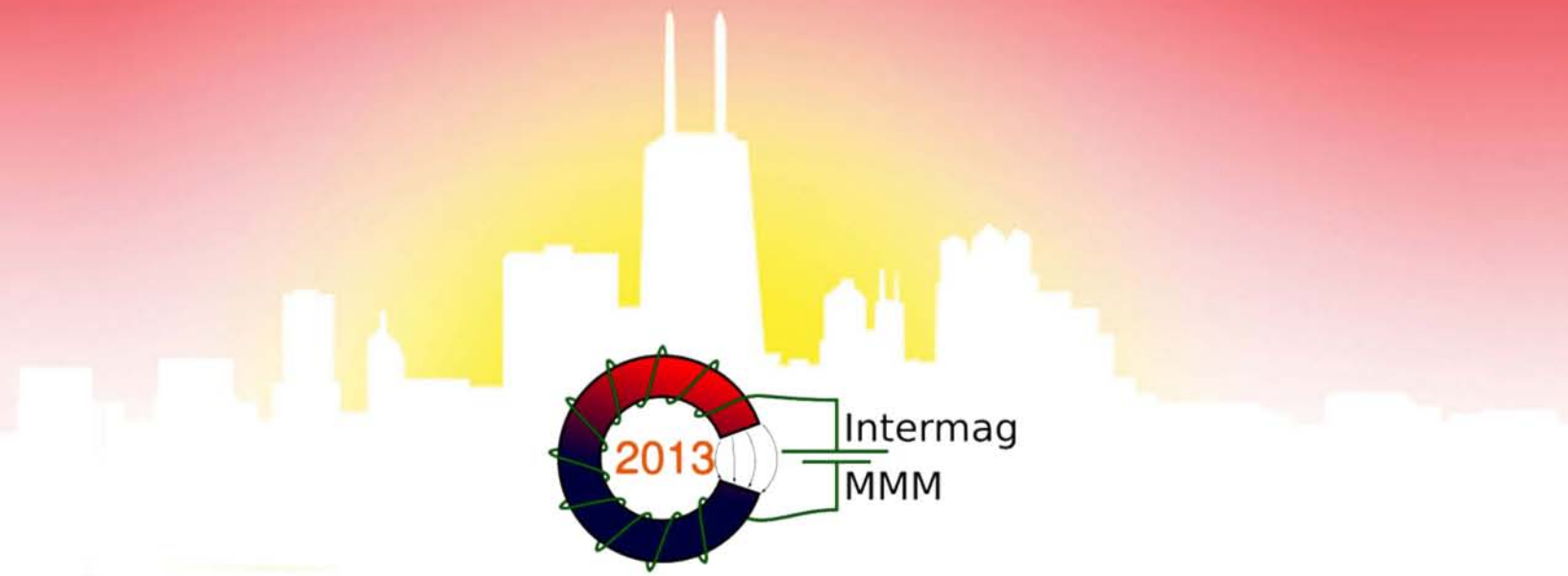

ABSTRACTS

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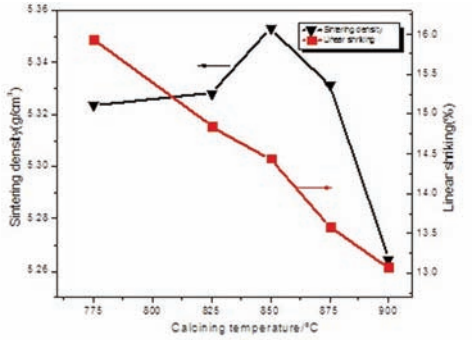

Fig.1.Sintering density & linear shrinkage at different calcination temperatures

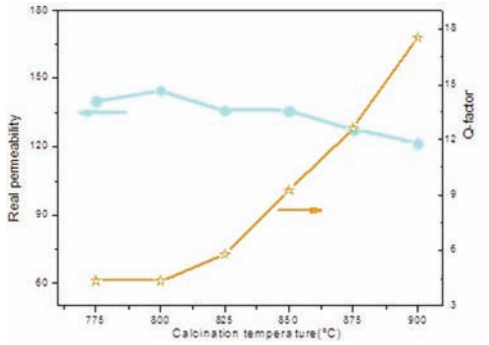

Fig.2. Real permeability & Q-factor of different calcination temperatures

CW-05. Study of site occupancy in single crystalline $Zn_xFe_{3-x}O_4$ microspheres based on Mössbauer analysis. *Y. Li*[1], S. An[2] and C. Kim[1] *1. Physics, Kookmin University, Seoul, Republic of Korea; 2. Corporate R&D Institute, Samsung Electro-Mechanics, Suwon, Republic of Korea*

The 3*d*-transition metal-oxide nano/microparticles have been considered to be an ideal candidate for biological applications with unique physical properties [1, 2]. A series of monodispersed $Zn_xFe_{3-x}O_4$ (x = 0, 0.05, 0.1, 0.2, 0.4) microspheres have been prepared by the solvothermal reaction technique. From the Rietveld refinement analysis, the crystal structure was determined to be cubic spinel with lattice constant and X-ray density, linearly increasing from 8.3956 to 8.4315 Å, and 5.1971 to 5.2158 g/cm^3, with the Zn concentration. HR-TEM measurements showed that the size of the monodispersed particles was around 200~300 nm as well as diffraction patterns with single crystalline spots. From the saturation magnetization (M_s) and coercivity (H_c) as a function of Zn concentration x in Fig. 1, we observed that M_s and H_c values at 295 K increase with x up to x = 0.05 and then decrease monotonously as x increases above 0.4. We have analyzed the Mö ssbauer spectra as 4 sets with six-lines of tetrahedral A site and octahedral B_1 and B_2 sites as well as including paramagnetic phase of a doublet at 295 K, as shown in Fig. 2. The values of the hyperfine field at A, B_1, and B_2 sites decrease from 488 to 453 kOe, 458 to 412 kOe, and 452 to 369 kOe with Zn concentration. From the isomer shift values, the valance state of A, B_1 sites and doublet were determined to be ferric, while the B_2 site was ferrous. The corresponding area ratio of A site decreased by 40~25 % while that of B (B_1, B_2) site and doublet sets increased by 60~63 %, and 0~12 %, as the Zn concentration changed from x = 0 to 0.4. Here, the changes in the area ratios of A, B sites and doublet set are originated from the site preference of cation in $Zn_xFe_{3-x}O_4$ microspheres. This site preference, depending on the amount of Zn^{2+} ion substituted in A site, affects the hopping between Fe^{2+} and Fe^{3+} ions, and the super-exchange interaction A-B and B-B between A and B sites [2, 3].

[1] N.-H Cho, T.-C. Cheong, J. H. Min, J. H. Wu, S. J. Lee, D. Kim, J.-S. Yang, S. Kim, Y. K. Kim, S.-Y. Seong, Nat. Nanotech. **6**, 675 (2011). [2] Deepak Venkateshvaran, Matthias Althammer, Andrea Nielsen, Stephan Geprags, M. S. Ramachandra Rao, Sebastian T. B. Goennenwein, Matthias Opel, and Rudolf Gross, Phys. Rev. B **79**, 134405 (2009). [3] V. Blanco-Gutieerrez, F. Jimeenez-Villacorta, P. Bonville, Marila J. Torralvo-Fernaandez, and R. Saaez-Puche, J. Phys. Chem. C **115**, 1627 (2011).

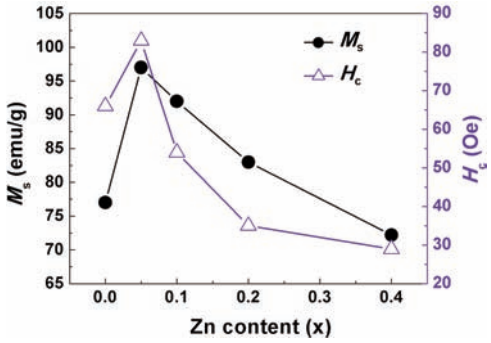

Fig. 1. The M_s and H_c of the $Zn_xFe_{3-x}O_4$ samples as a function of Zn content x at 295 K.

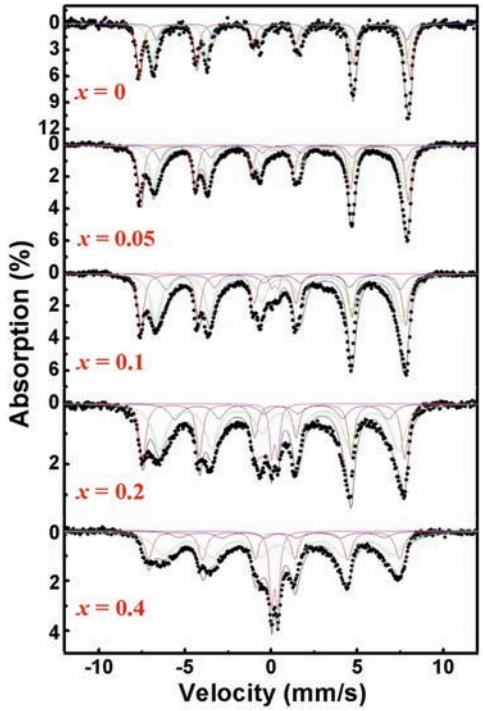

Fig. 2. Mössbauer spectra of $Zn_xFe_{3-x}O_4$ microspheres measured at 295 K.

CW-06. The Interplay of Shape Anisotropy and Magnetocrystalline Anisotropy in Electrodeposited Fe_3O_4 Films. R. Wu[1], X. Chen[1], Y. Yang[1], J. Wei[1], M. Xing[1], Y. Xia[1] and *J. Yang*[1,2] *1. School of Physics, Peking University, Beijing 100871, China; 2. State Key Laboratory for Mesoscopic Physics, Department of Physics, Peking University, Beijing 100871, China*

Recently, half-metallic materials, including Fe_3O_4, CrO_2, $La_{0.7}Sr_{0.3}MnO_3$ and some other Husler alloys, attracted more and more attention due to their potential applications in spintronics, such as magnetic random access memory and spin valves. Among these materials, Fe_3O_4 has highest Curie temperature (T_c=858 K) and is therefore a suitable candidate for spintronics devices.[1] Many methods, such as molecular beam epitaxy, magnetron sputtering have been developed to prepare thin films for all kinds of applications. Among those methods, electrodeposition is a relatively simple method to prepare magnetite films.[2- 3] In this work, iron oxide thin films had been