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ABSTRACTS

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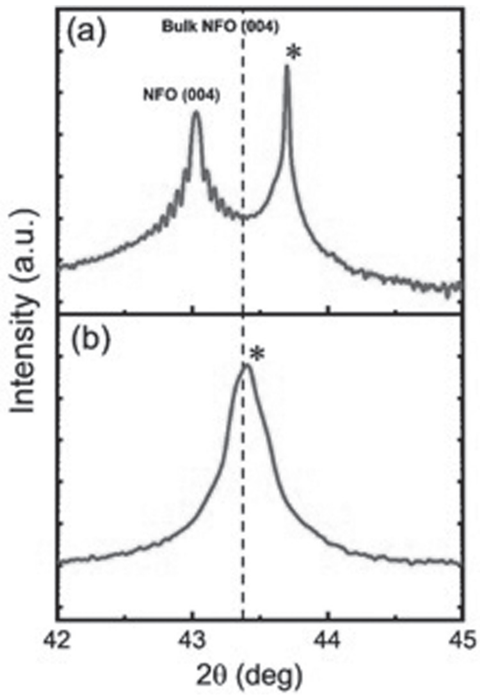

Figure 1. Partial 2θ-ω scans around 004 peak of the substrate and ≈ 200 nm NFO films deposited on (a) $MgGa_2O_4$ and (b) $ZnGa_2O_4$ substrates. (*) represents the substrate peaks.

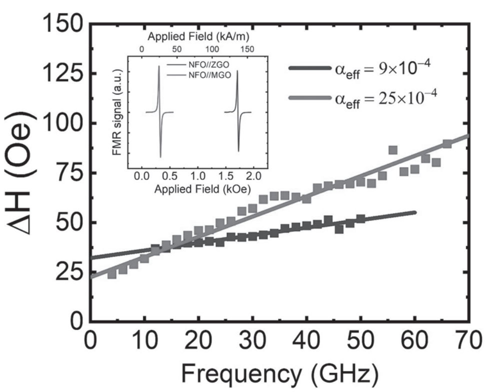

Figure 2. The variation of microwave frequency with FMR linewidth for NFO//MGO and NFO//ZGO films. The inset shows the typical FMR spectra for NFO//MGO and NFO//ZGO films at 10 GHz.

BR-10. Magnetic Properties of Polycrystalline Y-type Hexaferrite $Ba_{2-x}Sr_xNi_2(Fe_{1-y}Al_y)_{12}O_{22}$ using Mössbauer Spectroscopy. *J. Kim*[1], H. Choi[1] and C. Kim[1] *1. Kookmin University, Seoul, The Republic of Korea*

Synthesis of the polycrystalline $Ba_{2-x}Sr_xNi_2(Fe_{1-y}Al_y)_{12}O_{22}$ (x = 0.0, 1.5, y = 0.00, 0.01, 0.03) was accomplished by the polymerizable complex method. The samples were investigated for the crystallographic and the magnetic properties by x-ray diffraction (XRD), vibrating sample magnetometer (VSM), and Mössbauer spectrometer. The Mössbauer spectra were obtained by a conventional spectrometer with a ^{57}Co source in a Rh matrix in the temperature range from 4.2 to 295 K. From refined XRD patterns, all samples were confirmed of the rhombohedral structure with space group *R*-3*m*. Also, we were able to identify six distinguish sublattices, which are four octahedral sites ($18h_{VI}$, $3b_{VI}$, $6c_{VI}$, and $3a_{VI}$) and two tetrahedral sites ($6c_{IV}$*, $6c_{IV}$). The lattice constant of a_0 and c_0 decrease by Sr, Al substitution because the ionic radius of Sr^{2+} (1.12 Å) is smaller than that of Ba^{2+} (1.34 Å) and the ionic radius of Al^{3+} (0.535 Å) is smaller than that of Fe^{3+} (0.645 Å). The zero-field-cooled (ZFC) measurement between 4.2 and 295 K applied 100 Oe shows that spin transition temperature (T_S). Substitution of Sr ions increased T_S. Al ions were further substituted after Sr ions were substituted, and T_S increased to around room temperature. The Mössbauer spectra were fitting six distinguish sublattices: $18h_{VI}$, $3b_{VI}$, $6c_{VI}$, $6c_{IV}$*, $6c_{IV}$, and $3a_{VI}$. The measured isomer shift of all samples indicated that the charge state of Fe ions is Fe^{3+}. The Mössbauer spectra according to temperature change confirmed the changes in the magnetic hyperfine field curves at T_S.

[1] Y. Chang, K. Zhai, and Y. Sun, J. Phys. D-Appl. Phys., Vol.51, p.264002 (2018)

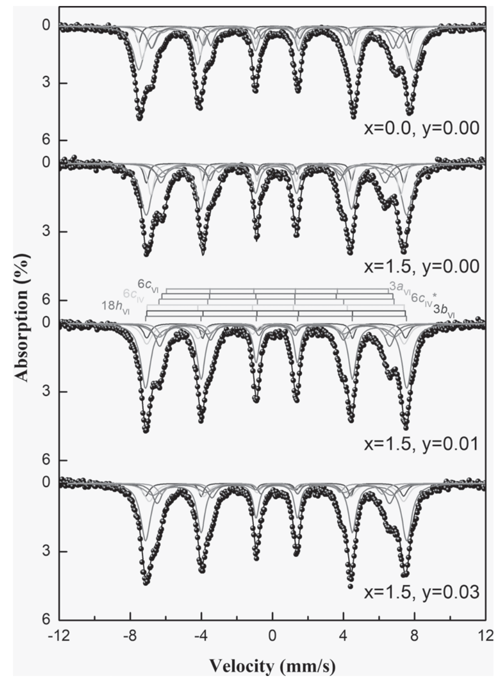

Fig.1. Mössbauer spectra of the $Ba_{2-x}Sr_xNi_2(Fe_{1-y}Al_y)_{12}O_{22}$ at 295 K.

BR-11. Static and dynamics magneto-viscoelasticity in $Co_{1-x}Zn_xFe_2O_4$ (0 ≤ x ≤ 1) based magnetic nanofluid. *A. Singh*[1], A. Rathi[1], P. Kumar[1], R. Pant[1], G. Basheed[1] and K.K. Maurya[1] *1. Indian reference Material (BND), AcSIR-National Physical laboratory, New Delhi, India*

The study of rheological characteristics of magnetic nano-fluid plays an important role in device development, as magnetic control on fluid behavior is a promising field in numerous applications. The present work investigates the magneto viscoelastic behavior of Zn substituted cobalt ferrite based magnetic fluid synthesized by surface modified chemical Co-precipitation route. The crystalline spinel phase and purity of all the samples have been confirmed by X-ray diffraction (XRD) and High-resolution transmission electron microscopy (HRTEM). The crystallite size calculated by W-H methods which are corroborated with HRTEM. The room temperature magnetic measurements confirm systematic decrease in saturation magnetization. Although for x = 0.4 the decrease is slightly low as compared to other composition. This has been confirmed from viscoelastic measurements performed in dynamics and oscillatory mode using magentorheometer. The steady-state rheograms (viscosity vs shear rate curve) shows a decrease in dynamics viscosity behavior with the increase of Zn substitution. The rheograms for all compositions are well fitted with power-law confirming the shear thinning behavior with n ≤1. Also from magneto-sweep rheograms (viscosity vs magnetic field), we have found that the steady increase in viscosity with increase in magnetic field is due to the formation of a chain like structure which causes an interruption in smooth streamline flow of the MNFs. With a small addition of Zn, we have observed a drastic decrease in the viscosity of fluid behavior. Field-induced viscoelastic behavior of Co-Zn MFs in static and dynamic mode provides significant information for optimization of MNFs for various applications