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ABSTRACTS

CS-08. Effects of cation distribution for $A\text{FeO}_3$ ($A = \text{Ga}, \text{Al}$). J. We¹, S. Kim¹ and C. Kim¹ *Physics, Kookmin University, Seoul, South Korea*

In piezoelectric and ferromagnetic $A\text{FeO}_3$ ($A = \text{Ga}, \text{Al}$) samples have been prepared by various annealing conditions and then their hyperfine structures have been investigated by x-ray diffraction and Mössbauer spectroscopy. From the analysis of the x-ray diffraction patterns by Rietveld refinement method, the crystal structure of all samples was found to be an orthorhombic structure ($Pc2_1n$) with four different cation sites which are labeled A_1 and A_2 (predominantly occupied by A ion), Fe_1 and Fe_2 (predominantly occupied by Fe ion). The crystal structure is not changed between the samples, but the occupancies of Fe ions in four cationic sites show slight difference. We notice that the occupancies of Fe ion in A_1 tetrahedral site of the samples have an effect on the magnetic properties. From the x-ray diffraction results, the ratio of occupied Fe ions in A_1 site were determined to be 9.5, 9.0 and 7.8 % for quenched GaFeO_3 , slow cooled GaFeO_3 , and AlFeO_3 , respectively, which accord with the result of Mössbauer spectroscopy. We found that the Curie temperature decreases range from 280 to 250 K, with decreasing the Fe occupancies in A_1 site. Also, external field dependence of magnetic moment curve shows a several-stepped shape which is similar with exchange-spring magnet. It could be explained distinctly by an effect of Fe ion distribution & hyperfine structure.