BS08

Magnetoelectric Effect of Co-ferrite and Tb-gaenet

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Magnetoelectric effect(ME) comprises various physical phenomena such as magnetoresistance, magnetic tunneling, magnetothermoelectric, and Hall effect as well as magnetoelectric polarization. [1,2] In this study the magnetoelectric polarization phenomenon is characterized in the $Co_{0.8}Fe_{2.2}O_4$ spinel ferrit and $Tb_3Fe_5O_{12}$ garnet. Manetoelectric polarization arises from the coupling either between the applied magnetic field H and electric polarization P or between the applied electric field E and magnetization M. This ME effect accompanies the spin-orbital coupling through interaction of the lattice distortion and magnetic dipole moments. Commonly Me effect is observed in the ferro(-ferri) magnetics with low symmetry. Hence the ME effect inevitably accompanies the magnetostriction in which magnetic dipole-dipole interaction distorts the lattice. In polycrystalline the magnetostriction appears isotropic due to the averaging effect. In a single domain the lattice distorts along the magnetization direction. Generally the the magnetostriction coefficient $\delta l/l$ is of the order of 10^{-5}~10^{-6}. However in few spinel and garnet ferrites such as $Co_{0.8}Fe_{2.2}O_4$, $Ti_{0.56}Fe_{2.44}O_4$, TbIG, and DyIG.[3] In this study the lattice distortion of the $Co_{0.8}Fe_{2.2}O_4$ and $Tb_3Fe_5O_{12}$ were measured by applying magnetic field (1T) down to 10K using neutron HRPD diffractometer at HANARO in Korea Atomic Energy Research Institute. And the dielectric properties of these ferritea were characterized with varying the temperature (RT~77K) with applying the magnetic field H.

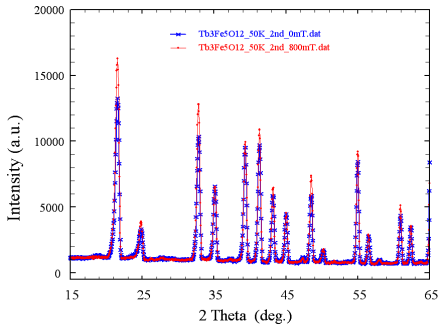

Fig. 1. Neutron diffraction pattern of $Tb_3Fe_5O_{12}$ garnet at 50K.

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BS09

Magnetic and Magnetocaloric Properties of $La_{0.7}(CaSr)_{0.3}Mn_{1-x}Ga_xMnO_3$ (x=0.00, 0.025, 0.05, 0.075 and 0.10) Compounds

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In this paper we report different results found for $La_{0.7}(CaSr)_{0.3}Mn_{1-x}Ga_xMnO_3$ (x=0, 0.025, 0.05, 0.075 and 0.1) manganites compounds, where transition metal Mn is substituted by Gallium element Ga.

These compounds were prepared by sol-gel method and then characterized by X-ray diffraction and the Foner magnetometer.

Rietveld refinement of the X-ray diffraction reveals that $La_{0.7}(CaSr)_{0.3}Mn_{1-x}Ga_xMnO_3$ samples crystallize in the rhombohedral structure (space group R-3C). The temperature dependence of the magnetization M(T) reveals a decrease of M when increasing the x content and the same behavior was observed for the Curie temperature T_C.

The magnetocaloric effect (MCE) was calculated according to the Maxwell relation based on the magnetic measurements. The magnetic entropy change (ΔS_M) reaches a maximum value near room temperature for an applied field of 1T. It was also found that these compounds exhibit a large MCE witch increase when the Ga concentration increases. So, the studied samples could be considered as a potential material for magnetic refrigeration application for a large temperature interval.

Keywords : Manganites, Magnetocaloric effect, Magnetic refrigeration, X-Ray Diffraction