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Stress Effects of $CoCr_2O_4$ Film on MgO and $MgAl_2O_4$ Grown by RF-Sputtering Process

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In multiferroic thin films, ferromagnetic and ferroelectricity coexist[1,2]. $CoCr_2O_4$ film was deposited on MgO and $MgAl_2O_4$ substrates by rf-sputtering process. The films were prepared at rf-magnetron sputtering power of 50W and a pressure of 10 mtorr (20 sccm in Ar), substrate temperatures of 550°C. The crystal structure was determined to be spinel (*Fd3m*) structure by means of X-ray diffraction (XRD) with Kα Cu radiation. The thickness and morphology of films were measured by scanning electron microscopy (SEM) and atomic force microscopy (AFM). The magnetic properties were measured using a Superconducting Quantum Interference Device(SQIUD). The ferrimagnetic transitions were observed about 82 K, which was determined as Néel temperature, but magnetic behavior shows different. The results of each other magnetic property can be explained by stress effects between $CoCr_2O_4$ and substrates of MgO and $MgAl_2O_4$.

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BS17

Magnetic Refrigeration Properties of $La_{0.8}Ca_{0.2}Mn_{0.99}{}^{57}Fe_{0.01}O_3$

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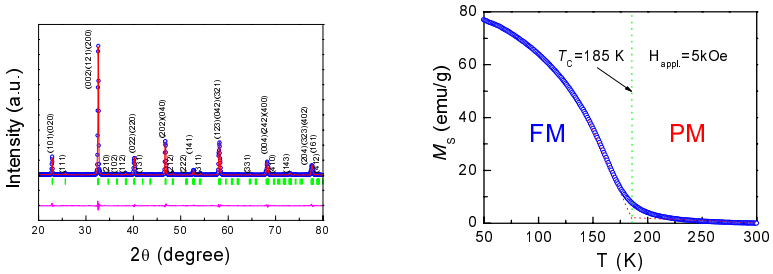
The crystallographic and magnetic properties of $La_{0.8}Ca_{0.2}Mn_{0.99}{}^{57}Fe_{0.01}O_3$ have been studied using x-ray diffraction (XRD), vibrating sample magnetometer (VSM) and Mössbauer spectroscopy measurements. The $La_{0.8}Ca_{0.2}Mn_{0.99}{}^{57}Fe_{0.01}O_3$ sample was prepared by sol-gel method with starting materialsLa-nitrate, Ca-nitrate, Mn-acetate and ^{57}Fe-powder. The sample was annealed at 1000°C under O_2 atmosphere. Fig. 1 a) and b) show the x-ray refinement and temperature dependence of magnetization, respectively.



a) b)

Fig. 1. a) Ritveld refinement of XRD pattern, b) temperature dependence of magnetization *M*(*T*) measured at 5 kOe for $La_{0.8}Ca_{0.2}Mn_{0.99}{}^{57}Fe_{0.01}O_3$.

The crystal structure of $La_{0.8}Ca_{0.2}Mn_{0.99}{}^{57}Fe_{0.01}O_3$ was fund to be orthorhombic (*Pnma*) structure with lattice constants a_o = 5.486 Å, b_o = 7.761 Å, and c_o = 5.510 Å at room temperature. The Curie temperature (T_c) is determined to be 185 K by zero field cold (ZFC) magnetization curve under 5 kOe applied field. Mössbauer spectrum at 4.2 K was fitted with two independant magnetic components of the magnetic hyperfine fields H_{f1} = 526 kOe and H_{f2} = 501 kOe. Mössbauer spectra shows that the linebroading and the ratio of the absorption areas is changed below T_c. The maximum value of magnetic entropy changes, $|\Delta S_{m,max}|$ is 0.54 J/kg·K at 155 K, under 5 kOe applied field [1]-[2].

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