PB04

Infrared Properties of $La_{0.8}Ba_{0.2}MnO_3$ and $La_{0.7}MnO_3$ Thin Films

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Two $La_{0.8}Ba_{0.2}MnO_3$ thin films (thickness around 300 Å and 1500 Å) and three $La_{0.7}MnO_3$ thin films (thickness around 3500 Å) were grown on $SrTiO_3$ (001) substrate using the off-axis magnetron sputtering technique or pulsed-laser deposition. The optical reflectance spectra of the samples were measured over a broad energy range from the far-infrared through the ultraviolet and at the temperatures between 20 and 330 K. To extract the optical constants of the films, the Drude-Lorentz model was used to fit all of the layers of this thin-film structure. From the parameters obtained, these studies reveal (i) the 1500 Å-thick $La_{0.8}Ba_{0.2}MnO_3$ thin film exhibits the strongest Drude response at 20 K and (ii) the pronounced resonance in the mid-infrared in all thin films can be well understood in the framework of small polaron model.

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PB05

Structural and Magnetic Characteristics of Bismuth Substituted Holmium Iron Garnet

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Bismuth-substituted heavy rare-earth iron garnet materials have attracted much attention in optical communication industries due to their small temperature coefficient of Faraday rotation, low optical absorption, and a low magnetic field for saturation [1]. Especially, $(TbBi)_3Fe_5O_{12}$, and $(HoBi)_3Fe_5O_{12}$ have received much attention for the communication systems devices in the wavelength range of 1.3 ~ 1.6 μm [2]. Here, we present the results of XRD, vibrating sample magnetometer (VSM), and the Mössbauer experiments on the bismuth substituted holmium iron garnet. The $Ho_2Bi_1Fe_5O_{12}$ powders were prepared by sol-gel method. The crystal structures were found to be a cubic structure with space group *Ia3d*. The determined lattice constant of sample is 12.462 Å. Fig. 1 shows the Temperature dependence of field cooled magnetization of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$. $Ho_2Bi_1Fe_5O_{12}$ exibited lower compensation temperature than $Tb_2Bi_1Fe_5O_{12}$. From the analysis of VSM hysteresis loop at room temperature, the saturation magnetization and coercivity of the sample are 15.545 emu/g and 33.33 Oe, respectively. The Néel temperature (TN) was determined to be 650 K by Mössbauer spectroscopy. Compare with our past results of $Tb_2Bi_1Fe_5O_{12}$ [3], $Ho_2Bi_1Fe_5O_{12}$ has larger saturation magnetization, higher T_N, and lower coercivity than $Tb_2Bi_1Fe_5O_{12}$. These phenomena can be explained by influence of the Bi ions on the super-exchange interaction between a-d sublattices[4].

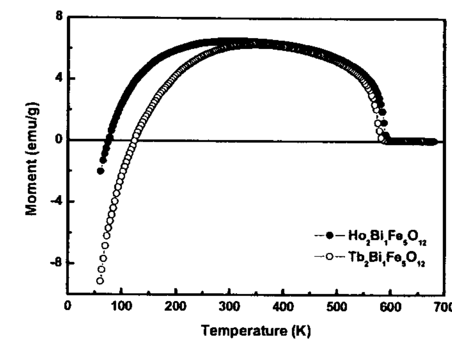

Fig. 1. Temperature dependence of field cooled magnetization of $Tb_2Bi_1Fe_5O_{12}$ and $Ho_2Bi_1Fe_5O_{12}$.

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