

QA07

**Thickness Dependence of Morphology and Properties of  $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$  Films Grown by Pulsed Electron Deposition Technique**

**Nam-Hee Ka, Young-Min Kang, Kyoung-Pil Ko, A.N. Ulyanov, and Sang-Im Yoo\***  
 Department of Material Science and Engineering, Seoul National University, Sillim 8-dong, Gwanak-Cu, Seoul, 151-744, Korea

\*Corresponding author: siyoo@snu.ac.kr, Phone: +82 02 880 5720, Fax: +82 02 886 4156

We report on deposition and properties of  $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$  thin films produced by pulsed electron beam deposition (PED) technique, which is very promising for semiconductor technology. Magneto-transport properties as a function of deposition processing parameters and thickness of the films were studied. The films were grown on (100)  $\text{LaAlO}_3$  single crystal substrate with temperature 750°C. Target-to-substrate distance (d) and oxygen pressure were systematically changed from 8.0 to 11.0 cm, and 15-20 mTorr, respectively, to obtain high films quality with different thickness. Characterization of the films was made by x-ray diffraction, scanning electron microscopy (SEM), atomic force microscopy (AFM), and magnetization and resistance measurements. Curie temperature and magnetoresistance effect (MR) were affected also by the annealing conditions (temperature, oxygen flow and time). Temperature dependence of magnetization and magnetoresistance for the films with 110 nm thickness are presented on Figs. 1 and 2. Cell parameters, surface morphology and films roughness as well as Curie temperature and magnetoresistance were very dependent on films thickness and will be discussed.

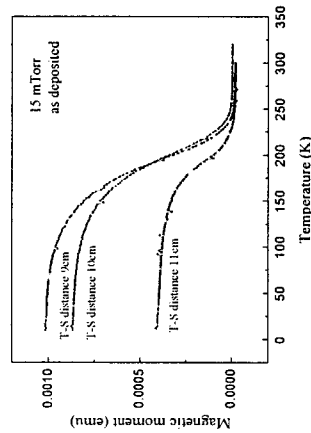


Fig. 1. Temperature dependence of magnetic moment for  $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$  films at different target-to-substrate distance.

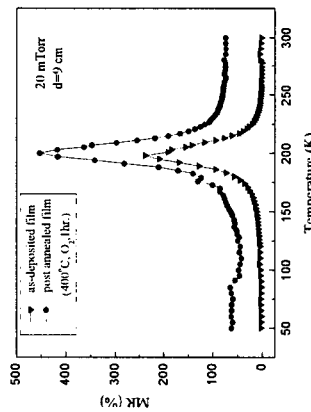


Fig. 2. Magnetoresistance of  $\text{La}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$  films at magnetic field of 1.0 T.

QA08

**Low Field Magnetoresistance of La-Sr-MnO<sub>3</sub> Thin Films Prepared by Post Annealing of Amorphous Films Deposited by RF-magnetron Sputtering**

**Young-Min Kang, Nam-Hee Ka, Alexander N. Ulyanov, and Sang-Im Yoo\***  
 Department of Materials Science and Engineering, Seoul National University, San 56-1, Shillim-dong, Gwanak-gu, Seoul 151-744, Korea

\*Corresponding author: siyoo@snu.ac.kr, Phone: +82 2 880 5720, Fax: +82-2-885-9671

Low field magnetoresistance (LFMR) properties of La-Sr-MnO<sub>3</sub> thin films deposited by RF magnetron sputtering with  $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$  target were investigated. Amorphous thin films deposited on different substrates at room temperature were crystallized by post annealing at 900°C for 2 hr in O<sub>2</sub> atmosphere. For the samples deposited at the same conditions including processing gas of 100 mTorr pure Ar and RF power of 100 W, the Curie temperature ( $T_c$ ) of films grown on SrTiO<sub>3</sub> (001) and on SiO<sub>2</sub>-buffered Si (001) substrate were 300K and 280K, respectively. While the films grown on SrTiO<sub>3</sub> were highly textured, those on SiO<sub>2</sub> layer were randomly oriented. Figure 1 shows the normalized resistance of the films measured at 250K and 285K. Highly textured La-Sr-MnO<sub>3</sub> thin films grown on SrTiO<sub>3</sub> show better LFMR properties at both of 250 K and 285 K.

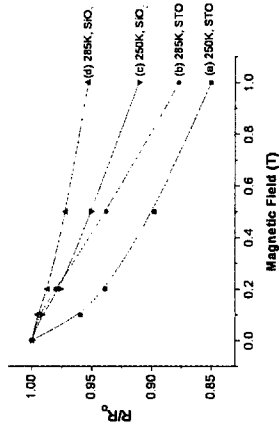


Fig. 1. Resistance change ( $R/R_0$ ) of La-Sr-MnO<sub>3</sub> thin films deposited on SrTiO<sub>3</sub> (001) and measured at 250K (a) and 285K (b), and deposited on SiO<sub>2</sub>-buffered Si (001) substrate and measured 250K (c) and 285K (d).