

Excellent low field magnetoresistance properties of $\text{La}_{0.7}\text{Sr}_{0.3}\text{Mn}_{1+d}\text{O}_3$ -manganese oxide composite thick films prepared by aerosol deposition

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We report excellent magneto-transport properties of pure $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ (LSMO) and LSMO-manganese oxide composite films which were prepared on YSZ (yttria stabilized zirconia) substrates by aerosol deposition and then followed by the post-annealing at high temperatures of 1000~1200°C for 2 h in air. While as-deposited films commonly showed a poor magnetic property with suppressed Curie temperatures, the post-annealed films exhibited a very good magnetic property with high Curie temperatures ranging from 355 to 370 K. Remarkably improved LFMR properties and dMR/dH values of LSMO-manganese oxide composite films compared with pure LSMO films are attributable to high grain boundary areal density and sharpening of disordered LSMO grain boundary region acting as more effective spin-dependent scattering centers. These results were also confirmed by high field MR properties. The largest LFMR value of 1.2% at 300 K and 500 Oe was obtained from LSMO-manganese oxide composite films annealed at 1200°C. The relationship among the annealing temperature, microstructure, magnetic and magnetotransport properties will be presented for a discussion. This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MEST) (No.2011-0002897).