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Magnetotransport properties of perovskite La–Ba–Mn–O-deposited films on Si substrates

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Abstract

To obtain high MR ratio near room temperature in thin films grown on Si substrate, La–Ba–Mn–O thin films were prepared with various substrate temperature (T_S) from 600°C to 720°C by RF magnetron sputtering, and the structural and magnetotransport properties were studied. All films were annealed at 800°C for 30 min in ambient. The structures, magnetic properties and compositions of La–Ba–Mn–O thin films have been studied with X-ray diffraction, X-ray photoemission spectroscopy, Rutherford back-scattering spectroscopy and vibrating sample magnetometer. The MR was measured using square-probe array method in the magnetic field of 0–1.5 T. The films were polycrystalline with (1 0 0) and (1 1 0) orientations and showed pseudocubic perovskite structure. The maximum MR ratio of thin film with T_S of 680°C is 0.62 under a relatively low field of 1.5 T. Moreover, it is important to notice that the MR ratio reached 0.3 near room temperature in thin films with T_S of 600°C and 680°C.

Keywords: Thin films-sputtered; Thin films-magnetic; Magnetoresistance