Magnetotransport properties of La0.67Ca0.33MnO3 with diffrent grain sizes.

ABSTRACT

The magnetotransport and magnetoresistive (MR)properties of manganese-based La0.67Ca0.33MnO3 perovskite with different grain sizes are reported. The electrical resistivity was measured as a function of temperature in magnetic fields of 0.5 and 1 T. The insulator–metal transition temperature, TIM, shifted to a higher temperature with the application of the magnetic field. In zero field, TIM is almost constant (~271 K) for all samples except for the sample with the largest grain size, where TIM = 265 K. The temperature dependence of resistivity was fitted with several equations in the metallic (ferromagnetic) region and the insulating (paramagnetic) region. The density of states at the Fermi level, N(EF), and the activation energy of electron hopping were estimated by fitting the resistivity versus temperature curves. The ρ–T 2 curves are nearly linear in the metallic regime, but the ρ–T 2.5 curves exhibit a deviation from linearity. The variable range hopping model and small polaron hopping model fit the data well in the high-temperature region,indicating the existence of the Jahn–Teller distortion that localizes the charge carriers. MR was found to increase with an increase in the magnetic field, an effect which is attributed to the intergrain spin tunneling effect.

Keyword: Magnetoresistant; LCMO.