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Influence of the indium oxide addition on low field magnetoresistance behavior in the $\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$ granular composite thin films

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Abstract

The $\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$ (LSMO) + In_2O_3 and LSMO + Al_2O_3 granular composite thin films have been prepared by a sol-gel spinning process. It is observed that low-field tunnel type magnetoresistance (MR) ratio of the LSMO + 5 vol% In_2O_3 film (MR = 0.70%) measured at 500 Oe was much higher than those of the films with 0 and 20 vol% In_2O_3 and 0–20 vol% Al_2O_3 . In complex impedance analysis, we observe that the grain resistivity is independent of the annealing temperature, however, the grain boundary resistivity increases significantly as the annealing temperature increases. Therefore, the value of enhanced low-field MR of LSMO thin films with addition of In_2O_3 is caused by increase of defects inside thin films and the growing grain boundary's insulation. © 2002 Elsevier Science B.V. All rights reserved.

Keywords: Low-field tunnel-type MR; Sol-gel; Complex impedance; Grain boundary
