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Journal of Magnetism and Magnetic Materials 226–230 (2001) 733–735



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Complex impedance analysis of granular $\text{La}_{2/3}\text{Sr}_{1/3}\text{MnO}_3$ manganite thin films

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Abstract

Low-field tunnel-type magnetoresistance (MR) was enhanced through annealing in the air, in contrast to the intrinsic CMR where the optimized MR is associated with the annealing in O_2 , and 10 times larger MR was obtained. Impedance analysis showed that the grain boundary resistance was 2 times larger in the film annealed in the air than that in the O_2 , while the grain resistance was invariant in the films. From these results, it can be concluded that the characteristics of grain boundaries play a crucial role in low-field tunnel-type MR of manganite LSMO/SiO₂/Si thin films. Therefore, we suggest that the complex impedance analysis can provide us with useful information about not only transport at grain boundaries, but also the separated contribution of grains and grain boundaries to MR. © 2001 Elsevier Science B.V. All rights reserved.

Keywords: Low-field tunnel-type MR; Sol-gel; Impedance analysis; Grain; Grain boundary
