

Comparative analysis of the magnetic and the transport properties of electron- and hole-doped manganite films

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Microstructure, magnetic and transport properties of as-deposited electron-doped $\text{La}_{1-x}\text{Ce}_x\text{MnO}_3$ and hole-doped $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ films prepared by pulse laser deposition, with $x = 0.1$ and 0.3 , have been investigated. The microstructural analysis reveals that the $\text{La}_{1-x}\text{Ce}_x\text{MnO}_3$ films have a column-like microstructure and a strip-domain phase with a periodic spacing of about $3c$, which were not found for the $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ones. At the same time, the experimental results manifest that there is no fundamental difference in the magnetic and the transport properties between electron- and hole-doped manganite films, except the appearance of ferromagnetic response in the low-doped $\text{La}_{0.9}\text{Ce}_{0.1}\text{MnO}_3$ film at temperatures above the Curie point. The observed magnetic behavior, typical for the Griffiths-like phase, for this film is explained by the percolation mechanism of the ferromagnetic transition and by the presence of strip-domain phase which stimulates the magnetic phase separation.