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Effect of Oxygen Deficiency in a Long-aged $\text{La}_{0.8}\text{Ca}_{0.2}\text{MnO}_3$ Film

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The structural dependence of transport and magnetic properties of $\text{La}_{0.8}\text{Ca}_{0.2}\text{MnO}_3$ film whose oxygen deficiency was produced by an aging was studied in order to investigate the influence of oxygen deficiency upon the aged film. The aged film was prepared by rf magnetron sputtering using the so-called "soft" target. The x-ray diffraction of the aged film has shown the coexistence of two crystalline phases of the cubic and rhombohedral symmetry with different oxygen contents of $\delta \simeq 0.08$ and 0.16, respectively. Transport and magnetic properties of the aged film suggest that both phases testify two different electronic (metal-insulator) and magnetic transitions with similar maximum values of magnetoresistance.

The coexistence of the ferromagnetic metallic and charge-ordered insulating phases in $\text{La}_{0.67}\text{Ca}_{0.33}\text{MnO}_3$ thin films governed by a nonuniformly-distributed lattice strains has been reported(1). Therefore the diffusion rate for the oxygen depletion during aging might be different according to regions produced by substrate-induced strain in the aged film and results in formation of the two phases with different oxygen contents.

[참고문헌]

1. A. Biswas, M. Rajeswari, R. C. Srivastava, Y. H. Li, T. Venkatesan, R. L. Green, and A. J. Millis, Phys. Rev. B **61**, 9665 (2000).