# The Crystallines and Transport Properties of Manganite Thin Films with High Temperature Coefficient of Resistance


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**ABSTRACT**

We successfully grown La0.75Sr0.25MnO3/La0.75Ca0.25MnO3 multilayers thin films on SrTiO3(001) substrates using RF magnetro sputtering. We used the photolithography and ion etching techniques to fabricate the thin film to a 20- μ m wide mircobridge for standard four-terminal measurement with a gold film evaporated onto electrical leads. In this article, we study the temperature coefficient of restistance(TCR), and the metal-insulator transiyion temperature(Tp) in LSMO/LCMO multilayers. In the LSMO/LCMO multilayers, we can find that the TCR and Tp ara larger than those in the mixed thin films. We also stude the effects of oxygen annealing on maximum value of TCR (TCRMAX) and Tp. For the LSMO/LCMO (50 A /100 A)8 multilayer with oxygen annealing at 800 ℃, the value of the Tp is increased from 271.6 K to 282.5 K, and TCRMAX is increased from 7.5 %K-1 to 11.1 %K-1. Here the numbers in parentheses correspond, respectively, to the thicknesses of LSMO and LCMO layers in unit of angstrom, and the subscript denotes the total repeated number of bilayers. Finally, the relationship between TCRMAX and bipolaron binding energy (λ1) is deduced by the current-carrier-density-collapse model. It is found that the TCRMAX increases as λ1 is decreased.



Keywords : multilayers ; RF sputter ; temperature coefficient of restistance ; metal-insulator transiyion temperature ; current-carrier-density-collapse ; bipolaron


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