

研究论文

真空退火La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub>薄膜的光诱导特性

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摘要:

用溶胶-凝胶(Sol-gel)法制备La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub>(LSMO)靶材, 用脉冲激光沉积(PLD)法在LaAlO<sub>3</sub>(012)基片上沉积出厚度约为187 nm的LSMO薄膜, 研究了真空退火对薄膜的输运和光诱导特性的影响. 结果表明, 薄膜的相变温度随着退火时间的增加而降低, 薄膜的电阻率升高. 在低温金属相光照使电阻率降低, 在高温绝缘相光照则使电阻率升高. 随着退火时间的增加, 光电导( $\rho$ )先增大而后减小, 在真空条件下退火40 min的薄膜光电导( $\rho$ )达到最大值为0.013  $\Omega$ cm. 根据双交换作用解释了薄膜光电导的变化规律.

关键词: 无机非金属材料 稀土掺杂锰氧化物 氧空位 双交换作用 光诱导效应

The vacuum annealing effect on the photoinduced properties in La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> thin film

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Abstract:

La<sub>0.7</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> (LSMO) target has been prepared by a Sol-gel method and the film of LSMO with the thickness of 187 nm has been deposited on a (012)-oriented LaAlO<sub>3</sub> substrate using the pulsed laser deposition technique. The transport and photoinduced properties of the LSMO film at different annealing conditions have been investigated. The phase transition temperature decreases and the electrical resistivity of the film increases with increasing the annealing time. Photoinduced properties show that the laser induces the increases of the electrical resistivity in the metallic phase and the reduction in the insulation phase. The photoconduction ( $\Delta\rho$ ) increases, and then decreases with increasing the annealing time. It is found that there exists the max photoconduction about 0.013  $\Omega$ cm for the sample with the 40 minutes vacuum annealing, which is attributed to double exchange interaction.

Keywords: inorganic non-metallic materials rare earth doped manganite oxygen vacancy double exchange interaction photoinduced effect

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