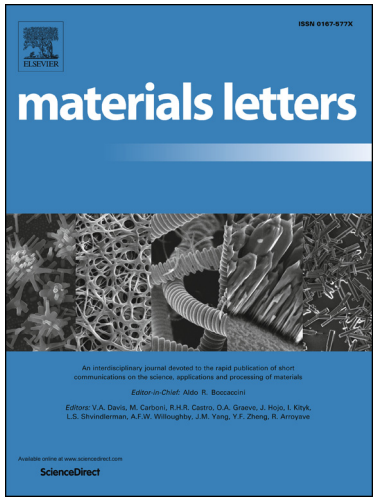

Tunning of metal-insulator phase transition temperature in $La_{0.3}Ca_{0.7}MnO_3$perovskite material

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TUNNING OF METAL-INSULATOR PHASE TRANSITION TEMPERATURE IN $La_{0.3}Ca_{0.7}MnO_3$ PEROVSKITE MATERIAL

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Abstract

In recent years, there is an increasing demand for more sensitive and high magnetoresistive materials in high-speed electronic and magnetic devices. $La_{1-x}Ca_xMnO_3$ perovskites are chosen to be beneficial for the potential applications in solid oxide fuel cells, magnetic sensors/reading heads and frequency switching devices. $La_{0.3}Ca_{0.7}MnO_3$ perovskites were prepared and sintered at four different temperatures such as 1173, 1273, 1373 and 1473 K. X-ray powder diffraction pattern confirms the existence of orthorhombic structure with Pnma space group in the perovskites. Scanning electron microscopy images of the perovskites were used to determine the size of the particles. In-situ measurement of ultrasonic longitudinal velocity was carried out employing a wide range of temperature. The ultrasonic measurements have shown an interesting anomaly at the metal-insulator phase transition. The metal insulator transition temperature is found to increase from 625 to 640 K with the increase of sintering temperature.

Key words: Perovskite, Sintering, Ultrasonic velocity, Transition temperature

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1. Introduction

Studies on $R_{1-x}A_xMnO_3$ (R- Rare-earth element and A- Alkaline element) manganite perovskites have significant importance because of their properties such as colossal magneto