11th International Conference
on Advanced Materials

Rio de Janeiro Brazil
September 20 - 25

ICAM2009

# Preparation of La-Ca-Mn polymeric resins to produce nanostructured perovskite oxides

J. F. Pacheco[(1)], H. E. V. Cotrina[(1)], A. Zenatti[(1)], J. F. Q. Rey[(1)],A. J. Lanfredi[(1)], R. F. Jardim[(2)], M. T. Escote[(1)]*

(1) Centro Engenharia, Modelagem e Ciências Sociais, Universidade Federal do ABC, Rua Santa Adélia, 166, Bairro Bangu, Santo André, SP, Brasil. marcia.escote@ufabc.edu.br

(2) Depto de Materiais e Mecânica, Instituto de Física, Universidade de São Paulo, São Paulo, SP, Brasil.

* Corresponding author.

**Abstract** – Nanostructures of $La_{0.7}Ca_{0.3}MnO_3$ were produced by a template assisted technique using mesopouros anodic aluminium oxide membrane. For this, a polymeric resin of La-Ca-Mn-O was prepared by the modified polymeric precursor route. This solutions was characterized by x-ray diffraction (Fig1) and thermagravimetric analysis (Fig.2). We have adjusted different viscosity values of the resin and deposited within templated. Results of X-ray diffraction and scanning electron microscopy revealed that nanotubes of $La_{0.7}Ca_{0.3}MnO_3$ were produced.

Mixed valence manganite oxides have been extensively studied due to their interesting properties as the giant magnetoresitance effects observed in this oxides.. Also the fabrication of nanotubes and nanowires of $La_{1-x}Ca_xMnO_3$ using template assisted method has been recently reported.[1,2] In this context, the aim of this work is produce nanostructured $La_{0.7}Ca_{0.3}MnO_3$ compounds using the pore wetting technique. For this, this manganite perovskite oxide were controlled synthesized within a porous anodic aluminum oxide (AAO) template by means of modified polymeric precursor method using acetate and nitrates as raw materials and citric acid as a chelating agent. In this process, it is necessary to study: (a) the conditions to prepare polymeric resins of La-Ca-Mn; and (b) the conditions to the pore wetting deposition in the AAO template (time, viscosity, and pressure). X-ray diffraction results of powder obtained through the polymeric resins revealed the presence of the manganite perovskite-type crystalline structure (see Figure 1). The thermal evolution of the crystalline structure formation was studied by means of the thermogravimetry analysis (TG) and X-ray diffraction from 400 to 750 °C. The result of both characterizations suggested that the crystallization process begin at temperatures higher than 400 °C (see figure 2). By means of the capillarity effect and controlling the viscosity and the pressure the La-Ca-Mn polymeric resin was deposited on the AAO template and heat-treated at 600 °C. The samples were characterized by means of X-ray diffraction and scanning electron microscopy. The preliminary analyses revealed that nanotubes of $La_{0.7}Ca_{0.3}MnO_3$ were obtained through this template assisted technique.

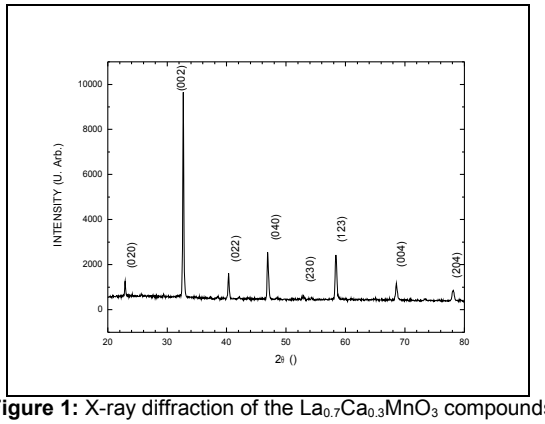


**Figure 1:** X-ray diffraction of the $La_{0.7}Ca_{0.3}MnO_3$ compounds heat-treated at 1200 °C.

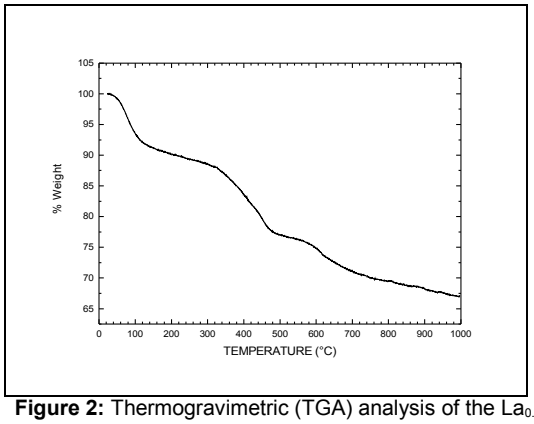


**Figure 2:** Thermogravimetric (TGA) analysis of the $La_{0.7}Ca_{0.3}MnO_3$ precursor

[1] X.Y. Ma, H. Zhang, J. Xu, J.J. Niu, Q. Yang, J. Sha, D.R. Yang, Chem. Phys. Lett. 363 (2002) 579-582.

[2] K. S. Shankar, S. Kar, A.K. Raychaudhuri, G.N. Subbanna, Appl. Phys. Lett. 84 (2004) 993-995