THE INFLUENCE OF TEMPERATURE ON THE PHYSICO-CHEMICAL PROPERTIES OF PEROVSKITE MATERIALS WITH A HEXAGONAL STRUCTURE

Paula Sfirloaga, Maria Poienar, Ionel Balcu, Corina Macarie, Paulina Vlazan

National Institute for Research and Development in Electrochemistry and Condensed Matter, str. Dr. A. Paunescu Podeanu 144, 300569 Timisoara Romania
e-mail: paulasfirloaga@gmail.com

Abstract

The rare-earth manganite, yttrium manganese oxide ($YMnO_3$) is a multiferroic material possessing ferroelectricity and magnetism properties simultaneously, which attracted much research interest from the past two decades. $YMnO_3$ exists in three phases; such as amorphous, hexagonal phase and an orthorhombic phase (Pbnm space group) whose chemical compositions are identical [1]. Hexagonal $YMnO_3$ with P63cm space group is one of the most intensively studied materials [2].

In this paper, a comparative study between perovskites materials obtained through sol-gel method, followed by thermal treatment at different temperature was performed. The obtained materials were studied morpho-structural by X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FT-IR), specific surface (BET), scanning electron microscopy (SEM) and semi-quantitative analysis (EDX). The physico-chemical properties of perovskites materials obtained through sol-gel method have been analyzed with the aim of studying the relationships between structure and properties in this class of materials the influence of the thermal treatment on the induced properties.

X-ray diffraction analysis revealed the formation at 800 and 1000°C of single-phase compounds with the average crystals size between 27-29 nm, crystallized in the hexagonal structure with P63cm space group. From the morphological analysis of the surface, it can be seen that the particles are spherical and very agglomerated, and the quantitative analysis showed that the obtained materials are pure, only the elements O, Mn, Y being present. Moreover, from the quantification of the elements, it can be observed that the stoichiometry of the ABO_3 compound has been preserved.

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References

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