26th Congress of SCTM

Sept. 20-23, 2023, Metropol Lake Resort, Ohrid, N. Macedonia

Synthesis and Investigation of Complex Perovskites with Manganese

B. Cheliku Ramadani,[a] S. Popovska,[b] M. Bukleski,[b],A. Reka,[a] S. Dimitrovska-Lazova[b] and S. Aleksovska[b,*]

[a] *Department of Chemistry, Faculty of Natural Sciences and Mathematics, University of Tetovo, Tetovo, North Macedonia*

[b] *Institute of Chemistry, Faculty of Natural Sciences and Mathematics, Ss. Cyril and Methodius University, Skopje, North Macedonia*

**bote.aleksovska@gmail.com*

The rare-earth perovskite oxides containing 3d transition metals are considered as important materials due to their specific electronic, magnetic, optical and catalytic properties. These properties are even more pronounced in complex perovskites, particularly those with manganese in the B-position. Continuing our work on complex perovskites, in this work we present the synthesis and characterization of new double perovskites with the general formula $PrMn_{0.5}M_{0.5}O_3$ (M = Cr, Fe, Co, Ni).

The synthesis was conducted by solution combustion method using glycine as fuel. The fuel quantity was calculated by setting the fuel/oxidant ratio to 1. The obtained powders were additionally heated in a furnace for 8 hours at 800 °C. Perovskites with iron were also synthesized by the method of sol-gel combustion with citric acid as fuel.

The obtained compounds were investigated by powder XRD, vibrational spectroscopy, SEM, and EDX analysis. The XRD patterns showed that the compounds are pure and isostructural to each other. The comparison of the obtained diffractograms with the ones of simple Pr-perovskites with the constituent metals, indicated that the synthetized perovskites are orthorhombic. The EDX analysis confirmed the 1:1 ratio of Mn/M that corresponds to the general formula $PrMn_{0.5}M_{0.5}O_3$ (M = Cr, Fe, Co, Ni). The recorded diffractograms of the iron-containing perovskites obtained by the two different methods are identical, thus indicating that both methods can be used for synthesis of this type of perovskites. In order to determine the way the applied method of synthesis affects the morphology and dimensions of the particles, SEM images were recorded. The compounds within the series are of the same polycrystalline porous morphology, typical for perovskites obtained by solution-combustion method.

Keywords: complex perovskites, manganese, solution combustion, sol-gel combustion, PXRD, vibrational spectroscopy, SEM, EDX.