

# Lanthanum substituted BiMnO<sub>3</sub> synthesis and characterization

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Manganites are mixed oxides of manganese which crystalizes in perovskite structure, and whose broad stoichiometric formula is ABO(3±δ) ; where A is a lanthanide element and B is manganese, which also includes the ability to generate an exact or not oxygen stoichiometry. [1] Multiferroic bismuth manganite (BiMnO<sub>3</sub>) is known as a material that exhibits both ferromagnetic and ferroelectric properties [2]. Multiferroic materials offer new range of applications like microwave resonators, gyrators, data storage and etc [3]. It is well known, that pure BiMnO<sub>3</sub> cannot be synthesized under ambient conditions. On the other hand, substituting part of bismuth with other elements, like lanthanum, can be done and those materials exhibit structural, magnetic phase transitions at different ratios of cations [4].

In this study, lanthanum doped bismuth manganites La<sub>1-x</sub>Bi<sub>x</sub>MnO<sub>3</sub> (x = 0.0-0.65) were prepared by sol-gel combustion synthesis method. The precursors were mixed and stirred for 1 h at 80 °C temperature. After the formation of sol, solvent was evaporated at 120 °C. Combustion reaction occurs when the temperature reaches 250 °C. Final annealing temperature (1000 °C) were chosen according to previously obtained results. For the characterization of obtained samples X-ray diffraction (XRD) analysis, scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR) and other methods were used.

The obtained results showed that sol-gel combustion synthesis route is suitable for the fabrication of La<sub>1-x</sub>Bi<sub>x</sub>MnO<sub>3</sub>. With this method the maximum concentration of bismuth can be 65%, which is biggest reported so far, when material is synthesized under ambient conditions. Also not only one structural phase transition can be observed, but also another one at that maximum concentration.

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