World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:18, No:08, 2024

Structural, Vibrational, Magnetic, and Electronic Properties of La_2MMnO_6 Double Perovskites with M = NI, Co, and Zn

Authors : Hamza Ouachtouk, Amine Harbi, Said Azerblou, Youssef Naimi, El Mostafa Tace

Abstract : This study investigates the structural, vibrational, magnetic, and electronic properties of La_2MMnO_6 double perovskites, where M represents Ni, Co, and Zn. Double perovskite oxides are noted for their flexible ionic placement within the A and B sub-lattices, prompting widespread interest due to their broad spectrum of physical properties, including multiferroic behavior, colossal magnetoresistance, and ferroelectric/piezoelectric functionalities. These materials are also crucial in energy-related applications such as solid oxide fuel cells and water-splitting catalysis due to their effective oxygen ion transport and storage. Specific attention is given to the phases La_2NiMnO_6 and La_2CoMnO_6, renowned for their unique magnetic, electric, and multiferroic properties. The current research expands the scope by incorporating La_2ZnMnO_6, synthesized through high-temperature solid-state chemistry, to explore how zinc substitution influences these materials. Structural analyses via X-ray diffraction confirmed a monoclinic structure within the P21/n space group. Detailed vibrational studies through infrared and Raman spectroscopy, combined with further XRD investigations, delineate the dynamic and electronic behaviors of these compounds, emphasizing the role of the chemical composition in tuning their functional properties. This comprehensive analysis not only reinforces the understanding of La_2MMnO_6's physical characteristics but also underscores its potential in advanced technological applications.

Keywords : double perovskites, structural analysis, vibrational spectroscopy, magnetic properties, electronic properties, high-temperature solid-state chemistry, La_2MMnO_6, monoclinic structure, x-ray diffraction.
Conference Title : ICBBB 2024 : International Conference on Bioscience, Biotechnology, and Biochemistry
Conference Location : New York, United States
Conference Dates : August 08-09, 2024