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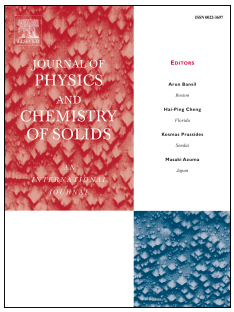

Electrical properties and conduction mechanism in the $NaLaMnMoO_6$ double perovskite ceramic

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Electrical properties and conduction mechanism in the $NaLaMnMoO_6$ double perovskite ceramic

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Abstract

The sodium double perovskite $NaLaMnMoO_6$ compound have been synthesized by the sol - gel method and characterized by X-ray diffraction (XRD) technique. The electrical conductivity and modulus characteristics of the system have been investigated in the temperature and the frequency range 332–373 K and 200 Hz–5 MHz respectively by means of impedance spectroscopy. The ac and dc conductivities were studied to explore the mechanism of conduction. Dielectric data were analyzed using complex electrical modulus M* at various temperatures. The non-overlapping small polaron (NSPT) model can explain the temperature dependence of the frequency exponent. The electrical conduction in sodium double perovskite $NaLaMnMoO_6$ compound is presumably caused by the motion of Na+ in the [-110] direction tunnel.

Keywords: ac conductivity; modulus formalism; conduction mechanism.

1. Introduction

Double perovskites with the general stoichiometry $A_2M'M''O_6$ or $A'A''M'M''O_6$ (where A is alkaline earth or lanthanide and M is a smaller transition metal or lanthanide cation respectively) exhibit number of interesting physical properties such as superconductivity, dielectricity and magnetoresistivity [1]. At the same time, these materials display range of crystal structures and tilt systems [2-4]. Depending on the constituents, M'M" may or may not order in rock salt like manner over the six coordinated octahedral sites. The governing parameters determining the structural and physical properties of double perovskite structure are the charge, size and electronic configuration of M'M" cations as well as the A/M size