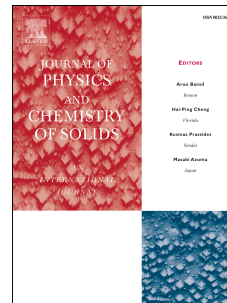


Accepted Manuscript

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PII: S0022-3697(17)31622-0

DOI: [10.1016/j.jpcs.2017.11.022](https://doi.org/10.1016/j.jpcs.2017.11.022)

Reference: PCS 8297

To appear in: *Journal of Physics and Chemistry of Solids*

Received Date: 30 August 2017

Revised Date: 18 November 2017

Accepted Date: 25 November 2017

Please cite this article as: S.M. Borchani, M. Megdiche, Electrical properties and conduction mechanism in the NaLaMnMoO₆ double perovskite ceramic, *Journal of Physics and Chemistry of Solids* (2017), doi: 10.1016/j.jpcs.2017.11.022.

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Electrical properties and conduction mechanism in the NaLaMnMoO₆ double perovskite ceramic

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Abstract

The sodium double perovskite NaLaMnMoO₆ 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 NaLaMnMoO₆ 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 A₂M'M''O₆ or A'A''M'M''O₆ (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

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