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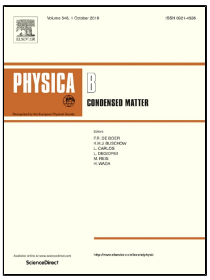

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Structural and electrical characterization of La_2ZnMnO_6 double perovskite

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Abstract: Polycrystalline La_2ZnMnO_6 (LZM) compound was synthesized successfully by solid state reaction route with single phase orthorhombic structure (*Pnma* space group) as revealed by X-ray diffraction analysis. The microstructure of LZM has inhomogeneous distributions of grains and average grain size is varying from 0.05 to 5.0 μm. EDAX survey showed Zn rich lines with an uneven distribution of the atoms. Peaks in Raman spectrum of LZM compound correspond to Mn-O bond stretching and tilt of the Mn-O octahedral. The dielectric behavior of ceramics in lower frequency regions exclusively depends on grain boundary effect. The temperature dependent dielectric loss study shows relaxation peaks dominating at lower frequencies and shifted towards higher temperature range with increasing frequency. The strong influence of non-Debye type relaxation is confirmed by Bergman fitting to experimentally observe electric modulus curve. VRH model has been used to study conduction behavior of the sample.

Keywords: Double perovskite; Electrical properties; X-ray Diffraction.

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1. Introduction

In ABO_3 perovskite, the substitution of two different types of cations (B' and B'') in B sites can organize the B sites by interesting ordering patterns. Among many such ordering patterns, double perovskites with general formula $A_2B'B''O_6$ (A: rare earth ions, B', B'': transition metals) have received much interest since they play an important role in displaying a wide variety of interesting physical properties in oxide systems [1-3]. Therefore, the ordered and disordered states in the B site control the physical properties, such as magnetic, dielectric properties, etc, in these double perovskite compounds. This substitution in the perovskite lattice may form a heterogeneous microstructure. Such changes may reflect as a diffused phase change. Sometimes the resulting materials may show relaxor type properties because of the B-site disordering. While a non-relaxor type high dielectric permittivity characteristics are generally arises due to crystal lattice defects. This crystal lattice defects may originate from oxygen vacancies defects or metal ions dopant [4]. The materials with a considerable concentration of defects are showing ionic or mixed ionic-electronic conductivity [5]. This type of materials are attracted due to the number of applications in various fields such as solid oxide fuel cells (SOFC), thin film substrate for superconductors, electrolytes and in spintronics and magneto-electric devices etc. [6-7].