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Structural, Magnetic, Electrical and Dielectric Properties of Pr0.8Na0.2MnO3 Manganite

Authors : H. Ben Khlifa, W. Cheikhrouhou, R. M'nassri

Abstract : The Orthorhombic Pr0.8Na0.2MnO3 ceramic was prepared in Polycrystalline form by a Pechini sol–gel method and its structural, magnetic, electrical, and dielectric properties were investigated experimentally. A structural study confirms that the sample is a single phase. Magnetic measurements show that the sample is a charge ordered Manganite. The sample undergoes two successive magnetic phase transitions with the variation of temperature: a charge ordering transition occurred at TCO = 212 K followed by a Paramagnetic (PM) to ferromagnetic (FM) transition around TC = 115 K. From an electrical point of view, a saturation region was marked in the conductivity as a function of Temperature s(T) curves at a specific temperature. The dc-conductivity (sdc) reaches a maximum value at 240 K. The obtained results are in good agreement with the temperature dependence of the average normalized change (ANC). We found that the conduction mechanism was governed by small polaron hopping (SPH) in the high-temperature region and by variable range hopping (VRH) in the low-temperature region. Complex impedance analysis indicates the presence of a non-Debye relaxation phenomenon in the system. Also, the compound was modeled by an electrical equivalent circuit. Then, the contribution of the grain boundary in the transport properties was confirmed.

Keywords : manganites, preparation methods, magnetization, magnetocaloric effect, electrical and dielectric
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