

Effect of Chemical pressure on structural, dielectric and optical properties of Nano lanthanum orthoferrite

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Abstract. This work describes the effect of incorporation of Nickel into LaFeO₃ nanoparticles on its structural and dielectric properties, prepared by sol-gel method. The samples of LaFe_{1-x}Ni_xO₃ (x = 0, 0.1, 0.2, 0.3 & 0.5) series were characterized by x-ray diffraction data using the Reitveld refinement method. The synthesized compositions crystallized mainly in the Pbnm symmetry and field emission scanning electron microscopy to find out the average particle size. Raman spectroscopy is an essential tool to investigate any strong influence on structural phase transitions, oxygen motion of perovskite-type materials and the order-disorder effects resulting in the lattice. To resolve the optical properties of Ni-doped LFO nanoparticles we executed UV-Vis diffuse reflectance spectroscopy. The surface state of the Ni-doped LaFeO₃ using X-ray Photoelectron Spectroscopy. The complex impedance spectra show a deviation from an ideal Debye type and they are modelled using an equivalent circuit consisting of resistances of grains and grain boundaries, grain capacitance and a constant phase element. The conductivity analysis implies that the materials behave as a semiconductor in the entire temperature range.

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