

ABSTRACT

Tin oxide (SnO_2) is considered as the vital member of the oxide materials due to its surface, electrical and optical properties. This study was carried out to analyze and evaluate the change in structural, optical and electrical properties by doping of La in SnO_2 which are the function of dopant and grain size. In present work, pure and La doped SnO_2 nanocrystalline powders have been synthesized by a chemical micro emulsion method. Dopant percentage of La in $\text{La}_x\text{Sn}_{1-x}\text{O}_2$ was 0, 1, 2, 5 and 10 mol%. Samples were annealed at 500°C and 850°C . Crystallographic, morphology, electrical and optical properties were investigated by means of X-ray diffraction (XRD), Field Emission Scanning Electron Microscope (FESEM), Fourier Transformation Infrared Spectroscopy (FTIR), UV-Vis and Near Edge X-ray absorption spectroscopy (NEXAS). Results confirmed the formation of single phase rutile type tetragonal structure. The average crystalline size was diminished with doping of La. Agglomeration and spherical shape of particles can be observed from surface morphology. Chemical bonding and presence of oxidation state were revealed by using FTIR and NEXAS, respectively. The slight change in band gap in $\text{La}_x\text{Sn}_{1-x}\text{O}_2$ has been observed. This wide band gap in a range of 3.7 to 3.8 eV has been calculated. Such La doped nanocrystalline SnO_2 material can be used as gas sensing material and optoelectronic material.