Abstract

The antiperovskite oxides structure due their beneficial properties which are widely used for many physical applications. The aim of present research work is to synthesis and characterization of Ba_3SnO for optoelectronic and spintronic devices. Powder samples of Ba_3SnO were prepared using solid state ceramic method. After pellet formation and suitable sintering of the powder, Co ion implantation has been done using Pelletron Accelerator. The study includes the investigations of penetration depth range of Co ions in target material, structural, surface morphology, verification of elemental composition, and band gap energy by using the characterization techniques SRIM, XRD, SEM, EDX, FTIR, and UV-Vis spectroscopy respectively. SRIM results ensure us the depth range of cobalt ions is near about 1μm. The XRD pattern reveals that the structure of Ba_3SnO is cubic and also shows the improvement in crystallinity by ion implantation using different doses of Co ions such as, 10^{13}, 5×10^{13} and 10^{14}ions/cm^2. The Lattice parameters and the volume of unit cell are increased by increasing the dose from 10^{13} to 10^{14}ions/cm^2. SEM results show that the rough and sharp rod shape varies into very smooth and fine granular shape by ion implantation. EDX plots confirm the existence of basic elements like Ba, Sn, Co and O. FTIR analysis ensure the formation of Ba_3SnO functional bonding and slight variations in incorporation of Co ions has been observed. The UV-Vis spectroscopy results exhibit the absorption band at 535 nm and the corresponding band gap is 2.32eV. Results reveal that by increasing the dose of ion implantation 10^{13} to 10^{14} causes the increase in band gap energy, ranges from 2.67 to 2.88 eV.