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Research article

Phase evolution, microscopic analysis, optical and dielectric property evaluation of Co-doped $BaSnO_3$ by mechanical mix assisted solid state sintering method

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Abstract: Cobalt (Co) doped barium stannate, i.e. $BaSn_{1-x}Co_xO_3$ with x = 0.05, 0.10 and 0.15 were prepared by mechanical mixing in agate mortar followed by sintering at 1350 °C for 2 hours. X-ray diffraction analysis (XRD) of the sample confirmed the cubic perovskite structure, crystallite size by Scherrer's formula 50 nm, 49 nm respectively and planes of orientation (110), (111), (200), (211), (220) along the major peaks. Absorption spectra obtained due to symmetric and asymmetric stretching of M–O coordinated bond formations were determined by Fourier Transform Infrared Spectroscopy (FTIR). Band gap analysis of the sintered samples evaluated using Tauc relation was obtained from UV-VIS spectral analysis while luminescence by PL spectra. Morphological analyses were carried out by SEM while EDX was done to know the presence of required elements in the samples. Particle sizes of the samples were in the range of 50–100 nm obtained by HRTEM analysis. SAED pattern was also obtained for synthesized material indicating polycrystalline nature. Higher Co doping on barium stannate leads to decrease in dielectric constant due to possible lower ionic polarization at B site of perovskite.