

Phase formation and dielectric properties of Ba_{0.5}Sr_{0.5}TiO₃ by slow injection sol-gel technique.

ABSTRACT

A simple sol–gel process incorporating slow precursor injection technique was employed to synthesize homogeneous Ba_{0.5}Sr_{0.5}TiO₃ nano powders. The Ba_{0.5}Sr_{0.5}TiO₃ samples were subjected to calcination temperatures from 600 to 1,100 °C and sintering temperatures from 1,250 to 1,350 °C for the study of phase formation, crystallite size, particle distribution, and dielectric properties. Single phase Ba_{0.5}Sr_{0.5}TiO₃ with a cubic perovskite structure was successfully synthesized after calcination at 800 °C. The average size of the nano particles is 42 nm with a narrow size distribution, and a standard deviation of 10%. The highest values recorded within the investigated range for dielectric constant, and dielectric loss measured at 1 kHz are 1,164 and 0.063, respectively, for Ba_{0.5}Sr_{0.5}TiO₃ pellets calcined at 800 °C and sintered at 1,350 °C. Leakage current density measured at 5 V for the Ba_{0.5}Sr_{0.5}TiO₃ pellet was found to be 49.4 pA/cm².

Keyword: Phase formation; Sol-gel technique; Dielectric; BST.