

Preparation and electrical properties of $\text{Ba}_{0.85}\text{Sr}_{0.15}\text{Ti}_{0.90}\text{Zr}_{0.10}\text{O}_3$ ceramics doped Sn by seed-induced method

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Abstract. $\text{Ba}_{0.85}\text{Sr}_{0.15}\text{Ti}_{0.90}\text{Zr}_{0.10}\text{O}_3$ (BSZT) ceramics doped Sn was prepared by seed-induced method. The seed was prepared by molten salt method, NaCl-KCl (1:1 by mole) eutectic mixtures was used as the flux. The BSZT added seed with doped SnO were calcined at 1250 °C for 3 hrs and sintered at 1400 °C for 2 hrs, respectively. The phase formation and morphology of these samples were characterized via X-ray powder diffraction and scanning electron microscopy, respectively. From the above studies, it has been concluded that the maximum dielectric constant is 19147 at BSZT ceramics prepared by seed-induce method.

Introduction

The lead based perovskite piezoelectric ceramics as PZT, PMN-PT, PLZT can be used for sensor, actuators, transformers and energy harvesting [1-2]. Lead based perovskite piezoelectric ceramics are exhibited excellent properties, however it have problems on environmental [1]. For this reason, researchers have been studying to find alternative materials to replace lead based [2]. Barium titanate (BT) based materials are very interesting, because it is friendly to environment and good properties [3-4].

In this research, we study the preparation of $\text{Ba}_{0.85}\text{Sr}_{0.15}\text{Ti}_{0.90}\text{Zr}_{0.10}\text{O}_3$ (BSZT) ceramics, the samples were prepared normal mixed oxide and seed-induced method [5-6] with doped SnO. The seed-induced method combines the crystal-chemical, thermodynamics and kinetic of the reaction of phase [5-6]. This research is using the nano-crystal of $\text{Ba}_{0.85}\text{Sr}_{0.15}\text{Ti}_{0.90}\text{Zr}_{0.10}\text{O}_3$ for nucleus to induce the phase formation. The samples were observed the microstructure and electrical properties for study the effect of method and SnO doped.

Experimental Procedure

The starting materials, BaCO_3 , ZrO_2 , TiO_2 , SrCO_3 and SnO reagent grade metal oxide powders were used for $\text{Ba}_{0.85}\text{Sr}_{0.15}\text{Ti}_{0.90}\text{Zr}_{0.10}\text{O}_3$ (BSZT) ceramic doped SnO preparing by seed-induced method. The samples were prepared to two parts. First BSZT seed was synthesized from $\text{Ba}_{0.85}\text{Sr}_{0.15}\text{Ti}_{0.90}\text{Zr}_{0.10}\text{O}_3$ powder by the molten-salt route. The starting powders were ball-mill for 24 hrs in ethanol with zirconia grinding media after that dried the mixed powders. The powders were