Structural and electrical characterizations of Sn/Zr co-doped Barium titanate perovskite ceramic.

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Abstract

Pure nanocrystalline and Sn and Zr doped $BaTiO_3$ with general formula Ba $(Ti_{0.96}Sn_xZr_{0.04-x})$ O_3, where (x = 0.02, 0.03, and 0.04), were synthesized using the solid-state reaction and mechanochemical route. These nanocrystalline ceramics were characterized by X-ray diffraction, Field emission scanning electron microscopy, and Impedance spectroscopy. X-ray diffraction patterns confirm the formation of single phase cubic and tetragonal crystal symmetry. The surface morphology of the sintered ceramic samples investigated by Field emission scanning electron microscopy (FESEM) are dense and have varying microstructures with the presence of voids. Complex impedance Cole-Cole plots showed the relaxation behavior in the test materials to be of a non-Debye type. The sample has been discovered to exhibit a negative temperature constant of resistance (NTCR) behavior indicating its semiconducting character.

Keywords: Barium titanate, X-ray diffraction, FESEM, Complex impedance

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