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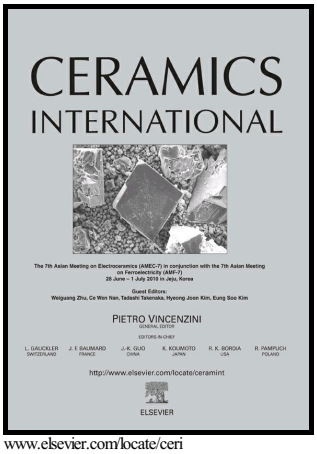

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ABSTRACT

Polycrystalline Bismuth and Lithium Co-Substituted Strontium Titanate $Sr_{(1-x)}(Bi,Li)xTiO_3$, was prepared using the solid-state method with microwave assisted heating of initial materials. The effect of Bi^{3+} and Li^{+} concentration on the crystal structure, microstructure, and permittivity and energy storage properties of $SrTiO_3$ ceramics are investigated. The phase and structure have been confirmed by XRD along with Rietveld refinement studies. Morphological investigations have been carried out using FESEM. Frequency and temperature dependence of dielectric permittivity was investigated using impedance spectroscopy. The sample with x=0.02 has shown dielectric relaxation behavior. The activation energy of relaxation is found to be 1.2 eV and relaxation time equals 1.12×10^{-7}sec. The room temperature P-E loop has been investigated, and the result confirms that there is no signature of the ferroelectric phase in all samples. The energy storage density was theoretically estimated in the present study using a P-E loop. The results showed an astonishing ten-time increase in energy storage density with 8% co-substitution. With increasing x, the grain size steadily decreased, and dielectric breakdown strength increased, yielding a higher energy storage density. The obtained results herald a promising future in the development of electrical capacitors for energy storage applications.

Keywords: Co-Substitution; Grain size; Dielectric constant; Porosity; Relaxation; Polarization; Breakdown strength; Energy density; and Efficiency.