Multiferroic and Magnetoelectric properties of BCT-ZF ceramics

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Abstract

Multiferroic BCT-ZF ceramics prepared from ferromagnetic (FM) zinc ferrite (ZF) and ferroelectric (FE) barium calcium titanate (BCT) with different mole % age of x, ($(1-x)Ba_{0.96}Ca_{0.04}TiO_3$–$(x)ZnFe_2O_4$) by using the solid state reaction method. The preliminary structural studies were carried out by using x-ray diffraction technique, which confirm that the samples have a tetragonal structure along with the cubic spinel ferrite phase at room temperature with the average crystallite size of 22-32 nm. Raman spectra of these composites also confirm the existence of BCT phase and ZF phase respectively. Room temperature ferroelectric characterizations have shown that the samples are ferroelectric along with an adequate magnetoelectric coupling of 10.85 mV/ (cm.Oe). The strong dependence of electric parameters on applied magnetic DC bias fields provides a framework for the development of potential magnetoelectric devices. Also, the high sensitivity of magnetoelectric coupling to the applied AC magnetic field can be used for its application in magnetoelectric sensors.

Keywords: Magnetoelectric, Ferroelectric, Ceramics, Zinc ferrite, Barium calcium titanate.

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