MS034.O04

Structural and magnetoelectric effect of (x)$Li_{0.1}Cu_{0.1}Co_{0.1}Zn_{0.6}Fe_{2.1}O4$ +(1-x)$Ba_{0.95}$

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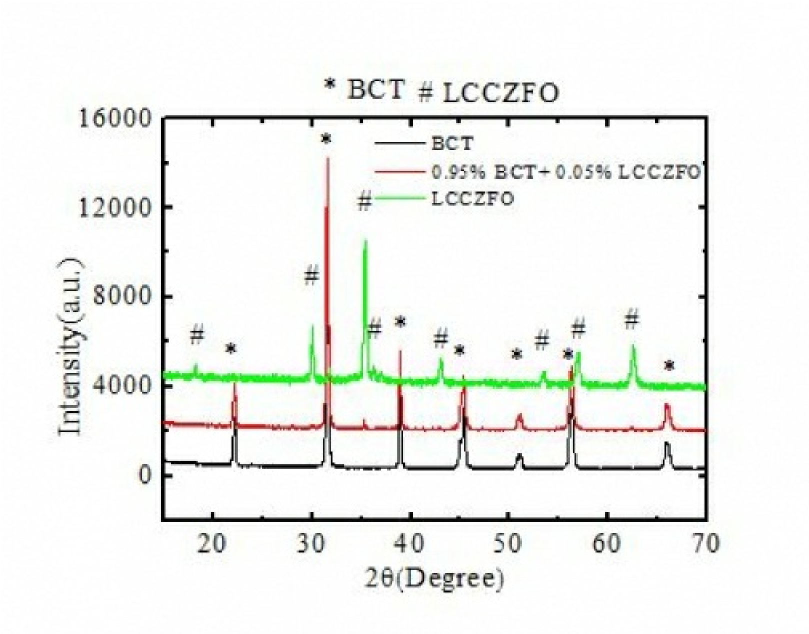
Multiferroic composites (x)Li0.1Cu0.1Co0.1Zn0.6Fe2.1O4 +(1-x)Ba0.95Ca0.05TiO3 (where x = 0.0, 0.05, 1.0) are synthesized by hybrid (Li0.1Cu0.1Co0.1Zn0.6Fe2.1O4 was prepared by auto combustion and Ba0.95Ca0.05TiO3 was prepared by standard solid state reaction) method. The X-ray diffraction analysis affirms the formation of both the component phases (Li0.1Cu0.1Co0.1Zn0.6Fe2.1O4 was spinel cubic and Ba0.95Ca0.05TiO3 was tetragonal) and also reveals that there is no chemical reaction between them. From the energy-dispersive X-ray spectroscopy study it is observed that the percentage of the elements in the component phases is well consistent with the nominal composition of the composites. Field Emission Scanning Electron Microscopy analysis shows almost homogeneous mixture of the two phases. Dielectric constant (ε´), loss tangent and AC conductivity are measured as a function of frequency at room temperature. The dielectric dispersion at lower frequency (<105 Hz) is due to the Maxwell Wagner interfacial polarization. The complex impedance spectroscopy is used to correlate between the electrical properties of the studied samples with their microstructures. Two semicircular arcs corresponding to both grain and grain boundary contribution to electrical properties have been observed in all the studied samples. The static ME voltage coefficient as a function of DC magnetic field for the samples is measured. The present composite might be a promising candidate as multiferroic materials showing effective electric and magnetic properties.



Keywords: multiferroic, auto combustion, magnetoelectric effect