



## Synthesis and electrical properties of Lead-free Magneto Electric (ME) composites

• Arti Kumari • Shreya Mishra • Shilpi Kumari  
• Kavita Verma

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**Corresponding Author: Kavita Verma**

**Abstract:** Polycrystalline composites of Barium cobalt titanate  $(1-x)$   $(\text{Ba}_{0.8}\text{Co}_{0.2}) \text{TiO}_3$  [BCT] and Cobalt zinc ferrite  $x$   $(\text{Co}_{0.6}\text{Zn}_{0.4}) \text{Fe}_2\text{O}_4$  [CZF] ( $x=0.00, 0.4, 0.3, 0.2, 0.1, 1.0$ ) were prepared by a modified wet chemical method followed by a high temperature sintering process. X-ray diffraction (XRD) studies at room temperature confirmed the formation of perovskites-spinel structure and on the basis of XRD pattern, the dominant peak has been observed at  $2\theta = 32^\circ$  and  $24^\circ$  and Miller indices (100) and (110) planes, respectively. Dielectric studies of composites prove that the effect of ferrite in the composites is to shift the ferroelectric phase

transition to the higher temperature side with a broadened Curie temperature transition. The conduction at low temperature is due to impurities, whereas at higher temperature it is due to polaron hopping.

**Keywords:** ferroelectric, perovskites-spinel, polycrystalline.

### Introduction:

Composite materials containing both ferroelectric and ferromagnetic phases have recently attracted a great deal of attention because of their potential applications in practical electronic devices, greater design flexibility and large magneto electric response. They can also be operated at room temperature. So they can be used as multifunctional devices such as magnetic-electric transducers and sensor applications. When ferromagnetism and ferroelectric property coexist in a material, magnetic-electric effect based phenomena are expected due to the interaction between the magnetization and the electric polarization. There are very few single-phase materials with such combined properties. Ferrites and ferroelectric materials are used in a large family of microwave and millimeter-wave devices. Spinel ferrites have been widely studied due to their interesting properties like high resistivity, mechanical hardness, remarkable stability and promising memory storage capacity. They have a wide range of applications in microwave absorbance, number of electronic devices as, radio, TV sets, high frequency transformers, memory core devices, rod antennas, and read-write heads for high-

### Arti Kumari

B.Sc. III year, Physics (Hons.), Session: 2015-2018,  
Patna Women's College, Patna University, Patna,  
Bihar, India

### Shreya Mishra

B.Sc. III year, Physics (Hons.), Session: 2015-2018,  
Patna Women's College, Patna University, Patna,  
Bihar, India

### Shilpi Kumari

B.Sc. II year, Physics (Hons.), Session: 2016-2019,  
Patna Women's College, Patna University, Patna,  
Bihar, India

### Kavita Verma

Assistant Professor, Deptt. of Physics,  
Patna Women's College, Bailey Road,  
Patna-800 001, Bihar, India  
E-mail : [kavitakvprakash@gmail.com](mailto:kavitakvprakash@gmail.com)