

**Effect of ferrite on the electrical properties of the (1-x) BaTiO<sub>3</sub> + x CoFe<sub>2</sub>O<sub>4</sub> composite with the charge density studies of the composite.**

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**Abstract**

Ceramic composite of cobalt ferrite and barium titanate ((1-x) BaTiO<sub>3</sub> + x CoFe<sub>2</sub>O<sub>4</sub>) was synthesized with different compositions (x = 0.2, 0.4, 0.6 and 0.8) by solid state synthesis method. Powder X-ray diffraction analysis with profile refinement method was used for phase analysis and structural refinement. Charge density analysis by Maximum Entropy Method was employed to study the electron distribution and bonding nature of the samples. The optical band gap energy of the composite has been determined from UV-Visible spectrophotometer and it is observed that the band gap energy decreases with the increase of cobalt ferrite in the composite. Scanning Electron Microscopy was used to study the surface morphology of the (1-x) BaTiO<sub>3</sub> + x CoFe<sub>2</sub>O<sub>4</sub> composite with x = 0.2, 0.4, 0.6, 0.8 compositions. The elemental compositions of the composite were analyzed from the recorded electron dispersive spectra using EDS spectrophotometer. The electrical characterization was studied with the dielectric and ferroelectric response of the sample. The electron density studies were correlated with the observed characterizations of the bulk magnetoelectric ceramic composite and it is observed that the Ti-O bond is responsible for the electric property and the Co-O bond in CoFe<sub>2</sub>O<sub>4</sub> also influences the electrical property of the prepared magnetoelectric ceramic composite.

**Key Words:** Magnetoelectric composites, Solid State Synthesis, Surface morphology, SEM, Electron density, X Ray diffraction.

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