

# Investigation of electrical impedance and leakage current of multifunctional solid solution of BiFeO<sub>3</sub>-BaTiO<sub>3</sub> (BFO-BTO)

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## Abstract:

The new perovskite material is synthesized by modifying samarium ferrite in the environment of barium titanate through conventional mixed oxide solid state route technique at an optimized temperature of 1175°C. The preliminary structural analysis carried out through X-ray diffraction (XRD) technique reveals formation of single phase compound. The crystal structure is identified with lattice parameters  $a = 5.0538 \text{ \AA}$ ,  $b = 12.5232 \text{ \AA}$ ,  $c = 5.7079 \text{ \AA}$  and  $\sigma = 0.017$  through 'POWD' crystal structure refinement software. The different modes of vibration associate with the elements present in the sample are identified through XPS technique. The dielectric, impedance, modulus and conductivity spectroscopic investigation are carried out in the wide range of frequency (100 Hz-5MHz) and temperature (25°C-500°C) using LCR meter. Room temperature dielectric parameters ( $\epsilon_r$  and  $\tan\delta$ ) value suggests it may be useful for storage application. The conduction features of the material are found to be due to immobile charges, oxygen vacancies and hopping of charges. The transport activities are found highly influence by grains and grain boundaries in the material. Magnetic investigation carried out through vibrating sample magnetometer (VSM) reveals the ferromagnetic property of the material at room temperature which suggests the material may be useful for magnetic field sensor.

Key Words: Raman; UV-Visible; Dielectric; Ferromagnetic, XPS

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