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# Crystal structure refinement, enhanced magnetic and dielectric properties of $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$ modified $\text{Bi}_{0.8}\text{Ba}_{0.2}\text{FeO}_3$ ceramics

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## Abstract

$(1-x) \text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3 - x (\text{Bi}_{0.8}\text{Ba}_{0.2}\text{FeO}_3)$  ( $x = 0.5, 0.6, 0.7$ , and  $0.8$ ) ceramics were synthesized via solid state reaction method. Powder X – ray diffraction investigations performed at room temperature along with Rietveld analysis show all the composites to exhibit a rhombohedral distorted perovskite structure, described by space group  $R3c$ . Rietveld refinement confirmed a good agreement between observed and calculated intensities and a low value of goodness of fit ( $\chi^2$ ). Magnetic measurements were carried out at room temperature up to a field of 6 kOe. Magnetic properties of BBFO modified NBT ceramics are improved with a significant opening in the  $M - H$  hysteresis loop at room temperature. Remanent magnetization and coercive field increased with increase of BBFO concentration. The dielectric response of these samples was analyzed in the frequency range 10 Hz – 7 MHz at different temperatures revealing a dispersion in dielectric constant ( $\epsilon'$ ) and in dissipation factor ( $\tan \delta$ ) at lower frequencies. Both  $\epsilon'$  and  $\tan \delta$  increase with increase of BBFO content. The temperature dependence of frequency exponent 's' of power law suggests that quantum mechanical tunneling (QMT) model to be applicable at lower temperature and

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