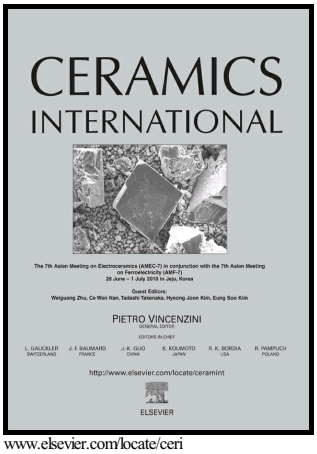

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PII: S0272-8842(16)32398-7
DOI: http://dx.doi.org/10.1016/j.ceramint.2016.12.128
Reference: CERI14438

To appear in: *Ceramics International*

Received date: 7 August 2016
Revised date: 28 December 2016
Accepted date: 28 December 2016

Cite this article as: Kavita Kaswan, Ashish Agarwal, Sujata Sanghi, Manisha Rangi, Sandhaya Jangra and Ajay Kumar, Crystal structure refinement, enhanced magnetic and dielectric properties of $Na_{0.5}Bi_{0.5}TiO_3$ modified $Bi_{0.8}Ba_{0.2}FeO$ ceramics, *Ceramics International* http://dx.doi.org/10.1016/j.ceramint.2016.12.128

Crystal structure refinement, enhanced magnetic and dielectric properties of $Na_{0.5}Bi_{0.5}TiO_3$ modified $Bi_{0.8}Ba_{0.2}FeO_3$ ceramics

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Abstract

(1-x) $Na_{0.5}Bi_{0.5}TiO_3$ – x ($Bi_{0.8}Ba_{0.2}FeO_3$) (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 (χ^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 M Hz at different temperatures revealing a dispersion in dielectric constant (ε′) and in dissipation factor (tan δ) at lower frequencies. Both ε′ and tan δ 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