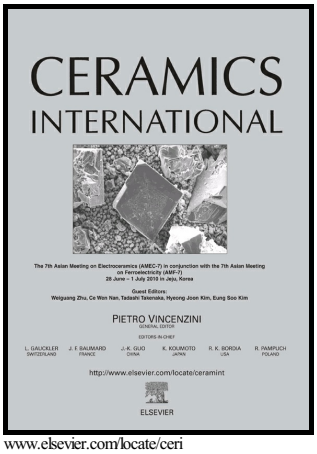

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PII: S0272-8842(18)30789-2
DOI: https://doi.org/10.1016/j.ceramint.2018.03.215
Reference: CERI17852

To appear in: *Ceramics International*

Received date: 31 December 2017
Revised date: 22 March 2018
Accepted date: 24 March 2018

Cite this article as: Jyoshna Rout and R.N.P Choudhary, Structural, Electrical and Magnetic Behavior of Mechanothermally Synthesized Multidoped Bismuth Ferrite, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2018.03.215

Structural, Electrical and Magnetic Behavior of Mechanothermally Synthesized Multidoped Bismuth Ferrite

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Abstract

Some lead-free compounds of a general formula $(Bi_{1-x}Sr_x)(Fe_{1-x}Mn_x)O_3$ (x = 0 - 0.15 with the interval of 0.05) were prepared by a mechanical alloying followed by sintering process. Structural, electrical and magnetic characteristics of multi-doped elements (Sr-Mn) in bismuth ferrite have been examined at different field frequencies and temperatures. X-ray diffraction studies suggest the rhombohedral phase for $x \leq 0.1$ and the orthorhombic phase for x = 0.15. Study of frequency-dependent dielectric properties showed the enhancing trend of dielectric constant with increasing co-doping concentration. Detailed analysis of impedance data at different frequencies and temperature estimated the contribution of grains and grain boundaries in the capacitive and resistive properties of the studied samples. The study of magnetic properties exhibits the weak ferromagnetism in co-substituted samples with maximum saturation magnetization (M_s = 0.121 emu/gm) for higher concentration of doping (x = 0.15). The magneto-electric coefficient (α_{ME}), measured with the varying DC magnetizing field under fixed AC magnetic field, is found to be 15.368 Oe.

Keywords: X-ray diffraction; Complex impedance analysis; Magnetic measurements

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