Accepted Manuscript

Structural transitions and multiferrocity in Ba and Co substituted nanosized bismuth ferrite

Anju Anju, Ashish Agarwal, Praveen Aghamkar, Vijender Singh, Ompal Singh, Ajay Kumar

PII: S0925-8388(16)34000-2

DOI: 10.1016/j.jallcom.2016.12.082

Reference: JALCOM 40004

To appear in: *Journal of Alloys and Compounds*

Received Date: 15 August 2016

Revised Date: 24 November 2016

Accepted Date: 6 December 2016

Please cite this article as: A. Anju, A. Agarwal, P. Aghamkar, V. Singh, O. Singh, A. Kumar, Structural transitions and multiferrocity in Ba and Co substituted nanosized bismuth ferrite, *Journal of Alloys and Compounds* (2017), doi: 10.1016/j.jallcom.2016.12.082.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Structural transitions and multiferrocity in Ba and Co substituted nanosized bismuth ferrite

Anju[a], Ashish Agarwal[b] , Praveen Aghamkar[a]*, Vijender Singh[c], Ompal Singh[b] and Ajay Kumar[d]

[a] Materials Science Lab, Department of Physics, Chaudhary Devi Lal University, Sirsa- 125055, India

[b] Department of Physics, Guru Jambheshwar University of Science & Technology, Hisar-125001, India

[c]School of Sciences, Baddi University of Emerging Sciences and Technology, Baddi (Solan)-173205, India.

[d]Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Chennai – 600036, India.

*Corresponding Author, Email: praveenaghamkar@gmail.com, p_aghamkar@yahoo.in

Abstract

To investigate the effect of Ba^{2+} and Co^{2+} substitution on the multiferroic properties of the $BiFeO_3$ (BFO) ceramic, $Bi_{1-x}Ba_xFe_{1-y}Co_yO_3$ (x=0,y=0 and x=0.2, y= 0,0.015,0.03,0.04,0.05) ceramics were prepared using sol-gel method. Multiferroic properties of BFO have been improved considerably on Ba^{2+} and Co^{2+} substitution at Bi and Fe site, respectively. Full pattern fitting of the XRD profile pattern confirmed the structural transition from rhombohedral to pseudo-cubic phase. The magnetisation in BFO rises appreciably and found to be 0.463 emu/g for $Bi_{1-x}Ba_xFe_{1-y}Co_yO_3$ (x=0.2, y= 0.05) ceramic nanoparticles. The abrupt increase in magnetization for $Bi_{0.8}Ba_{0.2}Fe_{0.95}Co_{0.05}O_3$ is due to anti-ferromagnetic orbital ordering among Fe/Co ions. The orbital ordering among the ions would change the low spin state of the Co^{2+} ions to high spin state and results in increased magnetization. Beside, the Co substitution is found helpful in reducing the coercivity of the magnetic nanoparticles for their application as magnetic sensors. The Ferroelectric behavior of Ba and Co substituted samples revealed that increase in maximum polarization with increasing Co content is due to interactions among different Jahn-Teller active Co^{2+} ions. Moreover, the slimmer polarization-electric field (P-E) loops on increasing Co content implying the relaxor ferroelectric behavior of the samples.

Keywords: $BiFeO_3$, cation substitution, multiferroic, orbital ordering, Rietveld refinement.

1. Introduction

Download English Version:

https://daneshyari.com/en/article/5460645

Download Persian Version:

https://daneshyari.com/article/5460645

Daneshyari.com