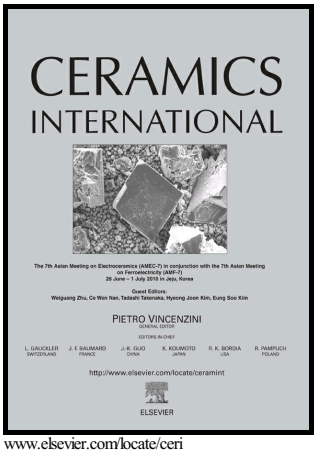

www.elsevier.com/locate/ceri

Amorphous phases and composition dependence of piezoelectricity in $BaTiO_3$-Bi_2O_3 polar amorphous ceramics

Dan Yu, Minglei Zhao, Chunlei Wang, Lihai Wang, Zhigang Gai, Chunming Wang, Jialiang Zhang, Jichao Li

PII: S0272-8842(15)01848-9
DOI: http://dx.doi.org/10.1016/j.ceramint.2015.09.140
Reference: CERI11417

To appear in: *Ceramics International*

Received date: 30 July 2015
Revised date: 22 September 2015
Accepted date: 23 September 2015

Cite this article as: Dan Yu, Minglei Zhao, Chunlei Wang, Lihai Wang, Zhigang Gai, Chunming Wang, Jialiang Zhang and Jichao Li, Amorphous phases and composition dependence of piezoelectricity in $BaTiO_3$-Bi_2O_3 polar amorphous ceramics, *Ceramics International*, http://dx.doi.org/10.1016/j.ceramint.2015.09.140

Amorphous phases and composition dependence of piezoelectricity in $BaTiO_3$-Bi_2O_3 polar amorphous ceramics

Dan Yu, Minglei Zhao[a)], Chunlei Wang, Lihai Wang, Zhigang Gai, Chunming Wang, Jialiang Zhang and Jichao Li

School of Physics, State Key Laboratory of Crystal Materials, Shandong University, Jinan 250100, People's Republic of China

Abstract

Composite ceramics with the nominal formula $BaTiO_3$-xBi_2O_3 (x=0.15, 0.2, 0.25, 0.5, 0.667 and 1) were sintered under a small thermal gradient. After sintering, the monoclinic α Bi_2O_3 changed into cubic $Bi_{12}TiO_{20}$ and a very small amount of rhombohedral $Bi_{8.11}Ba_{0.89}O_{13.05}$ in the x=0.2-1 samples; both direct and converse piezoelectric effects were observed for these samples without undergoing the electrical poling process. Because these composites do not contain obviously oriented grains and their piezoelectricity does not depend on ferroelectricity, temperature gradient-driven plastic flexoelectricity of the grain boundary amorphous phases may be the main poling mechanism. In this study, the largest value of the d_{33} piezoelectric constant of approximately 12 pC/N was found in the x=0.667 sample; this sample also exhibits the highest amorphous content. The depoling temperature of this type of polar material is determined solely by the melting temperature of $Bi_{12}TiO_{20}$, favoring the potential use of these composites as piezoelectric materials for high temperature applications.

[a)] Corresponding author: E-mail: zhaoml@sdu.edu.cn