

## Accepted Manuscript

Title: Temperature-Stable Dielectric Ceramics based on  $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$

Authors: Aurang Zeb, Saeed ullah Jan, Faith Bamiduro, David A. Hall, Steven J. Milne



PII: S0955-2219(17)30842-7  
DOI: <https://doi.org/10.1016/j.jeurceramsoc.2017.12.032>  
Reference: JECS 11637

To appear in: *Journal of the European Ceramic Society*

Received date: 7-9-2017  
Revised date: 30-11-2017  
Accepted date: 17-12-2017

Please cite this article as: Zeb A, Jan Su, Bamiduro F, Hall DA, Milne SJ, Temperature-Stable Dielectric Ceramics based on  $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$ , *Journal of The European Ceramic Society* (2010), <https://doi.org/10.1016/j.jeurceramsoc.2017.12.032>

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.

**Temperature-Stable Dielectric Ceramics based on  $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$** 

Aurang Zeb<sup>1,2</sup> Saeed ullah Jan<sup>1,2</sup>, Faith Bamiduro<sup>1</sup>, David A. Hall<sup>3</sup> and Steven J. Milne<sup>1</sup>

<sup>1</sup> Advanced Engineering Materials, School of Chemical Engineering, University of Leeds, Leeds LS2 9JT, U.K.

<sup>2</sup>Department of Physics, Islamia College Peshawar, KP, Pakistan

<sup>3</sup>School of Materials, University of Manchester, Manchester, M13 9PL, U.K.

**Abstract**

Multiple ion substitutions to  $\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3$  give rise to favourable dielectric properties over the technologically important temperature range  $-55\text{ }^{\circ}\text{C}$  to  $300\text{ }^{\circ}\text{C}$ . A relative permittivity,  $\epsilon_r$ ,  $= 1300 \pm 15\%$  was recorded, with low loss tangent,  $\tan\delta \leq 0.025$ , for temperatures from  $300^{\circ}\text{C}$  to  $0^{\circ}\text{C}$ , increasing to 0.05 at  $-55\text{ }^{\circ}\text{C}$  (1 kHz) in the targeted solid solution  $(1-x)[0.85\text{Na}_{0.5}\text{Bi}_{0.5}\text{TiO}_3-0.15\text{Ba}_{0.8}\text{Ca}_{0.2}\text{Ti}_{1-y}\text{Zr}_y\text{O}_3]-x\text{NaNbO}_3$ :  $x = 0.3$ ,  $y = 0.2$ . The  $\epsilon_r$ -T plots for  $\text{NaNbO}_3$  contents  $x < 0.2$  exhibited a frequency-dependent inflection below the temperature of a broad dielectric peak. Higher levels of niobate substitution resulted in a single peak with frequency dispersion, typical of a normal relaxor ferroelectric. Experimental trends in properties suggest that the dielectric inflection is the true relaxor dielectric peak and appears as an inflection due to overlap with an independent broad dielectric peak. Process-related cation and oxygen vacancies and their possible contributions to dielectric properties are discussed.

**Keywords:** Dielectrics; sodium bismuth titanate; high-temperature capacitor materials

Download English Version:

<https://daneshyari.com/en/article/7898729>

Download Persian Version:

<https://daneshyari.com/article/7898729>

[Daneshyari.com](https://daneshyari.com)