

### 论文摘要

中国有色金属学报

ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO

第19卷 第7期 (总第124期) 2009年7月

 [PDF全文下载]  [全文在线阅读]

文章编号: 1004-0609(2009)07-1289-05

## 铋基无铅压电陶瓷 $\text{Bi}_{0.5}(\text{Na}_{0.82}\text{K}_{0.18})_{0.5}\text{TiO}_3\text{-BiCrO}_3$ 的 微观组织与电性能

周昌荣<sup>1</sup>, 刘心宇<sup>1</sup>, 杨桂华<sup>2</sup>, 袁昌来<sup>1</sup>, 江民红<sup>1</sup>

(1. 桂林电子科技大学 广西信息材料重点实验室, 桂林 541004;  
2. 桂林工学院 电子与计算机系, 桂林 541004)

**摘要:** 采用传统陶瓷制备方法, 制备一种新型无铅压电陶瓷  $(1-x)\text{Bi}_{0.5}(\text{Na}_{0.82}\text{K}_{0.18})_{0.5}\text{TiO}_3-x\text{BiCrO}_3$  (BNKT-BC<sub>x</sub>)。研究Bi基铁电体 $\text{BiCrO}_3$ 对BNKT-BC<sub>x</sub>陶瓷晶体结构和压电介电性能的影响。结果表明: 在所研究的组成范围内, 陶瓷材料的主体结构为纯钙钛矿固溶体, 微量 $\text{BiCrO}_3$  ( $x=0-0.02$ , 摩尔分数)不改变陶瓷的晶体结构; 当 $\text{BiCrO}_3$ 含量 $x>0.02$ 时, 晶体结构由三方、四方共存转变为伪立方结构, 并出现明显的第二相; 当 $x=0.015$ 时,  $d_{33}=168$  pC/N; 当 $x=0.01$ 时,  $k_p=0.32$ , 为该体系压电性能的最大值; 随 $\text{BiCrO}_3$ 含量的增加, 陶瓷的低温介电反常峰向低温移动, 高温介电反常峰向高温移动, 反铁电相区域增加, 弥散指数增加。

**关键字:** 钛酸铋钠; 无铅压电陶瓷; 压电性能; 钙钛矿结构

## Microstructure and electrical properties of Bi-based lead-free piezoelectric ceramics $\text{Bi}_{0.5}(\text{Na}_{0.82}\text{K}_{0.18})_{0.5}\text{TiO}_3\text{-BiCrO}_3$

ZHOU Chang-rong<sup>1</sup>, LIU Xin-yu<sup>1</sup>, YANG Gui-hua<sup>2</sup>, YUAN Chang-lai<sup>1</sup>, JIANG Min-hong<sup>1</sup>

(1. Guangxi Key Laboratory of Information Materials, Guilin University of Electronic Technology, Guilin 541004, China;  
2. Department of Electron and Computer, Guilin University of Technology, Guilin 541004, China)

**Abstract:** A new  $(\text{Bi}_{0.5}\text{Na}_{0.5})\text{TiO}_3$ -based lead-free piezoelectric ceramics,  $(1-x)\text{Bi}_{0.5}(\text{Na}_{0.82}\text{K}_{0.18})_{0.5}\text{TiO}_3-x\text{BiCrO}_3$  (BNKT-BC<sub>x</sub>), was prepared by a conventional ceramic sintering technique. The effect of Bi-based ferroelectrics of  $\text{BiCrO}_3$  on the crystal structure, dielectric and piezoelectric properties was investigated. X-ray diffraction patterns indicate that trace  $\text{BiCrO}_3$  addition ( $x=0-0.02$ ) causes insignificant change in crystal structure, and an obvious secondary phase is observed in the samples with  $x>0.02$ . The piezoelectric constant  $d_{33}$  and the electromechanical coupling factor  $k_p$  of the ceramics attain

maximum values of 168 pC/N and 0.32 near morphotropic phase boundary (MPB) that co-existence between rhombohedral and tetragonal. With increasing BiCrO<sub>3</sub> content, the antiferroelectric phase zone gets broader and the diffuse coefficient increases.

**Key words:** sodium bismuth titanate; lead-free piezoelectric ceramics; piezoelectric properties; perovskites structure

版权所有：《中国有色金属学报》编辑部 湘ICP备09001153号

地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-88876765, 88877197, 88830410 传真： 0731-88877197

电子邮箱： [f-yssb@mail.csu.edu.cn](mailto:f-yssb@mail.csu.edu.cn)