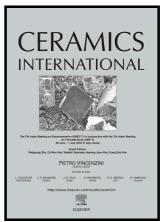
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Enhanced dielectric and energy-storage properties in ZnO-doped 0.9(0.94Na_{0.5}Bi_{0.5}TiO₃-0.06BaTiO₃)-0.1NaNbO₃ ceramics

Yuan Yao, Yong Li, Ningning Sun, Jinhua Du, Xiaowei Li, Liwen Zhang, Qiwei Zhang, Xihong Hao



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Enhanced dielectric and energy-storage properties in ZnO-doped

0.9(0.94Na_{0.5}Bi_{0.5}TiO₃-0.06BaTiO₃)-0.1NaNbO₃ ceramics

Yuan Yao, Yong Li, Ningning Sun, Jinhua Du, Xiaowei Li, Liwen Zhang, Qiwei Zhang, and

Xihong Hao*

Inner Mongolia Key Laboratory of Ferroelectric-related New Energy Materials and Devices,

School of Materials and Metallurgy, Inner Mongolia University of Science and Technology, Baotou

014010, China

Abstract: [0.9(0.94Na_{0.5}Bi_{0.5}TiO₃-0.06BaTiO₃)-0.1NaNbO₃]-xZnO (NBT-BT-NN-xZnO, x=0, 0.5

wt.%, 1.0 wt.%, 1.5 wt.%, and 2.0 wt.%) ferroelectric ceramics were fabricated using a

conventional solid-state reaction method. The effects of ZnO content on dielectric, energy-storage

and discharge properties were systematically investigated. Dielectric constant and difference

between maximum and remanent polarization were significantly improved by ZnO doping.

Dielectric constant of NBT-BT-NN-1.0-wt.% ZnO was 3218 at 1 kHz and room temperature, i.e.

one time bigger than that of pure NBT-BT-NN ceramic. As a consequence, a maximum

energy-storage density of 1.27 J/cm³ with a corresponding efficiency of 67% was obtained in

NBT-BT-NN-1.0-wt.% ZnO ceramic. Moreover, its pulsed discharge energy density was 1.17 J/cm³,

and 90% of which could be released in less than 300 ns. Therefore, ZnO doped NBT-BT-NN ceramic

with a large energy-storage density and short release time could be a potential candidate for

applications in high energy-storage capacitors.

Keywords: Na_{0.5}Bi_{0.5}TiO₃; Dielectric property; Energy-storage performance; Discharge property

*Corresponding author: xhhao@imust.cn; Tel: +86-472-5951572; Fax: +86-472-5951571

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