Title: The Structural Origin of Enhanced Energy Harvesting Performance in Piezoelectric Perovskite

Authors: Mupeng Zheng, Yudong Hou, Xiaodong Yan, Mankang Zhu

PII: S0955-2219(17)30580-0
DOI: http://dx.doi.org/10.1016/j.jeurceramsoc.2017.09.001
Reference: JECS 11436

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

Received date: 14-6-2017
Revised date: 23-8-2017
Accepted date: 1-9-2017

Please cite this article as: Zheng Mupeng, Hou Yudong, Yan Xiaodong, Zhu Mankang.The Structural Origin of Enhanced Energy Harvesting Performance in Piezoelectric Perovskite.*Journal of The European Ceramic Society* http://dx.doi.org/10.1016/j.jeurceramsoc.2017.09.001

The Structural Origin of Enhanced Energy Harvesting Performance in Piezoelectric Perovskite

Mupeng Zheng, Yudong Hou,* Xiaodong Yan, Mankang Zhu

College of Materials Science and Engineering, Beijing University of Technology, Beijing 100124, China

*Author to whom correspondence should be addressed. E-mail: ydhou@bjut.edu.cn

Abstract

Energy harvesting, which can translate the wasted vibration energy into electric energy, is now a hot topic in the field of new energy, and the key point is to design high power piezoelectric ceramic according with the requirements of low-frequency vibration energy harvesting. In this study, high quality Co-modified $0.2Pb(Zn_{1/3}Nb_{2/3})O_3–0.8Pb(Zr_{0.50}Ti_{0.50})O_3$ (PZN–PZT+Co) ceramics have been prepared by the two-stage method, and the energy harvesting characteristics were investigated. The results showed that the hierarchical nanodomain structure boosts the strong piezoelectric activity, leading to the high energy harvesting performance. The PZN–PZT+Co ceramic sintered at 1000 °C exhibits an excellent $d_{33}\times g_{33}$ value of 14080×10^{-15} m^2/N, which are much larger than that of commercial PZT-based ceramics. In the mode of the cantilever-type energy harvester, the output voltage and energy density of 33 V, 4.4 $\mu W/mm^3$ were obtained at a low resonance frequency of