

Accepted Manuscript

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PII: S0955-2219(18)30307-8
DOI: <https://doi.org/10.1016/j.jeurceramsoc.2018.05.011>
Reference: JECS 11889

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

Received date: 4-2-2018
Revised date: 8-5-2018
Accepted date: 10-5-2018

Please cite this article as: Dai B-Wen, Zheng P, Bai W, Wen F, Li L, Wu W, Ying Z, Zheng L, Direct and converse piezoelectric grain-size effects in BaTiO₃ ceramics with different Ba/Ti ratios, *Journal of the European Ceramic Society* (2010), <https://doi.org/10.1016/j.jeurceramsoc.2018.05.011>

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Direct and converse piezoelectric grain-size effects in BaTiO₃ ceramics with different Ba/Ti ratios

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Abstract:

The grain-size effects of the direct piezoelectric coefficient (d_{33}) and the converse piezoelectric coefficient (d_{33}^*) of BaTiO₃ ceramics with different Ba/Ti ratios were systematically explored. It was found that both d_{33} and d_{33}^* exhibited strong grain size (g) dependences for BaTiO₃ ceramics with various Ba/Ti ratios. Although d_{33} showed similar grain-size dependence for all the Ba/Ti ratios, two entirely different grain-size dependence of d_{33}^* were observed. By carefully examining the microstructure and ferroelectric properties of the ceramics, the variations of domain configurations and maximum polarization of BaTiO₃ ceramics with different Ba/Ti ratios were considered to be responsible for the different grain-size dependence of d_{33} and d_{33}^* , respectively.

Keywords: BaTiO₃ ceramics; direct/converse piezoelectric coefficient; Ba/Ti ratios; grain size.

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