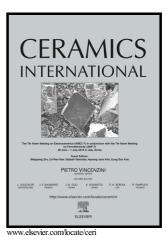
Author's Accepted Manuscript

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 PII:
 S0272-8842(16)32087-9

 DOI:
 http://dx.doi.org/10.1016/j.ceramint.2016.11.085

 Reference:
 CERI14173

To appear in: Ceramics International

Received date: 10 September 2016 Revised date: 12 November 2016 Accepted date: 12 November 2016

Cite this article as: Tao Shi, Gen Li and Jing Zhu, Compositional design stratege for high performance ferroelectric oxides with perovskite structure, *Ceramic International*, http://dx.doi.org/10.1016/j.ceramint.2016.11.085

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Compositional design strategy for high performance ferroelectric oxides with perovskite structure

Tao Shi¹, Gen Li¹, Jing Zhu*¹

National Center for Electron Microscopy in Beijing, School of Materials Science and Engineering, The State Key Laboratory of New Ceramics and Fine Processing, Laboratory of Advanced Materials, Tsinghua University, Beijing 100084, People's Republic of China

Abstract:

In this review, the mechanism and contributions of the tolerance factor and hybridization reactions on inducing ferroelectric displacements are discussed in ferroelectric oxides with perovskite structure. Based on the number of ionic radii and the effect of hybridization reactions on the ferroelectric displacement, we propose a new concept "contributions to ferroelectric displacements" for comprehensively evaluating the effects of different ions on stabilizing the ferroelectric displacements and classify ions as levels of contributions to ferroelectric displacements. By taking Sn-doped and Ca-doped BaTiO₃ as examples, we explain how dopants change the microstructure and properties of ferroelectric materials from the aspects of cutting down Coulomb field and lattice strains. Based on the discussions about the contributions of different ions to ferroelectric displacements, current status of typical ferroelectric systems are reviewed.

^{*}Corresponding author at: School of Materials Science and Engineering, Tsinghua University, Beijing 100084, China

Tel: +86-10-62794026; Fax: +86-10-62772507; Email: jzhu@mail.tsinghua.edu.cn

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