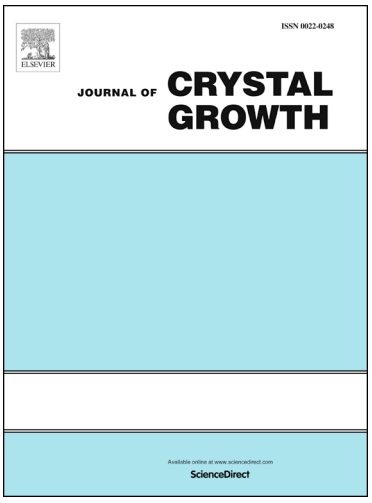

High-Temperature Solution Growth and Characterization of (1-x)$PbTiO_3$-xBi($Zn_{2/3}Nb_{1/3}$)O_3 Piezo-/ferroelectric Single Crystals

Alisa R. Paterson, Jinyan Zhao, Zenghui Liu, Xiaoqing Wu, Wei Ren, Zuo-Guang Ye

PII: S0022-0248(18)30016-2
DOI: https://doi.org/10.1016/j.jcrysgro.2018.01.009
Reference: CRYS 24445

To appear in: *Journal of Crystal Growth*

Please cite this article as: A.R. Paterson, J. Zhao, Z. Liu, X. Wu, W. Ren, Z-G. Ye, High-Temperature Solution Growth and Characterization of (1-x)$PbTiO_3$-xBi($Zn_{2/3}Nb_{1/3}$)O_3 Piezo-/ferroelectric Single Crystals, *Journal of Crystal Growth* (2018), doi: https://doi.org/10.1016/j.jcrysgro.2018.01.009

High-Temperature Solution Growth and Characterization of $(1-x)PbTiO_3$-$xBi(Zn_{2/3}Nb_{1/3})O_3$ Piezo-/ferroelectric Single Crystals

Alisa R. Paterson[1], Jinyan Zhao,[2,1] Zenghui Liu,[2,1] Xiaoqing Wu,[2] Wei Ren,[2] and Zuo-Guang Ye[1,2 *]

[1] Department of Chemistry and 4D LABS, Simon Fraser University, 8888 University Drive, Burnaby, BC, V5A 1S6, Canada

[2] Electronic Materials Research Laboratory, Key Laboratory of the Ministry of Education & International Center for Dielectric Research, Xi'an Jiaotong University, Xi'an 710049, China

Corresponding Author

Zuo-Guang Ye, zye@sfu.ca

Abstract

Complex perovskite $PbTiO_3$-$Bi(Me'Me'')O_3$ solid solutions represent new materials systems that possess a higher Curie temperature (T_C) than the relaxor-$PbTiO_3$ solid solutions, useful for potential applications. To this end, novel ferroelectric single crystals of the $(1-x)PbTiO_3$-$xBi(Zn_{2/3}Nb_{1/3})O_3$ (PT-BZN) solid solution were successfully grown by the high-temperature solution growth (HTSG) method. Powder X-ray diffraction shows that the symmetry of the grown crystals is tetragonal. The dielectric permittivity and optical domain structures were characterized by dielectric measurements and polarized light microscopy, respectively, as a function of temperature, revealing a first-order ferroelectric-paraelectric phase transition at a T_C of 436 ± 2 °C. Based on the T_C, the average composition of the crystal platelet was estimated to be 0.58PT-0.42BZN. Piezoresponse force microscopy measurements of the phase and amplitude