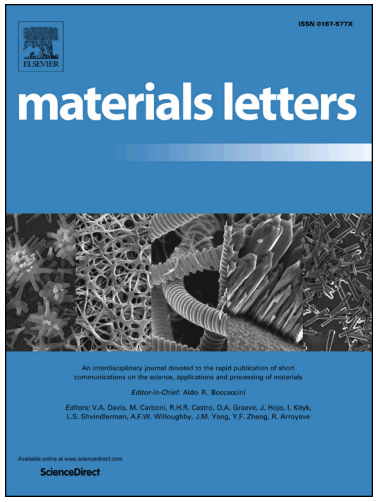
Accepted Manuscript



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PII: S0167-577X(17)31023-6
DOI: http://dx.doi.org/10.1016/j.matlet.2017.06.123
Reference: MLBLUE 22835

To appear in: *Materials Letters*

Received Date: 2 May 2017
Revised Date: 7 June 2017
Accepted Date: 28 June 2017

Please cite this article as: F. Wang, B. Li, Y. Ou, L.F. Liu, W.Wang, Effects of composition and misfit strain on multicaloric effects in $PbZr_{1-x}Ti_xO_3$ thin films, *Materials Letters* (2017), doi: http://dx.doi.org/10.1016/j.matlet.2017.06.123

Effects of composition and misfit strain on multicaloric effects in $PbZr_{1-x}Ti_xO_3$ thin films

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In this study, multicaloric effects in $PbZr_{1-x}Ti_xO_3$ thin films were investigated using phase field simulations and thermodynamic analyses. The results indicate that multicaloric temperature changes depend significantly on the composition and misfit strain in $PbZr_{1-x}Ti_xO_3$ thin films. The maximum multicaloric temperature change was found to be 11.8 K in a $PbZr_{0.25}Ti_{0.75}O_3$ thin film with tensile misfit strain at room temperature. Understanding the domain evolutions with different material compositions and misfit strains is of key importance for tuning the multicaloric effects in $PbZr_{1-x}Ti_xO_3$ thin films. These results provide an effective way of controlling the multicaloric effects in ferroelectric thin films.

Keywords: Ferroelectrics; Thin films; Multicaloric effect; Domain structure; Phase field simulation

1. Introduction

The lead zirconate titanate ($Pb(Zr_{1-x}Ti_x)O_3$,PZT) system has been intensively studied because of its excellent piezoelectric and ferroelectric properties[1-4]. In particular, a wide-reaching investigation of the caloric effects in PZT was triggered after a large electrocaloric effect was reported in a

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