

Accepted Manuscript

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PII: S0925-8388(18)31899-1

DOI: [10.1016/j.jallcom.2018.05.186](https://doi.org/10.1016/j.jallcom.2018.05.186)

Reference: JALCOM 46162

To appear in: *Journal of Alloys and Compounds*

Received Date: 3 March 2018

Revised Date: 15 May 2018

Accepted Date: 16 May 2018

Please cite this article as: Y. Zhou, Q. Li, C. Xu, N. Luo, F. Zhuo, Q. Yan, Y. Zhang, X. Chu, Field induced O-M_C phase transition and domain structure evolution in Pb(Mg_{1/3}Nb_{2/3})O₃-0.34PbTiO₃ single crystals under radial poling, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.05.186.

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Field induced O-M_C phase transition and domain structure evolution in Pb(Mg_{1/3}Nb_{2/3})O₃-0.34PbTiO₃ single crystals under radial poling

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Abstract

Radial electric (E)-field induced periodic polarization rotation from orthorhombic (O) to M_C-type monoclinic (M_C) phase in Pb(Mg_{1/3}Nb_{2/3})O₃-0.34PbTiO₃ (PMN-0.34PT) single crystals has been studied by *in situ* polarized light microscope. The piezoelectric coefficient (d_{33}^*) and dielectric permittivity ($\epsilon_{33}^T/\epsilon_0$) were 1800 pm/V and 5100, respectively, for [100]-oriented M_C samples, almost three times of those in [011]-oriented O phase crystals. The domain structure evolution from 1O to 4M_C was confirmed based on the optical extinction rules and permissible domain configurations. Moreover, the phase transition sequences of [100]- and [011]-poled PMN-0.34PT crystals were M_C—Tetragonal (T)—Cubic (C) and O—T—C upon heating, respectively. Our findings suggest that the phase stability of this crystals is associated

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