

Accepted Manuscript

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PII: S0925-8388(18)33341-3

DOI: [10.1016/j.jallcom.2018.09.101](https://doi.org/10.1016/j.jallcom.2018.09.101)

Reference: JALCOM 47520

To appear in: *Journal of Alloys and Compounds*

Received Date: 21 July 2018

Revised Date: 8 September 2018

Accepted Date: 10 September 2018

Please cite this article as: Z. Tang, B. Yang, J. Chen, Q. Lu, S. Zhao, Strong magnetoelectric coupling of Aurivillius phase multiferroic composite films with similar layered perovskite structure, *Journal of Alloys and Compounds* (2018), doi: 10.1016/j.jallcom.2018.09.101.

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**Strong magnetoelectric coupling of Aurivillius phase multiferroic composite films
with similar layered perovskite structure**

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Abstract

Aurivillius phase $\text{Bi}_5\text{Ti}_3\text{FeO}_{15}/\text{Na}_{0.5}\text{Bi}_{4.5}\text{Ti}_4\text{O}_{15}$ multiferroic composite films were synthesized using a sol-gel technique. Multiferroic properties and magnetoelectric coupling effect of composite films were investigated. The domain structures were clearly observed, which prove that composite films endow with good ferroelectric polarization. The maximum piezoelectric coefficient is up to 235 pm/V at 20V, which proves that good electrostrictive and piezoelectric properties are obtained. The composite films exhibit enormous magnetoelectric voltage coefficient with $\alpha_E=410$ mV/cm·Oe in magnetic field of $H_{\text{bias}}=7.6$ kOe at room temperature, which is ascribed to good ferromagnetic, piezoelectric properties and interface coupling between $\text{Bi}_5\text{Ti}_3\text{FeO}_{15}$ and $\text{Na}_{0.5}\text{Bi}_{4.5}\text{Ti}_4\text{O}_{15}$ layers. This work not only provides a new idea but also greatly improves the magnetoelectric effect of composite films, which makes magnetoelectric effect more effective in practice.

Keywords: magnetoelectric effect; magnetoelectric coupling; composite films

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