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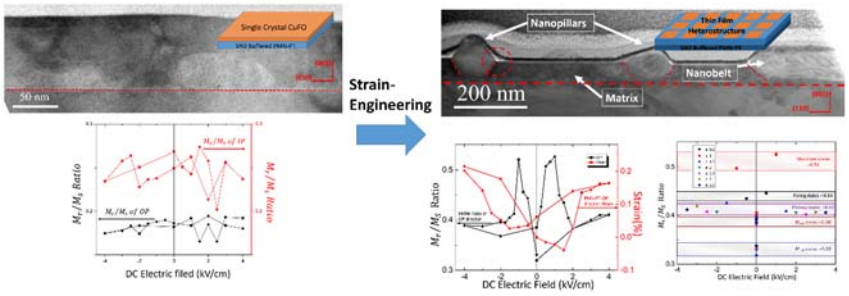
Nanostructure-enhanced magnetoelectric/magnetostrictive properties and reduced losses in self-assembled epitaxial CuFe2O4-BiFeO3 layers on Pb(Mg1/3Nb2/3)O3-33at%PbTiO3 crystals

Xiao Tang, Chung Ming Leung, Min Gao, Jiefang Li, Dwight Viehland.

Virginia Tech, MSE, Blacksburg, VA, 24061

Abstract

This work demonstrates a novel self-assembled heterostructures (CuFe2O4-BiFeO3/Pb(Mg1/3Nb2/3)-33at%PbTiO3).The nanostructure is unique, consisting of a mixed morphology of nanopillars and nanobelts with a notable degree of regularity. We show that these self-assembled layers have a significant magnetoelectric (ME) coupling and multiple magnetic states, which was not found for single CuFe2O4 layer heterostructures (CuFe2O4/Pb(Mg1/3Nb2/3)-33at%PbTiO3). The findings demonstrate a trade-off between magnetoelectric/magnetostrictive properties, which is tunable by nanostructure features.



Left: Cross-sectional image and magnetic properties of single phase CuFO/PMN-PT. Right: Cross-sectional image and magnetic properties of single phase BFO-CuFO/PMN-PT.

Biography

Xiao got his bachelor's degree at Jilin University, and pursed his Masters of Science at University of Florida. He started his Ph.D. program at Virginia tech since 2015 Fall in Dr. Viehland's group. His work focused on epitaxially growth self-assembled two phase nanostructures, and the magnetoelectric effect of these nanocomposites.