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Exchange bias in BiFeO₃/CoFe₂O₄ heterostructure

YONGHANG PEI, Physics Department, University of Virginia, JIWEI LU, RYAN COMES, Department of Materials Science and Engineering, University of Virginia, STUART WOLF, Physics Department, University of Virginia — Room temperature multiferroics BiFeO₃ (BFO), both ferroelectric and antiferromagnetic, has been extensively investigated as a part of exchange bias structures since it promises the electrical field control over the exchange bias. This work focuses on the exchange interaction between ferromagnet CoFe₂O₄ (CFO) and BFO. Bilayer films CFO and BFO were first grown on SrTiO₃ (STO) by Pulsed Electron Deposition (PED) and then field cooled in magnetic field. XRD showed single phase CFO and BFO were grown epitaxially on STO single crystal substrates, and the typical thickness was 21nm for BFO and 3.6~18nm for CFO. In the bilayer structure, we observed that the coercive field increased 100% at 300K and 30 % at 50K, comparing to these of CFO single layer. Also in the bilayer structure, a noticeable exchange bias field (Hex) increased from ~30 Oe at 300 K to ~ 60 Oe at 50 K. We will discuss the impact of the film thickness and the roughness of interface on exchange bias.

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