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Electric-field modulation of interface magnetic anisotropy and spin reorientation in $(Co/Pt)_3$/ PMN-PT heterostructure YOU BA, YING SUN, Tsinghua Univ, WENBO WANG, Rutgers Univ, WEI HE, XIAOLI ZHENG, LVKUAN ZOU, QINGHUA ZHANG, LIN GU, ZHAOHUA CHENG, JIANWANG CAI, Chinese Academy of Sciences, China, WEIDA WU, Rutgers Univ, CEWEN NAN, YONGGANG ZHAO, Tsinghua Univ — Electric-field control of magnetism in multiferroic heterostructures, composed of ferromagnetic (FM) and ferroelectric (FE) materials, has attracted much attention due to its interesting physics as well as applications. So far, most of the work on electric-field control of magnetism in FM/FE heterostructures focused on FM films with an in-plane magnetic anisotropy and the work on FM films with a perpendicular magnetic anisotropy (PMA), is rather limited. Moreover, electric-field control of the interface magnetic anisotropy, which favors the PMA, has not been demonstrated. $(Co/Pt)_3$ multilayers is a model system of PMA, which originates from the interface magnetic anisotropy. We study electric-field control of magnetism of $(Co/Pt)_3$ multilayers with different thicknesses grown on PMN-PT(011) FE substrates. Electric-field driven spin reorientation transition was observed. We also determined electric field induced changes of the bulk and interface magnetic anisotropies. Our analysis shows that electric-field modulation of interface magnetic anisotropy plays an essential role in driving the spin reorientation transition. Our work is also helpful for electric-field modulation of Dzyaloshinskii-Moriya interaction and Rashba effect originated from interface to create new phenomena and functionalities.

YOU BA
Tsinghua Univ

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