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Anomalous exchange bias at collinear/noncollinear spin interface
TAO WU, Nanyang Technological Universiity — We report on the interfacial magnetic coupling in manganite bilayers of collinear ferromagnetic $La_{0.7}Sr_{0.3}MnO_3$ and noncollinear multiferroic $TbMnO_3$. Exchange bias emerges at the Neel temperature of $TbMnO_3$ (about 41 K) due to the onset of long-range antiferromagnetic ordering in the Mn spin sublattice. Interestingly, an anomalous plateau of exchange bias emerges at the ordering temperature of Tb spins (about 10 K), and we ascribe this unique feature to the strong coupling between Tb and Mn spin sublattices in $TbMnO_3$, which in turn influence the magnetic coupling across the interface. On the other hand, the enhancement of coercivity in $La_{0.7}Sr_{0.3}MnO_3$ shows monotonous temperature dependence. Our results illustrate a strong interfacial magnetic coupling at the $La_{0.7}Sr_{0.3}MnO_3/TbMnO_3$ interface, highlighting the roles of competing spin orders, magnetic frustration, and coupling between multiple spin sublattices in artificial collinear/noncollinear spin heterostructures.

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