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Exchange bias between ferromagnetic metals and multiferroic $BiFeO_3$, $LuMnO_3$, and $TbMnO_3$ MAKOTO MURAKAMI, S. FUJINO, J. HATTRICK-SIMPERS, S.-H. LIM, L. SALAMANCA-RIBA, D. KUNDALIYA, S. OGALE, T. VENKATESAN, J. HIGGINS , M. WUTTIG, I. TAKEUCHI, University of Maryland, S. LOFLAND, Rowan University, S.-W. CHEONG, Rutgers University — We are using exchange bias at ferromagnet layer/multiferroic interfaces to study the nature of magnetism in multiferroic materials. Co 5 nm layers have been deposited by sputtering on surfaces of epitaxial $BiFeO_3$ and $TbMnO_3$ thin films and on $LuMnO_3$ single crystals. Epitaxial $BiFeO_3$ and $TbMnO_3$ films were prepared by PLD. Magnetic properties of the Co/multiferroic bilayers are measured using SQUID, VSM, MOKE and XMCD. In $BiFeO_3$, we find that the bilayers exhibit exchange bias even at room temperature. In the $TbMnO_3$ system, increasing of coercive field and exchange bias was also clearly observed below the Néel temperature. In $LuMnO_3$, we observe positive exchange bias as well as switching of the sign of the exchange bias depending on the cooling procedure. This behavior may be related to the frustration in Mn spins. Difference in the exchange bias behavior between different multiferroic materials will be discussed. The effect of electric field on exchange bias is currently under investigation. Supported by ONR N000140110761, ONR N000140410085, NSF DMR 0094265, DMR 0231291, MRSEC DMR-00-0520471, and the W. M. Keck Foundation.

Makoto Murakami
University of Maryland

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