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Magnetic coupling in Epitaxial $BiFeO_3$-$La_{0.7}Sr_{0.3}MnO_3$ Heterostructures Integrated on Si(100) SRINIVASA RAO SINGAMANENI, North Carolina State University, J.T. PRATER, Army Research Office, FAN WU, C.T. SHELTON, J.-P. MARIA, J. NARAYAN, North Carolina State University — We present and discuss the magnetic characteristic of $BiFeO_3$ (BFO)/$La_{0.7}Sr_{0.3}MnO_3$ (LSMO) heterostructure, integrated on Si (100) using pulsed laser deposition (PLD) via the domain matching epitaxy (DME) paradigm. The magnetic behavior of this heterostructure, in which a d^5 system (Fe^{3+}) manifested in FE-AFM BFO is epitaxially conjoined at the interface to a multivalent transition metal ion such as Mn^{3+}/Mn^{4+} in LSMO exhibits interesting magneto electric coupling phenomenon. The temperature- and magnetic field-dependent magnetization measurements reveal an unexpected enhancement in magnetization and improved magnetic hysteresis squareness originating from the BFO/LSMO interface. We observe a stronger temperature dependence of exchange coupling when the polarity of field cooling is negative as compared to positive field cooling. We believe such an enhancement in magnetization and magnetic coupling is likely directly related to an electronic orbital reconstruction at the interface and complex interplay between orbital and spin degrees of freedom.

[1] S. S. Rao *et al*, Nano Letters, http://dx.doi.org/10.1021/nl4023435.

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