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Giant magnetoresistance spin valves exchange-biased by ferroelectric $BiFeO_3$ thin films X. ZHANG, National Institute of Standards and Technology, S. MARUYAMA, University of Maryland, College Park, P.J. CHEN, G. FENG, National Institute of Standards and Technology, T.R. GAO, University of Maryland, College Park, R.D. SHULL, National Institute of Standards and Technology, I. TAKEUCHI, University of Maryland, College Park — The recent demonstrations of electric-field-driven magnetization control in ferromagnet(FM)/$BiFeO_3$ bilayer systems [1,2] have attracted considerable interest because of the potential applications in spintronics. In this study, giant magnetoresistance (GMR) spin valves (Co/Cu/Py/Ta) were fabricated on $SrRuO_3$/$BiFeO_3$ films by magnetron sputtering at a base pressure of 2×10^{-8} Torr and with an external field of 300 Oe. The presence of exchange bias between the $BiFeO_3$ layer and the ferromagnetic Co layer is established by magnetization and electronic transport data. The heterostructure was patterned in a rectangular shape with a width of about 20 μm and a length up to 100 μm. The GMR characteristics of the patterned devices were systematically studied and directly compared to that obtained from identically fabricated structures on NiO and SiO_2, respectively. How these results relate to the realization of reversible control of the GMR spin valve effect by an electric field will be discussed.

[1] Heron et al., Phys. Rev. Lett 107, 217202 (2011);
[2] Ratcliff et al., submitted].

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