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Permanent-Magnet Free Biasing of MR Sensors with Tunable Sensitivity SEAN HALLORAN, NIST, FABIO DASILVA, Univ. of Colorado, DAVID PAPPAS, NIST — Exchange coupling[1] has been previously observed in a trilayer structure of ferromagnet (FM)/non-magnetic/antiferromagnet (AFM) and the exchange bias was found to be a function of the thickness of the buffer layer.[2,3,4] This unique coupling is used as a stabilizing bias for the sense layer with the additional ability to tailor the magnetic gain of the sensor for various applications. The elimination of permanent magnet bias results in the elimination of one patterning and one deposition step. Ruthenium (Ru) is used as the buffer layer and is self aligned with the FM and AFM layers and the thickness is varied to change the slope of the transfer curve in the linear region. Sensor devices are fabricated with a bipolar output, a medium sensitivity, and a wide field range. The results show that this biasing scheme is well suited for barber pole and soft adjacent layer (SAL) anisotropic magnetoresistance (AMR) stripes used in magnetic field sensors with a FM layer of Permalloy (NiFe) and an AFM layer of Iridium-Manganese (IrMn). Applications include a 256 channel read head used for magnetic forensics. 1N.J. Gokemeijer, T. Ambrose, C.L. Chien, N. Wang and K.K. Fung, J. Appl. Phys. **81** (8), 4999, 15 April 1997. 2W.H. Meiklejohn and C.P. Bean, Phys. Rev. **102**, 1413 1956; **105**, 904, 1957. 3L. Thomas, A.J. Kellock and S.S.P. Parkin, J. Appl. Phys. **87** (9), 5061, 1 May 2000. 4D. Wang, J. Daughton, C. Nordman, P. Eames and J. Fink, J. Appl. Phys. **99**, 2006.

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