Abstract Submitted
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Spin-Valves Incorporating Magnetic and Nonmagnetic Organic Semiconductors J.D. BERGESON, R. SHIMA EDELSTEIN, K.I. POKHODNYA, A.J. EPSTEIN, The Ohio State University, Columbus, OH 43210-1106, JOEL S. MILLER, University of Utah, Salt Lake City, UT 84112-0850 — A clear spin-valve effect is reported for stacked thin film devices constructed of two ferromagnets with differing coercivities, iron (Fe) (100nm) and iron-cobalt (Fe_{50}:Co_{50}) (30nm), which are magnetically decoupled by a layer of α-sexithiophene (α6T) (120nm). Coherent spin transport is expected to be facilitated by relatively low spin orbit coupling in π-conjugated materials[1−3]. Spin-injection is aided by tunnel barriers at metal/semiconductor interfaces. A spin-valve effect of up to 20%, with switching at the expected coercive fields, is observed at 4.5K and the effect persists up to 150K. The conduction electrons in vanadium tetracyanoethylene ($V[TCNE]_x$), an organic-based magnetic semiconductor with $T_C > 350$K, are fully spin-polarized[4]. In addition to the low field 'conventional' spin-valve switching from 10 to 100K, an unusual background high field magnetoresistance is reported for the spin-valve device structure where α6T (50nm) is the nonmagnetic spacing layer between $V[TCNE]_x$ (<1um), and cobalt (Co) (25nm). Supported by DOE Grant No. DE-FG02-01ER45931 and DARPA (ONR Grant No. N00014-02-1-0593). 1. Dediu, et al., Solid State Comm. **122** 181 (2002) 2. Epstein, MRS Bull. **28** 492 (2003) 3. Xiong, et al., Nature **427** 821 (2004) 4. Prigodin, et al., Adv. Mater. **14** 1230 (2002), Raju, et al., J. Appl. Phys. **93** 6799 (2003)

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