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 (Fe₅₀:Co₅₀) (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 materials¹⁻³. 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 > 350K, are fully spin-polarized⁴. 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)