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Spin valve effect and high field magnetoresistance in hybrid magnetic tunnel junction of V(TCNE)$_{x\ 2}$/rubrene/ La$_{2/3}$Sr$_{1/3}$MnO$_3$[1] JUNG-WOO YOO, BIN LI, C.Y. CHEN, V.N. PRIGODIN, A.J. EPSTEIN, The Ohio State University, H.W. JANG, C.W. BARK, C.B. EOM, University of Wisconsin — Molecule/organic-based magnets, that allow chemical tuning of electronic and magnetic properties, are a promising new class of magnetic materials for future spintronics [1]. V (TCNE:tetracyanoethylene)$_x$ ($x \sim 2$) is the room temperature organic-based magnetic semiconductor ($T_c \sim 400$ K). It has ferrimagnetic coupling between the spins in the TCNE$^-$ anions and spins in V^{II} leading highly spin- polarized valence and conduction bands. In this talk, we present realization of an organic-based magnetic as an electron spin polarizer in the standard spin valve device geometry [2]. The room temperature organic-based magnet, V(TCNE)$_x$ was successfully incorporated into the standard magnetic tunnel junction devices in tandem with LSMO (La$_{2/3}$Sr$_{1/3}$MnO$_3$) film. Beside spin valve effect, the device exhibits large negative high-field magnetoresistance, which may be associated with anomalous field dependent Fermi level shift in LSMO.

[1] A.J. Epstein, MRS Bull. 28, 492 (2003)
[2] Yoo et al., Nature Materials 9, 638 (2010)

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