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Successful fabrication and characterization of V[TCNE]$_x$-based hybrid spin-LED[1] K. DENIZ BOZDAG, LEI FANG, Dept. of Physics, The Ohio State University, CHIA-YI CHEN, Chem. Phys. Prog., The Ohio State University, P. TRUITT, E. JOHNSTON-HALPERIN, A.J. EPSTEIN, Dept. of Physics, The Ohio State University — V(TCNE)$_x$ (x$\sim$2) is a fully spin polarized organic-based magnet with an ordering temperature above room temperature ($T_c > 350$ K). Chemical vapor deposited (CVD) magnetic V[TCNE]$_x$ films also exhibit semiconductor-like charge transport behavior with a room temperature conductivity of 10^{-2} S/cm and activation energy of ~ 0.5 eV. Electronic transport through V[TCNE]$_x$ leads to spin-polarization of free carriers due to splitting of the π^* band in $[TCNE]^-$ into two subbands (occupied: π^* and unoccupied: $\pi^* + U_c$) with opposite spin polarization, driven by on-site Coulomb repulsion. We have successfully constructed a hybrid III-V/V[TCNE]$_x$ spin light emitting diode (spin-LED) device and investigated its electrical and magnetic properties. We observed strong temperature dependence of the turn on voltage and positive magnetoresistance, indicating charge flow through the V[TCNE]$_x$ layer ($\sim$ 400 nm). Detailed electrical characterization of the hybrid device and fabrication techniques will be presented and implications for the optical detection of electrical spin injection in hybrid organic/inorganic devices will be discussed.

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