Abstract Submitted
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Optical detection of electrical spin injection in a V(TCNE)$_x$ based hybrid spin-LED[1] LEI FANG, K. DENIZ BOZDAG, Dept. of Physics, The Ohio State University, CHIA-YI CHEN, Chem. Phys. Prog., The Ohio State University, P. TRUITT, A.J. EPSTEIN, E. JOHNSTON-HALPERIN, Dept. of Physics, The Ohio State University — The integration of the organic-based magnet V(TCNE)$_x$ (x$\sim$2, $T_c > 350$ K) with inorganic compound semiconductors offers the potential for a new class of hybrid spintronic structures and devices. This work realizes that potential by coupling a GaAs/AlGaAs quantum well light emitting diode (LED) with a V(TCNE)$_x$ spin injector to create a hybrid organic/inorganic spin-LED. In control measurements, optically excited photoluminescence from a V(TCNE)$_x$ coated quantum well show no significant magnetic circular dichroism. In contrast, magneto-transport studies verify the electronic coupling of the magnetization of the V(TCNE)$_x$ to charge flow through the structure and circular polarization of the electroluminescence from a full spin-LED device (2% at 0.1 T and 60 K) follows the magnetization curve of V(TCNE)$_x$. Together, these results demonstrate optical detection of electrical spin injection across the organic/inorganic interface. This demonstration in turn lays the foundation for a new class of hybrid spintronic structure.

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