Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Impact of self-assembled monolayers on spin injection characteristics in Co/organic systems CURT A. RICHTER, HYUK-JAE JANG, SUJITRA J. POOKPANRATANA, CHRISTINA A. HACKER, Semiconductor and Dimensional Metrology Div, NIST, Gaithersburg, MD, JUN-SIK LEE, Stanford Synchrotron Radiation Lightsource, SLAC National Accelerator Lab, Menlo Park, CA, ICH C. TRAN, Lawrence Livermore National Laboratory, Livermore, CA — One of the key factors to realize spin injection and transport through organic semiconductors is the understanding and engineering of the spin-dependent phenomena at the interface between a ferromagnetic metal and an organic semiconductor. We present the results of experiments that explore the influence of self-assembled monolayers (SAMs) on spin injection into Alq3, an organic semiconductor, from a ferromagnetic metal, Co. Two different SAMs, MHA (16-mercaptohexadecanoic acid) and ODT (1-octadecanethiol) are inserted between Alq3 and Co layers and their effects on hybridization and related changes in energetics and spin dependent properties at the interface are investigated. Co is an easily oxidized surface. We find that the self-assembly of the bifunctional molecule, MHA, is profoundly different than ODT on oxidized Co. We propose an interface formation model and discuss the impact of this Co/molecule interface on electron transport. Ultraviolet photoelectron spectroscopy data reveal that when directly attached to unoxidized Co, both MHA and ODT treatments lower the Co work function. X-ray magnetic circular dichroism spectra imply that SAMs reduce the hybridization between Co and Alq3 and furthermore, they enhance the spin magnetic moment of Co.

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Date submitted: 14 Nov 2014 Electronic form version 1.4