Abstract Submitted
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Effects of interface microstructure on magnetotransport in organic spin valve structures[1] YAOHUA LIU, TAEGWEON LEE, H. E. KATZ, D. H. REICH, The Johns Hopkins University, S. M. WATSON, J. A. BORCHERS, NIST Center for Neutron Research — Organic semiconductors hold promise for spintronics because of their potentially long spin diffusion length. We have studied Fe/Alq_3 (tris(8-hydroxyquinoline) aluminum)/Co multilayer films with Alq_3 thickness in the range 50 to 150 nm.[1] Similar to previously reported results, we found considerable variability in the magnetotransport properties for cross junctions made in nominally identical conditions. To explore the sources of these effects, we studied the microstructure of such multilayer films by X-ray reflectometry and polarized neutron reflectometry (PNR). We found that the films show well-defined layers with limited chemical intermixing (3-5 nm) at the Alq_3/ferromagnet (FM) interfaces. However, larger magnetoresistance (MR) is associated with sharper Alq_3/FM interfaces, and with a magnetically dead Fe-rich region at the Alq_3/Fe interface, which may potentially circumvent the resistivity mismatch problem. The PNR data also show that the Co layer on top of the Alq_3 can adopt a multi-domain magnetic structure at low field and a perfect anti-parallel state is not obtained. [1] Y. Liu et al., arXiv:0810.0289v1.

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