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Morphology Influenced Properties in Organic Semiconducting Thin Films for Spin-Valves¹ J. SHEUNG, M. TEAGUE, C.R. HUGHES, S. MITROVIC, N.-C. YEH, Department of Physics, California Institute of Technology, Pasadena CA 91125 — The physical and electronic properties influenced by the morphology in organic thin films of tris(8-hydroxyquinoline) aluminum (Alq₃) are investigated systematically. This material is of interest for spintronics as the tunneling barrier in spin valves and for optoelectronics because it exhibits electroluminescence. In particular, in vacuo vapor deposited thin films are studied by atomic force microscopy, scanning tunneling microscopy and tunneling spectroscopy to determine the spatially resolved correlation of the electronic properties with the morphology. The contributions of various coulombic and thermodynamic parameters to achieving smooth and monolayer thick Alq₃ films are also investigated. Additionally, various high Curie temperature ferromagnets, including La_{1-x}Sr_xMnO₃, are explored as the spin-polarized electrode for optimized spin and charge transport properties in the organic/ferromagnetic heterostructures.

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