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Localized spectroscopic and topographic studies of heterostructures of OSE/M (OSE: organic semiconductor, M: metal) using scanning tunneling microscopy (STM) and atomic force microscopy (AFM). C. R. HUGHES, M. L. TEAGUE, S. MITROVIC, N. C. YEH, Phys. Dept., Caltech, Pasadena CA — We employ STM with AFM to study the charge transport and domain structures of OSE/M heterostructures fabricated under differing growth conditions [OSE: sublimated tris(8-hydroxyquinoline) aluminum (Alq_3), M: paramagnetic Au or ferromagnetic $La_{0.7}Ca_{0.3}MnO_3$ (LCMO)]. Specifically, using STM in the point contact mode we are able to determine the work function of the heterostructures by measuring the differential conductance versus bias voltage. In addition, we can compare the Alq_3 resistivity variations for heterostructures prepared under different Alq_3 annealing conditions and with Au or LCMO as the metal. In contrast, using STM in the tunneling mode we can determine the ballistic charge transport length by varying the Alq_3 thicknesses in the OSE/M heterostructures. Moreover, conductance maps for biased voltages above the Alq_3 band-gap provide spatially resolved information for the local conductance channel and the surface quality of the Alq_3 film, the latter further compared with the surface morphology taken with AFM. This work was supported by NSF under the Center for Science and Engineering of Materials at Caltech.

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