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Spatial and temperature-evolved tunneling spectroscopic studies of $La_{0.7}Ca_{0.3}MnO_3$(LCMO) films and LCMO/organic-semiconductor heterostructures with spin-polarized scanning tunneling microscopy (SP-STM)[1] C.R. HUGHES, A.D. BEYER, N.-C. YEH, Phys. Dept., Caltech, Pasadena CA — We report studies of spatially resolved tunneling spectra (TS) of $La_{0.7}Ca_{0.3}MnO_3$ (LCMO) (T_c = 260K) epitaxial films and related heterostructures of tris(8-hydroxyquinoline) aluminum (Alq3)/(LCMO) using a UHV, variable temperature STM. At 77K with a Pt/Ir tip we observe sharp spatial transitions between two cluster types with disparate normalized conductance. The majority type region exhibits high conductance peaks at high bias (+/- 2V) and a low energy gap, consistent with band structure calculations. The minority type region reveals moderate conductance over the entire bias range, from -3V to +3V. In contrast, spin-polarized tunneling spectra taken with Cr-coated STM tips show a spatially varying low bias gap in all regions. Further experiments using SP-STM on LCMO under varying temperatures and applied magnetic fields and on Alq3/LCMO structures to study the spin transport length in Alq3 will be reported.

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