

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Hopping transport in electrolyte-gated P3HT organic field effect transistors¹ SHUN WANG, MINGJING HA, MICHAEL MANNO, C. DANIEL FRISBIE, C. LEIGHTON, Department of Chemical Engineering and Material Science, University of Minnesota — Using ion-gel-gated poly (3-hexylthiophene) (P3HT), we successfully fabricated p-type organic field effect transistors (OFET) with on/off ratios of 10^5 and mobility of the order of $1 \text{ cm}^2/\text{V s}$ at room temperature. We studied charge transport in the electrochemically doped P3HT as a function of gate voltage, temperature, magnetic field, film thickness, and roughness. Carrier concentrations were obtained from both gate charging current and Hall effect measurements. The resistance vs. temperature (down to 5K for large gate voltages) characteristics indicate 2D hopping transport. Large positive magnetoresistance at temperatures lower than 50 K was observed, but with anomalously low anisotropy due to high roughness.

¹Work supported by NSF MRSEC.

Shun Wang
Department of Chemical Engineering and Material
Science, University of Minnesota

Date submitted: 27 Nov 2010

Electronic form version 1.4