

Abstract Submitted
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Variable-range hopping transport and Hall effect measurements in electrolyte-gated P3HT SHUN WANG, MINGJING HA, MICHAEL MANNO, C. DANIEL FRISBIE, C. LEIGHTON, Department of Chemical Engineering and Material Science, University of Minnesota — Extensive charge transport measurements (1.5 – 250 K) at gate-tuned hole concentrations between 1×10^{20} and $9 \times 10^{20} \text{ cm}^{-3}$ have been made on a single ion-gel gated poly-(3-hexylthiophene) (P3HT) thin film transistor. We report observation of a robust Hall effect, having rational trends with magnetic field, gate voltage, and temperature, and yielding hole concentrations close to those measured via the charging current. At high doping we observe transitions from apparent band transport, to 3D Mott variable range hopping (VRH), to Efros-Shklovskii (ES) VRH on cooling. At lower doping ES VRH is observed at all temperatures. A detailed analysis of the temperature and field-dependence of the VRH resistivity provides information on the localization length and dielectric constant as a function of doping, providing significant insights into the approach to the insulator-metal transition in this system and the nature of the Coulomb-gapped density of states. Work at UMN supported by NSF MRSEC

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