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Sub-100 nm Contact Effects in Poly 3-hexylthiophene (P3HT)
JEFF WORNE, DOUGLAS NATELSON, Rice University — Poly 3-hexylthiophene (P3HT) is a widely studied, versatile material used in organic electronics. Important to understanding the behavior of P3HT lies in its interaction with metal contacts. Contact effects between P3HT and metal electrodes can influence charge injection into P3HT, giving rise to a contact resistance and thereby influencing device performance. The origin of this contact resistance still remains poorly understood, but may result from changes in film morphology near the metal contact, charge transfer and band bending near the contact, or both. Understanding the detailed behavior of the interface between P3HT and metal electrodes will allow for optimization of device behavior. Based on previous work, the voltage drop at the P3HT-metal interface happens over 10-100 nm. We have fabricated devices on the tens of nanometer scale that directly probe this region, and present data on the effect of channel length versus device resistance as well as data on the temperature dependence of device resistance for gold and platinum electrodes. Implications for contact engineering will be discussed.

Jeff Worne
Rice University

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