



**Figure 2.10. OFET device characteristics for C11PDI HP after annealing at 200 °C (Figures were adapted from Dr. Shree Tiwari in the Kippelen group).**

Bulk heterojunction organic photovoltaic devices were constructed using a 1:1 weight ratio of P3HT:homopolymer blends by Mr. William Potscavage *Jr.* in the Kippelen group, and the device performances are summarized in Table 2.3. For the devices with average active layer thicknesses of  $\sim 100$  nm, P3HT:C11PDI HP cells show better performance compared with the other two blend systems, with short-circuit current ( $J_{SC}$ ) and PCEs up to  $1.8 \pm 0.1$  mA/cm<sup>2</sup> and  $0.38 \pm 0.02\%$ , respectively. Measurements of the incident photon-to-current efficiency (IPCE, Figure 2.13) show higher energy conversion in the major spectral range than the other two systems, and the IPCE is over  $\sim 10\%$  between 500 – 600 nm for devices from P3HT:C11PDI HP blend. The much lower  $J_{SC}$  and PCE for P3HT:N-PDI HP blend compared with the other two blends might be attributed to the low electron mobility originating from the low aggregation of the perylene repeat units of this material. The expansion of the