Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Role of Morphology on Carrier Transport in Conjugated Polymer Thin Films HENGXI YANG, BINGYUAN HUANG, PETER GREEN, University of Michigan — The effects of morphology on the out-of-plane hole mobility in poly(3-hexylthiophene) (P3HT) films were examined using impedance spectroscopy (IS), time-of-flight (ToF) and charge extraction by a linearly increasing voltage (CELIV). IS was used for the first time to measure the hole mobilities, μ, of P3HT films; μ was found to be film thickness dependent, increasing over an order of magnitude with increasing film thickness from 100 to 700 nm. These results are in excellent agreement with those measured using ToF and CELIV. IS has an added advantage over ToF and CELIV, as it also provides dc conductivity $\sigma_{\rm dc}$ and charge carrier density n. Both $\sigma_{\rm dc}$ and n are shown to decrease appreciably with increasing h, over the same thickness range. The thickness dependent trends in μ, $\sigma_{\rm dc}$ and n are consistent with changes in the morphology of these films.

Hengxi Yang
University of Michigan

Date submitted: 08 Nov 2012 Electronic form version 1.4