

Abstract Submitted  
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**Studies on Structure Property Relations in Printed Polymer Semiconductors** NIKHILA MAHADEVAPURAM, SAEED AHMADI VASELABADI, DAVID REZA SHAKARISAZ, University of Houston, JOSEPH STRZALKA, Argonne National Laboratory, PAUL RUCHHOEFT, GILA STEIN, University of Houston — Printed polymer semiconductors can be used in systems which require precise control on domain placements and for sequential casting like in sensors, multi color light-emitting diodes or tandem solar cells. Morphology in polymer semiconductors places an important role on carrier mobility. Polymer crystals help in charge transport. In this work, we used helium ion beam lithography to irradiate polymer films and study crystallinity and carrier mobility. Thin films of poly(3-hexylthiophene) P3HT were irradiated with helium ion beam and light absorption properties were measured using UV-Vis spectroscopy. Crystal orientations in irradiated P3HT films were investigated using grazing incidence wide angle X-ray scattering (GIWAXS). Degree of crystallinity in irradiated polymer films were estimated by constructing pole figures. Charge mobility was estimated from device measurements. It was observed that the light absorption properties were retained in irradiated polymer films. Irradiation can influence both crystal orientations and charge mobility as a function of exposure dose. In summary, polymer crystallinity can be independently varied using this technique and a better understanding of the charge transport and device function can be established.

Nikhila Mahadevapuram  
University of Houston

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