Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Fully conjugated donor-acceptor block copolymers as model systems for studies of charge transfer[1] MELISSA APLAN, YOUNG-MIN LEE, CHRISTOPHER GRAY, THOMAS MALLOUK, ENRIQUE GOMEZ, Pennsylvania State University — Fully conjugated block copolymers, consisting of an electron donor and an electron acceptor block, can serve as the active layer in organic photovoltaic devices. Incorporating the donor-acceptor interface within the chemical structure enables model studies of charge transfer. We synthesized a series of block copolymers consisting of a P3HT electron donor and a push-pull polymer electron acceptor, yielding: poly(3-hexylthiophene)−block−poly-((9-(9-heptadecanyl)-9H-carbazole)-1,4-diyl-alt-[4,7-bis(3-hexylthiophen-5-yl)-2,1,3-benzothiadiazole]-2',2"-diyl) (P3HT-b-PCT6BT), poly(3-hexylthiophene)−block−poly-((9,9-dioctylfluorene)-2,7-diyl-alt-[4,7-bis(3-hexylthiophen-5-yl)-2,1,3-benzothiadiazole]-2',2"-diyl) (P3HT-b-PFT6BT), and poly(3-hexylthiophene)−block−poly-((2,5-dihexylphenylene)-1,4-diyl-alt-[4,7-bis(3-hexylthiophen-5-yl)-2,1,3-benzothiadiazole]-2',2"-diyl) (P3HT-b-PPT6BT). By altering the electron rich unit of the acceptor, we adjust the energy difference between donor and acceptor HOMOs. Using photoluminescence, we observe no evidence of exciton dissociation to a charge transfer state in P3HT-b-PCT6BT. In P3HT-b-PFT6BT and P3HT-b-PPT6BT we observe varying degrees of intrachain charge transfer. These results measure the critical driving force needed for charge transfer.

[1]Fully conjugated donor-acceptor block copolymers as model systems for studies of charge transfer

Melissa Aplan
Pennsylvania State University

Date submitted: 04 Nov 2015 Electronic form version 1.4