

Abstract Submitted
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Thermally induced texture flip in semiconducting polymer stabilized by epitaxial relationship. KATHRYN A. O'HARA, University of California Santa Barbara (UCSB), BALAJI S.S POKURI, Iowa State University (ISU), CHRISTOPHER J. TAKACS, Stanford University, PIERRE M. BEAUJUGE, King Abdullah University of Science Technology (KAUST), BASKAR GANAPATHYSUBRAMANIAN, Iowa State University (ISU), MICHAEL L. CHABINYC, University of California Santa Barbara (UCSB) — The morphology of semiconducting polymer films has a large effect on the charge transport properties. Charges can move easily along the conjugated backbone and in the pi-pi stacking direction. However, transport through the film is determined by the connectivity between domains, which is not well understood. We previously observed quadrites in the polymer, PSBTBT, and proposed that the preferential overlap between lamellae may improve connectivity and provide an additional conduction pathway. Now, the presence of quadrites is revealed in another successful donor polymer, PBDTTPD, using high resolution transmission electron microscopy (HRTEM). A study of how side-chain substitution affects the epitaxial crossing is conducted by examining several PBDTTPD derivatives. The stability of the film texture with annealing is also examined as a function of quadrite formation. It has been shown that heating some semicrystalline polymers above the melting temperature and slow cooling can flip the lamellar texture from face-on to edge-on. We hypothesize that the orientation of lamellar crystallites in PBDTTPD films is stabilized by the epitaxial overlap between adjacent crystalline domains. This may have important implications for the electronic transport properties.

Kathryn O'Hara
Univ of California - Santa Barbara

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