

Morphological changes of PTB7 with high temperature annealing

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■ ABSTRACT

In this work, we study the effect of high temperature annealing on the high-performing OPV polymer PTB7 using X-Ray diffraction, UV-Vis spectroscopy, and Space Charge Limited Current hole mobility measurements. Annealing to temperatures below the melting temperature of PTB7 are shown to progressively increase crystallinity and mobility of the neat polymer film. Annealing to a high temperature near the melting temperature results in a previously unseen structural polymorph in which the π -stacking distance is decreased by 3.7%, while the alkyl-stacking distance is unchanged. Current theory suggests that a closer packing motif will decrease electronic disorder and increase mobility, but UV-Vis and SCLC measurements show that the opposite is true. We speculate that the closer packing of molecules results in steric hindrance between the sidechains, decreasing conjugation length.