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Manipulation of P3AT Crystallization Behavior BRYAN S. BECKINGHAM, VICTOR HO, RACHEL A. SEGALMAN, Lawrence Berkeley National Laboratory — While the commonly studied P3HT has a final melting transition approaching that of its thermal degradation; by judicious substitution of the alkyl side chain the melting transition can be controlled over a range of approximately 150C. Specifically, P3EHT has a melting transition that occurs between 35 and 85C, well below potential degradation temperatures, making P3EHT a model system for examining crystallization in P3ATs. Interestingly, the observed melting endotherms of P3ATs are multimodal in nature such that upon isothermal crystallization of P3EHT, three distinct peaks are observed by differential scanning calorimetry upon heating. Here, we resolve the lowest temperature feature to be a result of a rigid amorphous fraction forming at long times and high relative crystallinity. Moreover, we demonstrate that the two more distinct higher temperature features are a consequence of a melt-recrystallization process. Lastly, we explore how by understanding these processes the initial crystallization conditions and subsequent thermal treatments can be used to manipulate the crystal populations and thereby the properties of P3EHT.

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