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The impact of P3HT molecular weight and solvent composition on P3HT films processed from binary solvent mixtures LAWSON LLOYD, MADELEINE GORDON, DAVID BOUCHER, College of Charleston — Recent experimental endeavors have shown that well-ordered P3HT assemblies formed in solution can improve the crystallinity and morphological uniformity of thin films and composites, thereby providing a promising new route to more efficient polymeric optoelectronic materials. We have studied the assembly and crystallinity of two regioregular poly(3-hexylthiophene) (P3HT) samples, $M_n \approx 28$ kDa and $M_n \approx 65$ kDa, in several different binary mixtures of organic solvents. We use an excitonic coupling analysis of the UV/Vis absorbance spectra to assess the impact that the solvent and the molecular weight of P3HT have on the relative structural order of the polymer assemblies. In addition, we investigate the influence that the solvent composition and the structural order of P3HT aggregates have on the assembly and organization of P3HT films. We use optical and atomic force microscopy techniques to study thin films of P3HT processed from different solvent mixtures. Our results show that relatively small variations to the P3HT solutions can produce significant changes in the morphology and macromolecular structures of the P3HT films.

David Boucher
College of Charleston

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