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Effects of Annealing on the Photovoltaic Performance of All-Conjugated Poly(3-alkylthiophene) Diblock Copolymer MING HE, WEI HAN, YULIANG YANG, FENG QIU, ZHIQUN LIN — The effects of thermal annealing and solvent annealing on the photovoltaic performance of all-conjugated poly(3-butylthiophene)-b-poly(3-hexylthiophene) diblock copolymer, [6,6]-phenyl-C₇₁-butyric acid methyl ester (P3BHT:PC₇₁BM) based devices were investigated using the single diode model. Thermal annealing placed a better balance between the crystallization of P3BHT chains and the nanoscale phase separation with PC₇₁BM domains, while solvent annealing under chloroform vapor induced a significant improvement in the crystallinity of P3BHT as well as enlarged P3BHT crystalline domains, thereby leading to unbalanced charge transport and increased charge recombination in the blend films. The physical meanings of the parameters in the equivalent single diode model were also discussed in terms of crystallinity and phase separation to gain the fundamental understanding of the mechanism that account for the annealing effects.

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