

Supporting Information

Toward High Efficiency Organic Photovoltaic Devices with Enhanced Thermal Stability Utilizing P3HT-*b*-P3PHT Block Copolymer Additives

*Mingjing Zhu,^{1,§} Heejun Kim,^{2,§} Yu Jin Jang,² Sungmin Park,³ Du Yeol Ryu,³ Kyungkon Kim,² Ping
Tang,¹ Feng Qiu,¹ Dong Ha Kim,^{2,4*} and Juan Peng^{1*}*

¹State Key Laboratory of Molecular Engineering of Polymers, Collaborative Innovation Center of
Polymers and Polymer Composite Materials, Department of Macromolecular Science, Fudan
University, Shanghai 200433, China

²Department of Chemistry and Nano Science, College of Natural Sciences, Ewha Womans University,
Seoul 03760, Republic of Korea

³Department of Biological and Chemical Engineering, Yonsei University, 50, Yonsei-ro, Seodaemun-
gu, Seoul 03722, Korea

⁴Division of Chemical Engineering and Materials Science, College of Engineering, Ewha Womans
University, 52, Ewhayeodae-gil, Seodaemun-gu, Seoul 03760, Korea

§ These authors contributed equally to this work.

Corresponding Author

*E-mail: juanpeng@fudan.edu.cn (J. P.) ; dhkim@ewha.ac.kr (D. H. K.)

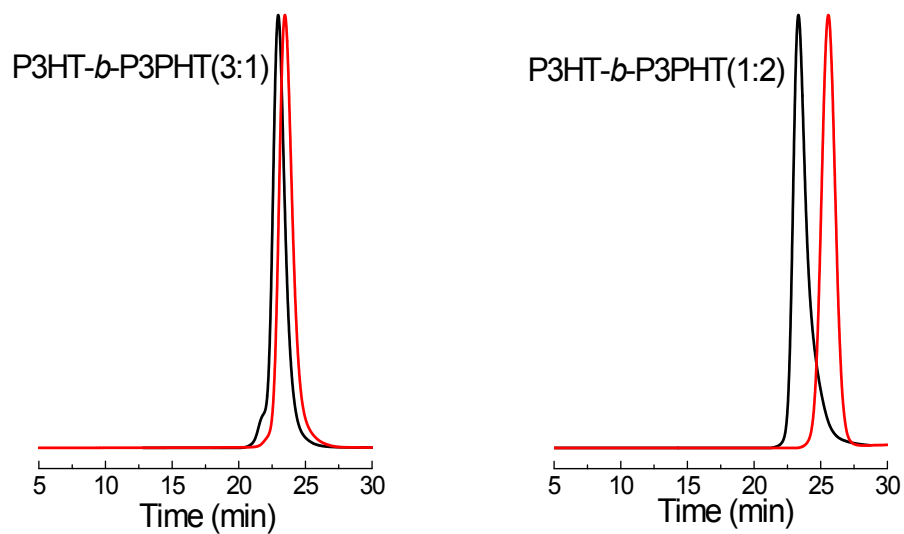


Figure S1. GPC profiles of P3HT-*b*-P3PHT diblock copolymers. Red line represents the GPC profile of P3HT in the first step and black line shows the GPC profile of P3HT-*b*-P3PHT (3:1) and P3HT-*b*-P3PHT(1:2).

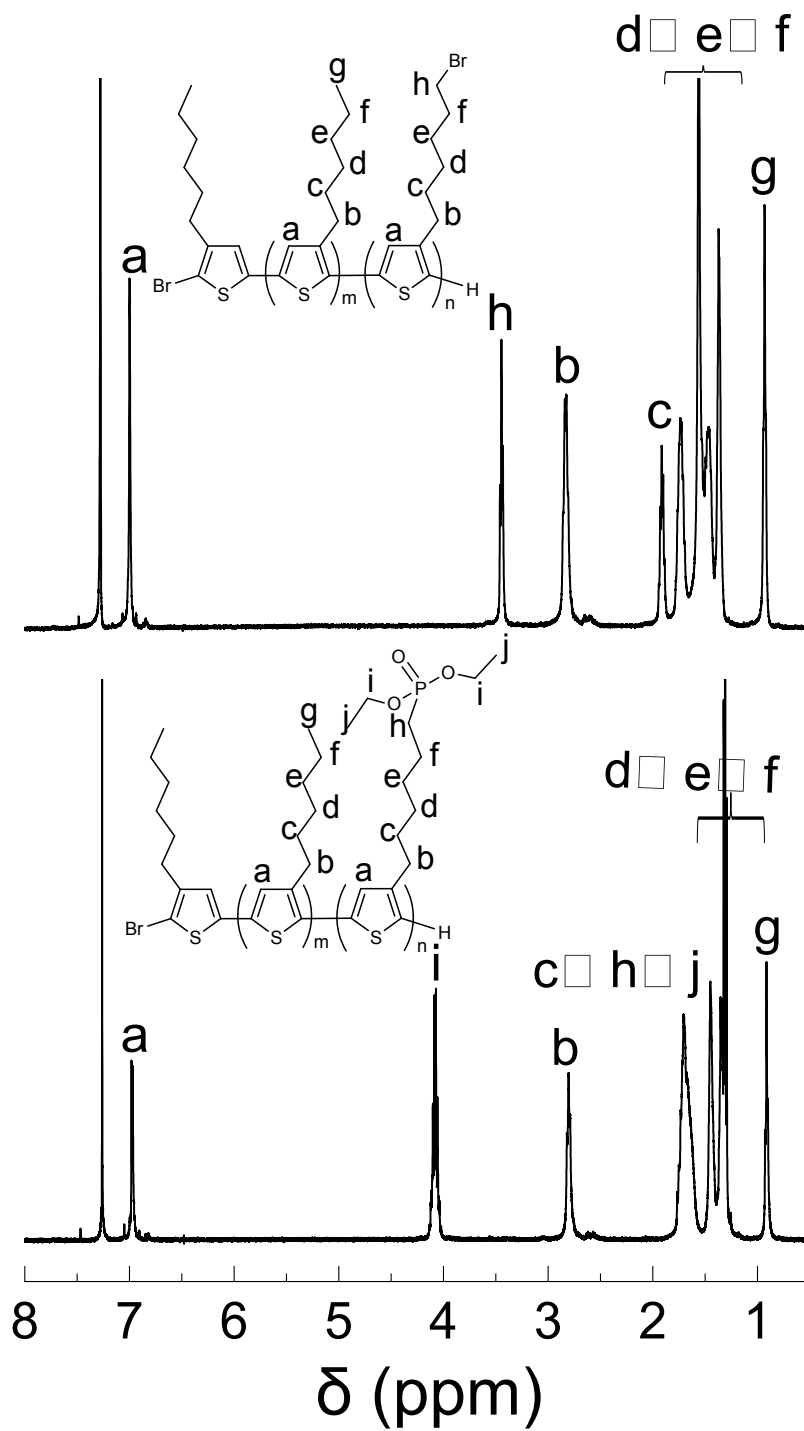


Figure S2. ^1H NMR spectra of $\text{P3HT-}b\text{-P3BrHT}$ and $\text{P3HT-}b\text{-P3PHT}$ in CDCl_3 .

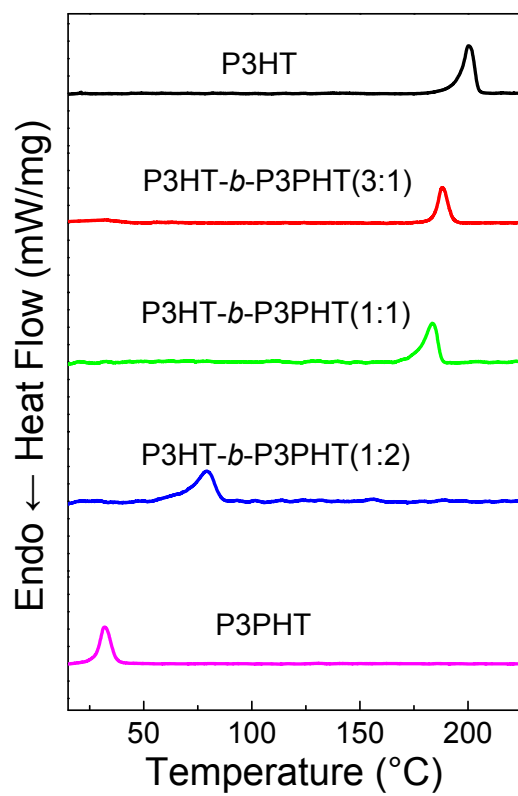


Figure S3. DSC exotherms of P3HT, P3PHT homopolymers and all the P3HT-*b*-P3PHT diblock copolymers.

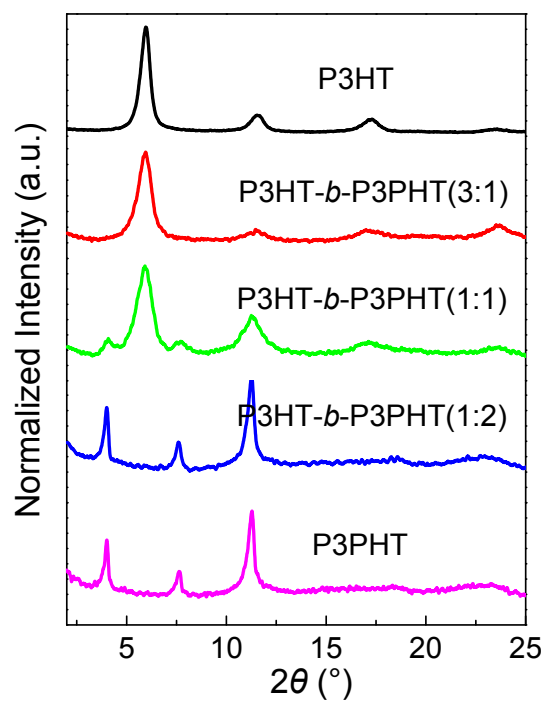


Figure S4. XRD profiles of P3HT, P3PHT, and P3HT-*b*-P3PHT diblock copolymers casted from 10 mg/ml solution dissolved in toluene.

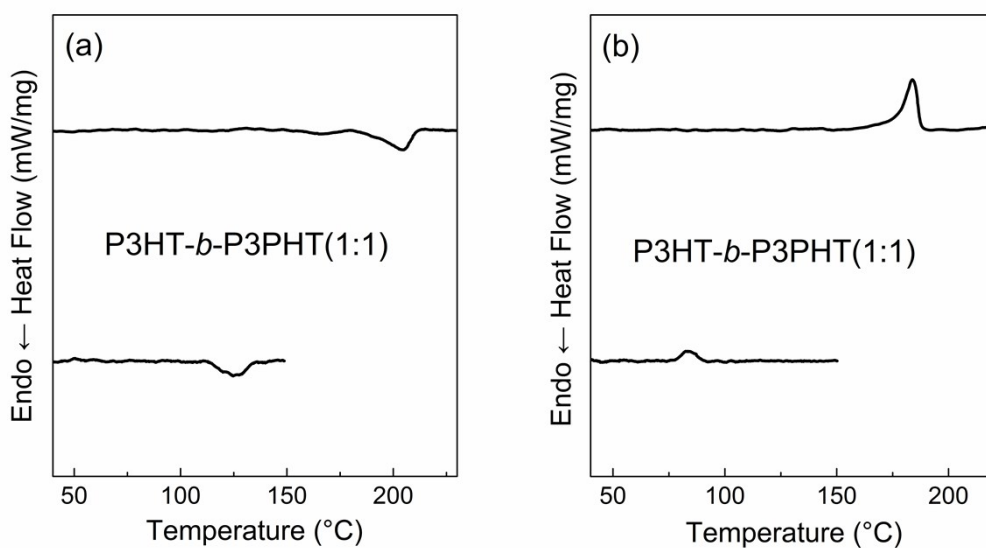


Figure S5. (a) DSC endotherms and (b) exotherms of P3HT-*b*-P3PHT (1:1) heated to 240 °C (upper line) or 150 °C (lower line).

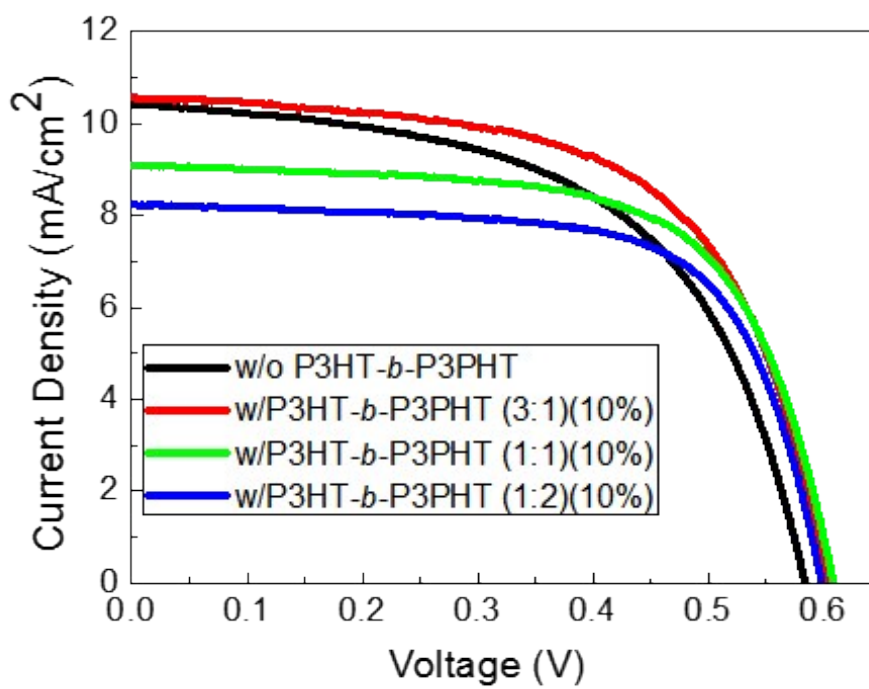


Figure S6. *J-V* characteristics of the P3HT:PC₆₁BM reference photovoltaic device and P3HT:PC₆₁BM blended with 10 wt% P3HT-*b*-P3PHT diblock copolymers.

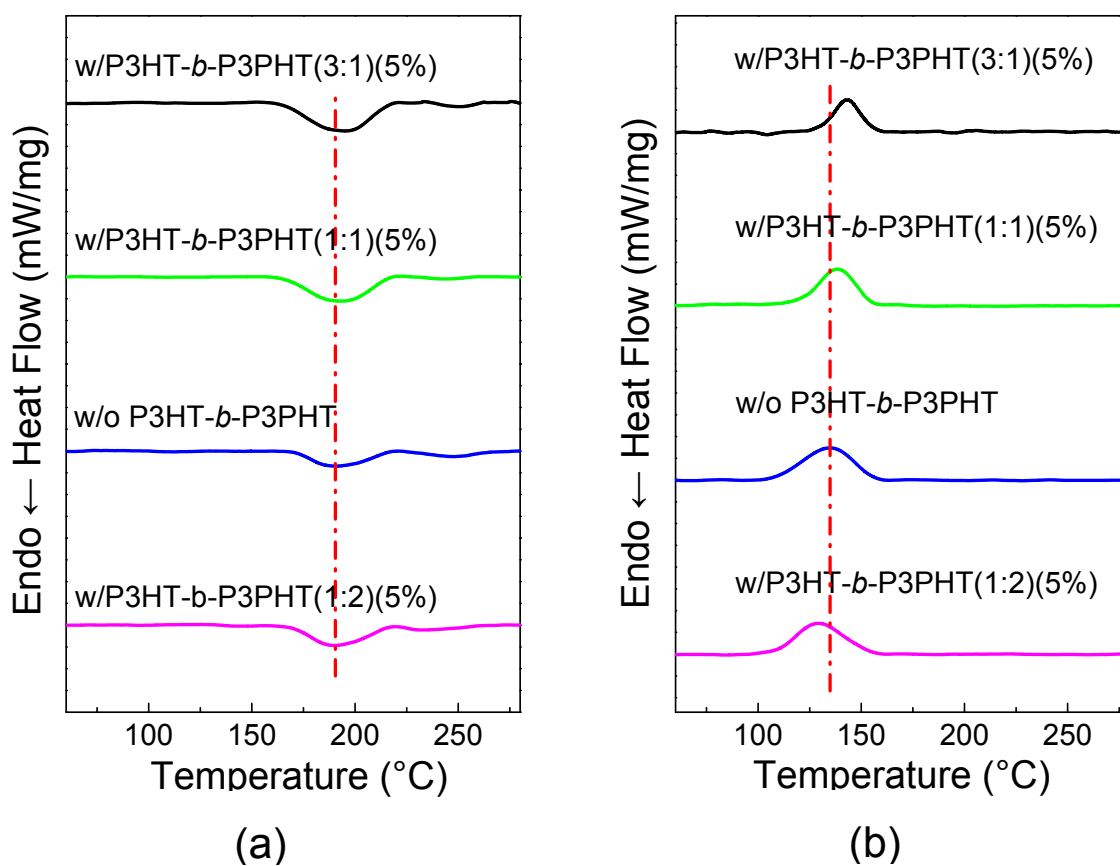


Figure S7. (a) DSC endotherms and (b) exotherms of P3HT:PC₆₁BM and P3HT:PC₆₁BM blended with 5% P3HT-*b*-P3PHT diblock copolymers.

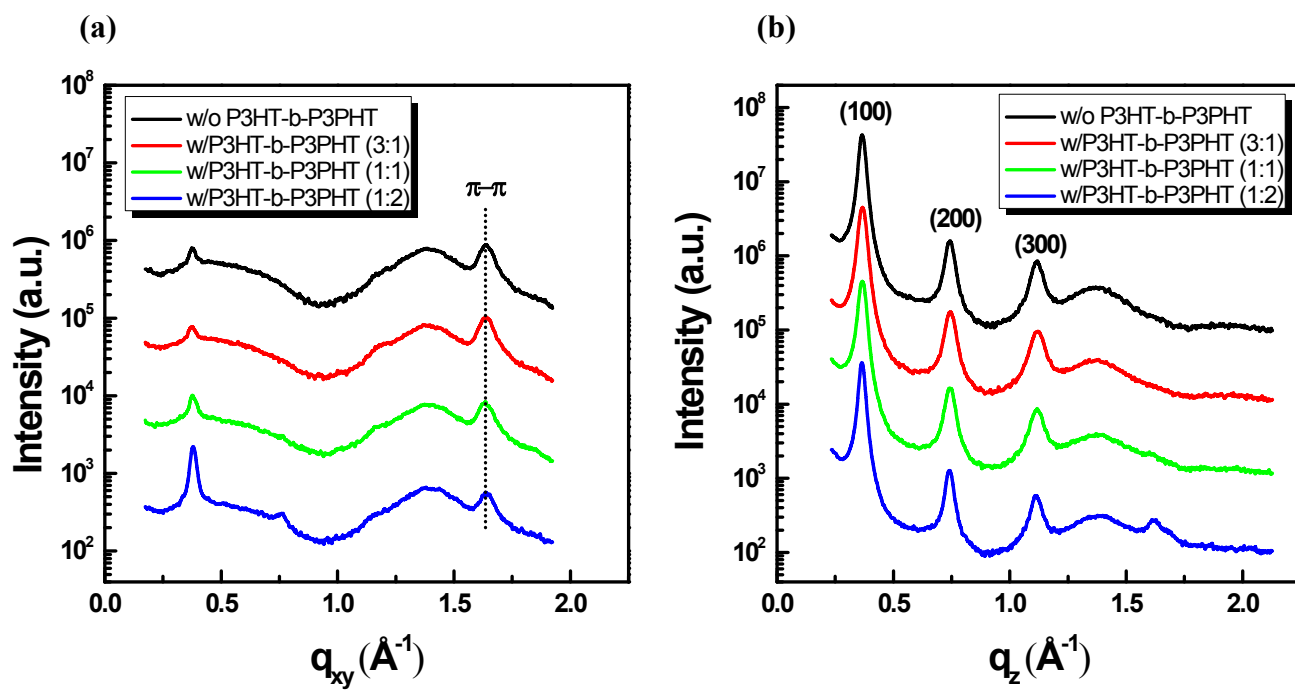


Figure S8. GIWAXS 1D profile of (a) in plane (b) out of plane of P3HT:PC₆₁BM and P3HT:PC₆₁BM blended with 5% P3HT-*b*-P3PHT diblock copolymers.

Table S1. Summary of Photovoltaic Characteristics of P3HT:PC₆₁BM and P3HT:PC₆₁BM Blended with 10 wt% P3HT-*b*-P3PHT Diblock Copolymers.

Sample	V_{oc} (V)	J_{sc} (mA/cm ²)	FF (%)	PCE (%)
w/o P3HT- <i>b</i> -P3PHT	0.58	10.4	55.8	3.39
w/P3HT- <i>b</i> -P3PHT(3:1)	0.60	10.6	60.3	3.85
w/P3HT- <i>b</i> -P3PHT(1:1)	0.61	9.07	65.6	3.62
w/P3HT- <i>b</i> -P3PHT(1:2)	0.60	8.23	67.6	3.37

Table S2. Summary of Photovoltaic Characteristics of P3HT:PC₆₁BM and P3HT:PC₆₁BM Blended with 5 wt% P3HT-*b*-P3PHT Diblock Copolymers after Annealing at 150 °C for 90 min.

Sample	V_{oc} (V)	J_{sc} (mA/cm ²)	FF (%)	PCE (%)
w/o P3HT- <i>b</i> -P3PHT	0.59±0.01	7.33±0.18	51.7±1.2	2.21±0.11
w/P3HT- <i>b</i> -P3PHT(3:1)	0.60±0.01	8.87±0.53	58.7±3.9	3.14±0.13
w/P3HT- <i>b</i> -P3PHT(1:1)	0.60±0.01	8.82±0.15	66.9±1.5	3.53±0.05
w/P3HT- <i>b</i> -P3PHT(1:2)	0.59±0.01	8.97±0.33	64.2±1.3	3.47±0.06