Supporting Information

Investigation of Supramolecular Interactions between Liquid Crystals and PCBM for Improved Morphological Stability in Solar Cells

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Figure S1 FTIR spectra of the binary blends based on (a) PC$_{61}$BM:8TTP8, (b) PC$_{61}$BM:8OCB and (c) PC$_{61}$BM:5CT, respectively.
Figure S2 The POM images of the specimens of (a) P3HT:PC$_{61}$BM (0.05:1), (b) P3HT:PC$_{61}$BM:8TTP8 (0.05:1:0.06), (c) P3HT:PC$_{61}$BM:8OCB (0.05:1:0.06) and (d) P3HT:PC$_{61}$BM:5CT (0.05:1:0.06) after annealing at 200 °C for 10 min.
Figure S3  AFM images for specimens of (a) P3HT:PC<sub>61</sub>BM, (b) P3HT:PC<sub>61</sub>BM:8TTP8, (c) P3HT:PC<sub>61</sub>BM:8TTP8 with electric field treatment, (d) P3HT:PC<sub>61</sub>BM:8OCB, and (e) P3HT:PC<sub>61</sub>BM:8OCB with electric field treatment. The electric field strength is 600 V/mm, and the scan areas are 5×5 μm.
Figure S4 POM images of (a) P3HT:PC\textsubscript{61}BM, (b) P3HT:PC\textsubscript{61}BM:8TTP8, (c) P3HT:PC\textsubscript{61}BM:8OCB and (d) P3HT:PC\textsubscript{61}BM:5CT films without heating treatment. The images were taken after adding a quarter-wave optical filter.
Figure S5 Current-voltage ($J$-$V$) characteristics of solar cells based on (a) PTB7-Th:PC$_{71}$BM, (b) PTB7-Th:PC$_{71}$BM:8TTP8, (c) PTB7-Th:PC$_{71}$BM:8OCB, (d) PTB7-Th:PC$_{71}$BM:5CT specimens after heating at 150 ºC for different time.
Figure S6 TEM images of specimens (a) PTB7-Th:PC$_{71}$BM, (b) PTB7-Th:PC$_{71}$BM:8TTP8, (c) PTB7-Th:PC$_{71}$BM:8OCB, (d) PTB7-Th:PC$_{71}$BM:5CT before thermal annealing (up), and specimens (e) PTB7-Th:PC$_{71}$BM, (f) PTB7-Th:PC$_{71}$BM:8TTP8, (g) PTB7-Th:PC$_{71}$BM:8OCB, (h) PTB7-Th:PC$_{71}$BM:5CT after thermal annealing (below) at 150 ºC for 20 min.
Figure S7 TEM images of binary blend films of (a) PTB7-Th:8TTP8, (b) PTB7-Th:8OCB and (c) PTB7-Th:5CT.
**Figure S8** DSC heating curves of P3HT:8TTP8 and P3HT:8OCB blends at different weight ratios of liquid crystals.
Figure S9 UV-vis spectra of the (a) P3HT:PC$_{61}$BM:8TTP8 and (b) P3HT:PC$_{61}$BM:8OCB ternary blend films at different weight fraction of liquid crystals.
Figure S10  The photoluminescence spectra of (a) P3HT:PC$_{61}$BM:8TTTP8 and (b) P3HT:PC$_{61}$BM:8OCB ternary blend films at different weight fraction of liquid crystals.
Figure S11 The photoluminescence spectra of PEDOT:PSS/P3HT:PC$_{61}$BM:8TTP8 (1:1:0.06) and PEDOT:PSS/P3HT:PC$_{61}$BM:8OCB (1:1:0.06) films after electric field treatment at 0 V/mm and 600 V/mm.