Supporting Information

Bimolecular crystal instability and morphology of bulk heterojunction blends in organic and perovskite solar cells

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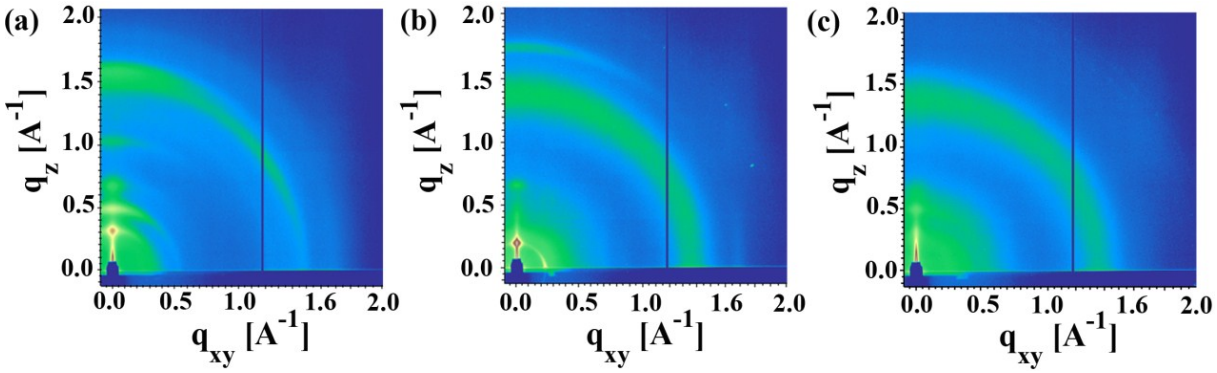

Fig. S1 The 2D GIXD patterns for (a) Pristine PQT, (b) PQT:$PC_{61}BM$, and (c) PQT:Bis-$PC_{61}BM$ on a logarithmic scale. The red arrows indicate the characteristic scattering peak of lamellar stacking.

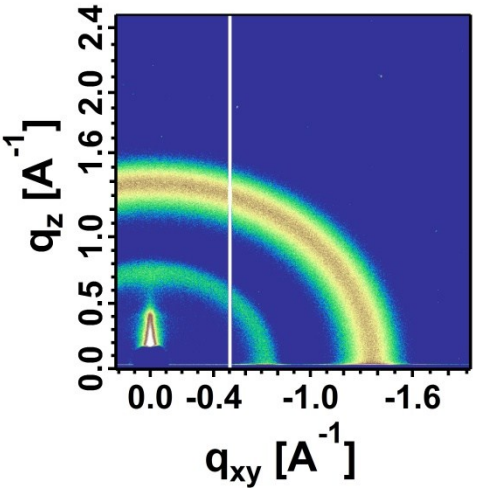

Fig. S2 The 2D GIWAXS pattern of pure $PC_{61}BM$.

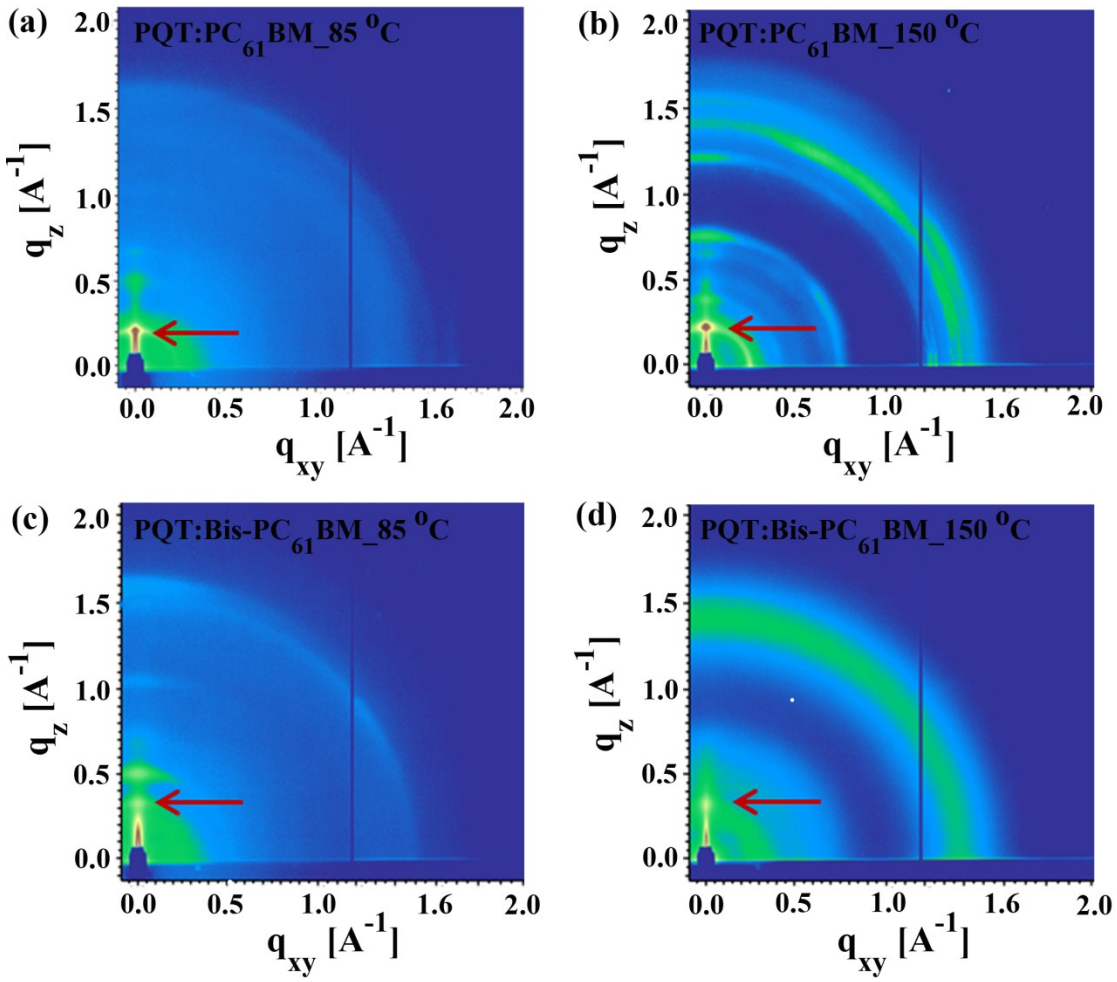

Fig. S3 The 2D GIXD patterns for bilayer thin films treated under different temperatures: (a) PQT:$PC_{61}BM$ annealed at 85 °C, and (b) 150 °C. (c) PQT:Bis-$PC_{61}BM$ annealed at 85 °C, and (d) 150 °C.

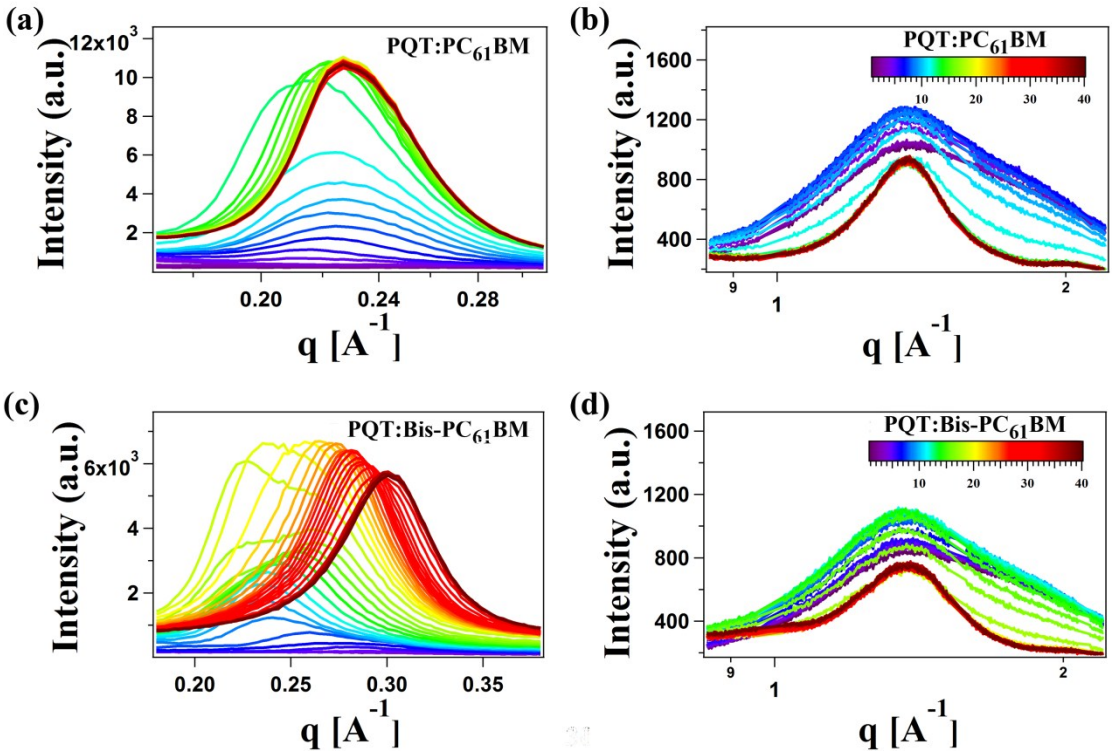

Fig. S4 Magnified 1D *in situ* GIXD images of PQT:PC_{61}BM (a, b), and PQT:Bis-PC_{61}BM (c, d).

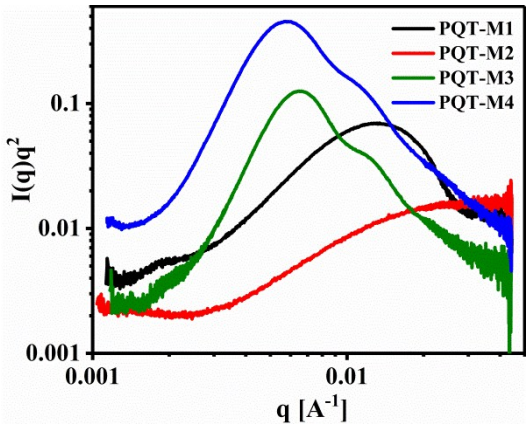

Fig. S5 The profiles of $I(q)q^2$ vs q derived from the original RSOXS data.

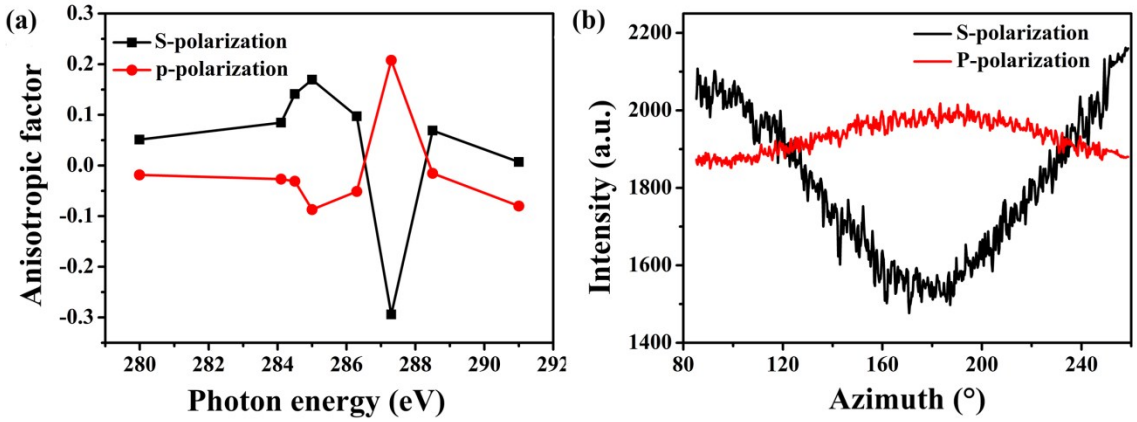

Fig. S6 (a) The anisotropic factor σ under different photon energies (b) A scattering intensity variation with the azimuth for q=0.005 $Å^{-1}$.

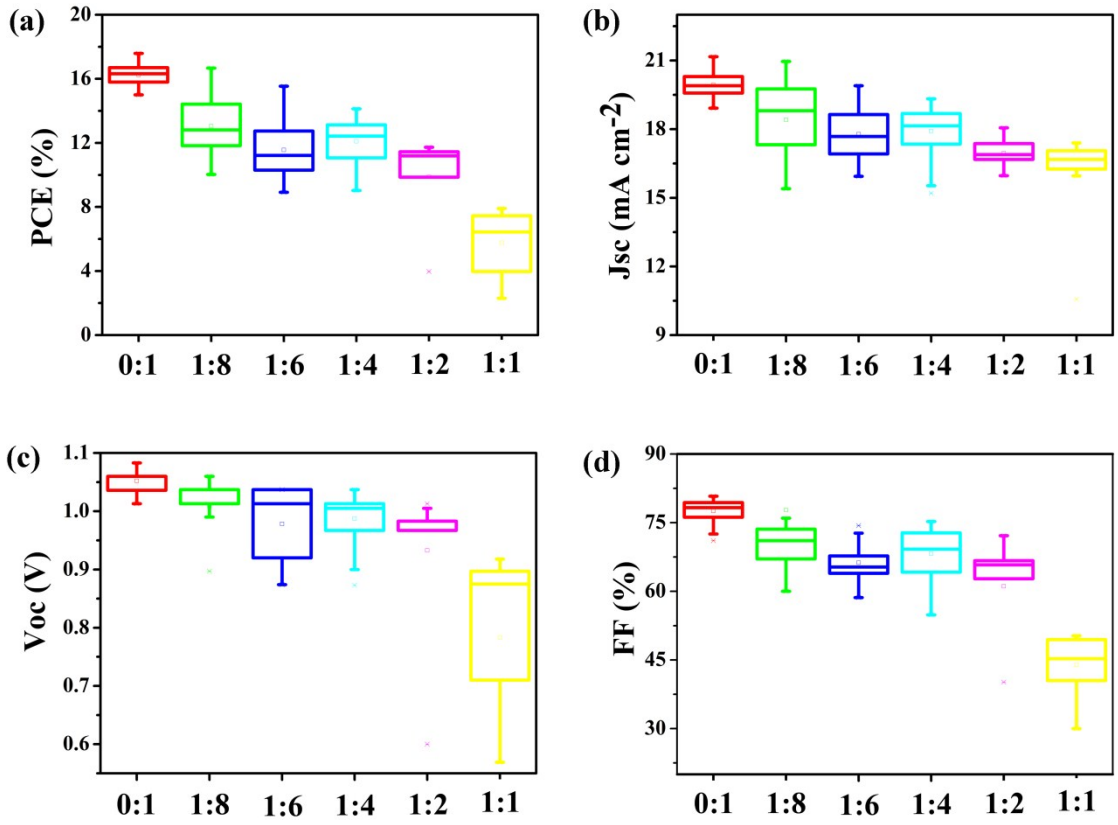

Fig. S7 Distribution of (a) PCE, (b) J_{SC}, (c) V_{OC}, and (d) FF of perovskite devices with different PQT:$PC_{61}BM$ weight ratios as electron transporting layer.

Table S1. Device parameters of ITO/PEDOT:PSS/PQT:fullerene ($PC_{61}BM$ or Bis-$PC_{61}BM$)/Al organic solar cells with different PQT:fullerene weight ratios

	J_{SC} (mA cm^{-2})	V_{OC} (V)	FF (%)	PCE_{max} (%)
PQT-M1	1.24	0.46	41.40	0.23
PQT-M2	2.76	0.74	47.00	0.96
PQT-M3	2.28	0.66	46.40	0.70
PQT-M4	1.55	0.57	63.10	0.56

Table S2. Summary of photovoltaic parameters for the perovskite solar cells with different PQT:$PC_{61}BM$ weight ratios as electron transporting layer.

PQT:$PC_{61}BM$ (wt%)	J_{SC} (mA cm^{-2})	V_{OC} (V)	FF (%)	PCE_{max} (%)
0:1	20.27	1.07	79.86	17.32
1:1	17.40	0.918	49.44	7.90
1:2	16.81	0.97	72.00	11.73
1:4	18.57	0.99	77.09	14.18
1:6	19.26	0.99	74.77	14.26
1:8	20.96	1.06	75.07	16.68