Supplementary Information

Nanoscale Phase Separation in Bulk Heterojunction Structure of Perylene Bisimide and Porphyrin by Controlling Intermolecular Interactions

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S1. Morphology characterization

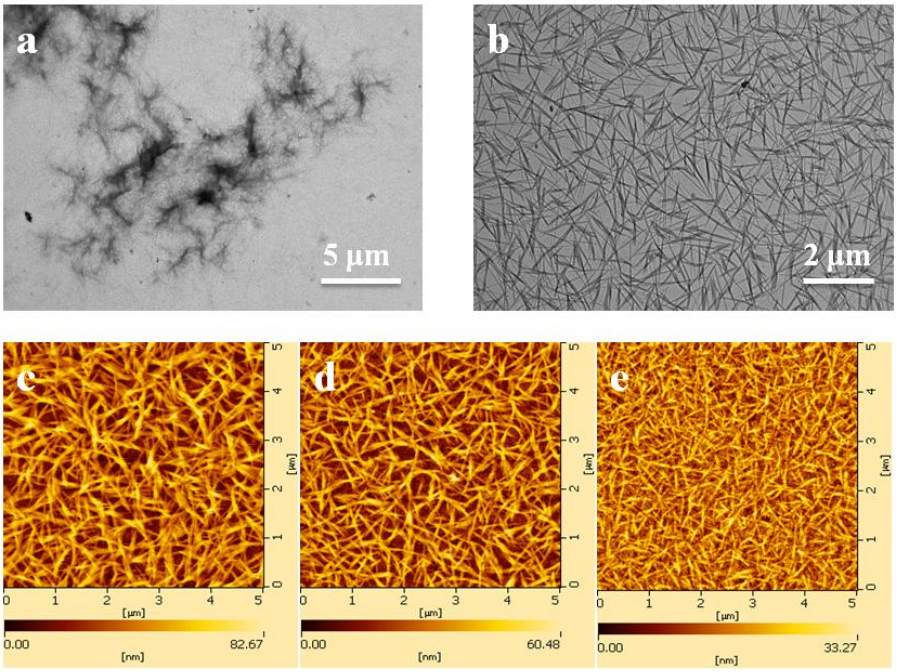

Figure S1. TEM image of **PBI-1** aggregates formed during drop-casting process on formvar stabilized with carbon support films from 1 mg/mL (a) chlorobenzene (b) THF solutions, AFM height images of **PBI-1** aggregates formed during spin-coating process on ITO from (c) 3 mg/mL, (d) 2 mg/mL, and (e) 1 mg/mL THF solutions at room temperature.

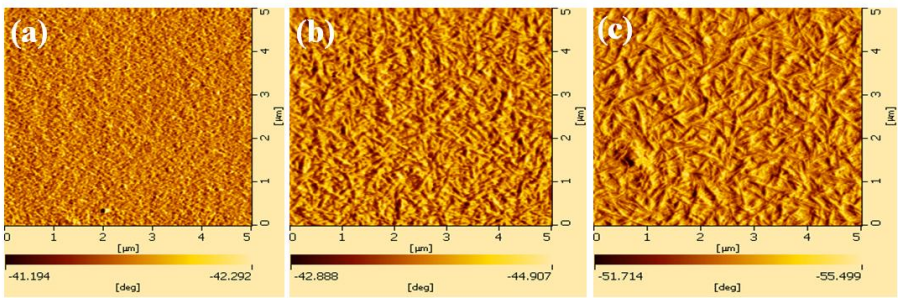

Figure S2. AFM height images of blend films with ratio of **PBI-1**:**Zn-mTNP** = (a) 1:9, (b) 2:8, (c) 3:7.

S2. Electrochemistry behavior

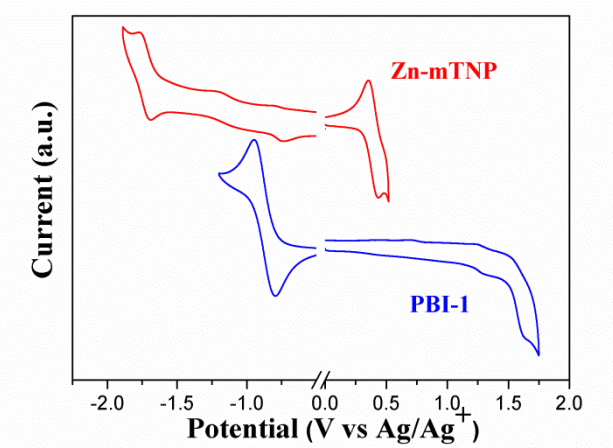

Figure S3. Cyclic voltammograms of **PBI-1** and **Zn-mTNP.** A glass-carbon disk electrode was used as the working electrode, a Pt wire as the counter electrode, Ag/Ag^+ as the reference electrode with ferrocene as the internal standard and Bu4NPF6 (0.1 M) as the electrolyte. The oxidation and reduction cycles were measured in CH_2Cl_2 and N, N-dimethylformamide (DMF), respectively.

S3. OPV performances

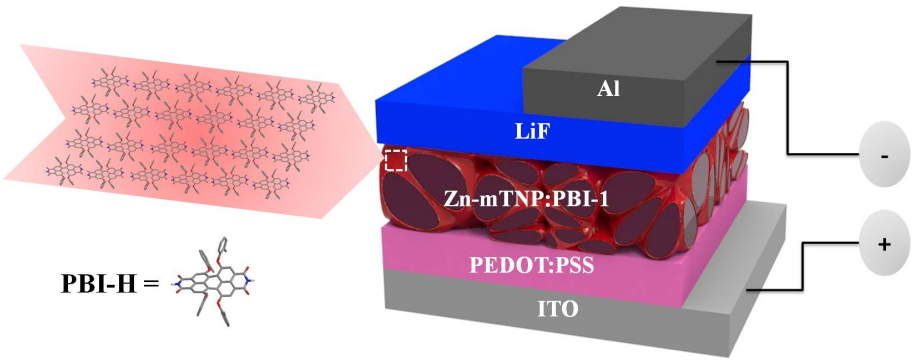

Figure S4. Schematic illustration of the device structure.

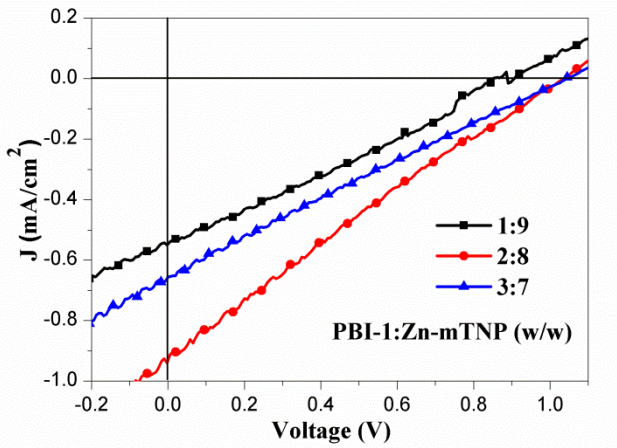

Figure S5. J-V curves of OPVs based on **PBI-1/Zn-mTNP** (w/w) under the illumination of AM 1.5G, 100mW cm^{-2}.

Table S1. Photovoltaic properties of OPVs based on **PBI-1/Zn-mTNP** (w/w) under the illumination of AM 1.5G, 100mW cm^{-2}.

PBI-1/Zn-mTNP (w/w)	Jsc (mA cm^{-2})	Voc (V)	FF	PCE (%)
1:9	0.53	0.95	0.26	0.13
2:8	0.93	1.03	0.23	0.22
3:7	0.66	1.03	0.25	0.17
4:6	0.28	1.06	0.20	0.06
5:5	0.06	0.71	0.22	0.01