Supporting Information

# Synthesis and photovoltaic properties of two new alkoxylphenyl substituted thieno[2,3-*f*]benzofuran based polymers

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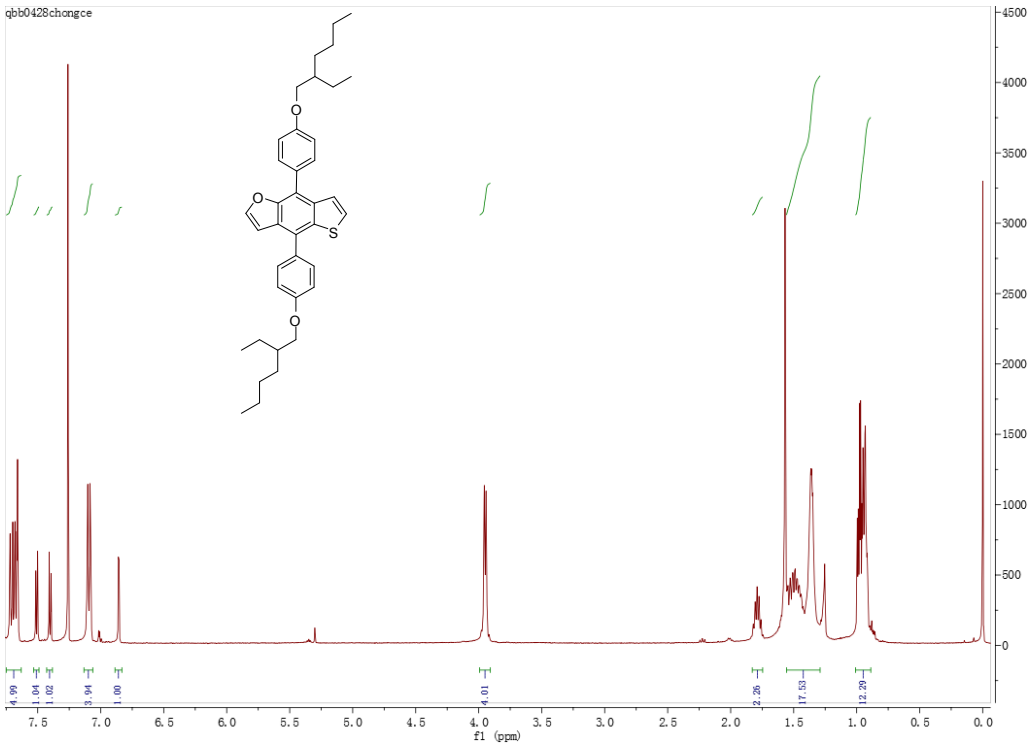


**Fig. S1** $^{1}$H NMR spectrum of compound 3.

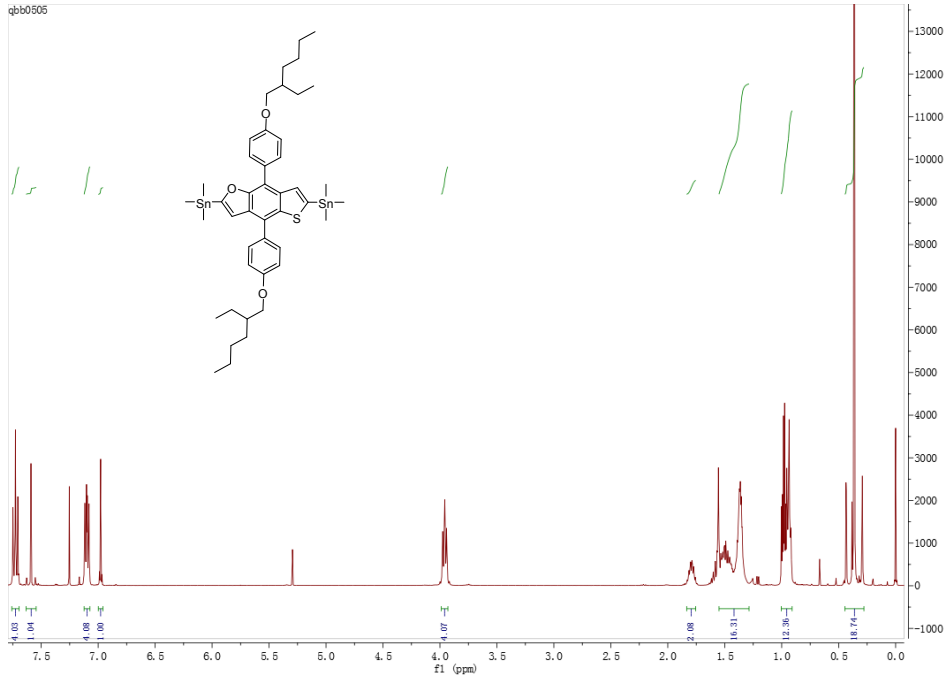


**Fig. S2** $^{1}$H NMR spectrum of compound M1.

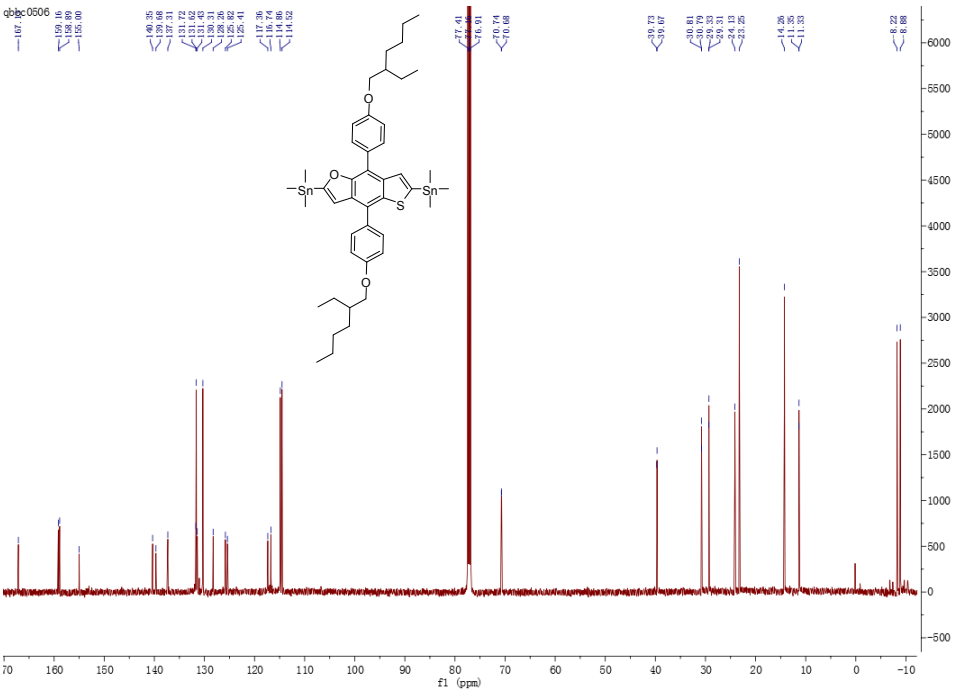


**Fig. S3** $^{13}$C NMR spectrum of compound M1.

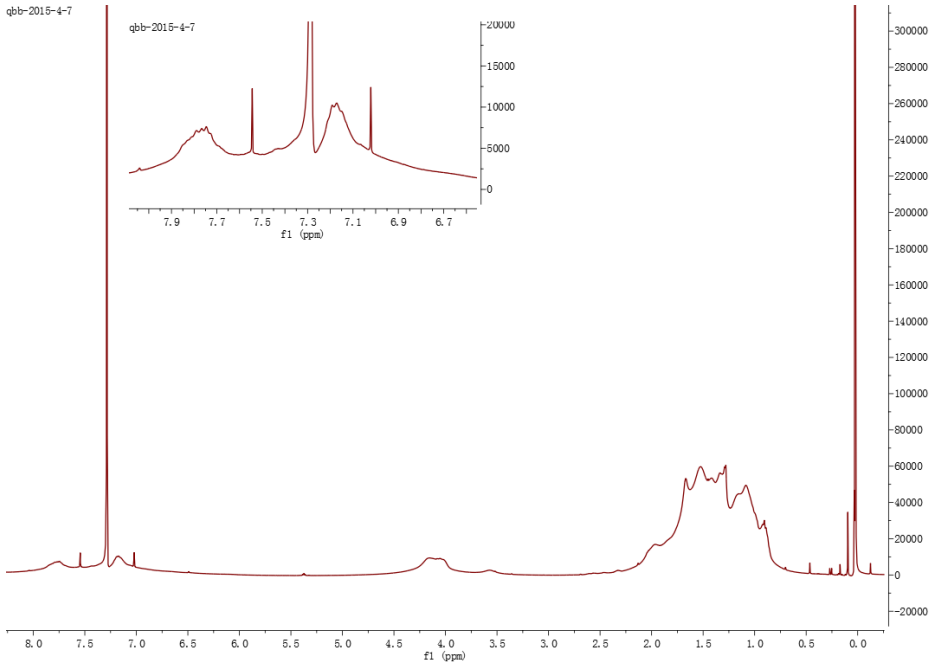


**Fig. S4** $^{1}$H NMR spectrum of polymer PTBFP-BT.

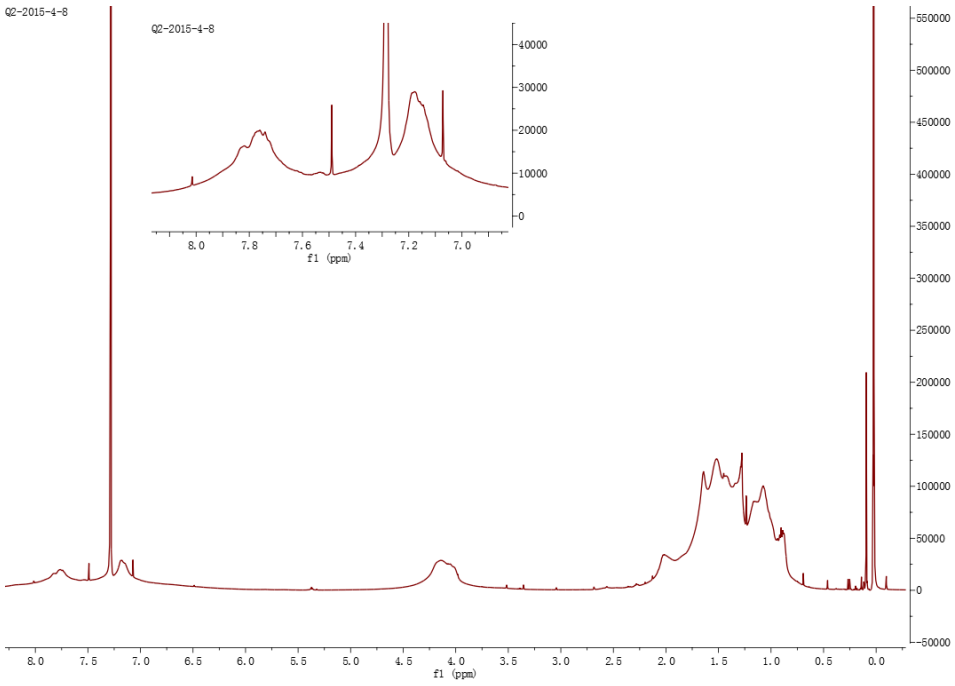


**Fig. S5** $^{1}$H NMR spectrum of polymer PTBFP-BO.

**Table S1** Photovoltaic characteristics of the polymer:$PC_{71}BM$ blend films with the device structure of ITO/PEDOT:PSS/polymers:$PC_{71}BM$/Ca/Al

| Active layer | $V_{oc}$ (V) | $J_{sc}$ ($mAcm^{-2}$) | PCE (%) | FF (%) |
|---|---|---|---|---|
| PTBFP-BT:$PC_{71}BM$=1:1 | 0.76 | 11.51 | 4.89 | 56 |
| PTBFP-BT:$PC_{71}BM$=1:2 | 0.75 | 12.44 | 5.58 | 60 |
| PTBFP-BT:$PC_{71}BM$=1:2.5 | 0.74 | 11.65 | 4.86 | 56 |
| PTBFP-BT:$PC_{71}BM$=1:3 | 0.74 | 10.97 | 4.39 | 54 |
| PTBFP-BO:$PC_{71}BM$=1:1 | 0.82 | 8.86 | 3.46 | 48 |
| PTBFP-BO:$PC_{71}BM$=1:2 | 0.77 | 9.61 | 3.64 | 49 |

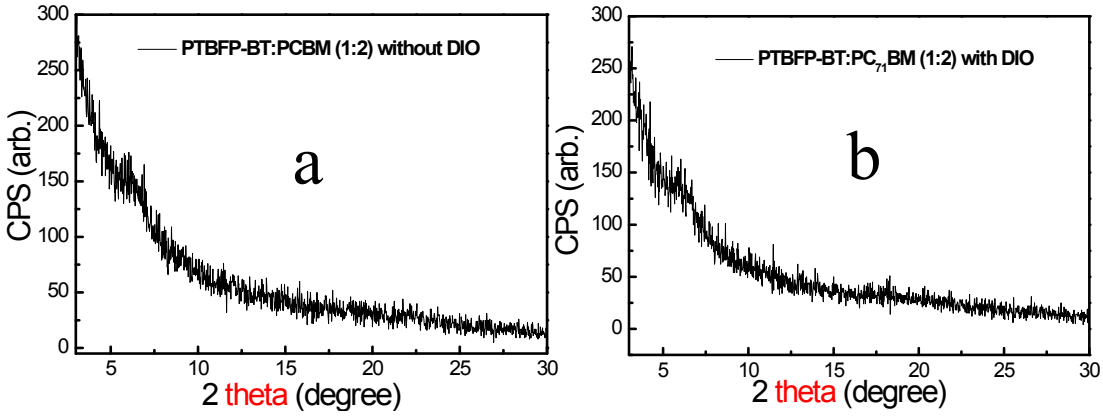


**Fig. S6** X-ray diffraction patterns of films of PTBFP-BT:$PC_{71}BM$ (1:2) with/without 3% DIO.

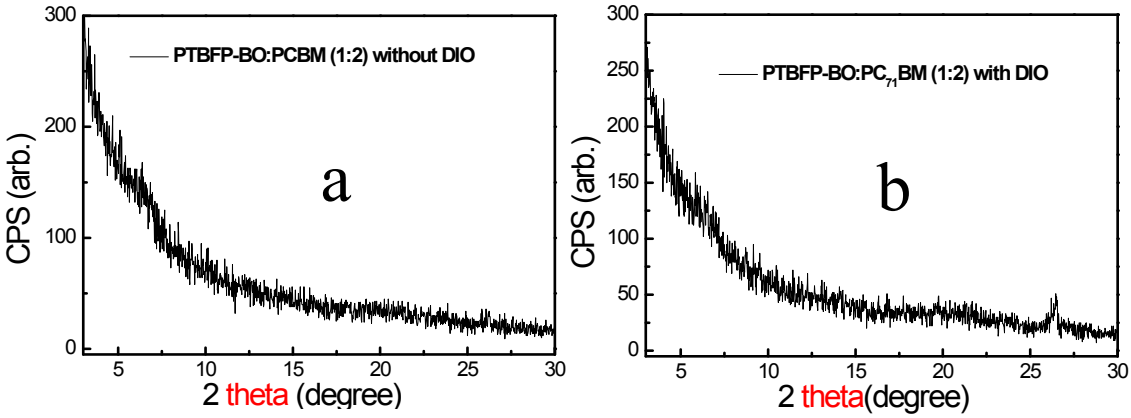


**Fig. S7** X-ray diffraction patterns of films of PTBFP-BO:$PC_{71}BM$ (1:2) with/without 3% DIO.

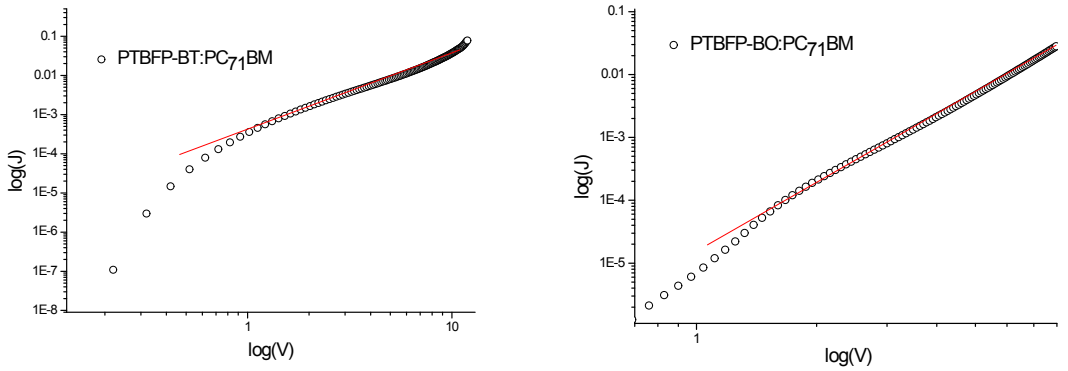


**Fig. S8** Plots of log (*J*) vs. log(*V*) from the device of ITO/PEDOT:PSS/blend film/Au for the measurement of hole mobility.

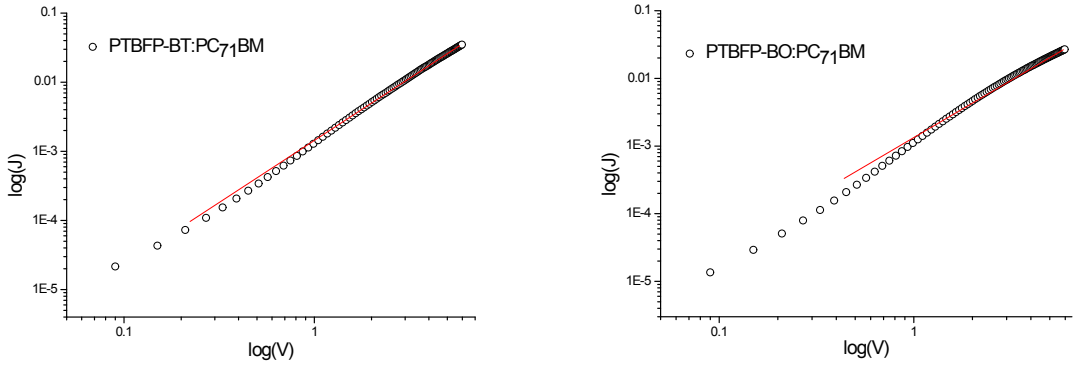


**Fig. S9** Plots of log (*J*) vs. log(*V*) from the device Al/blend film/Al for the measurement of electron mobility.

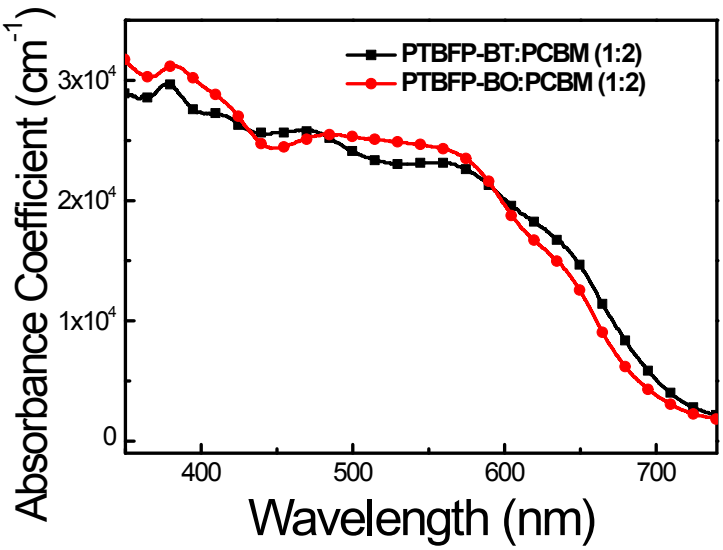


**Fig.S10** Absorption coefficient spectra of the spin-coated polymer:$PC_{71}BM$ (1:2) films on a glass substrate.