Supporting Information

Green-Solvent-Processed Hybrid Solar Cells Based on Donor-Acceptor Conjugated Polyelectrolyte

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Figure S1. Synthesis routes of PFBTBr: (k) $(PPh_3)_4Pd$, Toluene, K_2CO_3; (l) CH_3CH_2Br, DMSO, THF, H_2O.

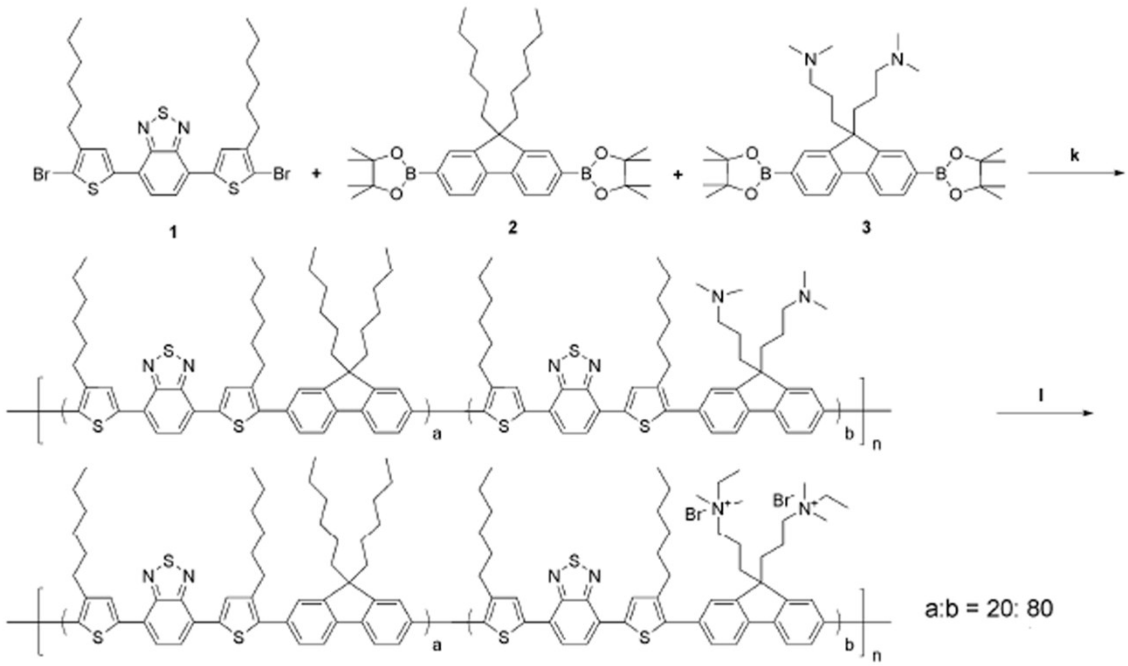

Figure S2. Synthesis routes of the monomers: (a) hexylbromide, diethyl ether, Mg, Ni(dppp)Cl_2; (b) n-BuLi, THF, tributylchloro -stannane, -78°C to -30°C; (c) HBr, Br_2; (d) THT, $PdCl_2(PPh_3)_2$; (e) NBS, THF; (f) $FeCl_3$, Br_2; (g)DMSO, Bu_4NBr, NaOH(50%),n-$C_6H_{13}Br$ (h) DMSO, Bu_4NBr, NaOH(50%), NaOH(s), $(CH_3)_2N(CH_2)_3\cdot HCl$ (i) & (j) THF, n-BuLi, 2-Isopropoxy- 4,4,5,5-tetramethyl-1,3,2-dioxaborolane, -78 °C

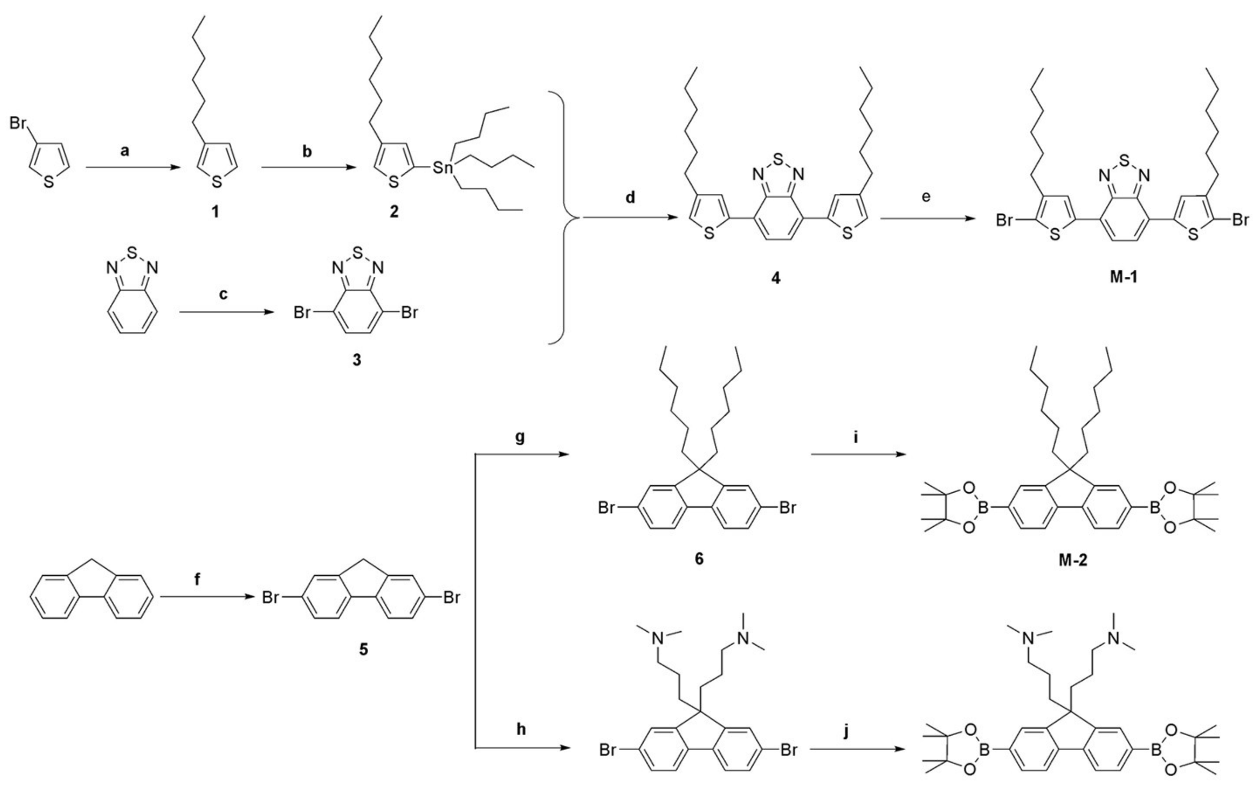

Figure S3. UV-vis absorption of PFBTBr without and with annealing.

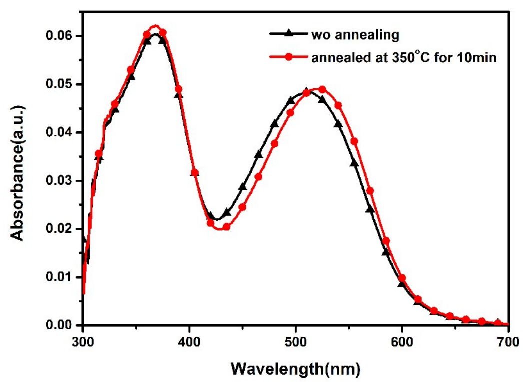

Figure S4. UPS spectra of PFBTBr: (a) cutoff regions and (b) Fermi-edge regions. The HOMO level value was calculated by subtracting the onset of the low-binding-energy photoemission from the onset of the secondary electron energy cutoff and then subtracting the excitation photoenergy (21.2 eV).

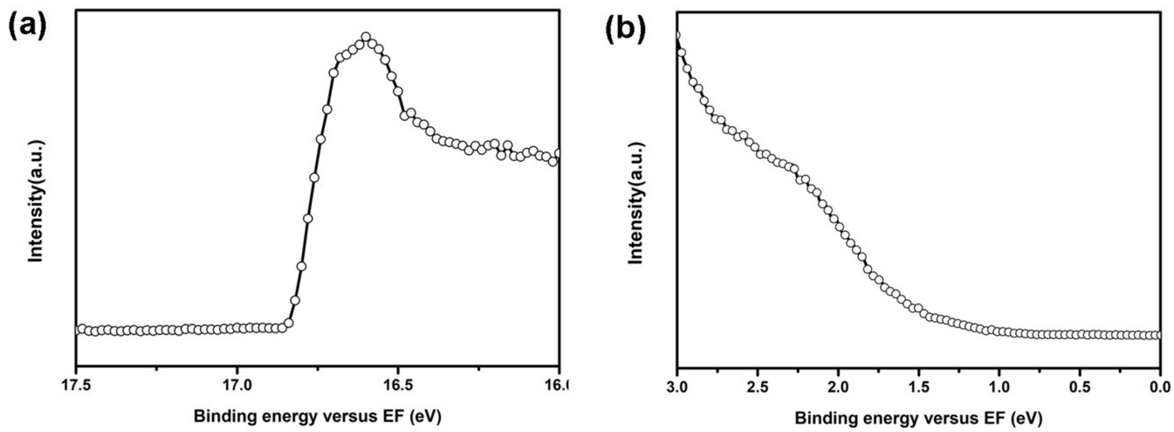

Figure S5. TEM images of (a) as-prepared CdTe NCs, (b) the optimized active layer.

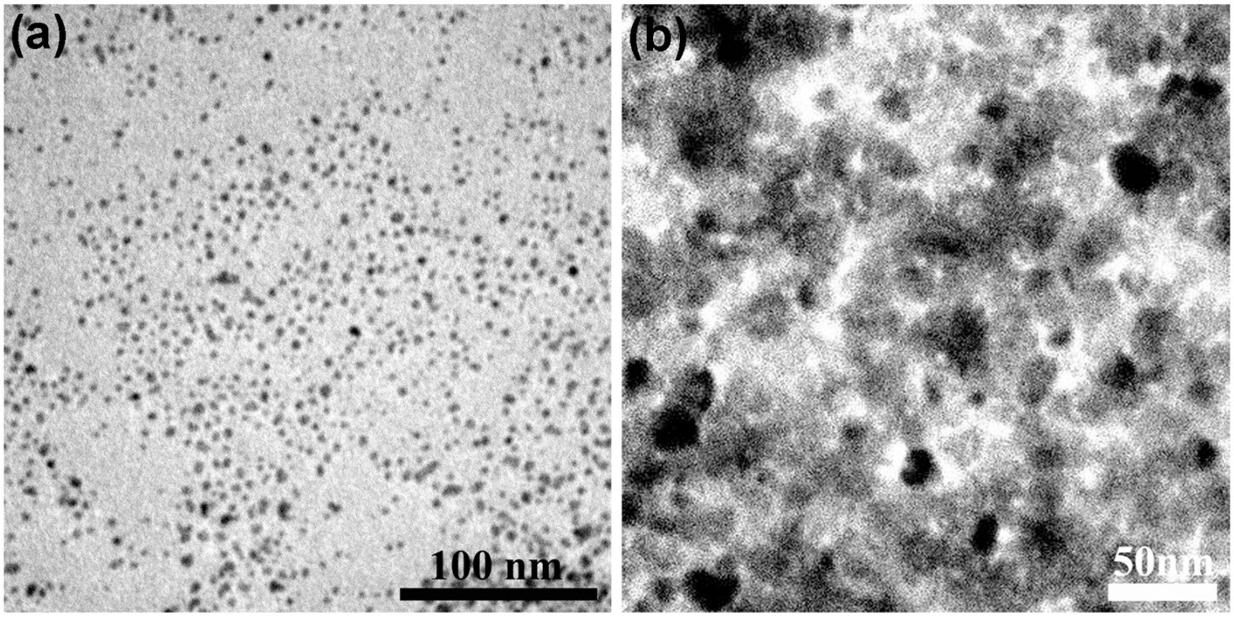

Figure S6. EQE curve of the PFBTBr:CdTe NCs based HSCs.

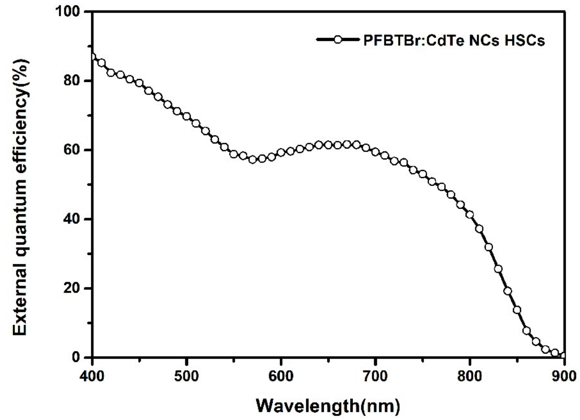

Figure S7. J-V curve of the PFBTBr:CdTe NCs based HSCs in dark.

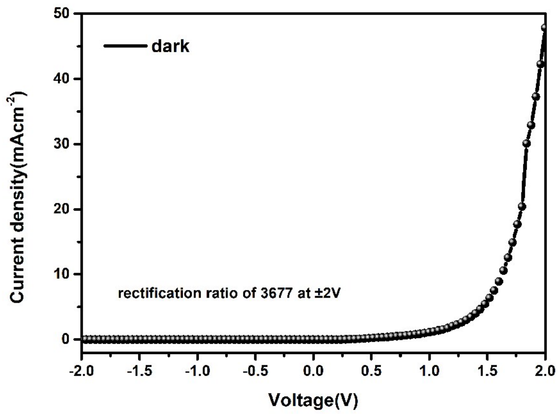

Table S1. Photovoltaic performances of the cells with different donor/acceptor ratio.

Weight ratio	V_{oc}(V)	J_{sc}(mA cm^{-2})	FF(%)	PCE(%)
1:5	0.57	6.06	22.04	0.76
1:10	0.61	14.76	32.68	2.96
1:20	0.59	15.00	29.89	2.63
1:40	0.55	12.86	33.79	2.38

Table S2. Photovoltaic performances of the cells with difference concentration of the PFBTBr:CdTe NCs solution concentration.

Concentration (mg mL^{-1})	V_{oc}(V)	J_{sc}(mA cm^{-2})	FF(%)	PCE(%)
73.3	0.59	15.10	36.80	3.30
88.0	0.54	14.47	38.55	2.98
109.7	0.50	12.14	33.66	2.05
132.0	0.51	7.21	36.15	1.31

Table S3. Photovoltaic performances of the cells with the active layer annealed at different temperature.

Annealing temperature(°C)	V_{oc}(V)	J_{sc}(mA cm^{-2})	FF(%)	PCE(%)
300	0.57	12.27	30.85	2.16
350	0.58	13.52	40.39	3.16
400	0.57	13.34	41.52	3.10
450	0.57	10.40	28.57	1.70

Table S4. Photovoltaic performances of the cells with the active layer annealed at 350 °C for different time.

Annealing time(min)	V_{oc}(V)	J_{sc}(mA cm^{-2})	FF(%)	PCE(%)
5	0.62	11.99	41.07	3.03
10	0.62	13.99	42.45	3.67
15	0.60	12.45	43.95	3.26
20	0.57	10.81	50.08	3.09

Table S5. Photovoltaic performances of the cells with different MoO_3 thicknesses.

MoO_3 thickness(nm)	V_{oc}(V)	J_{sc}(mA cm^{-2})	FF(%)	PCE(%)
3	0.59	16.65	37.04	3.62

5	0.62	16.34	44.29	4.49
7	0.60	16.22	36.30	3.55

Table S6. Photovoltaic performances of the cells without and with $MgCl_2$ treatment.

$MgCl_2$ treatment	V_{oc}(V)	J_{sc}(mA cm^{-2})	FF(%)	PCE(%)
w/o	0.62	16.34	44.29	4.49
with	0.64	20.09	39.17	5.03