Electronic Supplementary Information for:

Enhanced performance and stability of p-i-n perovskite solar cells by utilizing an AIE-active cathode interlayer

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1. NMR spectra

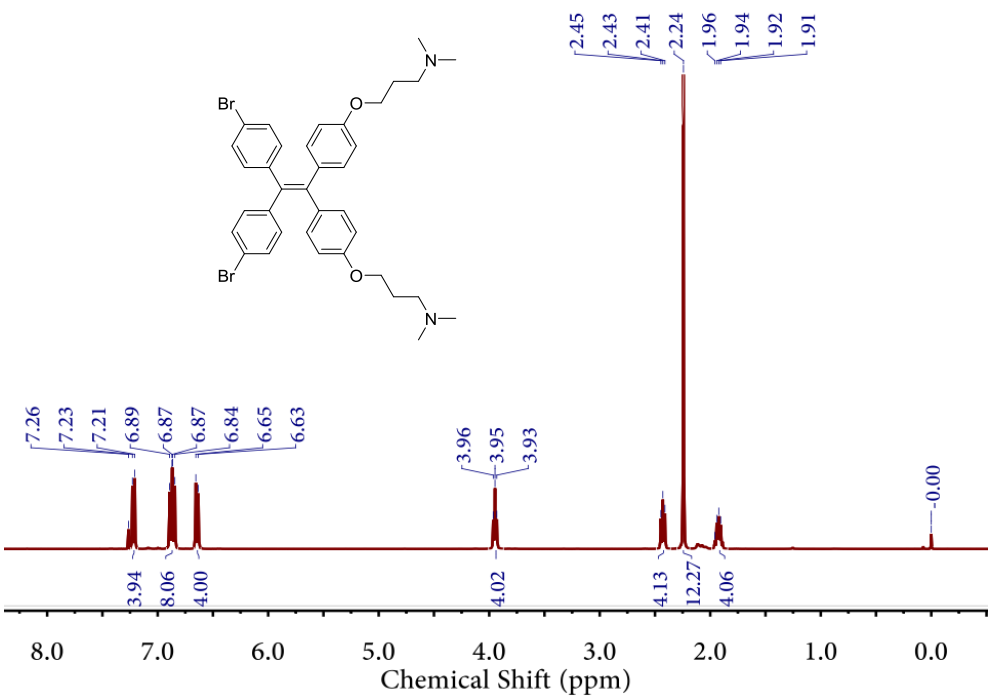

Fig. S1. ^{1}H NMR ($CDCl_3$) spectrum of M_1.

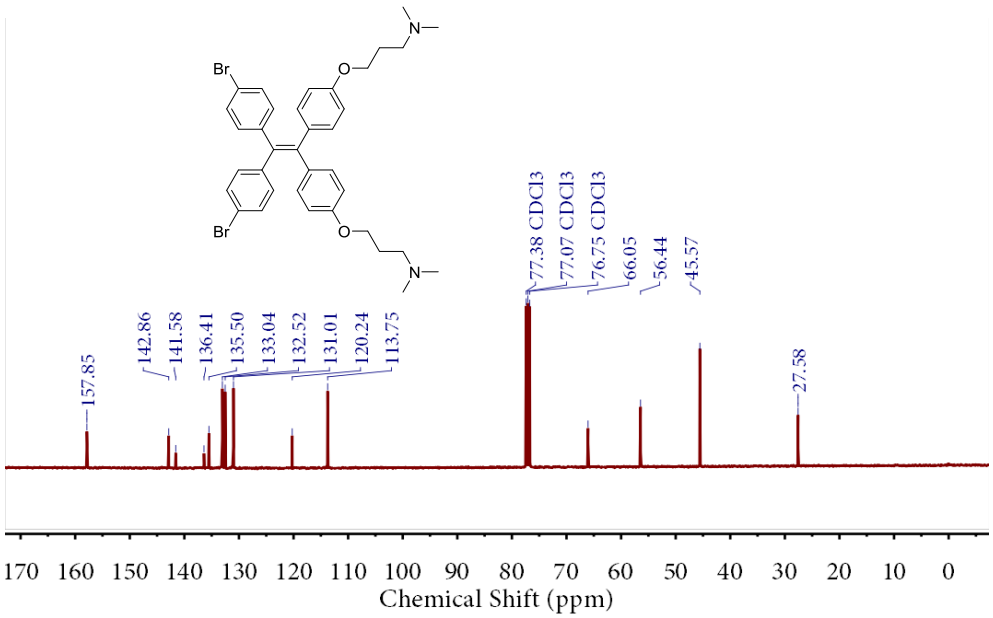

Fig. S2. ^{13}C NMR ($CDCl_3$) spectrum of M_1.

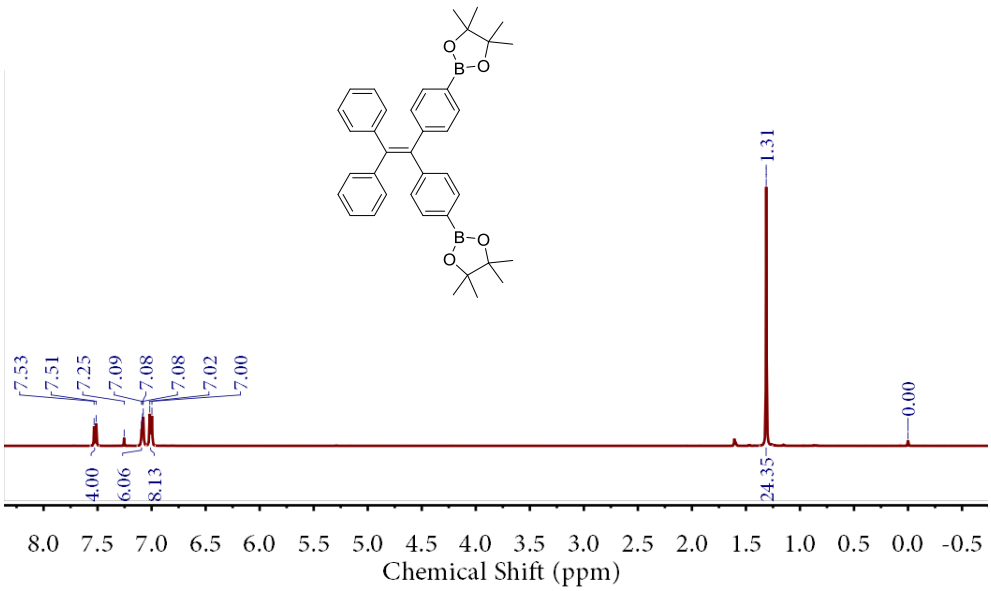

Fig. S3. ^{1}H NMR ($CDCl_3$) spectrum of M_2.

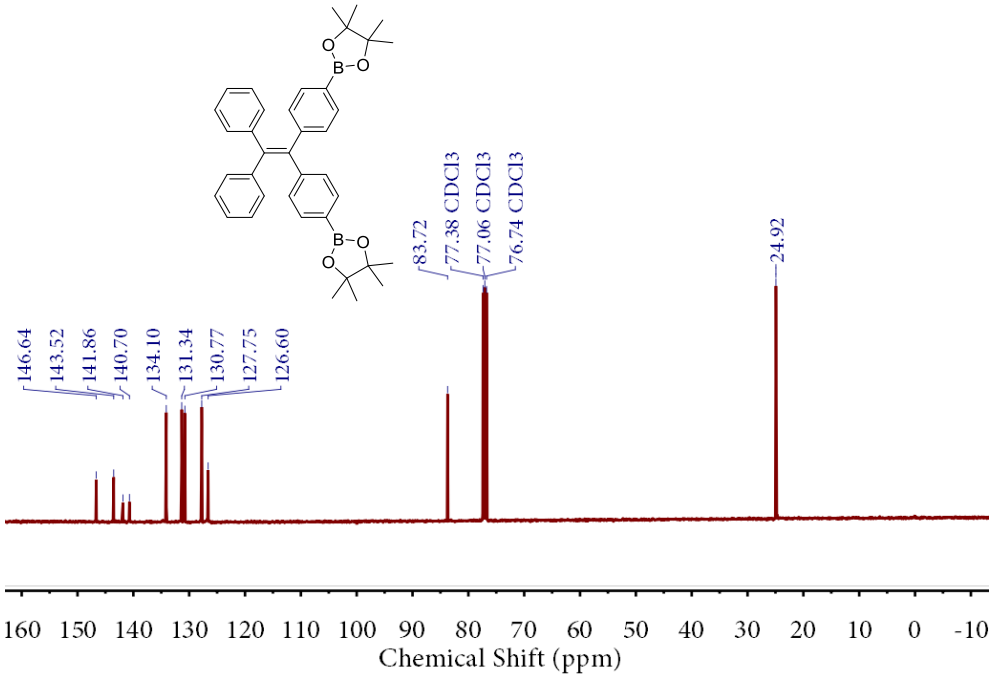

Fig. S4. ^{13}C NMR ($CDCl_3$) spectrum of M_2.

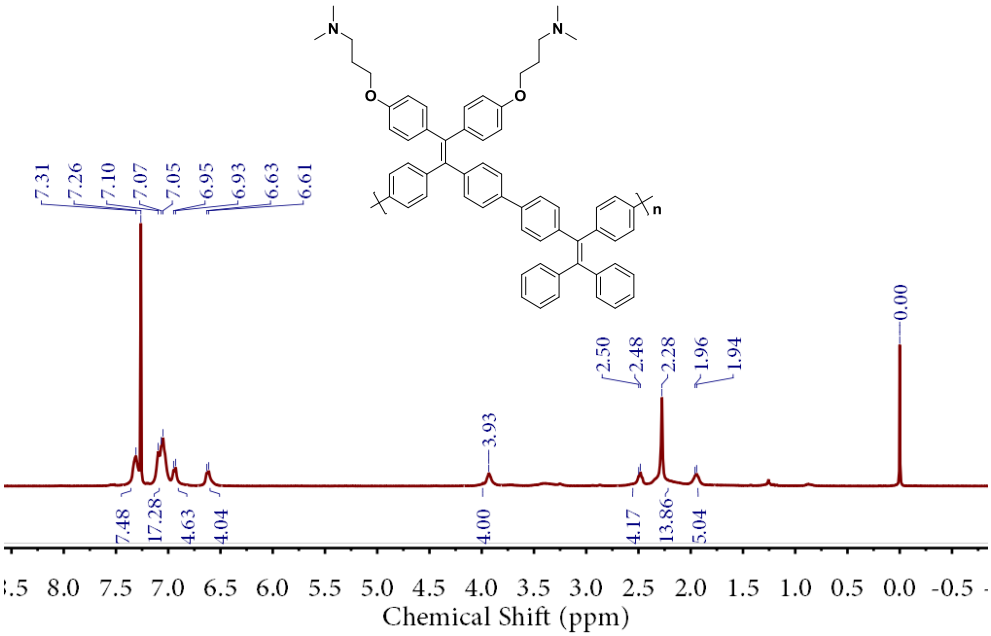

Fig. S5. ^{1}H NMR ($CDCl_3$) spectrum of **PTN**.

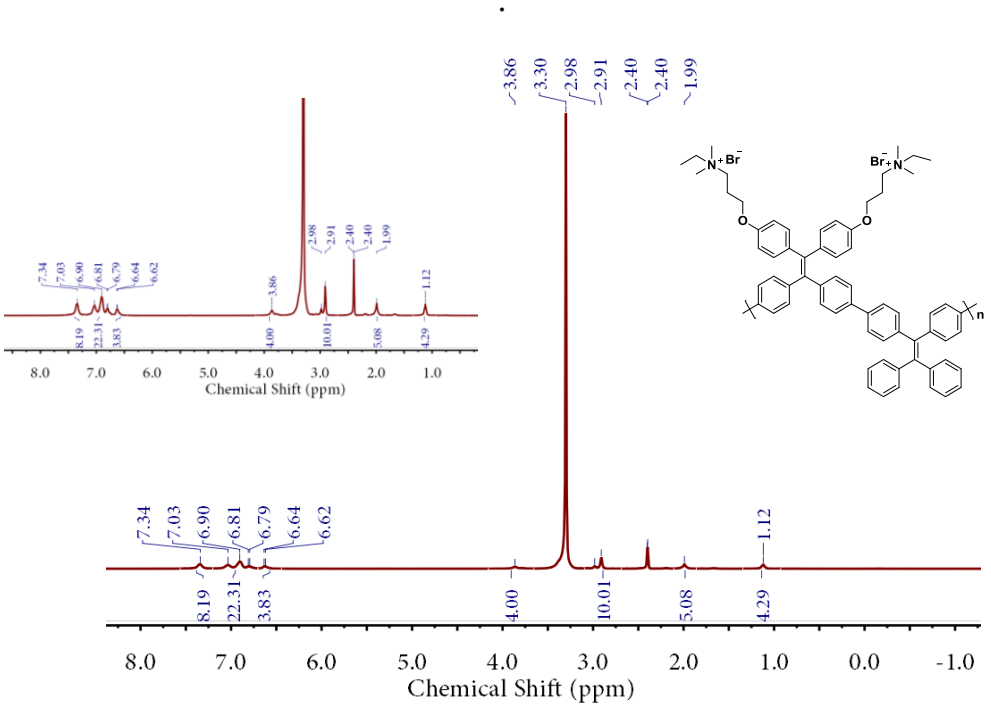

Fig. S6. ^{1}H NMR (DMSO) spectrum of **PTN-Br**

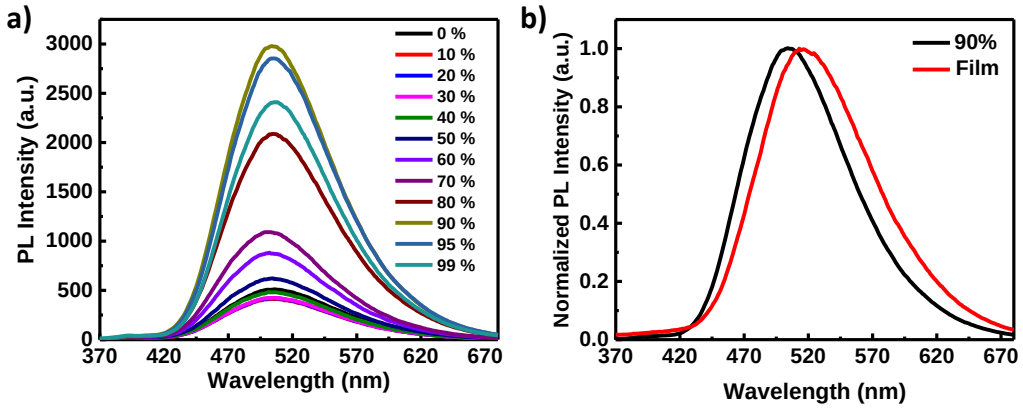

Fig. S7. a) AIE curves of **PTN-Br** (10 μM) in Methanol/ether mixtures with different ether fractions (f_e). b) PL spectrum of **PTN-Br** at the f_e = 90% and in the films.

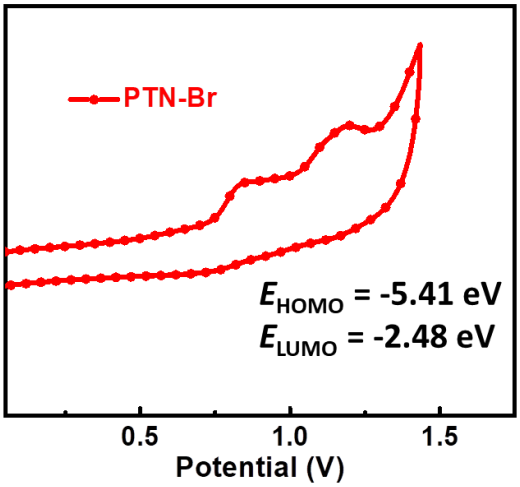

Fig. S8. CV curve of **PTN-Br** in the film measured in 0.1 Bu_4NPF_6 in CH_3CN.

Table S1. Photovoltaic performance parameters of the PVSCs with different concentration of **PTN-Br** CIL under AM 1.5G irradiation.

CIL	Thickness (nm)	V_{oc} (V)	J_{sc} (mA cm^{-2})	FF (%)	PCE (%)
w/o **PTN-Br**	0.0	1.004	20.67	72.93	15.14
0.2 mg mL^{-1} **PTN-Br**	4.4	1.016	21.11	75.73	16.24
0.5 mg mL^{-1} **PTN-Br**	5.8	1.023	21.89	77.88	17.44
1.0 mg mL^{-1} **PTN-Br**	8.1	1.023	20.25	75.58	15.66

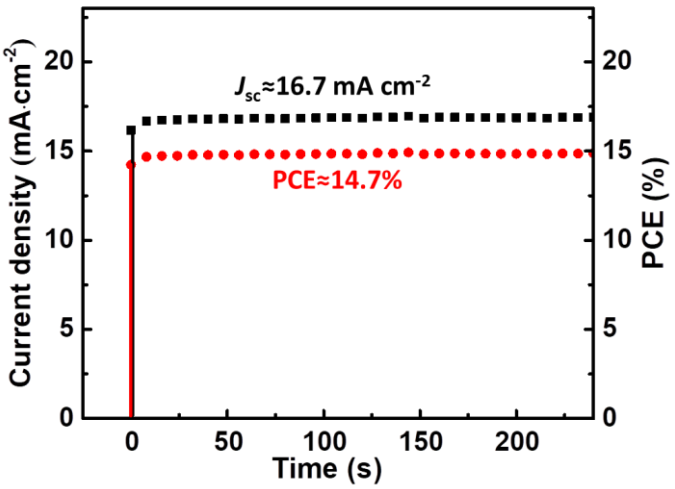

Fig. S9. Steady-state PCE and photocurrent of the reference PVSCs without **PTN-Br** measured at the maximum power point.

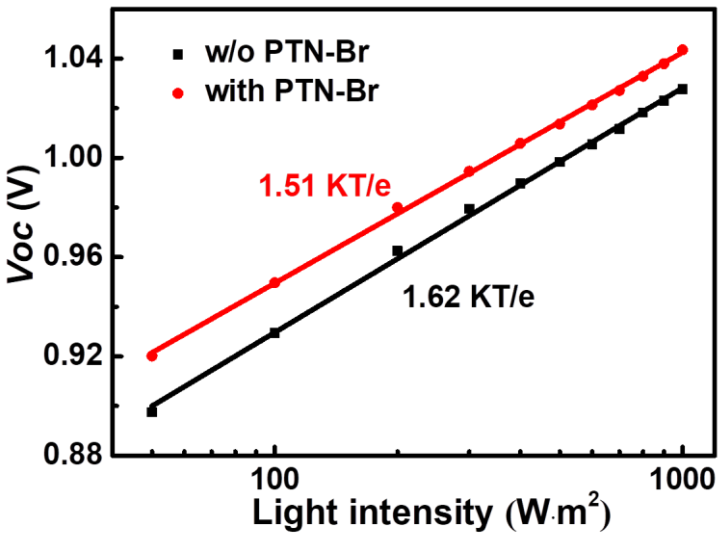

Fig. S10. Light intensity dependence of the V_{oc} of PVSCs with or without **PTN-Br**.

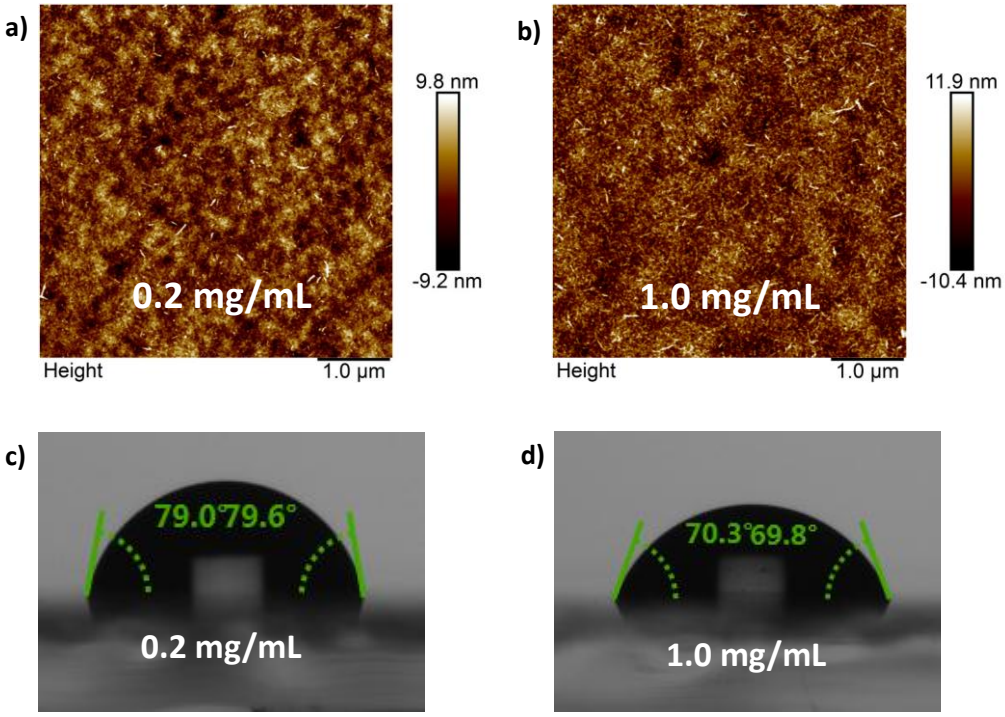

Fig. S11. AFM images of the films at the concentration of 0.2 a) and 1.0 b) mg mL^{-1},water contact angle of the films at the concentration of 0.2 c) and 1.0 d) mg mL^{-1}.

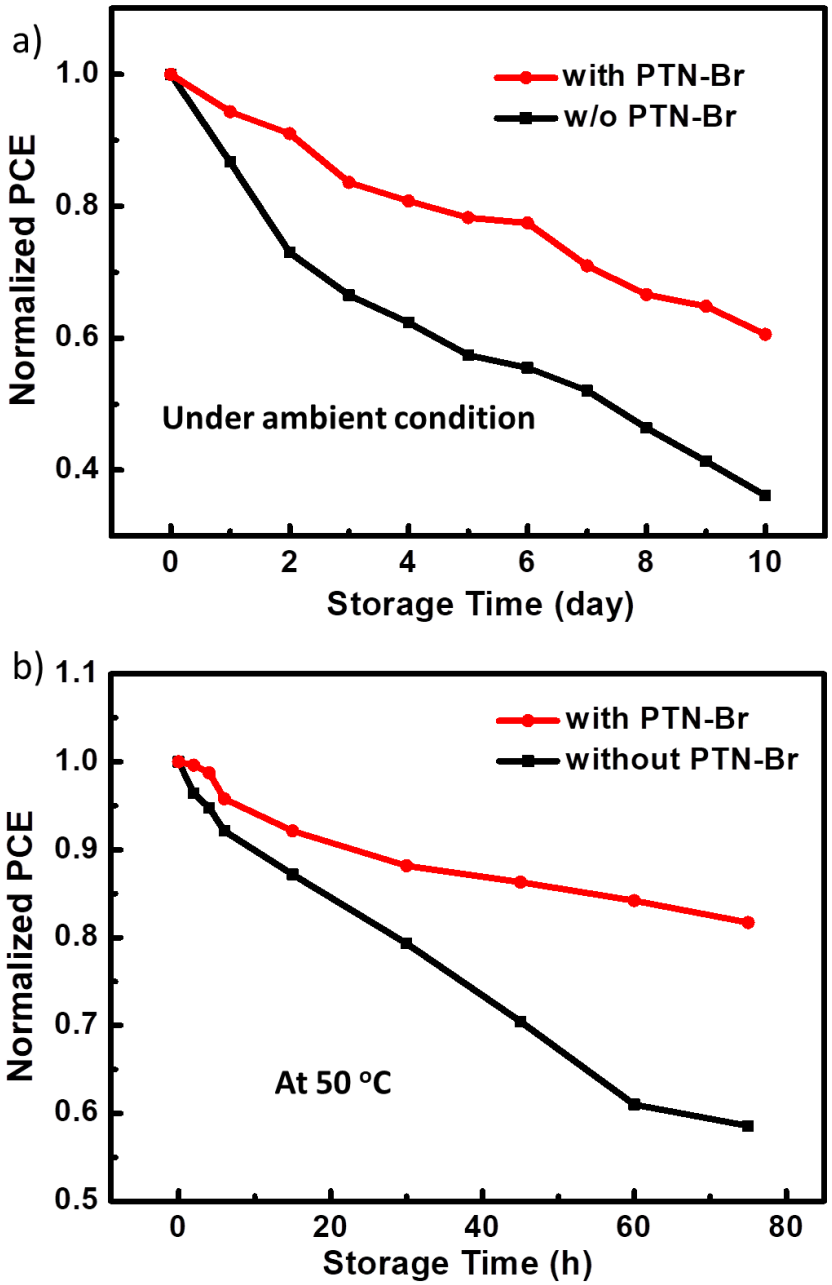

Fig. S12. a) Normalized PCE decay of **PTN-Br**-based PVSCs and reference one stored in ambient condition (25 ^{o}C, relative humidity = 55%). b) Normalized PCE decay of **PTN-Br**-based PVSCs and reference one in a N_2-purged glovebox at 50 ^{o}C.

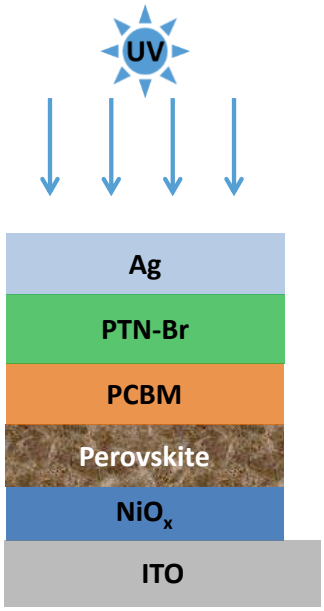

Fig. S13. The schematic diagram of the UV stability.