Supplementary Information

A biopolymeric buffer layer improves device efficiency and stability in inverted organic solar cells

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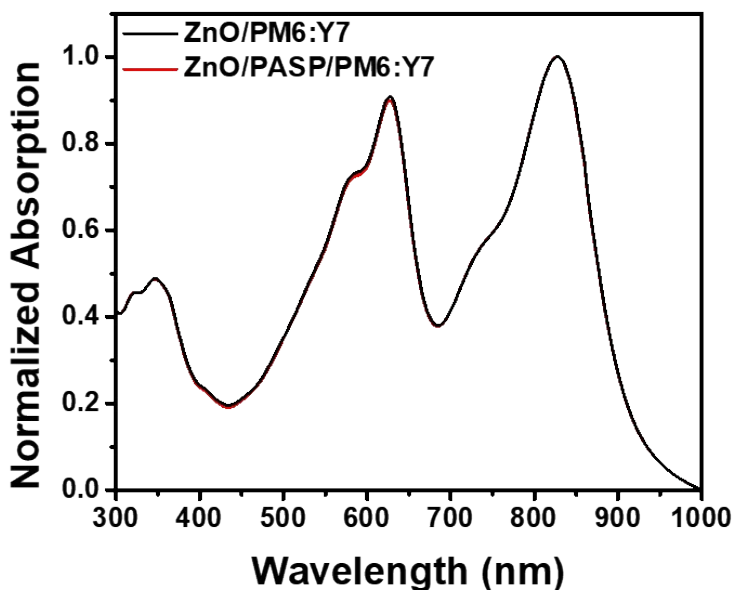
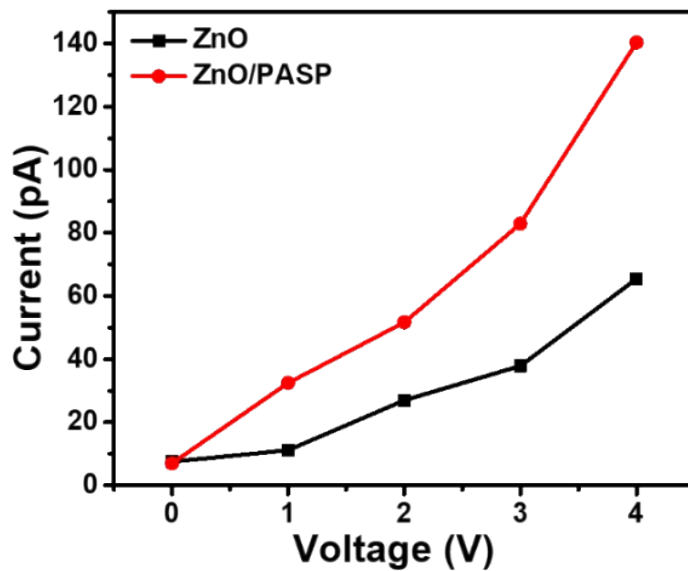**Fig. S1.** Normalized absorption spectra of PM6:Y7 blend films coated on ZnO and ZnO/PASP ETLs.

Fig. S2. Current versus voltage curves measured on ZnO, ZnO/PASP films with conductive-atomic force microscopy (c-AFM) using Ti/Ir coated tips at contact mode.
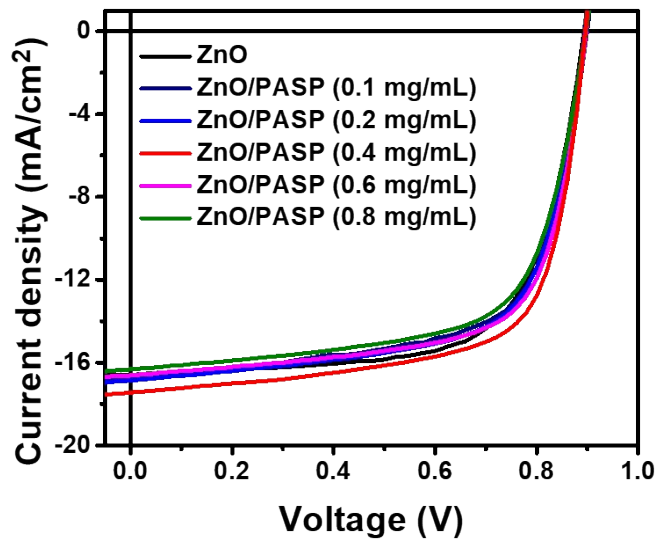

Fig. S3. Current density versus voltage (*J-V*) characteristics PBDBT-ITIC solar cells with ZnO and ZnO/PASP ETLs under AM 1.5 G solar irradiation (100 mW/cm^{-2}).

Table. S1. Photovoltaic parameters of PBDBT: ITIC devices based on ZnO and ZnO/PASP ETLs with different

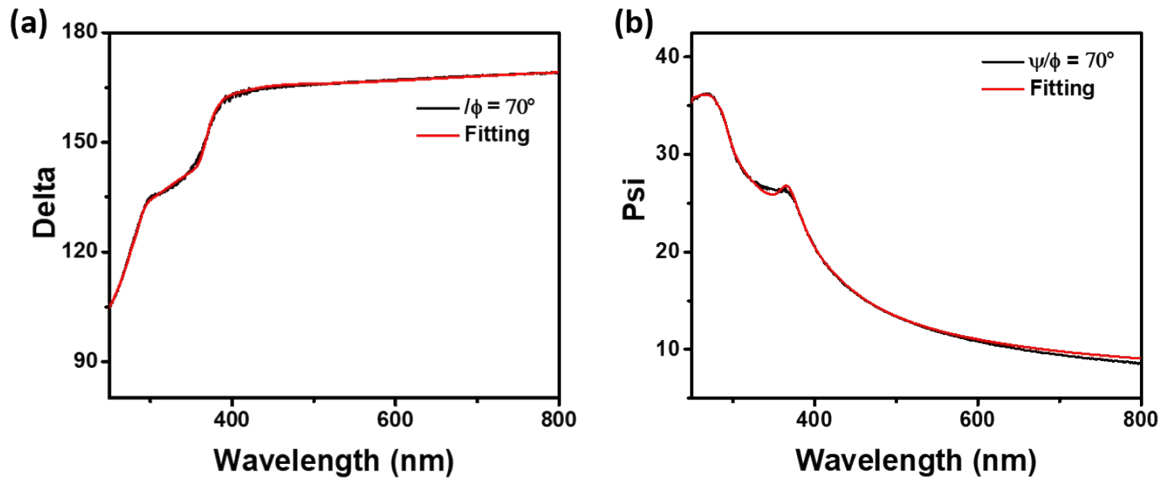| ETL	Conc.	Voc [V]	Jsc [mA/cm^2]	FF [%]	PCE [%]
ZnO		0.88	16.61	68.93	10.1
ZnO/PASP	0.1	0.88	16.98	65.06	9.7
ZnO/PASP	0.2	0.88	16.87	68.55	10.1
ZnO/PASP	**0.4**	**0.88**	**17.35**	**70.30**	**10.7**
ZnO/PASP	0.6	0.88	16.62	69.83	10.2
ZnO/PASP	0.8	0.88	16.32	67.39	9.6

concentration.

Fig. S4. Parameters (a) delta and (b) Psi used for the ellipsometry to determine the thickness of PASP thin layer.

Fig. S5. EQE spectra of PBDBT:ITIC based on ZnO and ZnO/PASP interlayers.
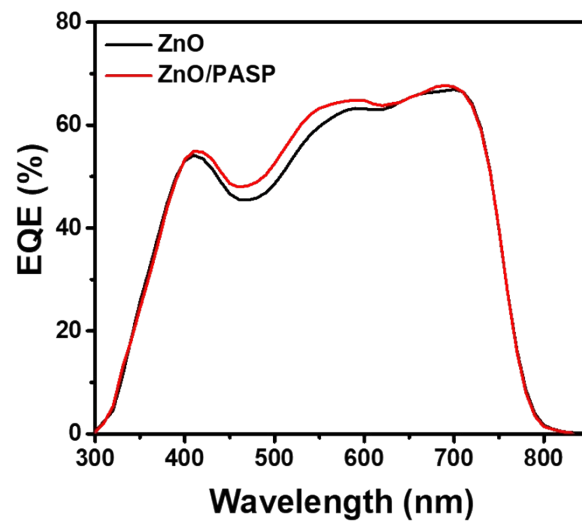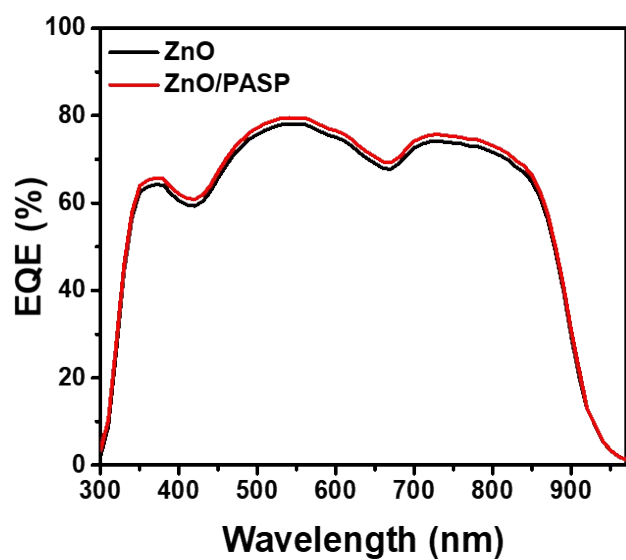
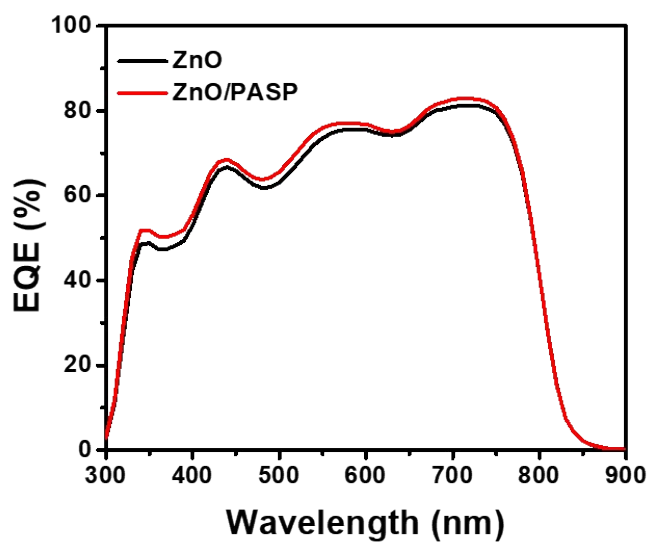**Fig. S6.** EQE spectra of PM6:Y7 based on ZnO and ZnO/PASP interlayers.

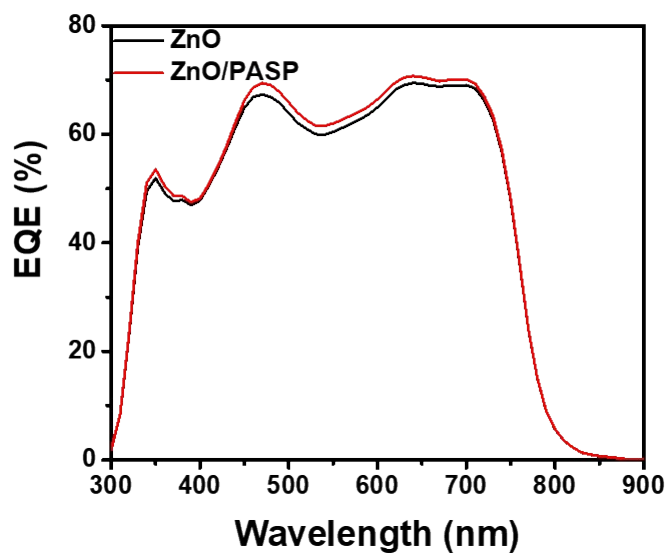**Fig. S7.** EQE spectra of PBDBT2F:IT4F based on ZnO and ZnO/PASP interlayers.

Fig S8. EQE spectra of PTB7-Th:PC$_{71}$BM devices with ZnO and ZnO/PASP interlayers.
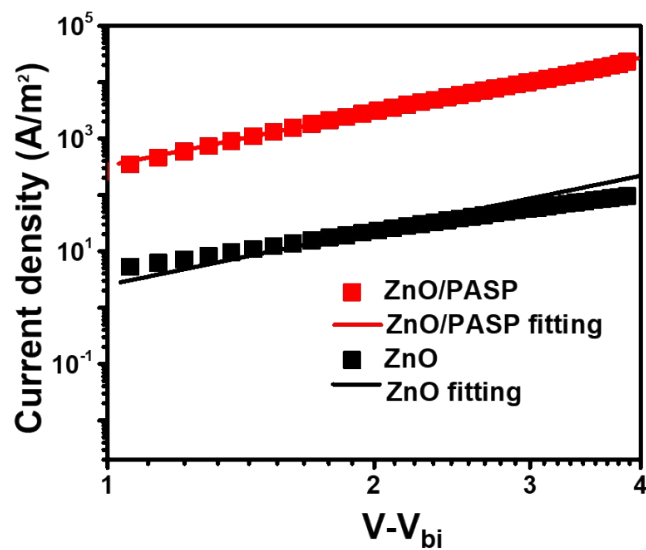

Fig. S9. Dark *J-V* characteristics of electron-only devices in configuration of ITO/(ZnO or ZnO/PASP)/BHJ/Al (BHJ is PM6:Y7).