Supplementary Information

Low-Temperature Processed $TiO_x/Zn_{1-x}Cd_xS$ Nanocomposite for Efficient $MAPbI_xCl_{1-x}$ Perovskite and PCDTBT:$PC_{70}BM$ Polymer Solar Cells

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Results

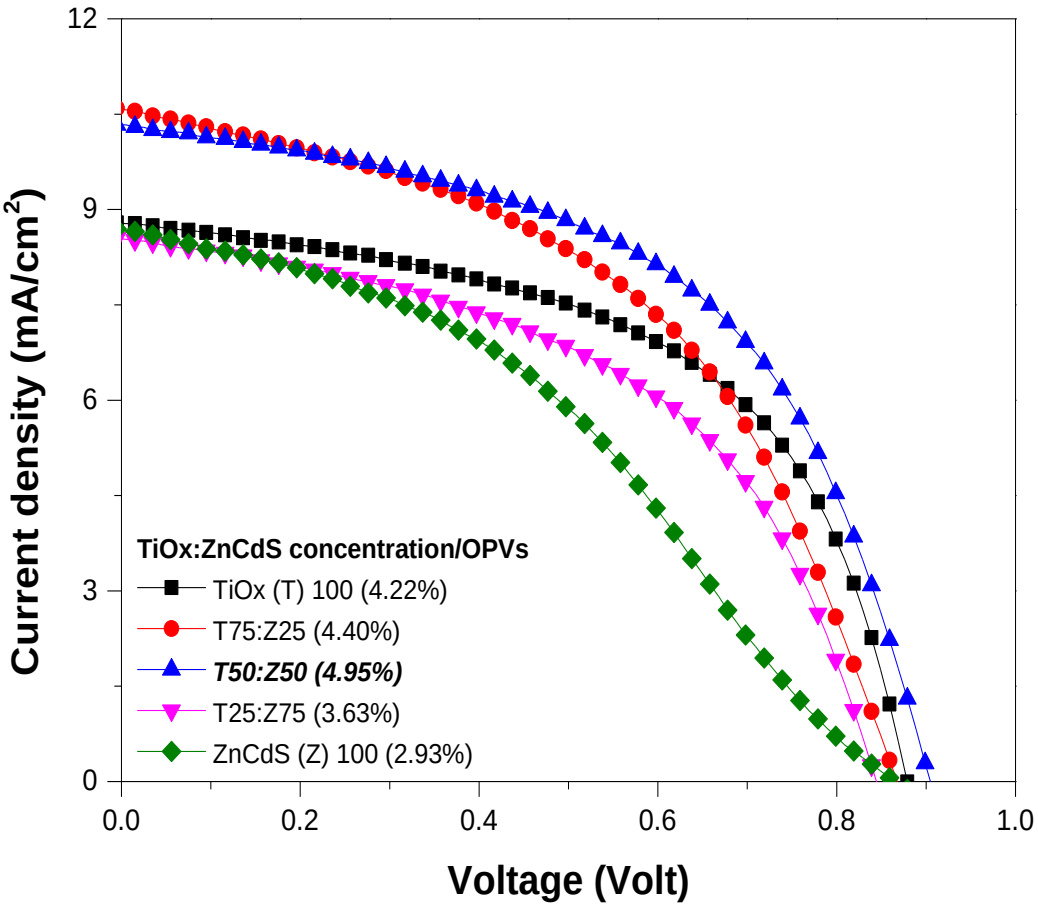

Figure S1. J-V characteristics of polymer solar cells

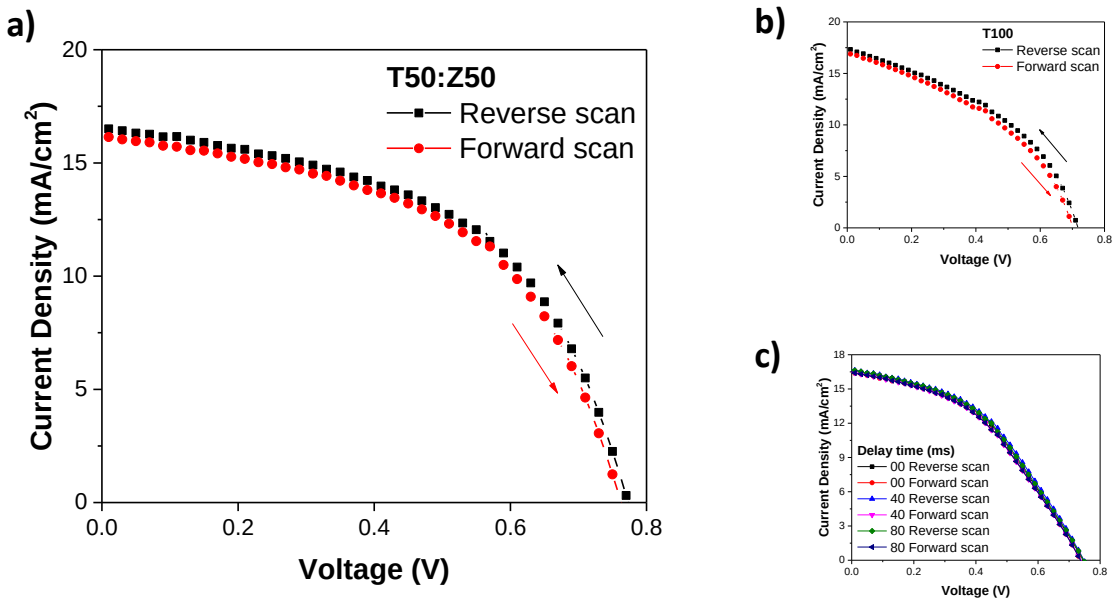

Figure S2. Hysteresis study of p-i-n perovskite solar cells device (**a**) the forward-reverse J-V curves with 40 ms delay time of T50:Z50 ETL. (**b**) the forward-reverse J-V curves with 40 ms delay time of 100 ETL. (**c**) the forward-reverse J-V curves with 0, 40 and 80 ms delay time of T100 ETL with negligible hysteresis .

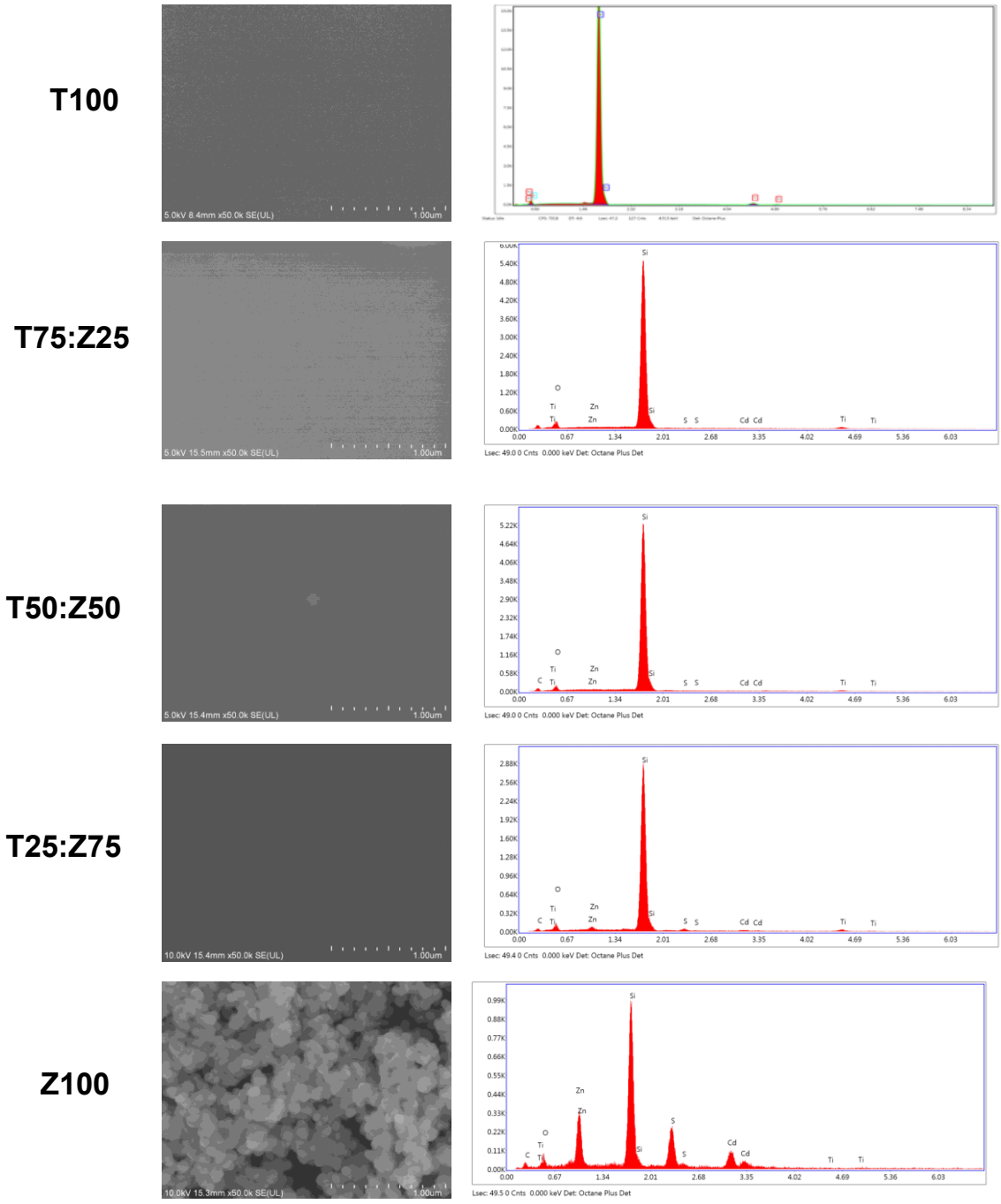

Figure S3. SEM and corresponding EDS spectra of T:Z nanocomposite films.

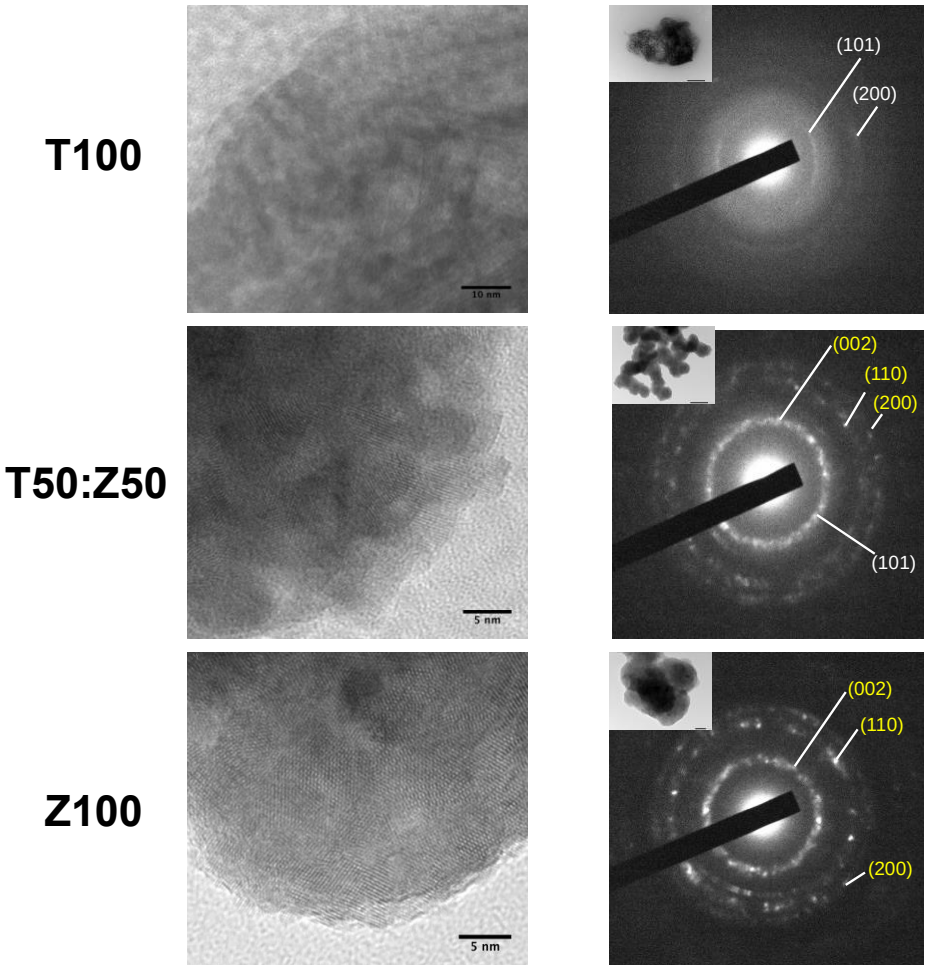

Figure S4. High-resolution TEM images and diffraction patterns at selected areas (insets) from of T100, T50:Z50 and Z100 samples.

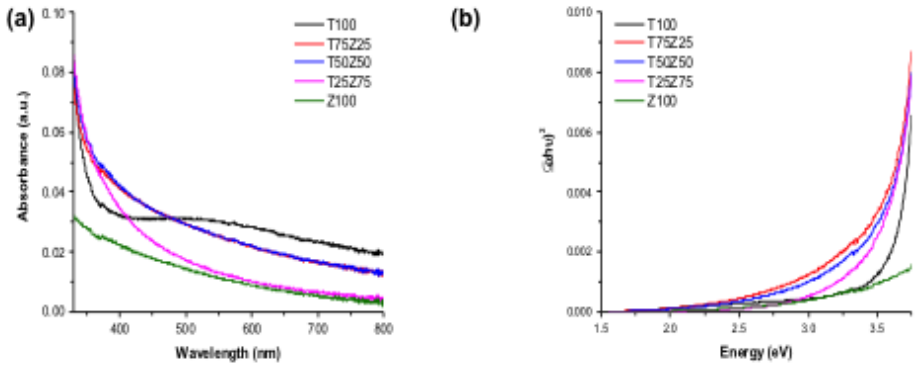

Figure S5. (**a**) UV-Vis spectra and (**b**) Tau plot of ETL composite thin films.

Table S1. Surface potential difference and work function of T:Z composite films obtained from SKPM technique.

	Vcpd (mV)	Work function (eV)
T100	292.03 ± 0.44	3.47 ± 0.44
T75Z25	356.28 ± 0.48	4.21 ± 0.48
T50Z50	258.23 ± 0.28	3.75 ± 0.28
T25Z75	358.80 ± 0.36	4.67 ± 0.36
Z100	138.92 ± 0.29	3.77 ± 0.29

Table S2. Binding energy and work function of T:Z composite films obtained from UPS technique. Photon energy is 40.8 eV.

	Binding energy cutoff (eV)	Work function (eV)
T100	36.58	4.22
T75Z25	36.80	4.00
T50Z50	37.10	3.70
T25Z75	36.72	4.08
Z100	37.20	3.60

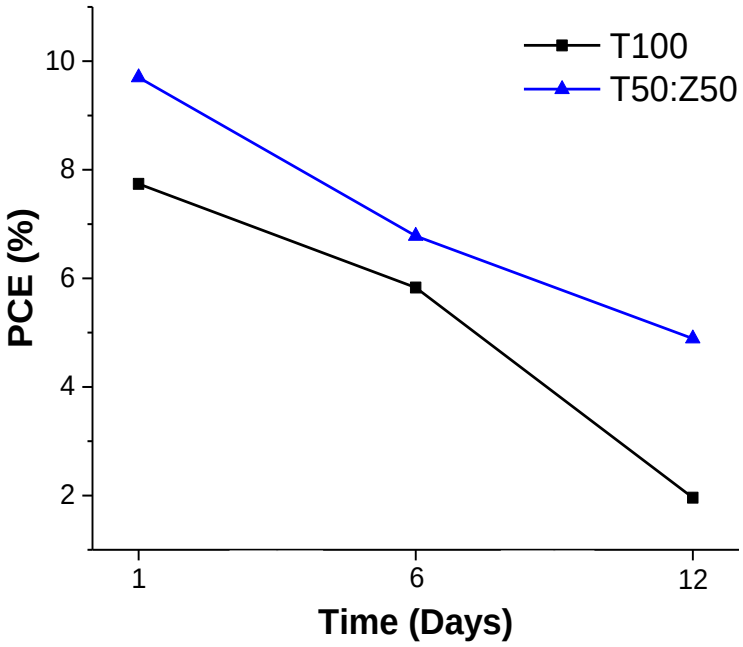

Figure S6 Stability of perovskite solar cell over 12 days**.**

Table S3. Perovskite solar cell parameters of with T100 and T50:Z50 ETL over 12 days.

Time (Days)	V_{oc} (v)	J_{sc} (mA/cm²)	*FF*	*PCE* (%)	Area (cm²)
T100 (D1)	0.859	15.14	0.60	7.74	0.1
T100 (D6)	0.901	11.95	0.54	5.83	0.1
T100 (D12)	0.767	5.96	0.43	1.96	0.1
T50:Z50 (D1)	0.889	17.99	0.61	9.79	0.1
T50:Z50 (D6)	0.874	13.98	0.55	6.78	0.1
T50:Z50 (D12)	0.823	13.19	0.45	4.89	0.1