

Supplementary material

An Inverted Perovskite Solar Cell with Good Comprehensive Performance Realized by Reducing the Concentration of Precursors

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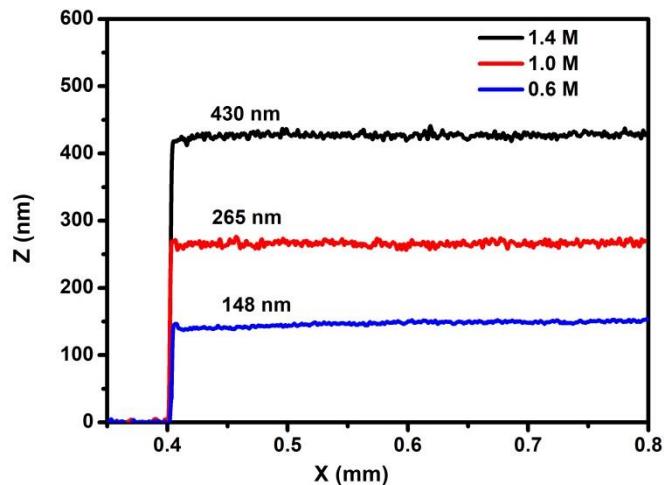


Figure S1. The thicknesses of perovskite films with different concentrations (1.4 M, 1.0 M and 0.6 M) of perovskite precursor. All the perovskite films were directly coated on ITO substrates.

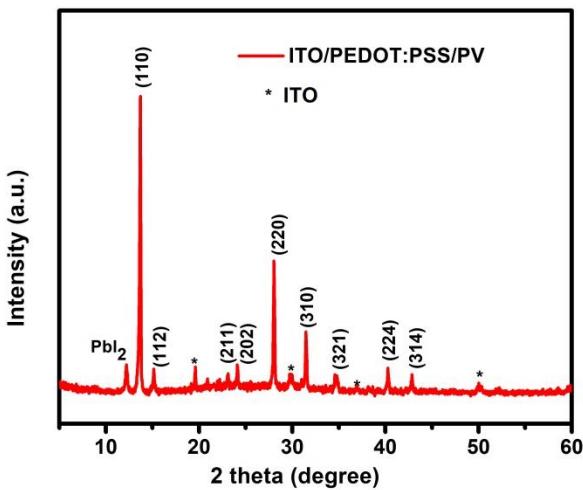


Figure S2. XRD spectra of perovskite film prepared by 1 M precursor coated on ITO/PEDOT:PSS film.

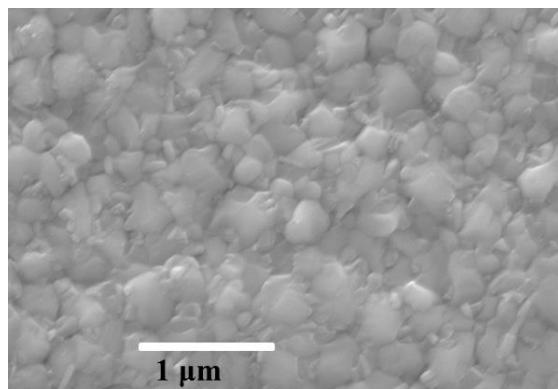


Figure S3: SEM image of perovskite film prepared by 1 M precursor coated on ITO/PEDOT:PSS substrate.

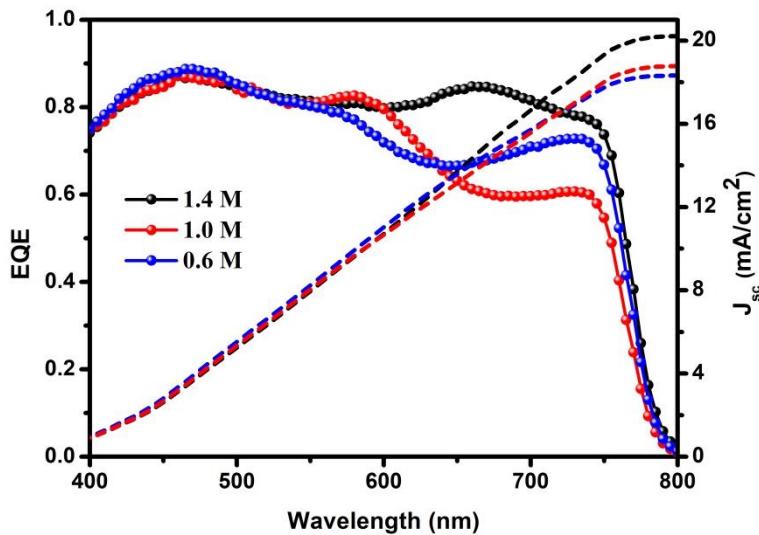


Figure S4. EQE spectra and their corresponding integrated photocurrents (dashed lines) of

inverted PSCs with different concentration (1.4 M, 1.0 M and 0.6 M) of perovskite precursors.

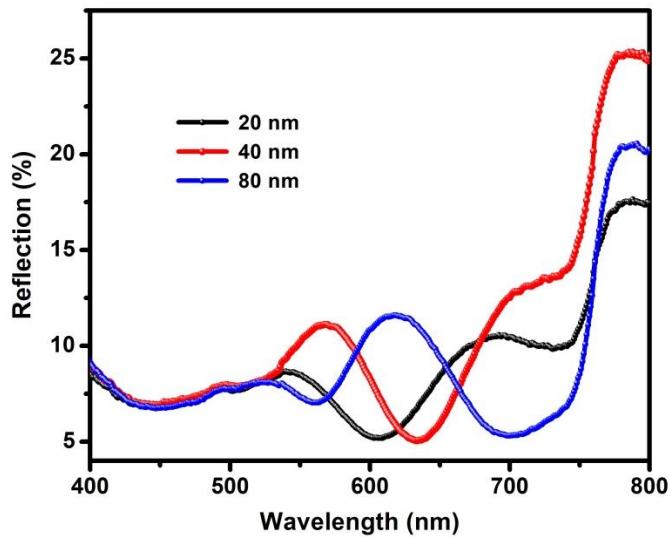


Figure S5. Reflection spectra of 1 M device with different thicknesses of C_60 ETL.

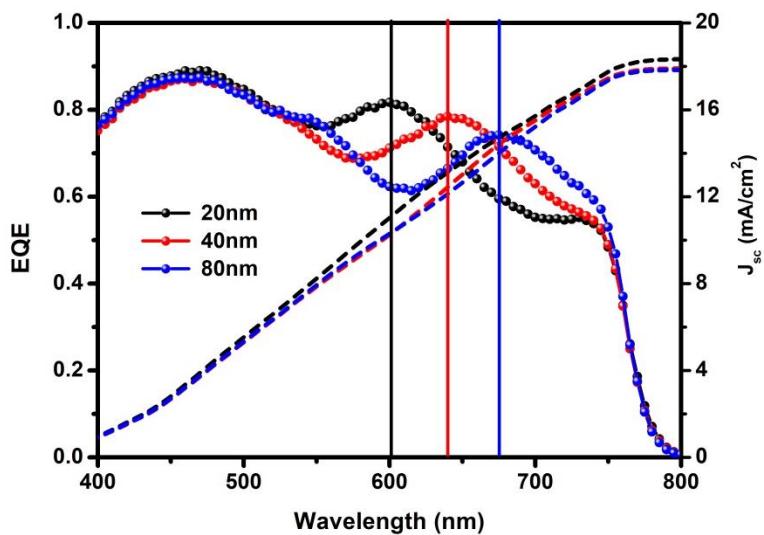


Figure S6. EQE spectra and their corresponding integrated photocurrents (dashed lines) of 1 M device with different thickness (20 nm, 40 nm, 80 nm) of C_60 ETL.

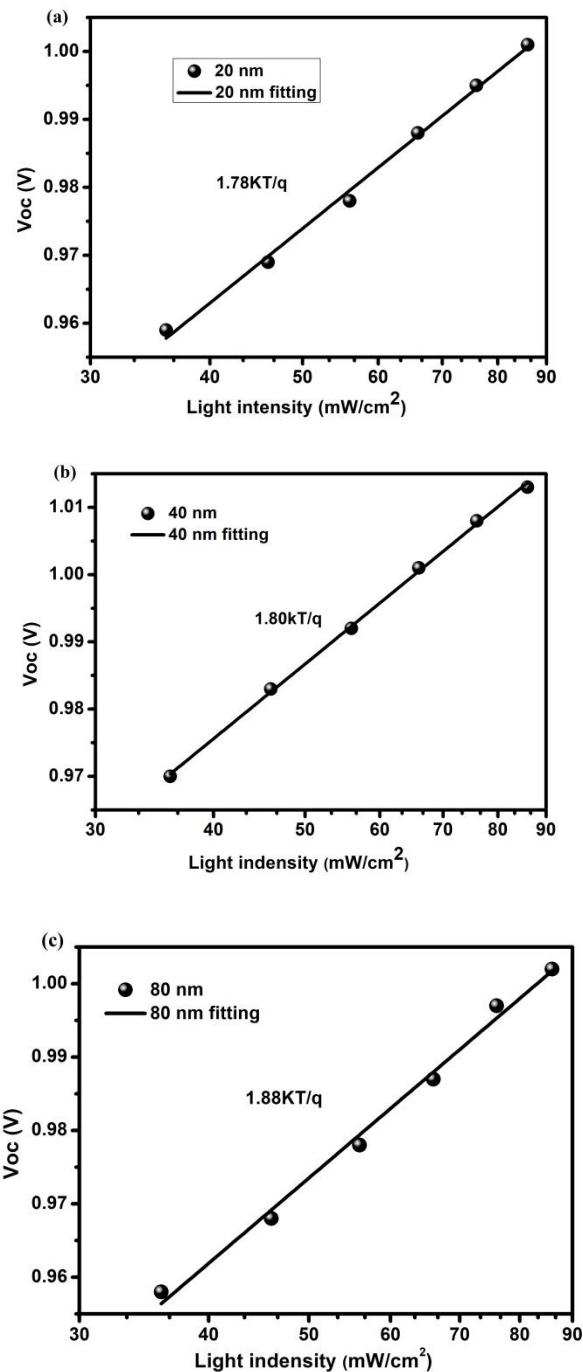


Figure S7. V_{oc} vs. light intensity for the PSCs with different thickness (a) 20 nm, (b) 40 nm, (c) 80 nm of C_60 ETL

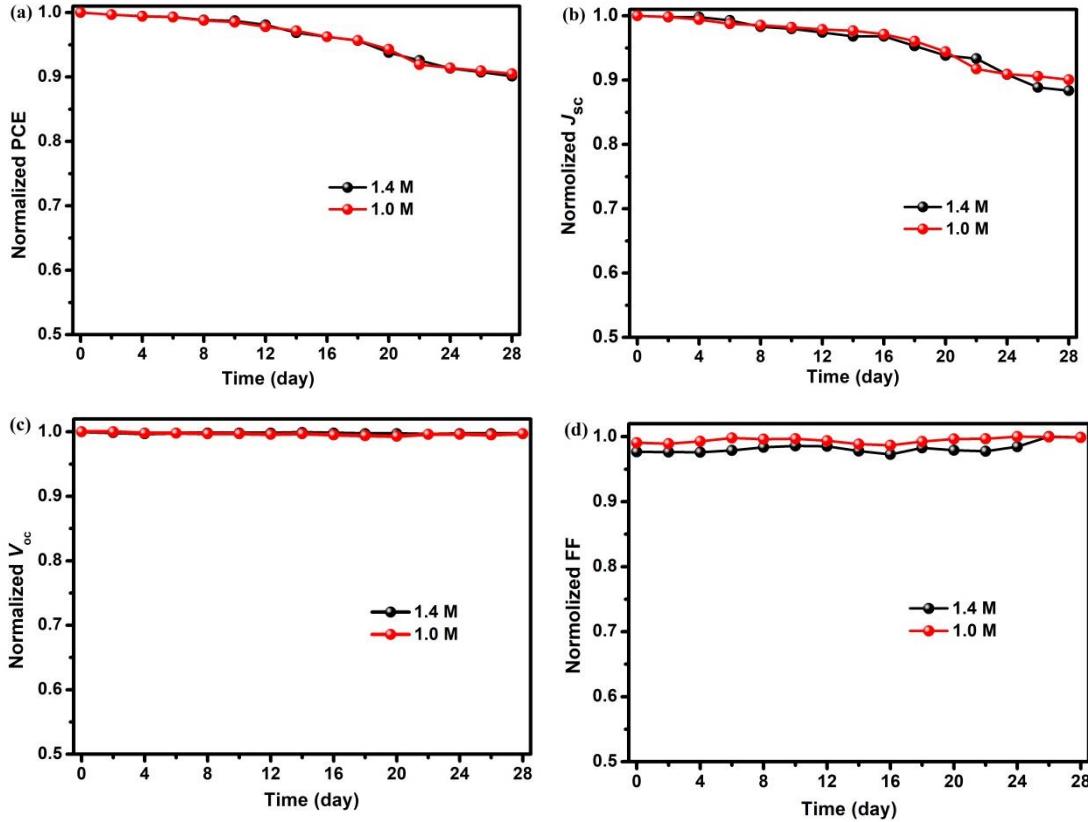


Figure S8. The normalized stability results displayed in Figure 4:(a) PCE, (b) J_{sc} , (c) V_{oc} and (d) FF.

Table S1: The photovoltaic parameters of 1 M device with three different thickness of C_{60} ETL.

Thickness C_{60}	V_{oc} (V)	J_{sc} (mA/cm^2)	FF (%)	PCE (%)
20 nm	1.030	18.53	81.2	15.50
40 nm	1.030	18.25	80.4	15.11
80 nm	1.028	17.30	80.6	14.33

Table S2: Parameters of equivalent circuit extracted from the fitting of impedance data for ITO/PEDOT:PSS/Perovskite/C₆₀/BCP/Ag device with different thicknesses of C₆₀ (20, 40, 80 nm) under the illumination of AM 1.5G, 100 mW/cm².

Thickness C60	Rs (Ω)	R_{ct} (Ω)	R_{rec} (Ω)
20 nm	35.3	337	869
40 nm	35.8	352	373
80 nm	43.7	372	367