Supporting Information

Highly stable perovskite solar cells with all-inorganic selective contacts from microwave-synthesized oxide nanoparticles

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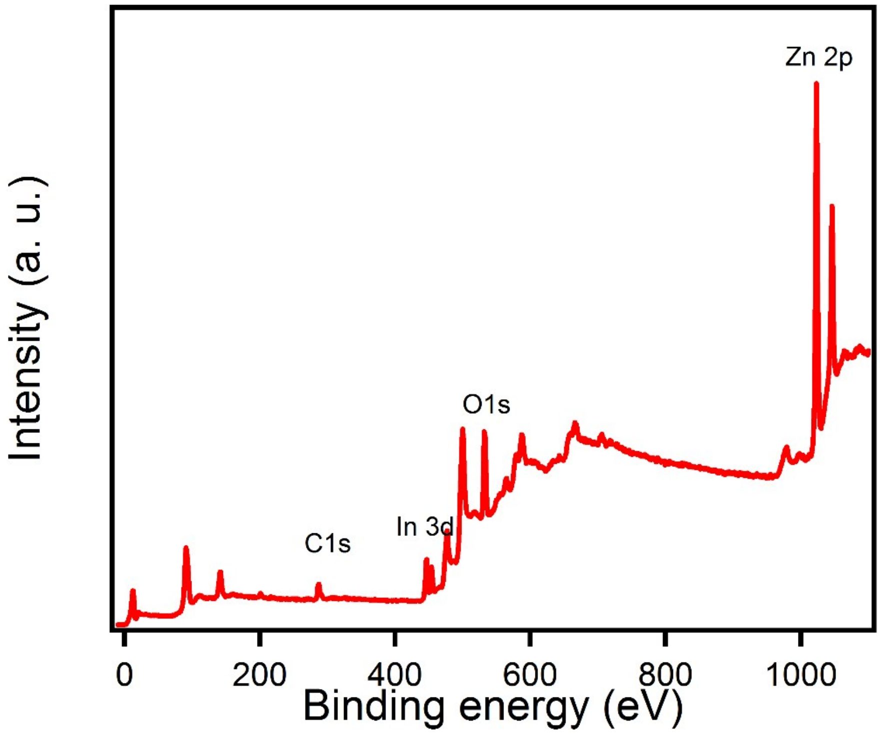

Fig. S1. The X-ray photoemission spectra for 5% IZO powders with full survey scan for binding energy 0-1100 eV.

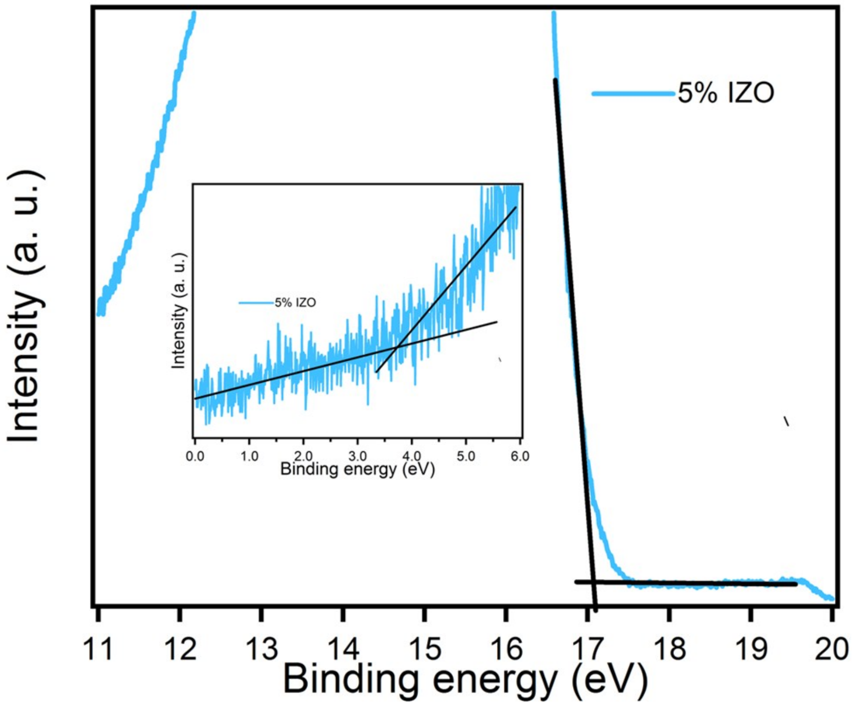

Fig. S2. The ultraviolet photoelectron spectroscopy (UPS) measurement for 5% IZO coated on FTO substrate to measure work function and valence band (inset).

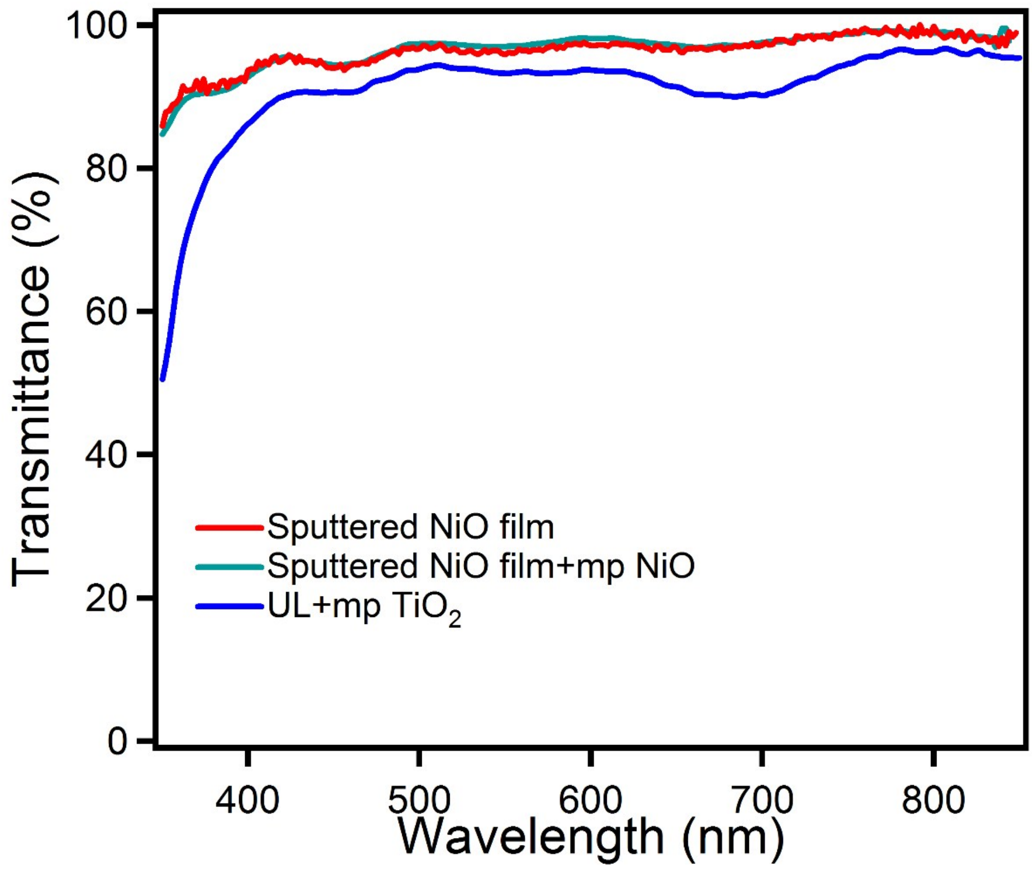

Fig. S3. The transmittance spectra of sputtered NiOx film, sputtered NiOx film + mesoporous NiO layer and mesoporous TiO_2 layer. (We used FTO substrate as baseline.)

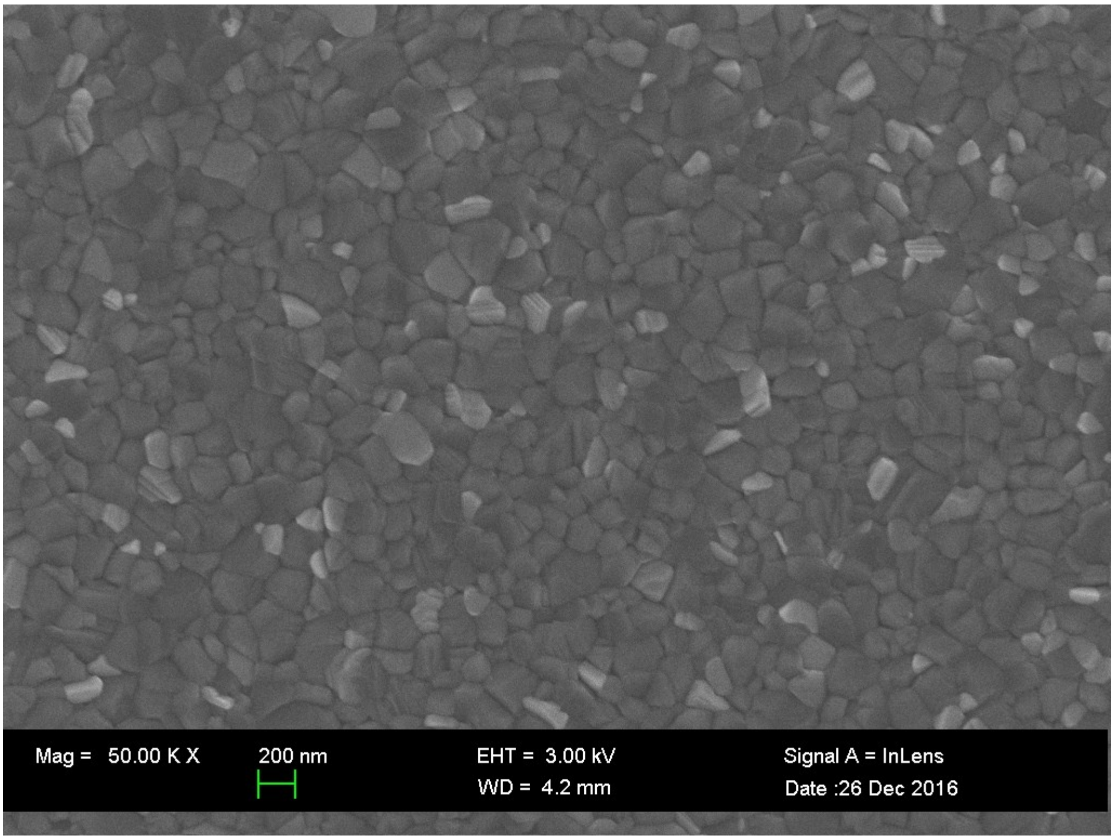

Fig. S4. The top-view SEM image for triple-cation perovskite coated on mesoporous NiO layer/NiO_x thin.

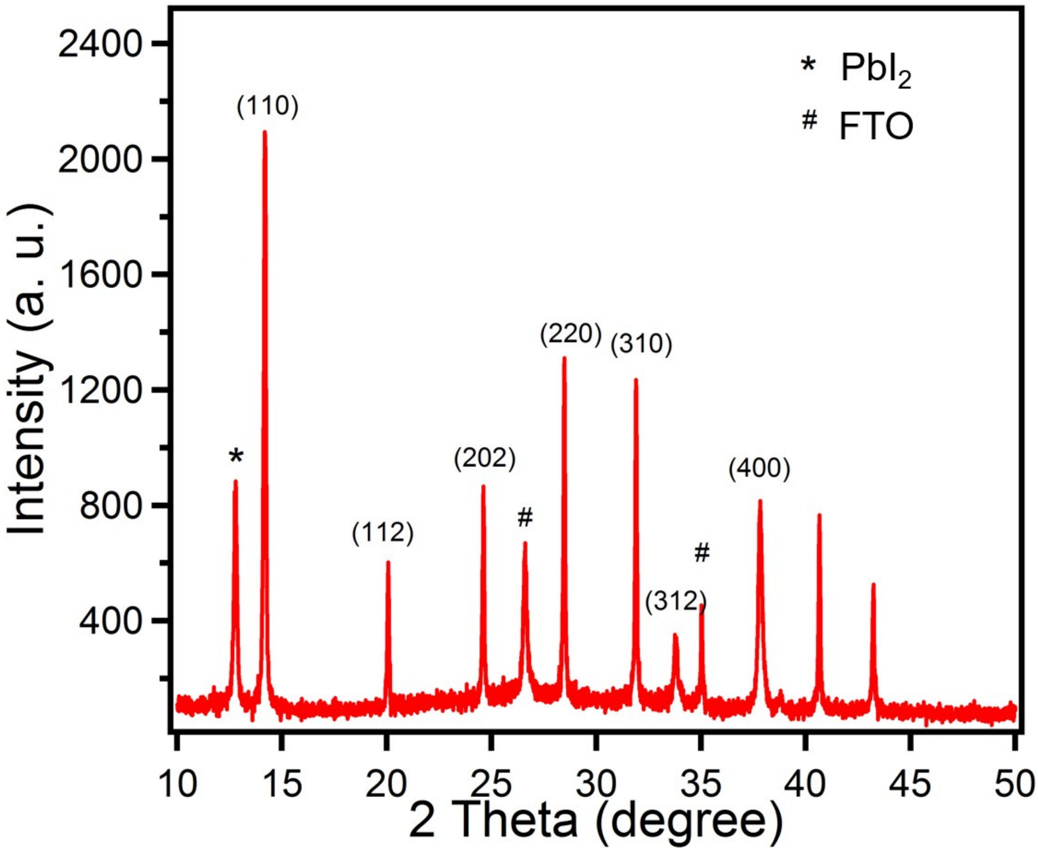

Fig. S5. The XRD pattern of triple-cation perovskite coated on mesoporous NiO layer/NiO_x thin.

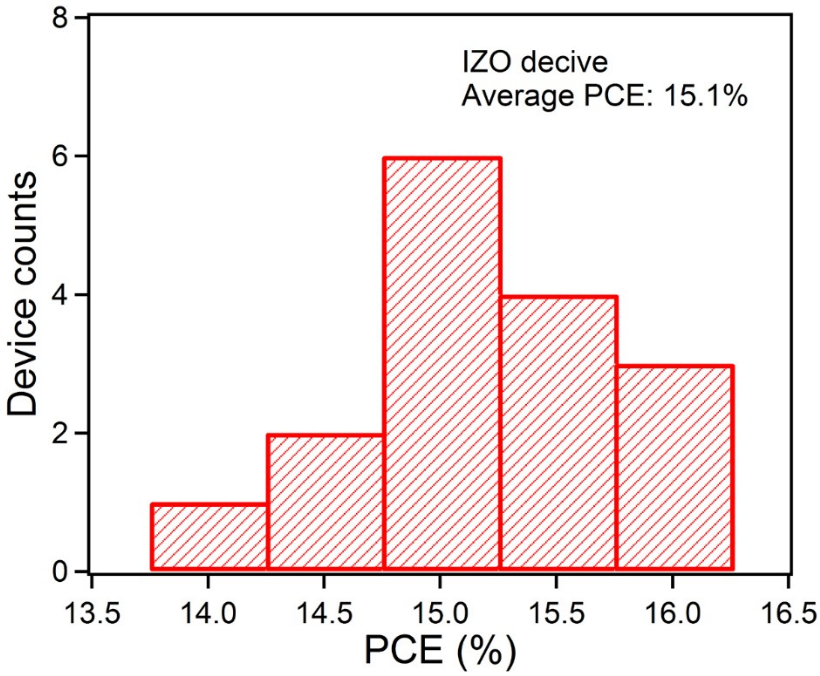

Fig. S6. The statistical data for 6.5 % IZO-based perovskite solar cells.

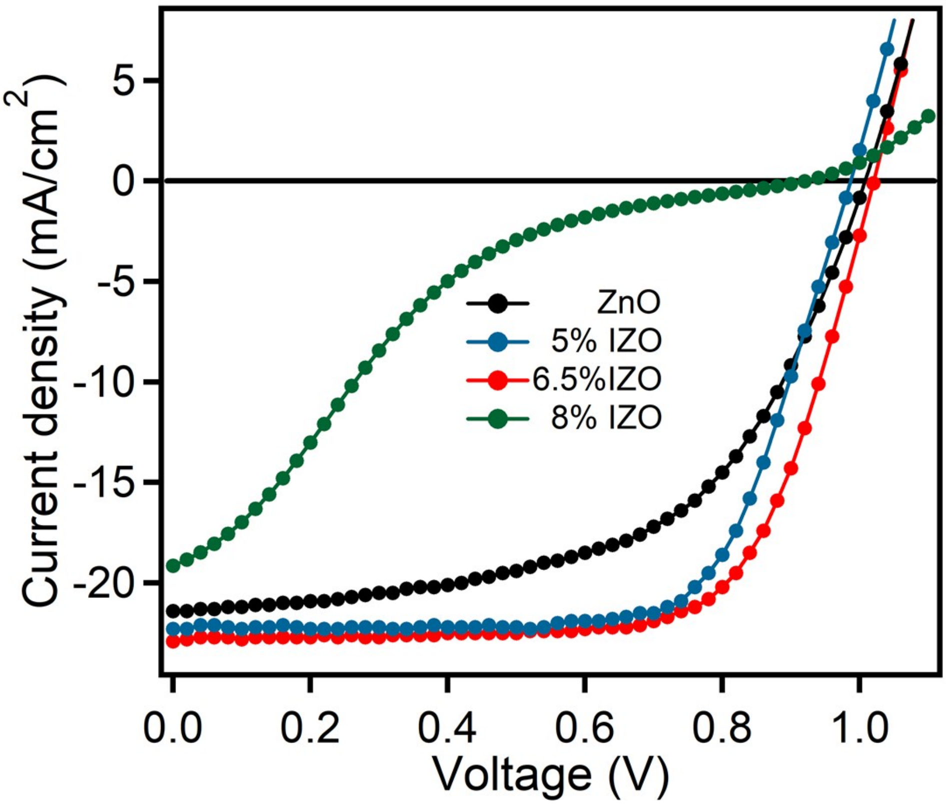

Figure S7. The J-V curve measurement based on different doping ratio of IZO device performance.

Table S1. The summarized *J-V* data for different doping ratio of IZO device performance.

	V_{oc} (V)	J_{sc} (mA/cm^2)	FF (%)	PCE (%)
ZnO	1.01	21.36	56.25	12.01
5% IZO	0.987	22.35	69.96	15.43
6.5 % IZO	1.02	22.86	69.43	16.20
8% IZO	0.92	19.15	15.17	2.67%

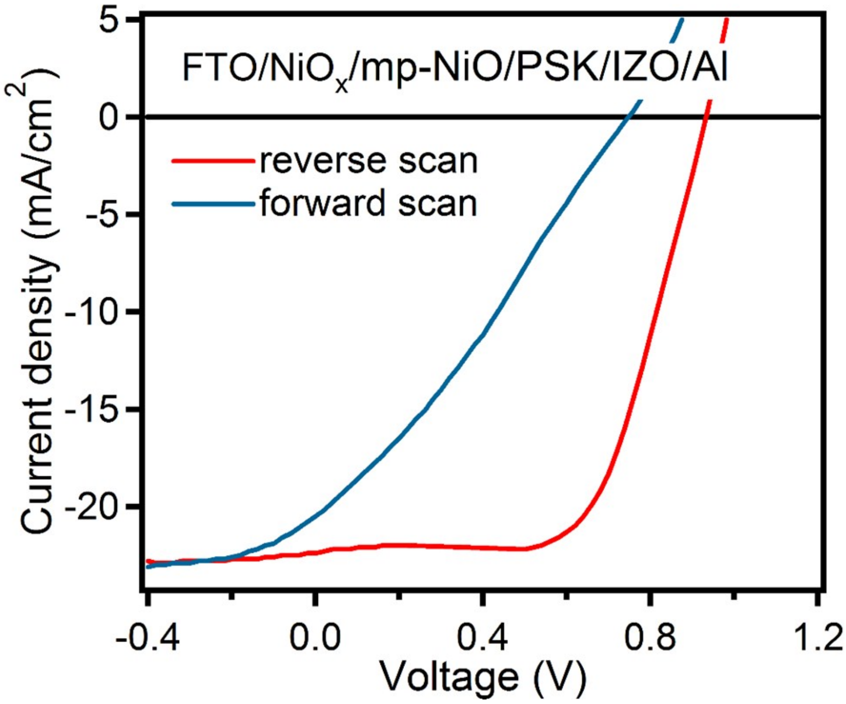

Fig. S8. The hysteresis effect on one of IZO-based perovskite solar cells with *J*-*V* curve for forward scan and reverse scan.

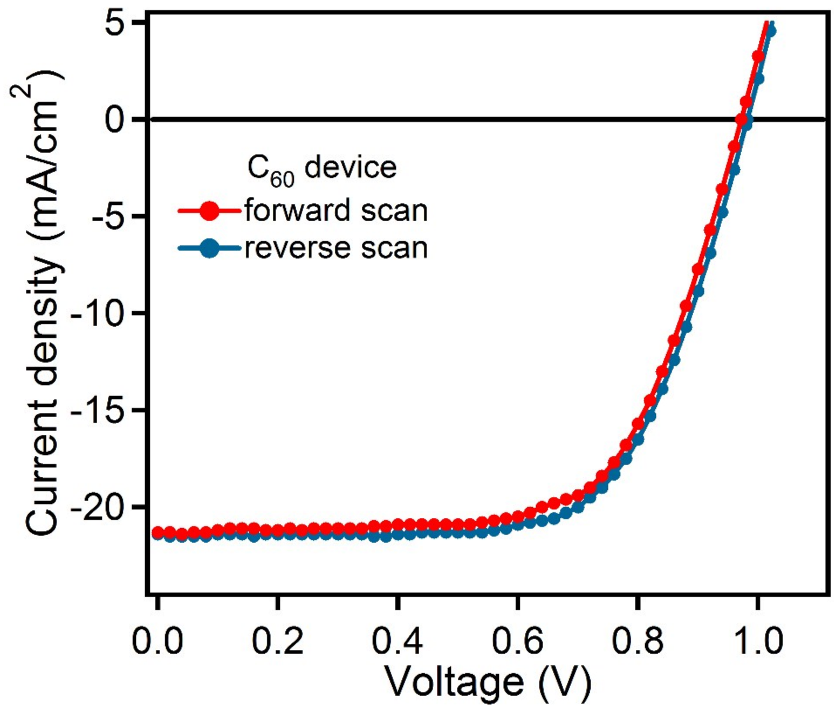

Fig. S9. The *J-V* curve for C_{60}-based perovskite solar cells with different scan direction from J_{sc} to V_{oc} (forward scan) and from V_{oc} to J_{sc} (reverse scan).

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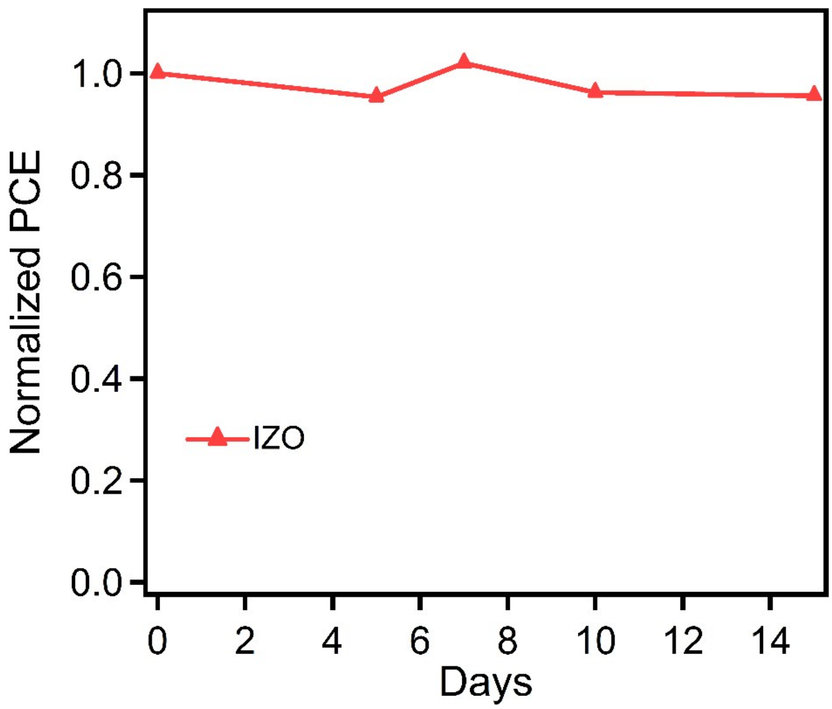

Fig. S10. The stability test with all inorganic interfaces device without encapsulation storage under ambient environment with relative humidity of 25 ± 5% for several days.

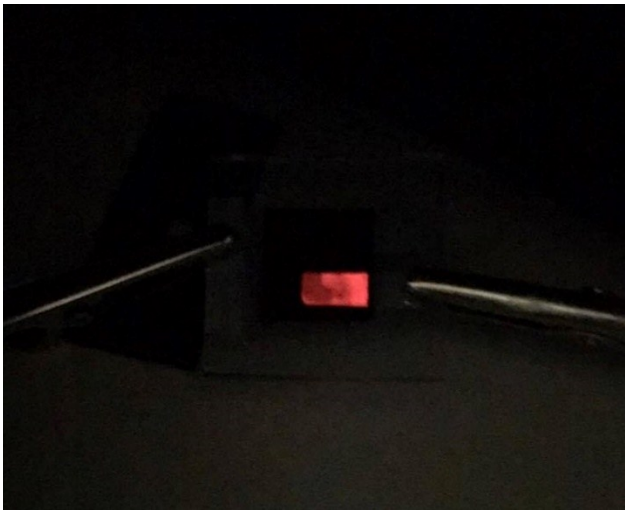

Fig. S11. The electroluminescence photo for IZO-based perovskite solar cell under forward bias in the dark.