Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

UV Degradation of the Interface between Perovskite and Electron Transport Layer

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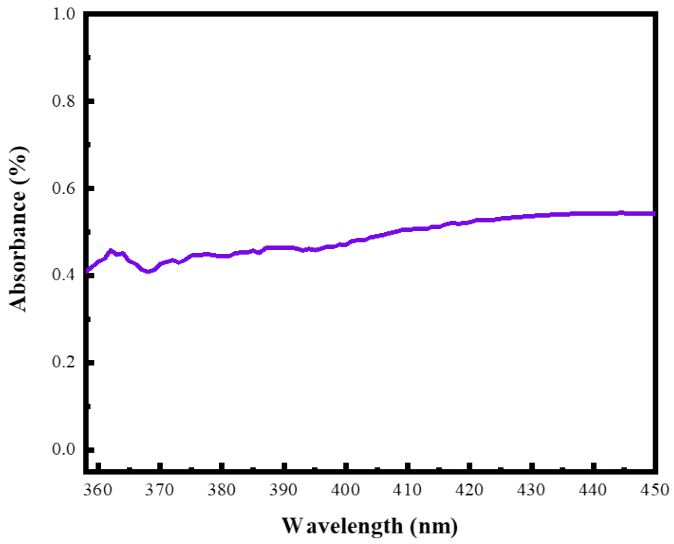

Figure S1 The optical absorbance spectra of FTO coated glass were measured by UV-vis/NIR spectrophotometer and its absorption coefficient at 365nm is 0.42. About 60 percent of ultraviolet light intensity can be transmitted and reach ETL.

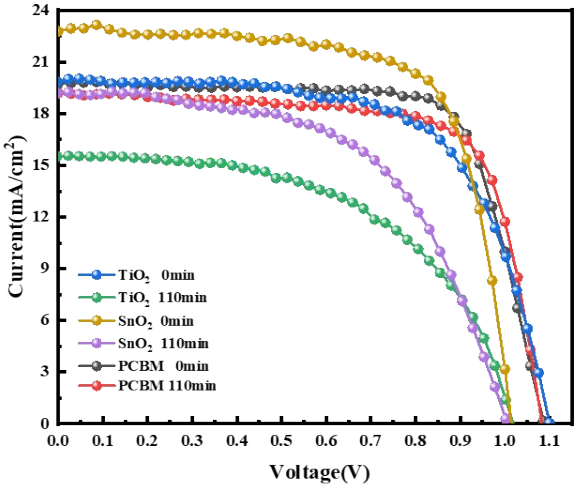

Figure S2 The typical *J–V* curves of the devices based on different ETLs before and after UV treatment.

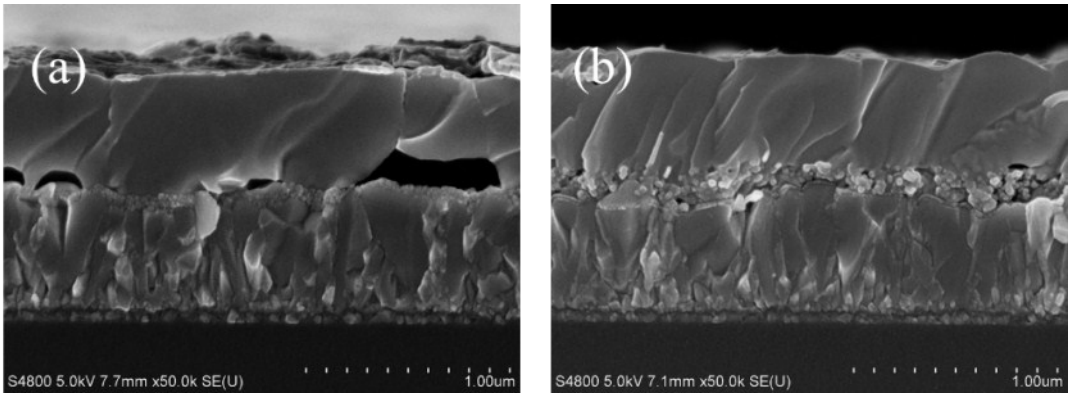

Figure S3 The cross-sectional SEM images of perovskite films based on (a) planar SnO_2, (b) mp-SnO_2 after 110 min UV exposure, respectively.

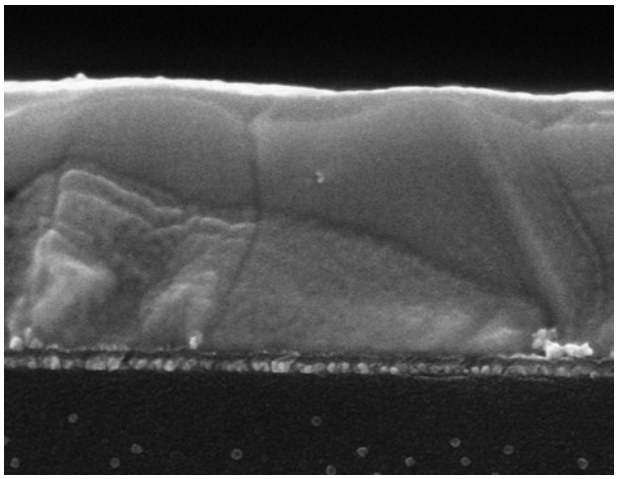

Figure S4 The cross-sectional SEM images of perovskite films based on PCBM after 110min UV treatment and the UV illumination was from the PCBM side. The morphology of PCBM/perovskite interface is stable which shows a similar effect as illumination from FTO side.

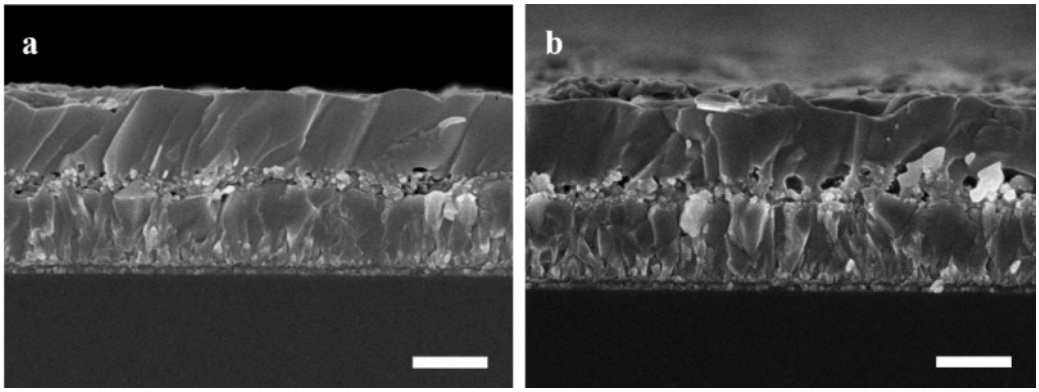

Figure S5 The cross-sectional SEM images of perovskite layers deposited on (a) mp-SnO_2, (b) mp-TiO_2 after 110min UV illumination in an open environment with a humidity of about 40%. The interface of mp-SnO_2/ perovskite or mp-TiO_2/perovskite is more serious than that in a nitrogen glove box.

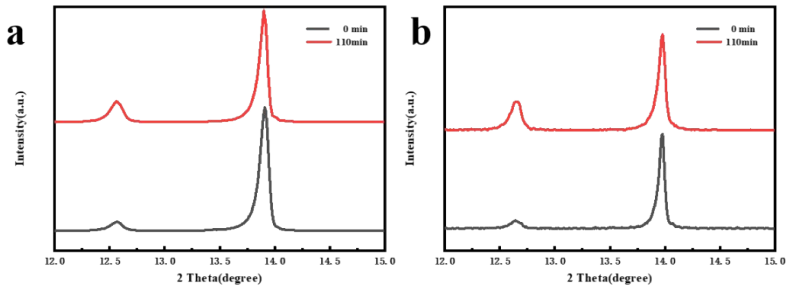

Figure S6 X-ray diffraction patterns of (a) mp-SnO_2, (b) mp-TiO_2 based perovskite film after 110min UV irradiation in an open environment with a humidity of about 40%. The intensity of PbI_2 diffraction peak increased significantly which indicates the stronger photocatalysis of TiO_2 and SnO_2 than that in N_2 atmosphere.

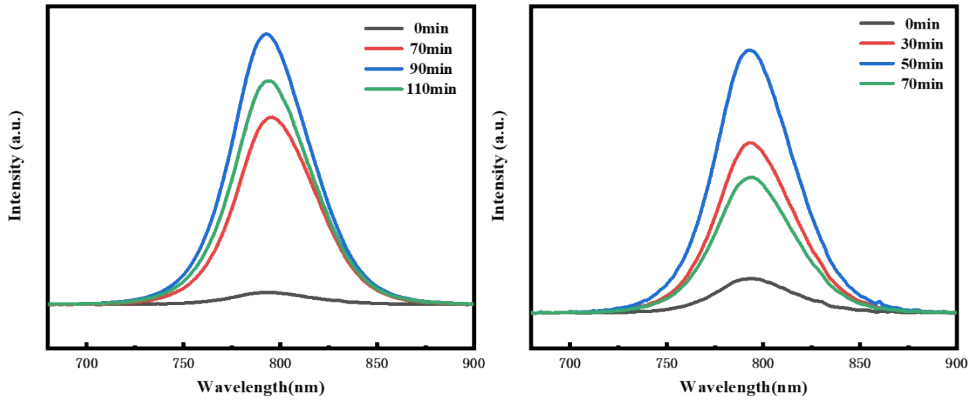

Figure S7 Steady-state photoluminescence (PL) spectra of perovskite film based on (a) mp-TiO_2, (b) mp-SnO_2. The 450nm laser is incident from the perovskite film surface. Compared with the laser from the glass side, the PL intensity of perovskite films deposited on mp-TiO_2 or mp-SnO_2 also shows the trend of increasing first and then decreasing with the extension of UV treatment time.

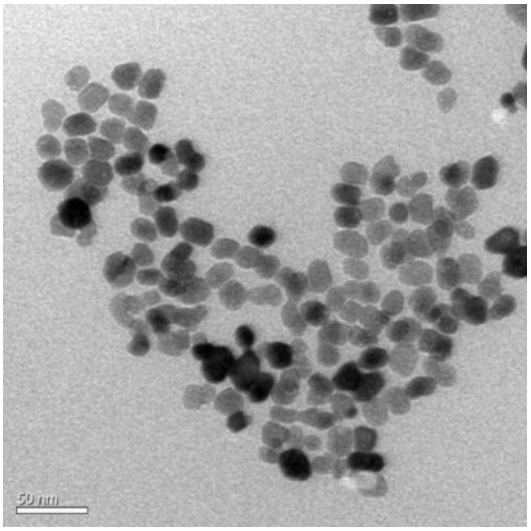

Figure S8 TEM image of SnO_2 nanoparticles (NPs). The grain size of the nanoparticles is approximately 20 nm and the SnO_2 NPs were uniformly dispersed and there was no agglomeration.

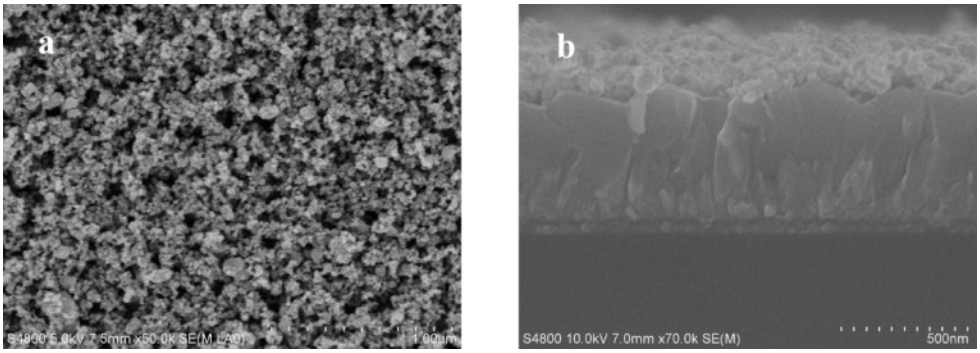

Figure S9 (a) Surface SEM image of SnO_2 nanoparticles. (b) Cross-sectional SEM images of SnO_2 NPs deposited on FTO. The thickness of mesoporous (mp) SnO_2 layer is about 150 nm.