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Supplementary Information

Enhancing Efficiency of Perovskite Solar Cells using Mesoscopic Zinc-Doped TiO_2 as Electron Extraction Layer through Band Alignment

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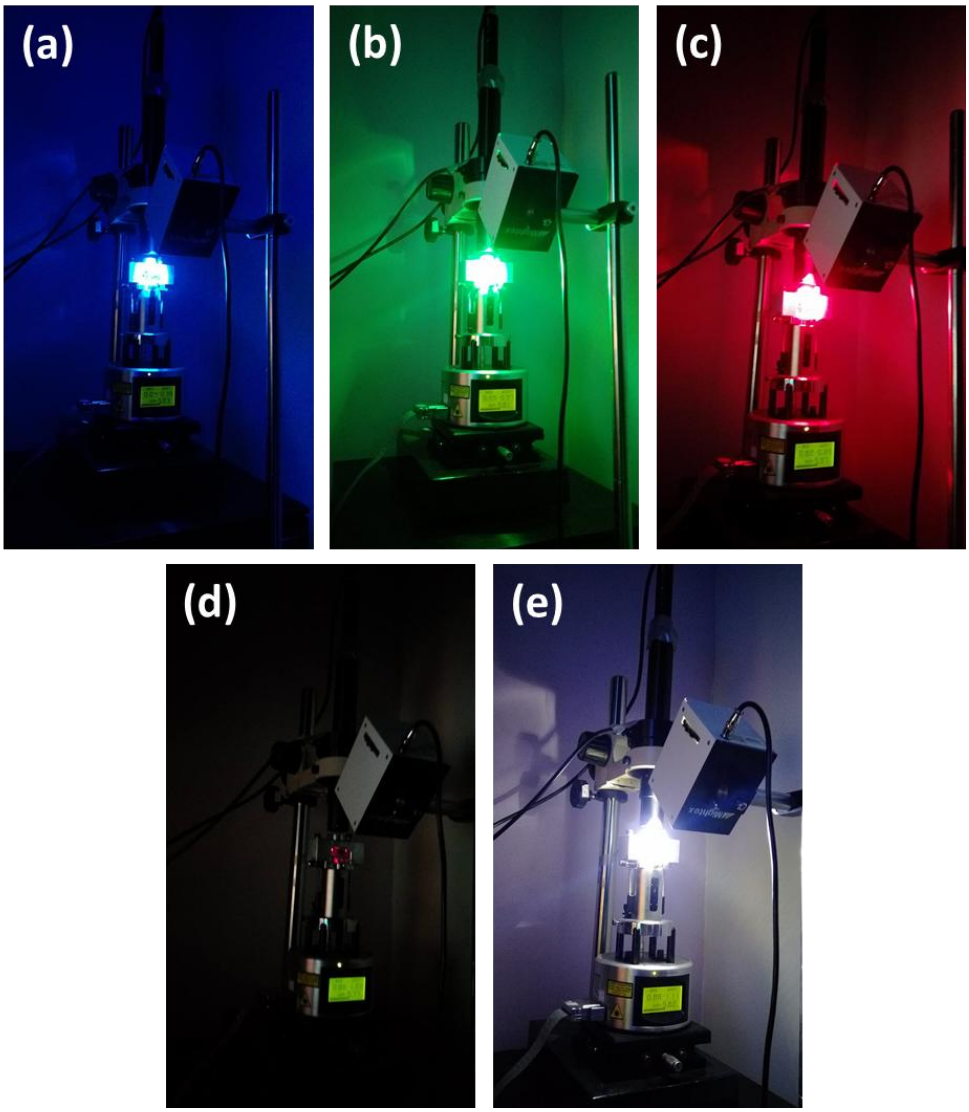

Fig. S1 Photographs of KPFM measurement under wavelength-switchable LED light source illumination. (a) 470 nm, (b) 530 nm, (c) 656 nm, (d) 850 nm, and (e) white light.

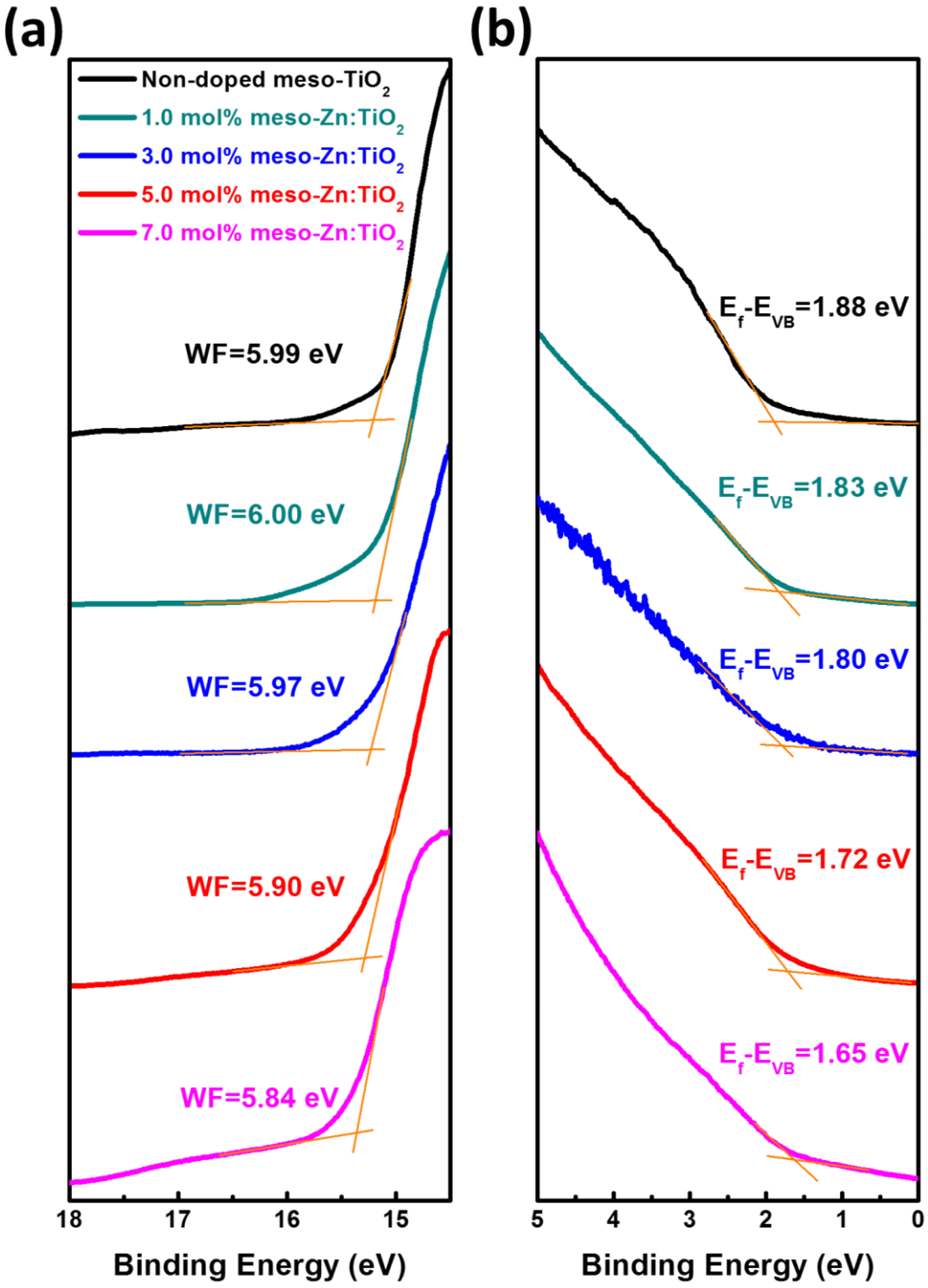

Fig. S2 UPS spectra of the meso-TiO_2 with different Zn doping level. (a) Secondary-electron cut-off, and (b) the valence-band region.

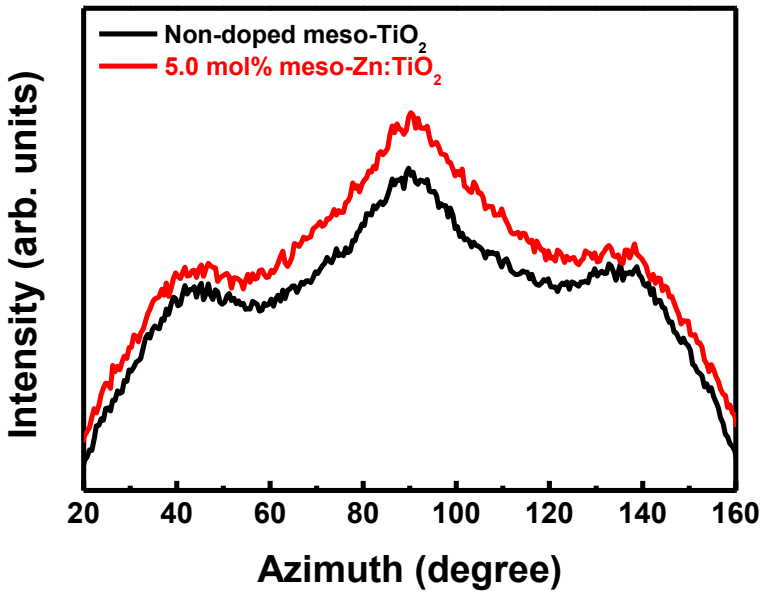

Fig. S3 Azimuthal intensity plots that corresponding to Fig. 4(a) and 4(b) along the ring at q=10 nm^{-1}, produced by the (110) plane of the $CH_3NH_3PbI_3$ film.

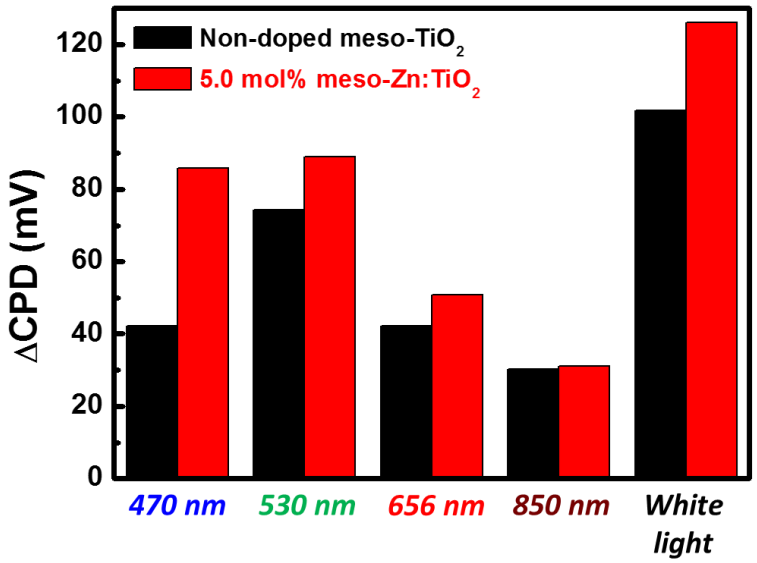

Fig. S4 Bar charts of ΔCPD *v.s.* different wavelengths of light for $CH_3NH_3PbI_3$/meso-TiO_2/dense TiO_2/FTO structure with non-doped meso-TiO_2 and 5.0 mol% meso-Zn:TiO_2

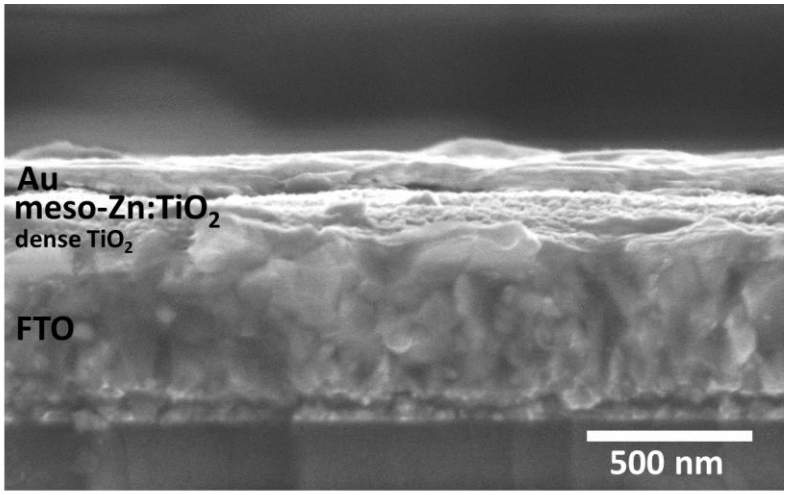

Fig. S5 Cross-section SEM image of electron-only device for SCLC measurement.