

Supplementary data for

Molecular doping of CuSCN for hole transporting layer in inverted-type planar perovskite solar cells

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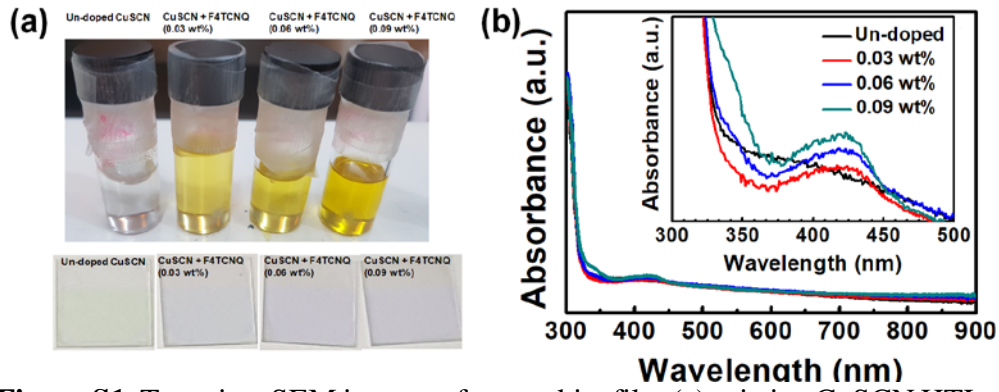


Figure S1. Top-view SEM images of perovskite film (a) pristine CuSCN HTL and (b) 0.03 wt% F4TCNQ-doped CuSCN.

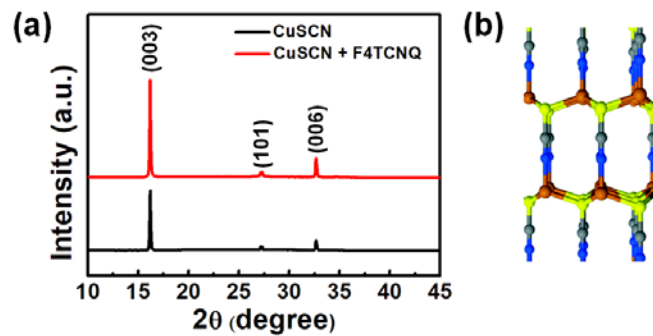


Figure S2. X-ray diffraction patterns of CuSCN with and without F4TCNQ (a) and corresponding schematic illustration of CuSCN in β -phase (brown sphere = Cu; yellow sphere = S; gray sphere = C; and blue sphere = N) (b).

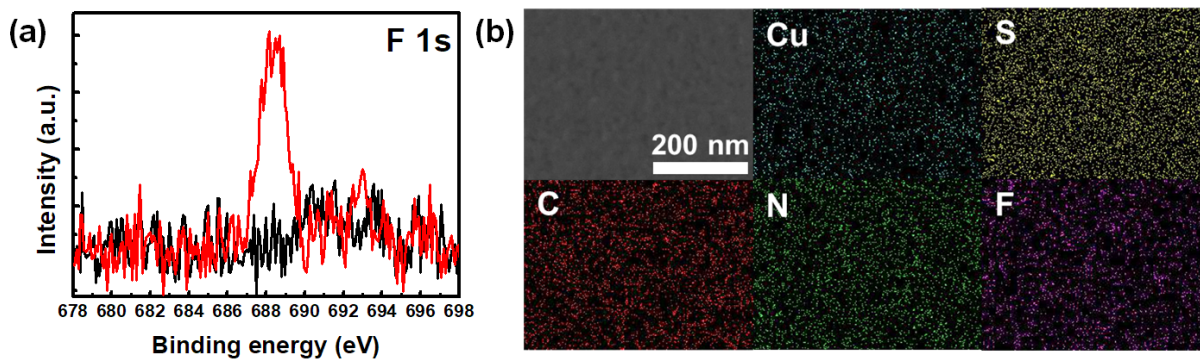


Figure S3. XPS core-level signal for F1s (a), and elemental mapping of F4TCNQ (0.03 wt%)-doped CuSCN thin films by SEM (EDS) (b).

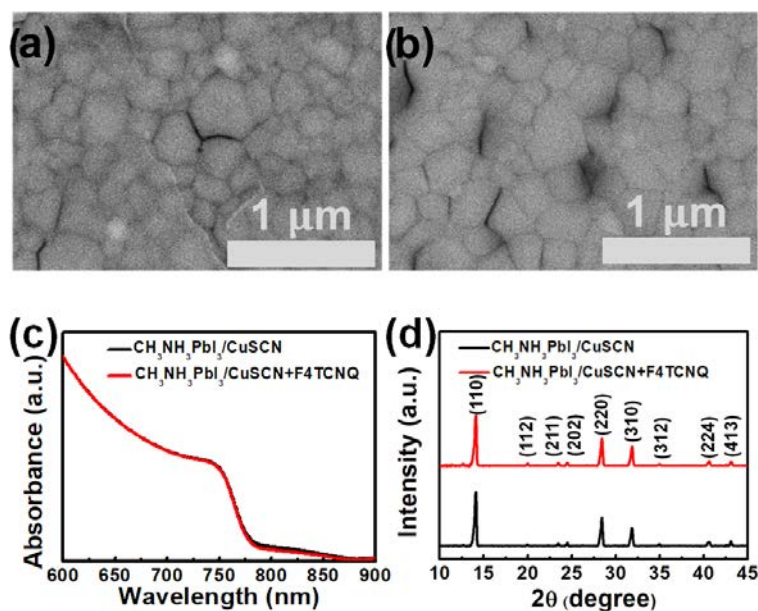


Figure S4. SEM images for $\text{CH}_3\text{NH}_3\text{PbI}_3$ layers on CuSCN (a) and on CuSCN with F4TCNQ (b), and their absorption spectra (c) and X-ray diffractograms (d).

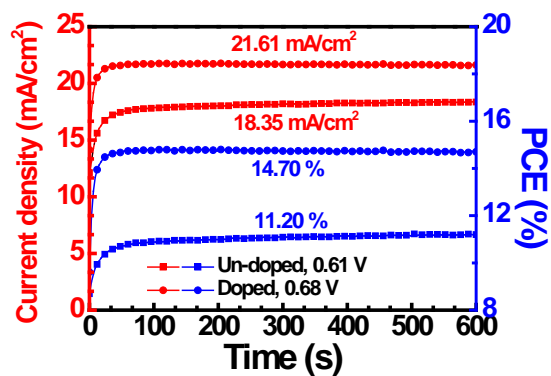


Figure S5. Steady-state photocurrent generations under 100 mW/cm^2 illumination at each maximum power point voltage for the devices employing the un-doped and the doped CuSCN.

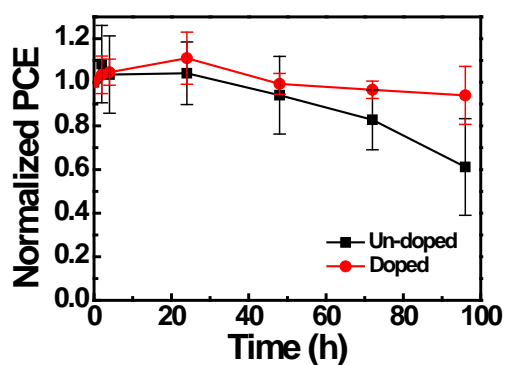


Figure S6. Normalized PCE of devices with un-doped and doped CuSCN when stored in a glovebox.