

Supporting information

Copper thiocyanate (CuSCN): an efficiency solution-processable hole transporting layer in organic solar cells

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Experimental

All chemicals and materials were purchased from sigma-aldrich and Alfa Aesar and used without further purification unless otherwise stated. P3HT ($M_n \sim 54,000$ and $PDI < 2.5$) and were purchased from sigma-aldrich. PCDTBT, PTB7, PC₆₁BM and PC₇₁BM were purchased from 1-material, Canada.

Preparation of CuSCN Hole Transport Layer (HTL)

10 mg of copper(I) thiocyanate (CuSCN) was dissolved in 1 mL of diisopropyl sulfide and the resulting suspension mixture was sonicated for 4 hrs at room temperature. After sonicated the mixture was kept for 1 hr at room temperature and the insoluble portion was settle down. The clear solution was used for solution-processable HTL in organic solar cells.

Preparation of MoO₃ Hole Transport Layer (HTL)

10 nm Thickness HTL of MoO₃ was deposited by thermal evaporation at a pressure of 5×10^{-6} mbar

Preparation of Active Materials

P3HT:PC₆₁BM: P3HT and PC₆₁BM were dissolved in chlorobenzene in the weight ratios from 1:0.8 and the concentration of the solution mixture of P3HT and PC₆₁BM was 30 mg/mL in total.

PCDTBT:PC₇₁BM: The composition ratio of PCDTBT:PC₇₁BM is 1:4 that dissolved in a mixture of chlorobenzene and dichlorobenzene (1:3 ratio) in a concentration of 35 mg/mL.

PTB7:PC₇₁BM: The compositions ratio of PTB7:PC₇₁BM is 1:1.5 that dissolved in a mixture of chlorobenzene and 1,8-diiodooctane (97:3 vol%) in a concentration of 25 mg/mL.

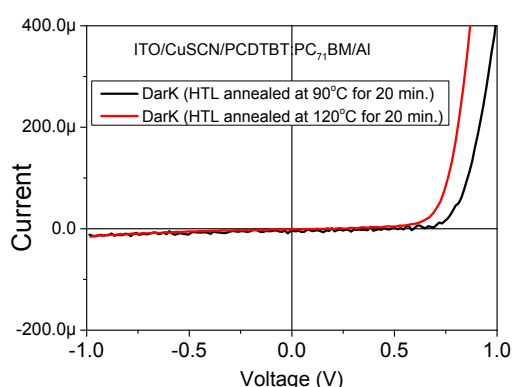


Figure S1. Dark curves for OPV devices for ITO/CuSCN/PCDTBT:PC₇₁BM/Al geometry.

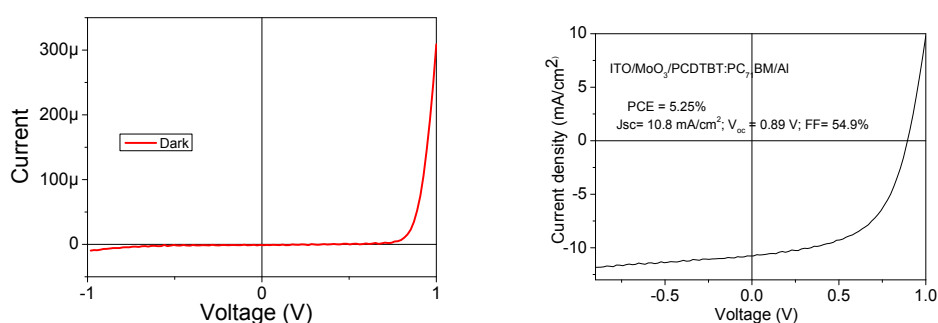


Figure S2. J-V curves for OPV device performance for ITO/MoO₃/PCDTBT:PC₇₁BM/Al geometry.

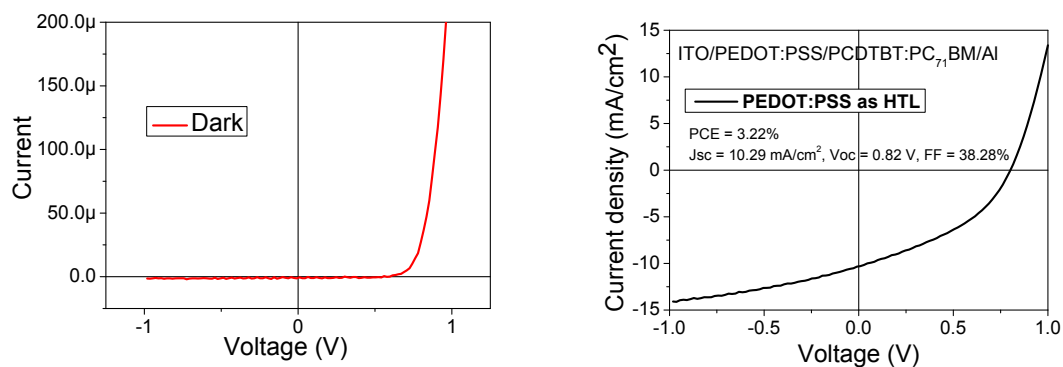


Figure S3. Dark and light J-V curves for OPV device for ITO/PEDOT:PSS/PCDTBT:PC₇₁BM/Al geometry.

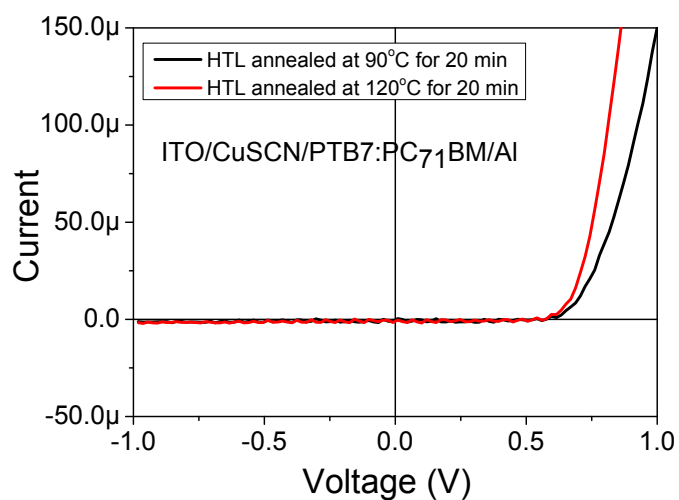


Figure S4. Dark curves for OPV devices for ITO/CuSCN/PTB7:PC₇₁BM/Al geometry.

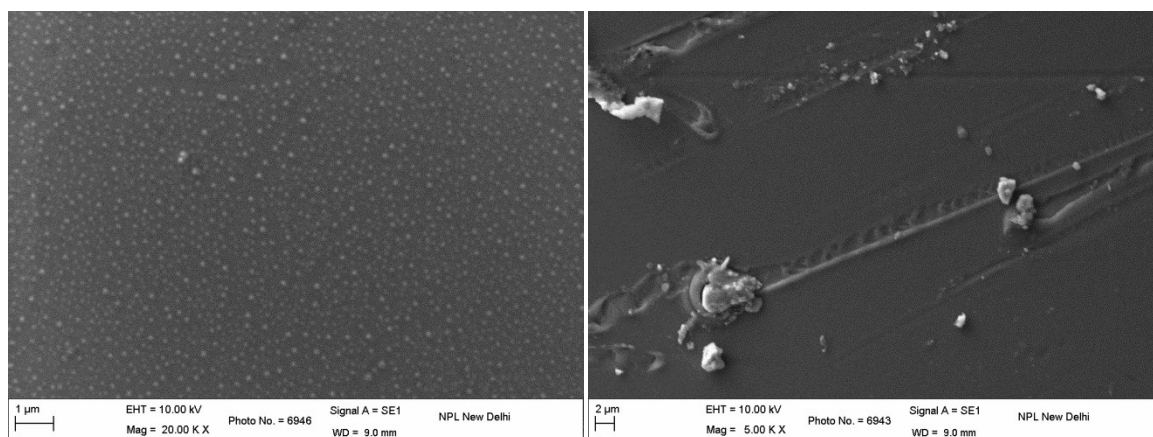


Figure S5. SEM images of (left) MoO_3 film and (right) PEDOT:PSS film on ITO.