Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.
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Supplementary Information for

Controlling Charge Injection Properties in Polymer Field-Effect Transistor by Incorporation of Solution Processed Molybdenum Trioxide

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Fig. S1 | Transfer characteristics of OFETs with P3HT/Au (a) and OFETs with P3HT/MoO_3(0.8wt%)/Au (b).

Fig. S2 | Transfer (I_d vs. V_g) characteristics of the OFETs with *p*-type polymer semiconductors, DPPT-TT, and Mo electrodes with and without a MoO_3 interlayer.

Fig. S3 | Transfer (I_d vs. V_g) characteristics of the OFETs with *p*-type polymer semiconductors, P3HT, and Mo electrodes with a MoO_3 interlayer.

Fig. S4 | Work function of Mo electrode dependence on MoO_3 thickness (for varied concentration of MoO_3 solution).

Table S1 | Estimation of depletion of W_d.

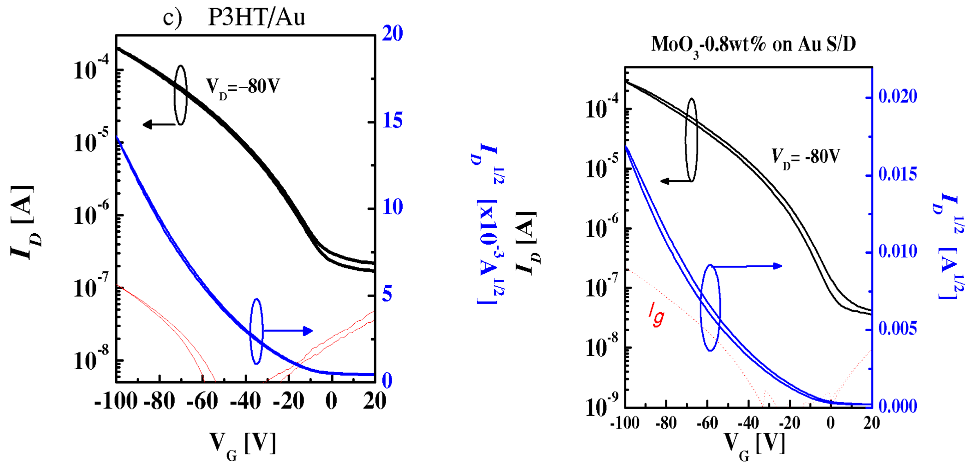

Figure S1. Transfer characteristics of OFETs with P3HT/Au (a) and OFETs with P3HT/MoO_3(0.8wt%)/Au (b). The performance showed very limited improvement as compared to pristine Au device. The P3HT/Au device shows mobility 0.15 cm2/Vs and P3HT/MoO3(0.8wt%)/Au exhibits mobility 0.172 cm2/Vs (yet the transfer curve exhibits hysteresis).

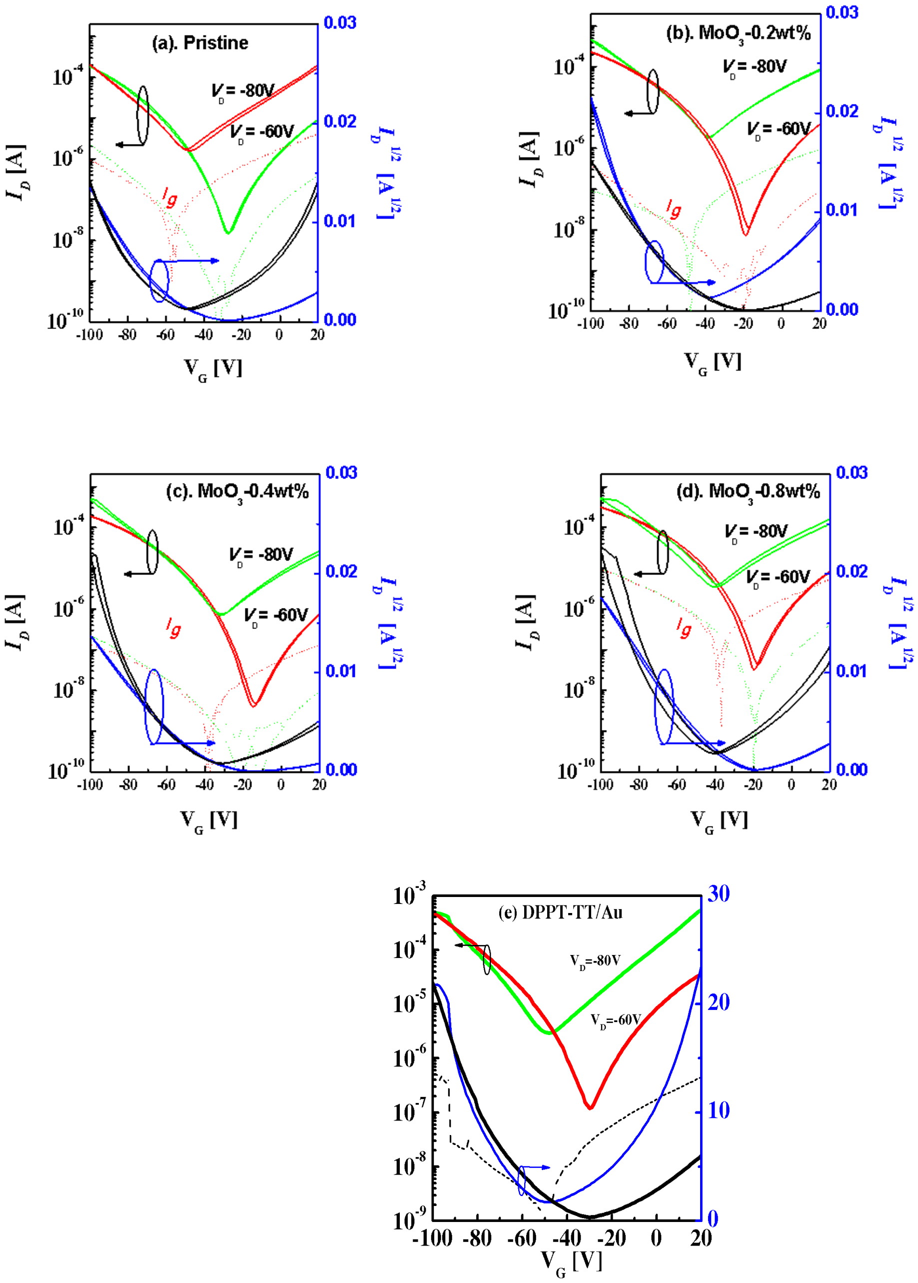

Fig. S2 | Transfer (I_d vs. V_g) characteristics of the OFETs with *p*-type polymer semiconductors, DPPT-TT, and Mo electrodes with and without a MoO_3 interlayer (0.2–0.8 wt%); (a) DPPT-TT OFETs with pristine Mo source/drain electrodes, (b,c,d) DPPT-TT OFETs with MoO_3-deposited Mo electrodes, and (e) DPPT-TT OFETs with Au electrode.

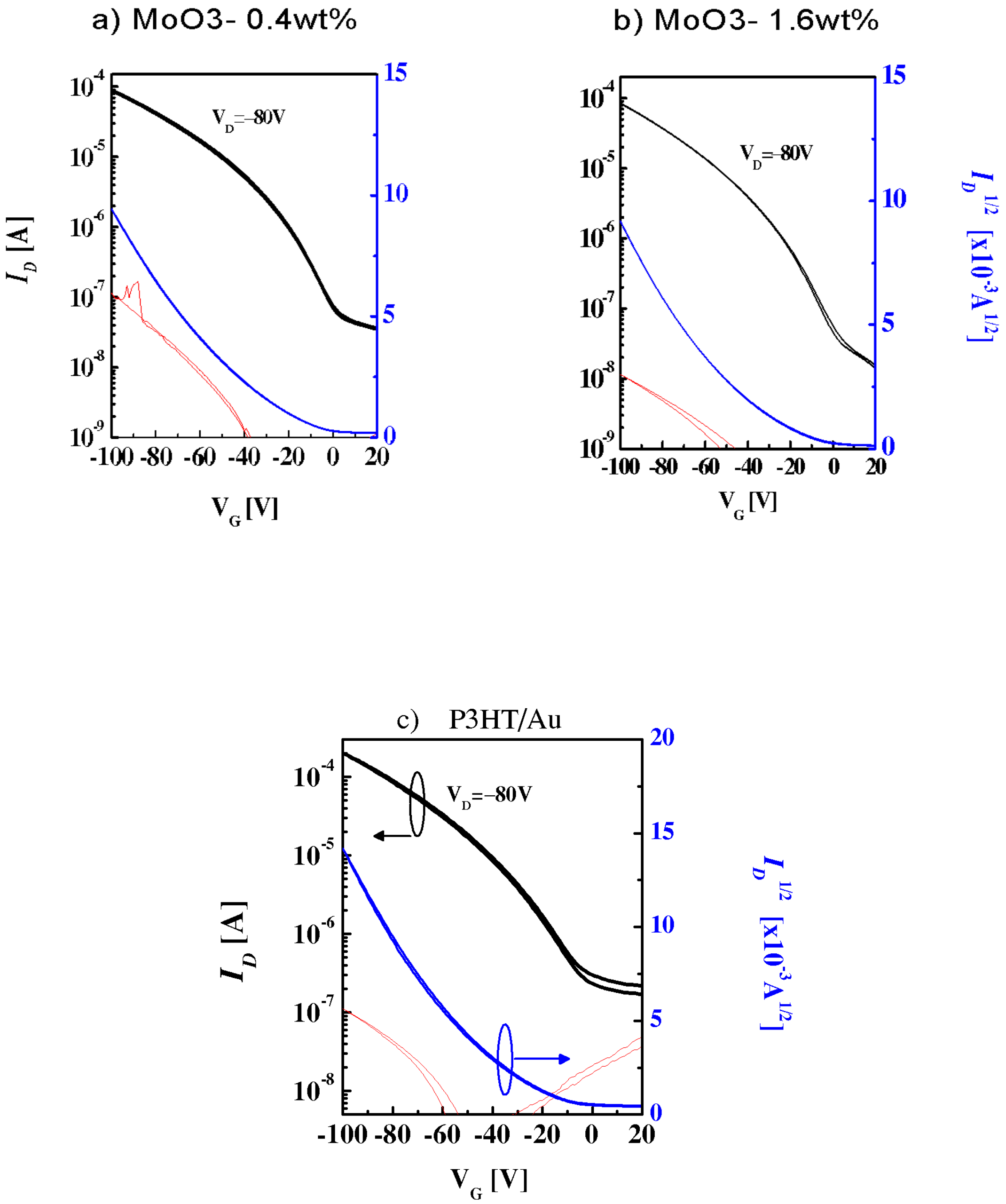

Fig. S3 | Transfer (I_d vs. V_g) characteristics of the OFETs with *p*-type polymer semiconductors, P3HT, and Mo electrodes with a MoO_3 interlayer (0.4 (a)–1.6 wt% (b)), and (c) P3HT on Au electrode.

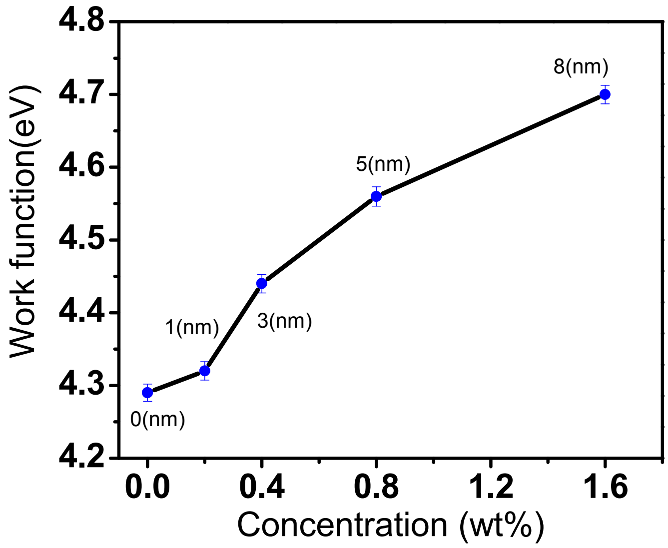

Fig. S4 | Work function of Ti electrode dependence on MoO_3 thickness (for varied concentration of MoO_3 solution).

Table S1. Constants and parameters of materials for the rough estimation of W_d of P3HT/MoO_3/Mo OFETs.

N_C (cm^{-3})	N_V (cm^{-3})	k (eV/K)	T (K)	Q (C)
10^{21}	10^{21}	8.6×10^{-5}	300	1.6×10^{-19}
E_g (eV)	E_{fi} (eV)	Shift in E_f (eV)	ε_{SC}	Φ_m (eV)
2.0	(5.0)	(0~1.0)	3.45×10^{-13}	4.5

By now, we cannot measure the vaule of E_{fi} and E_f accurately. So we roughly estimated W_d by assuming that E_{fi} is about 5.0 eV and that Fermi level shift of the semiconductor is up to 1 eV. By using the methods described in "experimental" section, we estimated depletion width and hole concentration near the contact as a function of Fermi-level shift from 0 to -1 eV:

Shift in E_f (eV)	0	-0.4	-0.6	-0.8	-0.9	-1
N_a (cm^{-3})	1.5×10^{4}	7.9×10^{10}	1.8×10^{14}	4.3×10^{17}	2.1×10^{19}	1.0×10^{21}
W_d (nm)	>1 μm	>1 μm	>1 μm	36	5.4	0.8