

Supporting Information

TITLE:

The role of spontaneous orientation polarization on charge storage behavior at an interface between organic semiconductor layers

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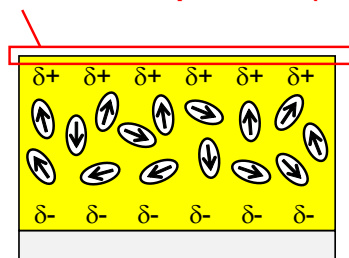
Figure S8: Characterization of SOP and charge storage ability in a device including different host materials

Table S1: Electrical properties of a charge storage device including different host materials

Figure S1.

In film

Giant surface potential (GSP)



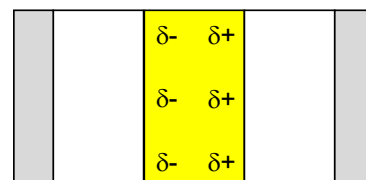
↗ : Permanent dipole moment (PDM) of molecules

spontaneous ordering of PDMs



Spontaneous orientation polarization (SOP)

In device



Potential

GSP slope

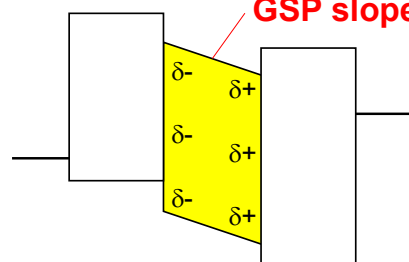


Figure S1: Schematic illustration of spontaneous orientation polarization and giant surface potential.

Figure S2.

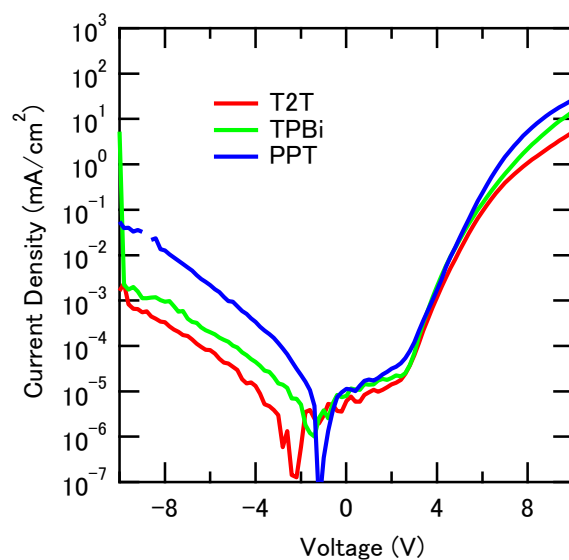


Figure S2: Current density-voltage characteristics of the charge storage devices in continuous-wave (CW) operation.

Figure S3.

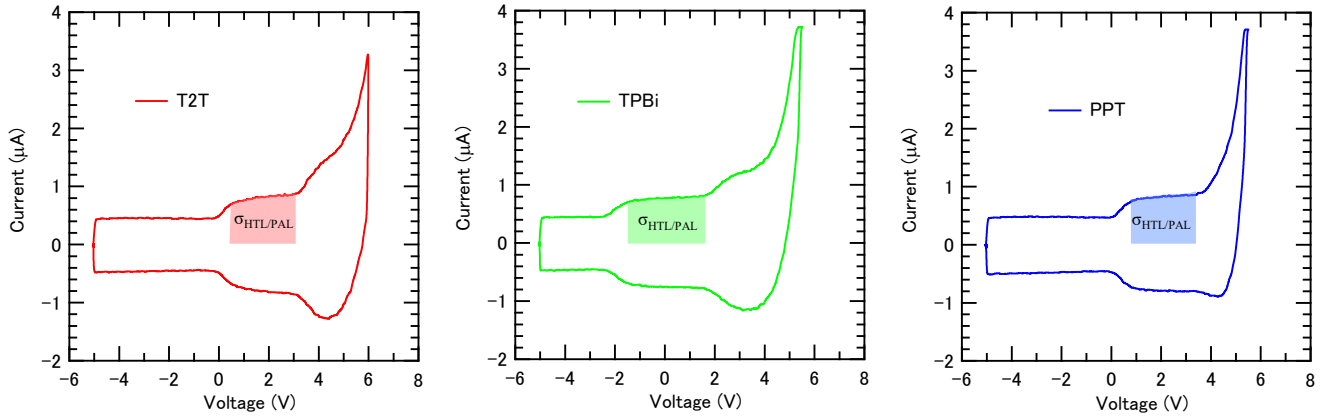


Figure S3: DCM characterization of T2T, TPBi, and PPT devices in dark condition. Interfacial charge density at HTL/PAL ($\sigma_{\text{HTL/PAL}}$) is calculated by integrating filled area.

Figure S4.

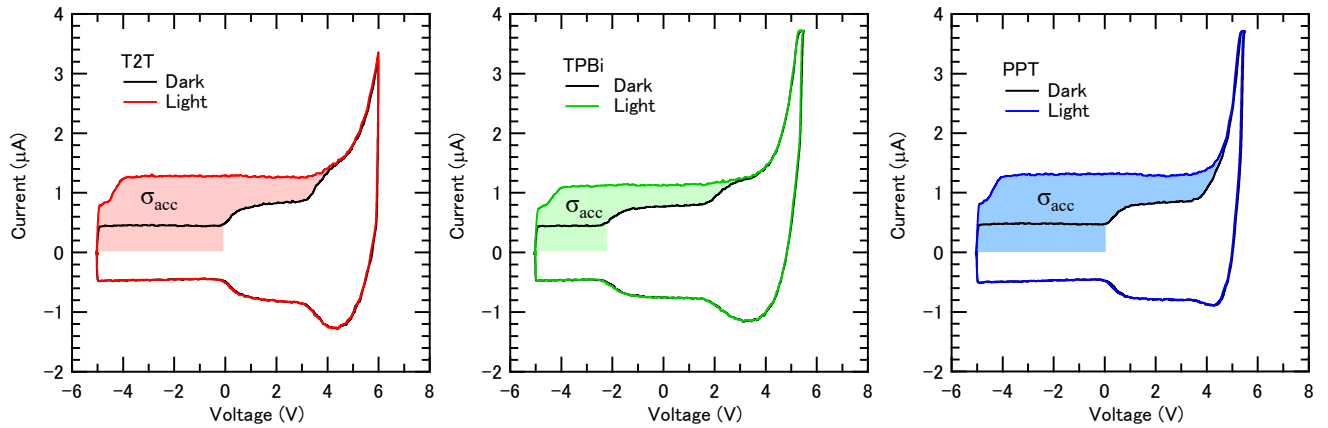


Figure S4: DCM characterization of T2T, TPBi, and PPT devices after light irradiation. Accumulated electrons in the devices (σ_{acc} : filled area) are estimated by subtracting integration of DCM curve after light irradiation from that in dark condition.

Figure S5.

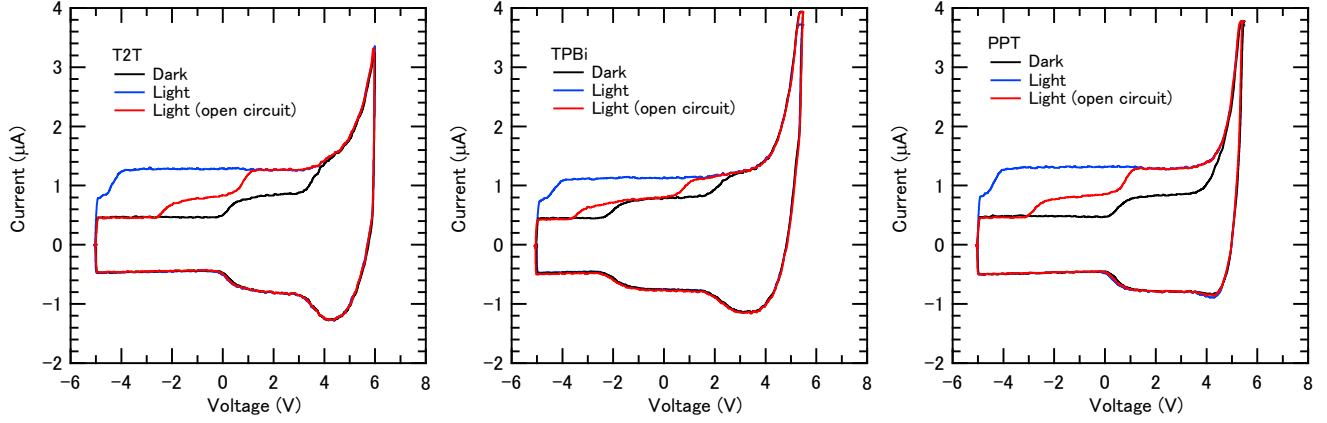


Figure S5: DCM characterization of T2T, TPBi and PPT devices after light irradiation. Accumulated electron in the devices (σ_{acc} : filled area) is estimated by subtracting integration of DCM curve after light irradiation from that in dark conditions.

Figure S6.

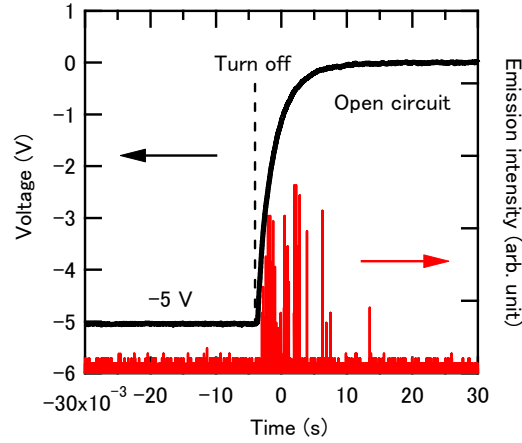


Figure S6: Electroluminescence in the T2T device after open circuit treatment.

Figure S7.

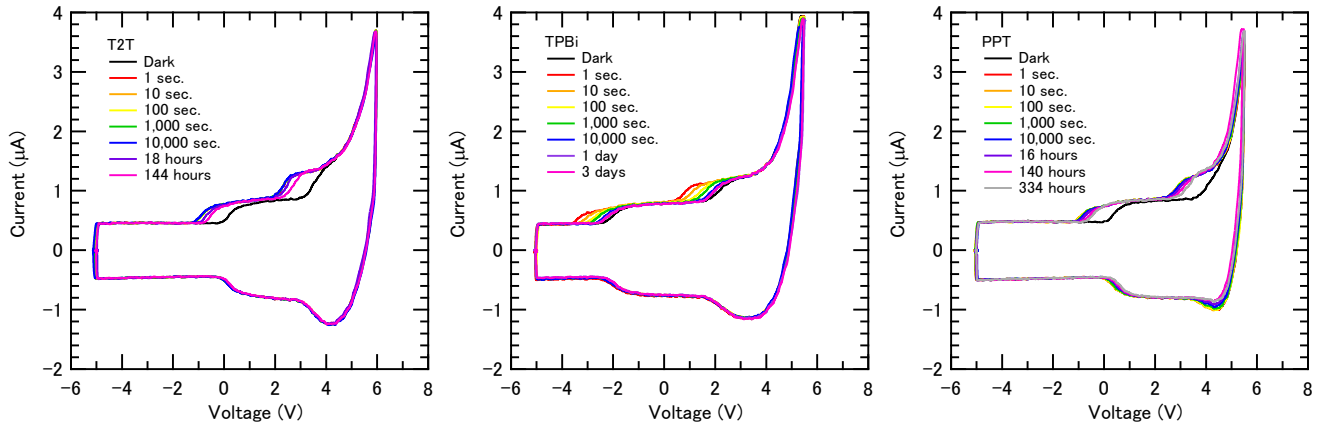


Figure S7: Charge storage characteristics in the condition of initial charge of ~ 3 nC. DCM profiles of each device are acquired after an arbitral hold time passed.

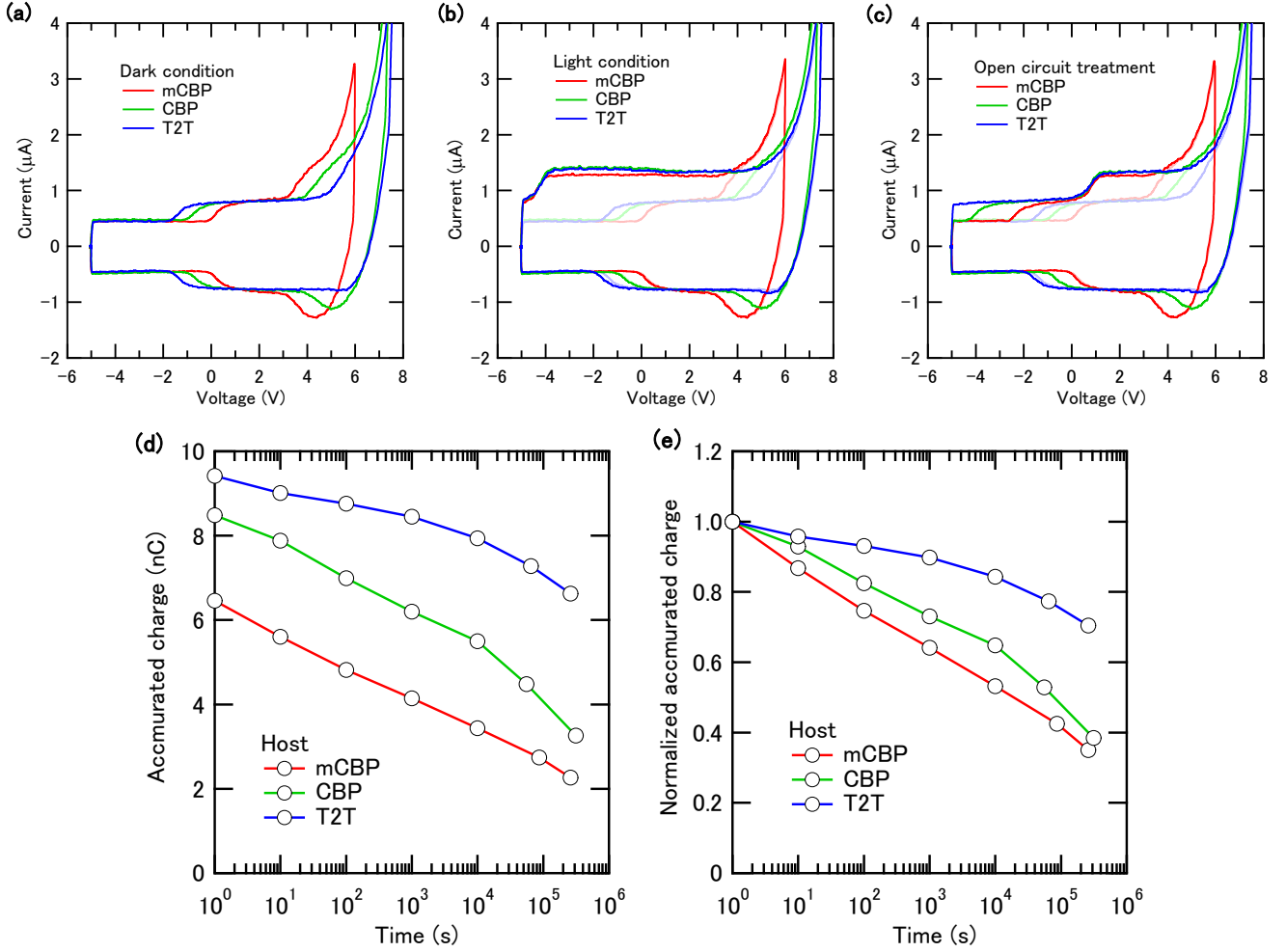
Figure S8.

Figure S8: Characterization of SOP and charge storage ability in a device including different host materials. The device structure is ITO/HAT-CN (10 nm)/TAPC (50 nm)/Host:TPA-DCPP (30 nm)/T2T (50 nm)/Al. The host materials are mCBP, CBP and T2T, respectively. (a) DCM in dark condition. (b) DCM after light irradiation with applying -5 V . (c) DCM after open circuit treatment. (d) Decay of accumulated charge electrons calculated by the DCM profile. (e) Decay profiles which are normalized by the initial value.

Table S1: Electrical properties of a charge storage device including different host materials. All parameters are obtained by DCM shown in Fig.S8.

Host material	GSP (P_{PAL}) (mV/nm)	$\sigma_{\text{HTL/PAL}}$ (mC/m ²)	V_{inj} (V)	$ \sigma_{\text{acc}} $ (nC)	$ \sigma_{\text{acc_open}} $ (nC)
mCBP	32.5	-1.04	-0.09	15.4	6.4
CBP	46.3	-1.48	-1.11	16.4	9.1
T2T	60.6	-1.94	-1.75	16.1	10.4