Supporting Information

Ultraviolet Light-Activated Charge Modulation Heterojunction for Versatile Organic Thin Film Transistors

Fu-Chiao Wu, Pei-Rong Li, Bo-Ren Lin, Ren-Jie Wu, Horng-Long Cheng, and Wei-Yang Chou**

Department of Photonics, Advanced Optoelectronic Technology Center, National Cheng Kung University, Tainan 701, Taiwan

Corresponding Author

*Horng-Long Cheng, Email: shlcheng@mail.ncku.edu.tw

*Wei-Yang Chou, Email: weiyang@mail.ncku.edu.tw

Outline

1. **Supplemental photoresponse data of OTFTs**
2. **Photoluminescence spectra of pentacene thin films**
3. **Charge behavior at the heterojunctions of the P3HT-PTCDI bimolecular system**

1. Supplemental photoresponse data of OTFTs

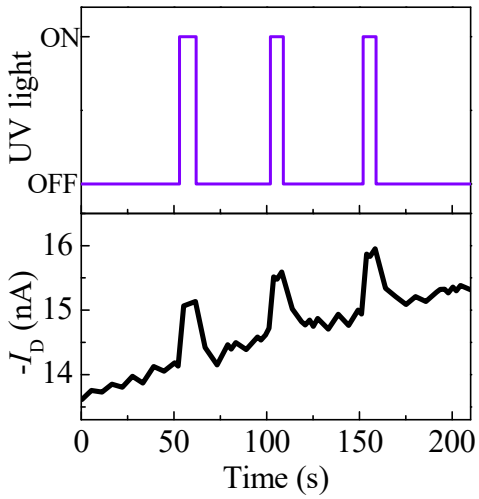

Figure S1. Time-resolved I_D variation of the PTCDI-covered P3HT-based OTFTs operated at V_D and V_G of -10 V during the continuous on and off UV light.

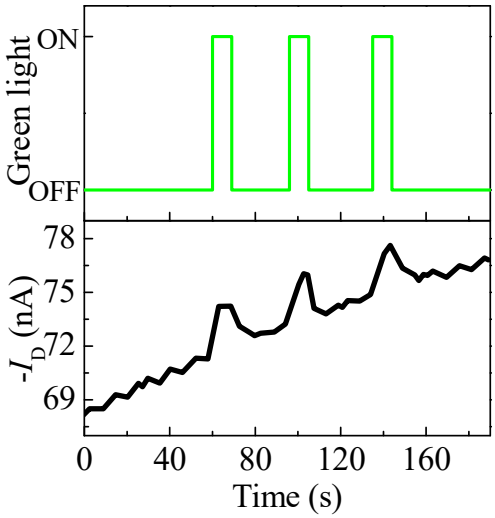

Figure S2. Time-resolved I_D variation of the Alq3-covered P3HT-based OTFTs operated at V_D and V_G of -10 V during the continuous on and off green light.

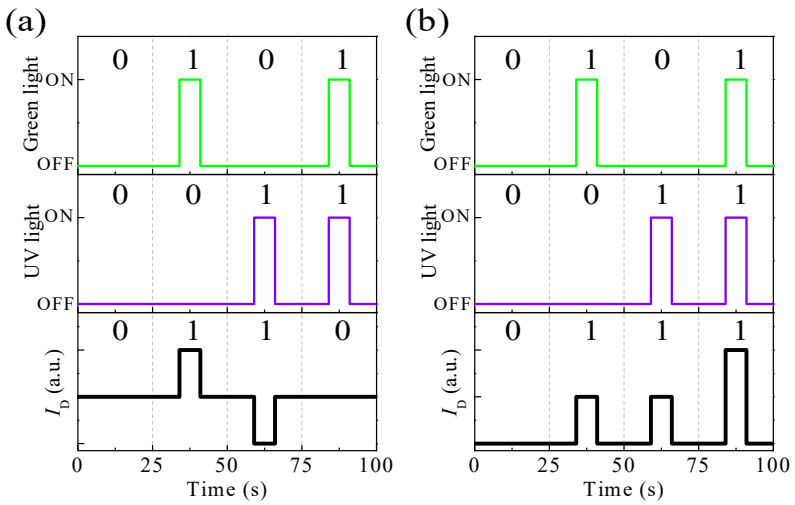

Figure S3. Simulations in the logic operation of (a) PTCDI/Alq3-covered P3HT-based OTFT as an XOR gate and (b) general UV-Vis organic phototransistors as an OR gate under the control of the green and the UV light. The logic 0, 1, and -1 are shown.

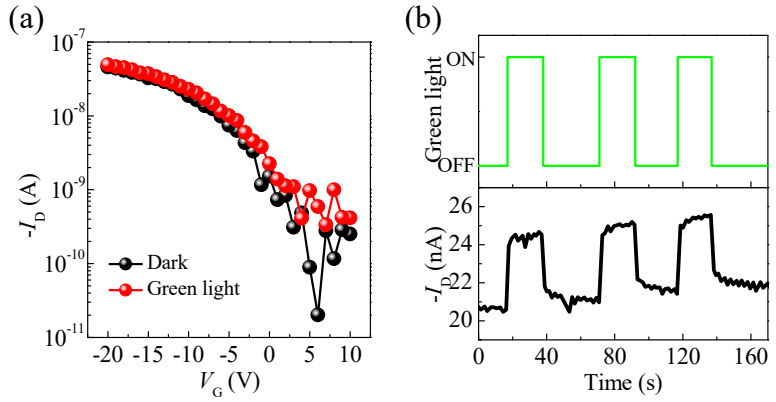

Figure S4. Green light photoresponse of pentacene/Alq3-covered P3HT based OTFTs: (a) transfer curves (V_D = -10 V); (b) time-resolved I_D variations (V_D = V_G = -10 V) during the continuous on and off green light.

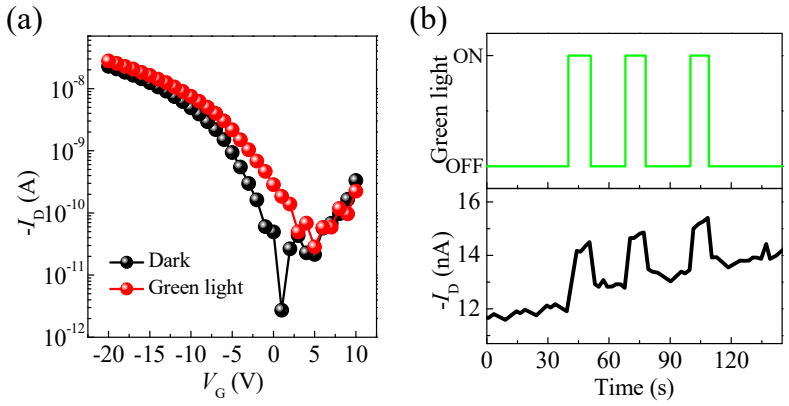

Figure S5. Green light photoresponse of LiF/Alq3-covered P3HT based OTFTs: (a) transfer curves (V_D = -10 V); (b) time-resolved I_D variations (V_D = V_G = -10 V) during the continuous on and off green light.

2. Photoluminescence spectra of pentacene thin films

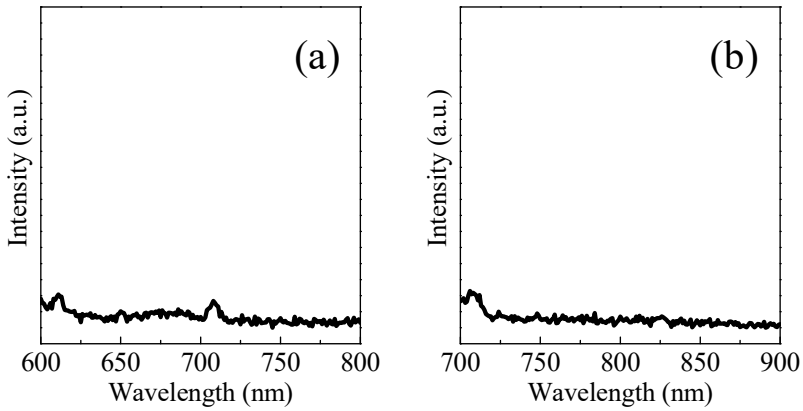

Figure S6. PL spectra of the pentacene thin film excited by (a) 532 and (b) 633 nm light sources.

3. Charge behavior at the heterojunctions of the P3HT-PTCDI bimolecular system

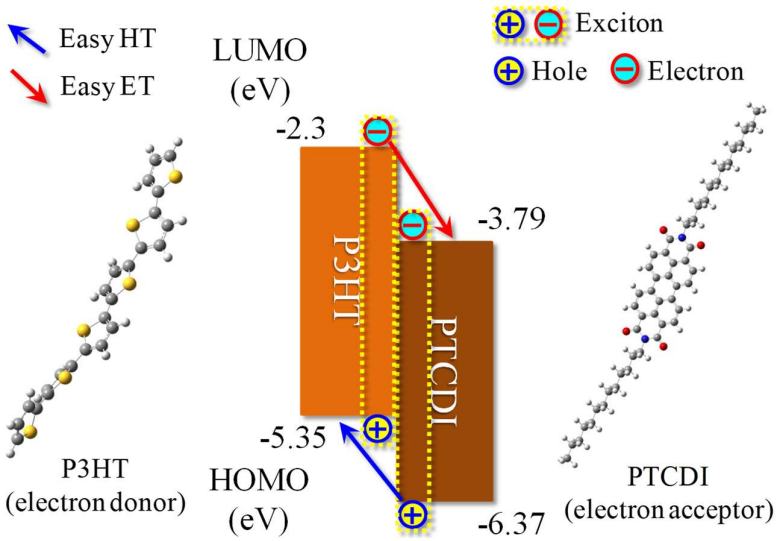

Figure S7. Illustration of charge behavior at the heterojunction of the P3HT-PTCDI system. The molecular optimized geometries and energy levels of the bimolecular system computed using Gaussian 16 program are shown.