

Supporting Information

A Self-Powered Solar-Blind Photodetector with Large V_{oc} Enhancing Performance Based on PEDOT:PSS/Ga₂O₃ Organic-Inorganic Hybrid Heterojunction

Shan Li,^{a, b} Zuyong Yan,^{a, b} Zeng Liu,^{a, b} Jun Chen,^c Yusong Zhi,^{a, b}

Daoyou Guo,^{*, d} Peigang Li,^{*, a, b} Zhenping Wu,^{a, b} and Weihua Tang^{*, a, b}

^a Laboratory of Information Functional Materials and Devices, School of Science, Beijing University of Posts and Telecommunications, Beijing 100876, China.

^b State Key Laboratory of Information Photonics and Optical Communications, Beijing University of Posts and Telecommunications, Beijing 100876, China.

^c Department of Bioengineering, University of California, Los Angeles, CA 90095, United States.

^d Center for Optoelectronics Materials and Devices & Key Laboratory of Optical Field Manipulation of Zhejiang Province, Department of Physics, Zhejiang Sci-Tech University, Hangzhou 310018, China.

*E-mail: dyguo@zstu.edu.cn.

*E-mail: pgli@bupt.edu.cn.

*E-mail: whtang@bupt.edu.cn.

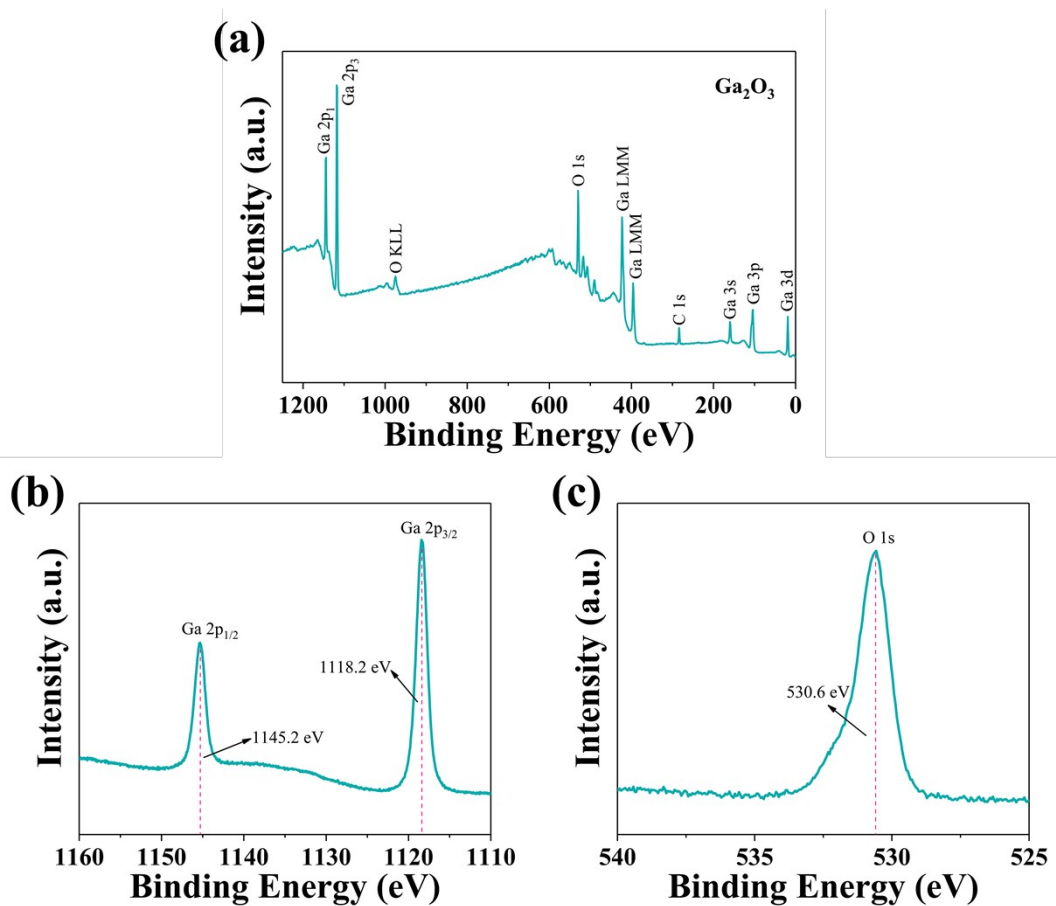


Figure S1. XPS spectra of the Ga₂O₃ thin film fabricated by MOCVD: (a) full scan, and precision scan for (b) Ga2p and (c) O1s.

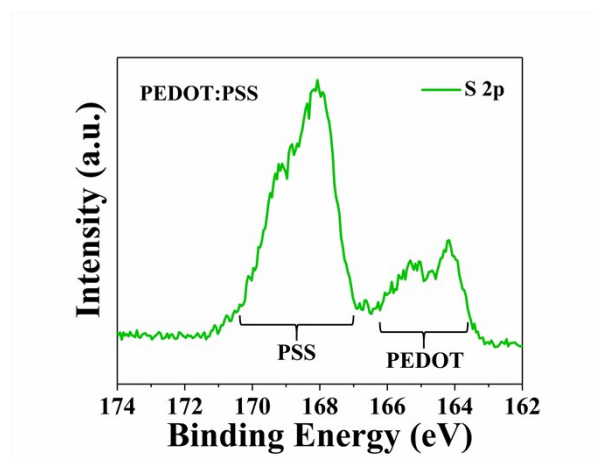


Figure S2. XPS spectrum with precision scan for S2p of the PEDOT:PSS thin film fabricated by spin coating method.

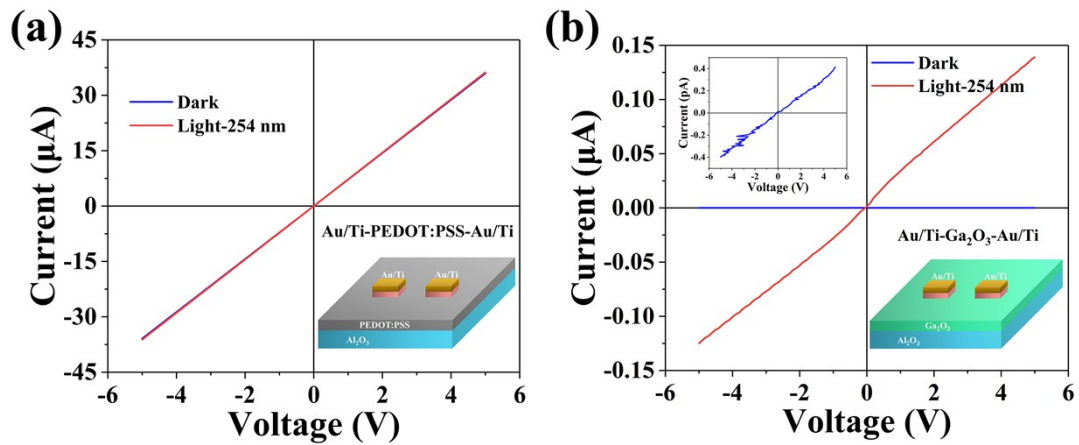


Figure S3. The I–V characteristics of (a) the PEDOT:PSS MSM single device and (b) the Ga₂O₃ MSM single device under dark and light-254 nm illumination, respectively. The inset is the corresponding schematic diagram of its MSM structure. Additionally, the detail I-V curve of the Ga₂O₃ MSM device under dark has been enlarged and presents as an inset in (b). Under same radiation condition, the photocurrent of the PEDOT:PSS MSM single device is about 300 times larger than that of the Ga₂O₃ MSM single device which demonstrates a high conductivity.

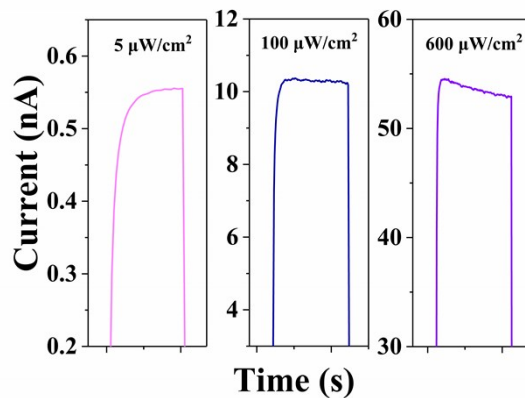


Figure S4. The time-dependent photoresponse curves at 0V with light intensities of (a) 5, (b) 100 and (c) 600 $\mu\text{W}/\text{cm}^2$, respectively.

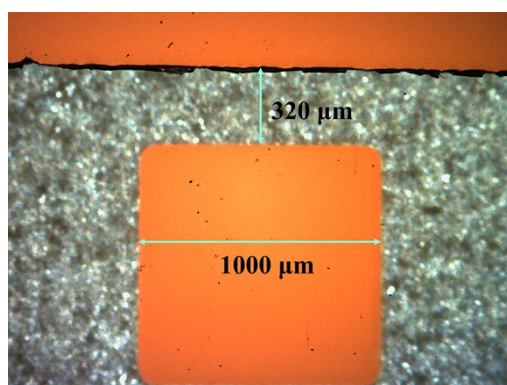


Figure S5. The microscope image of the effective irradiation area between two Au/Ti electrodes (one electrode on PEDOT:PSS film and the other electrode on Ga₂O₃ film).

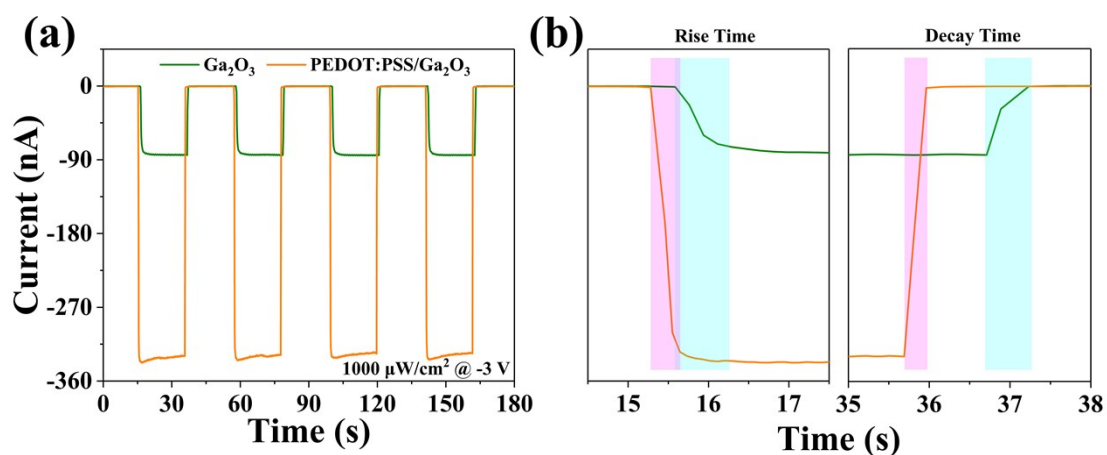


Figure S6. The comparison between Ga₂O₃ single device and PEDOT:PSS/Ga₂O₃ hybrid heterojunction device in (a) transient response current and (b) response speed. The photocurrent of the PEDOT:PSS/Ga₂O₃ hybrid heterojunction device is 330 nA which is larger than the 84 nA of Ga₂O₃ MSM single device at -3 V with 254 nm light intensity of 1000 μW/cm². Both the rise and decay times of the PEDOT:PSS/Ga₂O₃ hybrid heterojunction device (magenta area in Figure S6b) are both faster than that of Ga₂O₃ MSM single device (cyan area in Figure S6b) under on/off switch of UV lamp.