

Supporting Information

Ultrasensitive Solution-Processed Broadband PbSe Photodetectors through Photomultiplication Effect

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1. The crystalline orientation of PbSe QDs thin films.

To determine crystalline orientation of PbSe QDs modified by different organic molecules, thin films are investigated by grazing-incidence wide-angle X-ray scattering (GIWAXS), the results are shown in Supplementary Figure S1. There are no additional scattering rings observed from these PbSe QDs thin films, which indicates that crystallographic orientations are not changed by modification of the surface of PbSe QDs thin films. These results are consistent with other report.¹

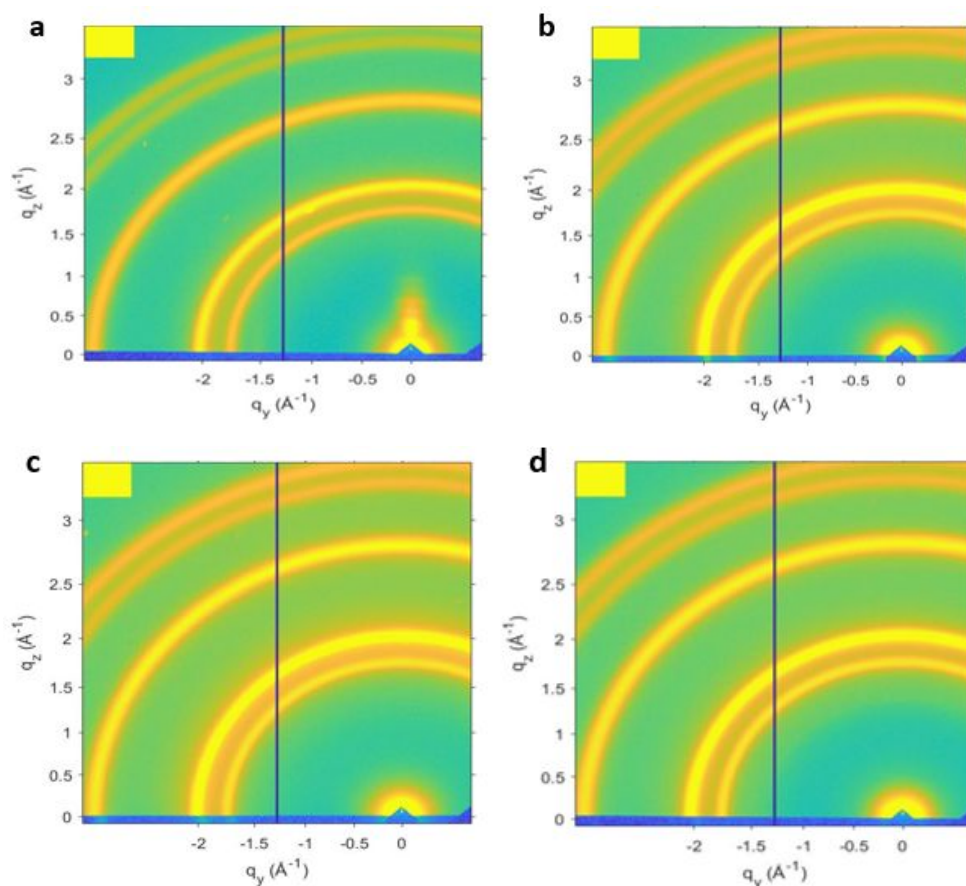


Figure. S1. 2D GIWAX profile of (a) TBAI-PbSe thin film and (b) EDT-PbSe thin film; (c) 4-thin-layer EDT-PbSe/1-thin-layer TBAI-PbSe thin film (d) and OA-PbSe thin films.

2. The J-V characteristics of the PDs fabricated by 4-thin-layer EDT-PbSe QDs/1-thin-layer TBAI-PbSe QDs thin film W/O PNDIT-F3N HBL

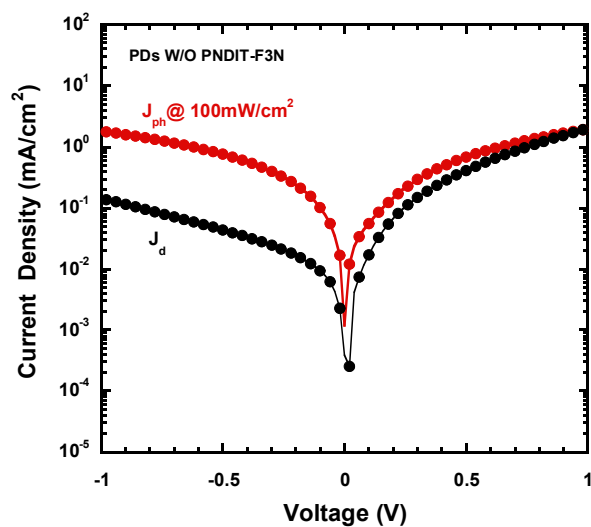


Figure S2. The J-V characteristics of the PDs fabricated by 4-thin-layer EDT-PbSe QDs/1-thin-layer TBAI-PbSe QDs thin film W/O PNDIT-F3N HBL.

3. EQE of the PDs fabricated by 4-thin-layer EDT-PbSe QDs/1-thin-layer TBAI-PbSe QDs thin film that incorporated with and without PNDIT-F3N, measured under an external bias of 0V and -1 V, respectively.

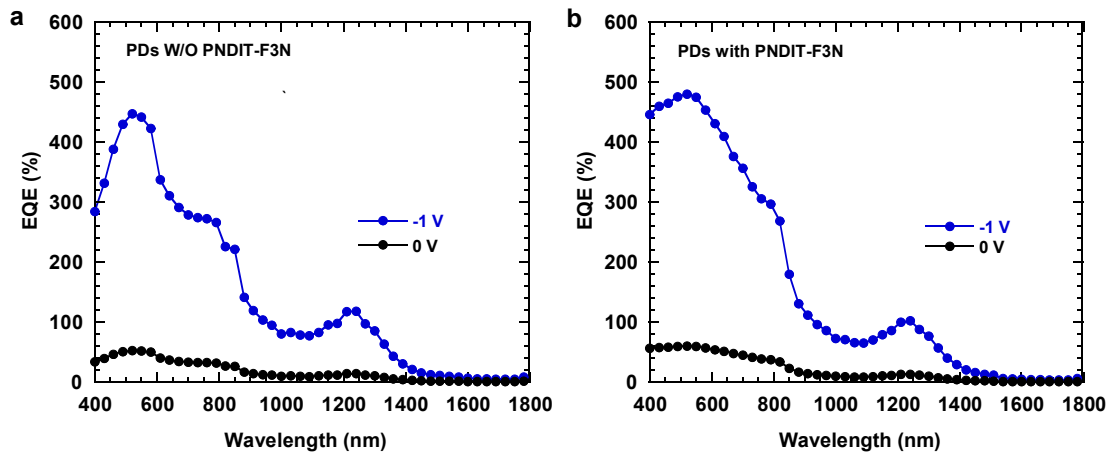


Figure S3. EQE spectra of PbSe based PDs (a) and (b) PDs fabricated by 4-thin-layer EDT-PbSe QDs/1-thin-layer TBAI-PbSe QDs thin film that incorporated with and without PNDIT-F3N, measured under an external bias of 0V and -1 V, respectively.

4. The absorption spectra of PNDIT-F3N

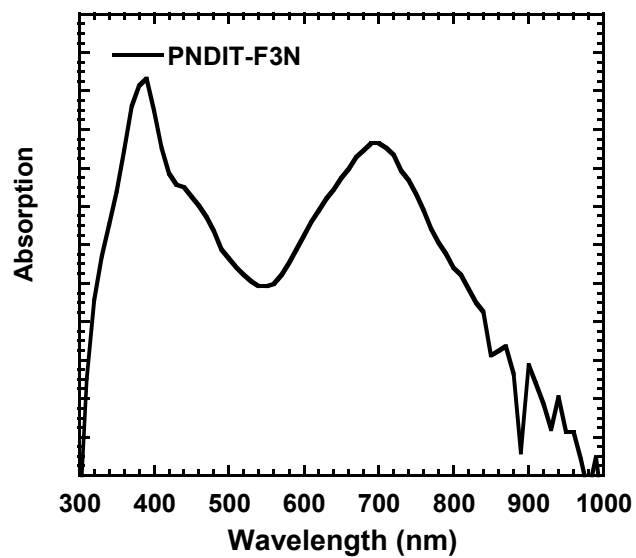


Figure S4. The absorption spectra of PNDIT-F3N.

REFERENCES

- (1) Ren, Z.; Sun, J.; Li, H.; Mao, P.; Wei, Y.; Zhong, X.; Hu, J.; Yang, S.; Wang, J. Bilayer PbS Quantum Dots for High-Performance Photodetectors. *Adv. Mater.* **2017**, *29*, 1702055.