Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

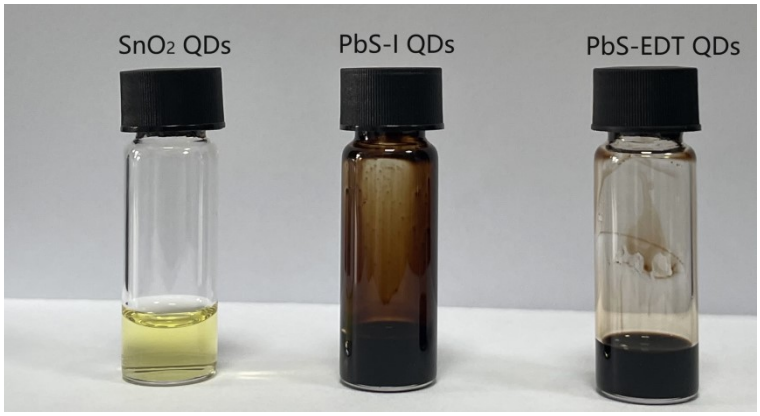

Figure S1 The optical image of the SnO_2, PbS-I and PbS-EDT QDs solutions.

Figure S2 EDS elemental mapping of Pb, S, Sn and In.

Figure S3 SEM images of the surface of the PD.

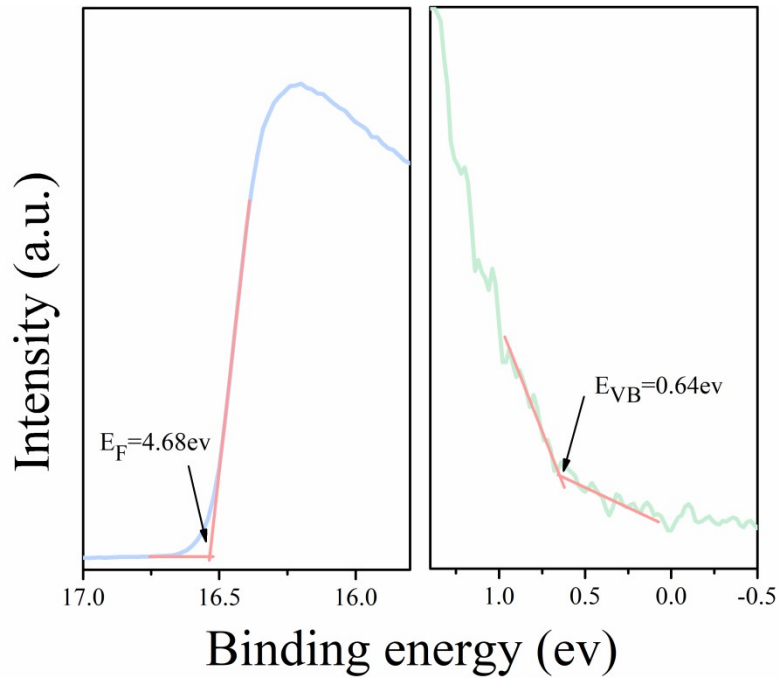

Figure S4 UPS characterization of PbS-I.

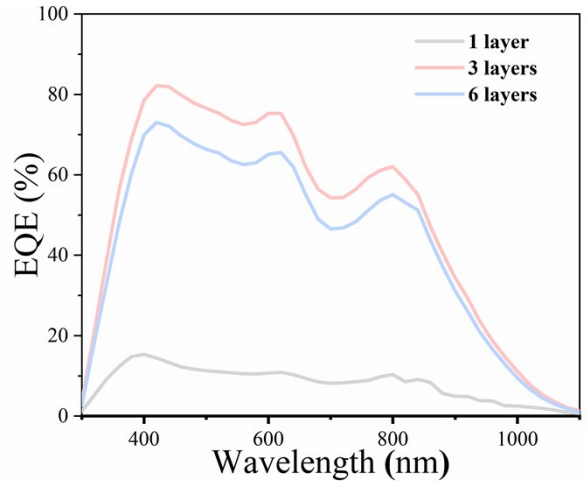

Figure S5 EQE spectra of the SnO_2 QDs/PbS-I QDs/PbS-EDT QDs PD with different SnO_2 layer (1, 3, and 6 layers), respectively (0 V bias).

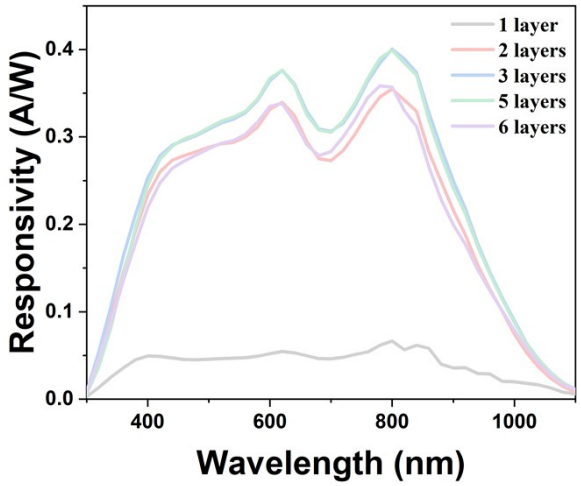

Figure S6 Responsivity of the SnO_2 QDs/PbS-I QDs/PbS-EDT QDs PD with different SnO_2 layer, respectively (0 V bias).

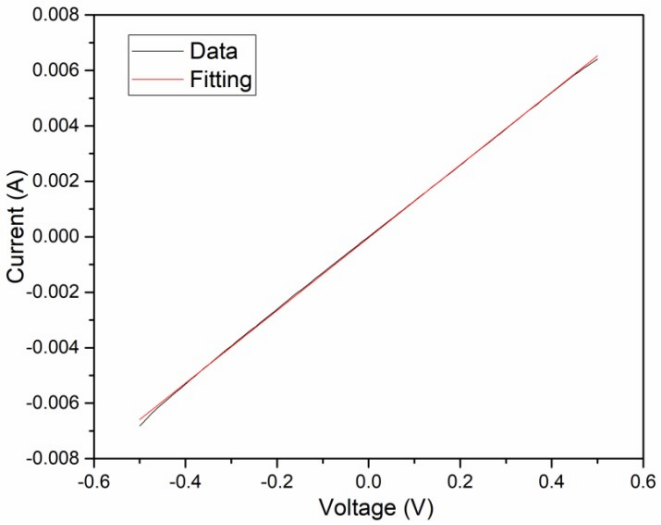

Figure S7 I-V curves of SnO_2 film.

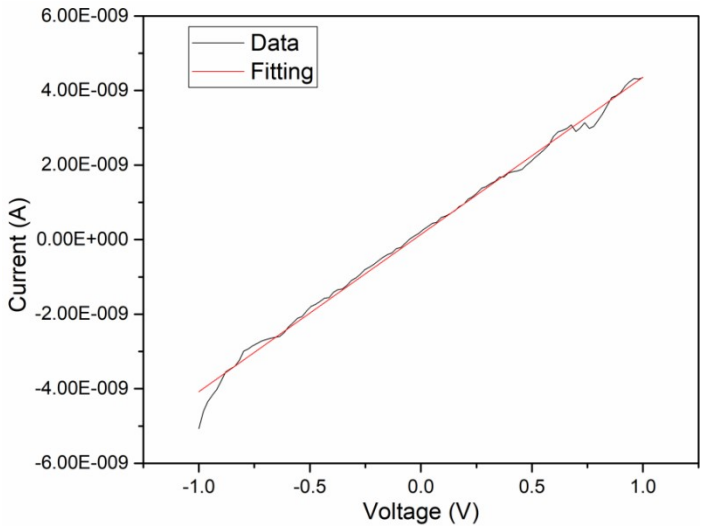

Figure S8 I-V curves of PbS-EDT film.

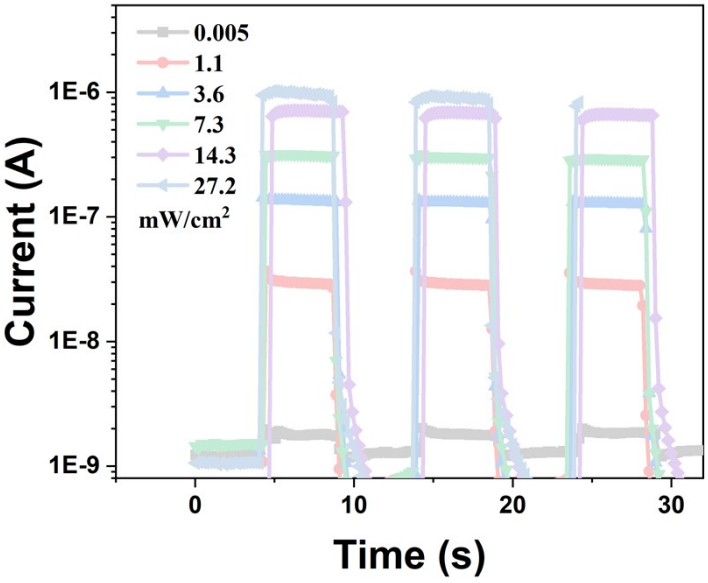

Figure S9 I-T curves of the PD under 365 nm UV light.

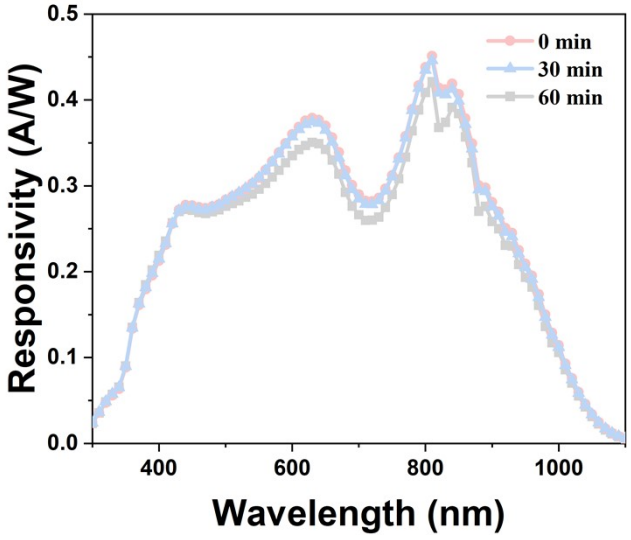

Figure S10. The responsivity spectra of our PD with continuous light illumination for

1 h.

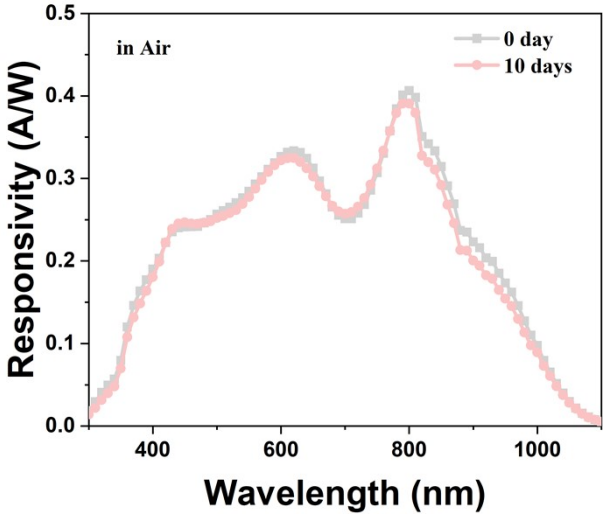

Figure S11. The responsivity spectra of our PD after 10 days stored in air.

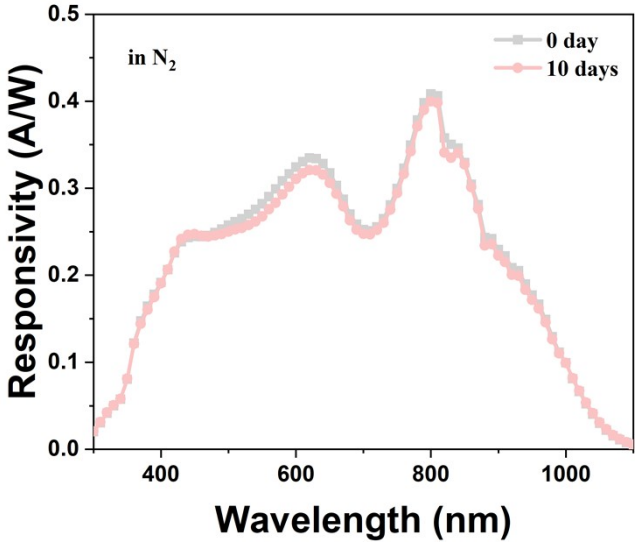

Figure S12. The responsivity spectra of our PD after 10 days stored in N2.

Table S1 Energy band diagram of the employed materials with various SnO_2 width in the device, simulated by SCAPS, parameter as follows:

Parameter	PbS-EDT	PbS-I	SnO_2
Thickness (nm)	50	310	10/30/66
Bandgap (eV)	1.25	1.33	3.6

Electron affinity (eV)	3.7	3.99	4.04
Dielectric permittivity (relative)	20	20	9
CB effective density of states ($1/cm^3$)	5×10^{19}	5×10^{19}	2.2×10^{18}
VB effective density of states ($1/cm^3$)	5×10^{19}	5×10^{19}	1.8×10^{19}
Electron mobility (cm/Vs)	5×10^{-2}	1×10^{-2}	1×10^{2}
Hole mobility (cm/Vs)	5×10^{-2}	1×10^{-2}	2.5×10^{1}