# **Supporting Information**

### Highly sensitive, broad-band organic photomultiplication-type

## photodetectors covering UV-Vis-NIR

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#### 1. The absorption spectra of different active layers.

The absorption spectra of different active layers were obtained by a Shimadzu UV-3101 PC spectrophotometer, as shown in **Fig. S1**. The broad absorption spectra of double layers and D18-CI:Y6-10 layer can well explain the broad spectral response from 300-1000 nm of OPMPDs with double layers and OPDs with D18-CI:Y6-10 layer. The relatively narrow spectral response from 300-830 nm of OPMPDs with PC<sub>71</sub>BM:P3HT layer can be explained by narrow absorption spectrum of PC<sub>71</sub>BM:P3HT layer.



Fig. S1. The absorption spectra of different active layers.

#### 2. The normalized spectrum of Xenon lamp and EQE spectrum of double layered OPMPDs.

The normalized spectrum of Xenon lamp and EQE spectrum of double layered OPMPDs were measured and shown in **Fig. S2**. The obvious fluctuating EQE values in wavelength from 850-1000 nm

of double layered OPMPDs can be observed, which is due to sharp fluctuation of incident light intensity from Xenon lamp.



**Fig. S2.** The normalized spectrum of Xenon lamp and EQE spectrum of double layered OPMPDs under an applied voltage of 5 V.

#### 3. The normalized R spectra of double layered OPMPDs.

The normalized R spectra of double layered OPMPDs were measured under different applied voltage, as exhibited in **Fig. S3**. The normalized R spectra of double layered OPMPDs are almost overlapped, indicating that the response characteristics of double layered OPMPDs can be well kept under different applied voltage.



Fig. S3. The normalized R spectra of double layered OPMPDs under different applied voltage.

### 4. The calculated noise equivalent power of double layered OPMPDs.

The calculated noise equivalent power of double layered OPMPDs was measured under an applied voltage of 5 V, as shown in **Fig. S4**. The lowest noise equivalent power of double layered OPMPDs approaches  $9.3 \times 10^{-14}$  W/Hz<sup>1/2</sup> under an applied voltage of 5 V.



**Fig. S4.** The calculated noise equivalent power of double layered OPMPDs under an applied voltage of 5 V.