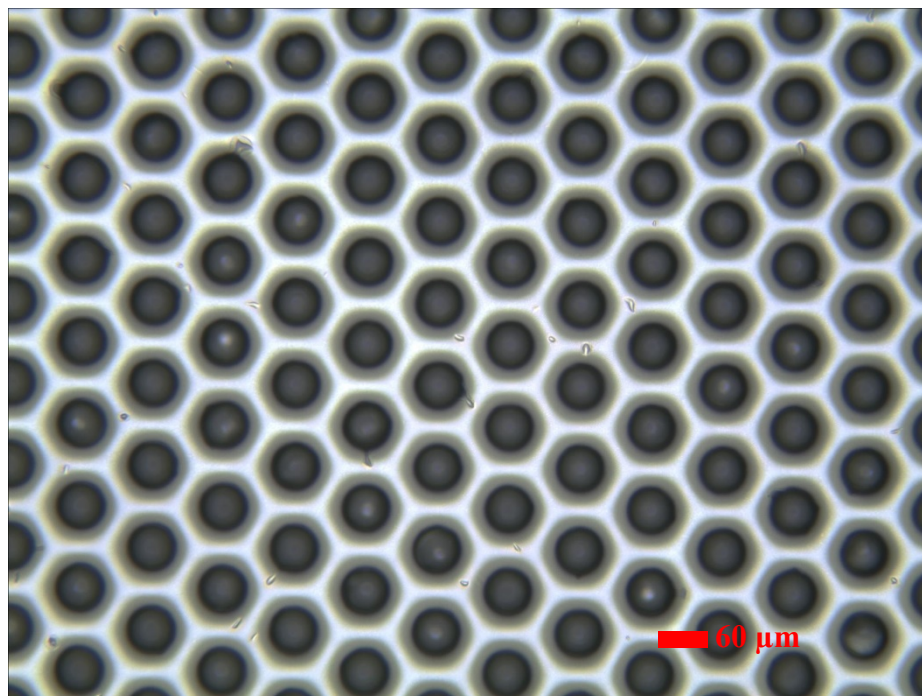


## Supporting information

### A stretchable ultraviolet-to-NIR broad spectral photodetector using organic-inorganic vertical multiheterojunctions

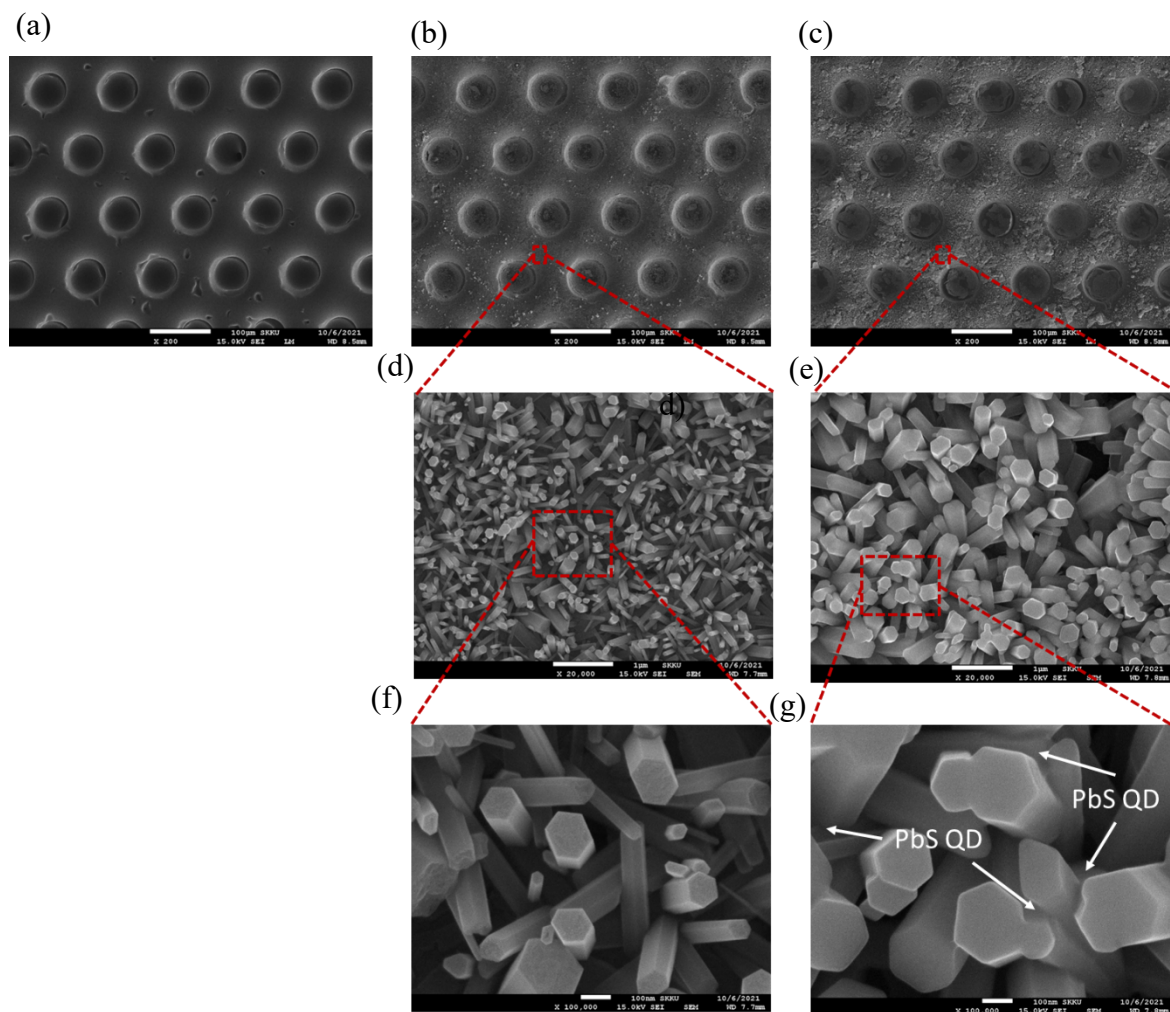
Tran Quang Trung,<sup>a,\*</sup> Vinh Quang Dang,<sup>f,g,\*</sup> Nae-Eung Lee,<sup>a,b,c,d,e</sup>

#### Supporting Figure S1



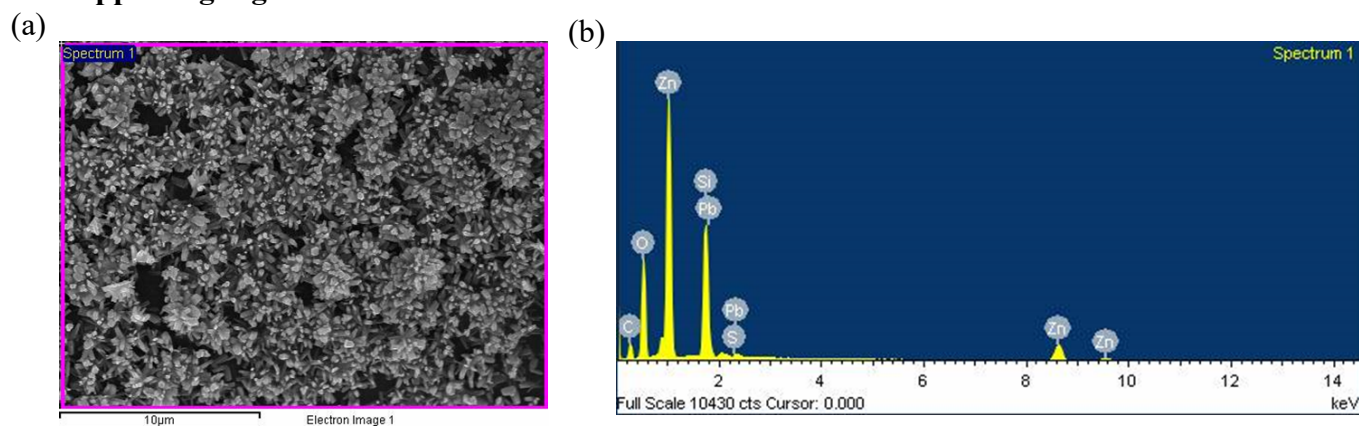
**Figure S1:** Optical image of 3D-MPSS

## Supporting Figure S2:



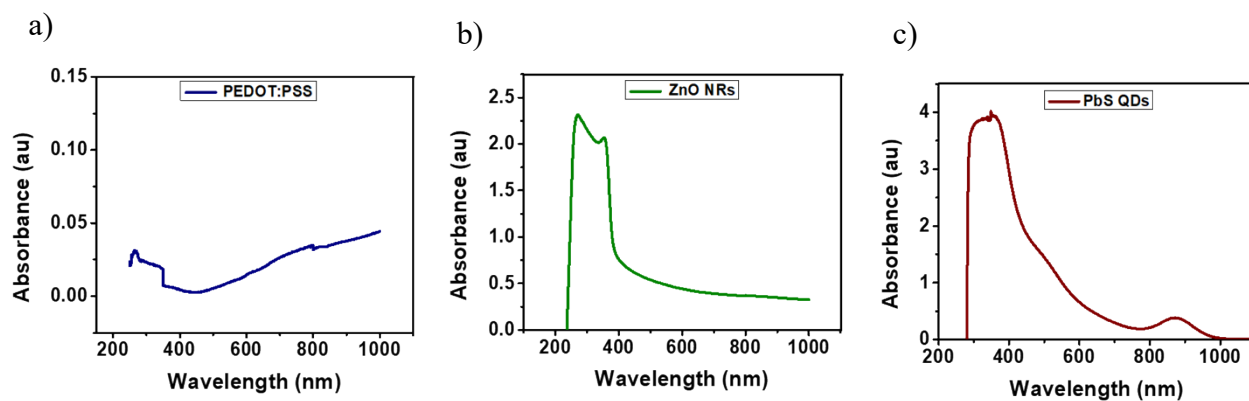
**Figure S2:** FE-SEM images of (a) PEDOT:PSS, (b) PEDOT:PSS/ZnO NRs, and (c) PEDOT:PSS/ZnO NRs/PbS QDs on 3D-MPSS (with magnification of 200 X). FE-SEM images of (d) PEDOT:PSS/ZnO NRs and (e) PEDOT:PSS/ZnO NRs/PbS QDs on 3D-MPSS (with magnification of 20,000X). FE-SEM images of (f) PEDOT:PSS/ZnO NRs and (g) PEDOT:PSS/ZnO NRs/PbS QDs on 3D-MPSS (with magnification of 100,000 X).

### Supporting Figure S3:



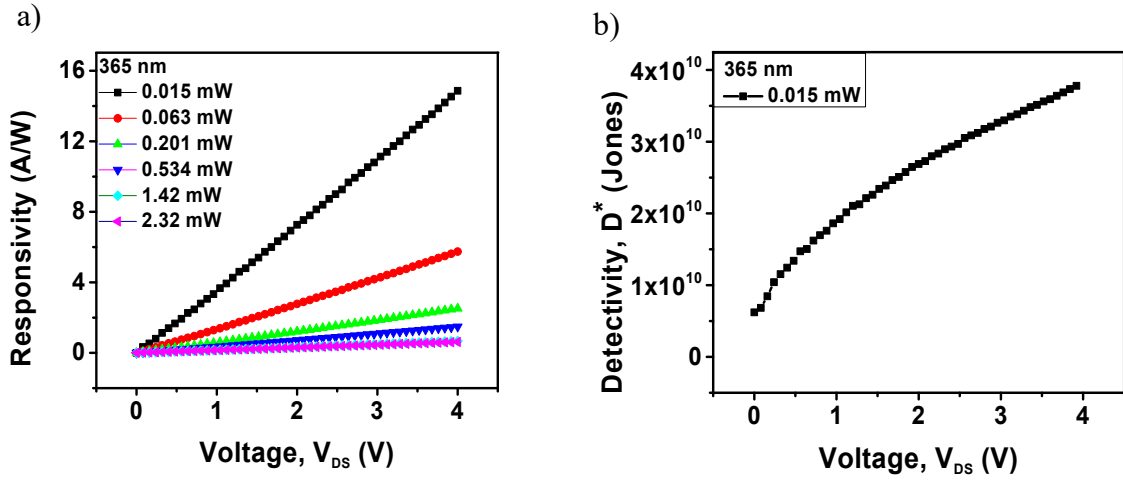
**Figure S3:** (a) A selected FE-SEM image of PEDOT:PSS/ZnO NRs/PbS QDs used for EDS analysis for elemental analysis. (b) EDS data of PEDOT:PSS/ZnO NRs/PbS QDs collected by rastering the incident electron beam on the selected area with elemental composition.

## Supporting Figure S4



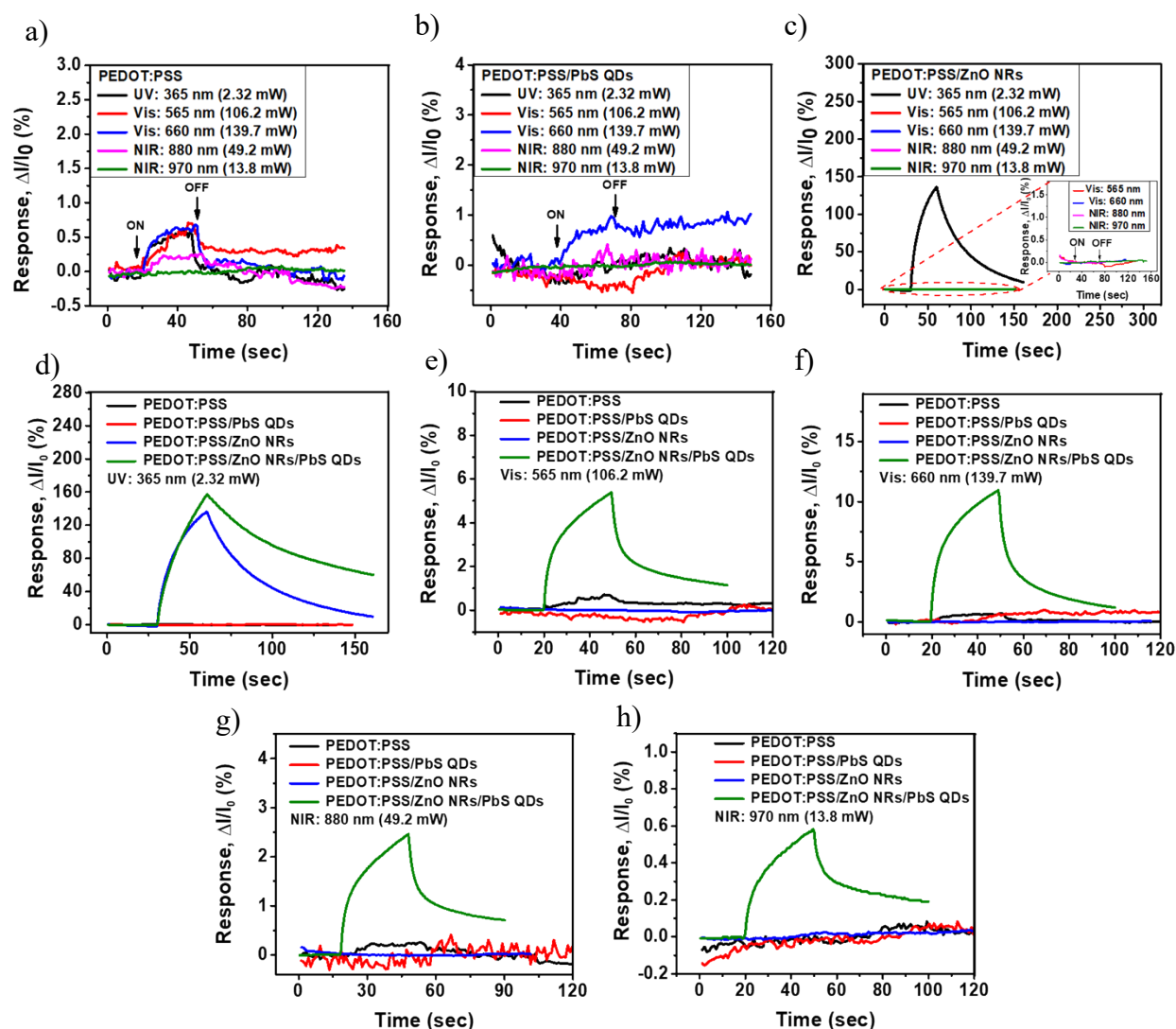
**Figure S4:** The UV-Vis-NIR absorption spectra of (a) PEDOT:PSS, (b) ZnO NRs, and (c) PbS QDs. During measurement, when the lighting system was switched from IR lamp to Vis lamp and from Vis lamp to UV lamp, abrupt changes in the absorption spectra in Figure S4a and the sharp peaks of the short-wavelength regions in Figure S4b and S4c were observed, respectively.

### Supporting Figure S5



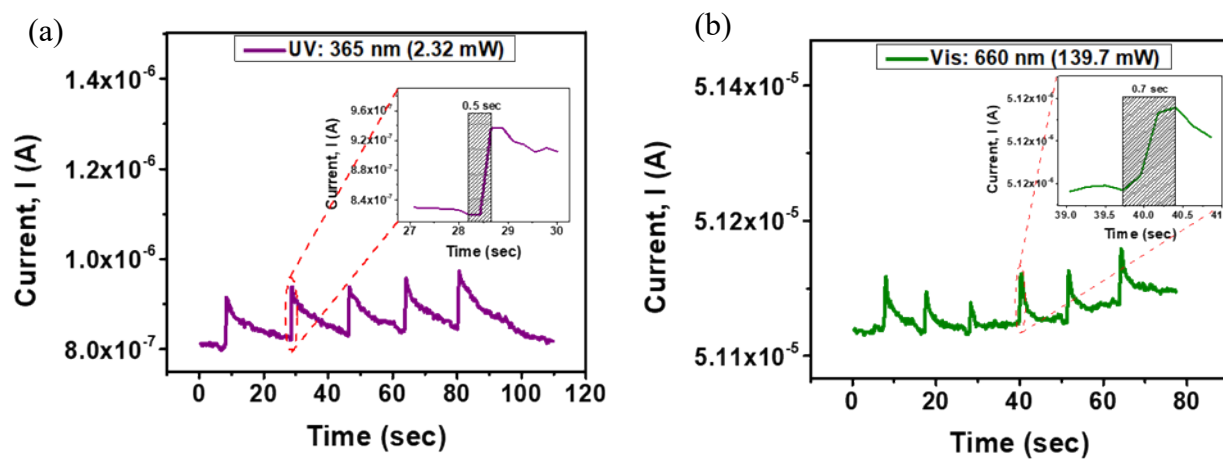
**Figure S5:** (a) The responsivity ( $R$ ) of the device as function of  $V_{DS}$  under UV light with different illumination levels. (b) The detectivity ( $D^*$ ) of the device as a function of  $V_{DS}$  under UV light.

# Supporting Figure S6



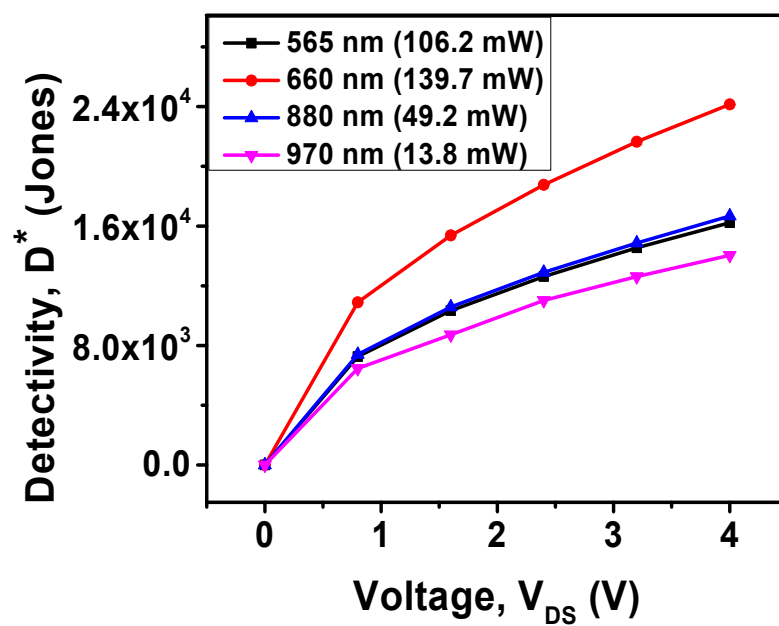
**Figure S6:** (a) The time-dependent photoresponses of (a) PEDOT:PSS-based PD, (b) PEDOT:PSS/PbS QDs-based PD, and (c) PEDOT:PSS/ZnO NRs-based PD under various illumination of UV(365 nm), Vis (560 nm), Vis (660 nm), NIR (880 nm), and NIR (970 nm) light. The comparison of the photoresponses of PEDOT:PSS-based PD, PEDOT:PSS/PbS QDs-based PD, and PEDOT:PSS/ZnO NRs-based PD with those of the broad-band PD under illumination of (d) UV (365 nm) (e) Vis (560 nm), (f) Vis (660 nm), (g) NIR (880 nm), and (h) NIR (970 nm) light.

## Supporting Figure S7



**Figure S7:** Current response of the stretchable broadband PD under illumination of (a) UV (365 nm) and (b) Vis (660 nm) with exposure time less than 1 s.

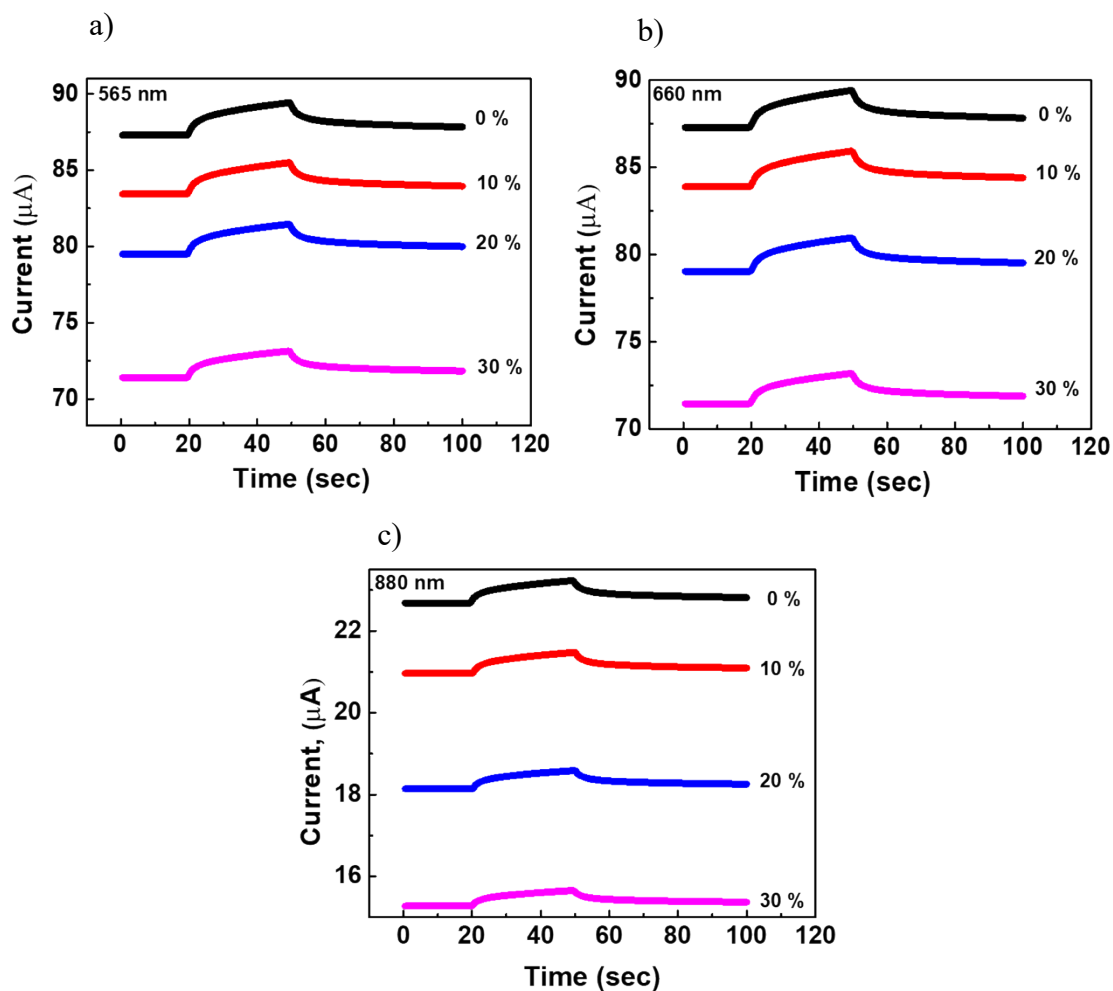
## Supporting Figure S8



**Figure S8:** The detectivity of the device as function of  $V_{DS}$  under Vis (565 nm), Vis (660 nm), NIR (880 nm), and NIR (970 nm) illumination.



## Supporting Figure S9



**Figure S9:** The time-dependent current of the device was recorded under on/off (a) Vis (565 nm), (b) Vis (660 nm), and (c) NIR (880 nm) light conditions at stretching from 0% to 30%.