Supporting Information for:

One-step fabrication of ultralong zinc octaethylporphyrin nanowire network with high-performance photoresponse

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Experimental section:

In a typical experiment, ZnOEP powder (Aldrich) was dissolved into a mixed solvent of chloroform, octane, and propylene glycol methyl ether acetate (PGMEA) at a concentration of 0.5 mg/ml. The volume ratio of $V_{chloroform}$:V_{octane}:V_{PGMEA} was 2:1:1. A drop of ZnOEP solution was then directly dropped onto the heavily-doped Si substrate. After the solvent evaporation, network of single-crystal nanowire of ZnOEP was formed. To remove the solvent thoroughly, the nanowire was post-annealed at 150 ^{o}C for 30 min. The morphology and crystalline structures were then characterized by scanning electron microscopy (SEM, Quanta 400 FEG), transmission electron microscopy (TEM, Tecnai G2 F20 S-Twin), X-ray diffraction (XRD, Bruker D8 Advance X-Ray Diffractometer), and Fourier-transform infrared (FTIR, Thermo Fisher Scientific FTIR 6700).

The photodetectors were constructed in bottom-connected configuration. The finger electrodes with the length of 200 μm, the width of 20 μm and the distance of 20 μm, were fabricated by the photolithography and electron beam deposition of Au on the SiO_2/Si substrate. The 25 μl ZnOEP solution (0.5mg/ml, the mixed solvent volume ratio of $V_{chloroform}$:V_{octane}:V_{PGMEA} was 2:1:1) was directly deposited on 5mm×5mm the Au electrodes deposited SiO_2/Si substrate. The solvent was allowed to evaporate in air. To remove the solvent thoroughly and enhance the contact the nanowire and the Au electrodes, the device was also post-annealed at 150 ^{o}C for 30 min. Current-voltage characteristics of the devices were recorded with Keithley 4200 SCS and SUSS PM8 probe station in a clean and shielded box at room temperature. A Xenon lamp was used as the white light source with different intensity. All measurements were carried

out at ambient conditions.

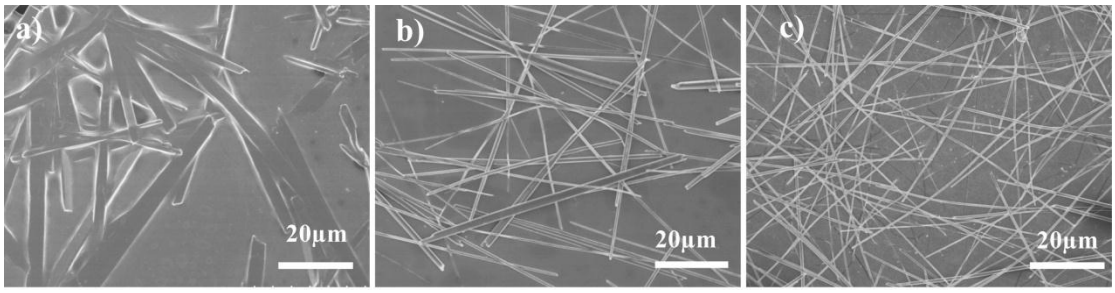

Figure S1. SEM images of ZnOEP nanowires fabricated by using different solvents: (a) chloroform; (b) chloroform + octane ($V_{chloroform}$:V_{octane}=3:1); (c) chloroform + octane ($V_{chloroform}$:V_{octane}=1:1).

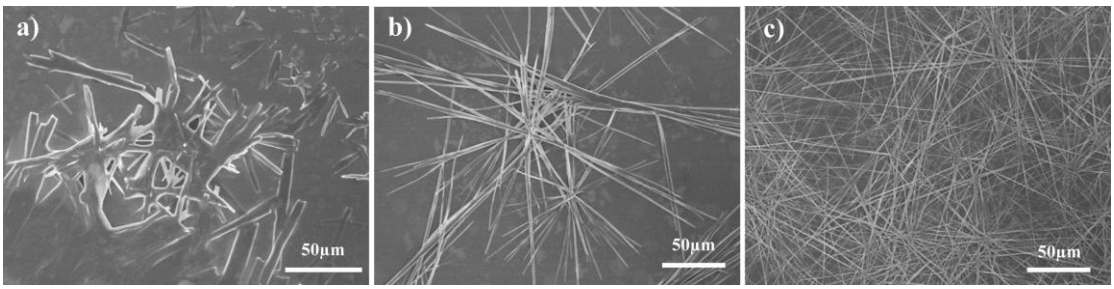

Figure S2. (a) chloroform; (b) chloroform + PGMEA ($V_{chloroform}$:V_{PGMEA}=3:1); (c) chloroform + PGMEA ($V_{chloroform}$:V_{PGMEA}=1:3).

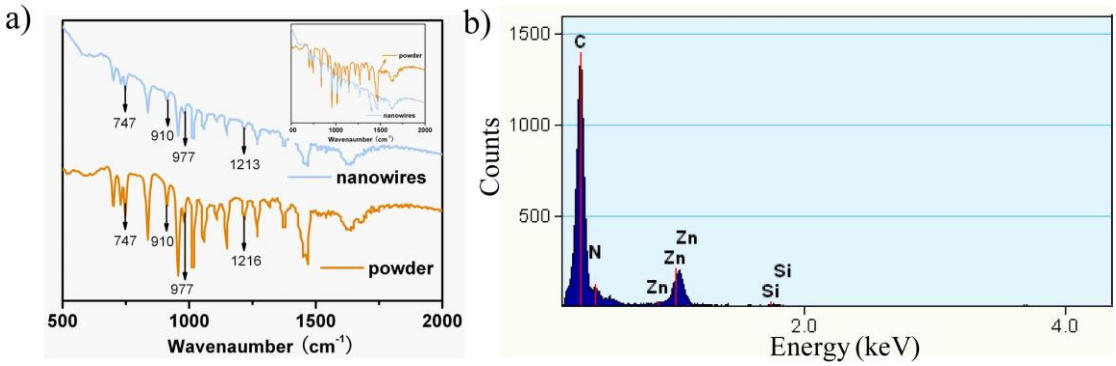

Figure S3. (a) FT-IR spectra of nanowire network and source powder of ZnOEP. (b) EDX spectrum of ZnOEP nanowire network.

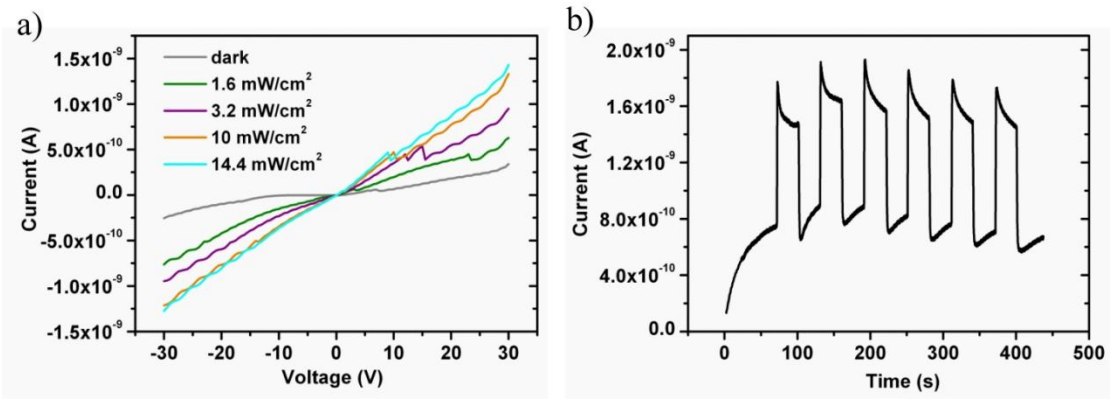

Figure S4. (a) Dark current and photocurrents at different incident power densities; (b) On/off switching of the device (light density: 14.4 mW/cm^2, bias voltage: 20V). The device was fabricated by thermal vapor deposition in a high-vacuum system. The base pressure was less than 5×10^{-4} Pa. The thickness of ZnOEP film was ~ 50 nm.

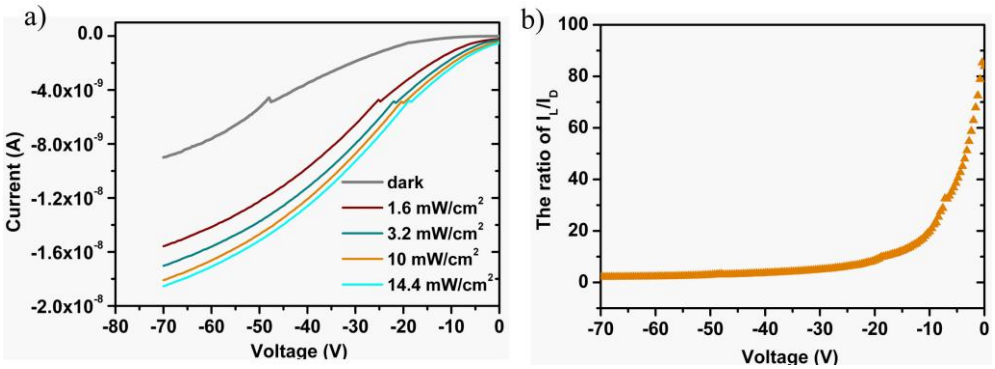

Figure S5. (a) Transfer characteristics of devices based on ZnOEP film in dark and under illumination. (b) The ratios of I_{SD} measured at different gate voltage under illumination of 14.4mW/cm^2. The V_{DS} is - 40 V. The device was fabricated by thermal vapor deposition in a high-vacuum system. The base pressure was less than 5×10^{-4} Pa. The thickness of ZnOEP film was ~ 50 nm.