*Supporting Information for:*

# Aerosol-jet printing of nanowire networks of zinc octaethylporphyrin and its application in flexible photodetector

Feng-Xia Wang, Jian Lin, Wei-Bing Gu, Yong-Qiang Liu, Hao-Di Wu and Ge-Bo Pan*

*Suzhou Institute of Nano-tech and Nano-bionics, Chinese Academy of Sciences, 215123 Suzhou, P. R. China*

## Experimental section

ZnOEP powder was purchased from Aldrich and used as received. In a typical process, 2 mg ZnOEP was dissolved in a mixed solvent including chloroform, octane and propylene glycol methyl ether acetate (PGMEA) (4 ml, $V_{chloroform}/V_{octane}/V_{PGMEA}$ = 2:1:1). The solution was ultrasonically agitated at 40 $^{o}$C for 30 min in order to form the stable ZnOEP ink. Then, the ink was transferred to the ultrasonic atomizer of aerosol jet printer and directly printed on poly(ethylene terephthalate) (PET) substrate at room temperature. Aerosol jet printing technology was a new maskless, non-contact, direct-write technique with wide ink adaptability, high resolution, and fast printing speed. In a typical aerosol jet printing process, the ink was ultrasonically atomized to obtain aerosols, which were transported through inert gas carrier and deposited onto substrate with predesigned micro-patterns. After the solvent evaporation, the network of ZnOEP nanowires was formed. The morphology and structure of the as-printed network film was characterized by means of scanning electron microscopy (SEM, Quanta 400 FEG), energy dispersed X-ray (EDX) spectrometer equipped in transmission electron microscopy (TEM, Tecnai G2 F20 S-Twin), ultraviolet-visible (UV-Vis) spectroscopy, and X-ray diffraction (XRD).

The photodetectors were constructed in bottom-connected configuration. Standard photoetching followed by Ti/Au deposition and liftoff was used to define the contact

electrodes. The finger electrodes with an interval of 20 μm, a width of 20 μm and a length of 2000 μm were deposited on the PET substrate. The ZnOEP ink was directly printed on the PET substrate with prepatterned electrodes. The solvent was allowed to evaporate in air. To remove the solvent thoroughly, the devices were further annealed at 100 $^{o}$C for 40 min. This process didn't affect the morphology and structure of the as-printed ZnOEP nanowire network. Typical current-voltage curves of the devices were recorded with Keithley 4200 SCS and SUSS PM8 probe station in a shielded box at room temperature. A Xenon lamp was used as the white light source with different intensity. All the measurements were carried out at ambient conditions.

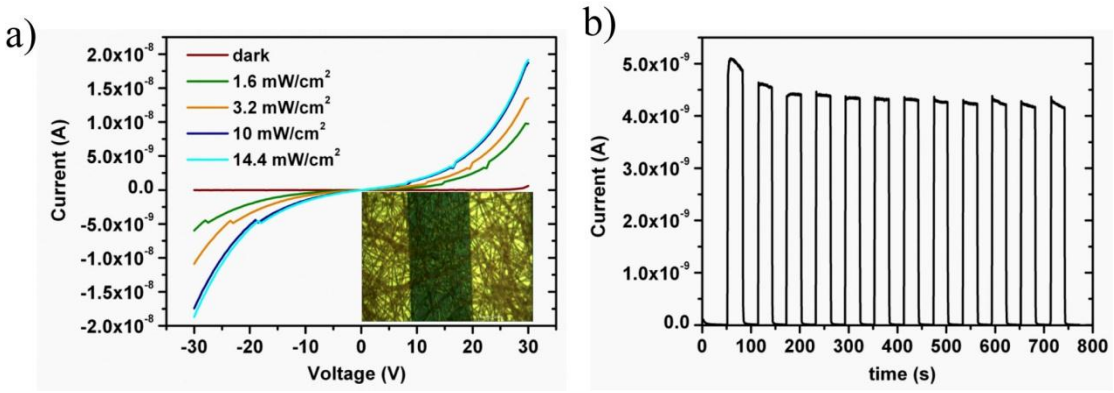


**Figure S1. (**a) Typical I-V curves of the device measured in the dark and under the illumination. (b) Temporal response of the photocurrent of the device. The power density is 14.4 mW/cm$^2$, and the applied bias is 20V.

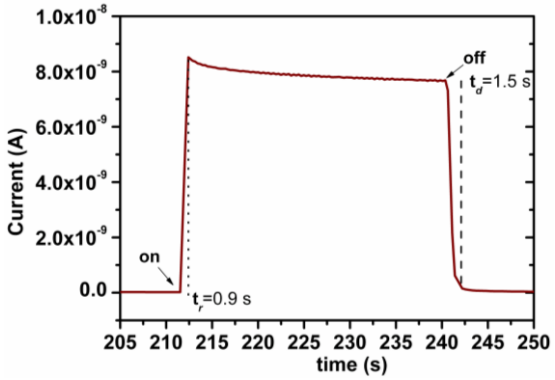


**Figure S2.** The rise time ($t_r$) and the decay time ($t_d$) of the device based on ZnOEP nanowire networks.

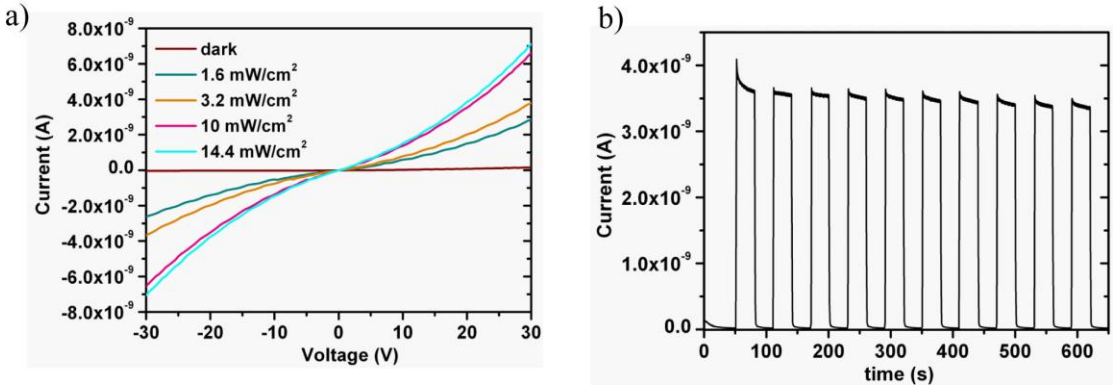


**Figure S3.** The photoresponse of the printed OPDs with a bending strain of 0.7%. (a) Typical I-V curves of the device measured in the dark and under the illumination. (b) Temporal response of the photocurrent of the device recorded with a power density of 14.4 mW/cm$^2$ and at an applied bias of 20V.