

Supporting information for:

Large-size nanosheets of 9,10-bis(phenylethynyl)anthracene with high photoresponse and light emission anisotropy

Juan-Ye Wang,^{ab} Hong-Dan Peng,^b Jia-Mei Yang,^b Jing-Hui Yan^{*a} and Ge-Bo Pan^{*b}

^a *College of Chemistry and Environmental Engineering, Changchun University of Science and Technology, 130022 Changchun, China. E-mail: yjh@cust.edu.cn*

^b *Suzhou Institute of Nano-tech and Nano-bionics, Chinese Academy of Sciences, 215123 Suzhou, P. R. China. E-mail: gbpan2008@sinano.ac.cn*

Experimental section

In a typical synthesis, the BPEA powder was dissolved in dichloromethane at a concentration of 1.2 mg ml⁻¹. The solution was injected in isobutyl alcohol with a volume ratio of dichloromethane and isobutyl alcohol of 1:5. The mixed solution was shaken for 10 s and stored at room temperature for ~1 h. The final products were collected and washed with isobutyl alcohol several times. Then, a drop (~10 μl) of solution with dispersed BPEA nanosheets was deposited onto Si substrate. The solvent was allowed to evaporate completely in air and the resultant product was further annealed at 120 °C for 30 min. The morphology and crystalline structures were characterized by means of scanning electron microscopy (SEM, Quanta 400 FEG), transmission electron microscopy (TEM, Tecnai G2 F20 S-Twin), X-ray diffraction spectrometer (XRD, Bruker D8 Advance X-Ray Diffractometer), Fourier-transform infrared spectroscopy (FTIR, Thermo Fisher Scientific FTIR 6700), photoluminescence spectroscopy and polarized photoluminescence spectroscopy (PL, Horiba JY Lab Ram HR 800).

The photodetectors were constructed in a bottom-connected configuration. Finger electrodes with a length of 200 μm, width of 20 μm, and distance of 20 μm are fabricated by photolithography and electron beam deposition of Au on a Si substrate covered with 300 nm thick SiO₂. A drop (~10 μl) of isobutyl alcohol solution with dispersed nanosheets is dropped on the surface of Au electrodes and the solvent is

allowed to evaporate in air. To remove the solvent thoroughly, the device is post-annealed at 120 °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 lamp was used as the white light source with different intensity. All measurements were carried out at ambient conditions.

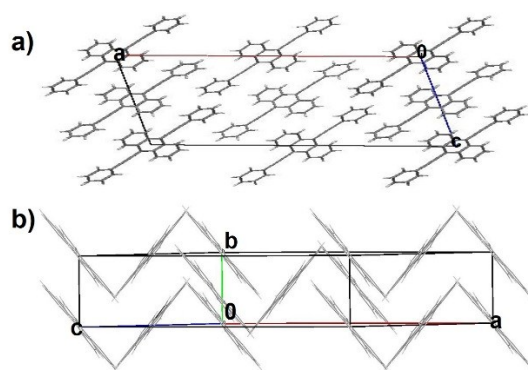


Fig. S1. Single crystal structure (a) viewed along b-axis and (b) side viewed of BPEA in a unit cell.

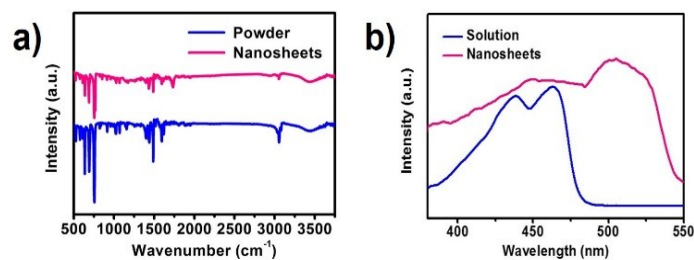


Fig. S2. (a) FTIR and (b) UV-vis absorption spectra of nanosheets and source powder of BPEA.

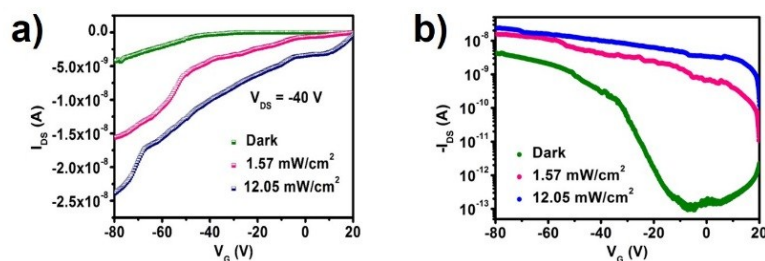


Fig. S3. (a) Transfer characteristics and (b) the I_{SD} - V_G curves based on BPEA nanosheet in dark and illumination at $V_{DS} = -40$ V.