Supporting information for:

Shape –controlled synthesis of platinum octaethylporphyrin crystalline aggregates modulated by versatile ionic liquids

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Experimental section

Platinum octaethylporphyrin (PtOEP) was purchased from Sigma-Aldrich. [BMIM]BF_4 (1-butyl-3-methylimidazolium tetrafluoroborate), [BMIM]NO_3 (1-butyl-3-methylimidazolium nitrate), [BMIM]PF_6 (1-butyl-3-methylimidazolium hexafluorophosphate), [B_3MePy]BF_4 (N-butyl-3-metylpyridinium tetrafluoroborate), [HOEtMIM]BF_4 (1-(2'-hydroxylethyl)-3-methylimidazolium tetrafluoroborate), and [BPy]BF_4 (N-butylpyridiniumtetrafluoroborate) were purchased from Shanghai Cheng Jie Chemical Co., Ltd. Chloroform and methanol were purchased from Shanghai Chemicals Company. All the chemical reagents were used as received.

In a typical process, a chloroform solution of PtOEP (2 mg/ml, 0.5 ml) was injected slowly into ionic liquids (0.5ml), and the mixed solution was stored for 24 h at room temperature. The final products were recovered by centrifugation and washed several times with the mixed solution of distilled water and methanol. A similar procedure was applied for a series of comparative experiments, in which the type of ILs, the volume ratio of chloroform/ILs, and the concentration of PtOEP were varied independently.

The morphology and crystalline structures of the as-obtained samples were characterized by 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), and confocal laser Raman

spectroscopy (Perkin Elmer Raman Station 400F). X-Ray photoelectron spectroscopy (XPS) was conducted using an AXIS Ultra spectrometer with a high-performance Al monochromatic source operated at 15 kV. Thermogravimetric analysis (TGA) of the sample was performed on a Pyris 1 TGA Instrument (PE, USA).

The current-voltage (I-V) 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. 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 SiO_2. A drop (~5 μl) of PtOEP dispersion of ethanol 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.

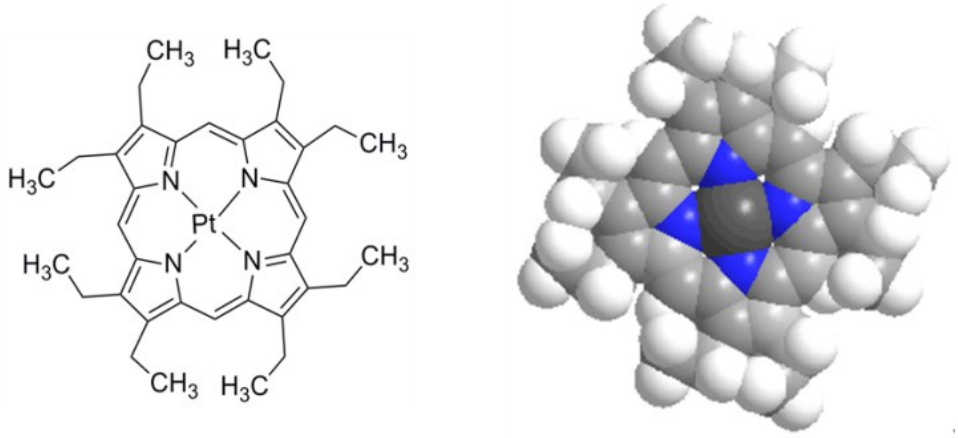

Fig. S1 Chemical structure and molecular model of PtOEP.

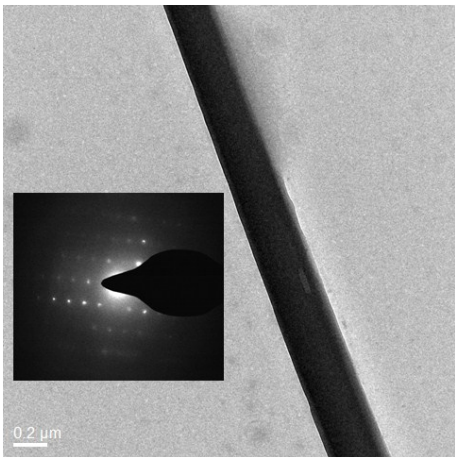

Fig.S2 TEM image of a single PtOEP microwire and the inset was the corresponding SAED pattern.

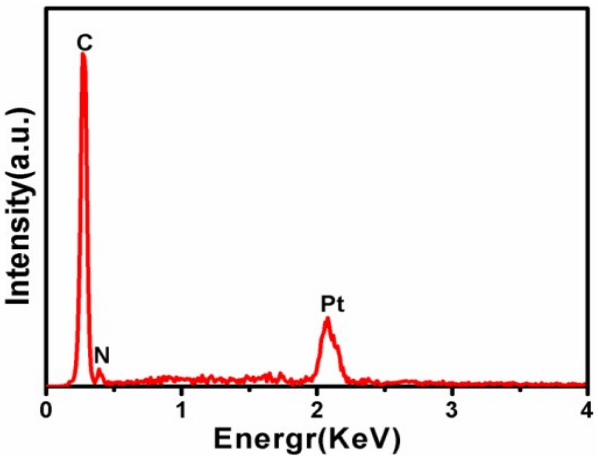

Fig.S3 EDX spectrum of PtOEP microwires

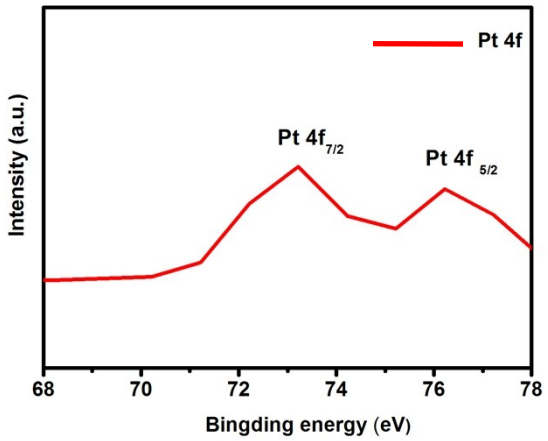

Fig. S4 XPS spectra of Pt 4f orbits of PtOEP microwires

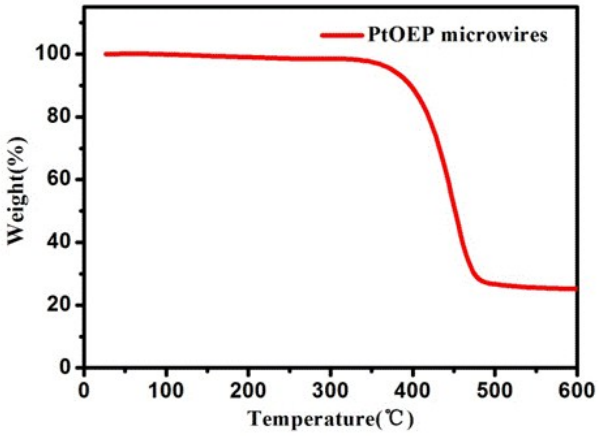

Fig. S5 TG curve of PtOEP microwires

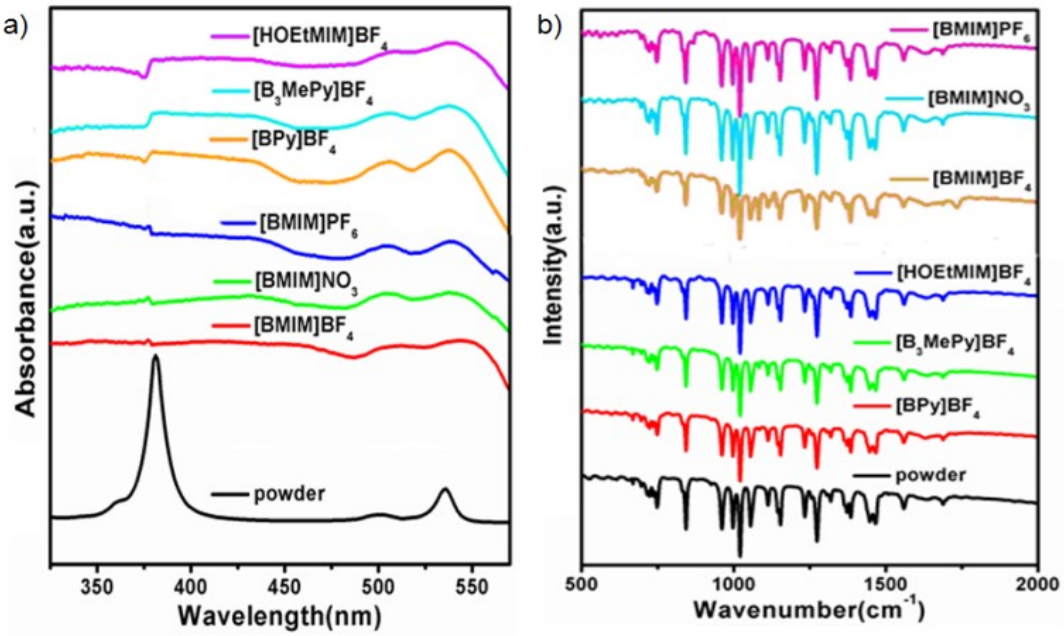

Fig.S6 (a) UV–Vis absorption and (b) FTIR spectra of PtOEP source powder and various assemblies obtained by different ILs-induced solution deposition.

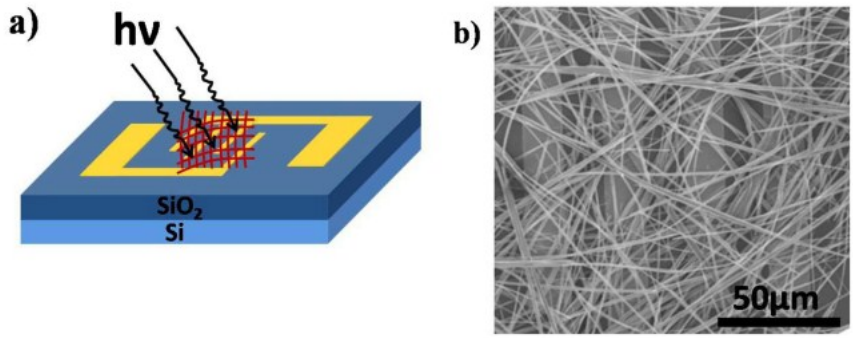

Fig.S7 (a) Schematic illustration of the device based on PtOEP nanowires film and (b) the corresponding SEM image of a real device.

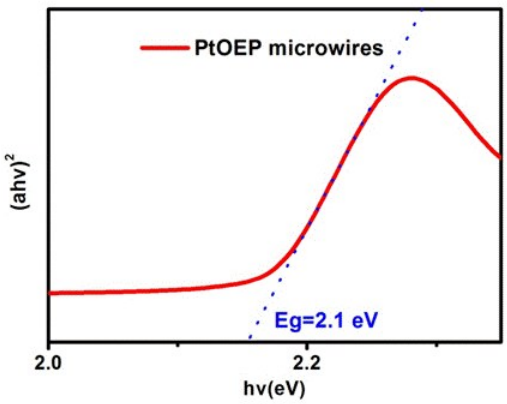

Fig. S8 By extrapolating the linear parts on the plots of *(ahγ)*^{2} *versus hγ* to (ahγ)^2 =0,

the band gap E_g value for the PtOEP microwires was about 2.1 eV.

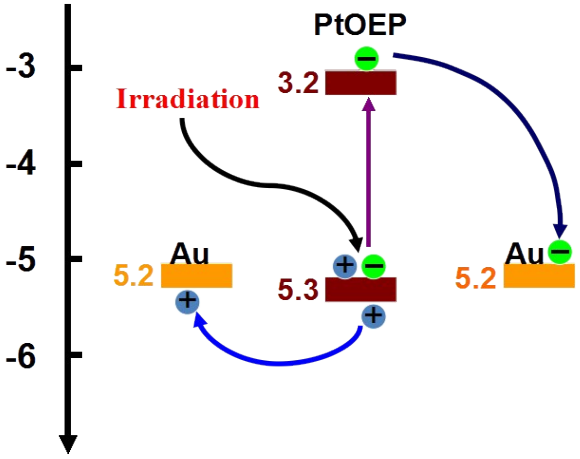

Fig.S9 Schematic diagram for the energy band of prototype photodetector

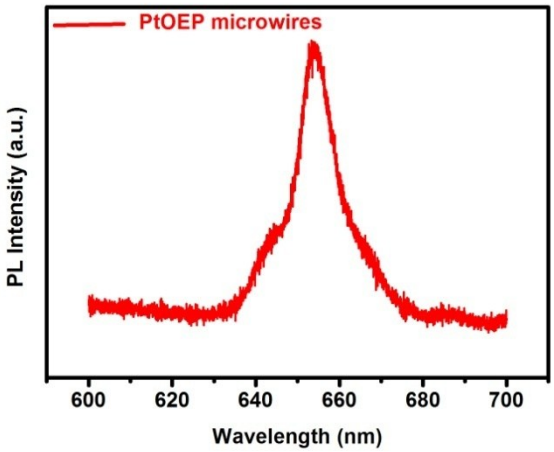

Fig.S10 Normalized photoluminescence (PL) spectra of PtOEP microwires deposited on a quartz wafer.