Electronic Supplementary Information

Donor-Acceptor Porphyrin Functionalized Pt Nano-Assemblies for Artificial Photosynthesis: A Simple and Efficient Homogeneous Photocatalytic Hydrogen Production System

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FT-IR discussion:

Fourier transform infrared (FT-IR) research on Pt–TPPAN reveals the interaction between the Pt nanoparticle and TPPAN in the nanohybrid. As shown in Fig. S1, the C=N stretching vibration of free TPPAN occurs at 1468 cm\(^{-1}\), while there is ca. 11 cm\(^{-1}\) shift to low wavenumbers for the peak of C=N vibration of porphyrin in Pt–TPPAN (ca.1457 cm\(^{-1}\)) and the intensity of this peak decreases conspicuously. The fact of the peak shift and intensity decrease for Pt–TPPAN can be ascribed to the interaction between Pt nanoparticle and the N atom of the porphyrin ring.\(^{S1-S3}\) On the other hand, the peak of N–H at 966 cm\(^{-1}\) disappear since the hydrogen atom in the N–H bonding is replaced by metallic Pt species.\(^{S4}\) The results give a evidence that there is coordination bond interaction between the Pt nanocomposite and the nitrogen atoms of the porphyrin ring.

References:

S1 M. Zhu, M. Han, Y. Du, P. Yang and X. Wang, Dyes Pigment., 2010, 86, 81–86.
**Fig. S2** B3LYP/6–31G(*) optimized structures of TPPAN with different model. a): ball & stick model; b): space filling model.

**Fig. S3** B3LYP/6-31G (*) optimized geometry parameters. The distances are given in Å.
Fig. S4 Spectra overlap of the fluorescence spectrum of 9-ClMA (black line) and the absorption spectrum of TPPAN (red line).

Fig. S5 Fluorescence spectrum of 9-ClMA excited at 420 nm (0.05 mM) at room temperature.
Fig. S6 Absorption spectrum (—) and corrected fluorescence excitation spectrum ($\lambda_{\text{em}}$ = 656 nm) (- - -) of TPPAN in CH$_2$Cl$_2$ solution.