Electronic Supplementary Material (ESI) for Catalysis Science & Technology

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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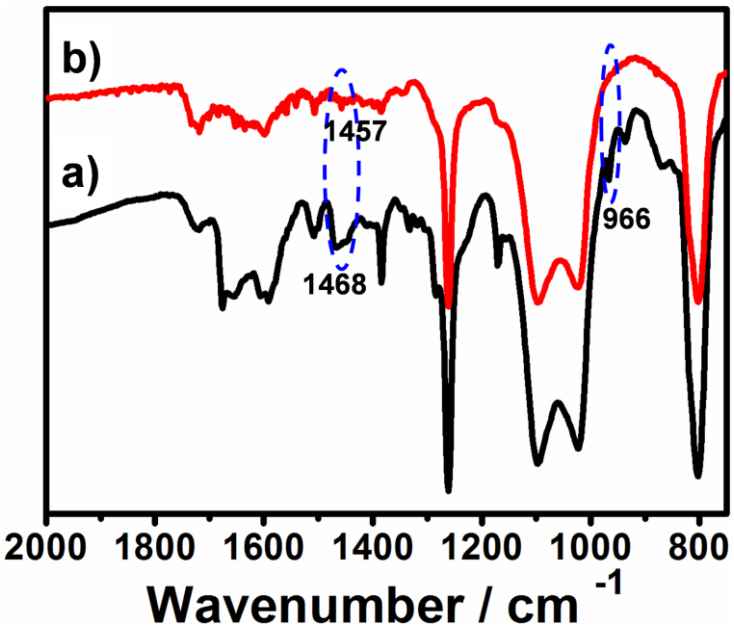

Fig. S1 FT−IR spectra of TPPAN and Pt−TPPAN nanocomposite.

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.
S2 M. Zhu, Y. Dong, Y. Du, Z. Mou, J. Liu, P. Yang and X. Wang, *Chem. Eur. J.*, 2012, **18**, 4367−4374.
S3 P. Yang, W. Zhang, Y. Du and X. Wang, *J. Mol. Catal. A: Chem.*, 2006, **260**, 4−10.
S4 E. Sun, Y. Shi, P. Zhang, M. Zhou, Y. Zhang, X. Tang and T. Shi, *J. Mol. Struct.*, 2008, **889**, 28−34.

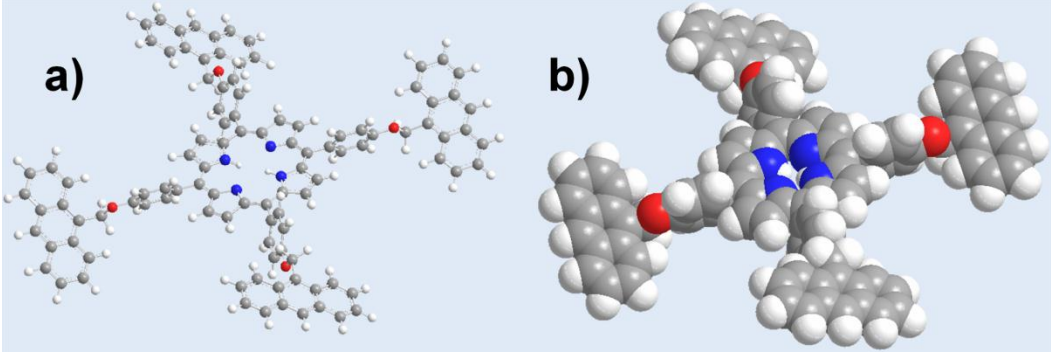

Fig. S2 B3LYP/6–31G(*) optimized structures of TPPAN with different model. a): ball & stick model; b): space filling model.

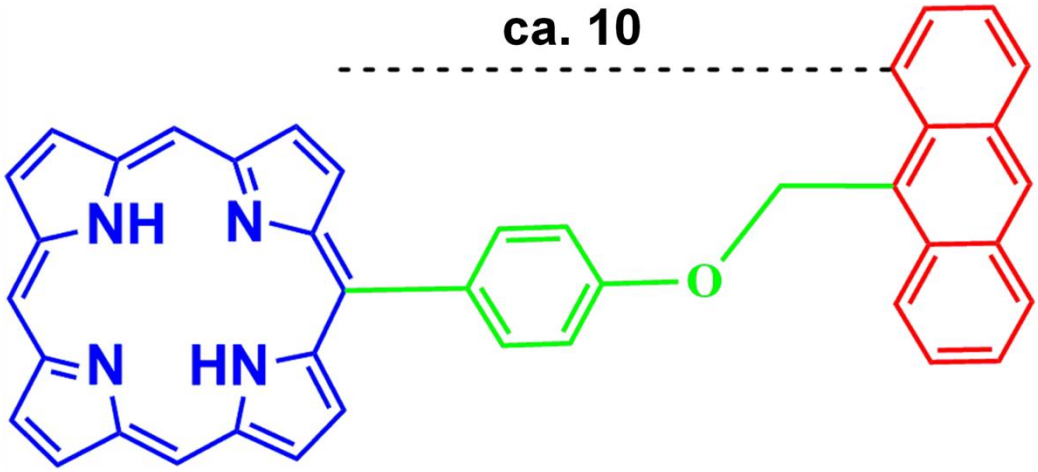

Fig. S3 B3LYP/6-31G (*) optimized geometry parameters. The distances are given in Å.

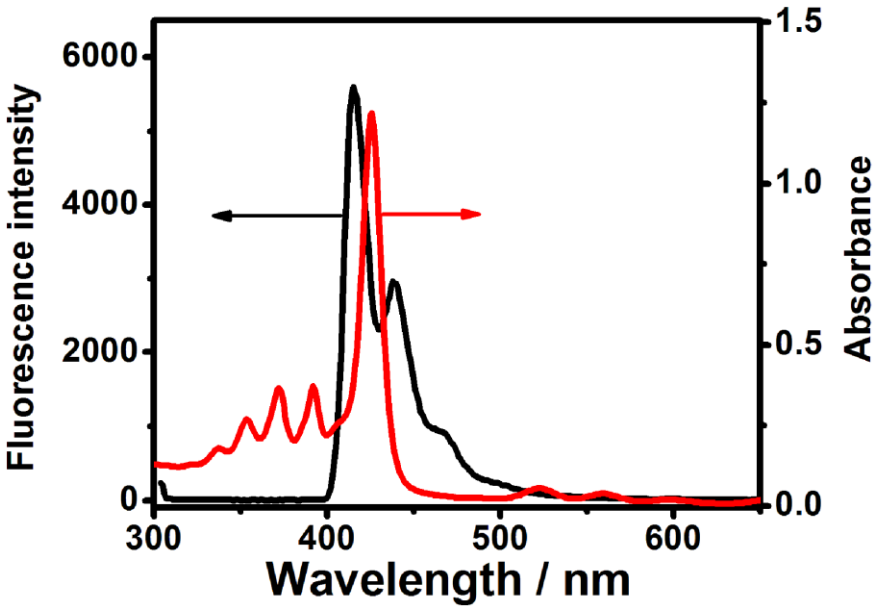

Fig. S4 Spectra overlap of the fluorescence spectrum of 9-ClMA (black line) and the absorption spectrum of TPPAN (red line).

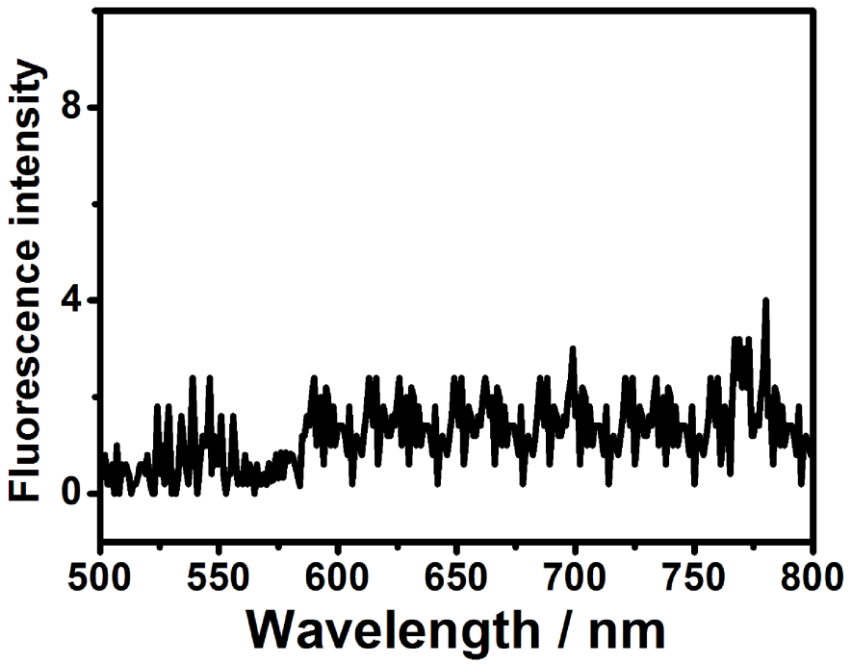

Fig. S5 Fluorescence spectrum of 9-ClMA excited at 420 nm (0.05 mM) at room temperature.

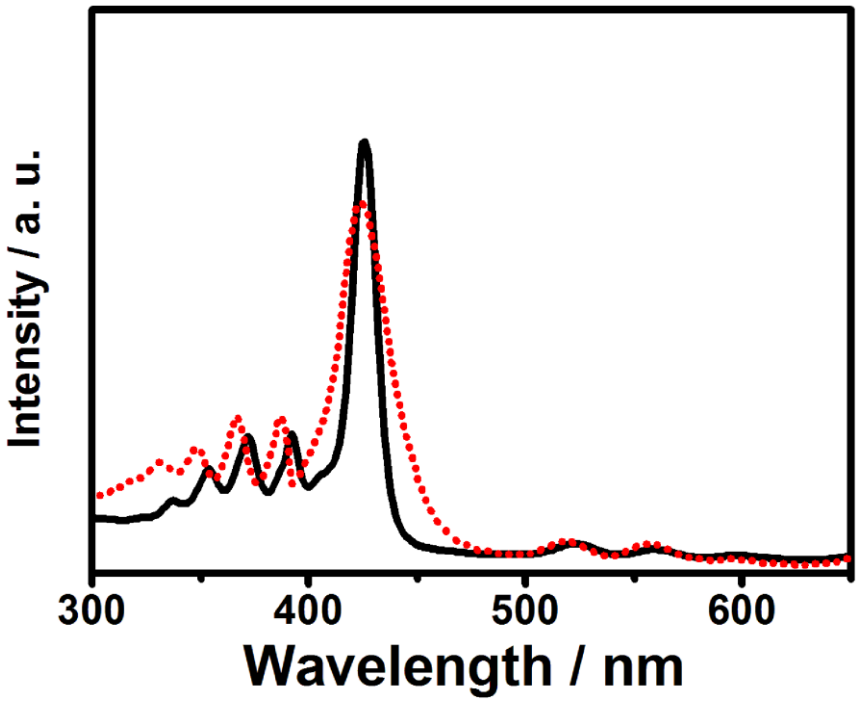

Fig. S6 Absorption spectrum (—) and corrected fluorescence excitation spectrum **(**λ_{em} = 656 nm) (- - -) of TPPAN in CH_2Cl_2 solution.