

Supporting Information

Effective TiO₂ hybrid heterostructure fabricated on nano mesoporous phenolic resol for visible-light photocatalysis

Yijun Jiang,* Lingqian Meng,[†] Xindong Mu,* Xiutao Li, Haisong Wang, Xiufang Chen, Xicheng Wang, Wei Wang, Feng Wu and Xiaoyan Wang

Key Laboratory of Biofuels, Qingdao Institute of Bioenergy and Bioprocess Technology, Chinese

Academy of Sciences, Qingdao 266101, P. R. China

Fax: +86-532-80662724; Tel: +86-532-80662723.

Corresponding author: Yijun Jiang and Xindong Mu

E-mail: jiangyj@qibebt.ac.cn; muxd@qibebt.ac.cn

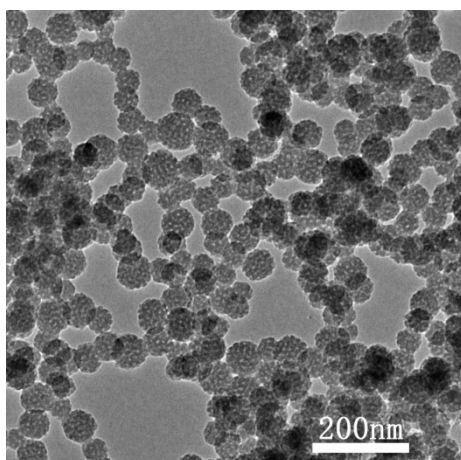


Figure S1. TEM image of NS-PR

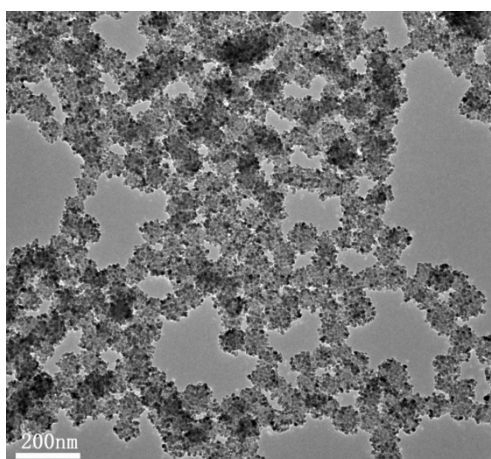


Figure S2. TEM image of TiO₂@NS-PR

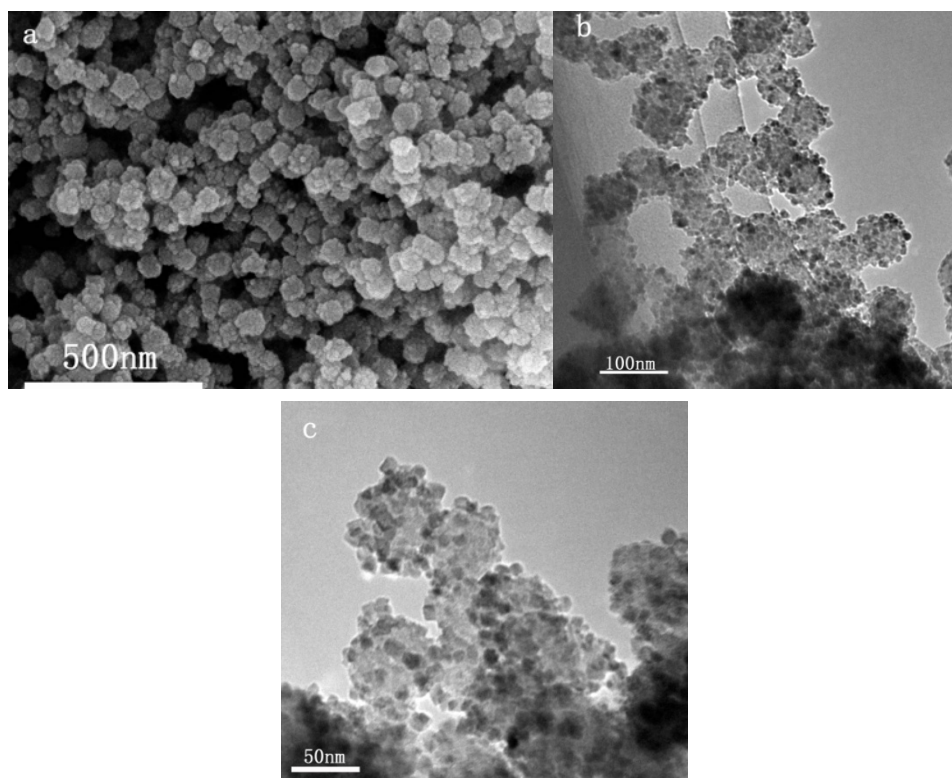


Figure S3. SEM images a) and TEM images b,c) of the TiO_2 @NS-PR-300

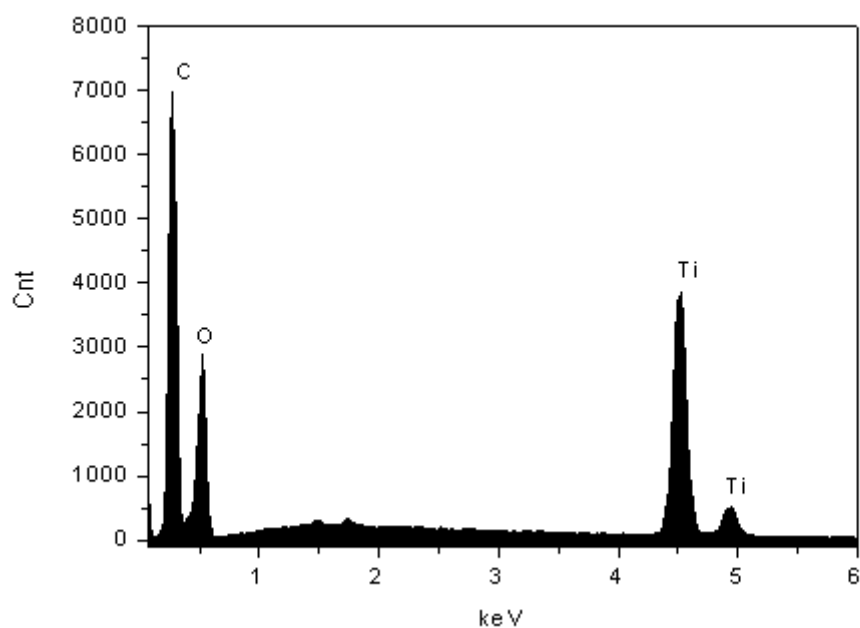


Figure S4. EDX of the TiO₂@NS-PR-300.

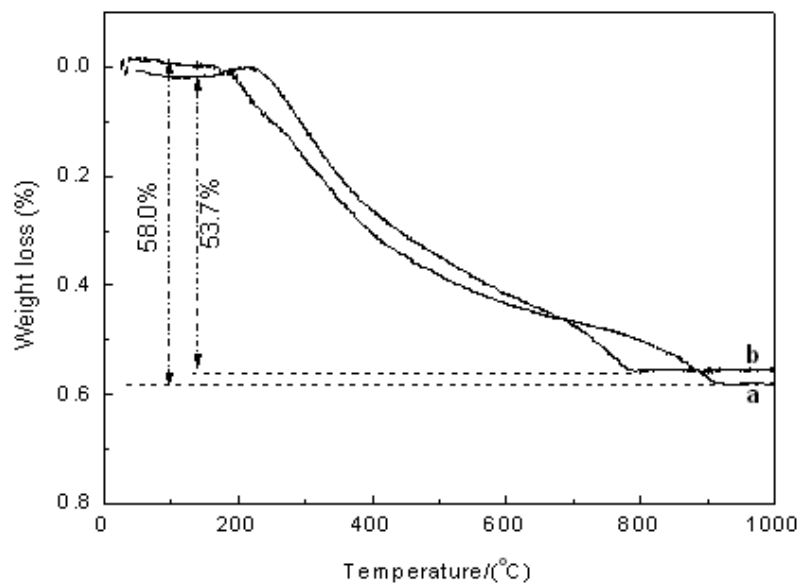


Figure S5. TGA curves of TiO₂@ of the a)TiO₂@NS-PR and b) TiO₂@NS-PR-300.

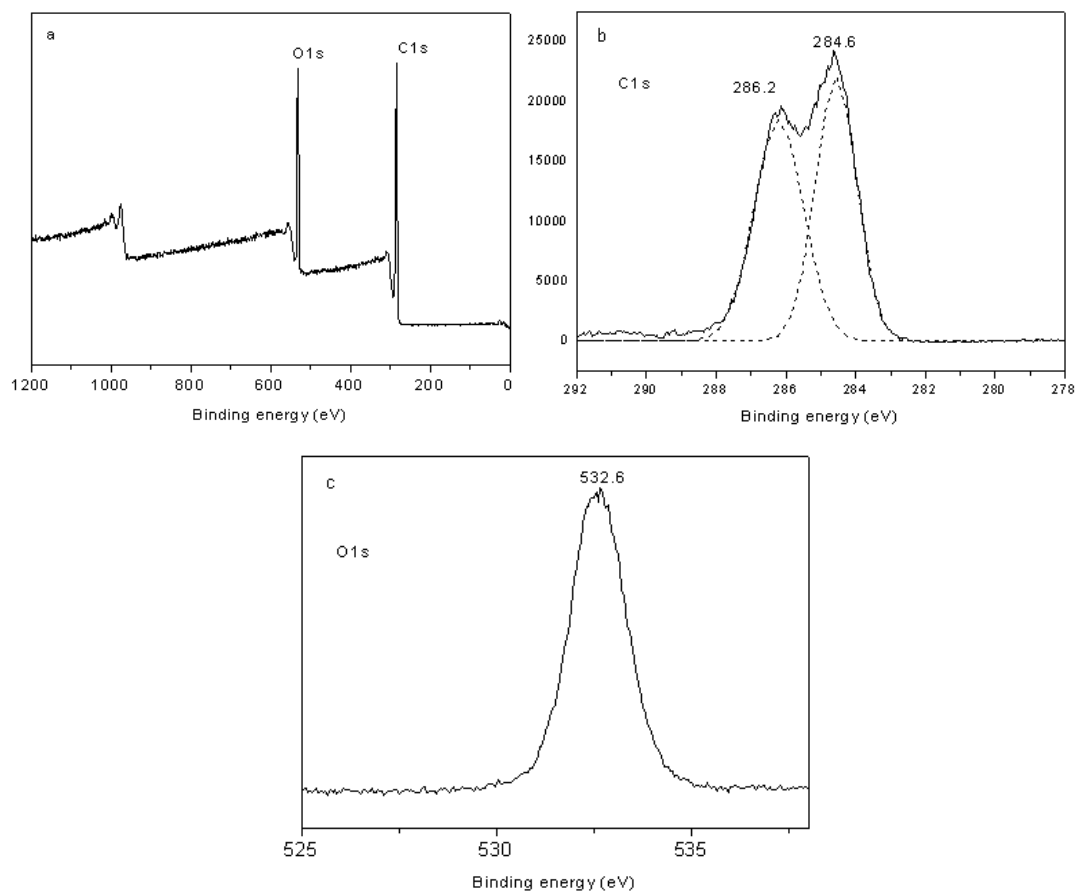


Figure S6. XPS of the NS-PR

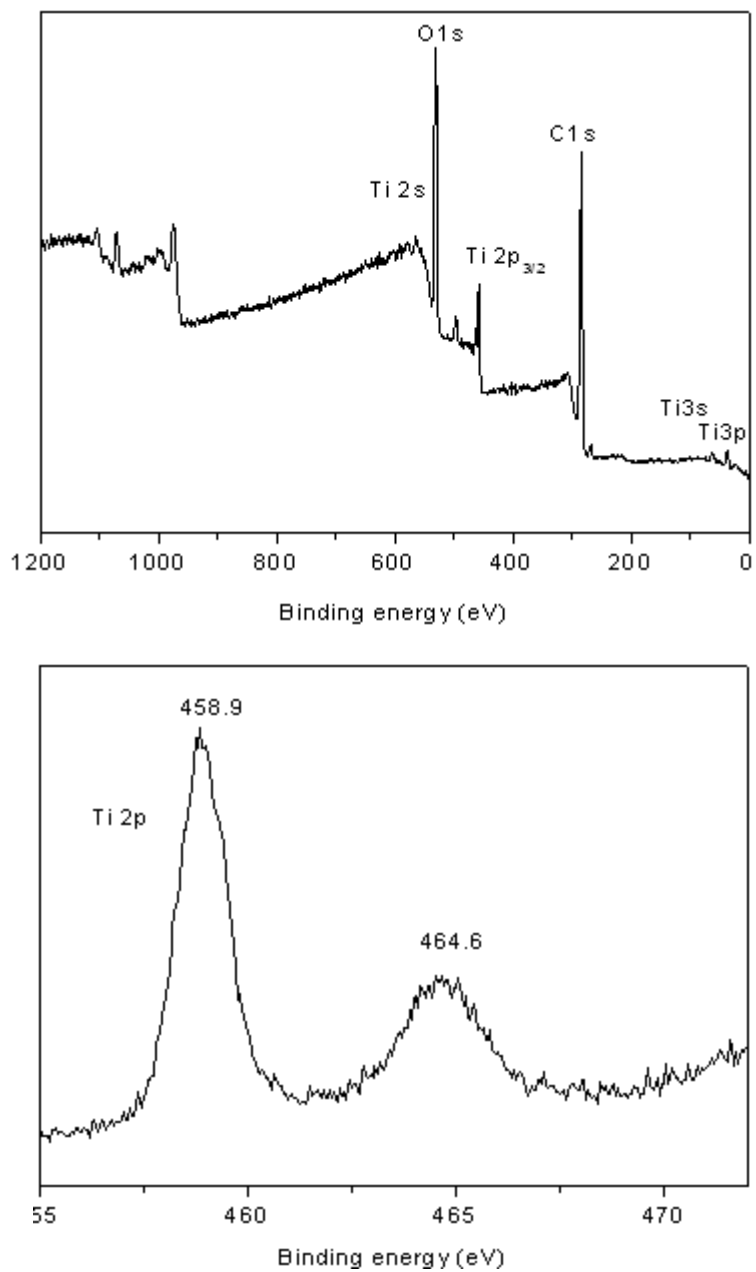


Figure S7. XPS of the TiO₂@NS-PR-300

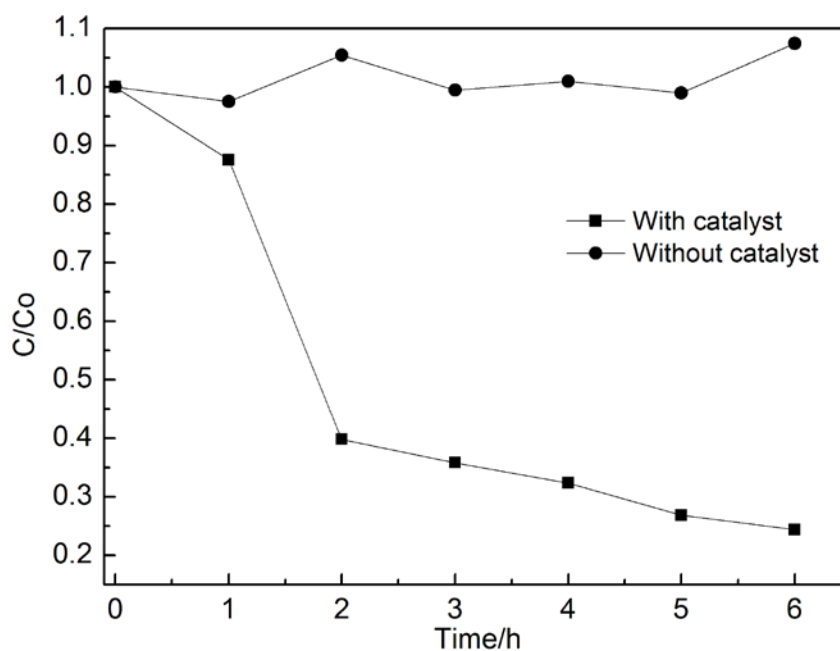


Figure S8. Photocatalytic degradation of formaldehyde (FD) over $\text{TiO}_2@\text{NS-PR-300}$ under visible light irradiation ($\lambda > 420$ nm).

Reaction conditions: Before the photocatalysis, the FD aqueous solution (50 mL, 20 mg/L) containing the catalyst (0.1g) was stirred in the dark for about 12 h to make sure the equilibrium of adsorption. During the irradiation, about 1.5 mL of suspension was continually taken from the reaction cell at given time intervals for subsequent FD concentration analysis after centrifuging. The FD concentration in the solution was determined by Varian GC with FID detector.

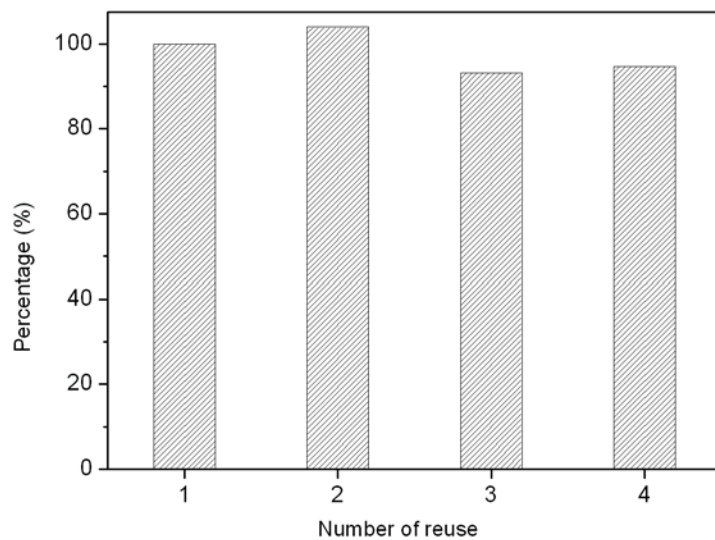


Figure S9. Recycle studies of TiO₂@NS-PR-300.

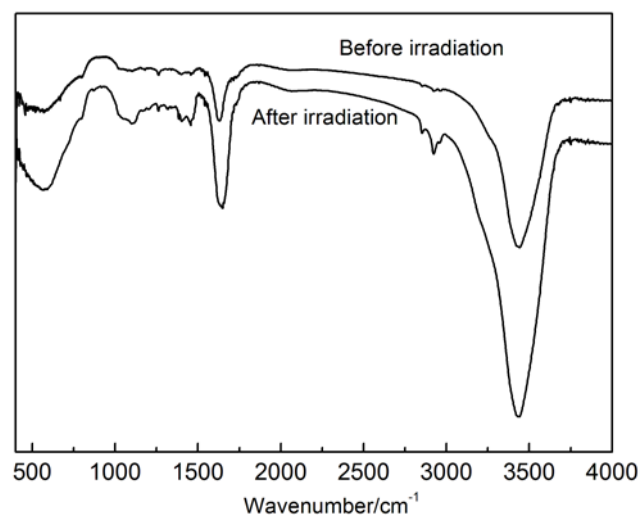


Figure S10. The spectrum of FT-IR before and after the visible-light irradiation for 12 h.

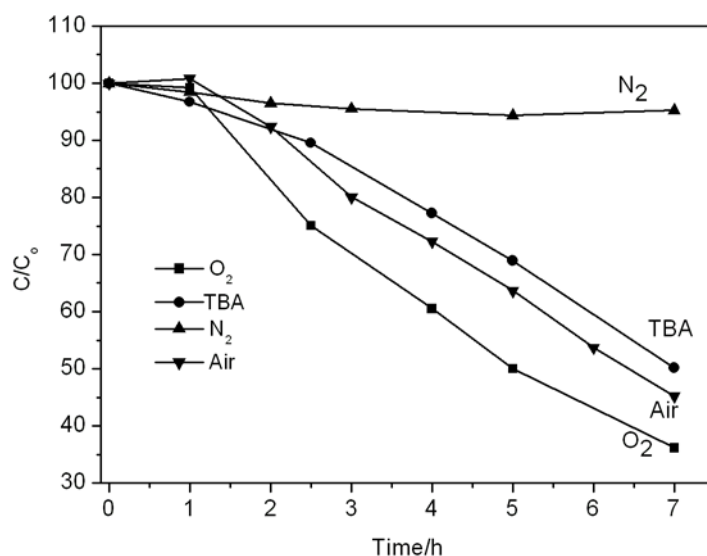


Figure S11. Effects of TBA (20 mM) addition, concentration of O₂ on visible-light photocatalytic degradation of MO.

Table S1. The total organic carbon in the water after the irradiation of visible-light.

sample	Total organic carbon (mg/L)	Percent of the TOC in water (%)
Decompose completely ^a	785.78	100
Irradiation for 0h ^b	2.24*	0.29
Irradiation for 1h	3.17	0.40
Irradiation for 2h	2.67	0.34
Irradiation for 4h	5.43	0.69
Irradiation for 6h	4.16	0.53
Irradiation for 8h	5.47	0.70

Reaction condition:

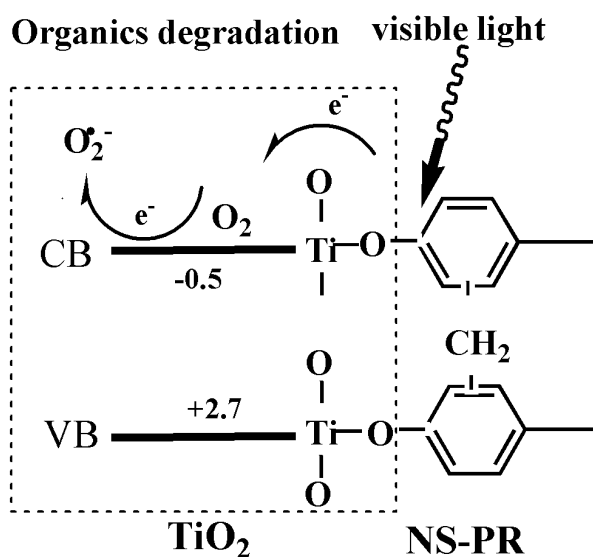
0.1g TiO₂@NS-PR-300 was added into the quartz reactor filled with 50 mL H₂O, then the mixture was stirred by magnetic bar at 1040 r/min for 12 h at dark (the sample at this time was named Irradiation for 0h). At last, the visible-light irradiation system was turned on,

during the irradiation, about 1.5 mL of suspension was continually taken from the reaction cell at given time intervals for subsequent analysis after centrifugation at 12000 r/min for 15 min and filtering with 0.22 μm filter.

^a On the assumption that the NS-PR in the $\text{TiO}_2@\text{NS-PR-300}$ was decomposed completely due to the instability under the photocatalysis. The content of NS-PR was calculated from the analysis of TG result.

^b This sample has been stirred at dark for 12 h.

*The TOC in the water was attributed to the $\text{TiO}_2@\text{NS-PR-300}$ particles which were not get rid of by the centrifugation and filtration due to the small size and observed by TEM.



Scheme S1 The proposed mechanism of visible-light induced photocatalytic degradation.