

Supporting Information

Graphene encapsulated hollow TiO₂ nanospheres: efficient synthesis and enhanced photocatalytic activity

Jian Zhang^{a,b,d}, Zhenping Zhu^a, Yanping Tang^c and Xinliang Feng^{*b,c}

^a State Key Laboratory of Coal Conversion, Institute of Coal Chemistry, Chinese Academy of Sciences, Taiyuan 030001, China. E-mail: zpzhu@sxicc.ac.cn; Fax: +86-351-4048433; Tel: +86-351-4048715

^b Max Planck Institute for Polymer Research, Ackermannweg 10, 55128 Mainz, Germany. E-mail: feng@mpip-mainz.mpg.de; Fax: (+49) 6131-379-100; Tel: (+49) 6131-379-488.

^c School of Chemistry and Chemical Engineering, Shanghai Jiao Tong University, 200240, Shanghai, P. R. China.

^d University of Chinese Academy of Sciences, Beijing 100049, China

Synthesis of TiO₂ NSs and the blended TiO₂ NSs/graphene (TiO₂-G): TiO₂ NSs was directly produced from amine-modified TS NPs following the synthesis procedure of GT NSs. 200 mg TS NSs was etched in 2M NaOH solution and TiO₂ NSs was obtained after washing with water. Then, TiO₂ NSs was re-dispersed into graphene oxide (GO) solution, containing 4 mg GO. The dispersion was chemically reduced by hydrazine in 90 °C for 1h. After filtration, washing and dryness, the blended TiO₂ NSs/reduced graphene oxide (TiO₂-G) was obtained.

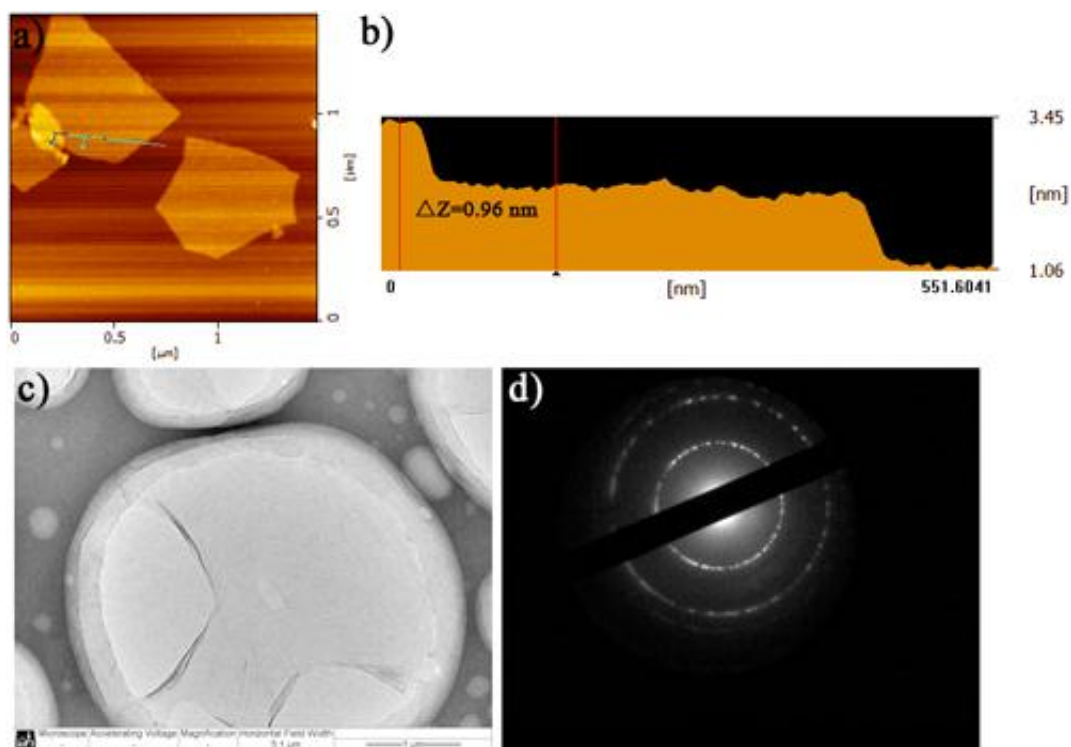


Fig. S1 AFM image (a) and corresponding thickness analysis of GO (b). TEM image (c) and electron diffraction pattern (d) of GO.

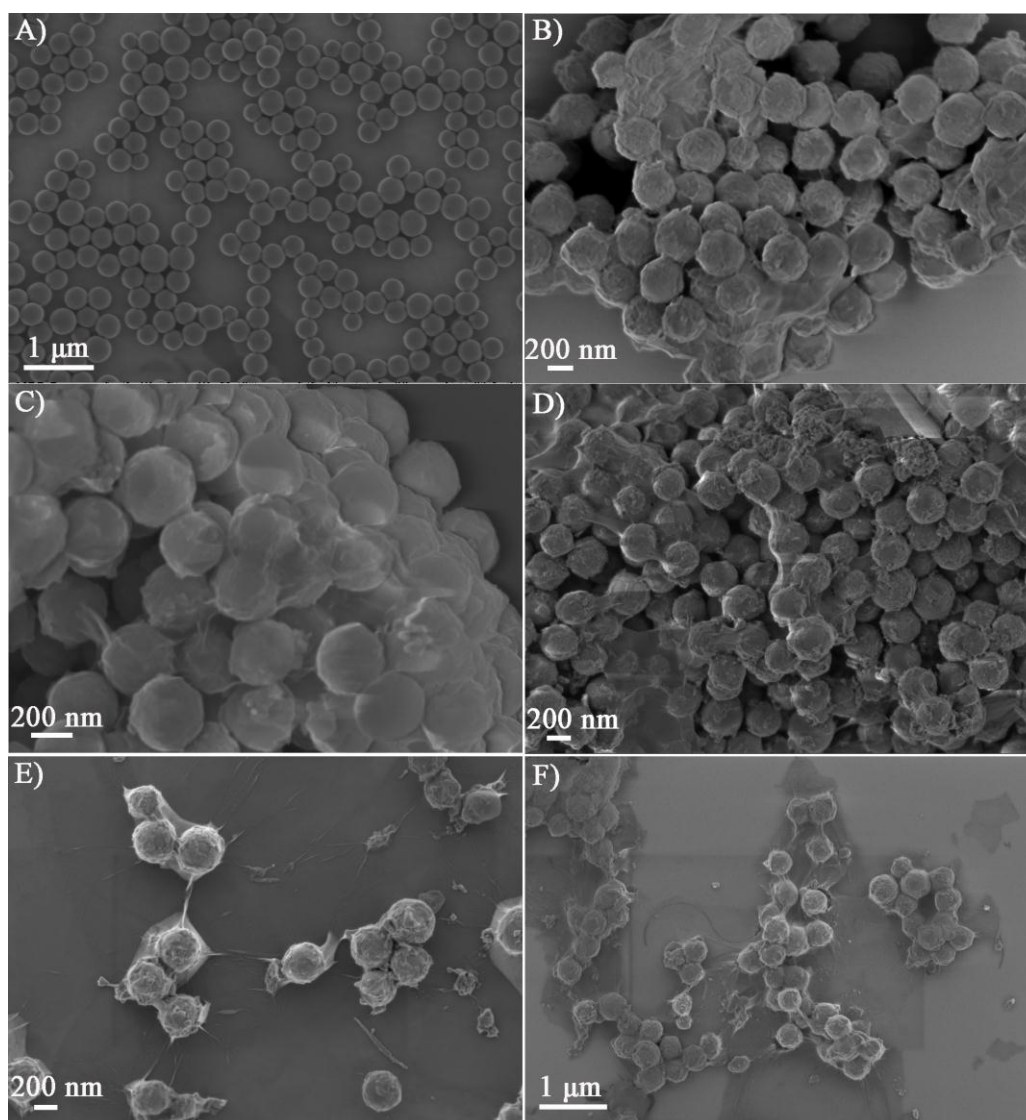


Fig. S2 SEM images of GOTS NSs with different weight ratios of TS NSs to GO: 100: 0 (A); 100:0.5 (B); 100:1 (C); 100:2 (D); 100:5 (E) and 100:10 (F).

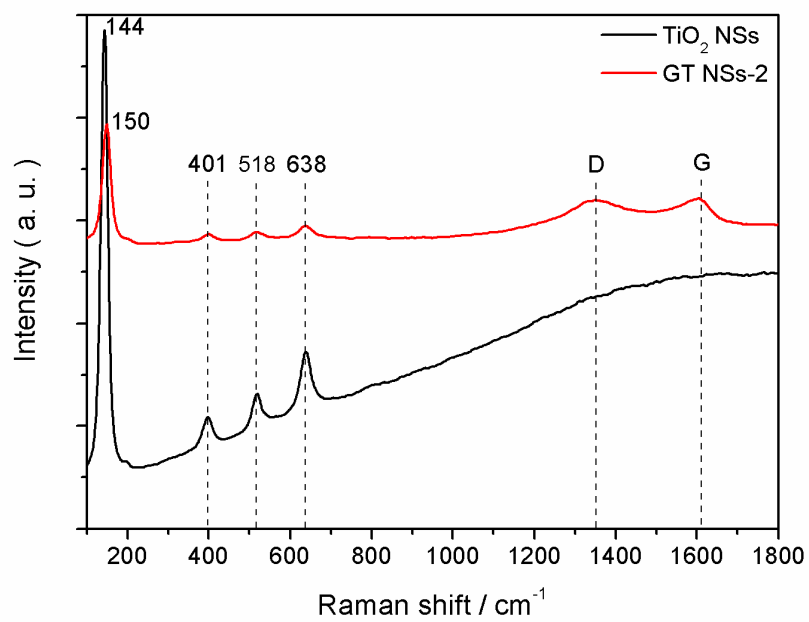


Fig. S3 Raman spectra of TiO₂ NSs and GT NSs-2 from 100 nm to 1800 nm.

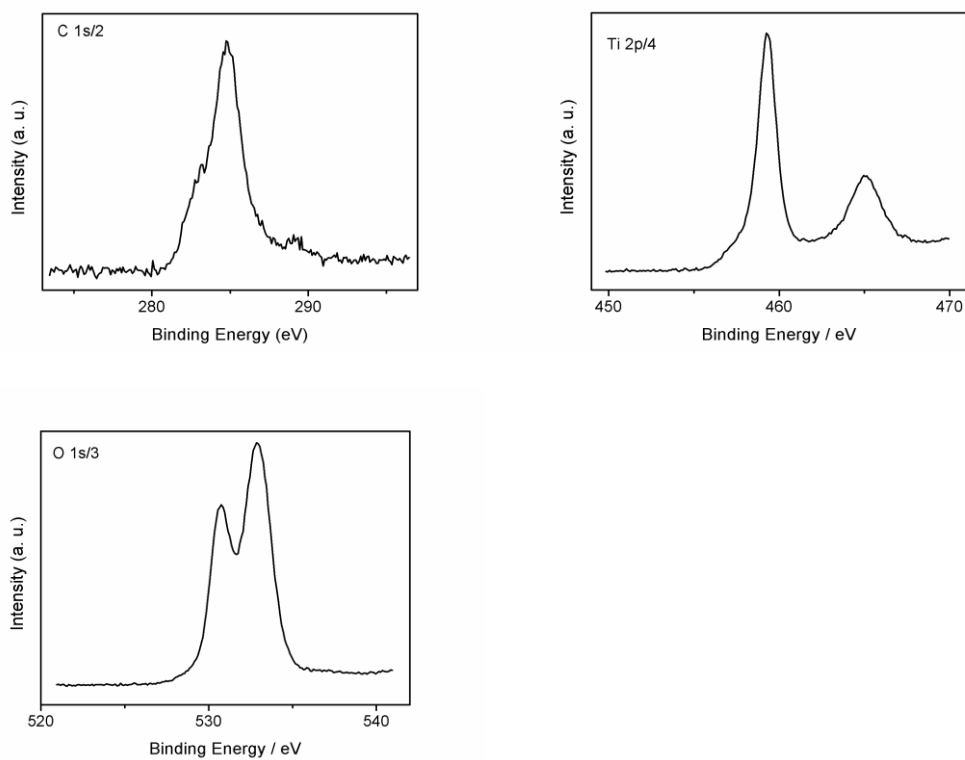


Fig. S4 High-resolution XPS spectra of GT NSs-2.

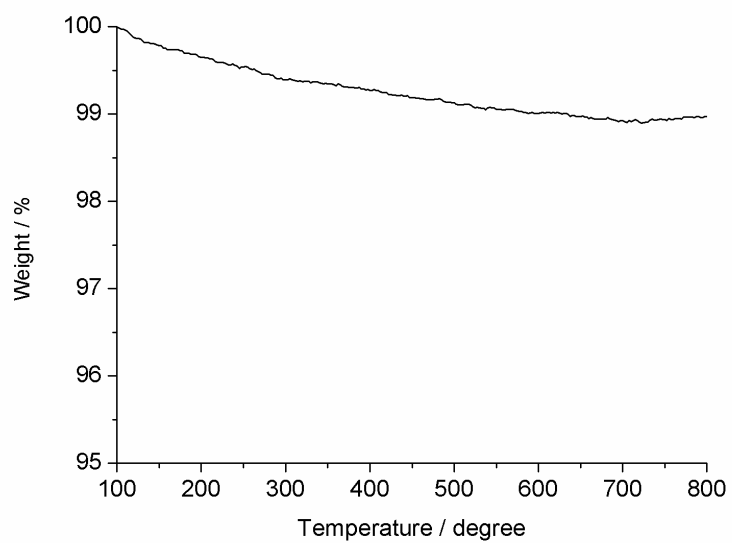


Fig. S5 Thermogravimetric analysis (TGA) of GT NSs-2.

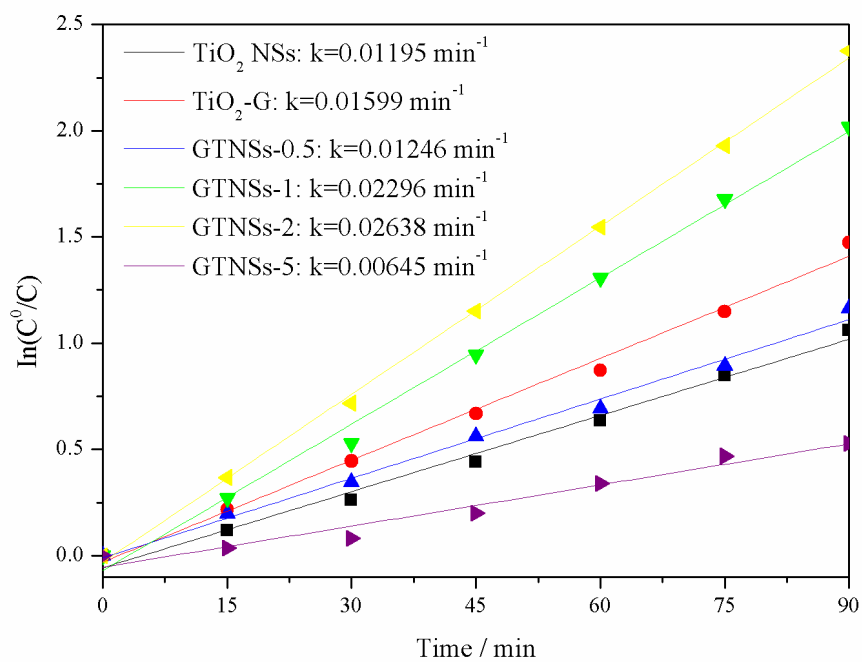


Fig. S6 Photocatalytic rate constants of degradation of RhB.

Time (h)	0 h	1 h	3 h	5 h	7 h
TOC (ppm)	15.14	14.58	11.97	9.63	8.06

Table S1. TOC result for the degradation of RhB using GT NSs-2 as catalyst.

Samples	TiO ₂ NSs	TiO ₂ -G	GT NSs-0.5	GT NSs-1	GT NSs-2	GT NSs-5
TOC (ppm)	10.03	9.12	9.77	8.37	8.06	11.94

Table S2. TOC results for the degradation of RhB using different catalysts after irradiation for 7h.

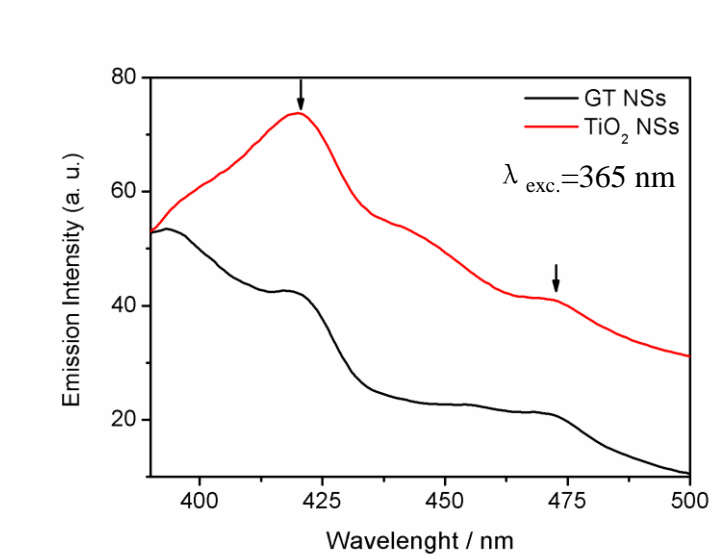


Fig. S7 Fluorescence spectrum of TiO₂ NSs and GT NSs-2.