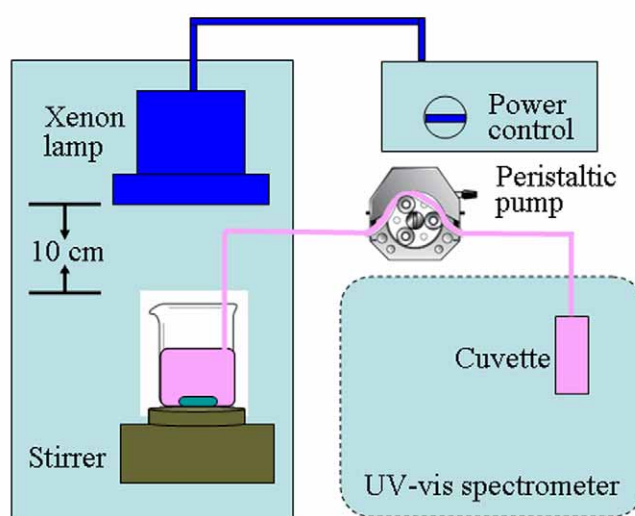


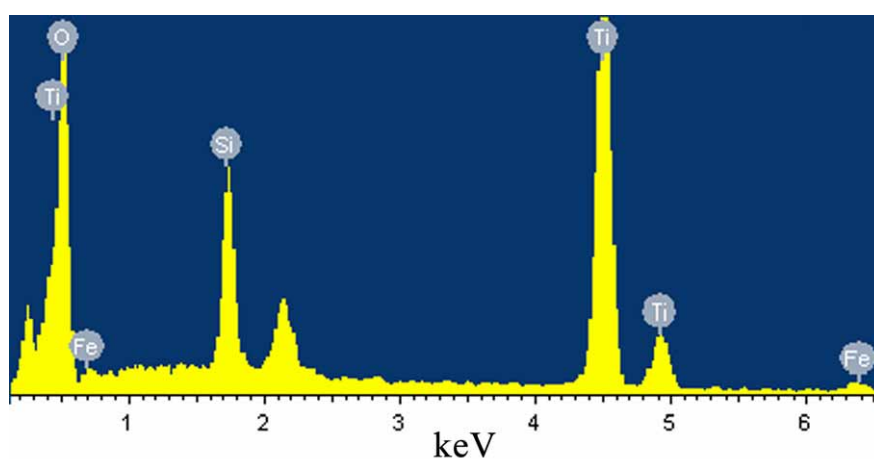
## Supporting Information

### Synthesis of Small Yolk-shell $\text{Fe}_3\text{O}_4@\text{TiO}_2$ Nanoparticles with Controllable Thickness as Recyclable Photocatalysts

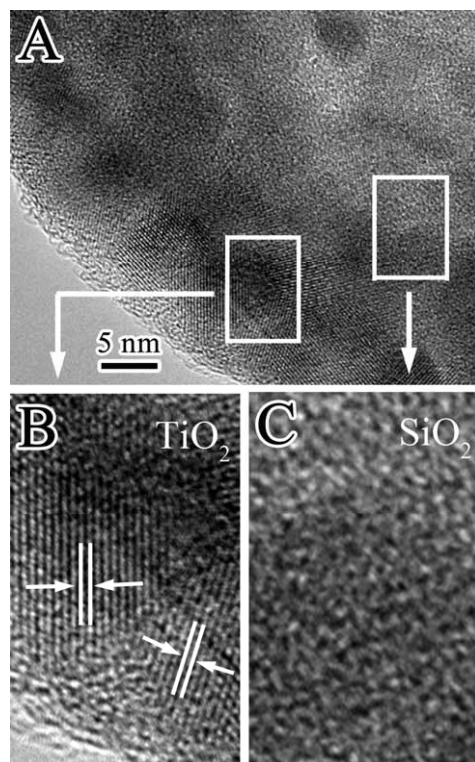
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**Fig. S1** Schematic illustration of the photocatalytic experiments.



**Fig. S2** EDS data of the prepared  $\text{Fe}_3\text{O}_4@\text{TiO}_2$  yolk-shell NPs (Sample 3). The peaks without denotation are from the copper substrate used for measurement. Beside the element Fe, Ti and O, an obvious peak from Si was also found. This result suggests that not the whole  $\text{SiO}_2$  layer has been etched off.



**Fig. S3** (A) High-resolution TEM image of the TiO<sub>2</sub> shell; (B) and (C) are magnified images at the surface and the inner layer, respectively. From the surface, clear lattice fringes can be observed and the distance is consistent with the (101) planes of anatase TiO<sub>2</sub> crystal, suggesting that the surface is composed of crystallized TiO<sub>2</sub> nanocrystals. In contrast, no obvious fringe is observed at the inner shell, implying that a thin amorphous SiO<sub>2</sub> layer still exist due to the incomplete etching.

<b>Samples</b>	TiO <sub>2</sub> thickness (nm)	Total size (nm)	Volume of TDAA solution (mL)
Samples 1	6	31	2.25
Samples 2	11	40	4.5
Samples 3	19	47	9
Samples 4	27	54	18

**Table S1** List of the total size and TiO<sub>2</sub> thickness of the samples prepared with different amount of TDAA solution. These results indicate that the thickness of TiO<sub>2</sub> shell can be controlled by the addition of TDAA solution.

Samples	Weight ratio (%)			
	Fe	O	Si	Ti
Samples 1	2.06	51.27	25.71	20.96
Samples 2	1.99	50.14	12.03	35.84
Samples 3	1.87	49.88	8.24	40.01
Samples 4	1.72	45.38	5.58	47.32

**Table S2** List of the elemental contents in different samples determined by EDS analyses.