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Supporting Information for:

A Stable and Highly Efficient Visible-Light Photocatalyst of TiO_2 and Heterogenous Carbon Core-Shell Nanofibers

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CHARACTERIZATION

Transmission electron microscope images (TEM): The TEM images of pure TiO_2 nanofibers are shown in Figure S1. Figure S1a shows the TEM image and Figure S1b shows the HRTEM image of the prepared pure TiO_2 nanofibers. It can be seen that there are no carbon species remained on the surface of the nanofibers after calcination at 550 °C in air for 2h. And the hybrid carbon is coated via the impregnation process.

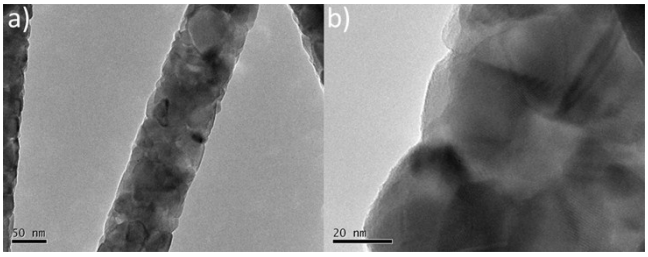

Figure S1. a) TEM and b) HRTEM images of pure TiO_2 nanofibers.

Electron dispersive spectrometer (EDS): The EDS results of the composite nanofibers are shown in Figure S2. Figure S2a shows the scanning transmission electron microscopy (STEM) image of C2 and Figure S2e, f, g, and h show the corresponding mapping results of Ti, O, C, and C&Ti, respectively. Figure S2b, c, and d show the line scanning results of C3 and the corresponding STEM image. It is indicated that a core-shell structure of TiO_2-carbon is formed.

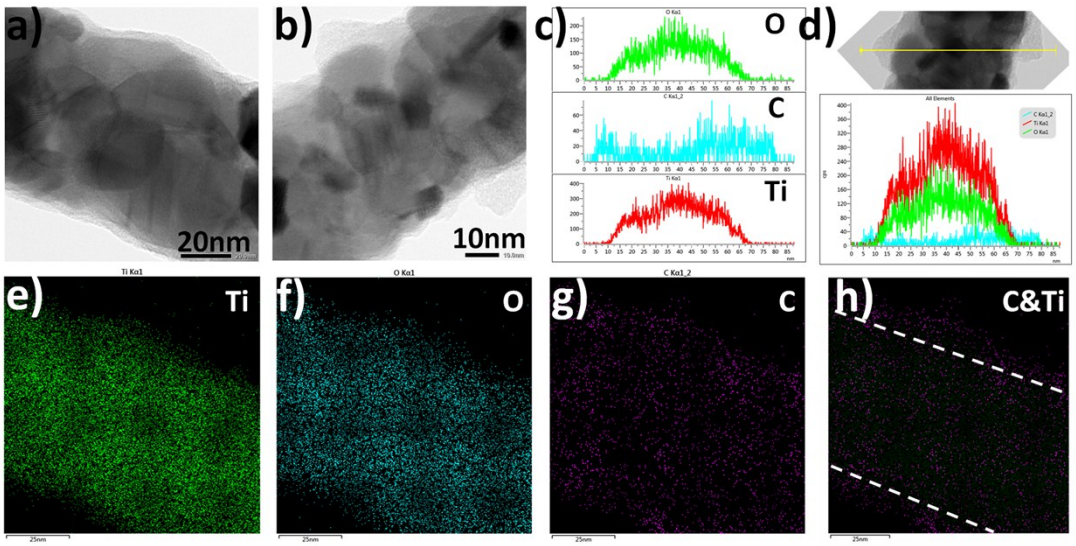

Figure S2. EDS results. a, b) STEM images of C2 and C3. c, d) line scanning results for Ti, O, and Ti of C3. e, f, g, h) mapping results for Ti, O, and C of C2.

Photoluminescence (PL) spectra: The PL spectra of the CQDs precursor solutions are shown in Figure S3. It can be seen that the PL intensity of the CQDs solution decreases while the main emission wavelength has a red shift as the ultrasonic time increases, which may due to the increased diameter of the as-prepared CQDs. [1] The PL spectrum of C3 has a broad emission at 450, 500 and 580 nm, indicating the mixture of CQDs with different size. The inset of Figure S3 shows the color of the CQDs precursor solution.

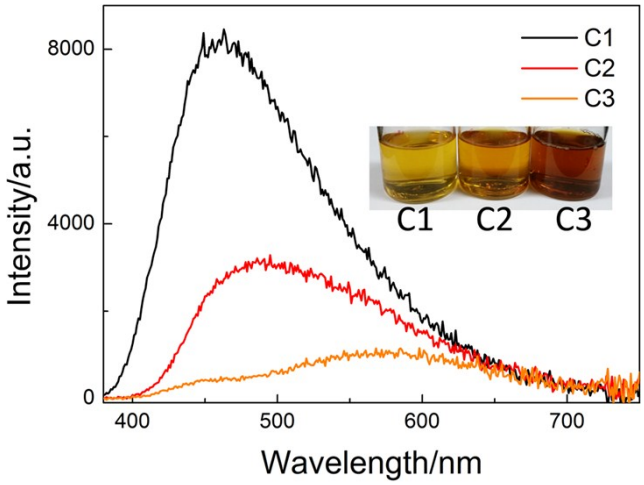

Figure S3.PL spectra of the CQDs precursor solutions with different ultrasonic time. The inset is the color of the solutions.

(1) Li, H.; He, X.; Kang, Z.; Huang, H.; Liu, Y.; Liu, J.; Lian, S.; Tsang, C. H. H.; Yang, X.; Lee. S. T. Water-Soluble Fluorescent Carbon Quantum Dots and Photocatalyst Design. *Angew. Chem. Int. Ed.* **2010**, 49, 4430-4434.

FTIR result: The FTIR spectra are used to confirm whether RhB adsorbed on the sample surface has been removed or not. The black line is the FT-IR spectrum of RhB ($C_{28}H_{31}ClN_2O_3$). The main bands are noted in Figure S4. The spectra of C2 before and after photocatalytic process are almost the same, indicates that the RhB adsorbed on the sample surface has been removed.

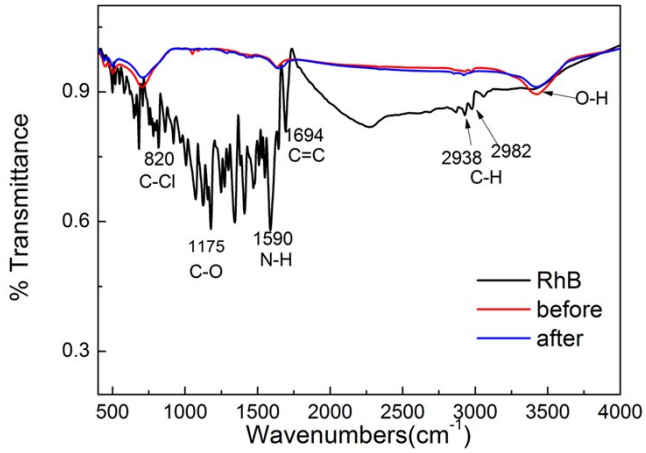

Figure S4. FTIR results of C2 before and after photocatalytic process.