Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting information

Assembly of CdS Quantum Dots-TiO_2 Nanobelts Heterostructure for Photocatalytic Application: Towards Efficient Visible Light Photocatalyst *via* Facile Surface Charge Tuning

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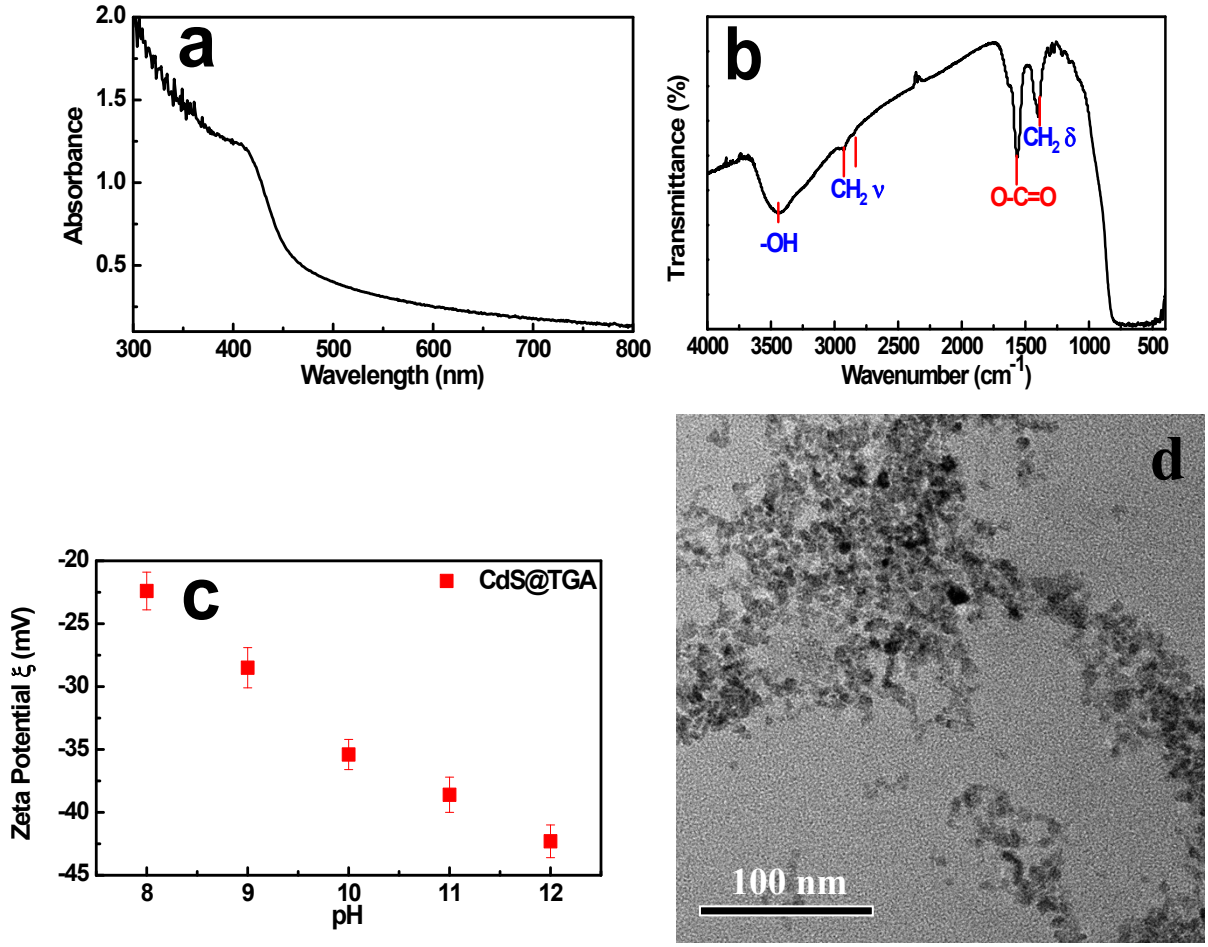

Figure S1. (a) UV-vis spectrum, (b) FTIR, (c) zeta potential, and (d) TEM image of CdS QDs.

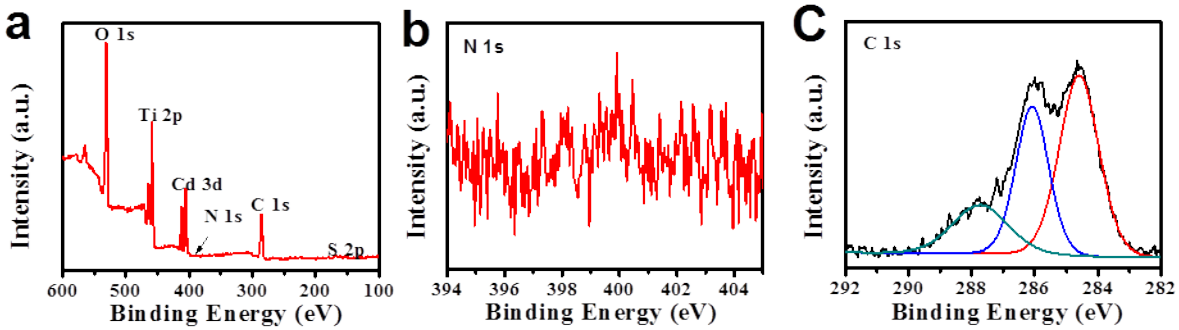

Figure S2. (a) Survey XPS spectrum and (b) high-resolution spectra of N1s and (c) C 1s for TiO_2 NBs-CdS QDs heterostructure.

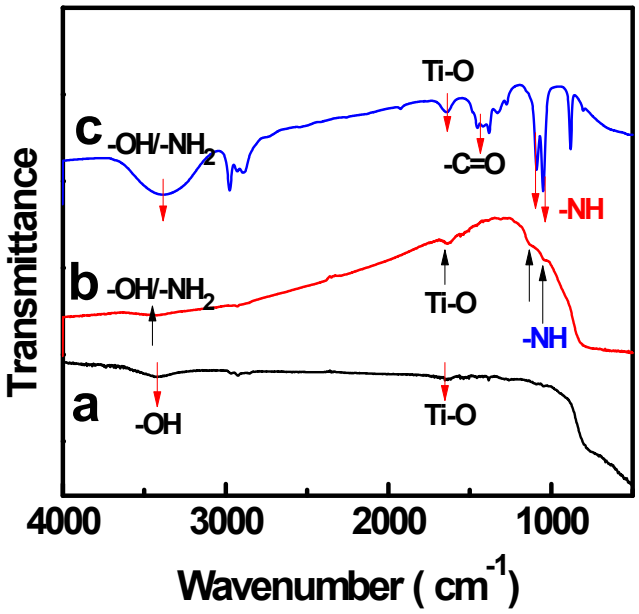

Figure S3. FTIR spectra of (a) blank TiO_2 NBs, (b) APTES-TiO_2 NBs, and (c) TiO_2 NBs-CdS QDs heterostructure.

Table S1. Chemical bond species *versus* binding energy for TiO_2 NBs-CdS QDs heterostructure

Element	***Peak BE***	***Chemical Bond Species***
C 1s A	284.59	C-C/C-H
C 1s B	286.08	C-OH/C-O-C
C 1s C	287.73	Carboxylate (CO_3^{2-})
O 1s A	529.76	Lattice Oxygen
O 1s B	532.05	COOH
Ti $2p_{3/2}$	458.48	Anatase (+4)
Cd $3d_{5/2}$	405.25	Cd (+2)
S $2p_{3/2}$	161.15	S (2^-)

Table S2. Elemental percentage for TiO_2 NBs-CdS QDs heterostructure

Name	***Peak (eV)***	***Chemical Bond Specie***	***At. %***
C1s Scan A	284.59	C-C/C-H	16.17
C1s Scan B	286.08	C-OH/C-O-C	11.05
C1s Scan C	287.73	Carboxylate (CO_3^{2-})	6.05
O1s Scan A	529.76	Lattice Oxygen	24.66
O1s Scan B	532.05	COOH	23.41
$Ti2p_{7/2}$	458.48	Anatase (+4)	12.99
$Cd3d_{7/2}$	405.25	Cd (+2)	3.45
$S2p_{3/2}$	161.3	S (2^-)	2.02

Figure S4. Photographs of blank TiO_2 NBs (*right: white*), TiO_2 NBs/CdS QDs (*middle: light yellow*), and TiO_2 NBs-CdS QDs heterostructure (*left: yellow*).

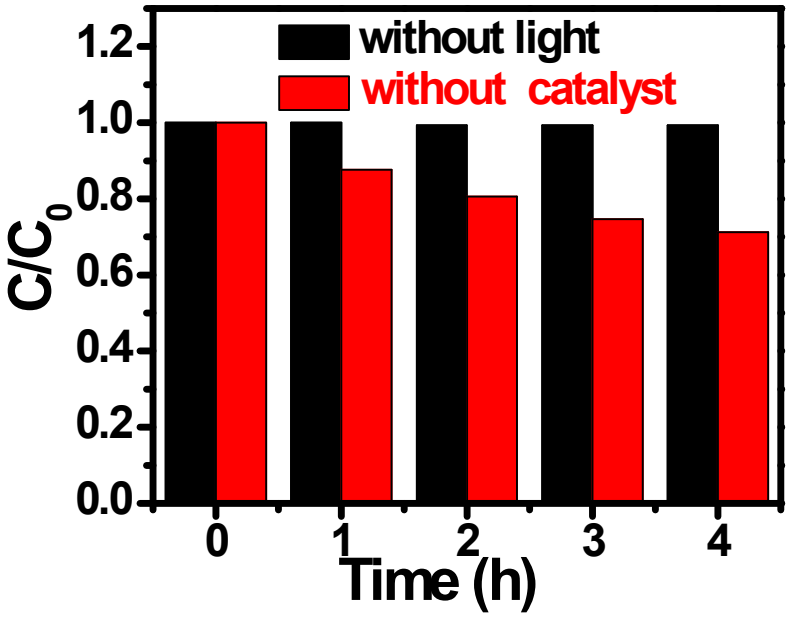

Figure S5. Blank experiments for photodegradation of RhB over TiO_2 NBs-CdS QDs heterostructure.

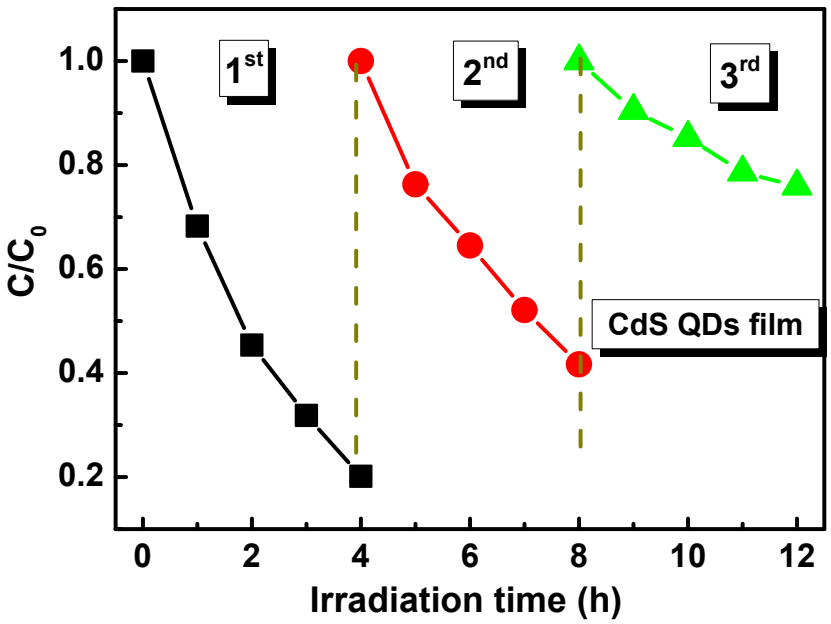

Figure S6. Cycling photocatalytic performances of blank CdS QDs film deposited on Ti foil under visible light irradiation ($\lambda > 420$ nm).

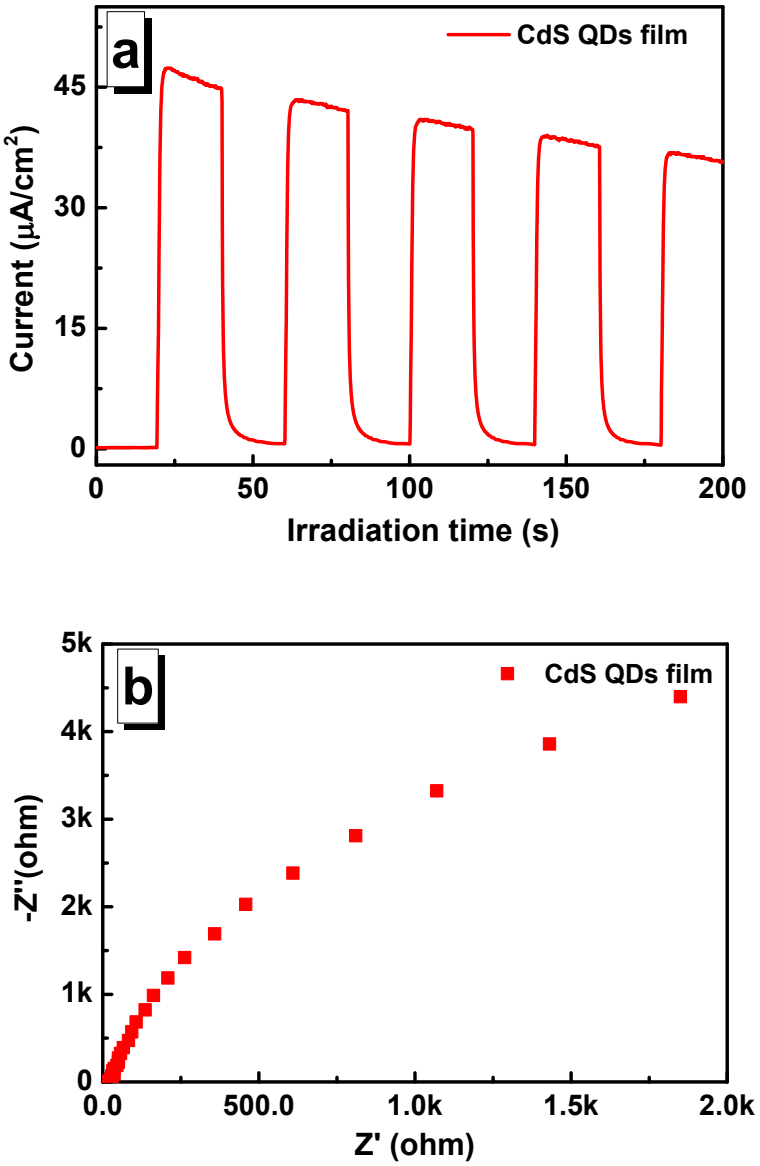

Figure S7. (a) Transient photocurrent responses and (b) Electrochemical impedance spectroscopy (EIS) of blank CdS QDs film deposited on Ti foil in 1 M KOH (pH = 13.9) aqueous solution under visible light irradiation ($\lambda > 420$ nm), the amplitude of the sinusoidal wave was set at 10 mV and the frequency varied from 100 kHz to 0.05 Hz.