

Supporting Information

Carbon Quantum Dot/TiO₂ Nanohybrids: Efficient Photocatalysts for Hydrogen Generation via Intimate Contact and Efficient Charge Separation

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The calculation of ET from AA to CQDs: The presence of AA at different concentrations in CQDs resulted in quenching of the fluorescence signal. When the unquenched fluorescence signal is divided by the quenched signal and plotted against the concentration of quencher, a linear relationship with y-intercept close to 1 is obtained. From the slope of the linear regression and the lifetime of 1.35 ns for CQDs from TCSPC measurements, a second order quenching rate of $6.25 \times 10^9 \text{ M}^{-1} \text{ sec}^{-1}$ is obtained. Using the optimized concentration of AA (0.1M) in the catalysis condition, the extrapolated time constant for reductive quenching is 1.6 ns.

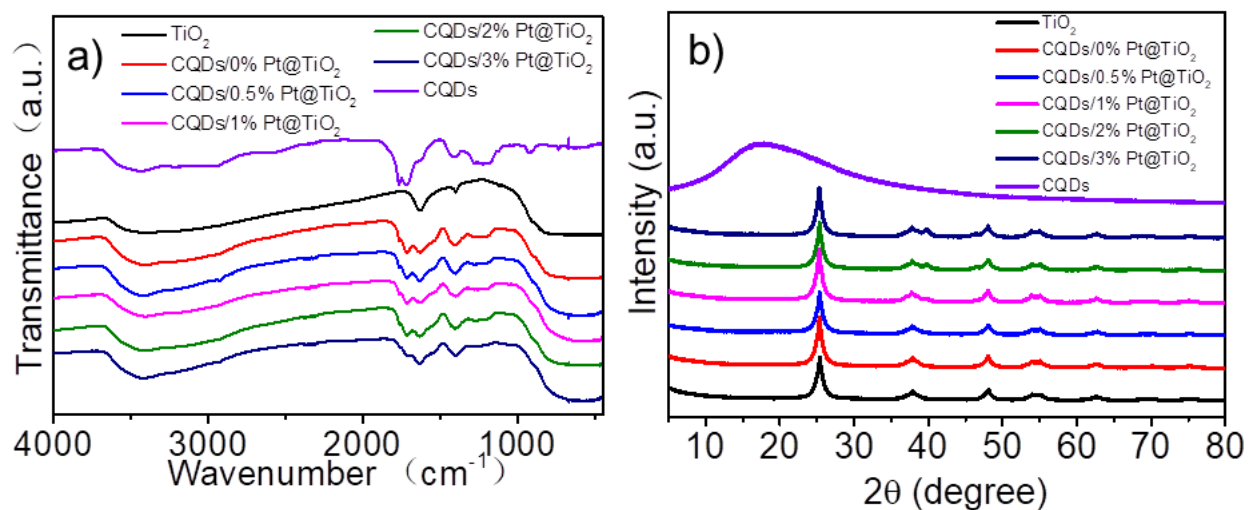


Figure S1. FTIR spectra (a) and XRD patterns (b) of CQDs, TiO_2 , and CQDs/X%Pt@ TiO_2 nanocomposites.

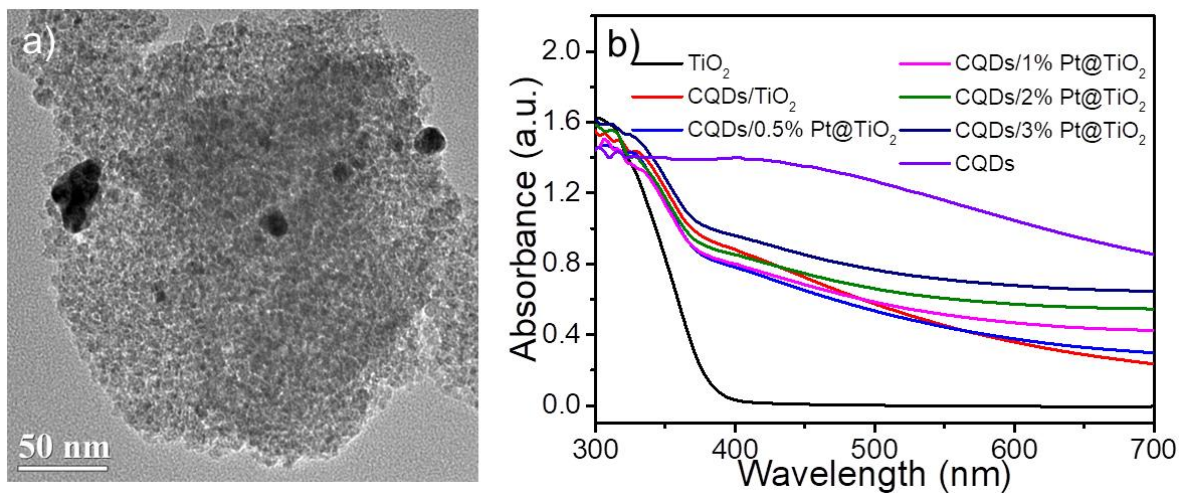


Figure S2. (a) The TEM image of CQDs/3%Pt@ TiO_2 . (b) The diffuse reflectance UV-visible absorption spectra of CQDs, TiO_2 and CQDs/X%Pt@ TiO_2 .

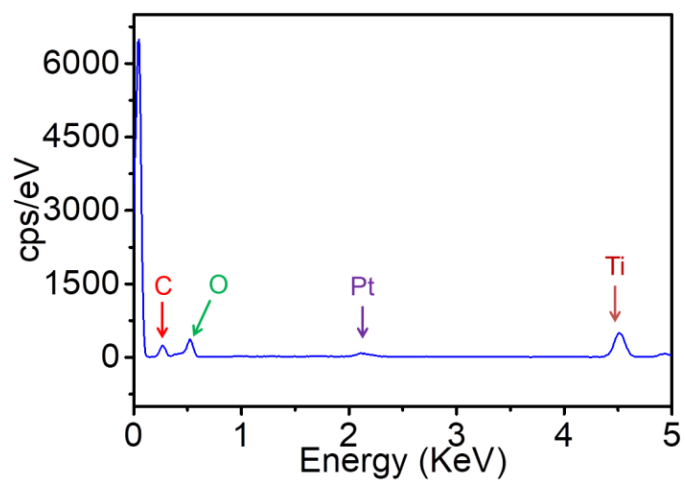


Figure S3. EDS spectrum of CQDs/3%Pt@TiO₂

Table S1. EDS element distribution.

<i>Element</i>	<i>Wt %</i>	<i>At %</i>
<i>C K</i>	23	34
<i>O K</i>	50	56
<i>Ti K</i>	26	10
<i>Pt M</i>	1.3	0.1

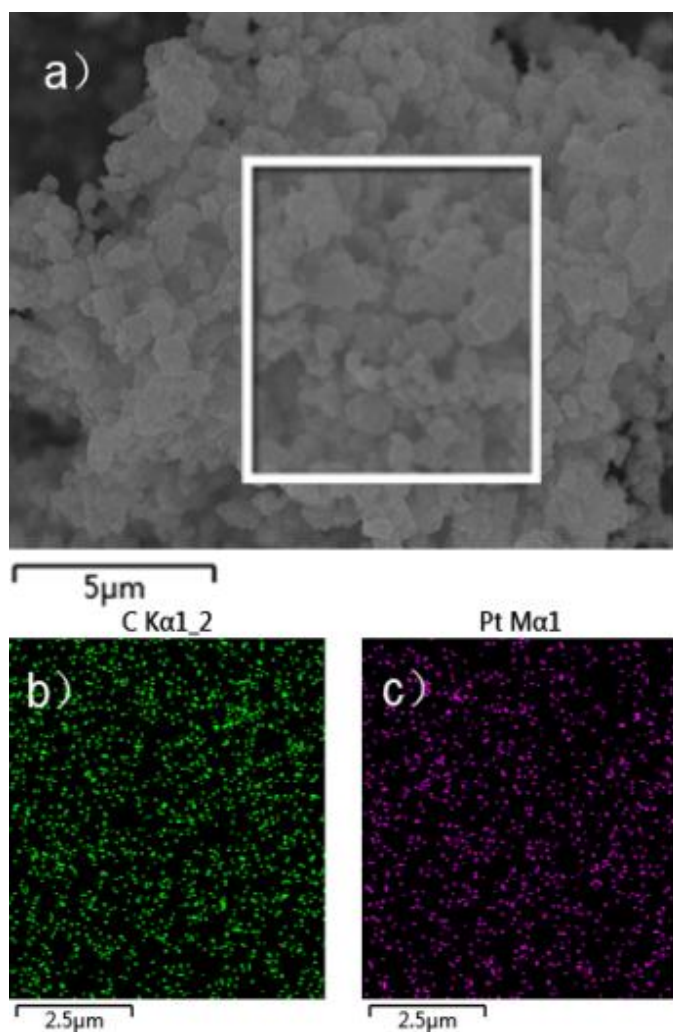


Figure S4. SEM (a), C-mapping (b), and Pt-mapping (c).

Table S2. The Pt and CQDs proportion on CQDs/*X*%Pt@TiO₂

Sample	Pt (wt %)	CQDs (wt %)
CQDs/0%Pt@TiO ₂	--	25.6
CQDs/0.5%Pt@TiO ₂	0.28	24.3
CQDs/1%Pt@TiO ₂	0.57	19.2
CQDs/2%Pt@TiO ₂	1.34	12.8
CQDs/3%Pt@TiO ₂	2.21	10.2

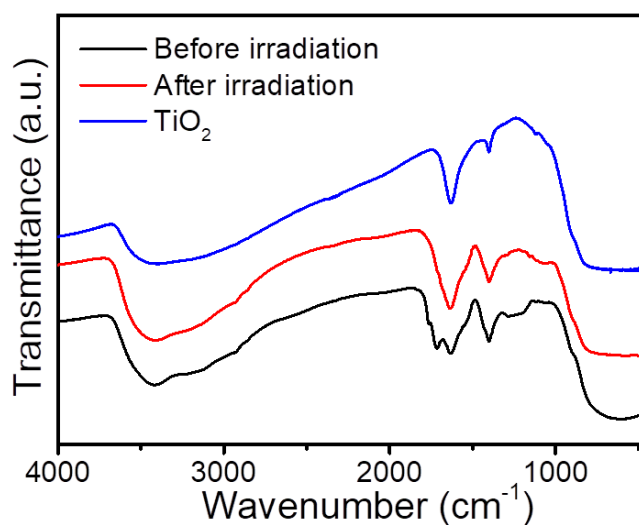


Figure S5. FTIR spectra of TiO₂, before and after 36h's irradiation of CQDs/1%Pt@TiO₂ nanocomposites.

Table S3. The fitting parameters for the emission lifetime of CQDs and CQDs/TiO₂ using multiple exponential decay function.

Sample	A ₁ (%)	t ₁ (ns)	A ₂ (%)	t ₂ (ns)	t _{ave} (ns)
CQD	78.2	0.692	21.8	3.69	1.35
CQD/TiO ₂	93.8	0.527	6.2	2.45	0.65

Table S4. The comparison of pH values before and after mixing with catalysts

AA stock solution	After adding catalyst
3.00	2.98
4.00	4.00
5.00	4.99
6.00	6.00