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## Supporting Information

# Carbon Dots Anchoring Pt Single Atoms on C<sub>3</sub>N<sub>4</sub> Boosting Photocatalytic Hydrogen Evolution

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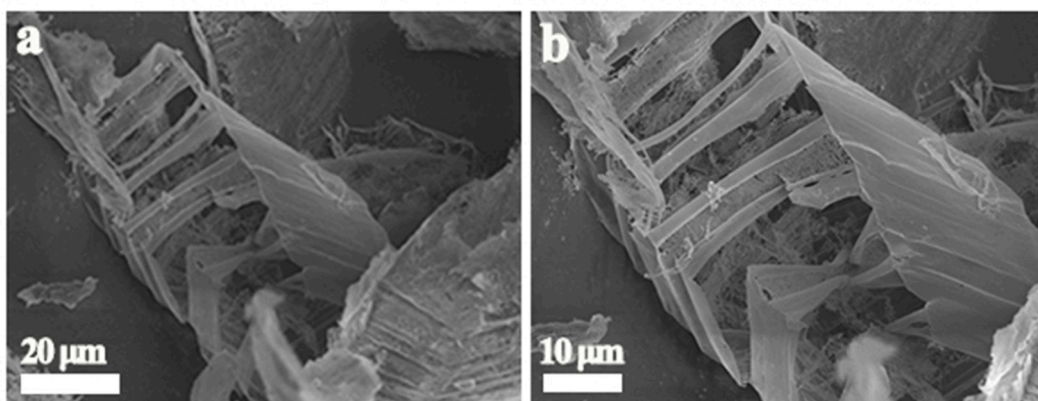
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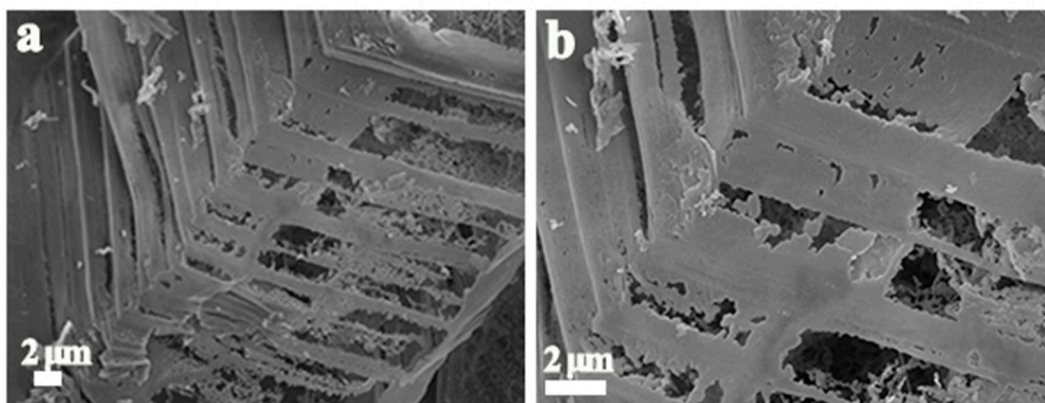
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## The content of ESI

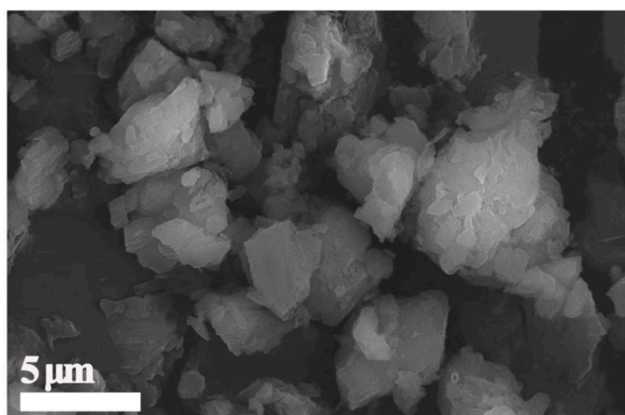
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2. **Figure S2.** SEM image of the 15-CDs/FC<sub>3</sub>N<sub>4</sub>.
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**Figure S1.** SEM image of the 5-CDs/C<sub>3</sub>N<sub>4</sub>.



**Figure S2.** SEM image of the 15-CDs/C<sub>3</sub>N<sub>4</sub>.



**Figure S3.** SEM image of the B-C<sub>3</sub>N<sub>4</sub>.

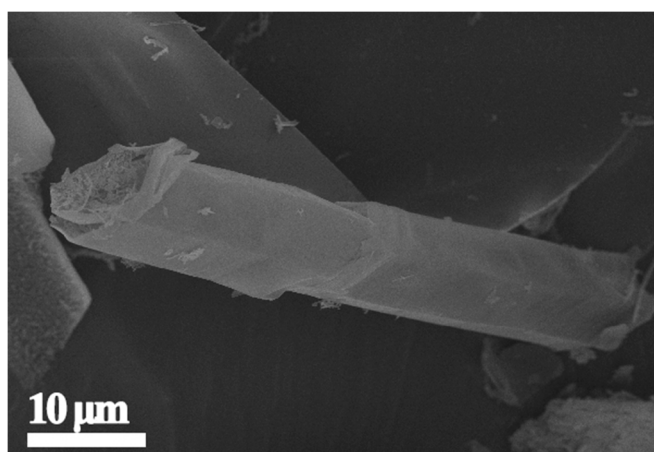


Figure S4. SEM image of the C<sub>3</sub>N<sub>4</sub>.

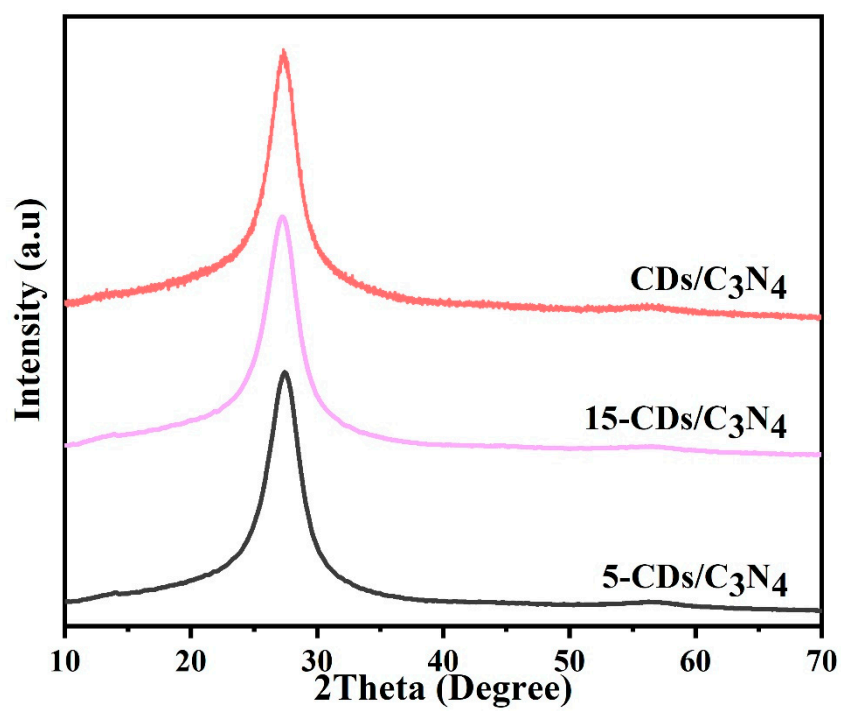
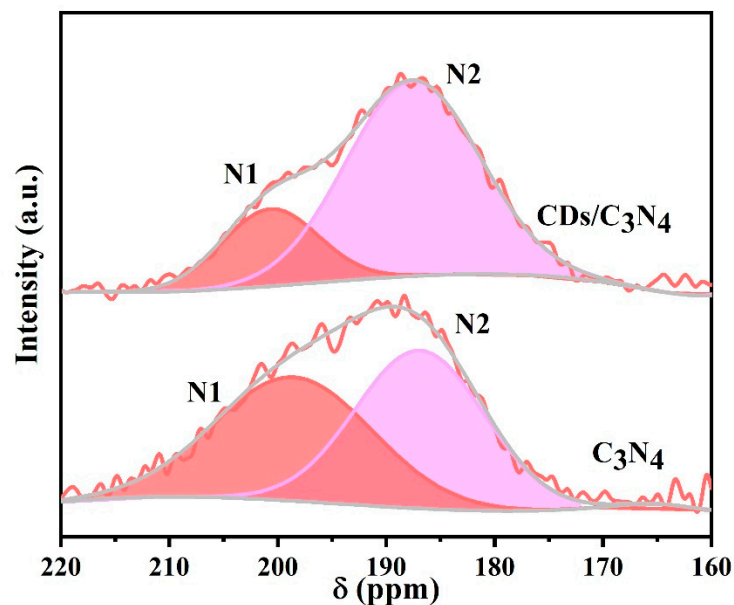
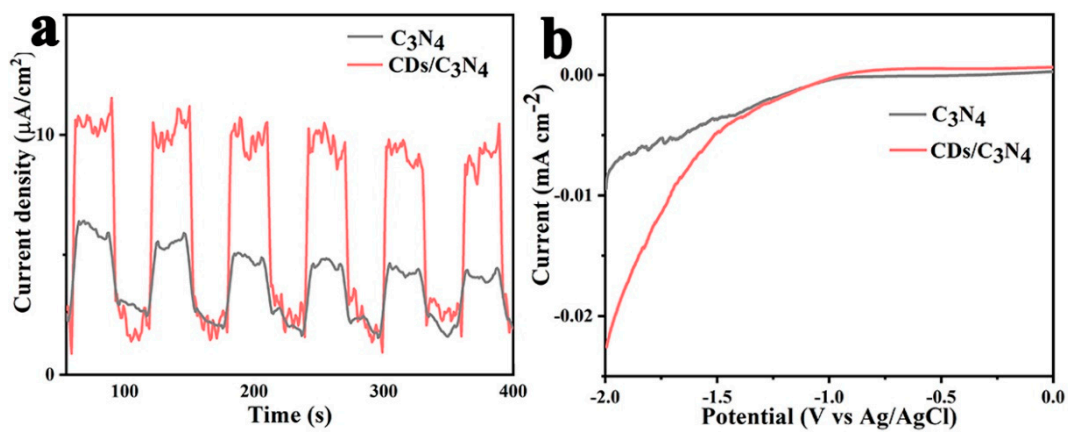


Figure S5. XRD patterns of 5-CDs/ C<sub>3</sub>N<sub>4</sub>, 15-CDs/ C<sub>3</sub>N<sub>4</sub>, CDs/C<sub>3</sub>N<sub>4</sub>.



**Figure S6.** Peak-differentiating analysis of the N1 and N2 peaks in the  $^{15}\text{N}$  NMR spectra of CDs/C<sub>3</sub>N<sub>4</sub> and C<sub>3</sub>N<sub>4</sub>.



**Figure S7.** (a) Transient photocurrent response of C<sub>3</sub>N<sub>4</sub> and CDs/C<sub>3</sub>N<sub>4</sub> with repeated on-off cycles under simulated sunlight irradiation, (b) Linear sweeps voltammograms of C<sub>3</sub>N<sub>4</sub> and CDs/C<sub>3</sub>N<sub>4</sub>.

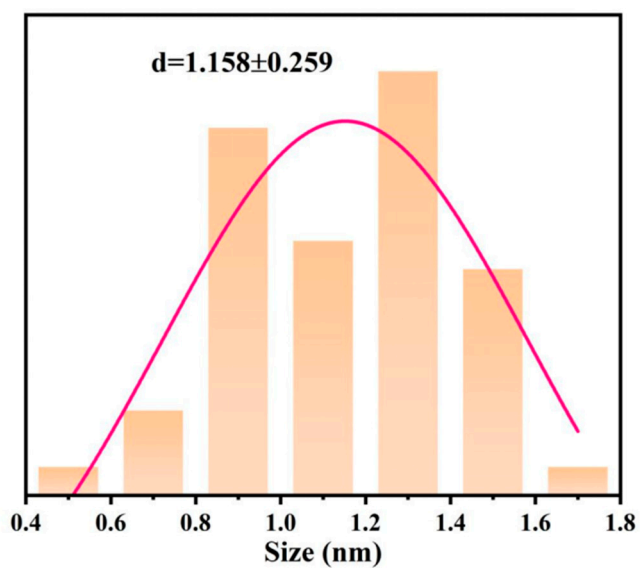


Figure S8. The particle size distribution map of Pt nanoparticles on C<sub>3</sub>N<sub>4</sub>.

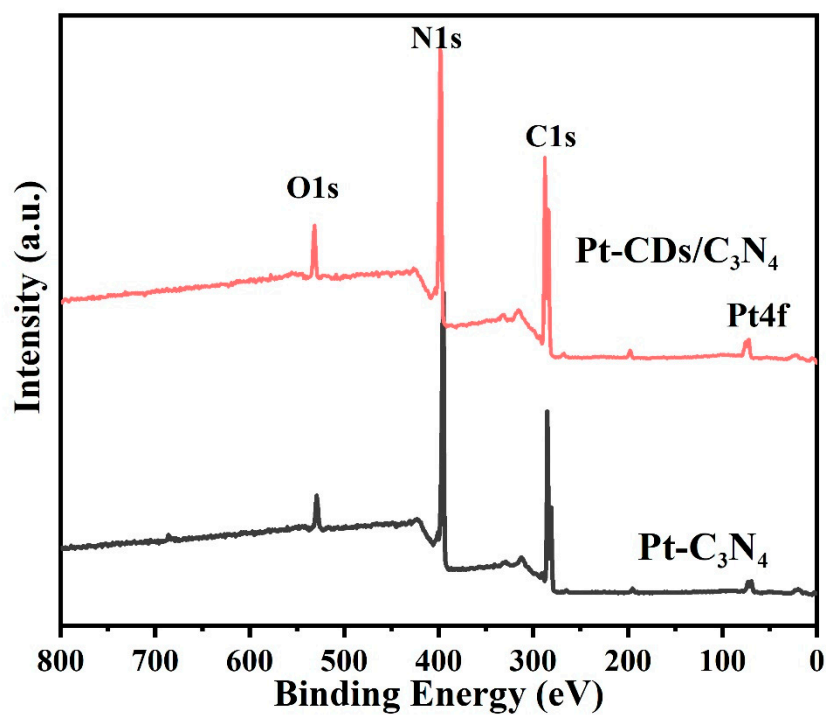
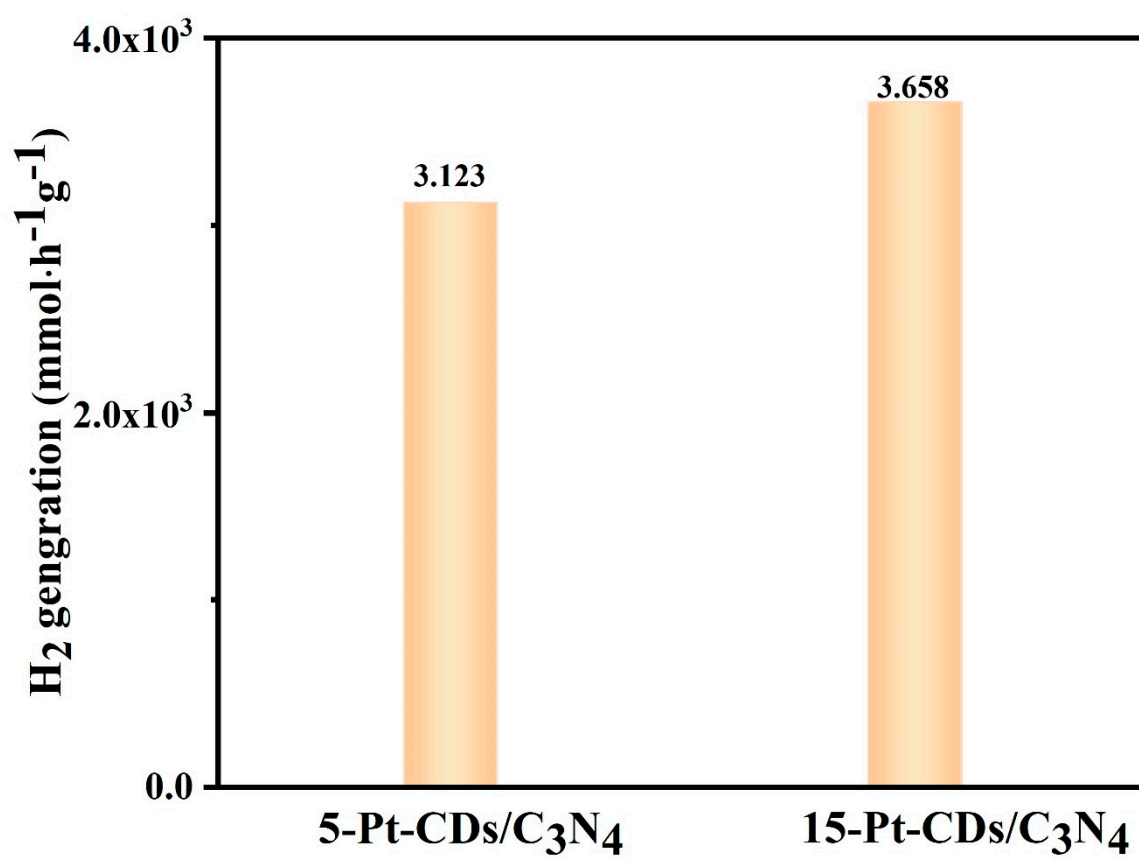


Figure S9. XPS survey spectrum of Pt-C<sub>3</sub>N<sub>4</sub> and Pt-CDs/ C<sub>3</sub>N<sub>4</sub>.



**Figure S10.** Photocatalytic H<sub>2</sub> evolution rate for 5-Pt-CDs/ C<sub>3</sub>N<sub>4</sub> and 15-Pt-CDs/C<sub>3</sub>N<sub>4</sub>.

**Table S1.** Type and contents of elements of different samples.

Samples	Type and contents of elements (%)		
		C	
	N-C=N	C-NH <sub>x</sub>	C-C
C <sub>3</sub> N <sub>4</sub>	61.7	4.8	33.5
CDs/C <sub>3</sub> N <sub>4</sub>	48	6.5	45.5

**Table S2.** Type and contents of elements of different samples.

Samples	Type and contents of elements (%)		
		Nitrogen	
	C-N=C	N-(C) <sub>3</sub>	C-NH
C <sub>3</sub> N <sub>4</sub>	72.7	13.0	14.3
CDs/C <sub>3</sub> N <sub>4</sub>	73.7	10.4	15.9

**Table S3.** PL lifetime of photogenerated charge carrier

Samples	$\tau_1$ (ns) [A <sub>1</sub> ]	$\tau_2$ (ns) [A <sub>2</sub> ]	$\tau_{Ave}$ (ns)
C <sub>3</sub> N <sub>4</sub>	2.9575 [48.56]	12.6506 [51.44]	7.94
CDs/C <sub>3</sub> N <sub>4</sub>	2.7788 [40.30]	15.3544 [59.7]	10.28

**Table S4.** EXAFS fitting parameters at the Pt L3-edge for various samples ( $S_0^2=0.925$ ).

Sample	Shell	CN <sup>a</sup>	R(Å) <sup>b</sup>	$\sigma^2$ (Å <sup>2</sup> ·10 <sup>-3</sup> ) <sup>c</sup>	$\Delta E_0$ (eV) <sup>d</sup>	R factor (%)
Sample-Pt	Pt-N	4.5±0.19	2.14±0.02	0.003±0.004	7.54±2.53	1.57



**Table S5.** Photocatalytic hydrogen evolution performance for Pt-CDs/C<sub>3</sub>N<sub>4</sub> composite in comparison with other CN-based photocatalysts that reported in recent years.

Photocatalyst	Experimental details (electron donor, co catalyst, light source)	H <sub>2</sub> productivity (mmol h <sup>-1</sup> g <sup>-1</sup> )	Ref.
CDs/C <sub>3</sub> N <sub>4</sub>	TEOA, Pt (1 wt%), 300W Xenon lamp, AM1.5	15.09	This work
PCN/NCDs	TEOA, Pt(1 wt%), 300 W Xenon Lamp, $\lambda > 420\text{nm}$	3.731	[22]
HCNS – C <sub>1.0</sub>	TEOA, Pt(3 wt%), 300 W Xenon Lamp, $\lambda > 420\text{nm}$	2.322	[49]
CDs/S-HTCN	TEOA, Pt (1 wt%), 300W Xenonlamp, AM1.5	9.284	[50]
GICN	TEOA, Pt (3 wt%), 300 W Xenon Lamp, $\lambda > 420\text{nm}$	2.684	[13]
P/UH-CNS	TEOA, Pt (2 wt%), 300 W Xenon Lamp, $\lambda > 420\text{nm}$	2.814	[51]
3DOM V-CN	TEOA, Pt (3 wt%), 300 W Xenon Lamp, $\lambda > 420\text{nm}$	2.3	[10]