Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Turbostratic carbon nitride enhances performance and stability of cadmium sulfide nanorod hydrogen evolution photocatalyst

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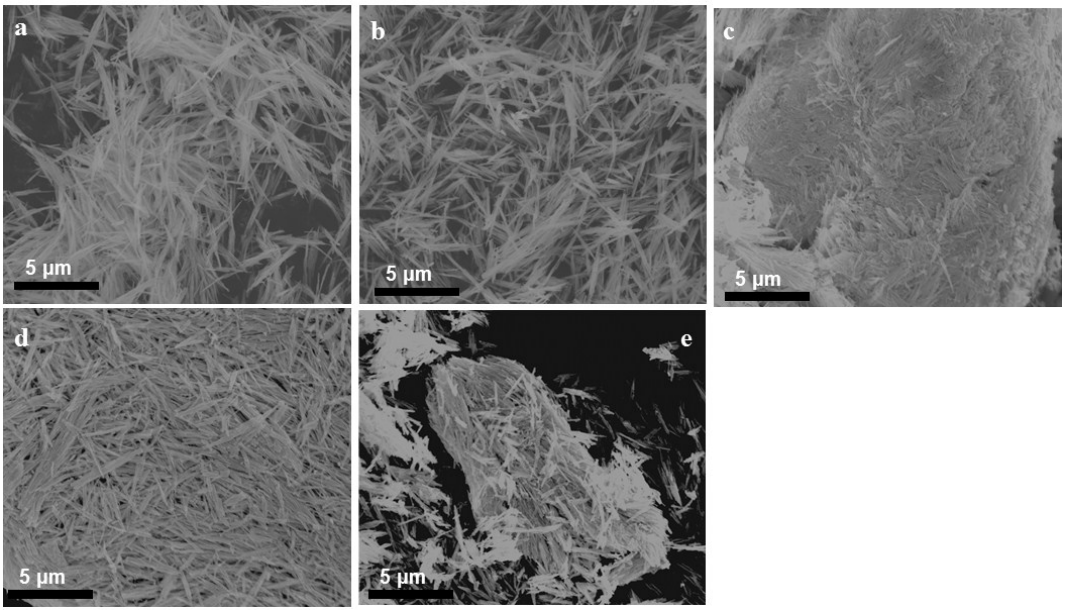

Fig. S1. SEM images of CdS (a), CdS-Pt (b), CdS/CN_x (c),CdS-Pt/CN_x (d) and CdS/CN_x-Pt (e).

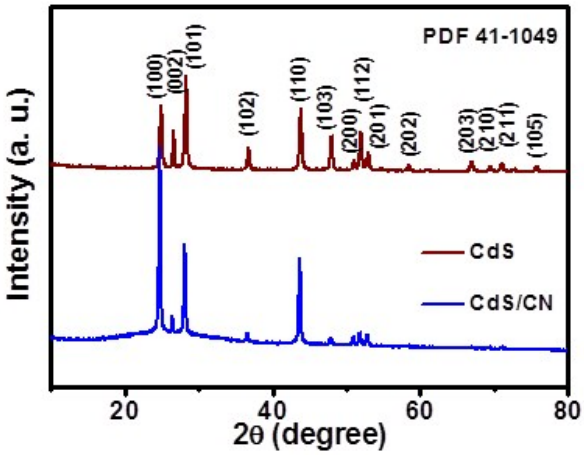

Fig. S2. XRD pattern for CdS nanorods and CdS/CN_x.

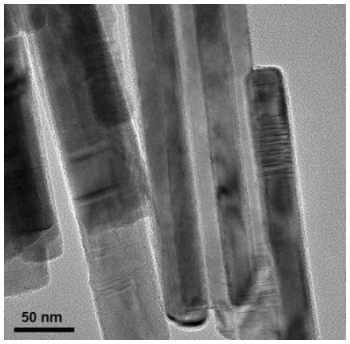

Fig. S3. TEM images for CdS/CN_x.

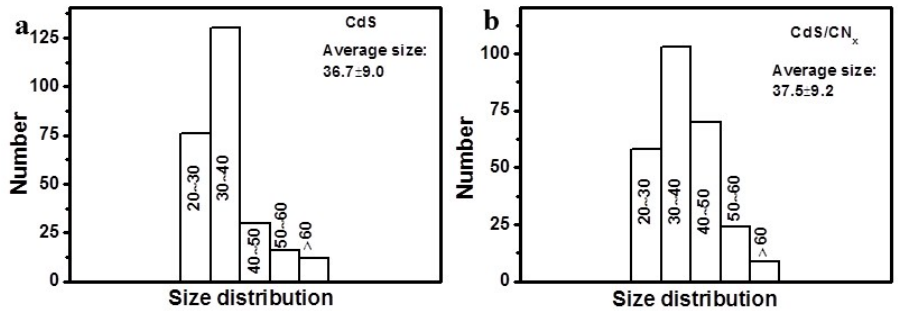

Fig. S4.The bar charts of the size distributions of (a) CdS and (b) CdS/CN_x based on 260 CdS nanorods.

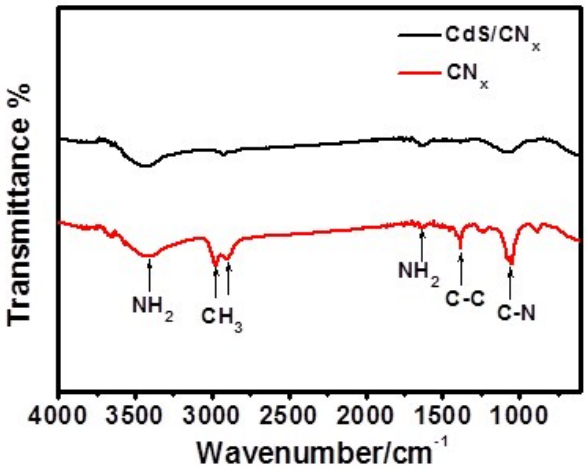

Fig. S5. FTIR spectra of CN_x and CdS/CN_x.

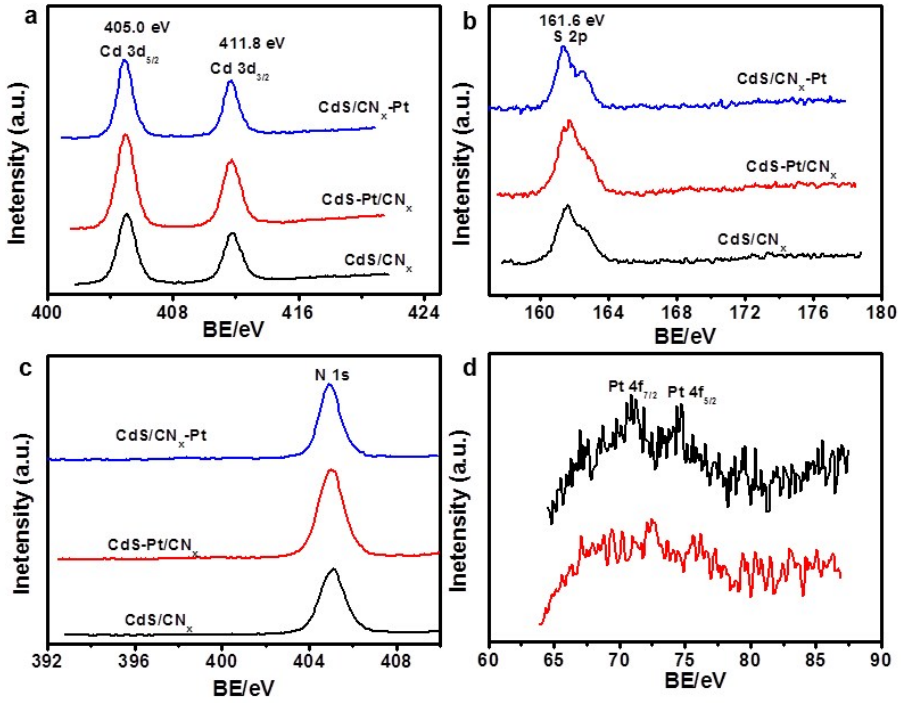

Fig.S6. XPS spectra of the as-obtained sample (a) Cd3d; (b) S2p; (c) N1s; (d) Pt4f.

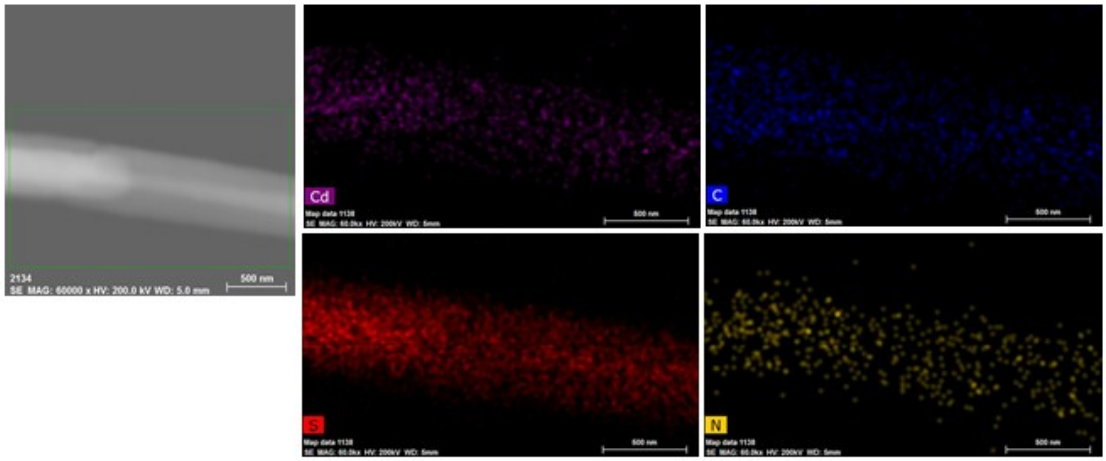

Fig. S7. EDS mapping of CdS/CN_x: Cd (purple), S (red), C (blue) and N (yellow). Scale bare is 500 nm for all images.

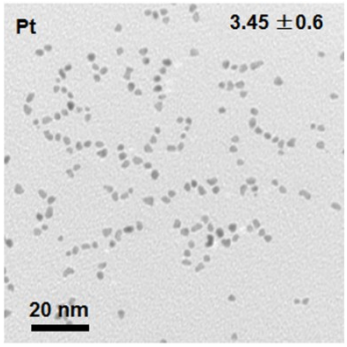

Fig. S8. TEM image of PtNPs.

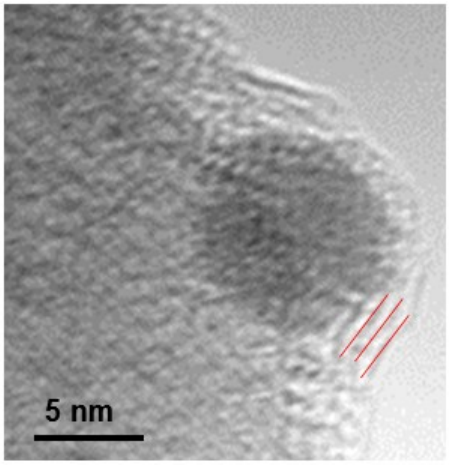

Fig. S9. HRTEM image of CdS-Pt/CN_x.

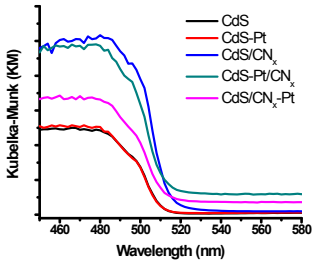

Fig. S10.UV-vis spectra of CdS, CdS-Pt, CdS/CN_x, $CdS-Pt/CN_x$ and CdS/CN_x-Pt catalysts.

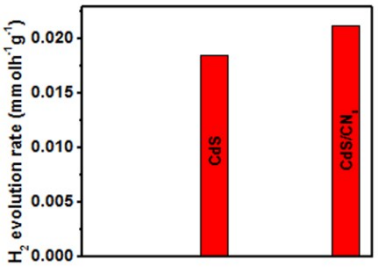

Fig. S11. Photocatalytic H_2-production rate of CdS and CdS/CN_x catalysts.

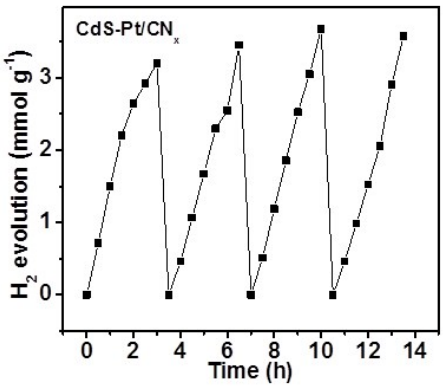

Fig. S12. Photocatalytic H_2-production rate of $CdS-Pt/CN_x$ catalysts.

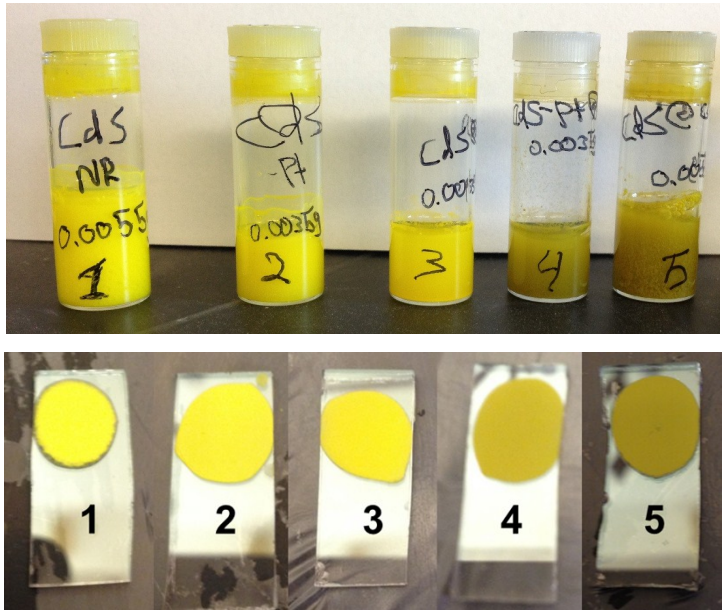

Fig. S13. (**Top**) 2 mg/mL sample dispersions after 1 hour of ultrasonication. (**Bottom**) Films of CdS nanorod samples on FTO coated glass. Thicknesses ranged from 2.2 - 4 µm based on profilometry measurements.

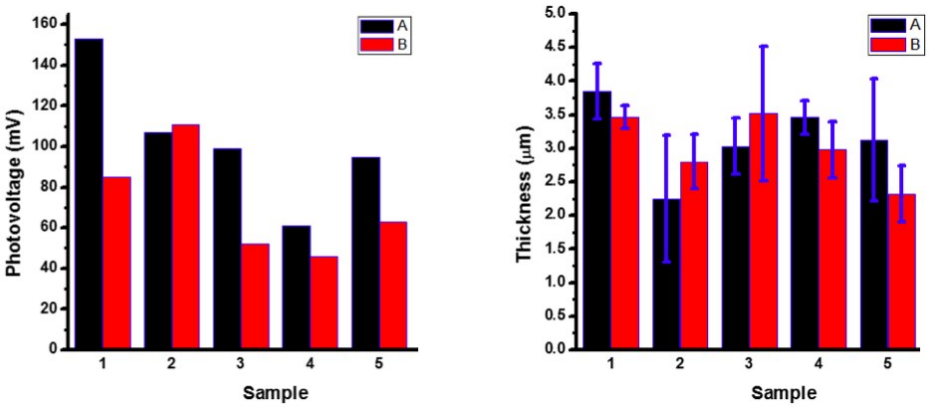

Fig. S14. Variation in photovoltage maximum at 2.70 eV between "A, **thicker**" and "B, **thinner**" samples (LEFT), and film thickness measurements of same (RIGHT). Error bars in blue indicate "roughness" of the films, the arithmetic average deviation from the mean.

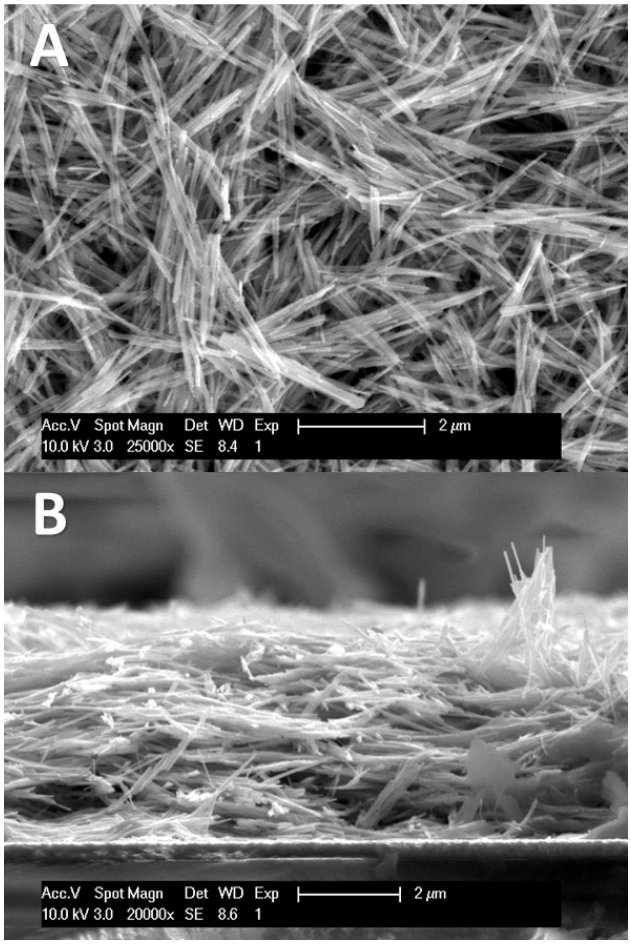

Fig. S15. SEM images of the CdS nanorods on FTO substrate.

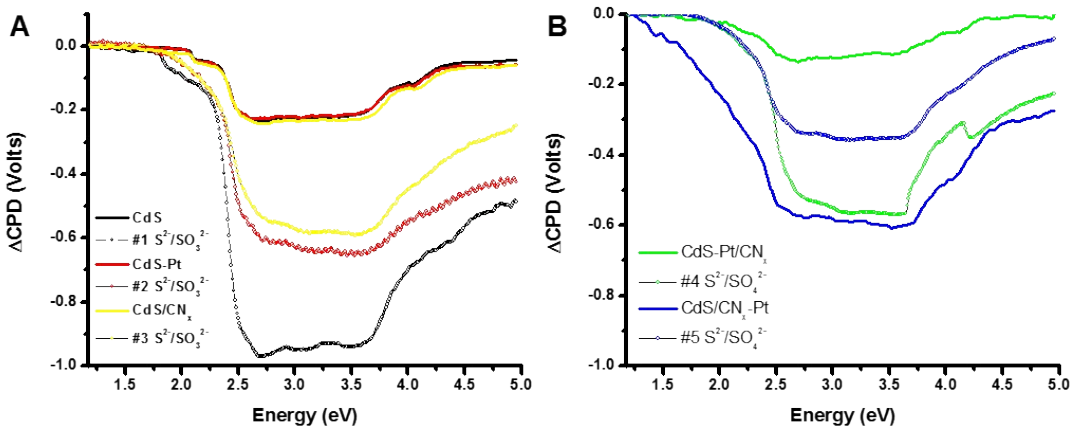

Fig. S16. Photovoltage spectra before (**solid lines**) and after (**circles**)addition of 0.35 M Na_2S and 0.25 M Na_2SO_3.

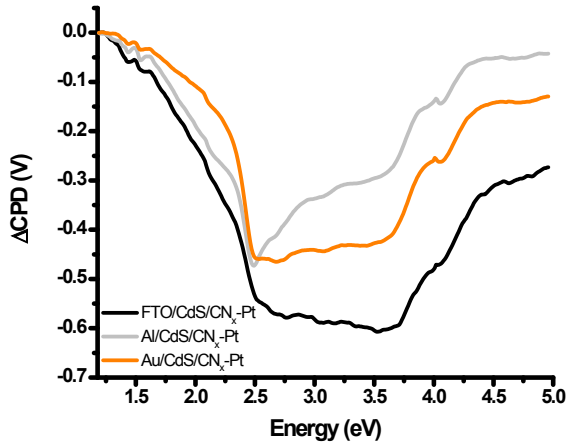

Fig. S17. Surface photovoltage spectra of CdS/CN_x-Pt (solid lines) on gold, aluminum and FTO substrates.

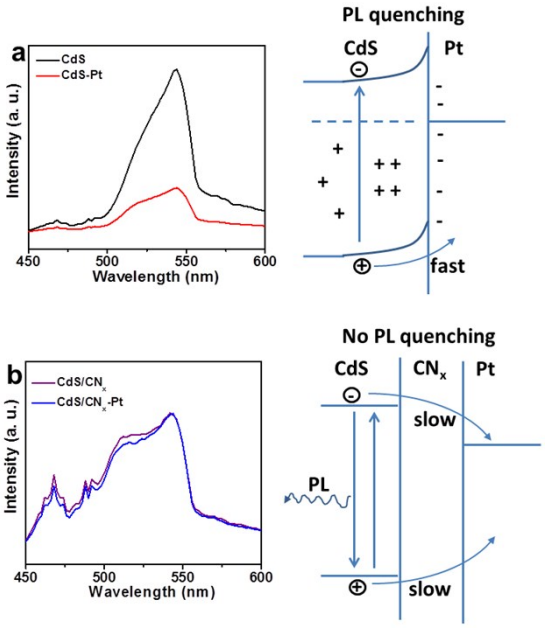

Fig. S18. Photoluminescence spectra of CdS, CdS-Pt,CdS/$CN_x$and CdS/CN_x-Ptat room temperature with an excitation wavelength of 400 nm andtheschematic diagram for PL of CdS-Pt and CdS/CN_x-Pt, respectively.

Table S1 Comparisonof hydrogen production rate and AQE of CdS-based pothocatalysts.

Sample	hydrogen production rate (mmol g^{-1} h^{-1})	AQE	Ref
CN0	2.00	2.1	1
CN0.5	1.98	2.0	1
CN1	2.66	2.7	1
CN2	4.15	4.3	1
CN3	1.03	1.1	1
CN4	0.47	0.5	1
GC	/	0.6～22.5	2
$Co(OH)_2$/CdS	0.061	/	3
CdS/Pt20	5	/	4
Pt-CdS@Ti-MCM-41	0.875	2.6	5
10%MWCNTs/CdS	/	2.16	6
CdS/CN_x-Pt	4.14	4.27	This work

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