Electronic Supplementary Material (ESI) for Catalysis Science & Technology.


Supporting Information for

# Porous Lantern-Like MFI Zeolite Composed of 2D Nanosheets for Highly Efficient Visible-Light-Driven Photocatalysis

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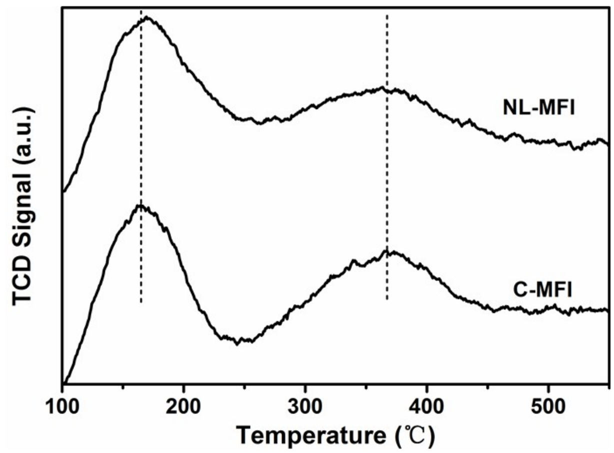


**Figure S1.** $NH_3$-TPD curves of C-MFI and NL-MFI.

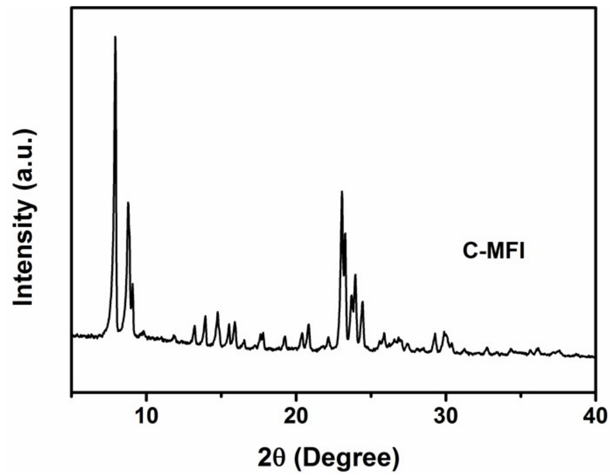


**Figure S2.** XRD pattern of C-MFI.

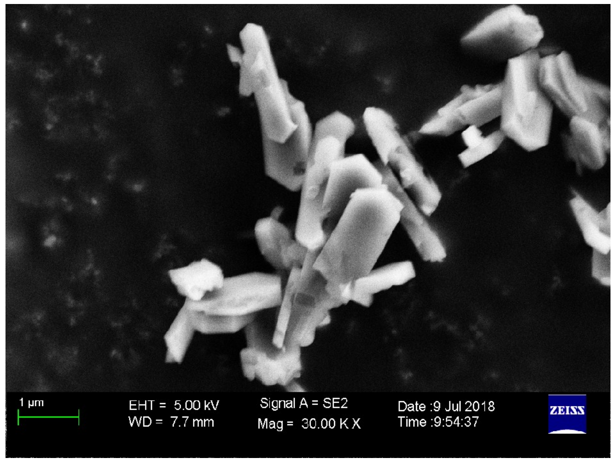


**Figure S3.** SEM image of C-MFI.

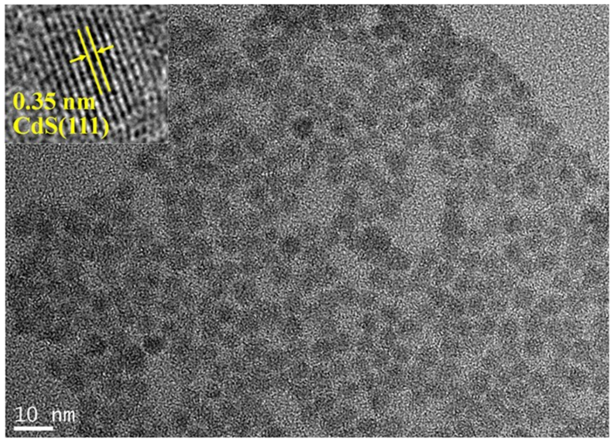


**Figure S4.** TEM image of the CdS nanoparticles.

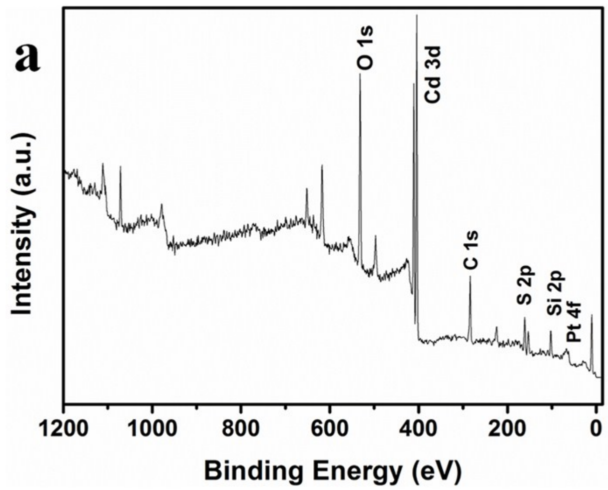


**Figure S5.** Full XPS spectrum of CdS/Pt/NL-MFI.

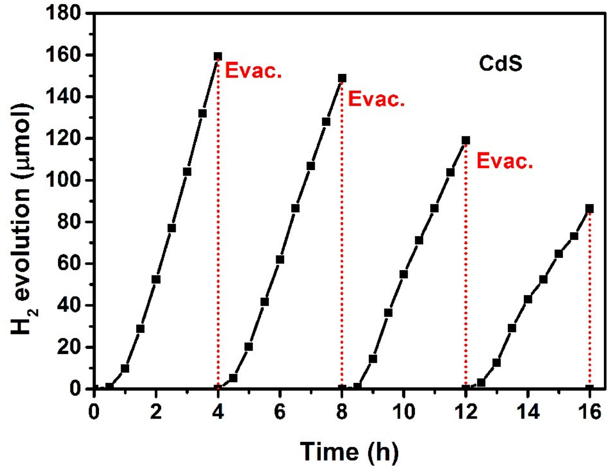


**Figure S6.** Photocatalytic stability of the pure CdS nanoparticles.

**Table S1.** ICP and NH3-TPD results of C-MFI and NL-MFI.

| Sample | Si/Al | Weak acid | | Strong acid | | Total acid amount ($mmol \cdot g^{-1}$) |
|---|---|---|---|---|---|---|
| | | Temperature (℃) | Amount ($mmol \cdot g^{-1}$) | Temperature (℃) | Amount ($mmol \cdot g^{-1}$) | |
| **C-MFI** | **50** | **166** | **0.16** | **367** | **0.13** | **0.29** |
| **NL-MFI** | **49** | **169** | **0.18** | **364** | **0.12** | **0.30** |

**Table S2.** Comparison of the photocatalytic $H_2$ evolution efficiency of CdS/Pt/NL-MFI with those of the CdS-based and zeolite-based photocatalysts reported in the literature.

| Photocatalyst | photocatalyst amount (mg); Reaction solution (mL) | Sacrificial reagent | Light source | $H_2$ evolution rate (μmol/h) | QE (%); wavelength (nm) | Ref. |
|---|---|---|---|---|---|---|
| CdS/Pt/NL-MFI | 60; 100 | 20 vol% Lactic acid | 300 W Xe, λ>420 nm | 2152.7 | 39.4% 450 nm | This work |
| CdS/Pt/$Ga_2O_3$-U | 100; 100 | 10 vol% Lactic acid | 300 W Xe, λ>420 nm | 995.8 | 43.6% 460 nm | S1 |
| CdS/Pt/$In_2O_3$-U | | | | 1032.2 | 45.3% 460 nm | |
| N-$MoS_2$/CdS | 50; 100 | 10 vol% Lactic acid | 300 W Xe, λ>420 nm | ~456 | | S2 |
| Pd-CdS/ZSM-5 | 600; 600 | 10 vol% ethanol | 7 W UVC, λ~254 nm | ~668.8 | | S3 |
| $MoS_2$/CdS-$TiO_2$ | 20; 80 | 10 vol% Lactic acid | 300 W Xe, λ>420 nm | 280 | 19.3% 420 nm | S4 |
| $MoS_2$/CdS-P25 | | | | 94.2 | | |
| Pt/CdS-$TiO_2$ | | | | 70 | | |
| Pt -CdS/ZnO | 10; 25 | 0.25 M $Na_2S$, 0.35 M $Na_2SO_4$ | 225 W Xe arc, λ: 420~720 nm | 221.2 | | S5 |
| CdS/$WS_2$/graphene | 8;8 | 0.35 M $Na_2S$, 0.25 M $Na_2SO_3$ | 500 W Xe arc, λ>420 nm | ~14.7 | 21.2% 420 nm | S6 |
| Pt/$Zn_{0.5}Cd_{0.5}S$ | 30; 120 | 0.1 M $Na_2S$, 0.1 M $Na_2SO_3$ | 500 W Xe arc, λ>400 nm | 114.3 | 7.15% | S7 |
| | | 0.15 M ascorbic acid | | 164.9 | 8.56% | |
| Pd@CdS/PdS | 10; 50 | 0.1 M $Na_2S$, 0.1 M $Na_2SO_3$ | 300 W Xe, λ>400 nm | 892 | | S8 |
| | | 0.5 M $Na_2S$, 0.5 M $Na_2SO_3$ | | 1448 | | |
| CdS/Pt/graphene | 20; 80 | 10 vol% Lactic acid | 350 W Xe arc, λ>420 nm | ~22.4 | 22.5% 420 nm | S9 |

| | | | | | | |
|---|---|---|---|---|---|---|
| CdS/Au/$MoS_2$ | 10; 50 | 10 vol% Lactic acid | Xe arc, λ>420 nm | ~70.1 | 27.9% | S10 |
| Pd-Ti-MCM-48 | 2; 2 | 20 vol% methanol | 300 W Xe, λ>280 nm | 560 | | S11 |
| Pt-$TiO_2$/ZSM-5 | 100; 200 | 10 vol% methanol | 300 W Xe | 1000 | 12.6% 365 nm | S12 |
| Pt-$TiO_2$/SBA-15 | | | | 880 | 5.4% 365 nm | |
| $TiO_2$/Na-Y | 100; 1000 | 5 vol% ethanol | 100 W high pressure mercury lamp | 25.1 | | S13 |
| Pd-CdPdS-NaY | 50; 25 | 0.4 M $Na_2S$, 0.3 M $Na_2SO_3$ | 288 W day light fluorescent lamp | ~116 | | S14 |

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