Electronic supplementary information

Enhanced photogenerated carrier separation in CdS quantum dot sensitized $ZnFe_2O_4/ZnIn_2S_4$ nanosheet stereoscopic films for exceptional visible light photocatalytic H_2 evolution performance

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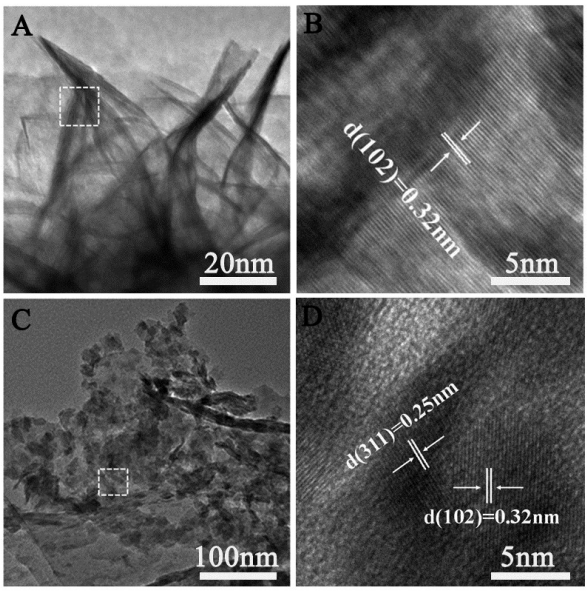

Fig. S1. (A) and (B) are the TEM and HRTEM images of $ZnIn_2S_4$, respectively; (C) and (D) are the TEM and HRTEM images of the $ZnFe_2O_4/ZnIn_2S_4$ composite, respectively.

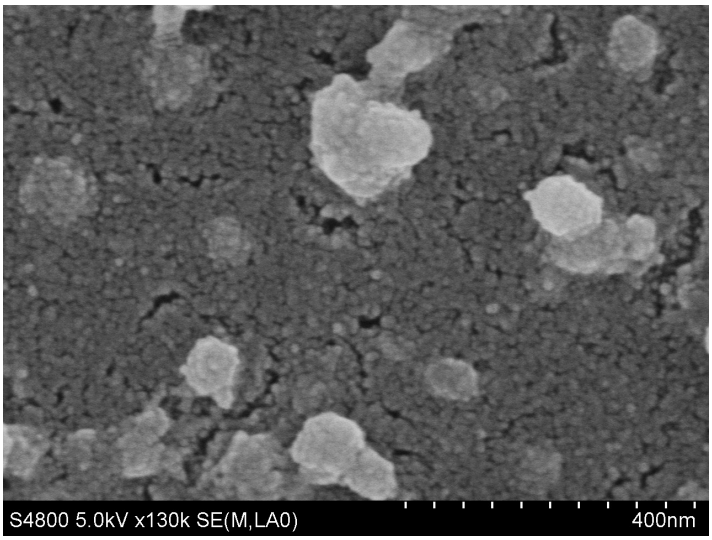

Fig. S2. SEM image of the $ZnFe_2O_4$ film.

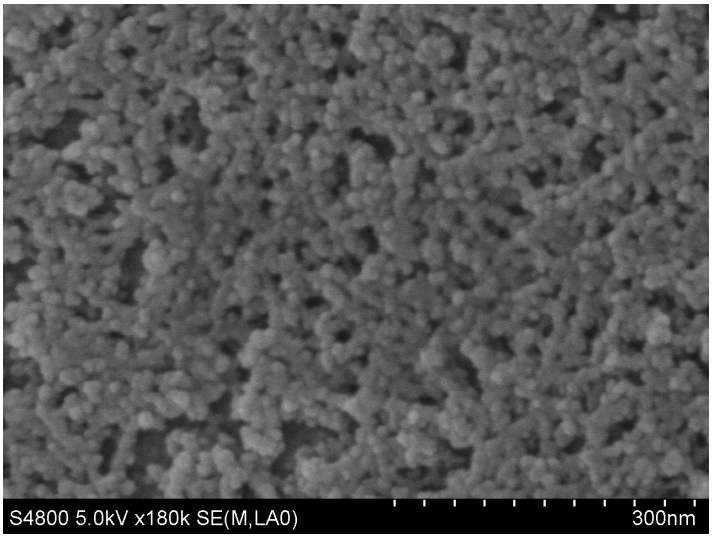

Fig. S3. SEM image of the CdS film.

Table S1. Summary of the photoluminescence decay time (τ) and their relative intensities of the different samples.

sample	τ_1(ns)	τ_2(ns)	I_1 (%)	I_2 (%)	Average lifetime(τ, ns)
1-CdS/$ZnFe_2O_4$/$ZnIn_2S_4$	2.15	9.58	28.97	71.03	8.95
CdS /$ZnIn_2S_4$	1.78	8.06	31.68	68.32	7.47
1-$ZnFe_2O_4$/$ZnIn_2S_4$	1.65	7.85	32.56	67.44	7.28
$ZnIn_2S_4$	0.98	5.48	35.48	64.52	5.07

The average lifetime was calculated using equation: $<\tau>=(I_1\tau_1^2 + I_2\tau_2^2)/(I_1\tau_1 + I_2\tau_2)$

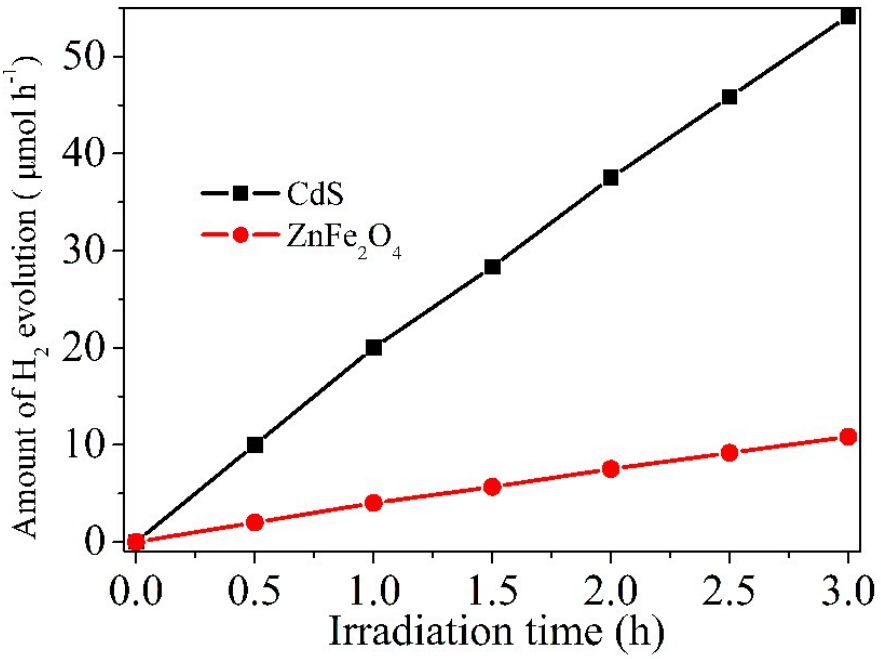

Fig. S4. Time-dependent photocatalytic H_2 evolution for the CdS and $ZnFe_2O_4$ film catalysts.

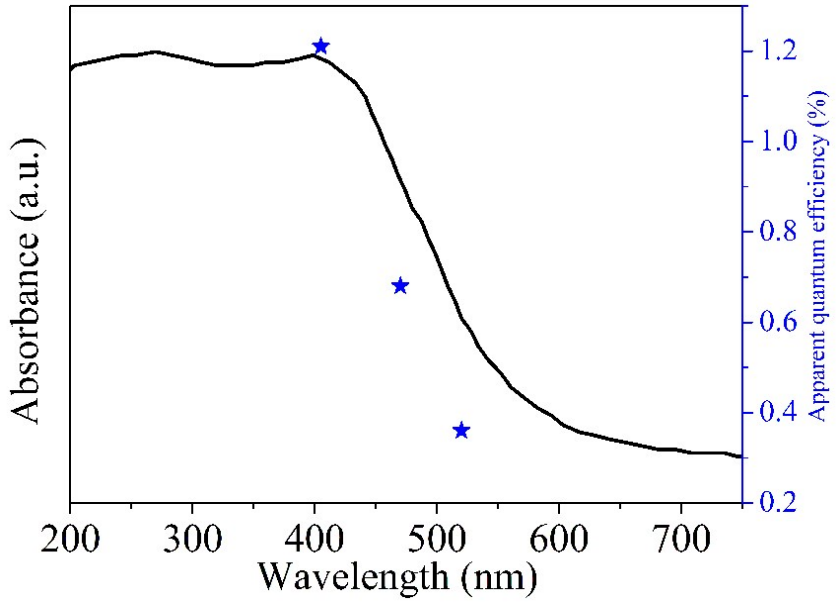

Fig. S5 The apparent quantum efficiencies of the 1-CdS/$ZnFe_2O_4$/$ZnIn_2S_4$ film against wavelength of monochromatic light.

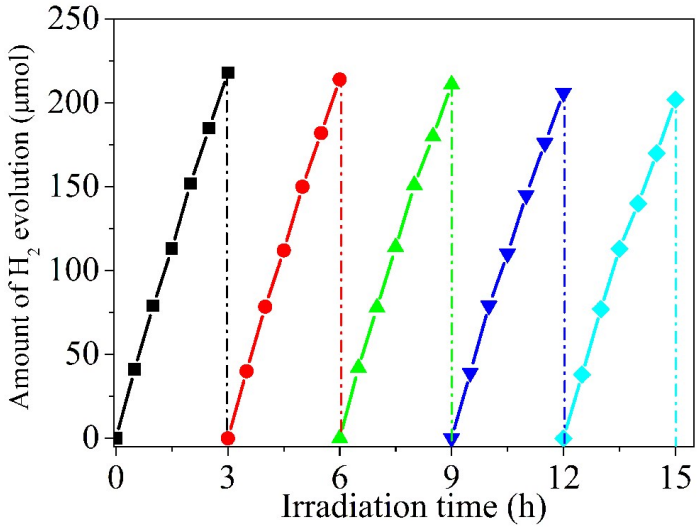

Fig. S6. Recycling test of the 1-CdS/$ZnFe_2O_4$/$ZnIn_2S_4$ film for the visible light ($\lambda \geqslant$ 420 nm) H_2 evolution in aqueous solution.

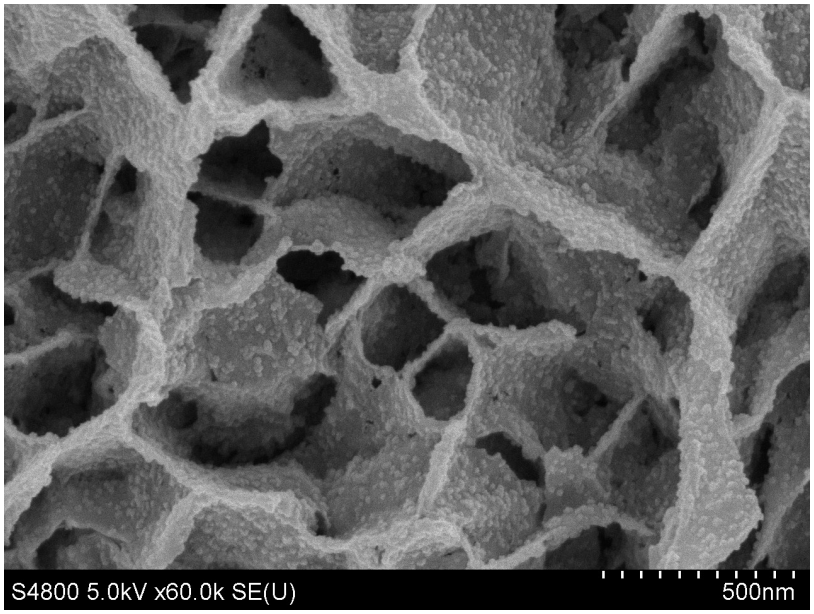

Fig. S7. SEM image of the 1-CdS/$ZnFe_2O_4$/$ZnIn_2S_4$ film after five times consecutive recycling of photoreaction.