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

Supporting Information

Amorphous CoS_x Modified $Mn_{0.5}Cd_{0.5}S$ Solid Solution with Enhanced Visible-light Photocatalytic H_2-Production Activity

Mengdi Wang,[a] Qianwen Liu,[a] Nan Xu,[a] Ningxi Su,[b] Xuxu Wang,[a] Wenyue Su*[a]

[a] State Key Laboratory of Photocatalysis on Energy and Environment, Fuzhou University, Fuzhou 350116, P. R. China

[b] College of Zijin Mining, Fuzhou University, Fuzhou 350116, P. R. China

*Corresponding author: Wenyue Su, Email: suweny@fzu.edu.cn

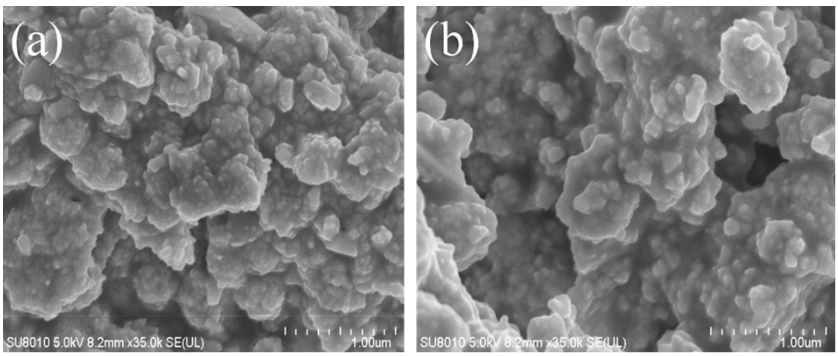

Fig. S1 SEM image of (a) $Mn_{0.5}Cd_{0.5}S$ (b) 0.3 wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$ sample.

Table S1 The loading amount of Co in the wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$ samples.

Samples	Co loading (wt%)
0.1 wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$	0.08
0.3 wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$	0.24
0.9 wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$	0.75
2.7 wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$	1.66

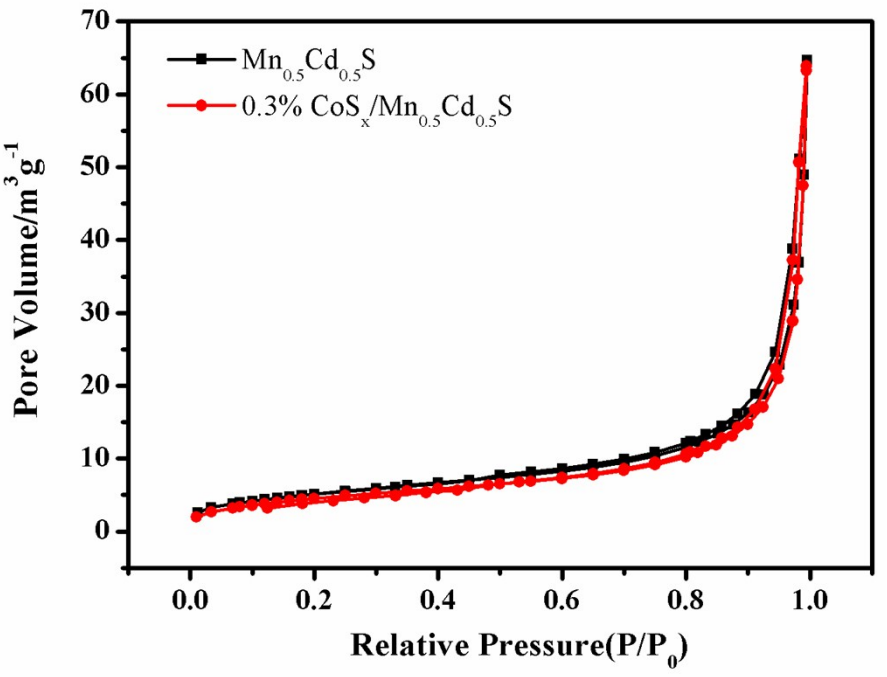

Fig. S2 N_2 adsoption-desorption isotherms of $Mn_{0.5}Cd_{0.5}S$ and 3 wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$ samples

Table S2 N_2 ad-desorption isotherms analysis of catalyst

Sample	**BET surface area（m^2/g）**	**Pore diameter（nm）**	**Pore volume（m^3/g）**
$Mn_{0.5}Cd_{0.5}S$	18.5	23.00	0.0992
0.3 wt% $CoS_x/Mn_{0.5}Cd_{0.5}S$	16.4	24.91	0.0974

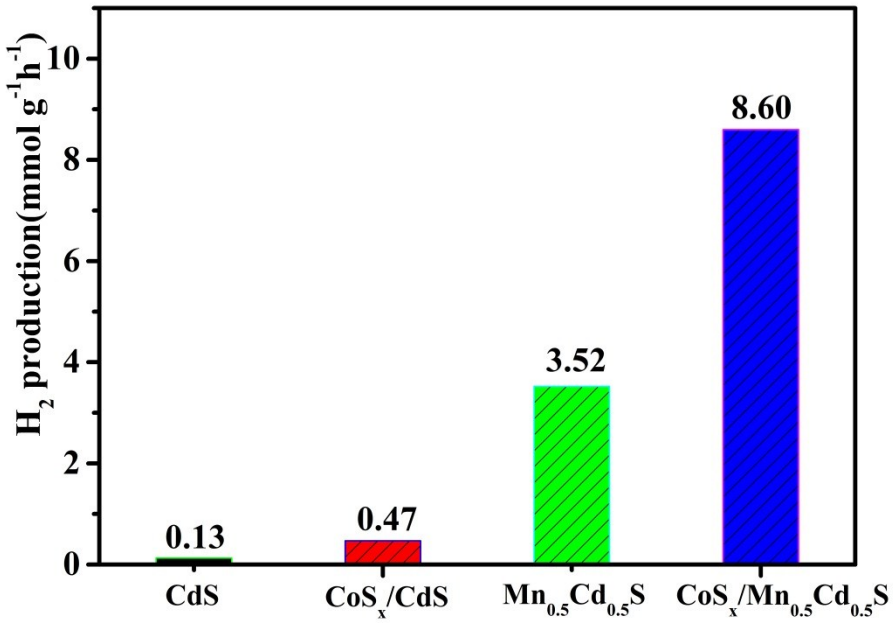

Fig. S3 Photocatalytic activity rate of H_2 evolution over CdS, CoS_x/ CdS, $Mn_{0.5}Cd_{0.5}S$ and $CoS_x/Mn_{0.5}Cd_{0.5}S$ samples

Table S3 The data of time-resolved fluorescence

Sample	**τ_1** (ns)		**τ_2** (ns)		**τ_3** (ns)		**Ave.**
	Value/ns	Rel%	Value/ns	Rel%	Value/ns	Rel%	**τ(ns)**
$Mn_{0.5}Cd_{0.5}S$	0.83	28.16	3.435	54.18	17.02	17.66	5.10
$CoS_x/Mn_{0.5}Cd_{0.5}S$	1.10	26.79	4.15	54.24	15.23	18.97	5.43

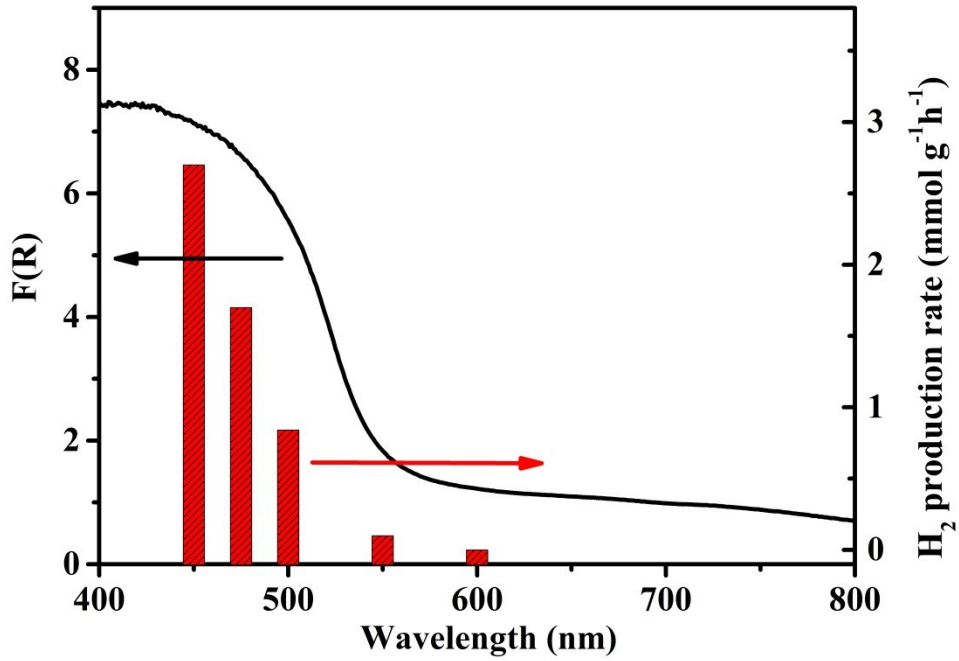

Fig. S4 Wavelength-dependent photocatalytic H_2 evolution performance of $CoS_x/Mn_{0.5}Cd_{0.5}S$

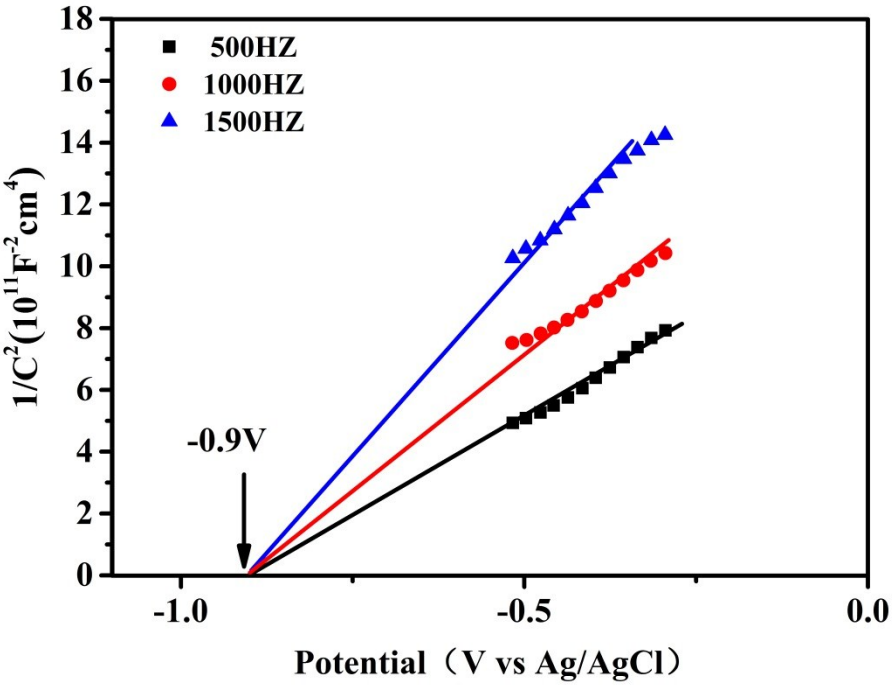

Fig. S5 Mott-Schottky plots of $Mn_{0.5}Cd_{0.5}S$