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Supplementary Data

A novel p–n $Mn_{0.2}Cd_{0.8}S/NiWO_4$ heterojunction for highly efficient photocatalytic H_2 production

Table S1. The added amount of samples and reagents

Sample	$Mn_{0.2}Cd_{0.8}S$ (mg)	$NiCl_2 \cdot 6H_2O$ (mg)	$Na_2WO_4 \cdot 2H_2O$ (mg)
$Mn_{0.2}Cd_{0.8}S/NiWO_4$-10 wt%	200	15	21
$Mn_{0.2}Cd_{0.8}S/NiWO_4$-30 wt%	200	47	65
$Mn_{0.2}Cd_{0.8}S/NiWO_4$-50 wt%	200	77	107
$Mn_{0.2}Cd_{0.8}S/NiWO_4$-70 wt%	200	109	151
$Mn_{0.2}Cd_{0.8}S/NiWO_4$-90 wt%	200	140	194
$Mn_{0.2}Cd_{0.8}S$	200	0	0
$NiWO_4$	0	140	194

Table S2. S_{BET}, pore volume and pore diameter of $Mn_{0.2}Cd_{0.8}S$, $NiWO_4$ and $Mn_{0.2}Cd_{0.8}S/NiWO_4$-30 wt% composite

Sample	S_{BET}[a] ($m^2\ g^{-1}$)	Pore Volume[b] ($cm^3\ g^{-1}$)	Pore Diameter[b] (nm)
$Mn_{0.2}Cd_{0.8}S$	29.63	0.054	1.18
$NiWO_4$	172.16	0.112	1.50
$Mn_{0.2}Cd_{0.8}S/NiWO_4$-30 wt%	40.48	0.074	2.52

[a]Gained by BET test.

[b] Relative pressure (P/P_0) of 0.99.

Table S3. H_2 production activities of some related metal tungstates-based heterojunction

Photocatalyst	Light source	Sacrificial reagent	H_2 production rate ($mmol\ h^{-1}\ g^{-1}$)	Ref.
$Mn_{0.2}Cd_{0.8}S/NiWO_4$	300 W Xe lamp ($\lambda \geq 420$ nm)	Na_2S/Na_2SO_3	17.76	This work

$Zn_{0.7}Cd_{0.3}S/NiWO_4$	5W LED ($\lambda \geq 420$ nm)	Na_2S/Na_2SO_3	15.95	[S1]
$CdS/NiWO_4$	300 W Xe lamp ($\lambda \geq 420$ nm)	lactic acid	5.07	[S2]
$NiWO_4/CdS/Pt$	550W Xe lamp ($\lambda \geq 420$ nm)	lactic acid	0.88	[S3]
$CdS/NiWO_4/CoP$	5 W LED ($\lambda \geq 420$nm)	lactic acid	47.7	[S4]
$CdS/InWO_4$	5W LED ($\lambda \geq 420$ nm)	lactic acid	6.15	[S5]
$CdS/CdWO_4$	500W Xe lamp	Na_2S/Na_2SO_3	1.805	[S6]
$CdS/CdWO_4$	300 W Xe lamp ($\lambda \geq 420$ nm)	lactic acid	9.17	[S7]
$CdS/CoWO_4$	300 W Xe lamp ($\lambda \geq 420$ nm)	Na_2S/Na_2SO_3	15.91	[S8]

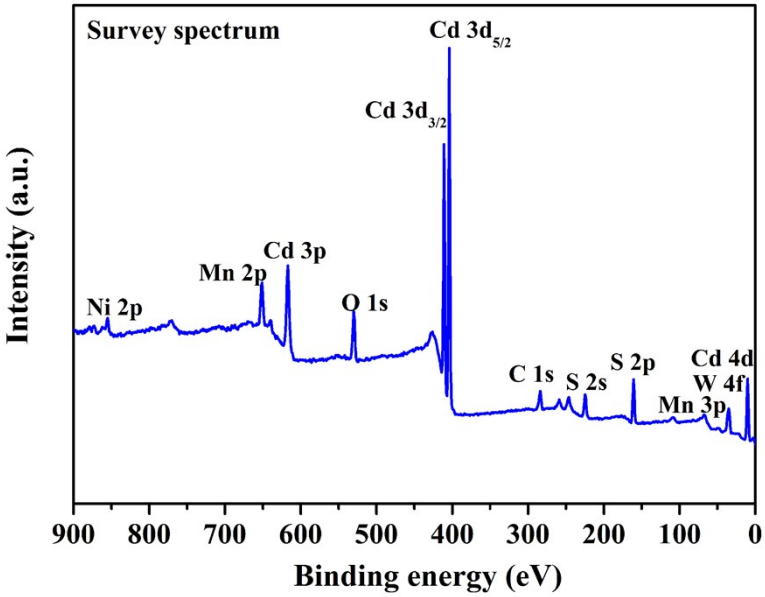

Fig. S1. XPS survey spectrum of $Mn_{0.2}Cd_{0.8}S/NiWO_4$-30 wt% composite

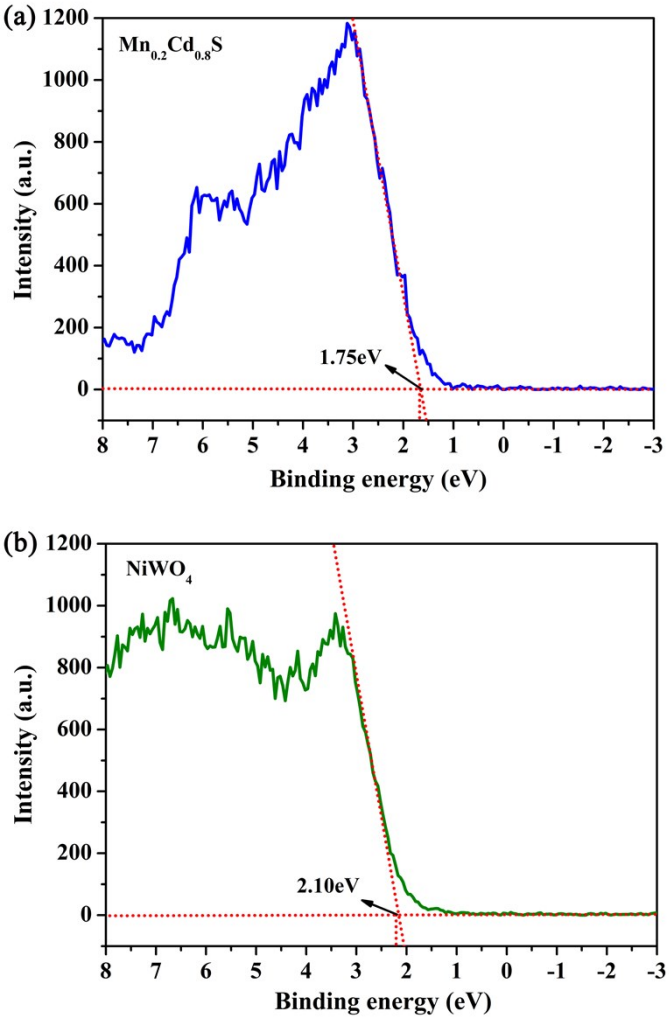

Fig. S2. XPS–VB of (a) $Mn_{0.2}Cd_{0.8}S$ and (b) $NiWO_4$

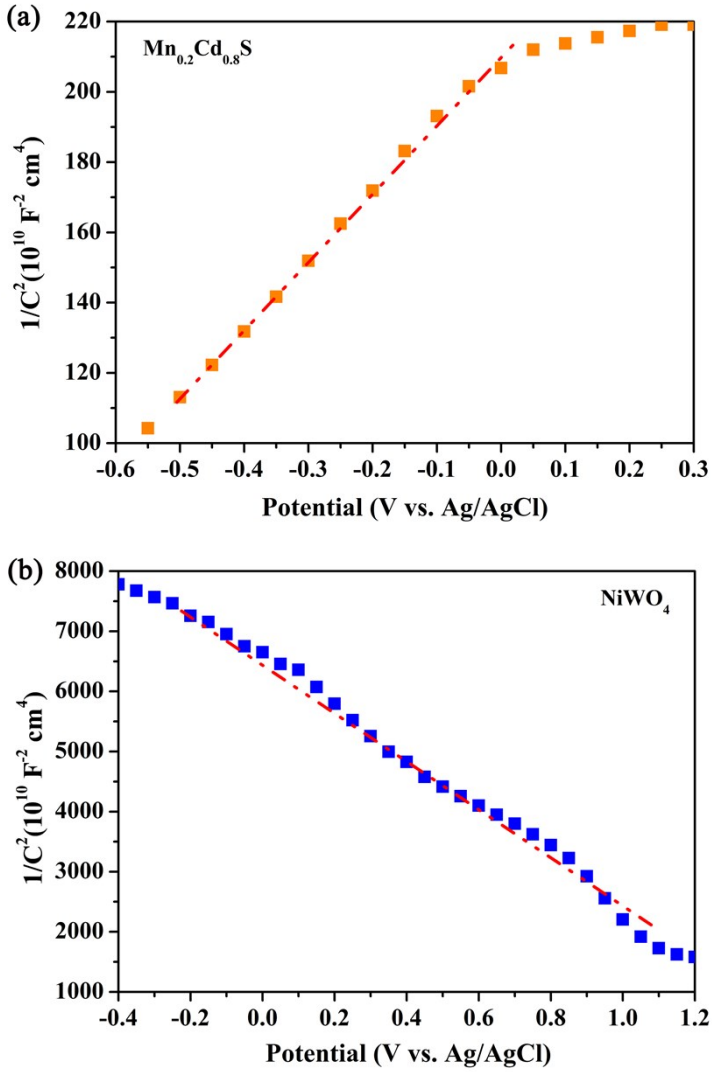

Fig. S3. Mott–Schottky polts of (a) $Mn_{0.2}Cd_{0.8}S$ and (b) $NiWO_4$.

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