Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

1T-WS_2 "electron pump" regulate charge transfer over ZnCdS/NiV-LDH p-n heterostructures for enhanced photocatalytic hydrogen evolution

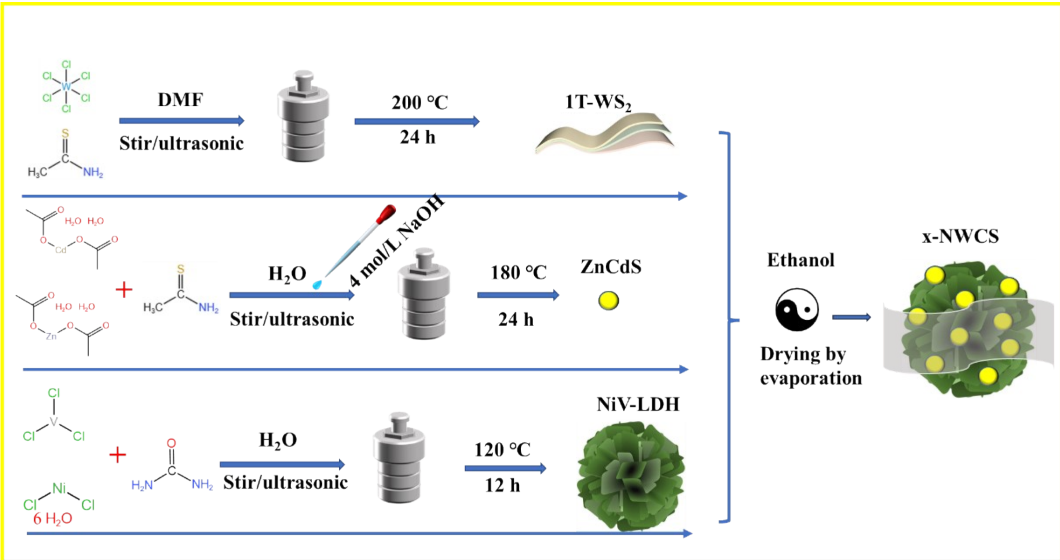

Fig. S1 Compound Catalyst preparation process.

Table S1. The S_{BET}, pore volume and pore diameter distribution for each catalyst.

Samples	S_{BET} ($m^2 \cdot g^{-1}$)	Pore volume ($cm^3 \cdot g^{-1}$)	Average pore size (nm)
ZnCdS	7.35	0.09	49.38
1T-WS_2	5.02	0.02	20.13
NiV-LDH	65.69	0.53	32.20
10-WCS	8.79	0.06	27.69
20-NWCS	10.56	0.13	47.52

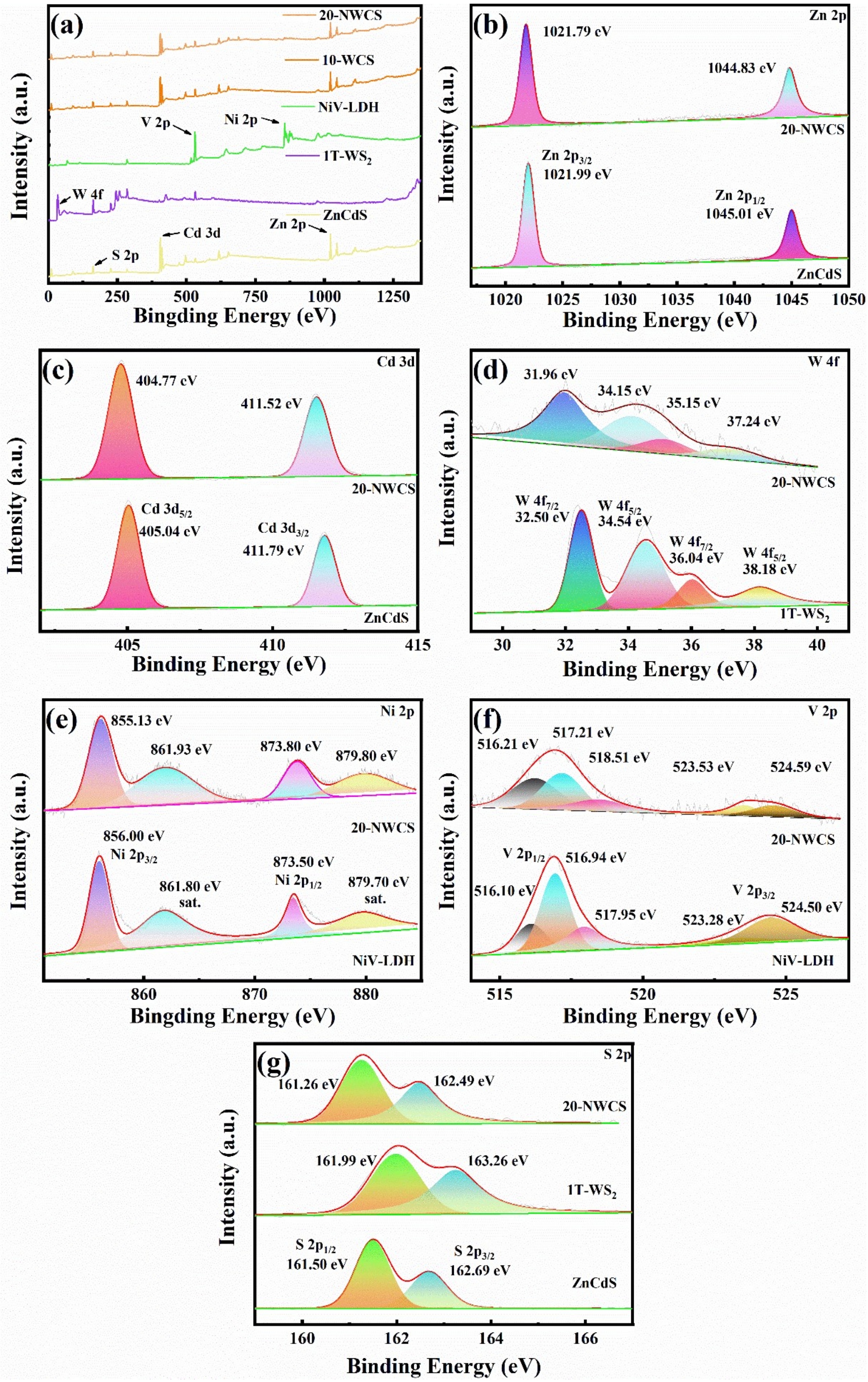

Fig. S2 XPS of **(a)** full spectrum; **(b)** Zn 2p; **(c)** Cd 3d; **(d)** W 4f; **(e)** Ni 2p; **(f)** V 2p and **(g)** S 2p.

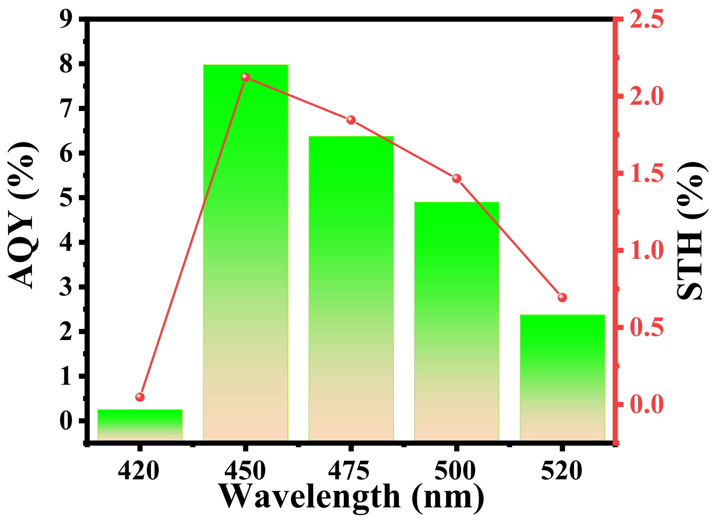

Fig. S3 AQE testing and STH conversion efficiency of 20-NWCS.

Table S2 Comparison of ZnCdS based composite materials for photocatalytic hydrogen evolution.

Photocatalyst	Light Source	Sacrificial agents	Production rate	AQE (%)/nm	Refs
ZnCdS/1T-WS_2/NiV-LDH	5 W LED	Lactic acid	22.37 mmol·g^{-1}·h^{-1}	7.98 (450)	This
ZnCdS/NiCoP	5 W LED	Lactic acid	11.64 mmol·g^{-1}·h^{-1}	7.93 (450)	[1]
ZnCdS/P-graphdiyne	5 W LED	Lactic acid	10.39 mmol·g^{-1}·h^{-1}	3.35 (420)	[2]
ZnCdS/Ce-MOF	300 W Xe lamp	Na_2S/Na_2SO_3	3.95 mmol·g^{-1}·h^{-1}	No	[3]
ZnCdS/CoSP	5 W LED	Na_2S/Na_2SO_3	17.76 mmol·g^{-1}·h^{-1}	No	[4]
ZnCdS/CuS/Cu_9S_5	5 W LED	Na_2S/Na_2SO_3	13.82 mmol·g^{-1}·h^{-1}	8.87 (475)	[5]
ZnCdS/Ni_3C	300 W Xe lamp	Na_2S/Na_2SO_3	3.31 mmol·g^{-1}·h^{-1}	No	[6]
ZnCdS/NiB	LED	Lactic acid	7.70 mmol·g^{-1}·h^{-1}	13.3 (not found)	[7]
ZnCdS/In_2O_3	300 W Xe lamp	Na_2S/Na_2SO_3	1.1 mmol·g^{-1}·h^{-1}	0.32	[8]

(400)

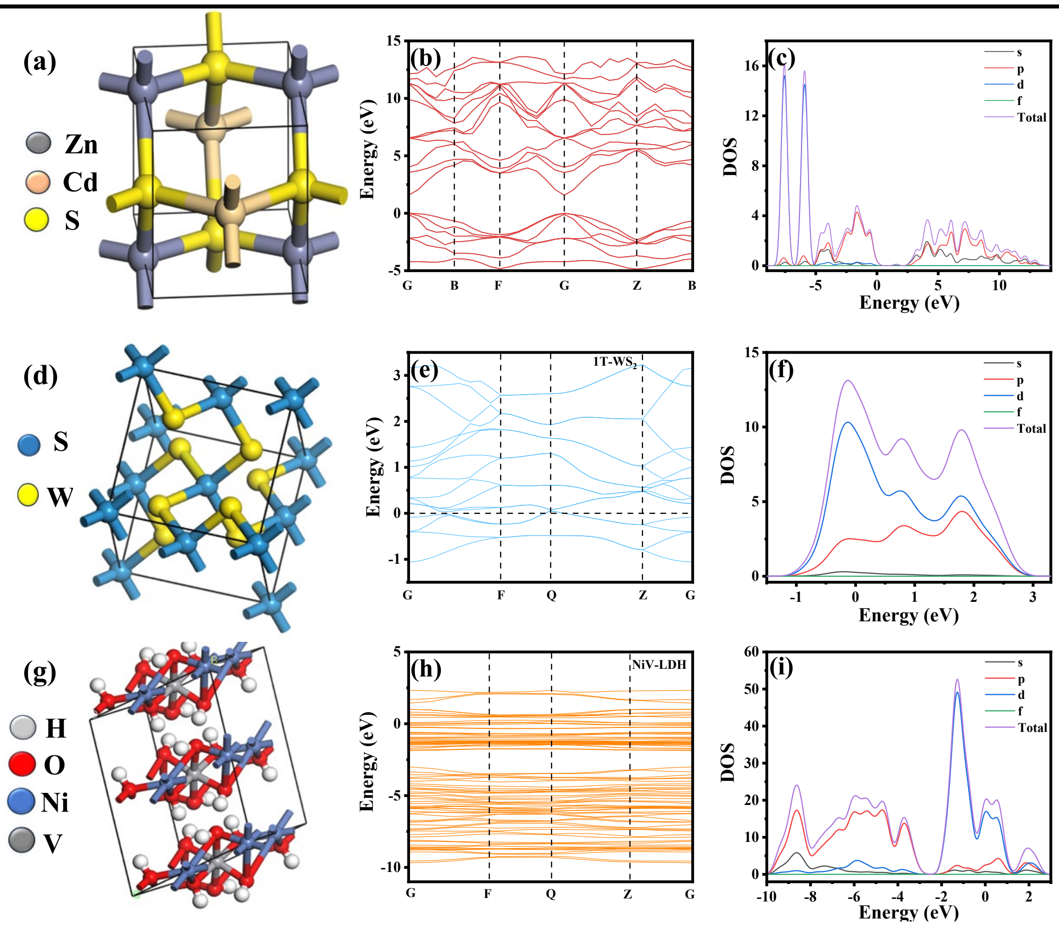

Fig. S4 Rhythm optimization model of **(a)** ZnCdS; **(d)** 1T-WS_2; **(g)** NiV-LDH; band structure of **(b)** ZnCdS; **(e)** 1T-WS_2; **(h)** NiV-LDH; DOS and PDOS of **(c)** ZnCdS; **(f)** 1T-WS_2; **(i)** NiV-LDH.

References

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