

Supporting Information

Highly Active $\text{Zn}_x\text{Cd}_{1-x}\text{S}$ Photocatalysts Containing Earth Abundant Elements Only for H_2 Production from Water under Visible Light

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Table S1 Abundance and price of metal elements employed in some representative promising photocatalysts for hydrogen production.

Element	Zn	Cd	Cu	Ni	W	Ga	In
Abundance (Mass fraction, in kg/kg) ^a	7.0×10^{-5}	1.5×10^{-7}	6.0×10^{-5}	8.4×10^{-5}	1.25×10^{-6}	1.9×10^{-5}	2.5×10^{-7}
Price of metal (USD/kg) ^b	2.1	7.7	7.7	21.5	39.4	505	510
Element	Ag	Pt	Pd	Ru	Rh		
Abundance (Mass fraction, in kg/kg) ^a	7.5×10^{-8}	5×10^{-9}	1.5×10^{-8}	1×10^{-9}	1×10^{-9}		
Price (USD/oz) ^b	19.4	1530	520	400	6850		

^aEarth bulk continental crust, from CRC handbook.

^bThe prices are for rough comparison only as some price data were from 1-2 years ago. Source: <http://www.metalprices.com/FreeSite/index.asp>.

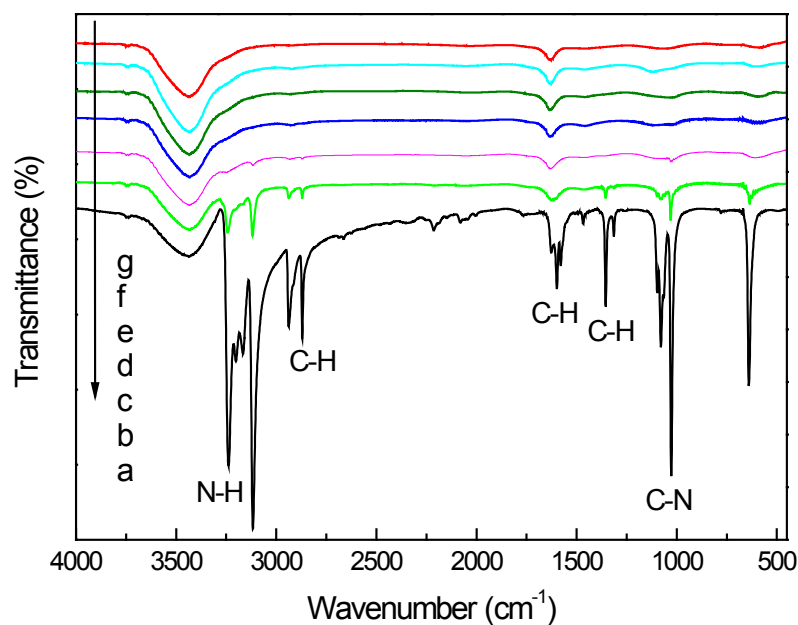


Fig. S1 FTIR spectra of Zn_xCd_{1-x}S samples synthesized by the solvothermal method in EDA at different conditions. (a) $x = 1.0$, 180 °C, 24 h, (b) $x = 0.5$, 180 °C, 2 h, (c) $x = 0.5$, 180 °C, 6 h, (d) $x = 0.5$, 180 °C, 12 h, (e) $x = 0.5$, 180 °C, 24 h, (f) $x = 0.5$, 180 °C, 48 h, (g) $x = 0$, 180 °C, 24 h.

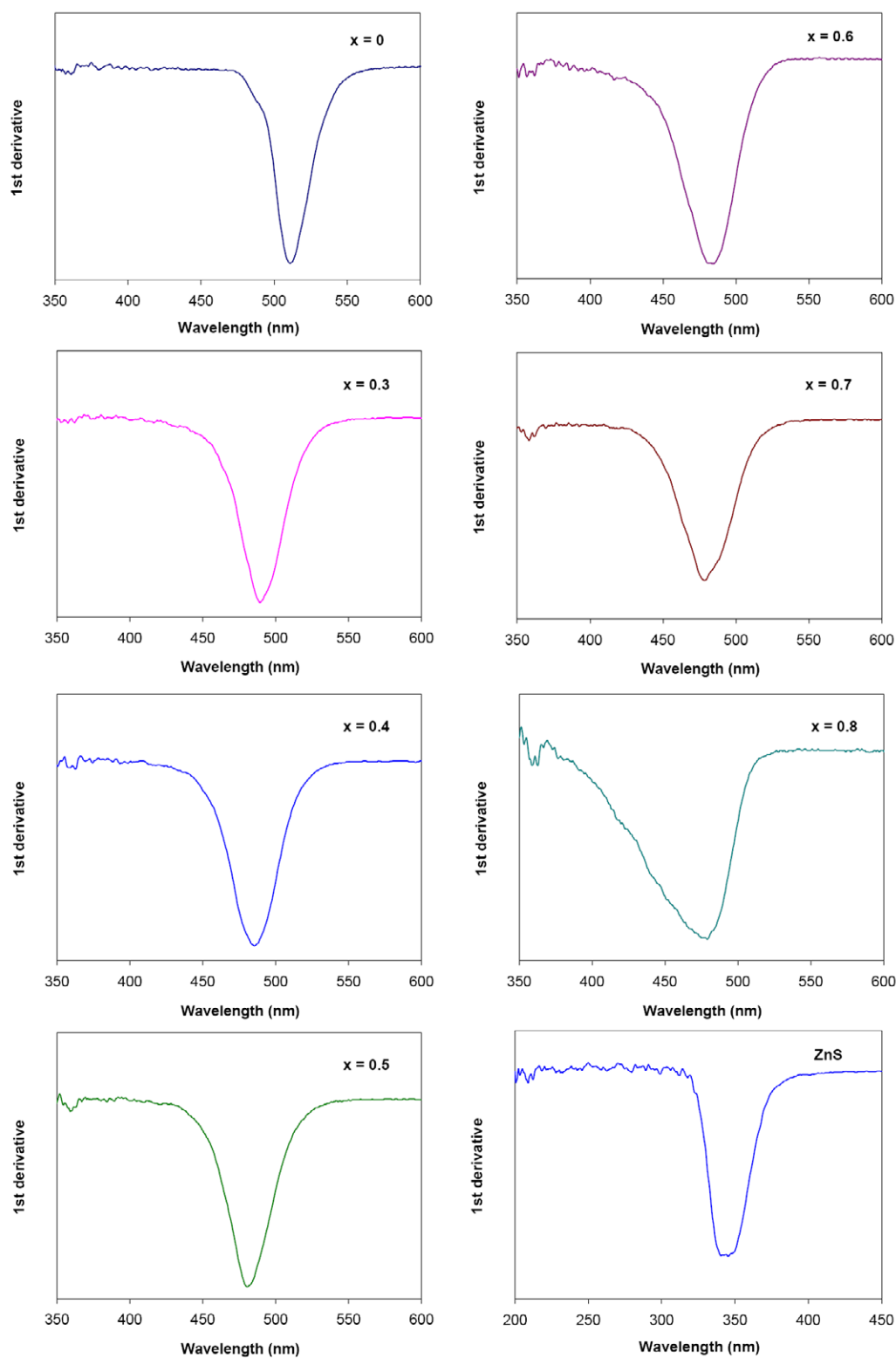


Fig. S2 The first derivative of the UV-vis DRS curves of $\text{Zn}_x\text{Cd}_{1-x}\text{S}$ samples synthesized by the solvothermal method in EDA (180 °C, 24 h) with different x values. Pure ZnS sample was prepared using water as the solvent while keeping other conditions the same.

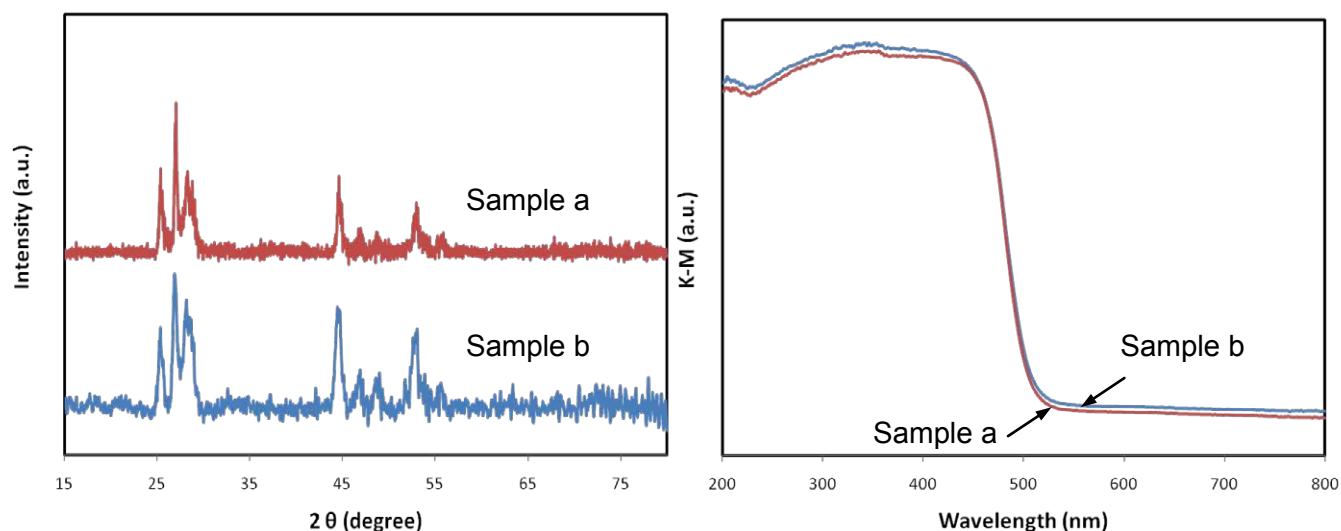


Fig. S3 XRD (left) and UV-vis DRS (right) results of $\text{Zn}_{0.5}\text{Cd}_{0.5}\text{S}$: Sample a (dried directly after synthesis) and Sample b (aged in Na_2S solution for 24 h before drying).

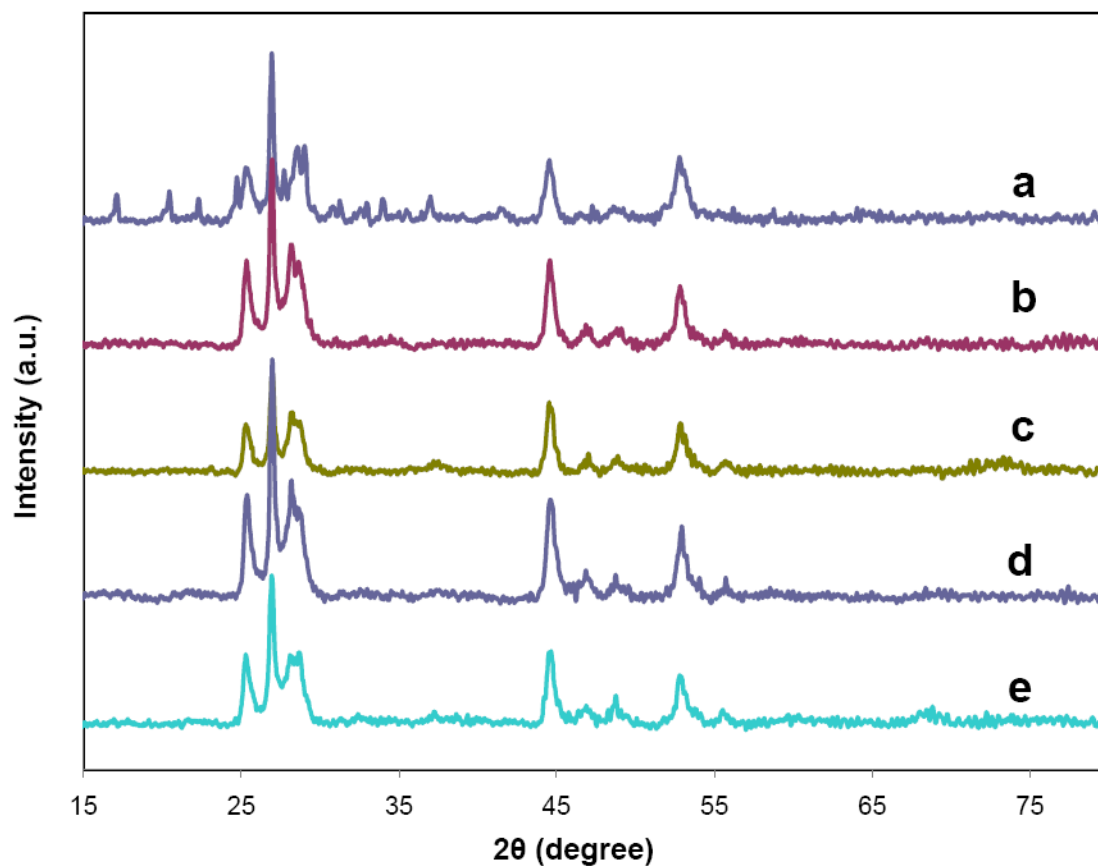


Fig. S4 XRD patterns of sample $\text{Zn}_{0.5}\text{Cd}_{0.5}\text{S}$ synthesized by the solvothermal method in EDA at 180 °C with different reaction time, (a) 2 h, (b) 6 h, (c) 12 h, (d) 24 h, (e) 48 h.

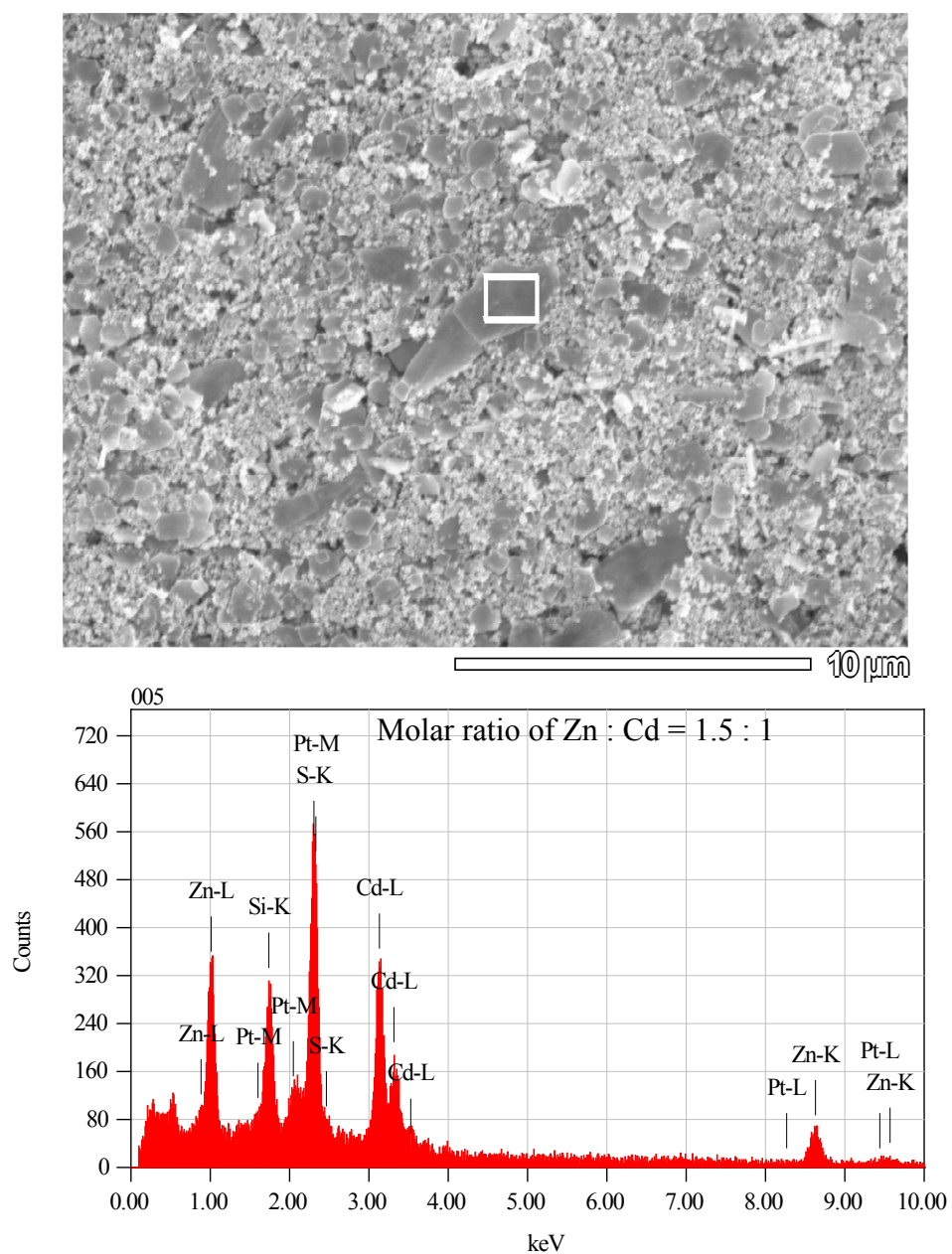


Fig. S5 SEM image of sample $\text{Zn}_{0.5}\text{Cd}_{0.5}\text{S}$ synthesized by the solvothermal method in EDA at 180 °C with a reaction time of 2 h and the corresponding EDS analysis results in the micro-plate area as indicated by the box in the SEM image.