Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Supplementary Data

Facile fabrication of a flexible and shape-adaptive $Cd_{0.5}Zn_{0.5}S$-based photocatalytic system and its photocatalytic activity for hydrogen evolution from water

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Supplementary Fig. S1

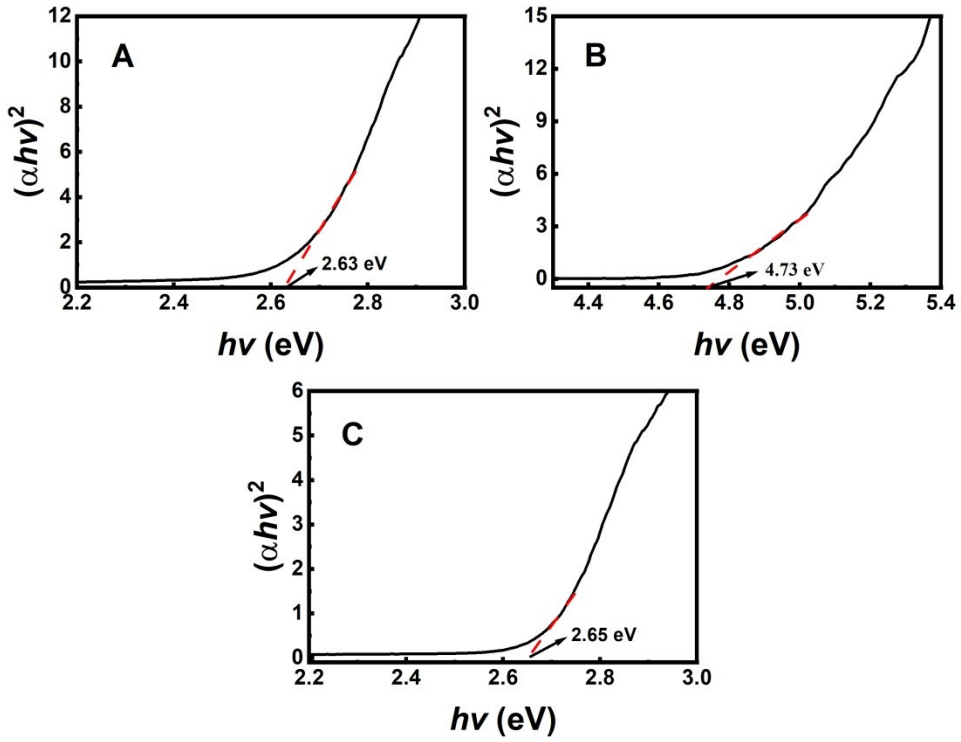

Fig. S1. Tauc plots of (A) the $Cd_{0.5}Zn_{0.5}S$ nanoparticles, (B) $SrWO_4$ and (C) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7).

Supplementary Fig. S2

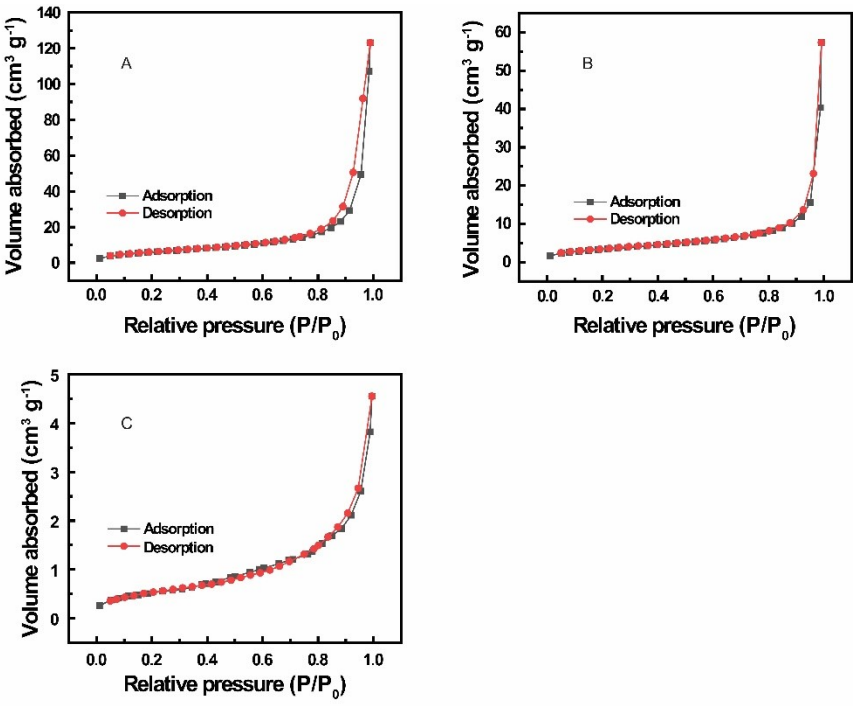

Fig. S2. N_2 adsorption-desorption isotherms of (A) the $Cd_{0.5}Zn_{0.5}S$ nanoparticles, (B) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%) and (C) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7).

Supplementary Fig. S3

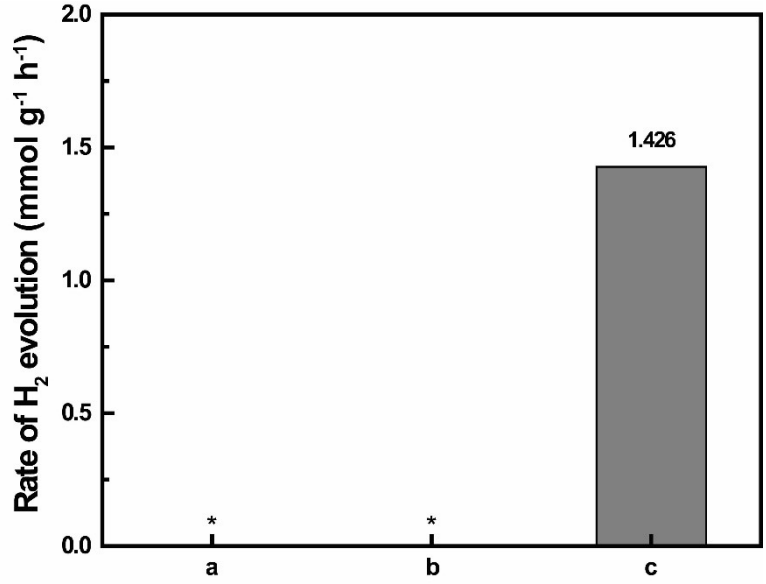

Fig. S3. (a) Rate of H_2 evolution from the lactic acid solution under visible irradiation when photocatalyst is absent (lactic acid aqueous solution 60 mL 17 vol.%, pH = 1.6, temperature 10°C, irradiation time 4 h); (b) rate of H_2 evolution over FP under visible irradiation (lactic acid aqueous solution 60 mL 17 vol.%, pH = 1.6, temperature 10°C, irradiation time 4 h); (c) rate of H_2 evolution over $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%) under visible irradiation (photocatalyst 1 mg, lactic acid aqueous solution 60 mL 17 vol.%, pH = 1.6, temperature 10°C, irradiation time 4 h).

Supplementary Fig. S4

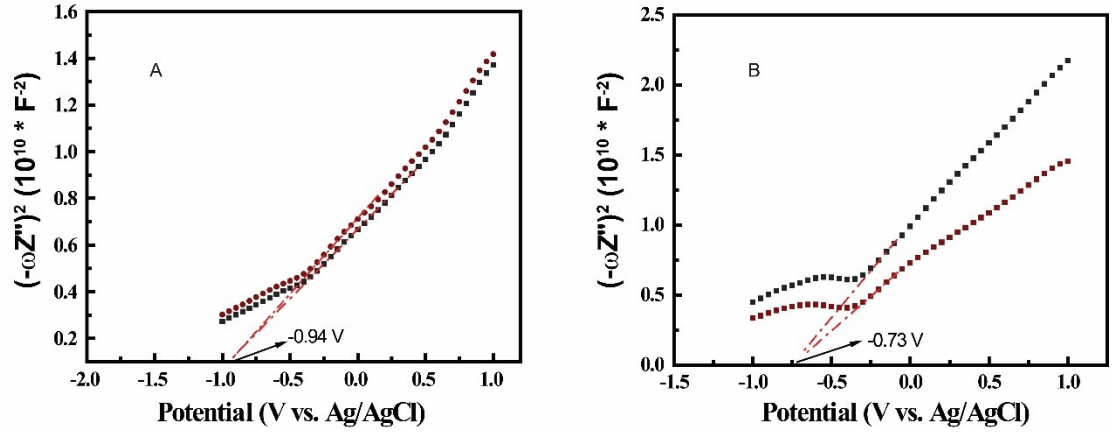

Fig. S4. Mott-Schottky curves of (A) the $Cd_{0.5}Zn_{0.5}S$ nanoparticles and (B) the $SrWO_4$ nanoparticles.

Supplementary Fig. S5

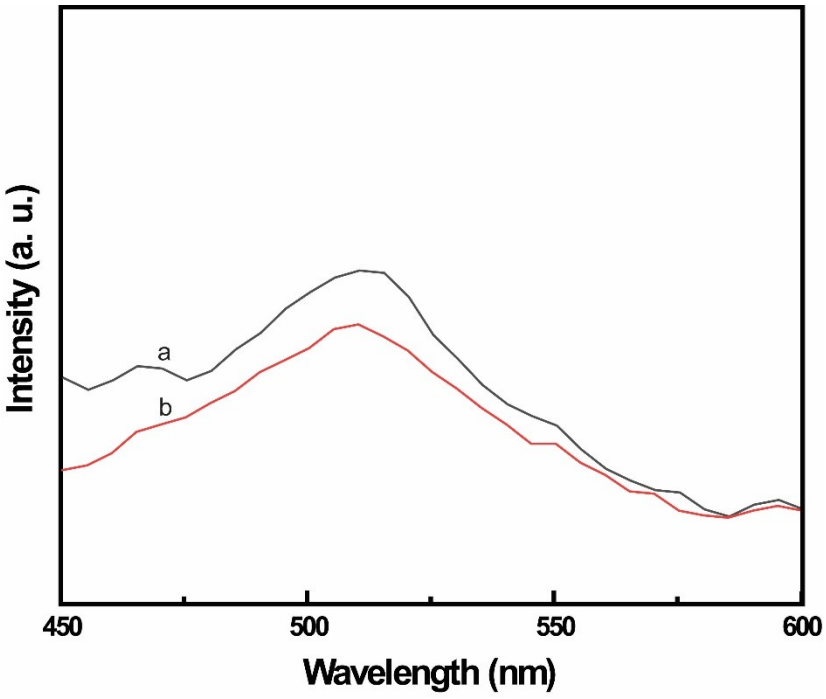

Fig. S5. Fluorescence spectra of (a) the $Cd_{0.5}Zn_{0.5}S$ nanoparticles and (b) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%) (excitation wavelength 400 nm).

Supplementary Fig. S6

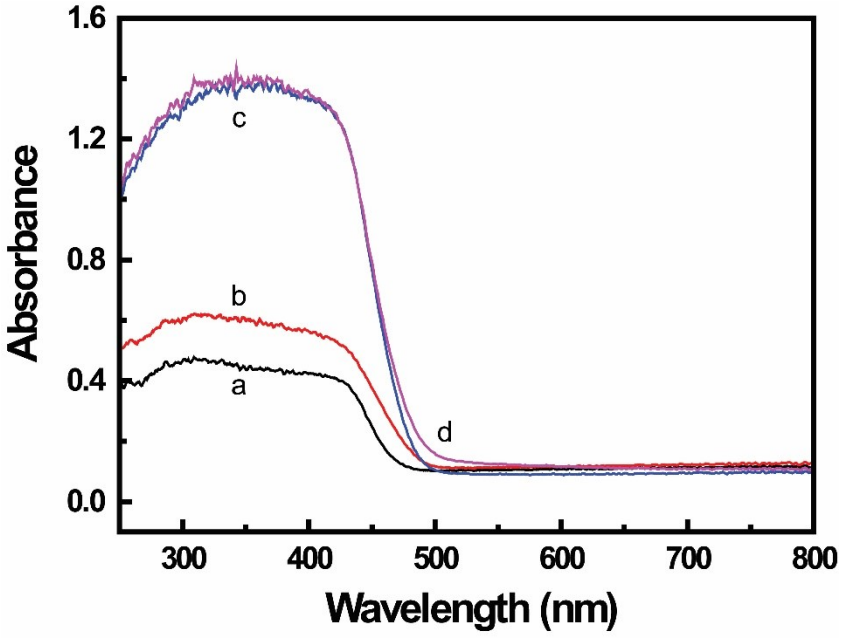

Fig. S6. UV-vis reflective spectra of (a) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (0.5), (b) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7), (c) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (17.6) and (d) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (52.1).

Supplementary Fig. S7

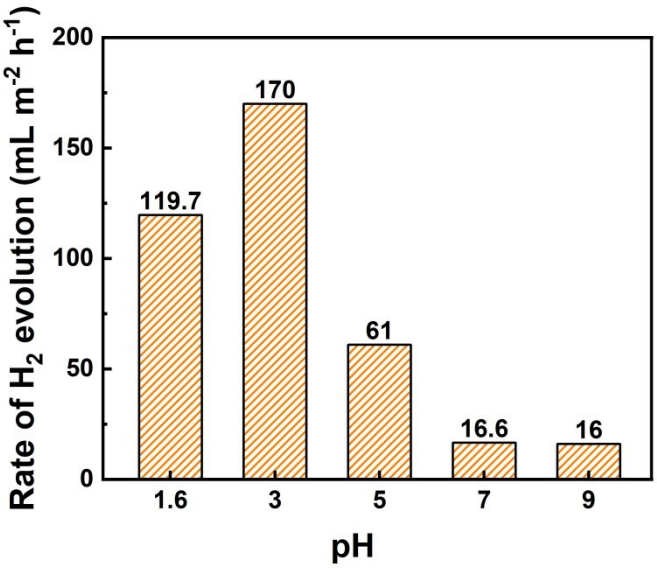

Fig. S7. Effect of pH on the photocatalytic activity of $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7).

Supplementary Table S1

Table S1. Photocatalytic H_2 evolution rate over $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) attached to various supports

Support	**Rate of H_2 evolution (mL m^{-2} h^{-1})**
Cu plate	0
Ti plate	54.6
Mica plate	73.8
Al plate	86
Glass slice	170

Supplementary Fig. S8

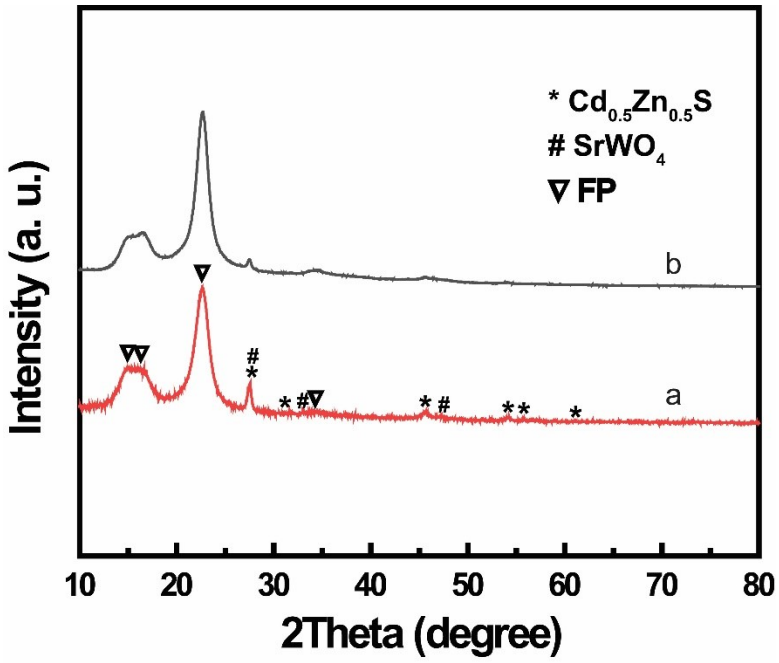

Fig. S8. XRD patterns of (a) fresh $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) and (b) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) used in strong acidic environment.

Supplementary Fig. S9

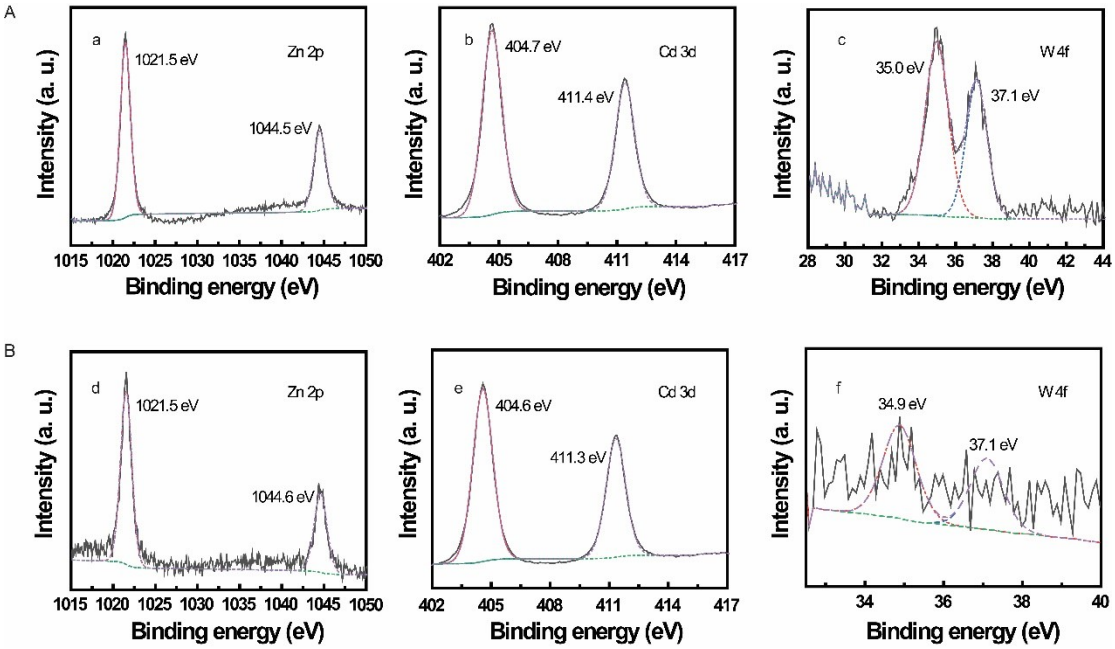

Fig. S9. XPS spectrum of (A) fresh $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) and (B) $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) used in strong acidic environment: (a) Zn 2p, (b) Cd 3d, (c) W 4f, (d) Zn 2p, (e) Cd 3d and (f) W 4f high resolution XPS spectra (solid lines) and curve-fitting analysis (dot lines) of states of Zn, Cd and W.

Supplementary Fig. S10

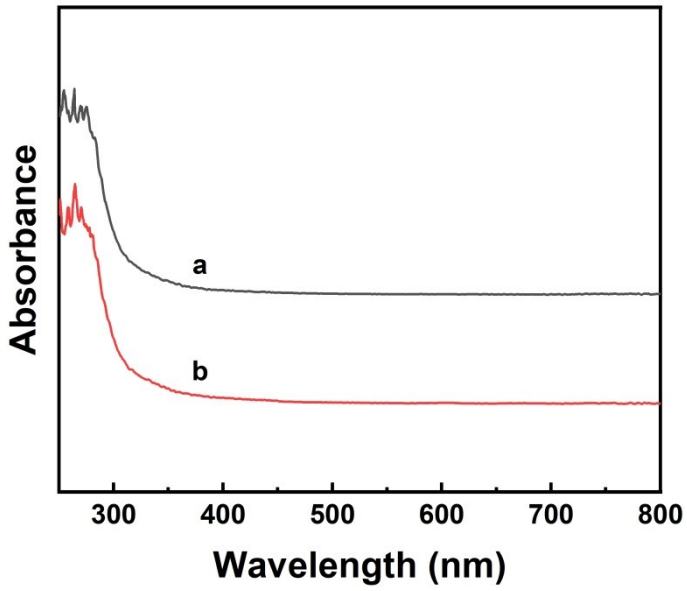

Fig. S10. UV-vis spectra of lactic acid solution: (a) before stirring, (b) after stirring at 600 r min^{-1} for 4 h in the presence of $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7).

Supplementary Fig. S11

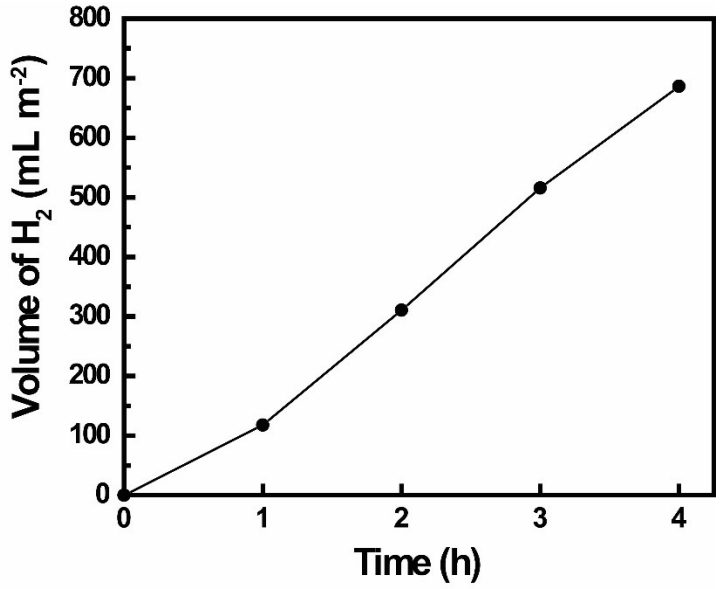

Fig. S11. Time-course of photocatalytic H_2 evolution over $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) which is folded four times (lactic acid aqueous solution 60 mL, 17 vol.%, pH = 3, temperature 10°C).

Supplementary Fig. S12

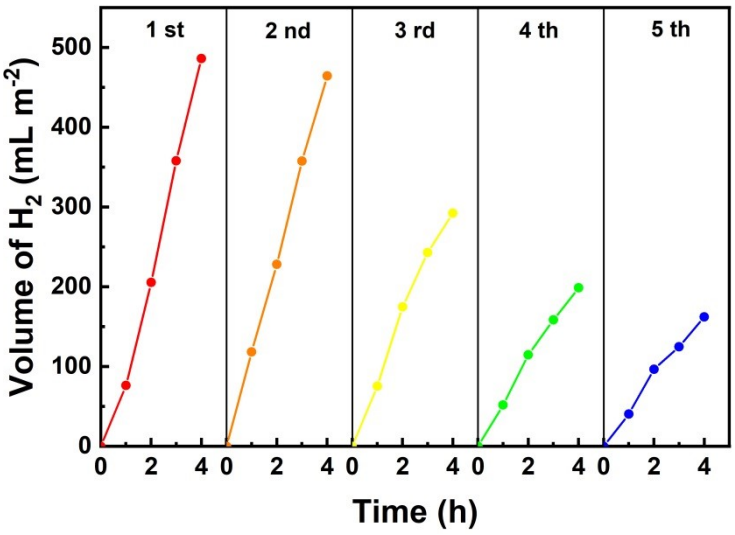

Fig. S12. Durability of $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) (lactic acid aqueous solution 60 mL 17 vol.%, pH = 3, temperature 10°C, irradiation time 4 h).

Supplementary Fig. S13

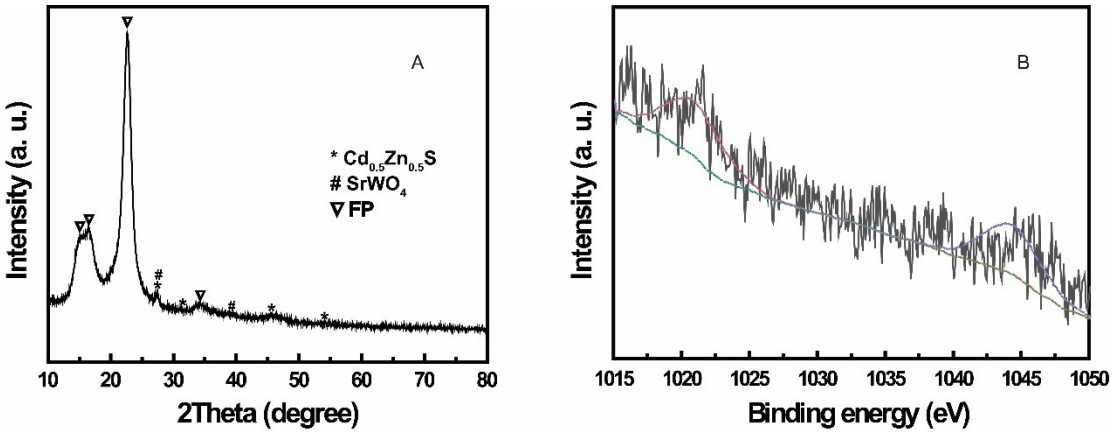

Fig. S13. (A) XRD pattern of the used $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) and (B) Zn 2p high resolution XPS spectrum (solid line) of the used $Cd_{0.5}Zn_{0.5}S/SrWO_4$ (13%)-FP (1.7) and curve-fitting analysis (dot lines) of states of Zn.