Supporting Information

Synthesis of ZnIn$_2$S$_4$@Co$_3$S$_4$ particles derived from ZIF-67 for photocatalytic hydrogen production

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Fig. S1 XRD patterns of samples ZIF-67 (a), ZC-5, ZnIn$_2$S$_4$ and Co$_3$S$_4$ (b).

Fig. S2 SEM images of prepared ZIF-67 (a), Co$_3$S$_4$ (b) and pure ZnIn$_2$S$_4$ (c).
**Fig. S3** N₂ adsorption-desorption isotherms of pure ZnIn₂S₄ and ZC-5 composite. Inset: the corresponding BJH pore-size distribution plots calculated from the desorption branch.

**Fig. S4** Wide-scan XPS spectra of pure ZnIn₂S₄ and ZC-5.
**Fig. S5** UPS spectra of pure ZnIn$_2$S$_4$ (a), ZC-5 (b) and Co$_3$S$_4$ (c).

**Fig. S6** Photo-luminescence (PL) spectra of ZnIn$_2$S$_4$ and Co$_3$S$_4$ (a); Photocurrent-time curves of ZnIn$_2$S$_4$ and Co$_3$S$_4$ under the irradiation of simulated sunlight (b); Nyquist impedance plots of EIS for ZnIn$_2$S$_4$ and Co$_3$S$_4$ (c).

**Fig. S7** Mott-Schottky plots for ZnIn$_2$S$_4$ (a), ZC-5 (b) and Co$_3$S$_4$ (c) in 0.5 M Na$_2$SO$_4$ aqueous solution.
Fig. S8 Photocatalytic hydrogen evolution over the ZC-5 photocatalyst for three cycles (a); The XRD patterns of ZC-5 before and after photocatalytic reaction (b).