Single-Step Solvothermal Synthesis of Highly Uniform Cd$_x$Zn$_{1-x}$S Nanospheres for Improved Visible Light Photocatalytic Hydrogen Generation

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Fig. S1 EDX spectra along with Cd, Zn and S at% of (a) CdS (b) Cd$_{0.8}$Zn$_{0.2}$S (c) Cd$_{0.6}$Zn$_{0.4}$S (d) Cd$_{0.4}$Zn$_{0.6}$S (e) Cd$_{0.2}$Zn$_{0.8}$S (f) ZnS. The X-axis and Y-axis title of the EDX spectra are energy (keV) and counts (cps), respectively.
**Fig. S2** XRD patterns of sample prepared with (a) water (b) ethanol (c) ethylenediamine.

**Fig. S3** FESEM images of the sample prepared with (a) water, (b) ethanol, and (c) ethylenediamine.
Fig. S4 XRD patterns of Cd$_{0.2}$Zn$_{0.8}$S sample prepared with a reaction duration of (a) 2 h, (b) 4 h, and (c) 12 h.

Fig. S5 FESEM images of Cd$_{0.2}$Zn$_{0.8}$S samples prepared with a reaction duration of (a) 2 h, (b) 4 h, and (c) 12 h.
**Fig. S6** Nitrogen adsorption–desorption isotherm of Cd$_{0.6}$Zn$_{0.4}$S.

**Fig. S7** Photocatalytic H$_2$ generation rate of synthesized samples.
Fig. S8 (a) XRD pattern, (b) FESEM image, and (c) EDX spectrum of Cd$_{0.2}$Zn$_{0.8}$S after 4th cycle of photocatalytic hydrogen generation.

Fig. S9 LSV plots of CdS, ZnS, and Cd$_{0.2}$Zn$_{0.8}$S under illumination and LSV plot of Cd$_{0.2}$Zn$_{0.8}$S under dark at a scan rate of 10 mV s$^{-1}$. 
Fig. S10 Equivalent circuit diagram of the Nyquist plot.