**Title:** Preparation of 1D cubic  $Cd_{0.8}Zn_{0.2}S$  solid solution nanowires using levelling effect of TGA and improved photocatalytic H<sub>2</sub>-produciton acitivity

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## **Electronic supporting information (ESI)**

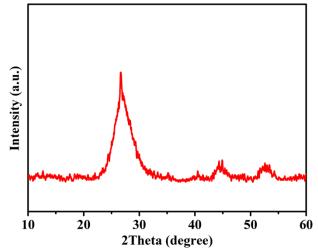


Fig. S1 XRD pattern of the as prepared Cd<sub>0.8</sub>Zn<sub>0.2</sub>S solid solution at 180 °C.

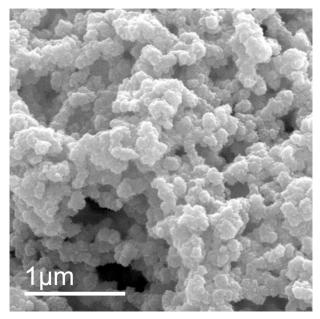


Fig. S2 SEM image of the as-prepared Cd<sub>0.8</sub>Zn<sub>0.2</sub>S solid solution at 180 °C

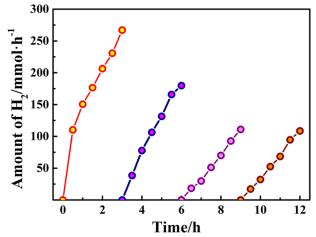


Fig. S3 Cycle operation of  $H_2$  evolution on the as-prepared 1D  $Cd_{0.8}Zn_{0.2}S$  solid solution nanowires.

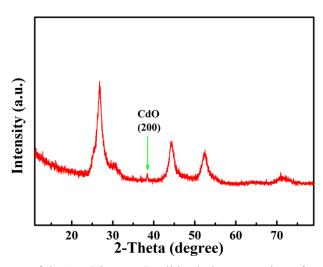


Fig. S4 XRD pattern of the 1D Cd<sub>0.8</sub>Zn<sub>0.2</sub>S solid solution nanowires after cycling for 12 h.

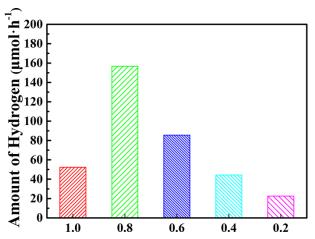


Fig. S3 Photocatalytic activities of the  $Cd_xZn_{1-x}S$  with different Cd-Zn ratio, x = 1, 0.8, 0.6, 0.4, 0.2.