Electronic Supplementary Material (ESI) for Nanoscale
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Electronic Supplementary Information

One-pot electrospinning fabrication of CdS/ZnO core/shell nanofibers for efficient photocatalytic hydrogen production

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S1. Corresponding characterization of $(CdS)_x/(ZnO)_y$.

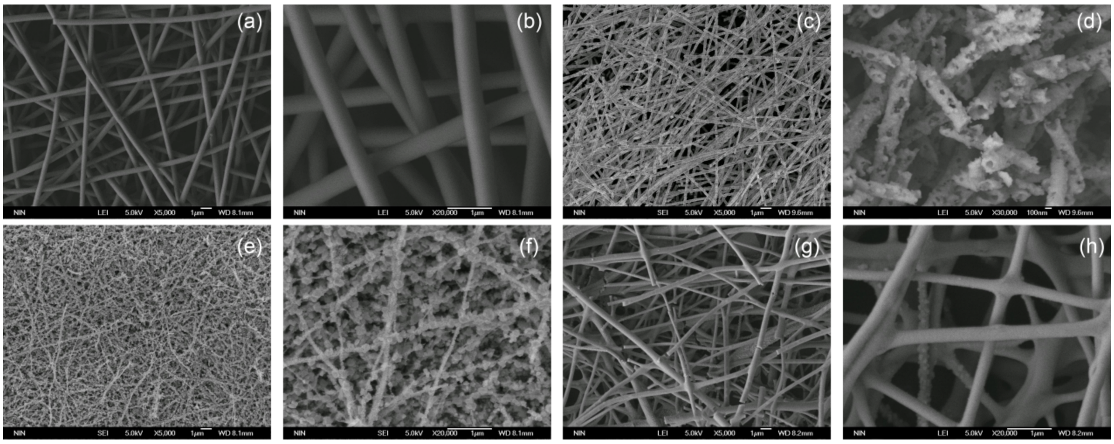


Fig. S1. SEM images of precursor composite nanofibers before annealed (a, b); $(CdS)_1/(ZnO)_1$ annealed at 600 ºC (c, d); $(CdS)_x/(ZnO)_y$ composite fibers calcined at 480 ºC, $(CdS)_0/(ZnO)_1$ (e, f), $(CdS)_1/(ZnO)_0$ (g, h).

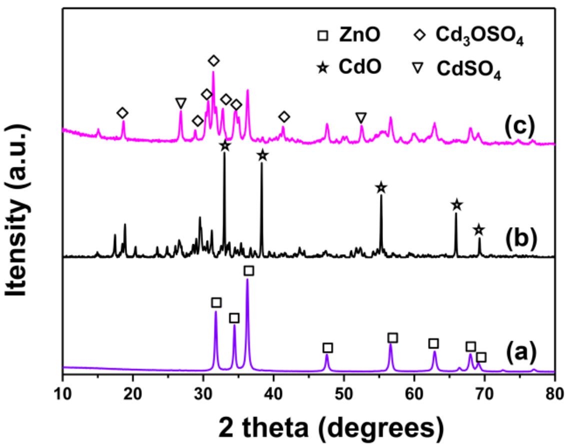


Fig. S3. XRD patterns of $(CdS)_x/(ZnO)_y$ composite fibers. $(CdS)_0/(ZnO)_1$ (a), $(CdS)_1/(ZnO)_0$ (b); and sample $(CdS)_1/(ZnO)_1$ annealed at 600 ºC (c).

Fig. S3 shows the XRD patterns of different ratios of Zn/Cd composite fibers prepared at 480ºC, and sample $(CdS)_1/(ZnO)_1$ annealed at 600 ºC. It is worth to mention that no CdS characteristic peaks appear in the Zn absent sample $(CdS)_1/(ZnO)_0$. Multiphase that composed of CdO (JCPDS No. 05-0640) Cd_3OSO_4 (JCPDS No. 26-0382) and $CdSO_4$ (JCPDS No. 14-0352)present in sample $(CdS)_1/(ZnO)_0$. In contrast, sample $(CdS)_0/(ZnO)_1$ is puer ZnO(JCPDS No. 36-1451). The sample $(CdS)_1/(ZnO)_1$ annealed at 600 ºC are composed of ZnO, Cd_3OSO_4 and $CdSO_4$.

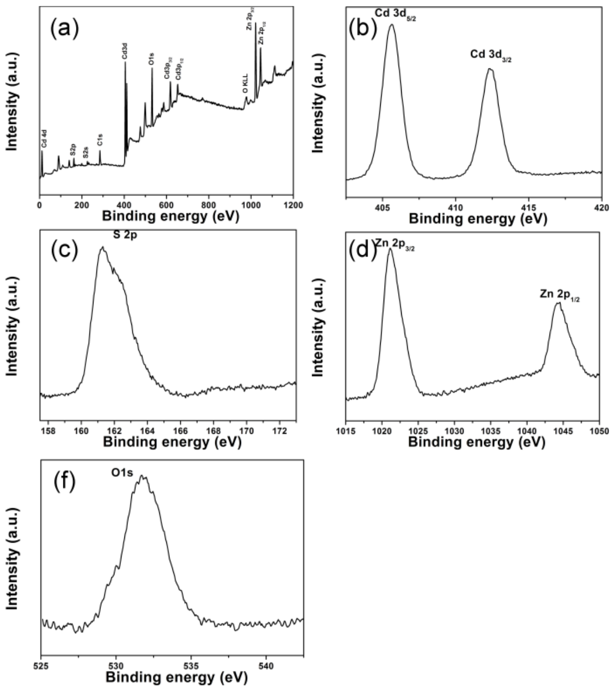


Fig.S4 (a) XPS fully scanned spectra of $(CdS)_1/(ZnO)_1$ nanofibers after photocatalytic process; High resolution XPS spectrum for (b) Cd 3d, (c) S 2p, (d) Zn 2p and (e) O 1s

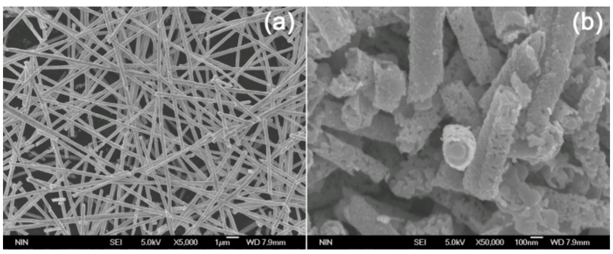
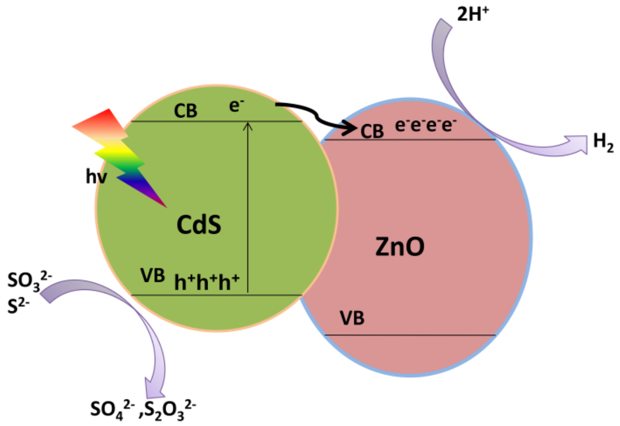


Fig. S5 SEM images of $(CdS)_1/(ZnO)_1$ nanofibers after photocatalytic process



Scheme S1. Schematic illustration of the band-gap energy and charge separation of the CdS/ZnO core/shell nanofibers

In the CdS/ZnO composites, because CdS and ZnO have matching band potentials, namely type II band structure. In such a system, the incident photons first excite the electrons at the ground state of CdS under visible light irradiation, then the photogenerated electrons are injected from the CdS conduction band (CB) to that of ZnO. This takes palce at the interface between these two semiconductors. In this case, a high concentration of electrons is obtained in the conduction band of ZnO, while the photogenerated holes stay on the CdS valence band (VB); consequently, the recombination of photogenerated electron-hole pairs is greatly suppressed. Therefore, the CdS/ZnO system not only extends the responsive region to the visible light, but also contributes to a high quantum yield.