

## **Supporting Information**

**For**

**“Hydrothermal synthesis of uniform sub-micrometer-spherical  
 $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$  photocatalyst with high activity for photocatalytic  
hydrogen production”**

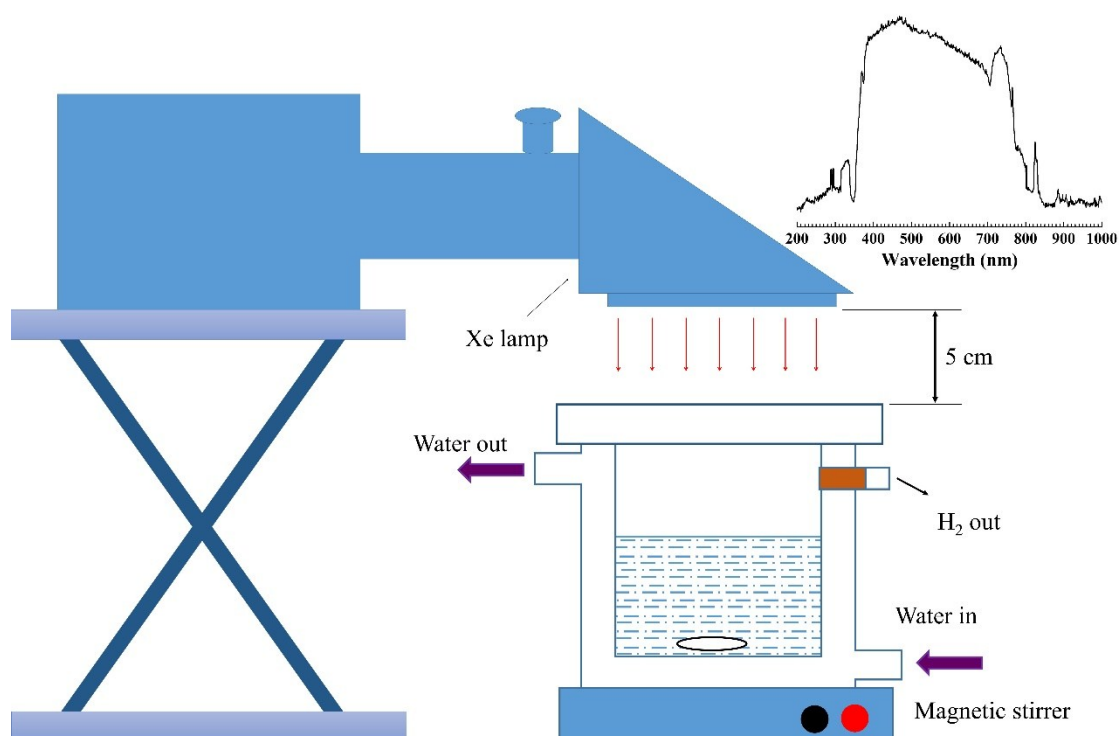
**Submitted by**

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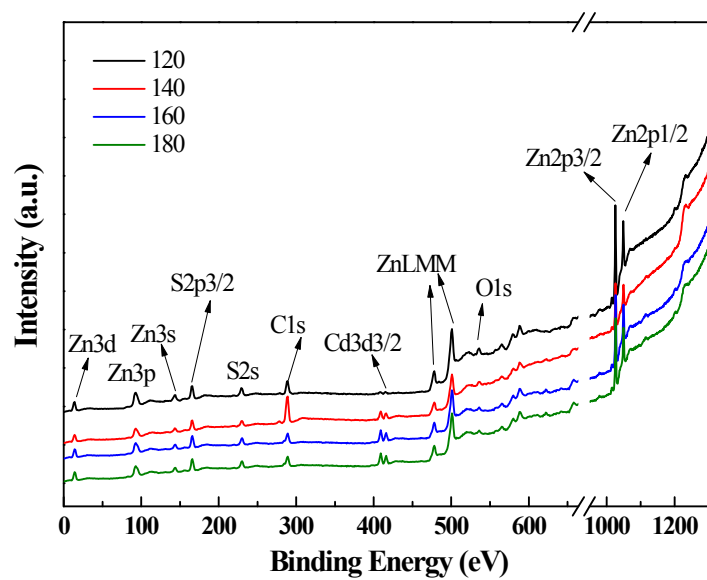
SI Fig.1 is the schematic diagram of the experimental set-up



SI Fig.1. The schematic diagram of the experimental set-up

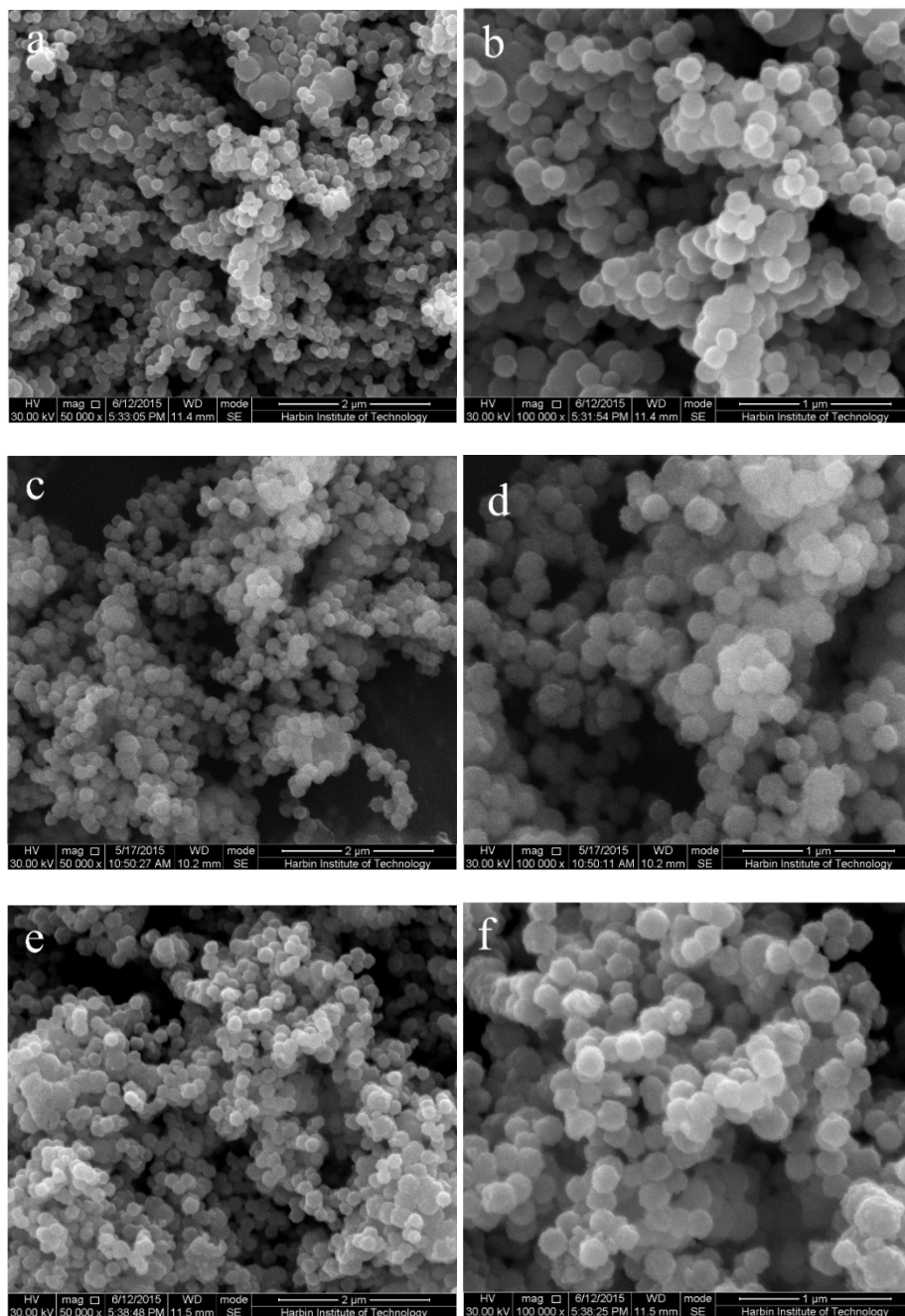
As showed in the SI Fig.1, the photocatalytic reaction was conducted in a closed glass circulation system, the entire reaction process was irradiated using a 300 W Xe lamp (PLS-SXE300, Perfectlight, China). The  $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$  photocatalyst (0.05 g) was dispersed in a 200 ml aqueous solution containing 0.35 M  $\text{Na}_2\text{S}$  and 0.25 M  $\text{Na}_2\text{SO}_3$  in a 250 ml quartz reaction cell which was 5 cm away from the Xe lamp. The solution was continuously stirred with a magnetic stirrer.

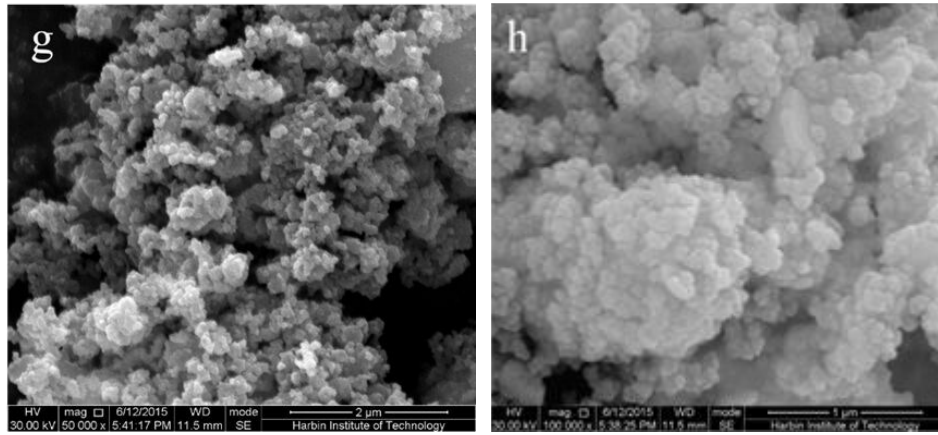
SI Fig.2. The spectrum of the overall survey scan of  $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$  samples



SI Fig.2 shows spectrum of the overall survey scan of  $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$  samples. All the spectra of samples indicate the presence of Zn, Cd, and S along with O and C.

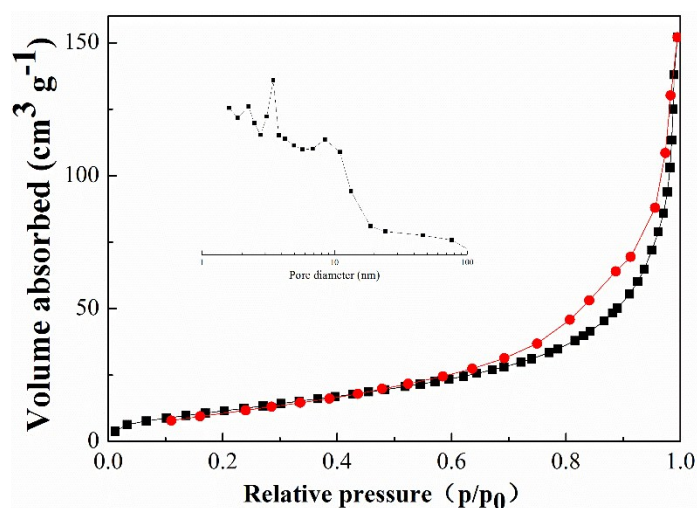
SI Fig.3. The SEM images of  $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$  prepared at different temperatures. a and b: 120°C; c and d: 140°C; e and f: 160°C and g and h: 180°C





SI Fig.3 shows all samples consisted of nano-spheres with different sizes.

SI Fig.4. Nitrogen adsorption –desorption isotherm and the corresponding pore-size distribution curve (inset) of  $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$  prepared at 160°C



$\text{N}_2$  adsorption/desorption investigations were carried out to study the textural properties of  $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$ . The adsorption/desorption isotherm of the representative  $\text{Zn}_{0.83}\text{Cd}_{0.17}\text{S}$  sample prepared at 160 °C for 12 hours showed a type IV isotherm with a clear hysteresis loop. Barrett-Joyner-Helenda (BJH) analysis revealed the sample possessed of an average pore diameter of 2-9 nm with the BET specific surface of 47.36  $\text{m}^2/\text{g}$ .