Solution-Based Synthesis of SnO_2 Nanoparticle/CdS nanowire Heterostructure

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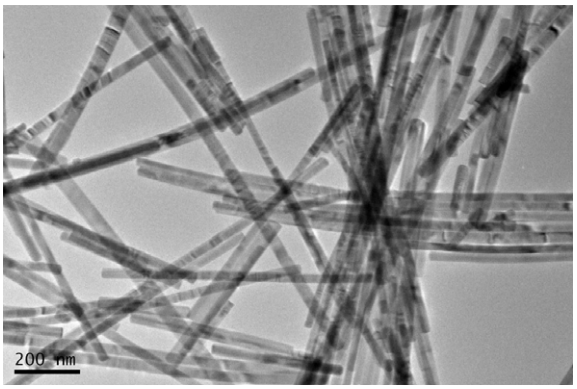


Figure S1 shows the image of pure CdS nanowire

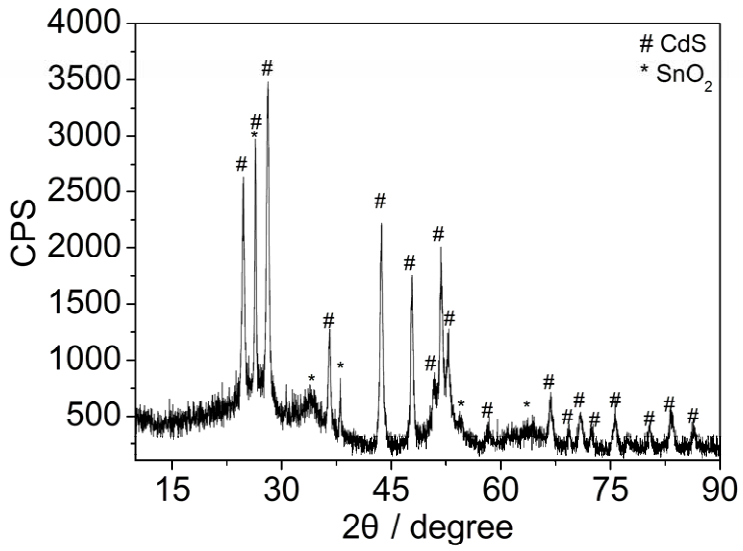
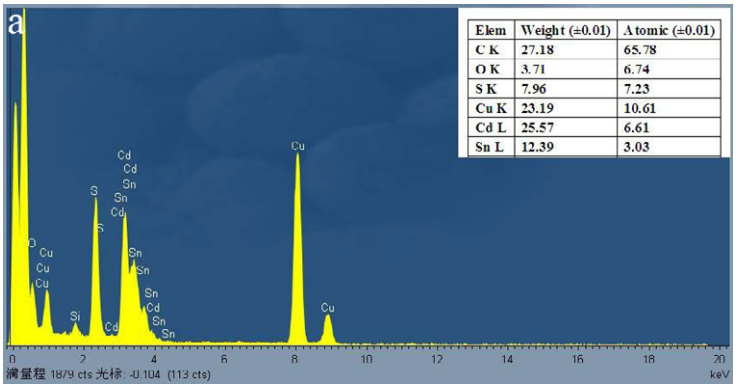


Figure S2 shows the XRD pattern of SnO_2 Nanoparticle/CdS nanowire.



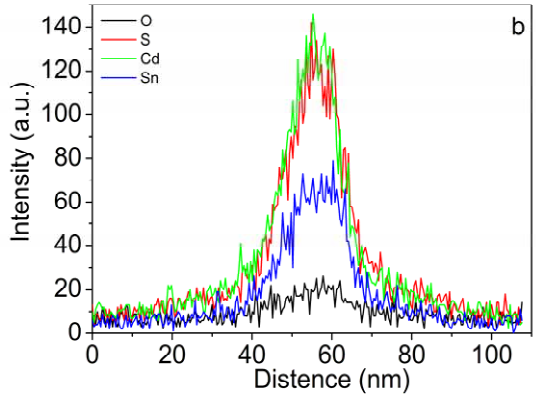


Figure S3a shows the EDXA analysis of SnO_2 Nanoparticle/CdS nanowire. In the EDXA spectrum, the peaks of Cd, S, Sn, and O are pronounced and no other peaks are found except for those of Cu and C originating from the Cu micro-grid with amorphous carbon used to support the SnO_2 Nanoparticle/CdS nanowire. The molar ratio of oxygen and tin was close to 2, calculated by EDXA software, indicated that the nanoparticle was SnO_2. In order to further confirm the element of the product, the

corresponding EDX line scanning of single SnO_2 Nanoparticle/CdS nanowire was shown in the Figure S3b. It is noticeable that the ratio of O and Sn is about 2, with a uniform distribution of the elements along the cross-section in the Figure S3b. The SAED pattern of SnO_2 NP/CdS NW heterostructure is shown in the Figure S3c. From the SAED pattern, there are the crystal SnO_2 spots in the pattern, which is different from the pattern of single crystal CdS.

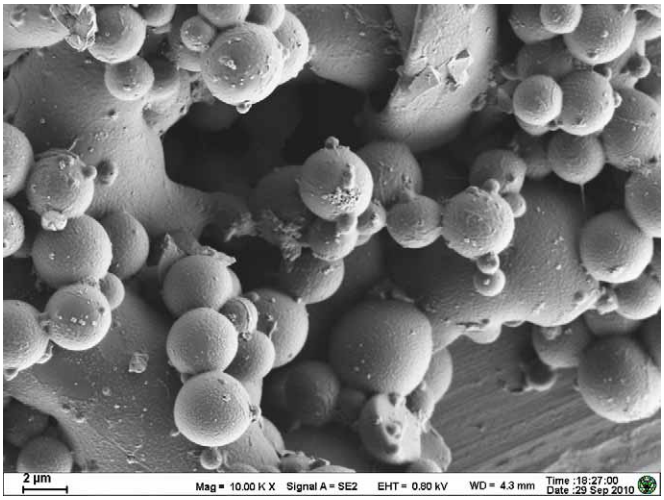


Figure S4 In contrast with SnO_2 NP/ CdS NW heterojunction reaction, a separate experiment (0.0075 g $SnCl_4$. $5H_2O$ were dissolved in 40 ml anhydrous ethanol. The resulting mixture was loaded into a 50 ml-Telfon-lined autoclave. The autoclave was sealed and maintained at 200℃ for 24 h. The autoclave was cooled to room temperature naturally.)was carried out for SnO_2 materials. The products are purely SnO_2 microparticles (Figure S4). The typical FESEM image is illustrated in Figure S4.

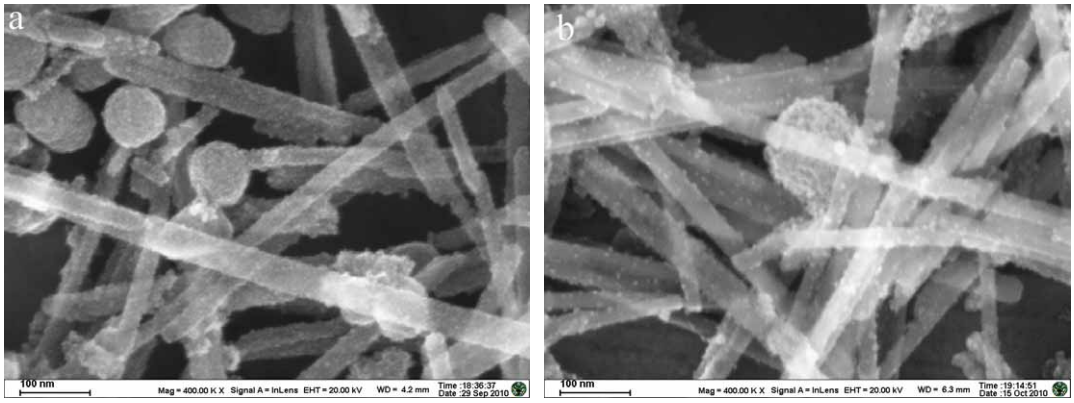


Figure S5 The product was firstly fabricated by the chemical solution method. 0.0030 g as-prepared CdS and 0.0075 g $SnCl_4$. $5H_2O$ were dissolved in 40 ml anhydrous ethanol. The resulting mixture was loaded into a 50 ml-Telfon-lined autoclave. The autoclave was sealed and maintained at 200℃ for 24 h. The autoclave was cooled to room temperature naturally. Subsequently, the 0.0075 g $SnCl_4$. $5H_2O$ was added into above autoclave again. (a)The autoclave was sealed again and maintained at 200℃ for 24 h (total 48h). (b) The autoclave was cooled to room temperature naturally; the autoclave was sealed again and maintained at 200℃ for 48 h (total 72h). According to Figure S5a, it was found that the product was SnO_2 NP/CdS NW heterostructures when the autoclave was sealed again and maintained at 200℃ for 24h (total 48h). To further extend the reaction time, like 48h, an interesting phenomenon appeared. Figure S5b shows there are few SnO_2 nanoparticles on the surface of CdS nanowires when the autoclave was sealed again and maintained at 200℃ for 48h (total 72h) though the amount of the $SnCl_4$. $5H_2O$ was twice than previous experiment.