Supporting Information

Facile electrochemical synthesis of CeO2@Ag@CdS nanotube arrays with enhanced photoelectrochemical water splitting performance

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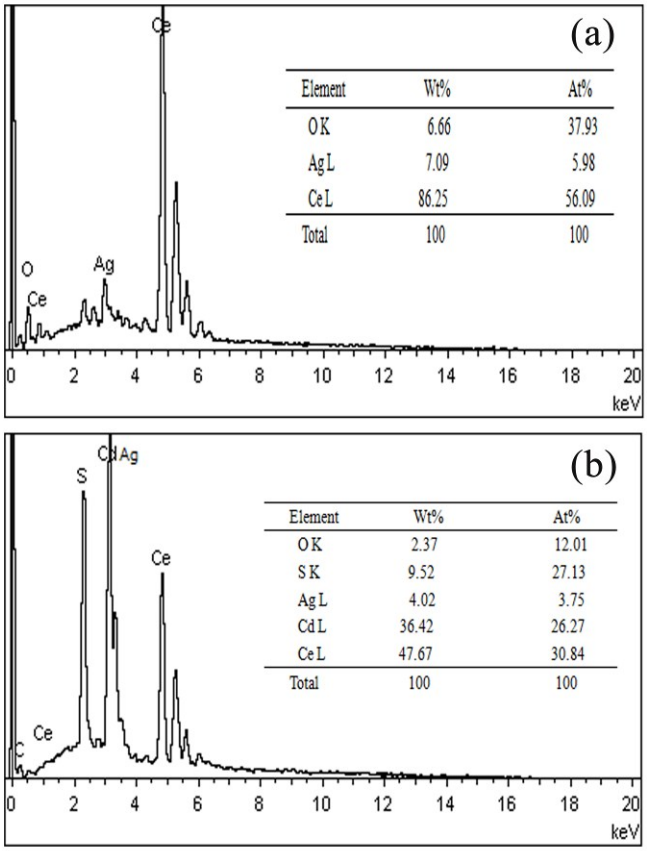

Fig. S1 EDS spectrum of (a) the CeO_2@Ag and (b) the CeO_2@Ag@CdS.

Apart from the carbon peaks, O, Ce and Ag signals can be observed in Fig. S1a, and S, Ce, Cd and Ag signals can be seen in Fig. S1b. The quantitive analysis reveals that both the Cd and S contents nearly 27 at.%, while their stoichiometric ratio remained approximately 1:1. The amount of Ag detected by EDS analysis is 3.75 at.%.

The CVs of the different materials were tested in 0.43 M Na_2S and 0.5 M Na_2SO_3, and the results are shown in Fig. S2. It was found that there is a little peak at −0.8 V (*vs*. Ag/AgCl) in the CVs of CeO_2@Ag, which is the redox peak of Ag nanoparticle. However, there is no peak in the CVs of CeO_2@Ag@CdS, suggesting that the Ag nanoparticles were completely coated with CdS layers.

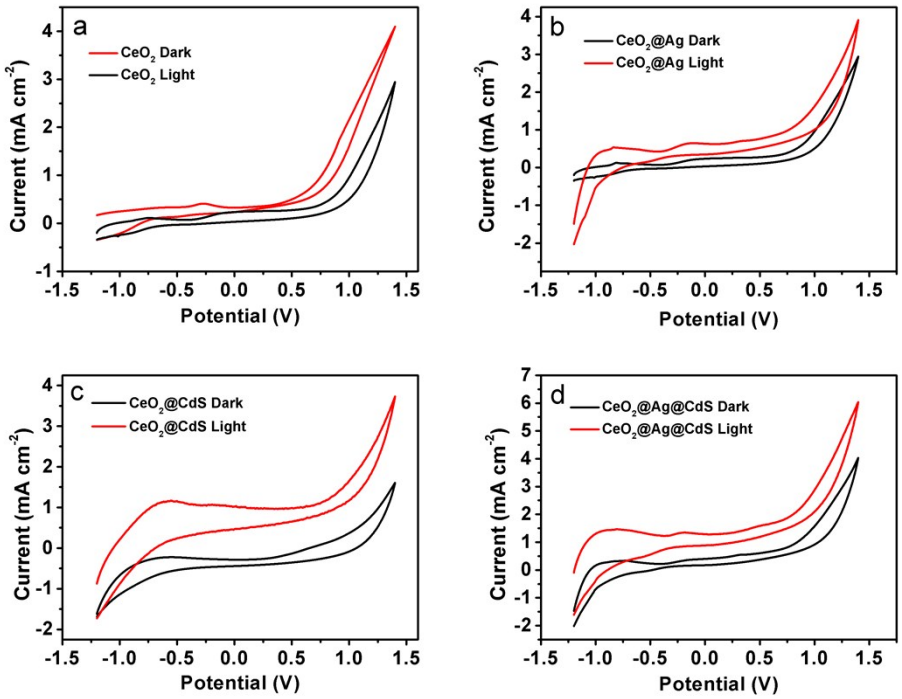

Fig. S2 CVs of (a) CeO_2, (b) CeO_2@Ag, (c) CeO_2@CdS and (d) CeO_2@Ag@CdS photoelectrodes in dark and light irradiation.

We have measured the XRD and SEM of CeO_2@Ag@CdS and the results are shown in Fig. S3,4. The XRD patterns and SEM images of different samples is consistent before and after PEC measurement. It was also found that the robustness of the nanotubes in different chemical conditions is very well and these samples could keep stable after PEC measurements.

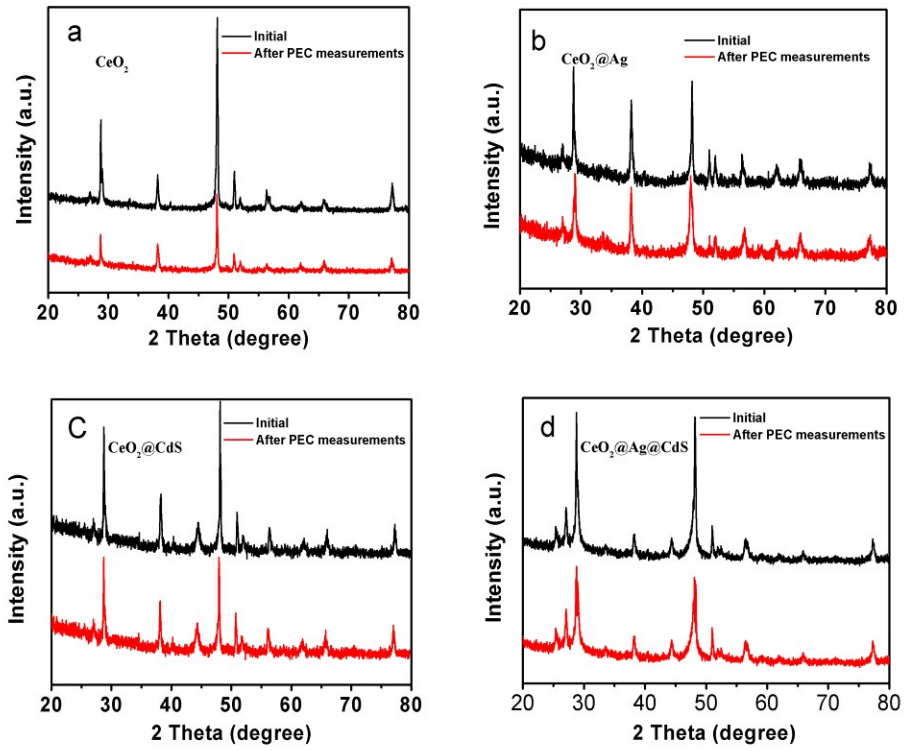

Fig. S3 XRD of the (a) CeO_2, (b) CeO_2@Ag, (c) CeO_2@CdS and (d) CeO_2@Ag@CdS nanotubes before and after PEC measurements.

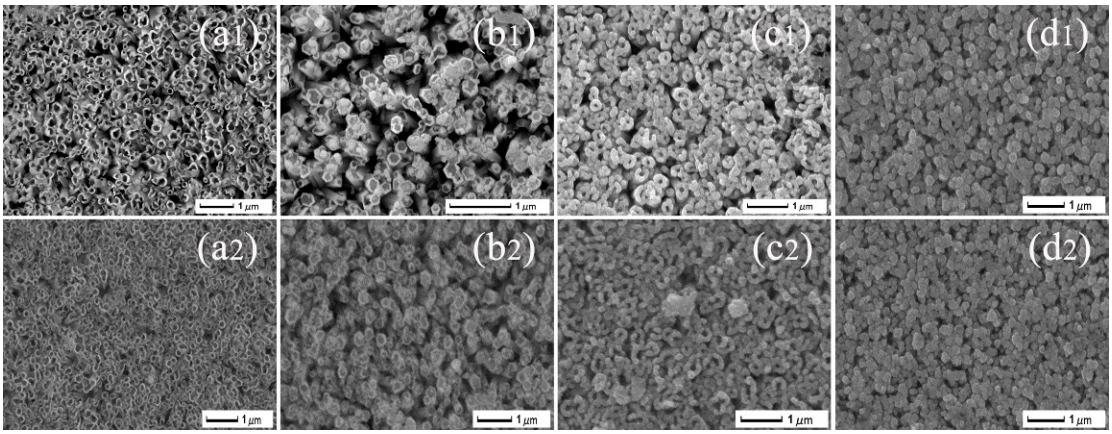

Fig. S4 SEM of (a) CeO_2, (b) CeO_2@Ag, (c) CeO_2@CdS and (d) CeO_2@Ag@CdS nanotubes. (a1: the SEM image of CeO_2 nanotubes before PEC measurement. a2: the SEM image of CeO_2 nanotubes after PEC measurement. b1: the SEM image of CeO_2@Ag nanotubes before PEC measurement. b2: the SEM image of CeO_2@Ag nanotubes after PEC measurement. c1: the SEM image of CeO_2@CdS nanotubes before PEC measurement. c2: the SEM image of CeO_2@CdS nanotubes after PEC measurement. d1: the SEM image of CeO_2@Ag@CdS nanotubes before PEC measurement. d2: the SEM image of CeO_2@Ag@CdS nanotubes after PEC measurement).