Electronic Supplementary Information

Constructing film composites of silicon nanowires@CdS quantum dots array with ameliorated photocatalytic performance

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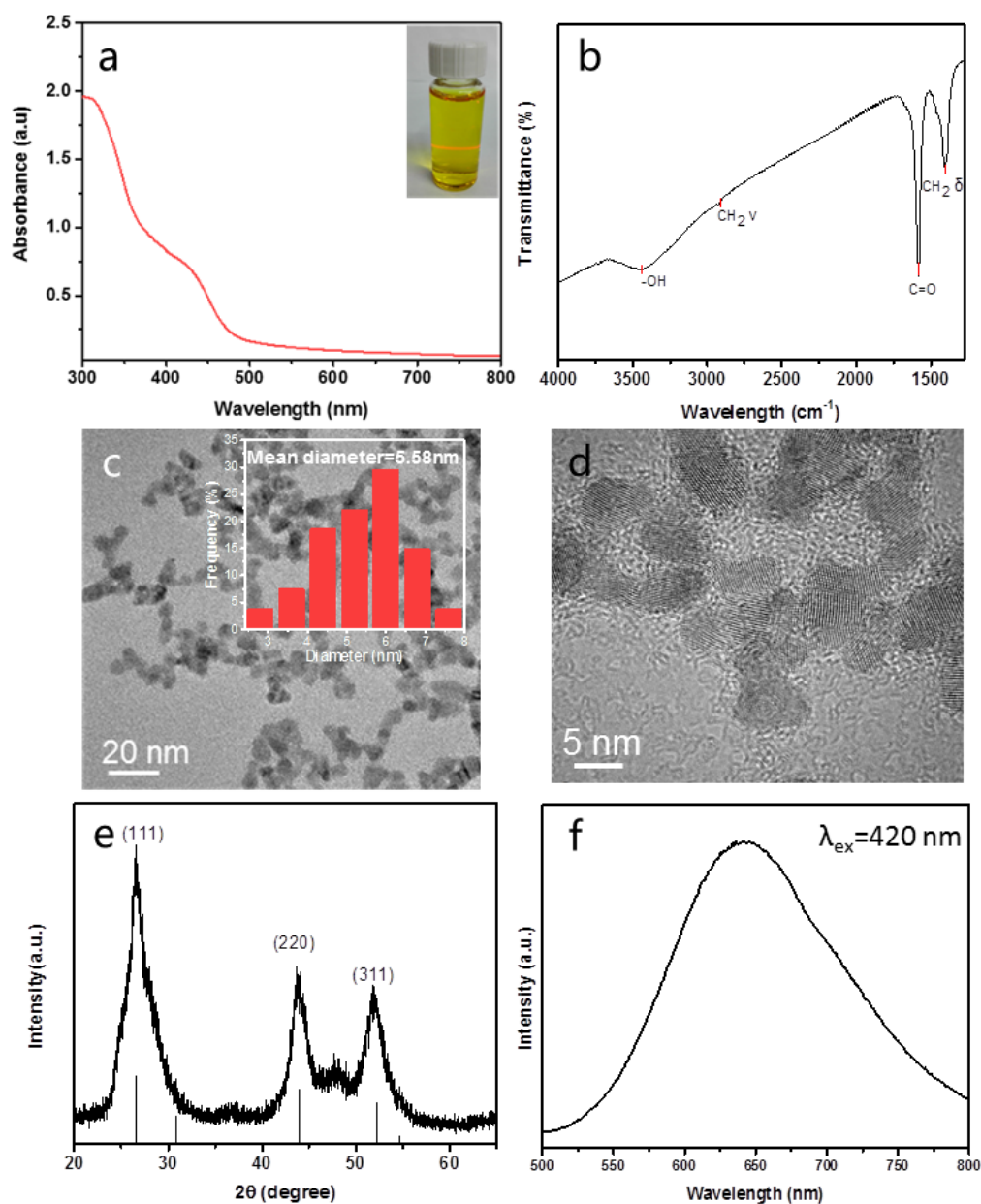*To whom correspondence should be addressed.

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Fig. S1 UV-vis spectrum (the inset is photograph of CdS QDs colloids) (a), FTIR spectrum (b), TEM image (the inset is mean diameter histogram) (c), HRTEM image (d), XRD pattern (e) and photoluminescence (PL) spectrum (f) of CdS QDs.
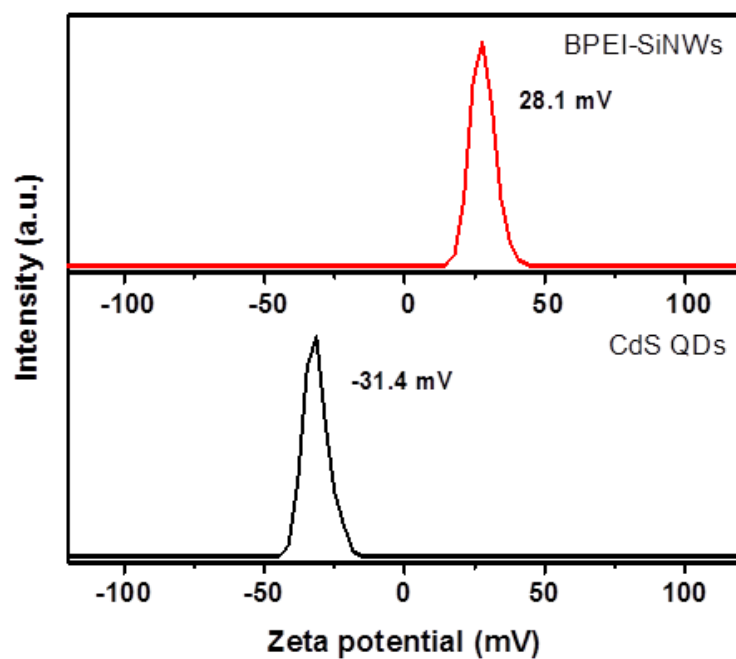
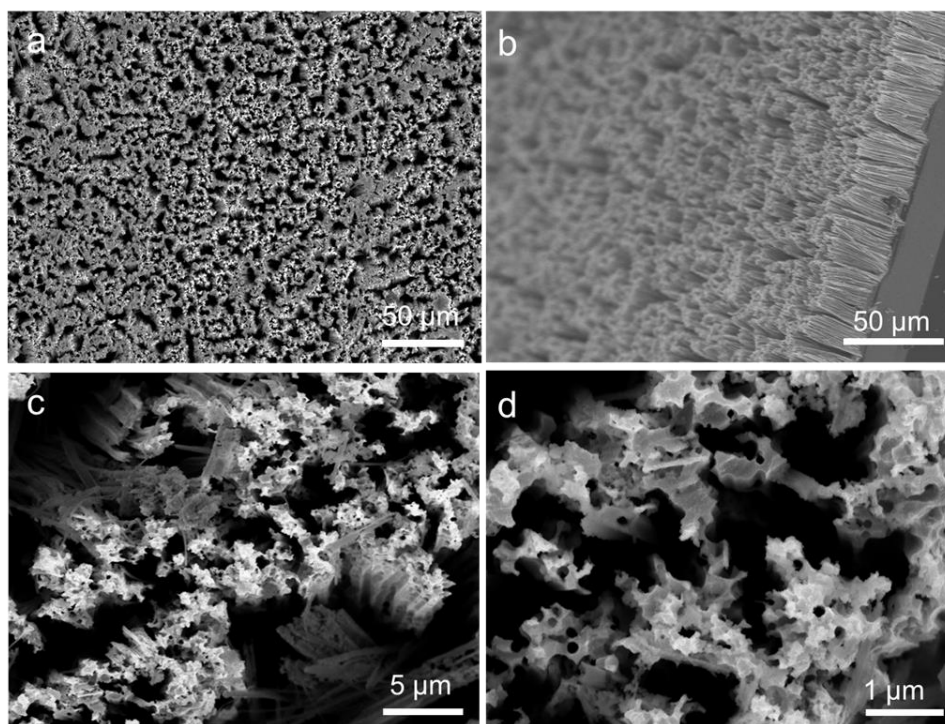**Fig. S2** Zeta potential of BPEI modified SiNWs arrays and TGA–stabilized CdS QDs colloids, respectively.

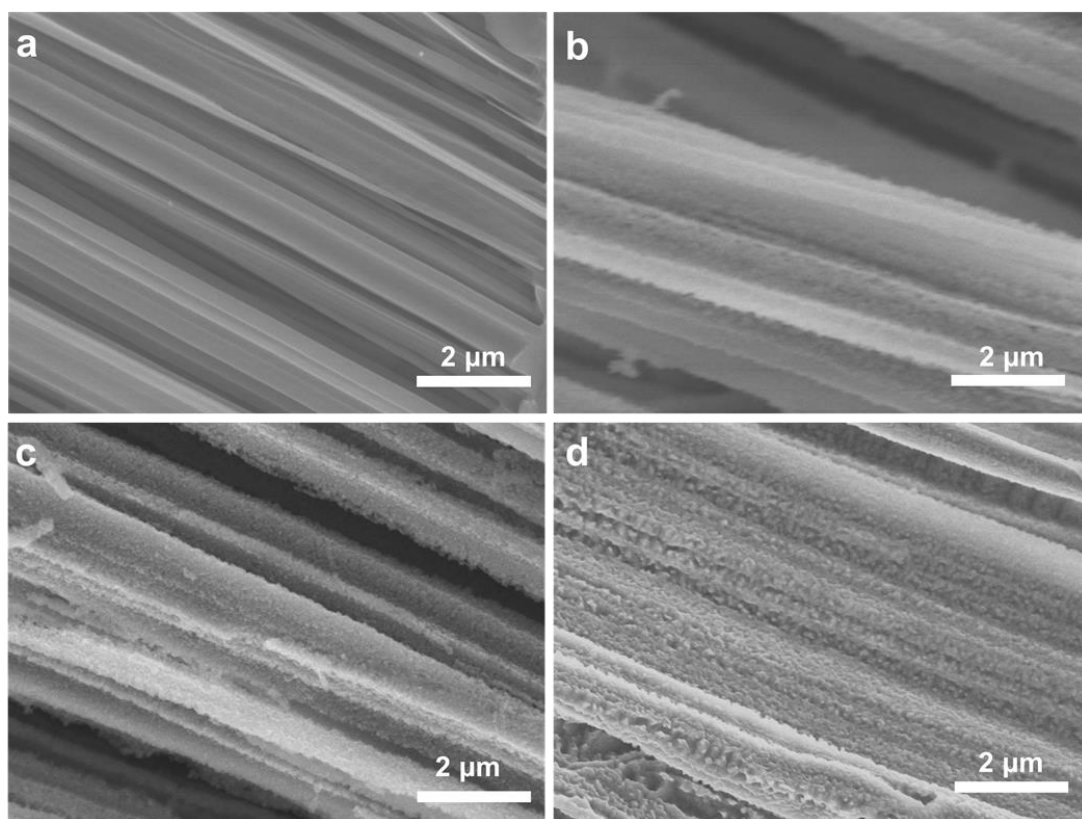**Fig. S3** SEM images of the SiNWs arrays with different magnifications.

Fig. S4 SEM images of the SiNWs arrays (a), SiNWs@CdS-5 (b), SiNWs@CdS-15 (c), and SiNWs@CdS-30 (d) arrays composites.
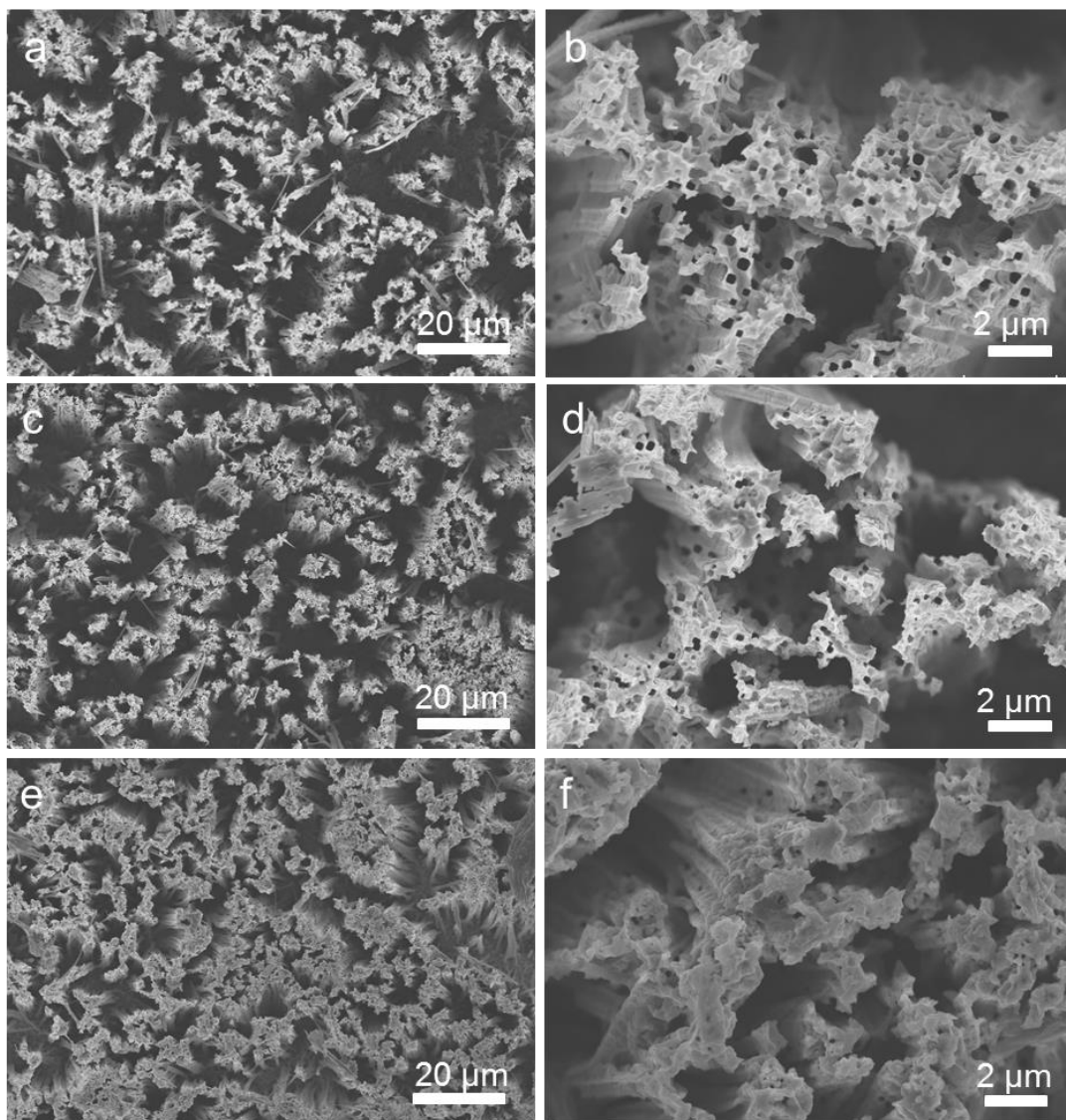
a

20 μm

b

2 μm

c

20 μm

d

2 μm

e

20 μm

f

2 μm

Fig. S5 Top-view SEM images of the plane of the SiNWs@CdS-5 arrays (a, b) SiNWs@CdS-15 arrays (c, d) and SiNWs@CdS-30 arrays (e, f).
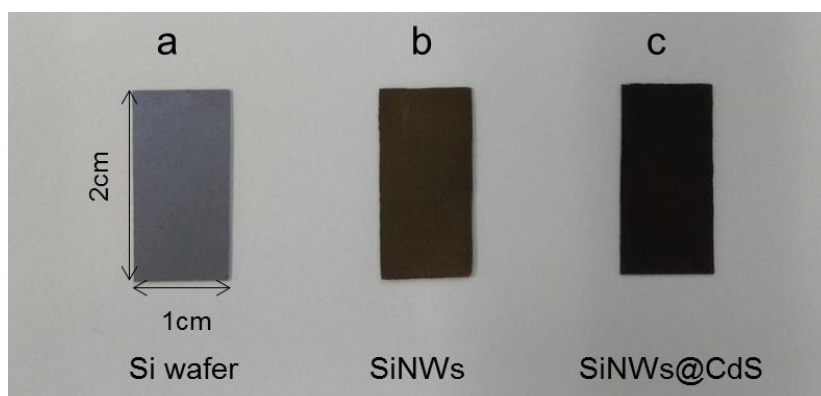
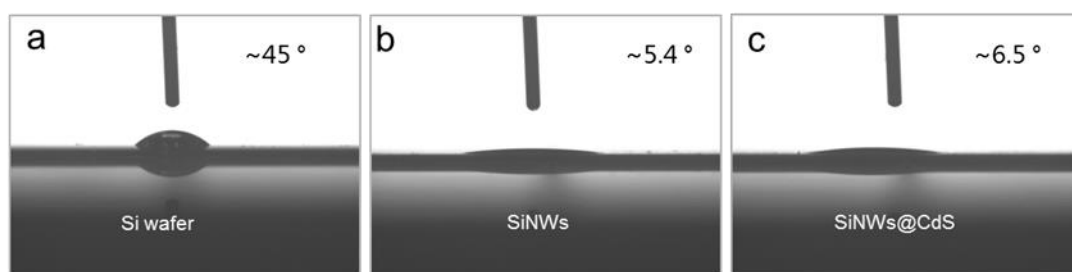**Fig. S6** Photographs of bare Si wafer (a), SiNWs arrays (b) and SiNWs@CdS arrays (c).

Fig. S7. Surface contact angles of water droplets on the surfaces of bare Si wafer (a), SiNWs arrays (b) and SiNWs@CdS arrays (c).
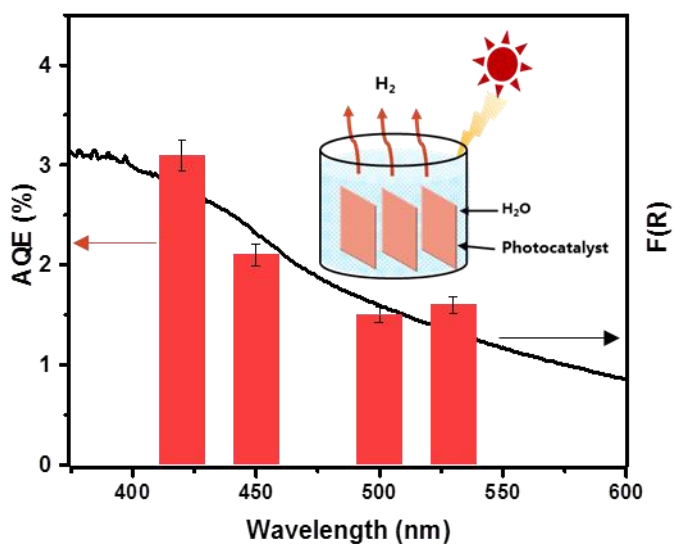

Fig. S8 Wavelength-dependent AQE of H_2 evolution over SiNWs@CdS arrays (left axis), UV/Vis light absorption spectra of SiNWs@CdS arrays (right axis).
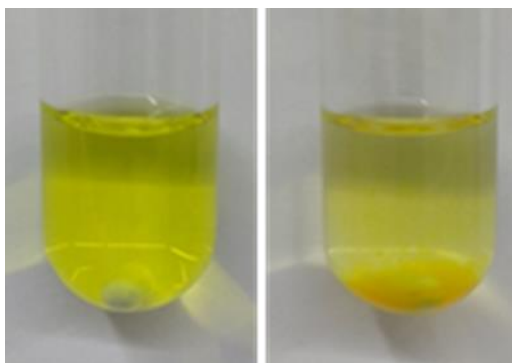
Fig. S9 Photographs of bare CdS QDs before and after 4 cycles for photocatalytic H_2 evolution.
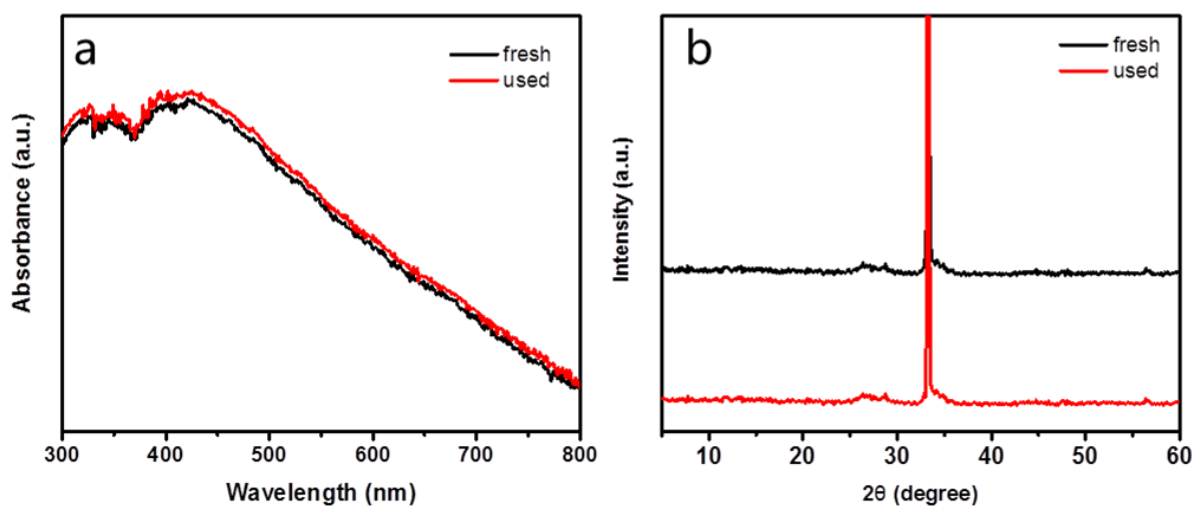

Fig. S10 DRS (a) and XRD (b) patterns of SiNWs@CdS-15 before and after 4 cycles for photocatalytic H_2 evolution.
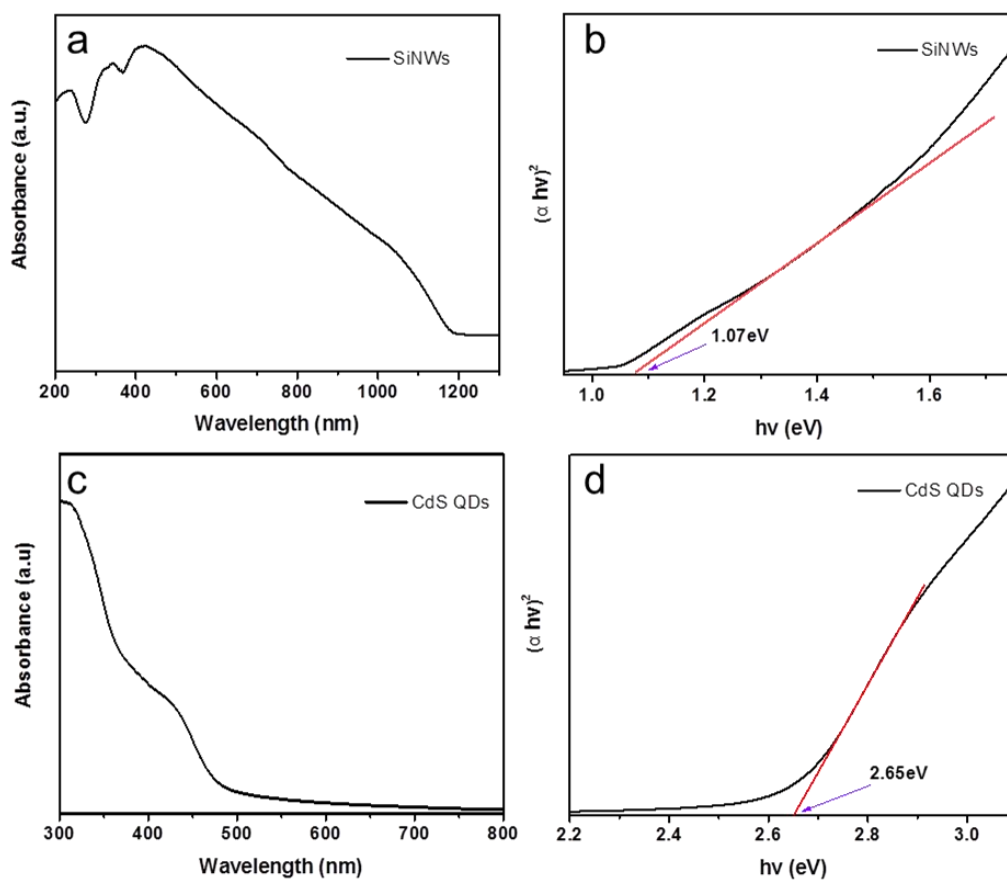
Fig. S11 DRS of SiNWs arrays (a) and UV-vis spectrum CdS QDs (c); the plot of transformed Kubelka-Munk function *versus* the energy of light for SiNWs (b) and CdS QDs (d).