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**Fig. S1** TEM image of NiTiO$_3$ nanorods.
**Fig. S2** TEM image of CdS nanoparticle
Fig. S3 EDX spectrum of CdS/NiTiO$_3$/CoS.
Fig. S4 XPS spectra of CdS (a) S 2p, (b) Cd 3d; NiTiO$_3$ (c) Ni 2p, (d) Ti 2p, (e) O 1s; CdS/NiTiO$_3$/CoS nanocomposite (f) Cd 3d, (g) Ti 2p, (h) O 1s.
Fig. S5 Nitrogen adsorption-desorption isotherm of the CdS/NiTiO$_3$/CoS nanocomposite. The inset shows the corresponding pore size distribution plot.
**Fig. S6** (a) The amount of H₂ evolved over the CdS/NiTiO₃/CoS nanocomposite under irradiation of the Xe lamp equipped with band pass of 435, 520, 650 and 760nm; (b) The UV-vis absorption of CdS/NiTiO₃/CoS nanocomposite.
**Fig. S7** XRD patterns of CdS sample before (a) and after (b) the photocatalysis, respectively.
Fig. S8 XRD patterns of CdS/NiTiO$_3$/CoS sample before (a) and after (b) the photocatalysis, respectively.