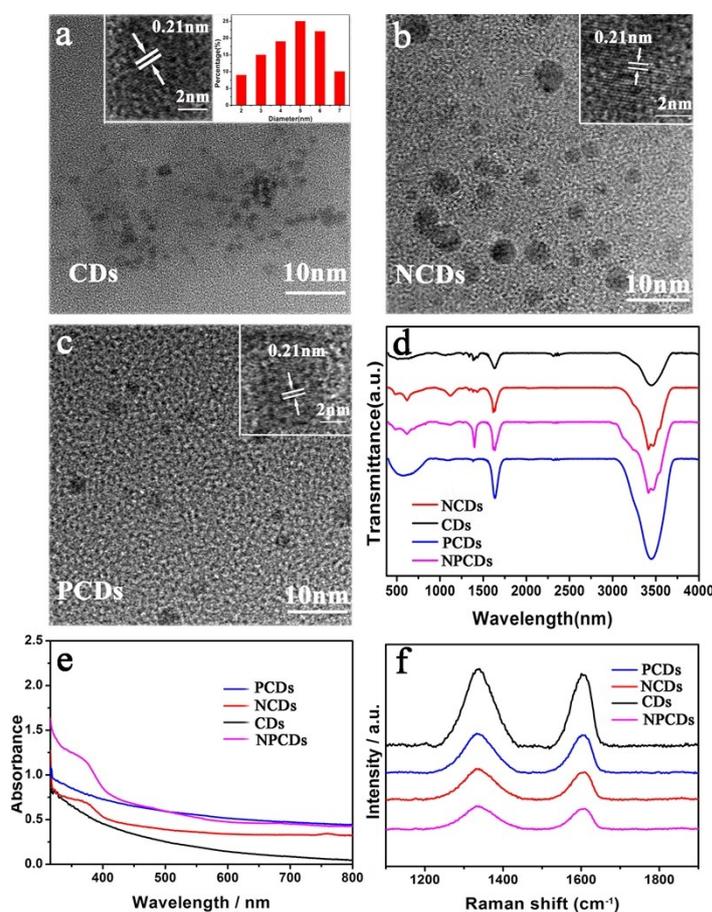


# Nitrogen, phosphorus co-doped carbon dots/CoS<sub>2</sub> hybrid for enhanced electrocatalytic hydrogen evolution reaction

## Supporting information

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**Fig. S1** (a-c) TEM and HRTEM images of CDs, NCDs and PCDs. The insets in (a) are the corresponding HRTEM image and particle-size histogram of CDs. FT-IR spectra (d), UV-Vis absorption spectra (e), Raman spectra (f) of CDs, NCDs, PCDs and NPCDs (black trace, red trace, blue trace, and pink trace, respectively).

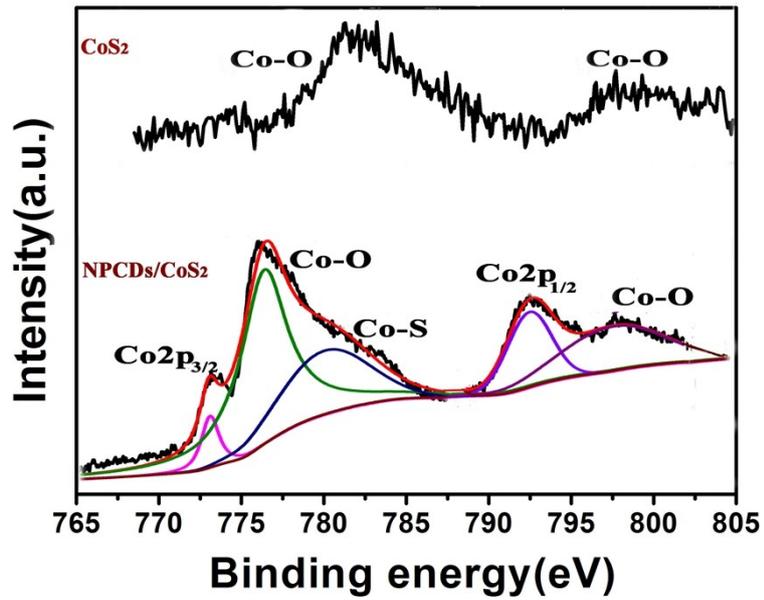


Fig. S2 High resolution XPS spectra of Co 2p in  $\text{CoS}_2$  and NPCDs/ $\text{CoS}_2$ .

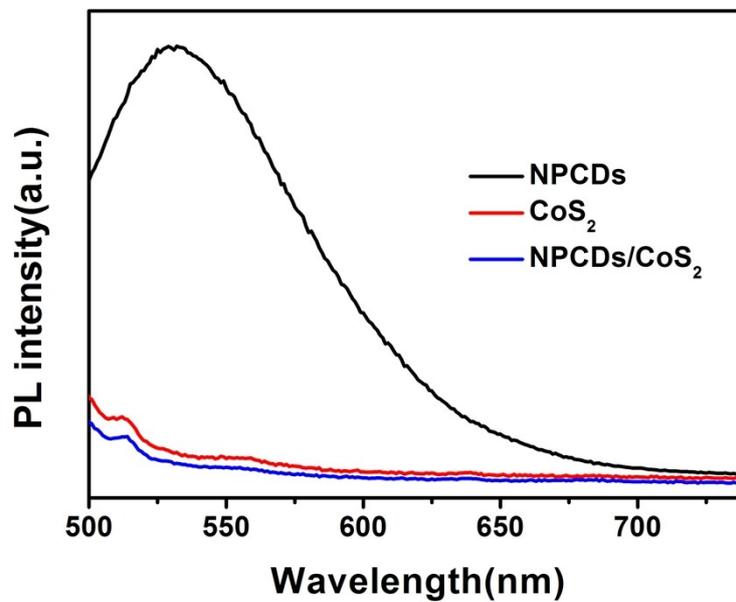


Fig. S3 PL spectra of NPCDs,  $\text{CoS}_2$ , and NPCDs/ $\text{CoS}_2$ .

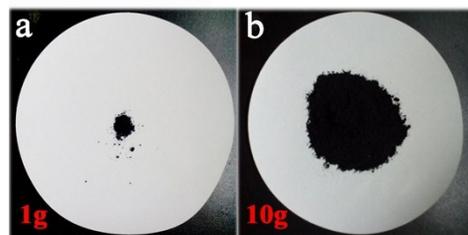
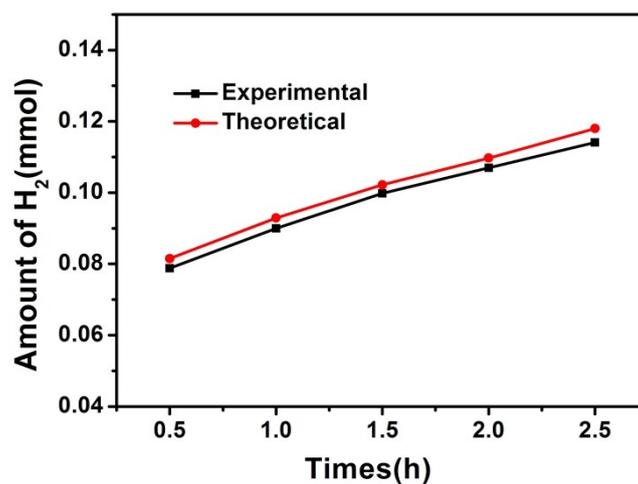


Fig. S4 The digital photos of different electrocatalyst yields (including 1 g and 10 g).

**Table S1.** Faradaic yields of H<sub>2</sub> production with NPCDs/CoS<sub>2</sub> at different overpotentials during 3600 s.

$\eta$ (mV)	Amount of H <sub>2</sub> (mmol)	Q <sub>Theoretical</sub> (C)	Faradaic yield (%)
140	0.04	8.47	91.00
160	0.07	14.63	92.20
180	0.09	18.32	94.60



**Fig. S5** Faradaic yields (both experimentally measured and theoretically calculated) of H<sub>2</sub> production versus time with NPCDs/CoS<sub>2</sub> at overpotential ( $\eta = 180$  mV) for 2.5 h in 0.5 M H<sub>2</sub>SO<sub>4</sub>.