

# Constructing Co-S Interface Chemical bonds over Co@NC/ZnIn<sub>2</sub>S<sub>4</sub> for efficient solar-driven photocatalytic H<sub>2</sub> evolution

Deling Wang<sup>a1</sup>, Lu Chen <sup>a1\*</sup>, Yuzhou Xia<sup>a</sup>, Ruowen Liang<sup>a</sup>, Xiyao Liu<sup>a</sup>, Shaoming Ying<sup>a\*</sup>, Guiyang Yan<sup>a\*</sup>

<sup>a</sup>Department of Chemistry, Fujian Province University Key Laboratory of Green Energy and Environment Catalysis, Ningde Normal University, Ningde 352100, PR China

Table S1 The light intensity of the Xenon lamp at different wavelengths.

Wavelength(nm)	420	450	500	550	600
Light intensity( $\text{mW}\cdot\text{cm}^{-2}$ )	12.3804	12.0411	20.0861	23.6001	21.6074

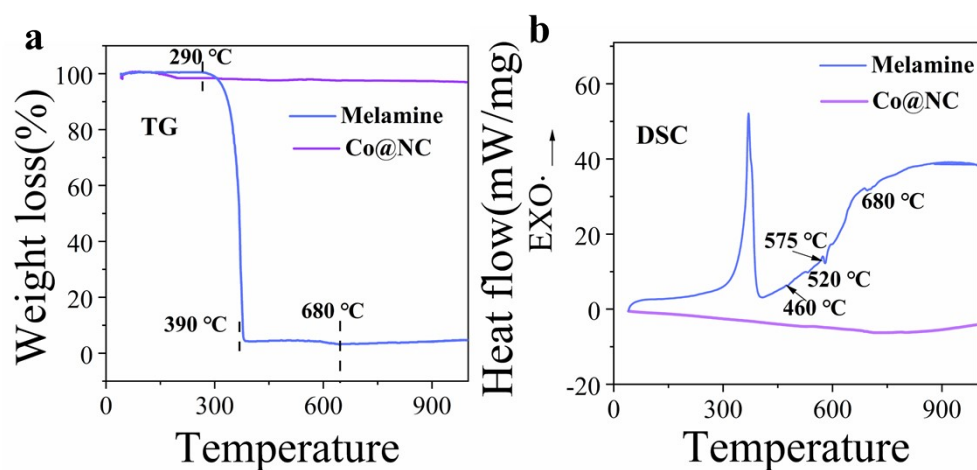


Fig. S1 TG-DSC thermograms of the melamine (a) and the Co@NC (b).

The DSC and TG thermograms show thermal stability and phase transformations of the melamine and the Co@NC in the Ar atmosphere. As shown in Fig. S1a, the strongest endothermic peak appears in the temperature range 290-390 °C, which indicated that the melamine occurred sublimation and thermal condensation at 290-390 °C and led to the weight of the melamine decreased rapidly. The thermal stability of the Co@NC was detected in the same system as melamine, the results show that the Co@NC was stable at 1000 °C. Figure. S1b shows that two weak endothermic peaks at 460 and 520 °C was corresponded to the further deamination process and decomposition of material, respectively. Two exothermic reaction peaks at 575 and 680 °C are attributed to the disappearance of this material via the generation of nitrogen and cyanogen fragments, respectively. The DSC thermograms indicated that the Co@NC is no phase transition. The above results show that melamine can be completely decomposed at 700 °C, there is no residue of melamine in the Co@NC

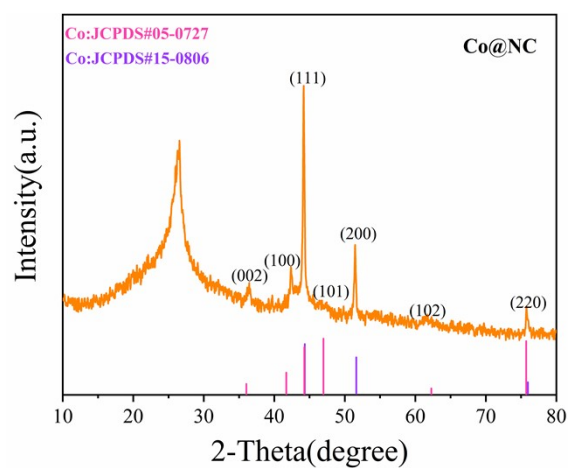


Fig. S2 XRD patterns of the Co@NC.

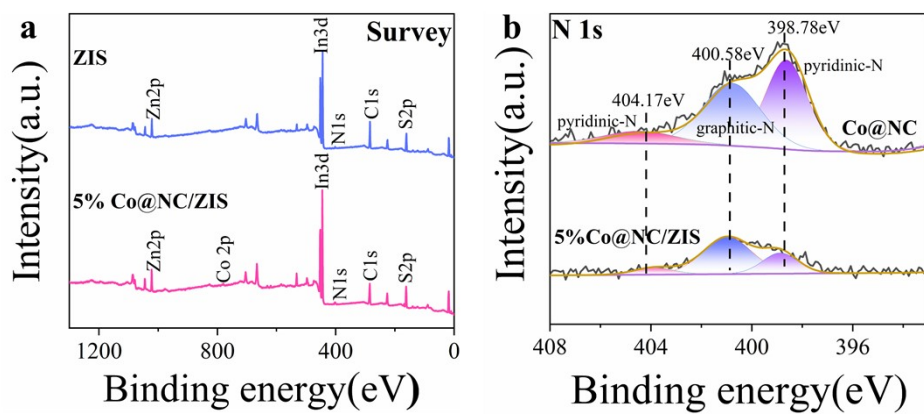


Fig. S3 (a) XPS survey spectra of the ZIS and 5 wt% Co@NC/ZIS; (b) XPS N 1s spectra of Co@NC and 5 wt% Co@NC/ZIS

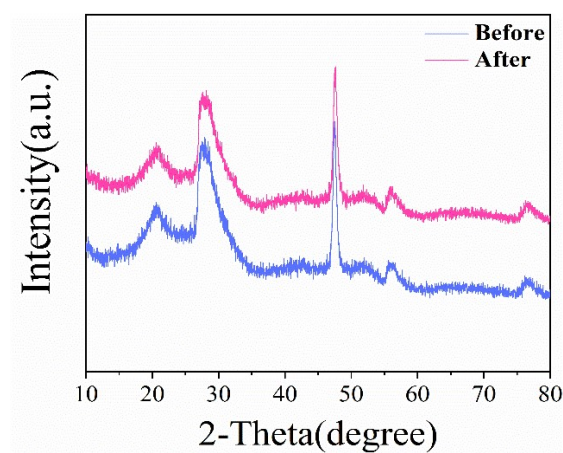


Fig. S4 XRD patterns of 5 wt% Co@NC/ZIS after six cycles of photocatalysis.

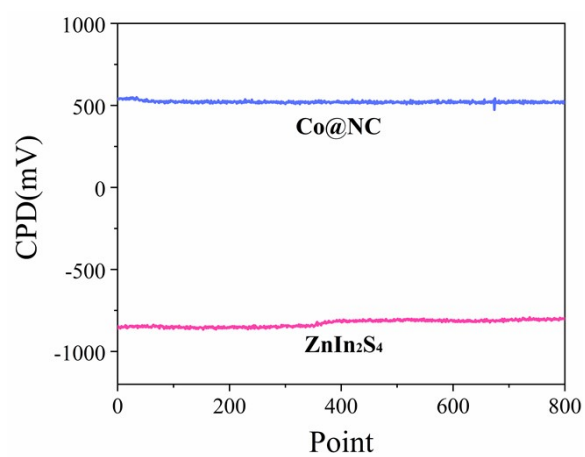


Fig. S5 CPDs of ZIS and Co@NC surface related to Au reference at single-point measurement over 800 points.