

Electronic Supplementary Information

**ZIF-8 derived carbon (C-ZIF) as bifunctional electron acceptor and
HER cocatalyst for g-C₃N₄: Construction of a metal-free, all carbon-
based photocatalytic system for efficient hydrogen evolution**

Fang He,^{a,b} Gang Chen,^{*a} Yansong Zhou,^a Yaoguang Yu,^a Laiquan Li,^b Sue Hao,^a and
Bin Liu^{*b}

*^aDepartment of Chemistry, Harbin Institute of Technology, Harbin 150001, P.R.
China*

*^bSchool of Chemical and Biomedical Engineering, Nanyang Technological University,
Singapore 637459, Singapore*

*Corresponding author: gchen@hit.edu.cn (G.C.); liubin@ntu.edu.sg (B.L.)

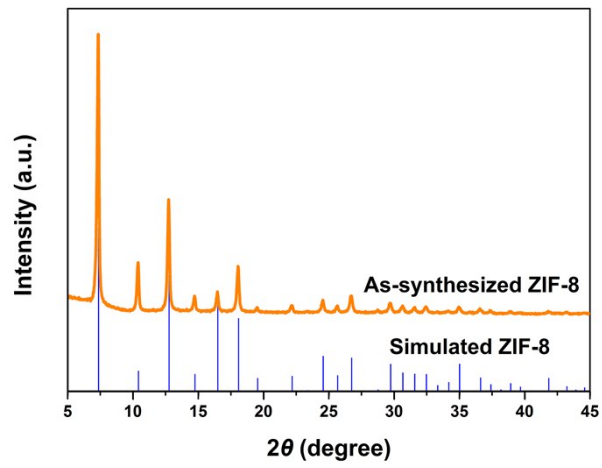


Fig. S1 XRD pattern of as-synthesized ZIF-8.

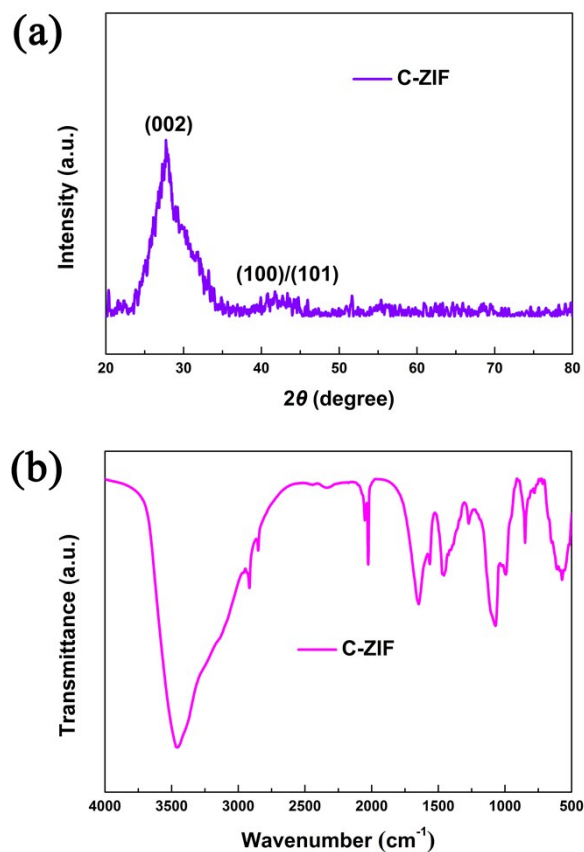
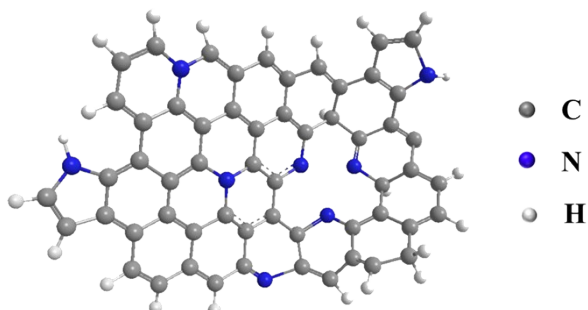


Fig. S2 (a) XRD pattern and (b) FT-IR spectra of C-ZIF.

Note: FT-IR spectrum of carbonized ZIF-8 (C-ZIF) indicates the formation of condensed C–N/C=N bonds, along with the presence of N–H bond. The carbon (C-ZIF) networks formed along with the decomposition of ZIF-8 occurring, which has been illustrated in the previous literature,¹ and can be demonstrated as follows:



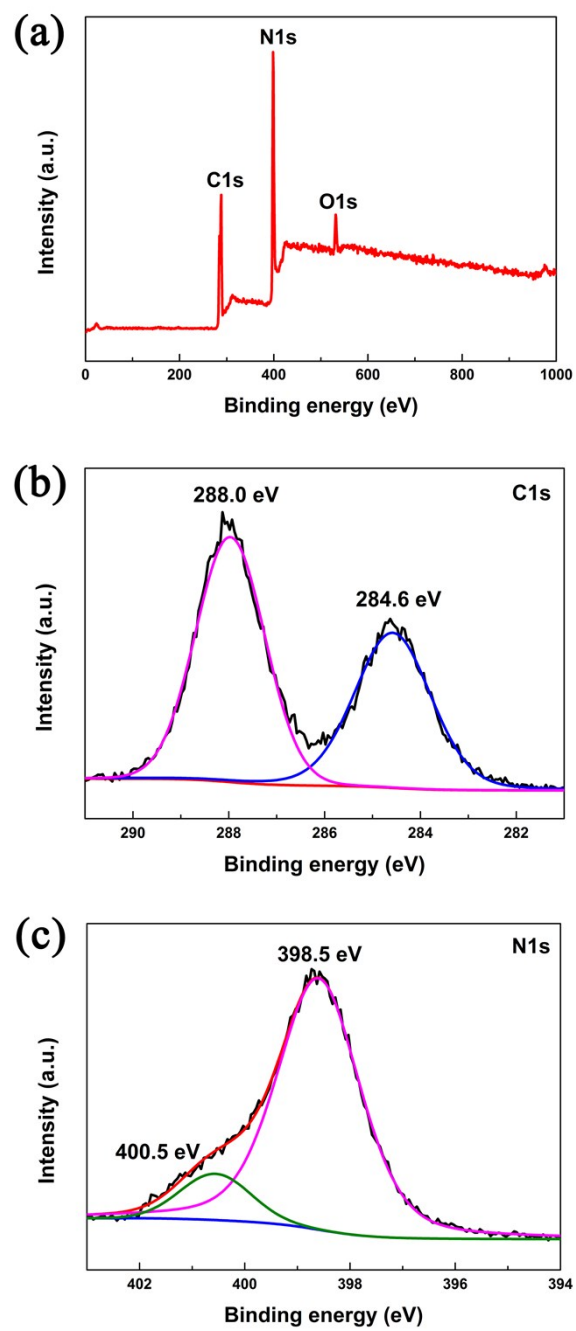


Fig. S3 XPS survey spectra (a), high-resolution XPS spectra of (b) C 1s, and (c) N 1s for 1 wt% C-ZIF/g-C₃N₄ composite.

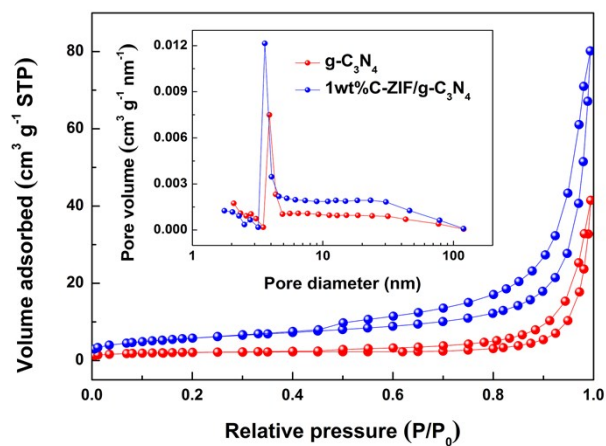


Fig. S4 Nitrogen adsorption-desorption isotherms and the corresponding pore size distribution curves (inset) of g-C₃N₄ and 1 wt% C-ZIF/g-C₃N₄ composite.

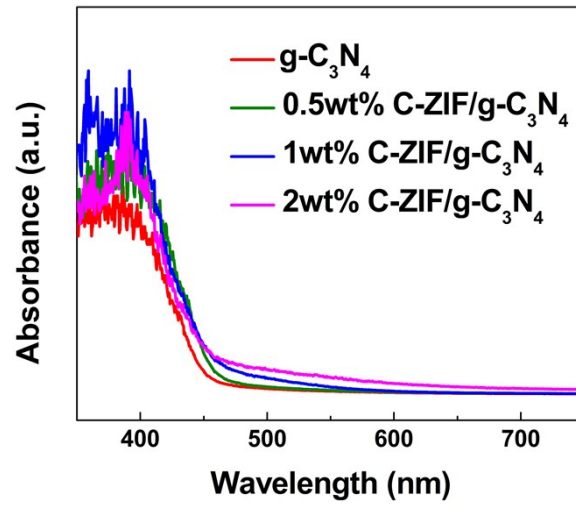


Fig. S5 UV-vis absorption spectra of g-C₃N₄ and C-ZIF/g-C₃N₄ composites with different C-ZIF contents.

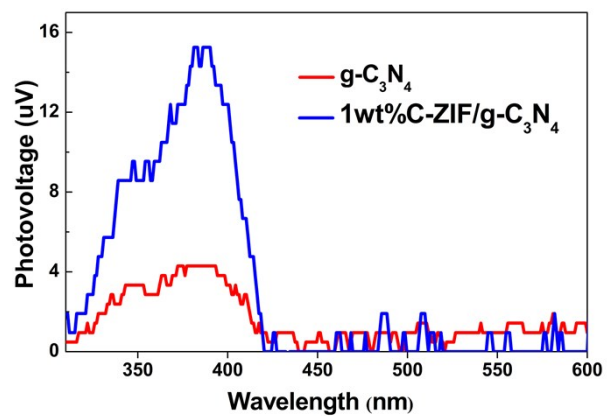


Fig. S6 SPV spectra of pure g-C₃N₄ and 1 wt% C-ZIF/g-C₃N₄ composite

Table S1 Radiative fluorescence lifetimes and their relative percentages of photoexcited charge carriers in the g-C₃N₄ and 1wt% C-ZIF/g-C₃N₄ composite.

Sample	τ_1 (ns)–Rel. %	τ_2 (ns)–Rel. %
g-C ₃ N ₄	1.27–54.71	9.33–45.29
1 wt% C-ZIF/g-C ₃ N ₄	2.39–61.78	13.93–38.22

Reference

1. H. X. Zhong, J. Wang, Y. W. Zhang, W. L. Xu, W. Xing, D. Xu, Y. F. Zhang, X. B. Zhang, *Angew. Chem. Int. Ed.* **2014**, *53*, 14235-14239.