Electronic Supplementary Information for

Facile one step method realizing scalable production of g-C_3N_4 nanosheets and study of their photocatalytic H_2 evolution activity

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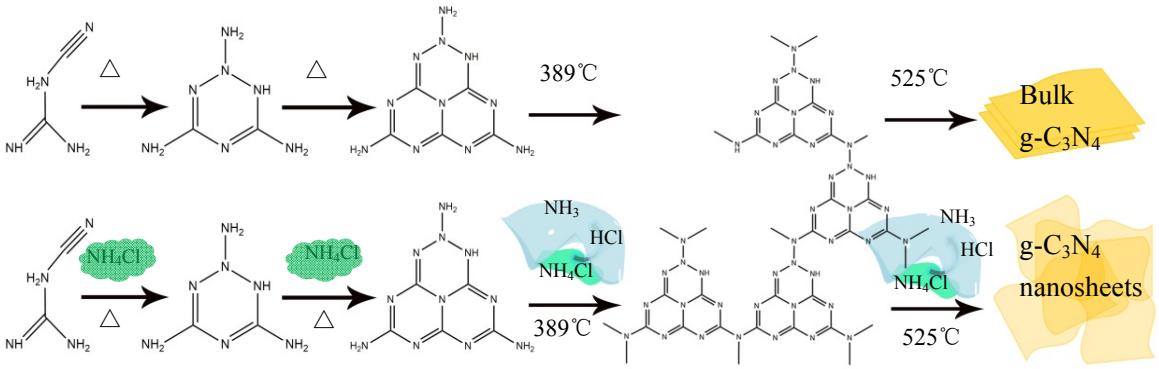

Figure S1. The illustration of detailed bubble process during formation of the g-C_3N_4 nanosheet.

In detail, 1g dicyandiamide and 5g ammonium chloride were put into 80ml water and evaporate the water at 100℃. The dried mixture was then heated at 550℃ for 4h. According to the reported literature,[1] dicyandiamide would melt at the point of 203℃ and change to melamine at 234℃. Within the temperature range from 335℃to 389℃, the melamine began to sublimate and polymerize to polymeric melem. When the temperature raised to 525℃, the carbon nitride network was formed. Ammonium chloride would decompose at 337℃ and act as a gas template. With the existence of NH_4Cl, the dicyandiamide-derived polymers would be blew by the released gases from NH_4Cl and finally produce g-C_3N_4 nanosheets.[2]

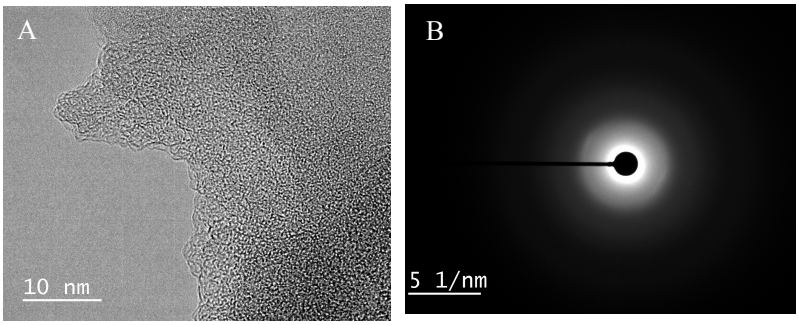

Figure S2.（A）the HRTEM and (B) corresponding electron diffraction pattern of g-C_3N_4 nanosheets.

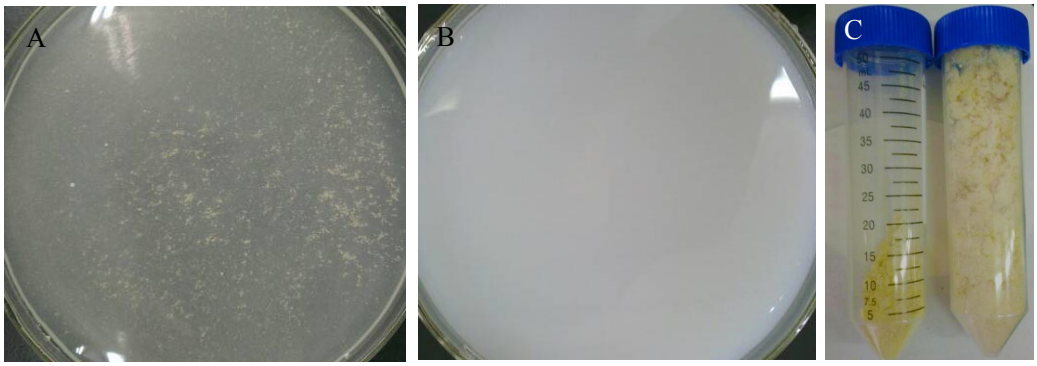

Figure S3. Photographs of the bulk g-C_3N_4（A）and the as-prepared g-C_3N_4 nanosheets（B）after sonicating them in water for 10 seconds. (C) Comparison images of the bulk g-C_3N_4 and 2D g-C_3N_4 with the same mass after sonicating them in water for only 10 seconds.

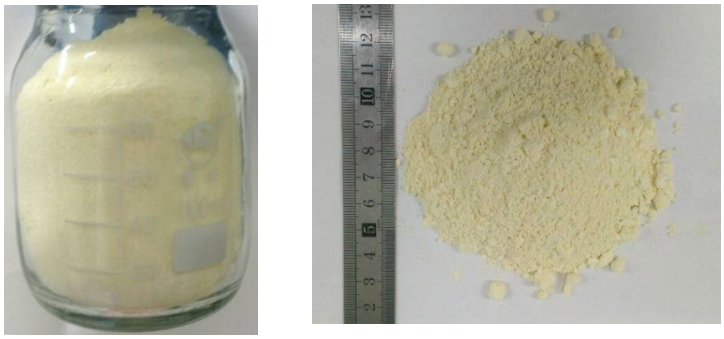

Figure S4. The image of the prepared g-C_3N_4 nanosheets, showing the realization of scalable production of graphene-like g-C_3N_4 by the simple one step method.

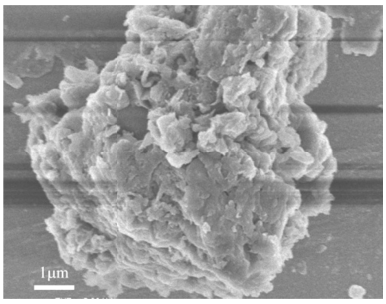

Figure S5. The SEM image of the bulk g-C_3N_4.

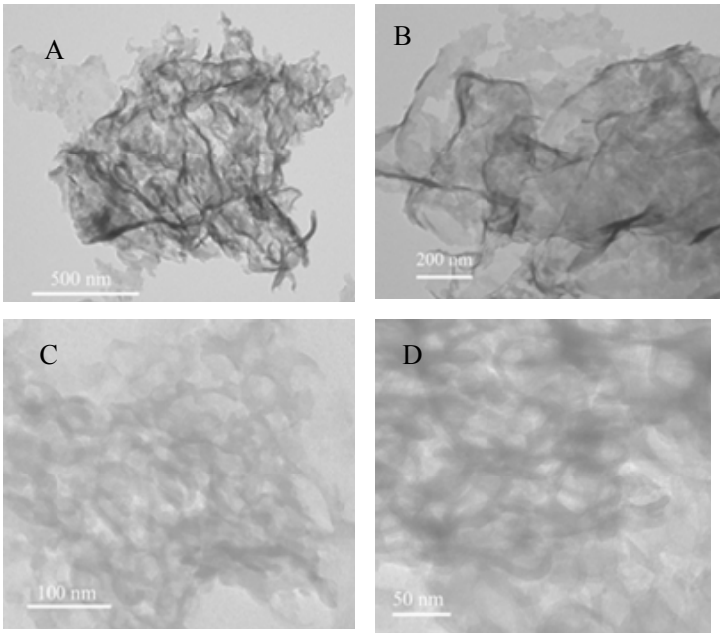

Figure S6. The TEM images of g-C_3N_4 nanosheets.

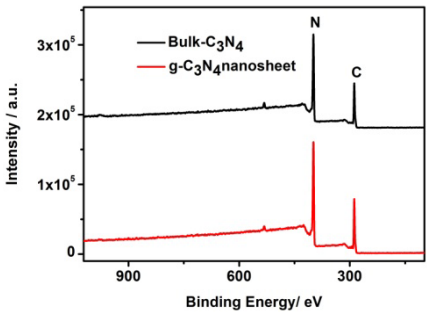

Figure S7. XPS survey spectra of the bulk and 2D g-C_3N_4 nanosheets.

The small peak at the position of about 530 eV could be assigned to small amount of oxygen element, which can be ascribed to the trace amount of O_2 molecules adsorbed on surface of synthetic g-C_3N_4 during process of polymerization, which is a common phenomenon for g-C_3N_4 materials.[3]

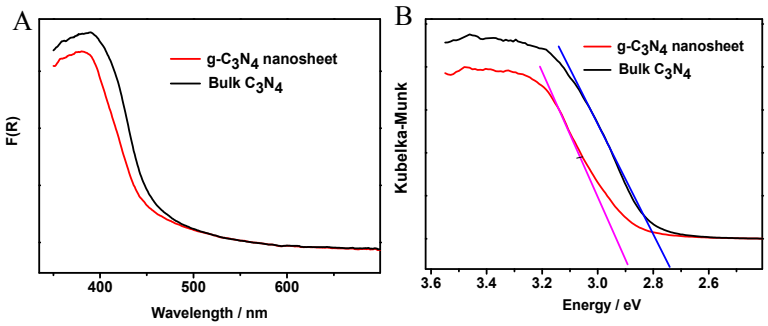

Figure S8. (A) UV–visible absorption spectra and (B) the corresponding $(ahv)^2$ versus photon-energy plots of bulk g-C_3N_4 and as-prepared g-C_3N_4 nanosheets.

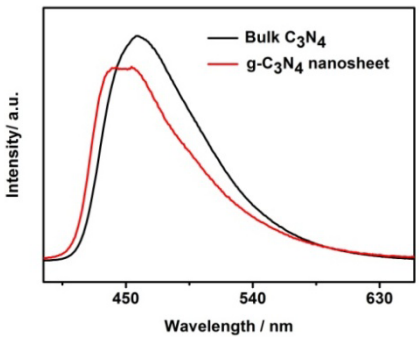

Figure S9. The fluorescence emission spectra of bulk g-C_3N_4 and graphene-like g-C_3N_4.

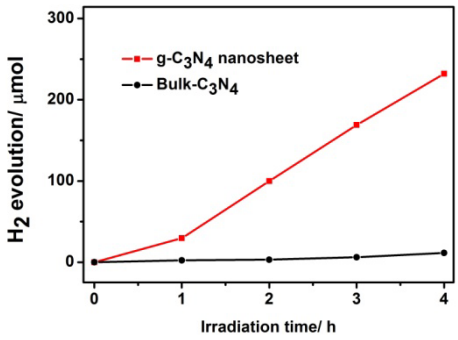

Figure S10. A typical time course of hydrogen evolution from a water/triethanolamine solution under visible light irradiation with 50 mg photocatalyst powder.

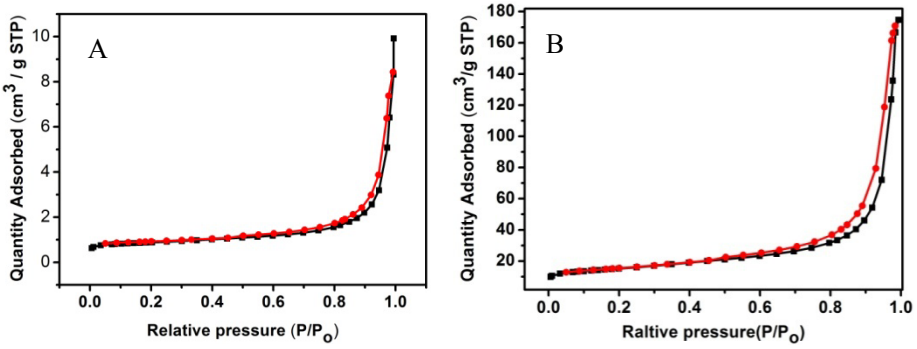

Figure S11. The N_2 sorption-desorption isotherm of (A) the bulk g-C_3N_4 and (B) g-C_3N_4 nanosheets.

References

1 X. Wang, K. Maeda, A. Thomas, K. Takanabe, G. Xin, J. M. Carlsson, K. Domen and M. Antonietti, *Nat. Mater.*, 2009, 8, 76.

2 X. Wang, Y. Zhang, C. Zhi, X. Wang, D. Tang, Y. Xu, Q. Weng, X. Jiang, M. Mitome, D. Golberg and Y. Bando, *Nat. Commun.*, 2013, 4.

3 X. Zhang, X. Xie, H. Wang, J. Zhang, B. Pan and Y. Xie, *J. Am. Chem. Soc.*, 2012, 135, 18-21.