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SUPPLEMENTARY INFORMATION

Facile synthesis of highly active g-C_3N_4 for efficient hydrogen production under visible light

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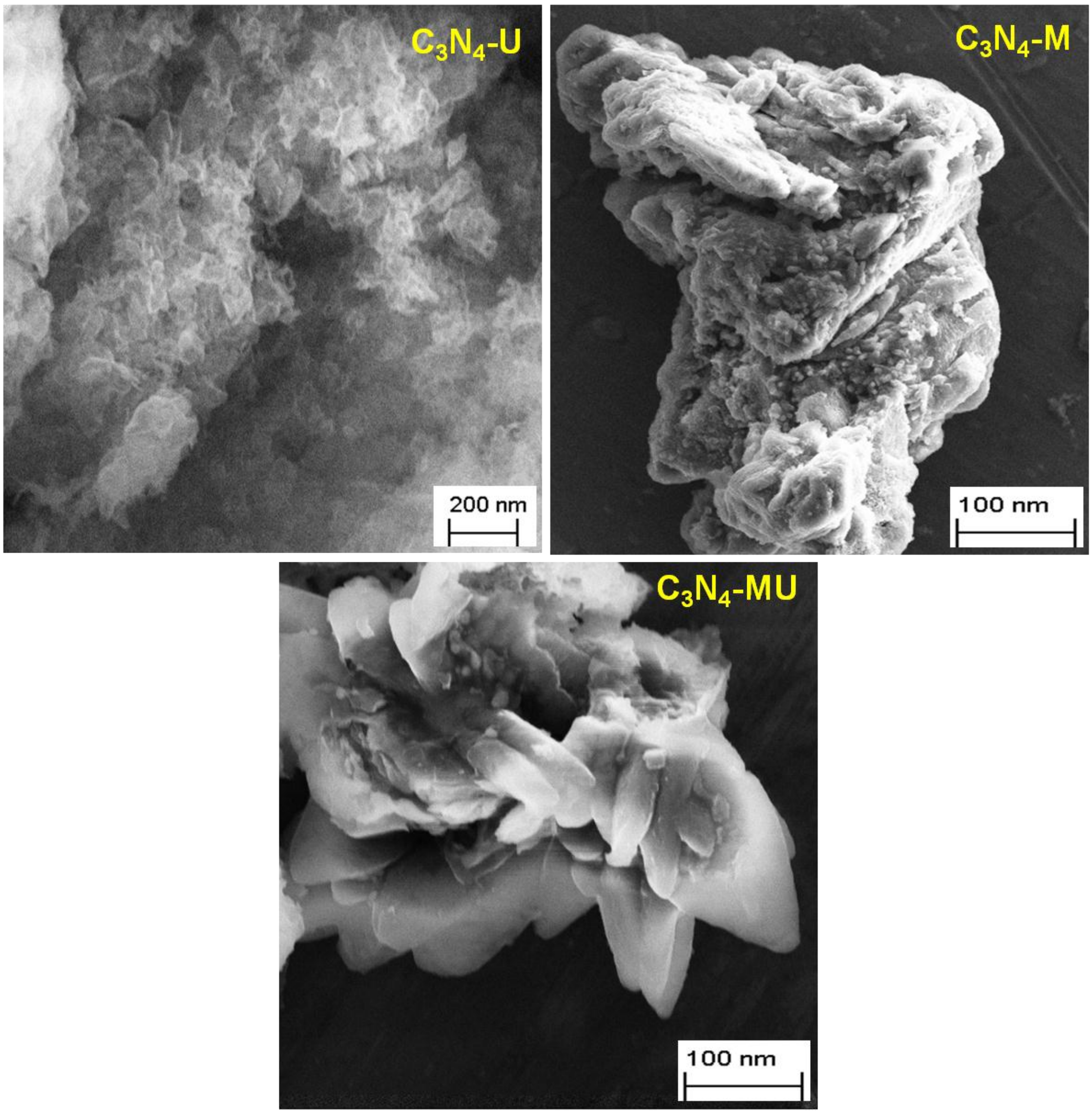

Fig. S1 FESEM images of C_3N_4-U, C_3N_4-M and C_3N_4-MU.

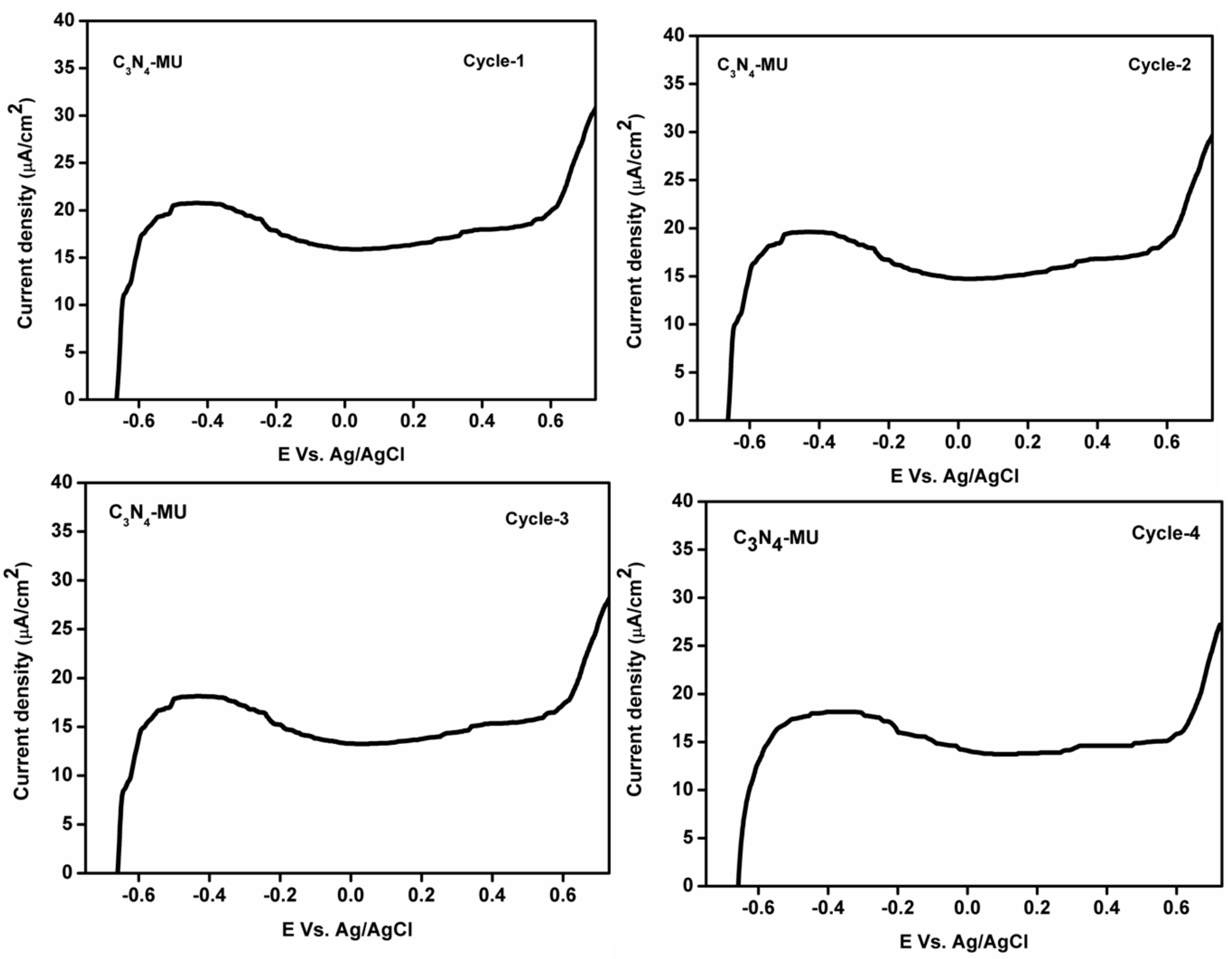

Fig. S2 Stability test of C_3N_4-MU photoelectrode.

Mechanism of photocurrent generation over n-type g-C_3N_4 photoelectrode

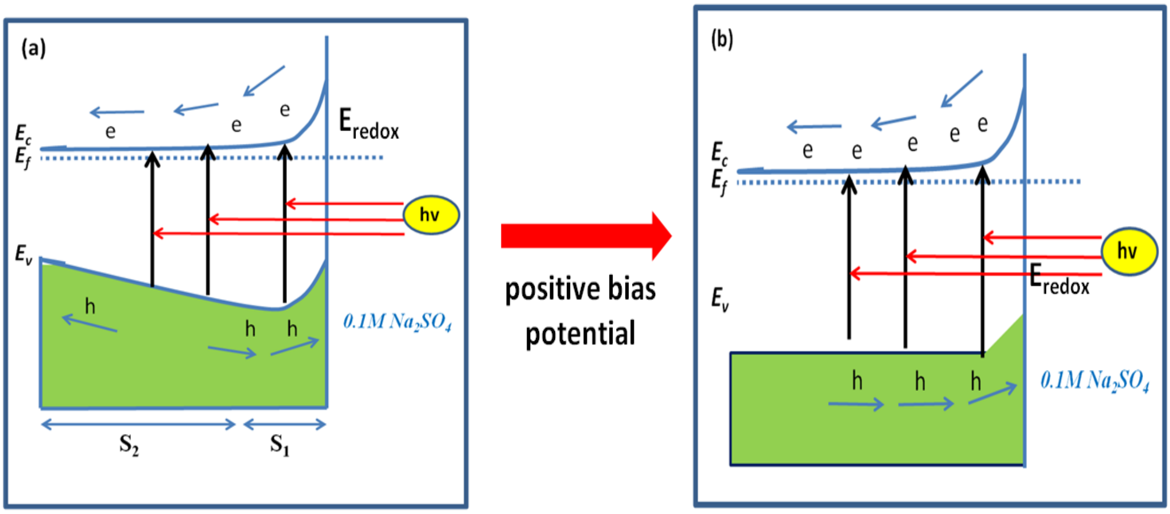

Fig. S3 Mechanism of photocurrent generation over n-type g-C_3N_4 photoelctrode.

The detail mechanism of photocurrent generation over n-type g-C_3N_4 electrode surface is as follow. Generally, the Fermi level of n-type semiconductor is typically more negative than that of the redox potential of the electrolyte.[1,2] When the g-C_3N_4 electrode is immersed into the electrolyte medium, an electrical field arises across the interface between semiconductor and electrolyte, causing the bending of the band as shown in Fig. S3 (a). When light energy greater than the band gap energy is irradiated over such an electrode surface, the electrons are excited from the valence band to the conduction band of semiconductor and leaving holes in the valence band. Fig. S3 (a) shows the band model diagram without applying the external potential. Near the semiconductor/electrolyte interface (S1 layer), the generation of electrical field in the space charge region can separate the electron-hole pairs and generate photocurrent.[1] In the interior (S2 layer) a part of holes may move to the electrolyte medium together with electrons, resulting in the recombination of electron-hole pairs. So a small amount of photocurrent is observed at low bias potential. When the applied potential is increased, the S2 layer can be reduced as shown in Fig. S3 (b). With increasing the applied potential, the recombination of electron-hole pairs decreases and consequently the generation of photocurrent increases.[1]

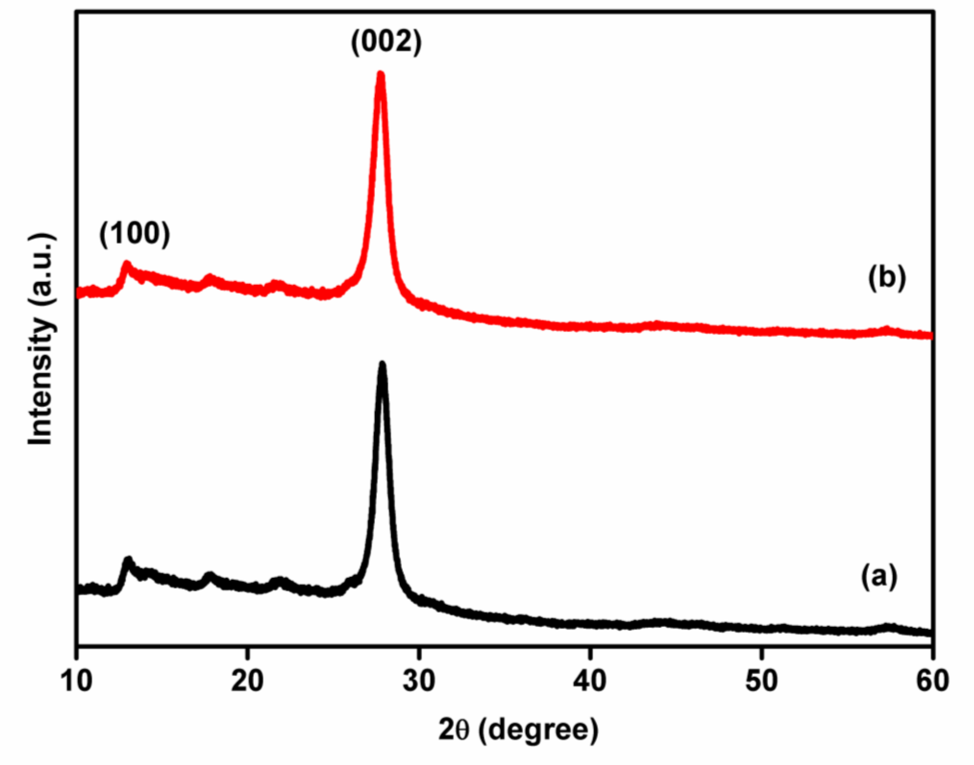

Fig. S4 X-ray diffraction patterns of the C_3N_4 prepared by taking melamine and urea with molar ratio of (a) 1:2 and (b) 2:1.

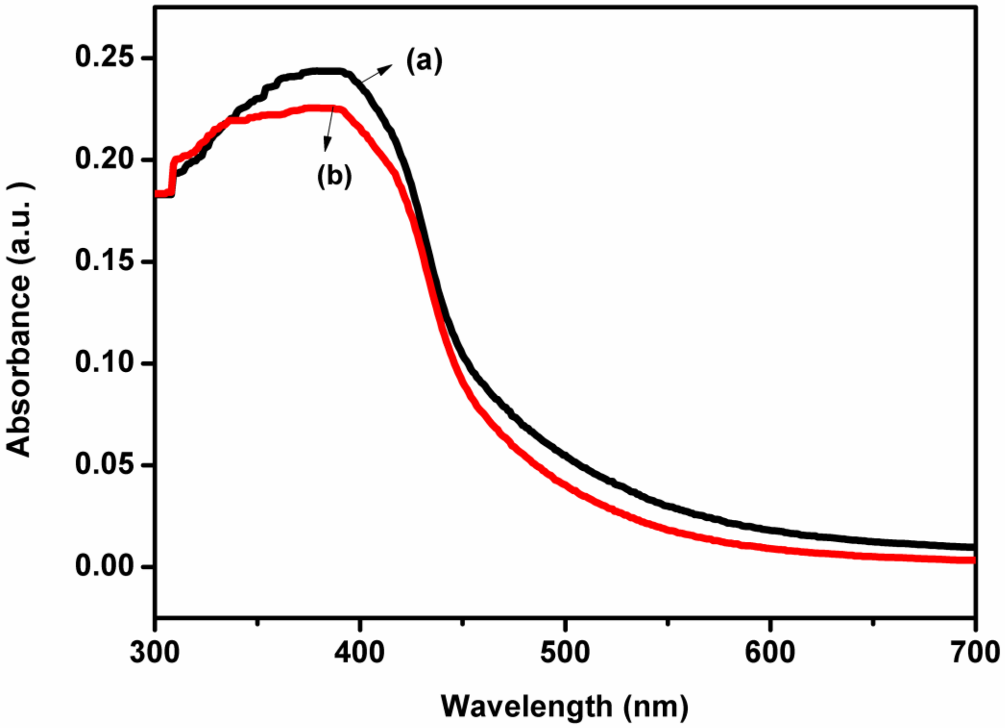

Fig. S5 Optical absorbance spectra of C_3N_4 prepared by taking melamine and urea with molar ratio of (a) 1:2 and (b) 2:1.

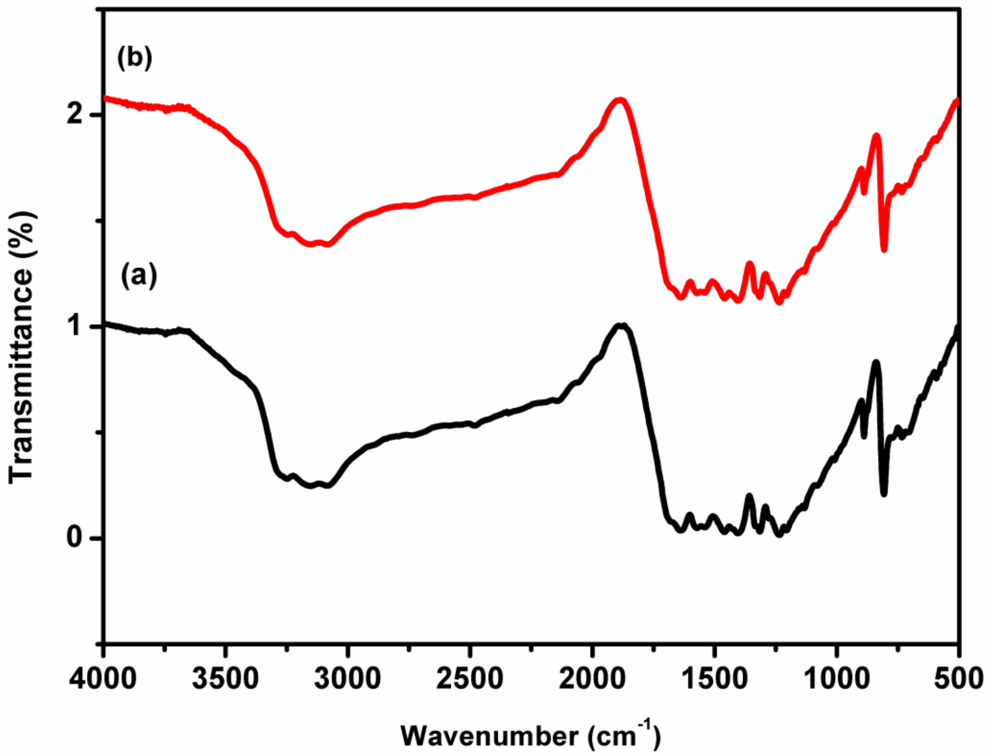

Fig. S6 FT-IR spectra of C_3N_4 prepared by taking melamine and urea with molar ratio of (a) 1:2 and (b) 2:1.

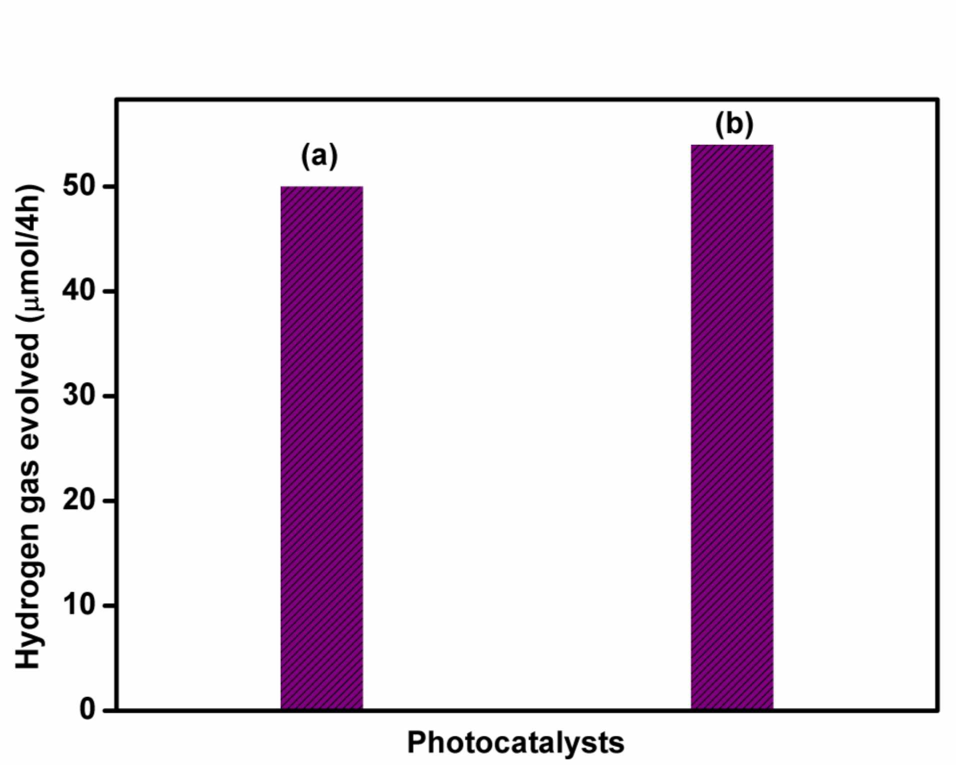

Fig. S7 Photocatalytic hydrogen evolution over 1wt% Pt loaded C_3N_4 prepared by taking melamine and urea with molar ratio of (a) 1:2 and (b) 2:1 under visible light irradiation ($\lambda \geq$ 400 nm).

References:

1 Z. Gaoling, S. Bin, H. Gaorong, H. Kozuka, T. Yoko, *Chinese Science Bulletin*, 2001, **46**, 914.

2 A. W. Bott, *Current Separations*, 1998, **17:3**, 87.