

Supplementary Materials

A 3D Hierarchical Pancake-Like Porous Carbon Nitride for Highly Enhanced Visible-Light Photocatalytic H₂ Evolution

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Quantum efficiency calculation

The apparent quantum efficiency (AQE) for PPCN was measured under the same photocatalytic reaction condition except that the incident light was supplied by a 300W Xe lamp with specific band-pass filters to get the desired incident wavelength (420 nm). The catalyst solution was irradiated for 10 hours. The average intensity of irradiation was determined to be 3.55 mW·cm⁻² and the irradiation area was 5.94 cm². The amount of H₂ molecules generated in 10 hours was 260.0 μmol. The quantum efficiency is calculated from equation (2). The number of evolved H₂ molecules is calculated by equation (3). The number of incident photons is 1.606×10²¹ as calculated by equation (4).

$$\begin{aligned} \text{AQE [\%]} &= \frac{\text{Number of reacted electrons}}{\text{Number of incident photons}} \times 100 \\ &= \frac{\text{Number of evolved H}_2 \text{ molecules} \times 2}{\text{Number of incident photons}} \times 100 \quad (2) \end{aligned}$$

$$\text{Number of evolved H}_2 \text{ molecules} = 6.02 \times 10^{23} \times 260.0 \times 10^{-6} = 1.57 \times 10^{20}$$

(3)

$$\begin{aligned} \text{Number of incident photons} &= E\lambda/hc = (3.550 \times 10^{-3} \times 5.94 \times 3600 \times 10 \times 420 \times 10^{-9}) \\ &/ (6.626 \times 10^{-34} \times 3 \times 10^8) = 1.606 \times 10^{21} \end{aligned} \quad (4)$$

The calculated AQE at 420 nm is 19%.