

Electrospinning Preparation of Nanostructured g-C₃N₄/BiVO₄ Composite Films with an Enhanced Photoelectrochemical Performance

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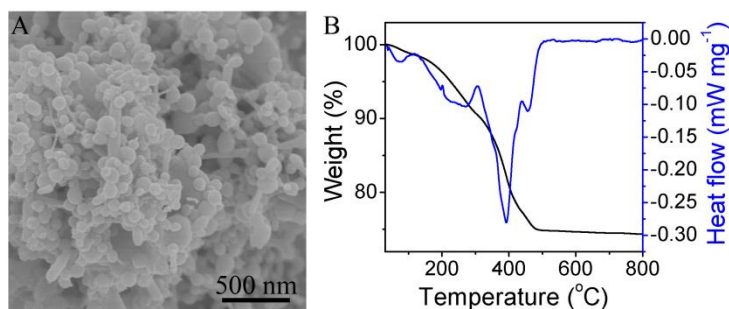


Fig. S1 (A) SEM image and (B) TG-DSC curves of the precursor films.

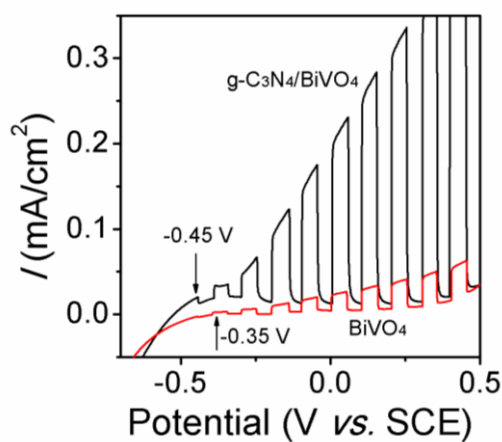


Fig. S2 Magnified current–voltage curves of the samples under chopped visible light in 0.5 M phosphate buffer (pH 7) with Na₂SO₃.

Table S1 Detailed dosages for the preparation of g-C₃N₄/ BiVO₄ sol

Samples	m (g) g-C ₃ N ₄	m (g) Bi(NO ₃) ₃ ·5H ₂ O	m (g) C ₁₅ H ₂₁ O ₆ V	m (g) CH ₃ COOH	m (g) Total	Proportion (wt%) g-C ₃ N ₄
CN/BV-1	0.075	0.27	0.195	2.63	3.17	2.4
CN/BV-2	0.125	0.27	0.195	2.63	3.22	3.9
CN/BV-3	0.175	0.27	0.195	2.63	3.27	5.4

Table S2 The crystal size for various samples

Sample	Calcination temperature	Crystal size	Sample	Calcination temperature	Crystal size
BV	450 °C	29.2 nm	CN/BV-2	400 °C	18.8 nm
CN/BV-1	450 °C	21.5 nm	CN/BV-2	450 °C	38.2 nm
CN/BV3	450 °C	30.8 nm	CN/BV-2	500 °C	34.4 nm

In TG-DSC curves of the precursor film (Fig. S1B), the weight loss and heat flow peaks before 306 °C are ascribed to be the removal of H₂O and organics. The exothermic peak centered at 392 °C is corresponding to the crystallization of BiVO₄, and the exothermic peak centered at 458 °C is caused by the burning of g-C₃N₄.

The potentials of the conductive band (CB) and valance band (VB) at the point of zero charge (pH zpc) were calculated according to the equations as follows¹:

$$E_{VB} = X - 4.5 + 1/2E_g \quad (1)$$

$$E_{CB} = E_{VB} - E_g \quad (2)$$

Where E_g is the band gap energy, which is estimated to be 2.53 eV for BiVO₄ and 2.94 eV for g-C₃N₄ from the Tauc plots analyzed (Fig. 7B and Fig. S1); 4.5 is the energy of free electrons on the hydrogen scale (4.5 eV vs NHE); E_{VB} and E_{CB} are respectively the valance band edge and conductive band edge; X is the absolute electronegativity of the semiconductor. According to previous reports, the X for g-C₃N₄ is 4.730 eV² and for BiVO₄ is 6.035 eV.³

References

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