Highly stable non-noble metal Ni$_2$P co-catalyst for increased H$_2$ generation by g-C$_3$N$_4$ under visible light irradiation

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Fig. S1 FT-IR spectra of pure g-C₃N₄ and g-C₃N₄/Ni₂P composites with various amount of Ni₂P (i.e. 2wt%, 4wt%, and 8wt%). FT-IR for Ni₂P is also provided for reference.

Fig. S2 XPS spectra of Ni 2p binding energy in (a) pure Ni₂P and (b) g-C₃N₄/Ni₂P(8wt%) sample.
Fig. S3 XPS spectra of P 2p binding energy in (a) pure Ni$_2$P and (b) g-C$_3$N$_4$/Ni$_2$P(8wt%) samples.

Fig. S4 XPS spectra of C 1s binding energy in pure g-C$_3$N$_4$, a physical mixture of g-C$_3$N$_4$ and Ni$_2$P (2 wt%), g-C$_3$N$_4$/Ni$_2$P (2 wt%), and g-C$_3$N$_4$/Ni$_2$P (8 wt%) samples.
Fig. S5 XPS spectra of N 1s binding energy in pure g-C₃N₄, a physical mixture of g-C₃N₄ and Ni₂P (2 wt%), g-C₃N₄/Ni₂P (2 wt%), and g-C₃N₄/Ni₂P (8 wt%) samples.

Fig. S6 UV-vis absorption spectra of pure g-C₃N₄, g-C₃N₄/Ni₂P (2 wt%), and a physical mixture of g-C₃N₄ and Ni₂P (2 wt%).
Fig. S7 SEM images of (a) pure g-C$_3$N$_4$, (b) g-C$_3$N$_4$/Ni$_2$P(2wt%), (c) g-C$_3$N$_4$/Ni$_2$P(4wt%), and (d) g-C$_3$N$_4$/Ni$_2$P(8wt%) sample. The scale bar is 1 μm.

Fig. S8 Elemental mapping for C, N, Ni, and P in g-C$_3$N$_4$/Ni$_2$P(2wt%) sample.
Fig. S9 TEM image of a g-C₃N₄/Ni₂P(8wt%) sample. The growth and aggregation of Ni₂P particle is highlighted by the dashed circles.

Fig. S10 XRD patterns of a g-C₃N₄/Ni₂P(2wt%) sample before and after 24 h long-term H₂ evolution testing.
Fig. S11 TEM image of a g-C_3N_4/Ni_2P (2wt%) sample after 24 h long-term H_2 evolution testing. Ni_2P particles are shown by dashed circles.

Fig. S12 TEM image of a g-C_3N_4/Pt (0.5 wt%) sample after 24 h long term H_2 evolution testing.
Fig. S13 Stable photoluminescence spectra of pure g-C₃N₄, g-C₃N₄/Ni₂P(2wt%), g-C₃N₄/Ni₂P(8wt%), g-C₃N₄/Pt(0.5wt%), and a physical mixture of g-C₃N₄ and Ni₂P(2wt%) measured in the solid state.

Fig. 14 Time-resolved photoluminescence decay spectra of pure g-C₃N₄, g-C₃N₄/Ni₂P(2wt%), and g-C₃N₄/Ni₂P(8wt%) measured in the solid state. The fitted lifetime from the fluorescence decays are illustrated in the table (inset).