Supplementary Materials: ZnO-Layered Double Hydroxide@Graphitic Carbon Nitride Composite for Consecutive Adsorption and Photodegradation of Dyes under UV and Visible Lights

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Figure S1. XPS spectra of ZnO-LDH. (a) Survey spectrum for ZnO-LDH; (b) High-resolution C 1s XPS spectrum of ZnO-LDH; (c) High-resolution XPS spectrum for Zn 2p of ZnO-LDH; (d) High-resolution XPS spectrum for O 1s of ZnO-LDH; (e) High-resolution XPS spectrum for Al 2p of ZnO-LDH.
There is a slow weight loss before 500 °C for g-C₃N₄. The first stage with 17.0 wt % mass loss was caused by the loss of surface hydroxyl groups and absorbed water molecules, which was followed by the decomposition of defects and edge functional groups such as uncondensed amine functional group and the edge cyano-group of polymer g-C₃N₄. Then there is a sharp weight loss during 500–600 °C, which indicates the disintegration of the whole g-C₃N₄ polymer. Thus, the crossing point of the two tangents of the two weight loss platforms is supposed to be the weight loss point of g-C₃N₄. The weight loss rate for ZnO-LDH and ZnO-LDH@C₃N₄ are 14.3% and 33.8% respectively. The difference is 19.5%, which is more than the experimental result 14.6 wt % for the content of g-C₃N₄. The larger difference should be ascribed to the larger relative amount of LDH in ZnO-LDH@C₃N₄, which is confirmed by the XRD patterns.

The zeta potentials of g-C₃N₄, ZnO-LDH and ZnO-LDH@C₃N₄ were measured at room temperature. Typically, each sample powder (20 mg) was dispersed in 20 mL of MQ water by ultrasonication for 30 min. The initial pH values for g-C₃N₄, ZnO-LDH, and ZnO-LDH@C₃N₄ aqueous suspensions are 3.29, 7.17 and 6.22 respectively. When the pH value for g-C₃N₄ aqueous suspension is adjusted into 13.89, the zeta potential is 23.1 mV.
Figure S4. (a) TEM image for bulk g-C₃N₄; (b) SEM image for g-C₃N₄; (c) TEM image for ZnO-LDH.
Figure S5. (A) HRTEM image for the composite ZnO-LDH@C₃N₄; (B) EDX spectrum of ZnO-LDH@C₃N₄.

Figure S6. The elemental mapping for ZnO-LDH@C₃N₄.
Figure S7. N₂ adsorption/desorption of isotherms of (a) g-C₃N₄; (b) ZnO-LDH and (c) ZnO-LDH@C₃N₄.

Figure S8. The adsorption dynamics of g-C₃N₄ (A) and ZnO-LDH (B) in OrgII adsorption.

Figure S9. FT-IR spectra of ZnO-LDH@C₃N₄, ZnO-LDH@C₃N₄ after OrgII adsorption in 1 h and ZnO-LDH@C₃N₄ after OrgII adsorption in 24 h.
FT-IR spectra of ZnO-LDH@C₃N₄ samples before and after OrgII adsorption in 1 h and 24 h were shown in Figure S9. The peaks at 810 cm⁻¹ assigned to the bending vibration of heptazine rings became sharper along with the adsorption time and changed into multi-peaks after saturated adsorption of OrgII, which may be induced by the molecular cooperation between adsorbed OrgII and g-C₃N₄.

Figure S10. The cycling runs of ZnO-LDH@C₃N₄ in the photodegradation of MB under UV irradiation.