Electronic Supplementary Information for

New insights into how Pd nanoparticles influence the photocatalytic oxidation and reduction ability of g-C$_3$N$_4$ nanosheets

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**Scheme S1.** Schematic of photocatalytic experimental setup for NOx removal.

**Scheme S2.** Schematic of experimental setup for the photocatalytic reduction of CO$_2$. 
Figure S1. TEM images (a, b, c) of C₃N₄-Pd-5% photocatalysts.
Figure S2. HRTEM images (a, b) of C₃N₄-Pd-5% photocatalysts.
Figure S3. UV-vis DRS (a), TEM image (b), and Visible-light photocatalytic performance of Pd$^{2+}$/C$_3$N$_4$ for NO removal.

Synthesis of Pd$^{2+}$/C$_3$N$_4$ samples.

To prepare Pd$^{2+}$/C$_3$N$_4$ composites, 1.0 g of the as-prepared g-C$_3$N$_4$ was added into 100 mL of ethanol and was sonicated for 2 h to get thin g-C$_3$N$_4$ nanosheets. The resultant was dried at 60 °C. Then, 1 g of the dried thin g-C$_3$N$_4$ nanosheets was added
into 100 mL of H₂O and was kept stirring for 30 min. Then, an appropriate amount of Pd(NO₃)₂ dissolved in 60 mL of H₂O was added dropwise into the above suspension (n(Pd) : n(C₃N₄) = 5%). After stirring for 30 min, the resulted suspension was aged for 2 h. Finally, the Pd²⁺/C₃N₄ samples were collected by filtration, washed with water and ethanol for four times and dried at 60 °C.

To explore the effect of Pd²⁺ on NO removal performance, we conducted an experiment in which g-C₃N₄ was immersed in Pd(NO₃)₂ and the photocatalytic activity of Pd²⁺/C₃N₄ was tested as shown in Electronic Supplementary Information (Figure S3). The NO removal ratio of Pd²⁺/C₃N₄ was 47.6%, slightly higher than the individual g-C₃N₄ (40.7%). The test showed that Pd²⁺ enriched composition did little to influence the photocatalytic activity in comparison with C₃N₄-Pd-5% (60.6%). It was Pd nanoparticles that played a dominant role in the enhancement of photocatalytic activity.

![Visible-light photocatalytic performance of heat-treated C₃N₄-Pd-5% for NO removal.](image.png)

**Figure S4.** Visible-light photocatalytic performance of heat-treated C₃N₄-Pd-5% for NO removal.

**Synthesis of heat-treated C₃N₄-Pd-5% samples.**

The as-prepared C₃N₄-Pd-5% samples are under heat treatment for 400 °C in an hour to get heat-treated C₃N₄-Pd-5% samples.