Versatile, metal free and temperature-controlled g-C_3N_4 as a highly efficient and robust photocatalyst for the degradation of organic pollutants

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Abstract

In the present study, we report novel graphitic carbon nitride (g-C_3N_4) nanosheets at different calcination temperatures viz 500 °C, 550 °C and 600 °C by the simple hydrothermal synthesis for photocatalytic degradation of organic contaminants. The crystal structure, optical properties, and surface morphology were studied by various tools such as X-ray diffraction, UV–visible spectroscopy, Fourier transform infrared spectroscopy, scanning electron microscopy and transmission electron microscopy analysis. The as-synthesized g-C_3N_4 nanosheets exhibited a hexagonal phase and had good crystallinity with a crystallite size of ~ 68 nm. The photodegradation efficiency of g-C_3N_4 nanosheets showed excellent photocatalytic activity towards RhB and CV dye solution, and the dye degraded within 70 and 60 min, respectively. The g-C_3N_4 @550 °C nanosheets showed superior photocatalytic activity due to the adsorption capability and delayed electron hole recombination rate. In addition, the photocatalytic mechanism and reusability test were also found by trapping experiments.