Construction of hybrid g-C_3N_4/CdO nanocomposite with improved photodegradation activity of RhB dye under visible light irradiation

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ABSTRACT
The hybrid graphitic carbon nitride-cadmium oxide (g-C_3N_4/CdO) nanocomposite was fabricated using chemical precipitation and self-assembly method. The photocatalysts were characterised by XRD, XPS, FTIR, BET, TEM, FESEM, UV-Vis and PL spectroscopy. Based on the optical study, visible light harvesting was improved and the band gap of bulk g-C_3N_4 to hybrid g-C_3N_4/CdO nanocomposite was greatly reduced from 2.72 eV to 2.35 eV, signifying a better charge carrier mobility. The photocatalytic activity were further assessed by conducting rhodamine B (RhB) photodegradation reaction using visible light. An excellent dye removal efficiency of 96% was achieved when 1.5 g/L of hybrid g-C_3N_4/CdO nanocomposite was used with an initial concentration of 10 ppm for 120 min whereas only 66% of RhB was removed by bulk g-C_3N_4 within the same operating conditions. Besides, reusability tests were carried out and evidenced that hybrid g-C_3N_4/CdO nanocomposite can be recycled up to four times by retaining the degradation efficiency. The scavenging studies confirmed that the RhB photodegradation using hybrid g-C_3N_4/CdO nanocomposite was controlled by valance band h^+ and $\cdot O^{2-}$ oxidation reactions. Conclusively, the inclusion of CdO onto g-C_3N_4 resulted in remarkable photocatalytic activity for dye degradation applications.

KEYWORDS
Hybrid; g-C_3N_4/CdO; Photodegradation; Rhodamine B; Mechanism

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