Document details - Design and Fabrication of a Novel Metal-Free SiO₂/g-C₃N₄ Nanocomposite: A Robust Photocatalyst for the Degradation of Organic Contaminants

Journal of Inorganic and Organometallic Polymers and Materials

Volume 28, Issue 1, 1 January 2018, Pages 268-278

Design and Fabrication of a Novel Metal-Free $SiO_2/g\text{-}C_3N_4$ Nanocomposite: A Robust Photocatalyst for the Degradation of Organic Contaminants(Article)

Prakash, K., Kumar, P.S., Latha, P., Saravanakumar, K., Karuthapandian, S.

Department of Chemistry, VHNSN College, Virudhunagar, Tamil Nadu 626001, India

Abstract

Abstract: Development of novel and efficient nanostructured materials for the waste water treatment is a great challenge for the researchers. In this regard, we report a novel $SiO_2/g\text{-}C_3N_4$ nanocomposites were tailored via simple solvothermal route and characterized by various spectroscopic and microscopic techniques such as XRD, FT-IR, UV–Vis DRS, SEM, TEM and XPS. The photocatalytic performances of the as-prepared $SiO_2/g\text{-}C_3N_4$ nanocomposites were evaluated for the removal of hazardous rhodamine B (RhB) and crystal violet (CV) organic dyes in aqueous solution under visible light irradiation. Interestingly, the UV–Visible spectroscopy results revealed that the as-synthesized $SiO_2/g\text{-}C_3N_4$ nanocomposite showed superior photocatalytic activity for the degradation of RhB and CV dyes could degrade 99 and 98% under visible-light irradiation respectively. The enhanced photocatalytic activity of $SiO_2/g\text{-}C_3N_4$ nanocomposites could be mainly attributed to the proficient separation of photo-induced charge carriers. A plausible degradation mechanism for the controlled visible-light photocatalytic activity of $SiO_2/g\text{-}C_3N_4$ nanocomposites was strongly evidenced by the trapping experiment by employing different scavengers. The present research findings may open up a new platform for the $g\text{-}C_3N_4$ based photocatalyst for the degradation of organic pollutants. Graphical Abstract: Proposed degradation mechanism of the $SiO_2/g\text{-}C_3N_4$ photocatalyst.

Author keywords

Scavenger | $SiO_2/g\text{-}C_3N_4$ nanocomposite | Solvothermal synthesis | Visible-light photocatalyst

Indexed keywords

Engineering controlled terms: Degradation | Dyes | Image enhancement | Irradiation | Light | Nanocomposites | Organic pollutants | Photocatalysis | Photocatalysts | Rhodium compounds | Silica | Solutions | Stripping (dyes) | Waste treatment | Wastewater treatment | Water treatment

Engineering uncontrolled terms: Degradation of organic contaminants | Photocatalytic activities | Photocatalytic performance | Scavenger | Solvothermal synthesis | Spectroscopic and microscopic techniques | Visible light photocatalytic activity | Visible-light photocatalysts

Engineering main heading: Photodegradation

ISSN: 15741443
Source Type: Journal
DOI: 10.1007/s10904-017-0715-5
Document Type: Article

Original language: English **Publisher:** Springer New York LLC

Karuthapandian, S.; Department of Chemistry, VHNSN College, Virudhunagar, Tamil Nadu, India;