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A novel n-CeO_2/n-CdO heterojunction nanocomposite for enhanced photodegradation of organic pollutants under visible light irradiation(Article)

Saravanakumar, K., Muthupoongodi, S., Muthuraj, V.

[a]Department of Chemistry, V.H.N.S.N College, Virudhunagar, Tamilnadu 626 001, India
[b]Department of Chemistry, Sri Kaliswari College, Sivakasi, Tamilnadu 626 130, India
[c]Department of Chemistry, Thiagarajar College, Madurai, Tamilnadu 625 009, India

Abstract

In this study, a series of novel visible light driven n-CeO_2/n-CdO heterojunction (CeO_2/CdO) nanocomposites were successfully fabricated by simple ultrasonication method. Several characterization tools including X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and UV-vis diffuse reflectance spectroscopy (UV-DRS), etc., were utilized to investigate the physicochemical properties of the catalyst and confirm the formation of heterojunction. Under visible light irradiations, the photocatalytic activities of the as-prepared CeO_2/CdO nanocomposites were evaluated by degrading of Congo red (CR) and Rhodamine B (RhB) solutions. As a result, the CeO_2/CdO (mass percentage ratio 1:3) nanocomposite displays remarkable performance for CR and RhB degradation. The enhancement in the photocatalytic performance of CeO_2/CdO (1:3) nanocomposite can be attributed not only to the strong visible-light absorption region, separating the photogenerated electron-hole pairs but also to the formation of n-n type heterojunction. The results also indicate that the CeO_2/CdO (1:3) nanocomposite has good stabilization and high reusability. In addition, the mechanism is proposed for the coupled semiconductors and possible reasons for the enhancement of visible-light photocatalytic efficiency are also discussed. This work can provide a new gateway to fabricate visible photocatalysts and promising candidate catalysts for poisonous wastewater treatment in the near future.

Author keywords

Heterojunction | n-CeO_2/n-CdO | Photocatalysis | Photodegradation | Rare earths | Visible light

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Muthuraj, V.; Department of Chemistry, V.H.N.S.N College, Virudhunagar, Tamilnadu, India;