Document details - Visible-light-driven Pd doped β-Bi₂O₃ nanocomposite: an affordable and an efficient catalyst for mitigation of noxious pollutant

Applied Physics A: Materials Science and Processing

Volume 127, Issue 7, July 2021, Article number 535

Visible-light-driven Pd doped β-Bi_2O_3 nanocomposite: an affordable and an efficient catalyst for mitigation of noxious pollutant(Article)

Parvathi, L.T., Arunpandian, M., Arunachalam, S., Karuthapandian, S.

[a]Department of Chemistry, V. H. N. Senthikumara Nadar College (Autonomous), Virudhunagar, 626001, India
[b]Sri Kaliswari College (Autonomous), Sivakasi, 626123, India
[c]Department of Chemistry, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil, 626126, India

Abstract

A series of surface plasmonic effect induced by Pd anchored β-Bi_2O_3 flower-shaped nanocomposite photocatalysts were prepared by the facile hydrothermal method. The crystallinity of the synthesized Pd loaded β-Bi_2O_3 nanocomposites is analyzed by powder X-ray diffraction analysis and the morphology and element presence of the synthesized Pd loaded β-Bi_2O_3 nanocomposites were characterized by field-emission scanning electron microscopy, transition electron microscopy and energy dispersive X-ray analysis. The optical properties of the synthesized Pd loaded β-Bi_2O_3 nanocomposites are analyzed by ultraviolet–visible diffuse reflection spectroscopy. The 2% Pd loaded β-Bi_2O_3 composite has higher photocatalytic activity in methylene blue degradation in visible irradiation than immaculate β-Bi_2O_3 and other Pd loaded β-Bi_2O_3 nanocomposites. The effect behind the improvement of photocatalytic activity of the 2% Pd loaded β-Bi_2O_3 composite is the surface plasmon resonance effect of Pd NPs and also interdependent bonding interaction between Pd and β-Bi_2O_3. Moreover, the radical trapping experiment substantiates that $^{\bullet}OH$ and $O_2^{\bullet-}$ play a vital role in MB abatements. The present work provides new deep insights into the intriguing other plasmonic photocatalytic materials with potential applications in the area of environmental indemnification.

Author keywords

Pd@Bi_2O_3 | Photocatalyst | Photodegradation | Surface plasmon | Visible light

Indexed keywords

Engineering controlled terms: Complexation | Crystallinity | Energy dispersive X ray analysis | Field emission microscopes | Morphology | Nanocomposites | Optical properties | Photocatalytic activity | Plasmons | Scanning electron microscopy | Surface plasmon resonance | X ray powder diffraction

Engineering uncontrolled terms: Bonding interactions | Diffuse reflection spectroscopy | Field emission scanning electron microscopy | Methylene blue degradations | Photocatalytic materials | Powder X ray diffraction | Surface plasmon resonance effects | Visible-light-driven

Engineering main heading: Bismuth compounds

Funding details

Funding text

We gratefully acknowledge the College Managing Board, The Principal, and the Head of the Department (Chemistry), V. H. N. Senthikumara Nadar College (Autonomous) for providing necessary research facilities.

ISSN: 09478396
CODEN: APAMF
Source Type: Journal
Original language: English
DOI: 10.1007/s00339-021-04679-3
Document Type: Article
Publisher: Springer Science and Business Media Deutschland GmbH

Karuthapandian, S.; Department of Chemistry, V. H. N. Senthikumara Nadar College (Autonomous), Virudhunagar, India;