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Photocatalytic remediation of atrazine under visible light radiation using Pd-Gd₂O₃ nanospheres

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Abstract

A hydrothermal method was used to prepare gadolinium oxide nanospheres. A photo-assisted deposition method was used to dope palladium onto the surface of a gadolinium oxide nanosphere. Gadolinium oxide and palladium-doped gadolinium oxide nanospheres were characterized by different techniques such as BET surface area, photoluminescence spectra, transmission electron microscopy, UV-Vis diffuse reflectance spectra and X-ray diffraction. The results reveal that the nanosphere is the shape of gadolinium oxide, and dots that appear on the surface of gadolinium oxide are referred to as doped palladium on the surface of gadolinium oxide. Doping of palladium on the surface of a gadolinium oxide nanosphere changes the electronic and optical properties of the gadolinium oxide nanosphere. The photocatalytic remediation of atrazine under visible light radiation using Pd-Gd₂O₃ nanospheres is more efficiency than the photocatalytic remediation using Gd₂O₃ nanospheres. The weight percent of doped palladium on the surface of the gadolinium oxide nanosphere determines the photocatalytic activity of the gadolinium oxide nanosphere, and the best photocatalytic activity for degradation of atrazine is achieved using a 0.6 wt% Pd-Gd₂O₃ nanosphere. Additionally, the photocatalytic activity of the 0.6 wt% Pd-Gd₂O₃ nanosphere remains unchanged after five uses. (C) 2016 Elsevier B.V. All rights reserved.

Keywords

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