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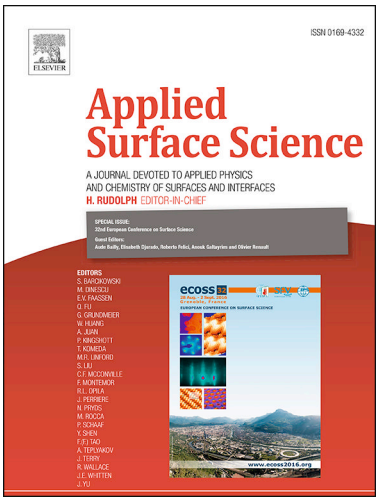

Full Length Article

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Enhancement of Visible-Light Photoactivity By Polypropylene Coated Plasmonic Au/TiO_2 for Dye Degradation In Water Solution

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ABSTRACT

A new approach to obtain a heterogeneous photocatalytic material with gold nanoparticles and TiO_2 semiconductor was performed exploiting the reducing ability of acetylacetone, a chemical present in the TiO_2 paste formulation. Gold / TiO_2 heterogeneous catalyst supported on polypropylene $[PP@Au\text{-}TiO_2]_A$ was prepared; composition, structure and morphology of this new material were defined by using UV–Vis spectroscopy, Scanning Electron Microscopy (SEM), Atomic Force Microscopy (AFM), X-Ray diffraction (XRD), X-Ray Fluorescence (XRF), Raman Spectroscopy, Photoluminescence and Diffuse Reflectance Spectroscopy. The new material was tested in the photocatalytic degradation of Alizarin Red S in water solution, as target pollutant, under visible light and correlated with structural and spectroscopic characterizations. $[PP@Au\text{-}TiO_2]_A$ showed higher photocatalytic activity respect to pure $[PP@TiO_2]_A$ with an improvement of photodegradation kinetic. The best performance was obtained using $[PP@Au\text{-}TiO_2]_A$ sample with 0.006 wt.% of Au and the photocatalytic improvement was correlated with the band gap energy decrease of photocatalyst.

Keywords:

TiO_2;

Gold nanoparticles;

Heterogeneous Photocatalysis;

Band gap energy;

Alizarin Red S.