World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:11, No:10, 2017

Facile Fabrication of $TiO_2NT/Fe_2O_3@Ag_2CO_3$ Nanocomposite and Its Highly Efficient Visible Light Photocatalytic and Antibacterial Activity

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Abstract : Due to the increasing need to environment protection in real time need to energize new materials are under extensive investigations. Between others, TiO2 nanotubes (TNTs) nanocomposite with iron oxide and silver carbonate, are promising alternatives as high-efficiency visible light photocatalyst due to their unique properties and their superior charge transport properties. Our efforts in this domain aim the construction of novel nanocomposite of TiO2NT/Fe2O3@Ag2CO3. The structure, surface morphology, chemical composition and optical properties were characterized by X-ray diffraction (XRD), Raman, Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), energy dispersive X-ray spectrometer (EDS), transmission electron microscopy (TEM), selected area electron diffraction (SAED) and UV–vis diffuse reflectance spectroscopy (DRS). XRD results confirm the interaction of TiO2-NT with iron oxide. This novel nanocomposite shows remarkably enhanced performance for phenol compounds photodegradation. The experimental data shows a promising photocatalytic activity. In particular, a maximum value of 450 mg/g was removed within 60 min at solar light irradiation with degradation efficiency of 99.5%. The high photocatalytic activity of the nanocomposite is found to be related to the increased adsorption toward chemical species, enhanced light absorption and efficient charge separation and transfer. Finally, the designed TiO2NT/Fe2O3@Ag2CO3 nanocomposite has a great degree of sustainability and could has a potential application for the industrial treatment of wastewater containing toxic organic materials.

Keywords : nanocomposite, photocatalyst, solar energy, titanium dioxide nanotubes
Conference Title : ICCCPEB 2017 : International Conference on Chemistry, Chemical, Process Engineering and Biotechnology
Conference Location : Istanbul, Türkiye
Conference Dates : October 26-27, 2017