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Novel magnetically separable nanocomposites as visible-light-driven photocatalysts with highly enhanced activity

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In the present century, human beings face with different challenges, such as environment pollution, energy shortage, and global warming. Heterogeneous photocatalytic processes have attracted a great deal of attention as a promising green technology with potential application to address these challenges. However, generally there are three main drawbacks for efficiently using traditional photocatalysts. Firstly, they cannot sufficiently absorb the solar irradiation, due to their wide band gaps, impeding energy absorptions from the solar energy. Secondly, separation of photocatalysts from the treated solutions by filtration or centrifugation in large scale is not economic. Thirdly, the photogenerated electron-hole pairs recombine with high rate, leading to reduced activity. However, by combination of semiconductors with matching band potentials, the formed nanocomposites can benefit from the synergistic effects of suppressing recombination of the charge carriers and enhancing absorption of the solar radiation. Moreover, magnetic visible-light-driven photocatalysts can provide an effective strategy for separation of photocatalysts from the treated solutions using magnetic field. In this presentation, we will discuss about some novel magnetic nanocomposites prepared by my research group with facile and large-scale method. The prepared nanocomposites were characterized by X-ray diffraction, energy dispersive analysis of X-rays, transmission electron microscopy, UV–vis diffuse reflectance spectroscopy, Fourier transform-infrared spectroscopy, thermogravimetric analysis, and vibrating sample magnetometry techniques. Photocatalytic activities of the nanocomposites were investigated by degradation of different dye pollutants.

Biography

Aziz Habibi-Yangjeh received his PhD in Physical Chemistry/Reaction Kinetics from Sharif University of Technology, Tehran, Iran, in 2001. He is currently Full Professor of Physical Chemistry at the University of Mohaghegh, Ardabili. His research interests include preparation of different visible-light-driven photocatalysts based on ZnO and graphitic carbon nitride (g-C3N4). He has published more than 85 international refereed journal papers. Moreover, he is reviewer in his area of research for several international journals. Also, he has published two Persian text books.

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