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Photosensitization of zinc oxide: Novel visible-light-driven nanocomposites for photocatalytic removal of organic pollutants

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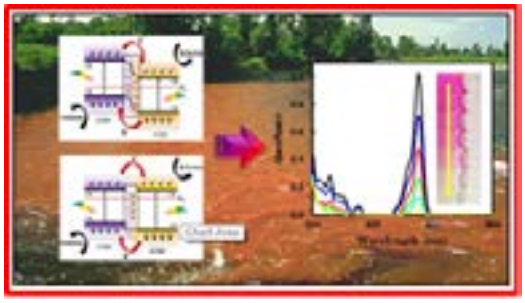
In recent years, it was found that heterogeneous photocatalytic processes, as green promising technology, have potential to address different challenges in the field of environmental pollution, global warming, and energy shortage using the solar energy [1]. However, conventionally used photocatalysts such as TiO2, ZnO, SnO2, and ZnS can be mainly activated under UV light, accounting for nearly 5 % of energy from the solar spectrum. In addition, due to recombination of photogenerated electron–hole pairs with considerable rate, quantum efficiency of one-component photocatalysts are poor. Among various methods to overcome these shortcomings, combination of large band gap semiconductors with proper narrow band gap ones is very efficient and attractive. Up to now, several narrow band gap semiconductors including AgBr, AgI, WO3, and CdS have been used to prepare visible-light-driven photocatalysts and their photocatalytic activities in degradation of pollutants investigated. On the other hand, it was recently revealed that formation of n-p or n-n heterojunctions between semiconductors can considerably enhance separation of electron-hole pairs. In these heterojunctions, internal electric field is formed between the semiconductors in the junction area, leading to enforce separation of the charge carriers. In this presentation, we will discuss about some novel visible-light-driven photocatalysts that we have prepared by combining n-type semiconductors to prepare various nanocomposites such as ZnO/Ag3VO4, ZnO/Ag2CrO4, and ZnO/AgBr/Ag2CrO4 nanocomposites with highly enhanced photocatalytic activity. It was found that photocatalytic activity of these nanocomposites are significantly higher than those of their counterparts.



Biography

Aziz Habibi-Yangjeh received his PhD degree in physical chemistry/reaction kinetics from Sharif University of Technology, Tehran, Iran, in 2001. He is currently full professor of physical chemistry at University of Mohaghegh Ardabili. His research interests include preparation of different visible-light-driven photocatalysts based on zinc oxide, titanium dioxide, and graphitic carbon nitride. He has published more than 120 international refereed journal papers. Moreover, he is reviewer in his area of research for several international journals.

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