SONOCHEMICAL SYNTHESIS OF SEMICONDUCTORS FOR PHOTOCATALYTIC APPLICATIONS

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ABSTRACT

Over the last few decades, photocatalysis with transition metal oxide nanoparticles has proven to be useful for the degradation of organic pollutants. It essentially converts organic pollutants into inorganic compounds such as CO_2, H_2O and inorganic acids. Photocatalysts are a class of materials that have made remarkable progress in recent years due to their important role in environmental pollution control and waste management. Semiconductor nanoparticles have attracted great attention due to their unique size-dependent optical properties. In addition, the disadvantages of individual components can be compensated by semiconductor composites, since they induce a synergistic effect, such as efficient charge separation and improvement of photostability [1-4].

In the present work sonochemically synthesized nanoscale semiconductors TiO_2, CdS, CdS-TiO_2, ZnO, ZnO-CdS, CdS-TiO_2-Au were studied as solid phase catalysts during the degradation of Methylene Blue, via UV illumination. CdS has been observed to be a remarkable photocatalyst, while Zn and Ti, as transition metals, can have a beneficial effect on it. This effect can be further optimized by decorating with noble metals such as Au [3]. However Au is an inhibitory factor in the photocatalytic activity of the CdS-TiO_2 catalyst [1]. In conclusion several semiconductors were synthesized in the presence of ultrasounds in shorter reaction times compared to conventional techniques and acted as high performance photocatalysts.

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