

OC-14: Visible-light Can Degrade RB5 by Sono-Synthesized Core-Shell Nanocrystal**Narjes Ghows and Mohammad H. Entezari****Department of Chemistry, Ferdowsi University of Mashhad, 91775, Mashhad, Iran***Corresponding author: moh_entezari@yahoo.com*

In recent years, core/shell nanocomposite materials have shown an increasing interest due to their unique optical and electronic properties (Kamat, 2008). In this study, a novel composite with a core-shell structure (CdS/TiO₂) was synthesized recently in our lab through the combination of ultrasound and new micro-emulsion without surfactant (Ghows and Entezari, 2012). This nano-composite showed an appropriate adsorbability and high catalytic activity under visible light for the reactive black 5 (RB5) as an azo dye. The decomposition of RB5 in aqueous solution was carried out in a series of experiments by the synthesized nano-composite. The composite of CdS/TiO₂ with mole ratio of 1/2.5 has shown a higher catalytic activity in comparison to the composite with mole ratio of 1/6, pure nano-sized CdS, and TiO₂ powders. The extent of removal depends on the operating conditions such as type of catalyst, concentration of catalyst, and the pH of solution. The increased catalytic activity of the nanoparticles in the presence of ultrasound is due to the enhancement of mass transfer, cleaning and sweeping the catalyst surface, and preventing the aggregation of particles which it allows more active sites to be available for the reaction. In addition, a kinetic model with two first-order in-series for the first time was applied recently to describe the sono-degradation of RB5. The obtained results were in agreement with the proposed kinetics model. The rate constant of degradation was highest under the visible light and ultrasound than other applied conditions.

References

Ghows N., Entezari M. H., 2012, Sono-synthesis of core-shell nanocrystal without surfactant, Ultrason. Sonochem. Accepted.

Kamat P.V., 2008, Quantum dot Solar cells. semiconductor nanocrystals as light harvesters, J. Phys. Chem. C 112, 18737-18753.