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**SONOCATALYTIC DEGRADATION OF METHYLENE BLUE DYE USING A NANOSIZED ZINC OXIDE POWDER PREPARED VIA SONOCHEMICAL METHOD**

*A. Stanković, Lj. Veselinović, S. Marković, D. Uskoković  
Institute of Technical Sciences of SASA, Belgrade, Serbia*

Nanostructured semiconductor materials are of great importance for various technological application due to their physical and chemical properties which are determined by the morphology and the size of the particles. Among semiconductor oxides, ZnO is one of the most important multifunctional material with its wide direct band gap energy of 3.37 eV and its excitation binding energy around 60 meV.

Nowadays, many studies focus on the application of sonochemical reactions for treatment of industrial wastewaters, and also investigated the improvements of this method by some semiconductor materials (ZnO or TiO<sub>2</sub>) due to their high catalytic activity, stable chemical properties, safety and low cost. For a long period of time different toxic materials are used in dyeing, paper and pulp, textiles, plastics, leather, paint, cosmetics, pharmaceutical and food industries. These toxic materials usually have very complex, aromatic molecular structures which make them extremely stable and difficult to biodegrade. Sonocatalytic degradation presents a very efficient method for wastewater purification.

In this work we have investigated heterogenic sonocatalytic degradation of methylen blue (MB) aqueous solution, as a common organic pollutant, in the presence of nanosized ZnO powder as catalysts. The phase composition of sonochemically synthesized ZnO nanopowder was identified by XRD, particles morphology was characterized by FE-SEM, while the particle size distribution was measured by laser light-scattering particle size analyzer. The optical properties of ZnO nanocrystals were investigated by ultraviolet-visible (UV-Vis) diffuse reflectance spectroscopy (DRS). In a typical experimental procedure we used 5, 10 and 20 ppm water solution of MB containing 50 mg of nanosized ZnO powder. Prepared suspensions were treated with the ultrasound irradiation which has an output of 150 W. Concentration of the MB dye in the water solution containing ZnO nanoparticles before and after sonocatalytic degradation was calculated according to the absorbance maxima value at 665 nm characteristic for MB. The experiments were performed on a UV-Vis spectrophotometer in the wavelength range of 300–800 nm. Degradation efficiency of MB dye (for all examined concentrations) was found to be close to 100 % after ultrasound treatment in the presence of ZnO nanoparticles.