World Academy of Science, Engineering and Technology
International Journal of Chemical and Molecular Engineering
Vol:9, No:05, 2015

# Preparation and Visible Light Photoactivity of N-Doped ZnO/ZnS Photocatalysts

**Authors :** Nuray Güy, Mahmut Özacar

**Abstract :** Semiconductor nanoparticles such as $TiO_2$ and ZnO as photocatalysts are very efficient catalysts for wastewater treatment by the chemical utilization of light energy, which is capable of converting the toxic and nonbiodegradable organic compounds into carbon dioxide and mineral acids. ZnO semiconductor has a wide bandgap energy of 3.37 eV and a relatively large exciton binding Energy (60 meV), thus can absorb only UV light with the wavelength equal to or less than 385 nm. It exhibits low efficiency under visible light illumination due to its wide band gap energy. In order to improve photocatalytic activity of ZnO under visible light, band gap of ZnO may be narrowed by doping such as N, C, S nonmetal ions and coupled two separate semiconductors possessing different energy levels for their corresponding conduction and valence bands. ZnS has a wider band gap (Eg=3.7 eV) than ZnO and generates electron–hole pairs by photoexcitation rapidly. In the present work, N doped ZnO/ZnS nano photocatalysts with visible-light response were synthesized by microwave-hydrothermal method using thiourea as N source. The prepared photocatalysts were characterized by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM) and UV–visible (UV–vis). The photocatalytic activities samples and undoped ZnO have been studied for the degradation of dye, and have also been compared with together.

**Keywords :** photocatalyst, synthesis, visible light, ZnO/ZnS
**Conference Title :** ICCSC 2015 : International Conference on Chemicals and Sustainable Chemistry
**Conference Location :** Rome, Italy
**Conference Dates :** May 02-03, 2016