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PII: S2213-3437(17)30088-X
DOI: http://dx.doi.org/doi:10.1016/j.jece.2017.02.036
Reference: JECE 1502

To appear in:

Received date: 15-11-2016
Revised date: 21-2-2017
Accepted date: 23-2-2017

Please cite this article as: P. Ranjan, R.K. Singh, H. Suematsu, L. Phillip, R. Sarathi, Synthesis of Nano-ZnO by Wire Explosion process and its photocatalytic Activity, *Journal of Environmental Chemical Engineering* (2017), http://dx.doi.org/10.1016/j.jece.2017.02.036

Synthesis of Nano-ZnO by Wire Explosion process and its photocatalytic Activity

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Abstract

Zinc oxide (ZnO) nanoparticles were produced by wire explosion process and characterised through X-ray diffraction (XRD) studies and by TEM studies. The particle size analysis indicates that they follow log-normal distribution and the mean size of the ZnO nanoparticles formed is about 44 nm. Optical band gap of ZnO is found to be 3.21 eV by UV-Vis diffuse reflectance spectroscopy (DRS). The synthesized ZnO nano particles were used as photo catalyst for degradation of methylene blue (MB) in aqueous solution. 100 mg/L of nano ZnO particles was found as the optimum quantity for UV photo degradation of 10 mg/L MB. ZnO nanoparticles were verified for its reusability. The results of the study are compared with commercial ZnO nanoparticle and with Degussa P-25 TiO_2. LC-MS studies were carried out to identify the intermediates and degradation pathway.

Keywords: ZnO; nanoparticles; Wire Explosion; water treatment; Methylene Blue; Degradation mechanism