

Accepted Manuscript

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

Author: Prem Ranjan Raj Kamal Singh H. Suematsu Ligy
Phillip R. Sarathi



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>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

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

Prem Ranjan¹, Raj Kamal Singh², H. Suematsu³, Ligy Phillip² and
R. Sarathi^{1,*}

¹Department of Electrical Engineering, IIT Madras, Chennai, 600036 India

²Department of Civil Engineering, IIT Madras, Chennai, 600036, India

³ Extreme Energy-Density Research Institute, Nagaoka University of Technology, Nagaoka 940-2188, Japan

* Corresponding author. Tel.: +91 44 2257 4436; Fax: +91 44 2257 0509.
Email address: rsarathi@iitm.ac.in (R. Sarathi).

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 TiO₂. LC-MS studies were carried out to identify the intermediates and degradation pathway.

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

Download English Version:

<https://daneshyari.com/en/article/4908506>

Download Persian Version:

<https://daneshyari.com/article/4908506>

[Daneshyari.com](https://daneshyari.com)