Effects of morphology on photocatalytic performance of Zinc oxide nanostructures synthesized by rapid microwave irradiation methods

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\textbf{A R T I C L E   I N F O}

\begin{tabular}{l}
Article history: \\
Received 16 November 2011 \\
Received in revised form 20 January 2012 \\
Accepted 26 January 2012 \\
Available online 3 February 2012
\end{tabular}

\textbf{K e y w o r d s:} \\
Zinc oxide nanostructures \\
Microwave synthesis \\
Photocatalytic performance \\
Methylene blue (MB)

\textbf{A B S T R A C T}

In this study, two different chemical solution methods were used to synthesize Zinc oxide nanostructures via a simple and fast microwave assisted method. Afterwards, the photocatalytic performances of the produced ZnO powders were investigated using methylene blue (MB) photodegradation with UV lamp irradiation. The obtained ZnO nanostructures showed spherical and flower-like morphologies. The average crystallite size of the flower-like and spherical nanostructures were determined to be about 55 nm and 28 nm, respectively. X-ray diffraction (XRD), scanning electronic microscopy (SEM), Brunauer–Emmett–Teller (BET), room temperature photoluminescence (RT-PL) and UV–vis analysis were used for characterization of the synthesized ZnO powders. Using BET N\textsubscript{2}-adsorption technique, the specific surface area of the flower-like and spherical ZnO nanostructures were found to be 22.9 m\textsuperscript{2}/gr and 98 m\textsuperscript{2}/gr, respectively. Both morphologies show similar band gap values. Finally, our results depict that the efficiency of photocatalytic performance in the Zinc oxide nanostructures with spherical morphology is greater than that found in the flower-like Zinc oxide nanostructures as well as bulk ZnO.

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doi:10.1016/j.spmi.2012.01.015