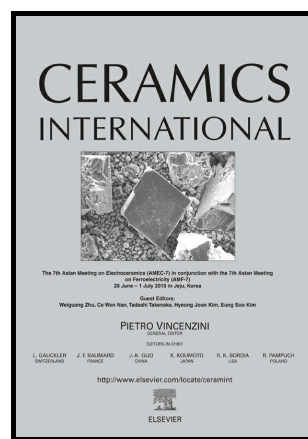


ZnS nanoparticles prepared via simple reflux and hydrothermal method: optical and photocatalytic properties

Vahid Sabaghi, Fatemeh Davar, Zeinab Fereshteh



www.elsevier.com/locate/ceri

PII: S0272-8842(18)30175-5
DOI: <https://doi.org/10.1016/j.ceramint.2018.01.159>
Reference: CERI17291

To appear in: *Ceramics International*

Received date: 5 October 2017
Revised date: 18 January 2018
Accepted date: 19 January 2018

Cite this article as: Vahid Sabaghi, Fatemeh Davar and Zeinab Fereshteh, ZnS nanoparticles prepared via simple reflux and hydrothermal method: optical and photocatalytic properties, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2018.01.159>

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 galley proof before it is published in its final citable 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.

ZnS nanoparticles prepared via simple reflux and hydrothermal method: optical and photocatalytic properties

Vahid Sabaghi^a, Fatemeh Davar^{a*}, Zeinab Fereshteh^b

^aDepartment of Chemistry, Isfahan University of Technology, Isfahan 84156-83111, Iran

^b Department of Biological Sciences, University of Delaware, Newark, DE 17916, USA

* Corresponding author. davar@cc.iut.ac.ir. Tel: +983133913289, Fax: +983133913233

Abstract

In this research, zinc sulfide nanoparticles (NPs) with various morphologies such as spherical, flower-like, microspheres decorated with nanoparticles and nanorods were synthesized by two distinct, simple and efficient methods. These approaches include reflux and hydrothermal methods. Zinc nitrate hexahydrate ($\text{Zn}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$) were used as Zn source and thioacetamide (TAA) was used as S source. The effects of TAA to zinc ion mole ratio were investigated on the morphology, particle size, optical and photocatalytic properties of ZnS nanocrystals. In hydrothermal synthesis with increasing Zn^{2+} :TAA mole ratio from 1:1 to 1:2 bone like nanocrystals changed to semi-spherical nanoparticles with average particle size 50-60 nm, with different effect as photocatalysts. But any change at morphology were didn't observed with changing Zn^{2+} :TAA mole ratio from 1:1 to 1:30 in the reflux method. In the reflux method with increasing in Zn^{2+} :TAA mole ratio, dispersed semi-sphere nanoparticles were observed. The synthesized nanocrystals were characterized by infrared spectroscopy (FT-IR), field emission scanning electron microscopy (FESEM), energy-dispersive x-ray spectroscopy (EDS) and X-ray diffraction (XRD) analysis. XRD analysis and FESEM images show that the size of synthesized ZnS NPs is in the range of 15-25 nm. UV-Vis spectra showed that by increasing the amount of sulfur source and increasing the reaction time, λ_{max} shifted towards lower wavelengths, and the band gap was in the range of ~3.9-4.8 eV for all of the samples. Also, photoluminescence (PL) analysis showed by increasing particle size and degree of agglomeration, emission intensity (λ_{em}) decreased. The photocatalytic activity of the as-prepared samples has been compared for

Download English Version:

<https://daneshyari.com/en/article/7887520>

Download Persian Version:

<https://daneshyari.com/article/7887520>

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