

Accepted Manuscript

Structural, magnetic and optical properties of sonochemically synthesized Zr-ferrite nanoparticles

Jitu Das, Vijayanand S. Moholkar, Sankar Chakma

PII: S0032-5910(17)30938-5
DOI: doi:[10.1016/j.powtec.2017.11.057](https://doi.org/10.1016/j.powtec.2017.11.057)
Reference: PTEC 12976

To appear in: *Powder Technology*

Received date: 17 July 2017
Revised date: 31 October 2017
Accepted date: 21 November 2017



Please cite this article as: Jitu Das, Vijayanand S. Moholkar, Sankar Chakma, Structural, magnetic and optical properties of sonochemically synthesized Zr-ferrite nanoparticles, *Powder Technology* (2018), doi:[10.1016/j.powtec.2017.11.057](https://doi.org/10.1016/j.powtec.2017.11.057)

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.

Structural, Magnetic and Optical Properties of Sonochemically Synthesized Zr-Ferrite Nanoparticles

Jitu Das^a, Vijayanand S. Moholkar^{a,*}, Sankar Chakma^{b,*}

^a Department of Chemical Engineering, Indian Institute of Technology Guwahati, Guwahati – 781039, Assam, India

^b Department of Chemical Engineering, Indian Institute of Science Education and Research Bhopal, Bhopal – 462066, Madhya Pradesh, India

* Corresponding authors: vmoholkar@iitg.ernet.in (V.S.M.); schakma@iiserb.ac.in (S.C.)

Abstract

The present study investigated sonochemical synthesis of Zr-ferrite nanoparticles under different operating parameters. In order to explore the sintering effect on ferrite phase formation, the synthesized ferrite particles were also calcined in the range of 200 – 900°C. The obtained nanoparticles were characterized using XRD, FESEM, TEM, EDX, DRS, and VSM. The results revealed that the formation of ferrite phase needs external calcinations and *in-situ* microcalcination induced by transient cavitation is not sufficient for formation of spinel ferrite phases. The DRS results showed that it has a high capability of visible light absorption due to low band-gap energy in the range of 1.85 eV-1.93 eV. The change in band-gap energy is attributed to the crystalline size of the particle and the change of nature of the ferrite from amorphous to crystalline structure. While analysis of magnetic properties revealed that coercivity is dependent on calcination temperature and the solution pH. The highest coercivity and magnetic saturation were determined as 725 Oe and 0.750 emu/g; respectively. At higher pH, ferromagnetic behaviour with decreasing order in both magnetic saturation (M_s) and magnetic remanence (M_r) has been observed. To the best of our knowledge, this is the first report on magnetic properties of Zr-ferrite.

Keywords: Nanoparticles; Magnetic materials; Zirconium ferrite; Ultrasound

Download English Version:

<https://daneshyari.com/en/article/6675437>

Download Persian Version:

<https://daneshyari.com/article/6675437>

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