






PAPER

Structural, magnetic and catalytic properties of cobalt ferrite nanoparticles dispersed in silica matrix

P P Bardapurkar¹ , S S Shewale², N P Barde³  and K M Jadhav⁴ 

Published 25 January 2019 • © 2019 IOP Publishing Ltd

Materials Research Express, Volume 6, Number 4

Citation P P Bardapurkar *et al* 2019 *Mater. Res. Express* **6** 045055

DOI 10.1088/2053-1591/aafe32

nilesh_barde123@rediffmail.com

¹ S.N. Arts, D. J. Malpani Commerce & B. N. Sarda Science College, Sangamner, Maharashtra, India

² Ahmednagar College, Ahmednagar, Maharashtra, India

³ Badrinarayan Barwale Mahavidyalaya, Jalna, Maharashtra, India

⁴ Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, M.S., India

P P Bardapurkar  <https://orcid.org/0000-0002-7223-3220>

N P Barde  <https://orcid.org/0000-0001-7405-3015>

K M Jadhav  <https://orcid.org/0000-0001-9911-411X>

1. Received 24 November 2018
2. Revised 7 January 2019
3. Accepted 14 January 2019
4. Published 25 January 2019




Method: Single-anonymous

Revisions: 1

Screened for originality? Yes

Buy this article in print

 Journal RSS

 Sign up for new issue notifications

Abstract

Tendency of magnetic nanoparticles to agglomerate can be minimized by dispersing them in suitable inert matrix. This paper reports the synthesis, structural, optical and magnetic properties of cobalt ferrite

matrix. This paper reports the synthesis, structural, spectral and magnetic properties of cobalt ferrite nanoparticles dispersed in silica matrix. Samples were characterized using x ray Diffractometry (XRD), Infrared Spectroscopy (IR), Transmission Electron Microscopy (TEM) and Vibrating Sample Magnetometry (VSM). It was observed that silica matrix retains the properties like crystal structure, cation distribution, band positions in IR spectra etc. Crystallite sizes were found to change from 15.1 nm to 17.6 nm with increased SiO₂. Magnetic properties were observed to be significantly affected due to altered inter-particle distances and change in crystallite size after dispersion in the matrix. A gradual reduction in saturation magnetization from 68.7 emu g⁻¹ to 4.77 emu g⁻¹ was observed with augmented SiO₂ content indicating that the magnetic properties can be tuned by varying the ferrite-silica ratio. Further, the catalytic activity of a typical sample was also studied and a maximum yield of 78% was obtained at a reaction temperature of 70 °C with isopropyl alcohol as a solvent for the synthesis of 2 Phenylbenzimidazol.

Export citation and abstract

BibTeX

RIS

Previous article in issue

Next article in issue

Access this article

The computer you are using is not registered by an institution with a subscription to this article. Please choose one of the options below.

Login

Access through your institution

IOPscience login

Find out more about journal subscriptions at your site.

Purchase from

Article Galaxy
CCC RightFind

Purchase this article from our trusted document delivery partners.

Rent from





This article is available from DeepDyve.

Make a recommendation

To gain access to this content, please complete the Recommendation Form and we will follow up with your librarian or Institution on your behalf.

For corporate researchers we can also follow up directly with your R&D manager, or the information management contact at your company. Institutional subscribers have access to the current volume, plus a 10-year back file (where available).

You may also like

JOURNAL ARTICLES

Effect of praseodymium in cation distribution, and temperature-dependent magnetic response of cobalt spinel ferrite nanoparticles

Temperature annealing dependence of structural, magnetic, and antibacterial properties of silver substituted cobalt ferrite nanoparticles produced by coprecipitation route

Cation trivalent tune of crystalline structure and magnetic properties in coprecipitated cobalt ferrite nanoparticles

Controlling the size and magnetic properties of nano CoFe_2O_4 by microwave assisted co-precipitation method

Fabrication and magnetoelectric investigation of flexible PVDF-TrFE/cobalt ferrite nanocomposite films

Tuning of magnetic properties of Al-doped cobalt ferrite nanofiber prepared by electrospinning technique

IOPSCIENCE

[Journals](#)

[Books](#)

[IOP Conference Series](#)

[About IOPscience](#)

[Contact Us](#)

[Developing countries access](#)

[IOP Publishing open access policy](#)

[Accessibility](#)

IOP PUBLISHING

[Copyright 2024 IOP Publishing](#)

[Terms and Conditions](#)

[Disclaimer](#)

[Privacy and Cookie Policy](#)

PUBLISHING SUPPORT

[Authors](#)

[Reviewers](#)

[Conference Organisers](#)

This site uses cookies. By continuing to use this site you agree to our use of cookies.

IOP