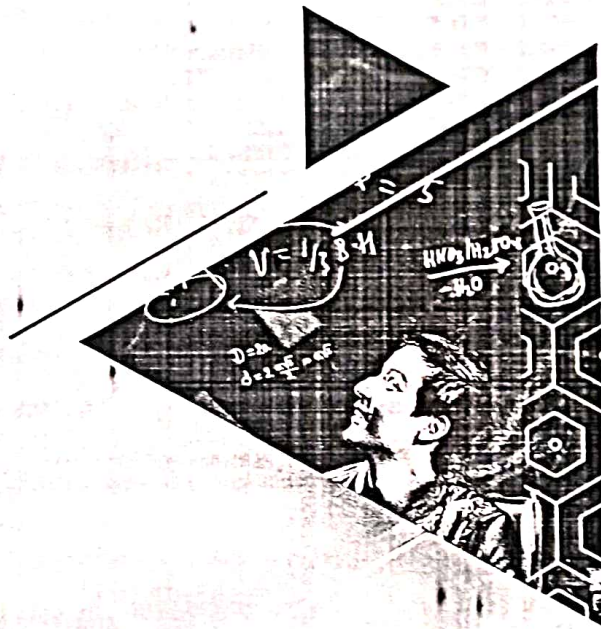


Business Mathematics

B.Com Sem II (CBCS)

Chaudhary Bansi Lal University Bhiwani



JBS Publishers
Faridabad



BUSINESS MATHEMATICS

(Chaudhary Bansi Lal University, B. Com-I, Sem- II)

Dr. Yogesh Kumar Goyal
(M.Sc., M.Phil, Ph.D.)
Aggarwal P.G. College
Ballabgarh (Haryana)

Dr. Seema Bansal
Assistant Professor
Department of Mathematics
Vaish College Bhiwani (Haryana)

Ritu
Assistant Prof.(JRF)
Department of Mathematics
Govt. College, for Women
Badhra (Charkhi Dadri)

Meenesh Kumari
Assistant Prof. (Extension)
Department of Mathematics
Ch. Bansi Lal Govt. College, Loharu

J.B.S. Publishers Faridabad (HRY)

JBS PUBLISHERS
Specimen Copy
Pr. Ritu

Published By:
J.B.S. Publishers and Distributors

jbspublisherfbid@gmail.com

(Mohit Communication Shop No. 16, Rama Dairy Market Sect-3 Faridabad)

Text to read free is available on the site jbspublishers.com

© All rights reserved

No part of the publications may be reproduced in any form by any means of electronic, mechanical, photocopy, recording or otherwise without the prior permission of the publisher. All disputes are subjected to Faridabad jurisdiction only.

Phone : 9467361123, 9868725603, 8010133360.

ISBN 978-93-84009-18-2

Edition 2022

Price ₹ 230/-

The work
needs of
introduc
easy lan
(as per f
of the te
text cov
univers
questio
illustra
chapter
and wi
The bo
Rewar

Object

* T
and to
* T
* M
* S
* S

Au
conv

BUSINESS MATHEMATICS

B.Com Sem-I

Faridabad (HR)

Yogesh Kumar Goyal
Archana Bhatia

Mukesh Bansal
Ritu
Vandana

Business Mathematics

(B.Com.1 Sem. I)

*Dr. Yogesh Kumar Goyal
(M.Sc., M.Phil, Ph.D.)
Aggarwal P.G. College
Ballabgarh (Haryana).*

*Dr. Archana Bhatia
Associate Professor
Deptt. of Commerce
DAV Cetenary College
Faridabad (Haryana)*

*Ritu
Asst. Professor (JRF)
GCW Badhra (Charkhi Dadri)*

*Pr. Mukesh Bansal
Deptt. of Commerce
Associate Professor
DAV Cetenary College
Faridabad (Haryana)*

*Vandana Kumari
(M.A., M. Phil., MCA)
D. N. College for Women
Faridabad*

JBS Publishers

Faridabad (HRY)

Published By:
J.B.S. Publishers and Distributors

Mohit Communications, shop No. 16, Rama dairy market Sector-3, Ballabgarh. (09716668074)

Faridabad (Haryana)

© All rights reserved

No part of the publications may be reproduced in any form by any means electronic, mechanical, photocopy, recording or otherwise without the prior permission of the author.

Phone : 08527187130, 9868725603.
e-mail : jbspublisherfbid@gmail.com

1st Edition 2010
IInd Edition 2011
IIIrd Edition 2012
IVth Edition 2013
VIIIth Edition 2016
Revised Edition 2019

Price ₹ 230/-

ISBN-978-93-84009-23-6

CHAPTER

1. SET

2. INDIC

3. LOG

4. SEQU

5. GEO

6. PER

7. DATA

8. GRA

Question

Role of State and Market :

In The Context of Indian Higher Education Sector

Edited By

Dr. Reena Singh

*Associate Professor & Head
Department of Economics
MMH College,
Ghaziabad (U.P.)*



Alankar Publishing House

Delhi

Role of State and Market :
In The Context of Indian Higher Education Sector

© : Author

First Edition : 2021

ISBN : 978-93-86817-49-5

Price : 595.00

Published by

Alankar Publishing House

1/9929, West Gorakh Park

Gali No. 3H, Shahdara, Delhi-110032

Mobile : 9810429755 / 9999163460

E-mail : alankar_books07@yahoo.com

Branch :

H.No.11, Bhaikhunthpur, Lalmati

Guwahati-781029 (Assam)

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording or any information storage and retrieval system, without permission in writing from the author.

Printed in India by Abhishek Tondon for Alankar Publishing House

Content

(v-vii)

Preface

Chapter- 1

State vs. Market : In the Context of Higher Education

Jyoti Atri 11

Chapter- 2

Privatization of Higher Education in India

Jyoti Atri 29

Chapter- 3

An Evaluation of New Education Policy in Context of Higher Education

Suman Rani 55

Chapter- 4

New Education Policy- A New Dawn

Anayatullah Nayaji 69

Chapter-5

New Education Policy and Challenges of Rural Students

Dr. Joginder Singh & Dr. Pramjeet Singh 81

Chapter-6

Globalization and Higher Education in India

Sanjeev Kumar 89

Chapter-7

Emerging Social & Economic Issues Due to Privatization of Higher Education in India

Jyoti Atri 109

MICRO ECONOMICS



Author:

Dr. Paramjeet Singh

Assistant Professor of Economics

Government College for Women Badhra Charkhi

Dadri Haryana

Dr. Pratibha

Department of Commerce

Assistant Professor

Vaish College Rohtak

VIKAS PUBLISHERS & DISTRIBUTORS

MICRO ECONOMICS

VIKAS PUBLISHERS & DISTRIBUTOR

A-5, Christian Colony Patel Chest
University of Delhi, Delhi-110007

Phone: 9918156302, 0455251733

E-mail: akhilesh_tiwari1979@yahoo.com,

santoshtiwari05712@gmail.com;

Website: www.theyoungantar.in

© 2023, Publisher

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information retrieval system, with written permission from the publishers.

First Edition: 2023

ISBN: 978-81-920322-9-0

Price : Rs. 500.00

Published By:

Vikas Publisher's & Distributors, Delhi-110007

The crystal structure, refinement and dielectric properties of Ba and Mn substituted bismuth ferrite

Cite as: AIP Conference Proceedings 2142, 040027 (2019); <https://doi.org/10.1063/1.5122364>
Published Online: 29 August 2019

Manisha Hantl, Sujata Sanghi, Ashish Agarwal, Sandhya Jangra, and Jogender Sangwan



View Full Article



Export Citation

ARTICLES YOU MAY BE INTERESTED IN

Electrical conductivity of magnesium ferrite prepared by sol-gel auto combustion technique
AIP Conference Proceedings 2142, 040004 (2019); <https://doi.org/10.1063/1.5122341>

Dielectric studies of multifunctional $\text{Bi}_{1-x}\text{Sm}_x\text{FeO}_3$ ($x = 0.0$ and 0.02) ceramics
AIP Conference Proceedings 2142, 040025 (2019); <https://doi.org/10.1063/1.5122362>

Rare earth (Er^{3+}) doped nickel zinc ferrite: Additional effects in structural and dielectric properties

AIP Conference Proceedings 2142, 040003 (2019); <https://doi.org/10.1063/1.5122340>

Lock-in Amplifiers up to 600 MHz

starting at

\$6,210



Zurich
Instruments

Watch the Video



The Crystal Structure, Refinement and Dielectric Properties of Ba and Mn Substituted Bismuth Ferrite

Manisha Rangi^{1,a)}, Sujata Sanghi^{2,b)}, Ashish Agarwal^{2,c)}, and Sandhaya Jangra^{2,d)},
Jogender Sangwan^{2,e)}

¹Department of Physics, Vaish College, Rohtak -124001, Haryana, India

²Department of Physics, Guru Jambheshwar University of Science and Technology, Hisar-125001, Haryana, India

^{a)}Corresponding author: mrangi100@gmail.com

^{b)}sutkash@yahoo.com

^{c)}aagju@yahoo.com

^{d)}sndh17@gmail.com

^{e)}jogy.sangwan@gmail.com

Abstract. The effect of Ba and Mn substitution on the crystal structure and dielectric properties of BiFeO₃ has been studied using X-ray diffraction at room temperature, Rietveld refinement and dielectric properties measurements technique. Single phase Bi_{0.8}Ba_{0.2}Fe_{1-x}Mn_xO₃ (x= 0.01, 0.05) multiferroics have been synthesized by two stage solid state reaction method. Rietveld refinement of both the samples revealed that the synthesized ceramics exhibit rhombohedral structure with space group R3c as of parent BiFeO₃. The dielectric response of both samples was analyzed in the frequency range 100 Hz–2 MHz at different temperatures revealing dispersion in dielectric constant (ϵ') and in dielectric loss ($\tan\delta$) at lower frequencies. Both ϵ' and $\tan\delta$ increase with increase of Mn content.

INTRODUCTION

Now a day, there has been revival of interest in multiferroics materials in which magnetism and ferroelectricity exists in single phase. Such materials are relatively rare and interesting due to the physics behind them [1, 2]. Among all multiferroic materials, Bismuth Ferrite has gain so much attention as it is the only known material which has ferroelectric and antiferromagnetic orders (ferroelectric Curie temperature $T_C \sim 1100\text{K}$ and high antiferromagnetic Neel temperature $T_N \sim 640\text{K}$) well above room temperature. This behavior makes it suitable for various practical applications like sensors, actuators, memory devices etc. BiFeO₃ (BFO) has a rhombohedrally distorted perovskite structure with space group R3c in which polar cation (Bi³⁺) is present at A-site and magnetic cation (Fe³⁺) at B-site with G-type antiferromagnetic order [3-4]. Apart from the positives BFO has some problems as well which are (i) it has spiral spin structure which inhibits the macroscopic magnetization (ii) synthesis of single phase BFO (iii) high leakage current and low electrical resistivity [3-5]. Many solutions have been tried up and among them ionic substitution is found to be suitable to minimize these issues. So in this present work, substitution of diamagnetic divalent ion i.e., Ba is done at Bi site and transition metal ion i.e., Mn at Fe site is done and there structural and dielectric properties has been studied.

EXPERIMENTAL DETAILS

Conventional two stage solid state reaction method has been employed to synthesize the Bi_{0.8}Ba_{0.2}Fe_{1-x}Mn_xO₃ (x=0.01, 0.05). The appropriate materials Bi₂O₃, BaCO₃, Fe₂O₃, and Mn₂O₃, ($\geq 99\%$ pure) reagents were taken in stoichiometric ratio, mixed properly and grounded in an agate mortar to obtain a homogenous mixture. These mixtures were calcined at 673 K for 4h at the rate of 5 K/min and grinding was again done for 1 hour to get

more homogeneous mixture. Final sintering was carried out at 1123 K for 4 hours for and cooled at room temperature to obtain a single phase perovskite. Structural Characterization was done by X-ray diffraction at room temperature. XRD patterns were collected by using RigakuMiniflex-II diffractometer with $\text{CuK}\alpha$ radiation ($\lambda = 1.54\text{\AA}$) in the 2θ range from 20° to 80° with the scanning rate of 2° min^{-1} at room temperature. Rietveld Refinement of XRD data has been carried out using FullProf program. The impedance measurement was performed using an impedance/gain phase analyzer (Newton's 4th Ltd.). Dielectric data was recorded in the frequency range of 100 Hz to 1 MHz and temperature range 313 K to 623 K.

RESULT AND DISCUSSION

XRD pattern of polycrystalline $\text{Bi}_{0.8}\text{Ba}_{0.2}\text{Fe}_{1-x}\text{Mn}_x\text{O}_3$ ($x=0.01$, and 0.05 and henceforth designated as Mn 01 and Mn 05 respectively) multiferroics (Figure 1) exhibit single phase perovskite structure with traces of impurity phases ($\text{Bi}_2\text{Fe}_4\text{O}_{10}$, $\text{Bi}_{23}\text{FeO}_{39}$). Absence of any 'extra peak in both the sample indicates that no complete structural transformation takes place.

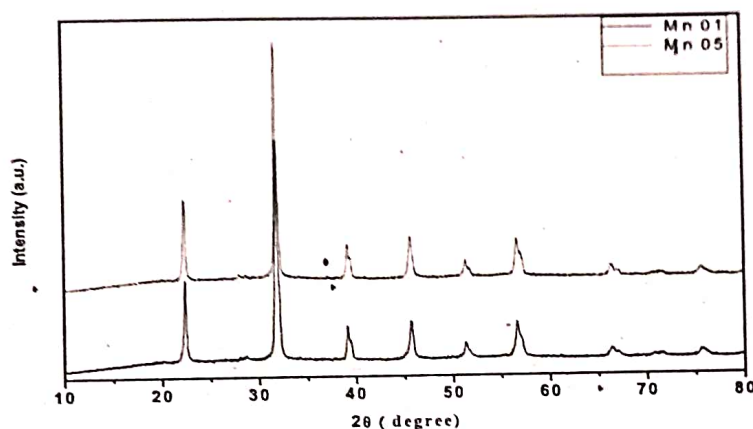


FIGURE 1. XRD patterns of $\text{Bi}_{0.8}\text{Ba}_{0.2}\text{Fe}_{1-x}\text{Mn}_x\text{O}_3$ ($x = 0.01$, and 0.05) multiferroic samples at room temperature.

In order to analyse the structural properties, the observed XRD patterns of both the samples have been refined using the Rietveld refinement method by FullProf program. Structure of $\text{Bi}_{0.8}\text{Ba}_{0.2}\text{FeO}_3$ has been ascribed to rhombohedral with space group $R3c$ as reported earlier [4]. The ground state space group does not change with Mn substitution which is also reported by Yin et al [6]. Therefore Rietveld refinement of Mn01, Mn 05 samples was performed using same space group i.e. $R3c$ and the structural model allow us to reproduce all the observed peaks. The observed, simulated and difference XRD pattern resulting from refinement are shown in Figure 2.

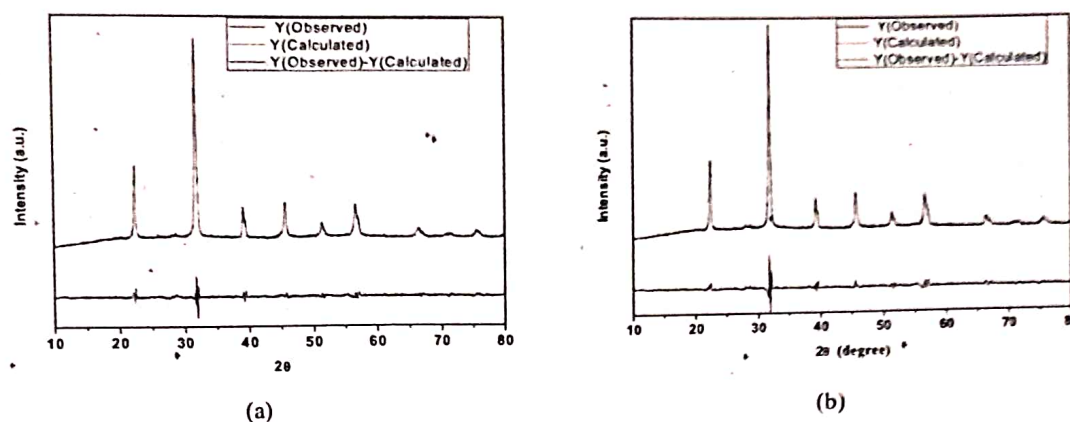


Figure 2. Observed, calculated and difference of Rietveld refined XRD patterns of $\text{Bi}_{0.8}\text{Ba}_{0.2}\text{Fe}_{1-x}\text{Mn}_x\text{O}_3$ (a) $x = 0.01$, (b) $x = 0.05$ samples.

The refined parameters are listed in table 1. With increase in the content of Mn, lattice parameters ' a ', ' c ' and volume decreased. But ionic radii of Mn^{3+} are same as that of Fe^{3+} i.e. 0.645 Å, which normally suggests that there should be no change in the lattice parameters with increase in the manganese content. But Fe and Mn are versatile species with multiple oxidation state, which points towards that Mn exists in Mn^{4+} state as also reported earlier [7].

TABLE 1. Refined structural parameters of $\text{Bi}_{0.8}\text{Ba}_{0.2}\text{Fe}_{1-x}\text{Mn}_x\text{O}_3$ samples only.

| Concentration | Mn=0.01 | Mn=0.05 |
|--------------------|--|--|
| Crystal Structure | Rhombohedral | Rhombohedral |
| Lattice parameters | $a = 5.6359 \text{ \AA}$ $c = 13.6926 \text{ \AA}$ $V = 376.661 \text{ \AA}^3$ | $a = 5.6314 \text{ \AA}$ $c = 13.6905 \text{ \AA}$ $V = 376.457 \text{ \AA}^3$ |
| Atomic Positions | Bi/Ba(0, 0, 0.2361) Fe/Mn(0, 0, 0) O(0.8018, 0.6270, 0.4288) | Bi/Ba(0, 0, 0.2391) Fe/Mn(0, 0, 0) O(0.7912, 0.6053, 0.4304) |
| R-factors | $R_p = 4.14$ $R_{wp} = 5.38$ $\chi^2 = 3.49$ | $R_p = 4.81$ $R_{wp} = 6.43$ $\chi^2 = 4.91$ |

Figure 3 represents the frequency dependence response of dielectric constant (ϵ') and dielectric loss ($\tan \delta$) for all the ceramics at different temperature. The dielectric constant for all the samples shows dispersion behaviour at low frequencies, and becomes constant at higher frequencies. Large values of ϵ' at low frequencies may be ascribed to the interfacial dislocations, oxygen vacancies, grain boundary effect etc., while as frequency is increased the charge carriers are not able to follow the applied external applied field and so there is a decrease in dielectric constant. This type of behaviour may be explained on the basis of Maxwell Wagner type interfacial polarization [8-9]. According to M-W model, the dielectric material is made up of well conducting layer of grains that are separated by grain boundaries which are highly resistive. At low frequency, grain boundaries have more impact than the grains and due to this charge accumulate near the boundary causes high dielectric constant. However at high frequency grains comes into play which in turn reduced the probability of hopping conduction mechanism, results in the decrement in dielectric constant in that region and become constant at high frequency regime [10]. Similar behavior was observed in dielectric loss. At low frequency, grain boundary offered high resistance leads to large energy dissipation and high value of dielectric loss. On the contrary, at high frequency low resistance is offered by grains, causes small value of dielectric loss [8-10].

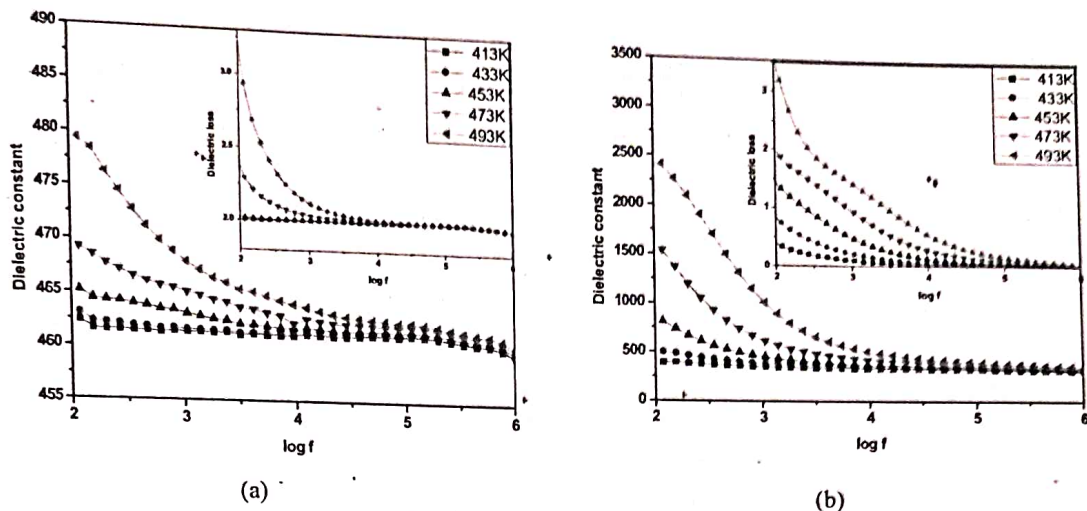


FIGURE 3. Frequency dependence of real part of dielectric constant (ϵ') and dielectric loss ($\tan \delta$) at inset of $\text{Bi}_{0.8}\text{Ba}_{0.2}\text{Fe}_{1-x}\text{Mn}_x\text{O}_3$ for (a) $x = 0.01$, (b) $x = 0.05$.

As the temperature increases, dielectric constant also increases due to the thermal conduction hopping mechanism. With increase in concentration of Mn dielectric constant increase appreciably which is the desirable result. Improvement in dielectric properties may be attributed to the suppression of oxygen vacancies created by the substitution of divalent ion (Ba^{2+}) in place of volatile trivalent ion (Bi^{3+}) by high valance of Mn ion to neutralise the charge [10, 11].

CONCLUSIONS

$\text{Bi}_{0.8}\text{Ba}_{0.2}\text{Fe}_{1-x}\text{Mn}_x\text{O}_3$ ($x=0.01, 0.05$) multiferroics were synthesized by solid state reaction method. XRD pattern and Rietveld refinement shows that all the samples are phase pure and crystallized in rhombohedral structure with space group R3c. Dispersive behavior of dielectric constant (ϵ') and dielectric loss ($\tan \delta$) is observed at low frequency. Improved dielectric properties are attributed to the suppression of oxygen vacancies by Mn ion.

ACKNOWLEDGMENTS

Authors are thankful to DST, New Delhi (FISTScheme) for providing XRD facilities

REFERENCES

1. W. Eerenstein, N.D. Mathur and J.F. Scott, *Nature* **442**, 05023 (2006).
2. F. Azough, R. Freer, M. Thrall, R. Cernik, F. Tuna and D. Collison, *J. Eur. Ceram. Soc.* **30**, 727 (2010).
3. N.A. Hill, *J. Phys. Chem. B* **104**, 6694 (2000).
4. V. A. Khomchenko, D. A. Kiselev, J. M. Vieira, L. Jian, A. L. Kholkin, A. M. L. Lopes, Y. G. Pogorelov, J. P. Araujo and M. Maglione, *J. Appl. Phys.* **103**, 024105 (2008).
5. M. Rangi, S. Sanghi, S. Jangra, K. Kaswan, A. Agarwal, *Ceram. Int.* **42**, 5043–5411 (2016).
6. L. H. Yin, W. H. Song, X. L. Jiao, W. B. Wu, X. B. Zhu, Z. R. Yang, J. M. Dai, R. L. Zhang and Y. P. Sun, *J. Phys. D: Appl. Phys.* **42**, 205402 (2009).
7. A. Ianculescu, F. P. Gheorghiu, P. Postolache, O. Oprea and L. Mitoseriu, *J. Alloys Compd.* **504**, 420–426 (2010).
8. K. W. Wagner, *Ann. Phys.* **40**, 817 (1913).
9. C. G. Koops, *Phys. Rev.* **83**, 121 (1951).
10. Reetu, A. Agarwal, S. Sanghi, Ashima and N. Ahlawat, *J. Appl. Phys.* **113**, 023908 (2013).
11. G. L. Yuan, S. W. Or, J. M. Liu and Z. G. Liu, *Appl. Phys. Lett.* **89**, 052905 (2006).

Structural, dielectric and magnetic properties of (Ho, Ti) modified BFO

Cite as: AIP Conference Proceedings 2142, 040028 (2019); <https://doi.org/10.1063/1.5122365>
Published Online: 29 August 2019

Jogender Singh, Ashish Agarwal, Sujata Sanghi, Manisha Rangi, Tanvi Bhasin, and Sandhaya Jangra



View Online



Export Citation

ARTICLES YOU MAY BE INTERESTED IN

The crystal structure, refinement and dielectric properties of Ba and Mn substituted bismuth ferrite

AIP Conference Proceedings 2142, 040027 (2019); <https://doi.org/10.1063/1.5122364>

Dielectric studies of multifunctional $\text{Bi}_{1-x}\text{Sm}_x\text{FeO}_3$ ($x = 0.0$ and 0.02) ceramics

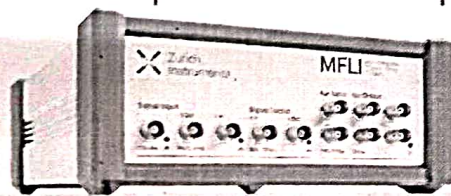
AIP Conference Proceedings 2142, 040025 (2019); <https://doi.org/10.1063/1.5122362>

Investigation of structural properties of a $\text{GaAs}_{1-x}\text{P}_x$ ternary semiconductor compound

AIP Conference Proceedings 2142, 040029 (2019); <https://doi.org/10.1063/1.5122366>

Lock-in Amplifiers up to 600 MHz

starting at
\$6,210



Zurich
Instruments

Watch the Video

Structural, Dielectric and magnetic Properties of (Ho, Ti) Modified BFO

Jogender Singh^{1*}, Ashish Agarwal¹, Sujata Sanghi¹, Manisha Rangi², Tanvi Bhasin¹, Sandhaya Jangra¹

¹Department of Physics, Guru Jambheshwar University of Science & Technology, Hisar-125001
(Haryana) India

²Department of Physics, Vats College, Rohtak 124001, India

*Email-joggy.sangwan@gmail.com

Abstract. $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$ multiferroics was synthesized by method of mixed-oxide route. The XRD, dielectric properties and magnetic measurements of the compound were carried out. The X-ray structural analysis shows mixed phase. Rietveld refinement of the XRD patterns deduce that the found it fit by the mixed phase setting of rhombohedral R3c and triclinic P1 space group. The change in crystal structure is attributed to the distortion of FeO_6 octahedra due to replacing a part of B-site Fe ions by Ti ions. Magnetic evaluation were performed at room temperature up to an external magnetic field of 16kOe. It was observed that the Ti co-doping shows a significant role for the improving multiferroics properties.

INTRODUCTION

The materials in which at least two of ferroelectric, ferromagnetic and ferro-elastic ordering exhibit in the same phases simultaneously have been under concentrated study recently [1-2]. These materials have great use in the large magneto electric effect and have potential application which include information storage, spintronic devices, sensors etc. BiFeO_3 (BFO) belongs to this class [3] at room temperature. It is only single phase fascinating multiferroic material because of its high ferroelectric Curie temperature, ($T_c=1143\text{ K}$) and antiferromagnetic (AFM) Neel temperature ($T_N=643\text{ K}$) [3-4]. The simultaneous doping of titanium and lanthanide can enhance together electrical and magnetic properties of BiFeO_3 . Some other exciting results also have been reported in literature for BiFeO_3 when codoped with La and Ti; Dy and Ti [5]. In this study, we have fabricated BiFeO_3 ceramics with codoping of Ho and Ti and found enhancement in electrical and magnetic properties.

Various attempts have been made by many researchers to enhance the multiferroics characteristics of BFO by co-doping at the sites A and B simultaneously. As Ho possesses high magnetic moment, so Bi has been substituted with it in the present work and therefore, co-doped BiFeO_3 ceramic samples in which doping is done by Ho at A-site and Ti at B-site.

EXPERIMENTAL DETAILS

High quality oxide powders of Bi_2O_3 , Ho_2O_3 , Ti_2O_3 and Fe_2O_3 procured from Sigma Aldrich, their particular amount in stoichiometric ratio was grounded thoroughly with the help of mortar and pestle for 2 hours and then calcinated for 3 hours at 400°C . The calcinated compound then grounded for 1 hour and sintered for 1 hour at 820°C in an alumina crucible. Structural analysis were performed using X-ray diffraction (XRD) using Rigaku-Miniflex II Desktop X-Ray diffractometer, scanning electron microscopy. The quality XRD pattern was further analyzed using a Rietveld refinement and Edper program in FullProf suite software. Micrographs evaluation were carried out using JEOL scanning electron microscope (SEM), respectively. Magnetization measurements were performed at room temperature using vibrating sample magnetometer (VSM) (model Lakeshore, 7304).

| Sample | Model | Cell (Å) | Atom | x | y | z | R-factor |
|--|-----------------|-----------------------------|-------|---------|---------|---------|--------------------------------|
| $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$ | R3c (66.42%) | a= 5.5693 | Bi/Ho | 0.0000 | 0.0000 | 0.02485 | $R_p=4.90$ |
| | | b= 5.5693 | Fe/Ti | 0.0000 | 0.0000 | 0.25115 | |
| | | c=13.6702 | O | -0.1984 | 1.6068 | 0.7148 | |
| | | V= 367.204(Å ³) | | | | | |
| | P1 (33.58%) | a= 4.3307 | Bi/Ho | 0.16159 | 7.85772 | 0.37914 | $R_{wp}=6.27$ $\chi^2=4.88$ |
| | | b= 4.0994 | Fe/Ti | 0.63868 | 8.46743 | 0.91230 | |
| | | c=3.8903 | O1 | 1.5028 | 1.8327 | 0.1741 | |
| | | V= 68.2819(Å ³) | O2 | 2.8796 | 0.7321 | -1.0982 | |
| | | | O3 | -1.2690 | 1.1918 | 5.6569 | |

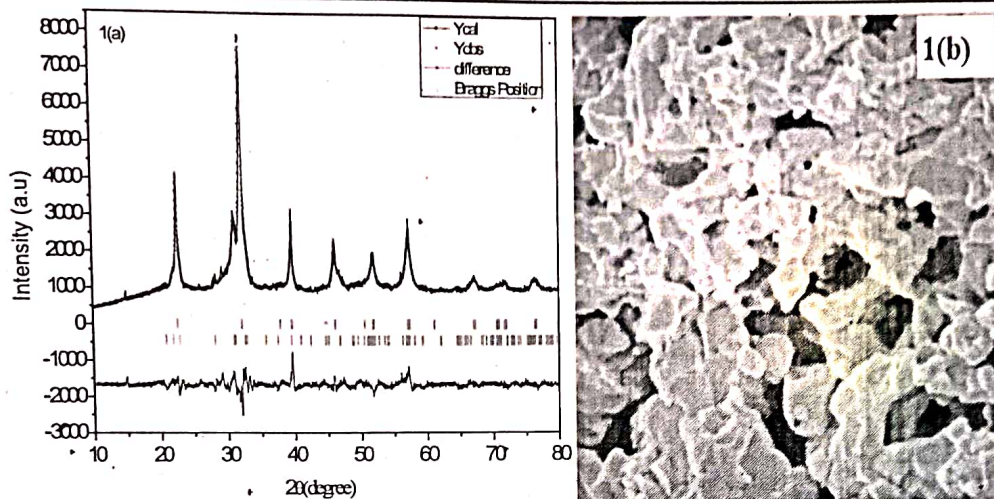


Fig 1. The Rietveld refined XRD patterns and 1(b) SEM micrographs of $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$ ceramic.

Fig. 1 shows the Rietveld refined XRD spectra of $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$. The Rietveld refinement of XRD pattern was best fitted by the mixed phase assumption including rhombohedral R3c ($\approx 66.42\%$) and triclinic P1 ($\approx 33.58\%$).

The parameters obtained from refinement are summarized in Table I.

Table 1. Rietveld refined structural parameters of $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$ of XRD.

Fig. 1(b) explain scanning electron micrographs (SEM) of $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$. The micrographs represent the dense and uniform morphology of the sample. It signifies that Ti doping suppresses the growth of grains resulting in small grain sizes of highly doped sample reflects in the SEM micrographs. Another possible reason of decrease in grain sizes is the dissimilarity in the ionic radius of Bi^{3+} and Ti^{3+} . Earlier studies suggested that the reduction in the grain size is ascribed to the suppression of oxygen vacancies with the Ti-doping. Since the motion of oxygen vacancies during the sintering mechanism are responsible for growth of grains. Structural symmetry for (Ni, Co, Cd, Nd, Ho with Ti)-co-doped BFO is summarized in Table 2.

TABLE 2. Structural symmetry for (Ni, Co, Cd, Nd, Ho with Ti) co-doped BFO is summarized.

| S. No. | Compounds Name | XRD Structure | Average Crystallite Size | Reference |
|--------|--|----------------------------------|--------------------------|--------------|
| 1. | $\text{Bi}(\text{Ni}_{1/4}\text{Ti}_{1/4}\text{Fe}_{1/2})\text{O}_3$ | Orthorhombic Symmetry | 28 nm | [2] |
| 2. | $\text{Bi}(\text{Ni}_{0.45}\text{Ti}_{0.45}\text{Fe}_{0.10})\text{O}_3$ | Tetragonal Symmetry | 30 nm | [4] |
| 3. | $\text{Bi}(\text{Ni}_{0.40}\text{Ti}_{0.40}\text{Fe}_{0.20})\text{O}_3$ | Orthorhombic Symmetry | 36 nm | [1] |
| 4. | $\text{Bi}(\text{Co}_{1/4}\text{Ti}_{1/4}\text{Fe}_{1/2})\text{O}_3$ | Orthorhombic Symmetry | 30 nm | [3] |
| 5. | $\text{Bi}_{0.90}\text{Nd}_{0.10}\text{Fe}_{0.93}\text{Ti}_{0.07}\text{O}_3$ | Triclinic Symmetry | -- | [5] |
| 6. | $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$ | Triclinic+ Orthorhombic Symmetry | 26 nm | Present work |

MAGNETIC ANALYSIS

Prestine BFO exhibiting a spatially modulated spin configuration along with G-type antiferromagnetic ordering which does not permit the resulting net magnetization [2]. On the basis of various reports it is concluded that Tico-doping at B-site of BFO is very effective in order to enhance the magnetic properties of BFO. Fig. 2 shows *M-H* hysteresis curves of the synthesised sample with a maximum field of ± 10 kOe at room temperature. The magnetic parameters calculated from *M-H* loop and comparison with published report are listed in Table 3.

TABLE 3. Comparison between magnetic parameters for co-doping (Ti) BFO.

| S. No. | Compounds Name | Magnetic Parameters | | Reference |
|--------|--|---------------------|------------|--------------|
| | | M_s (emu/g) | H_c (Oe) | |
| 1. | $\text{Bi}(\text{Ni}_{1/4}\text{Ti}_{1/4}\text{Fe}_{1/2})\text{O}_3$ | 0.131 | 298.98 | [2] |
| 2. | $\text{Bi}(\text{Ni}_{0.40}\text{Ti}_{0.40}\text{Fe}_{0.20})\text{O}_3$ | 0.363 | 389 | [1] |
| 3. | $\text{Bi}(\text{Co}_{1/4}\text{Ti}_{1/4}\text{Fe}_{1/2})\text{O}_3$ | 2.66 | 653.75 | [3] |
| 4. | $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$ | 0.144 | 67.77 | Present work |

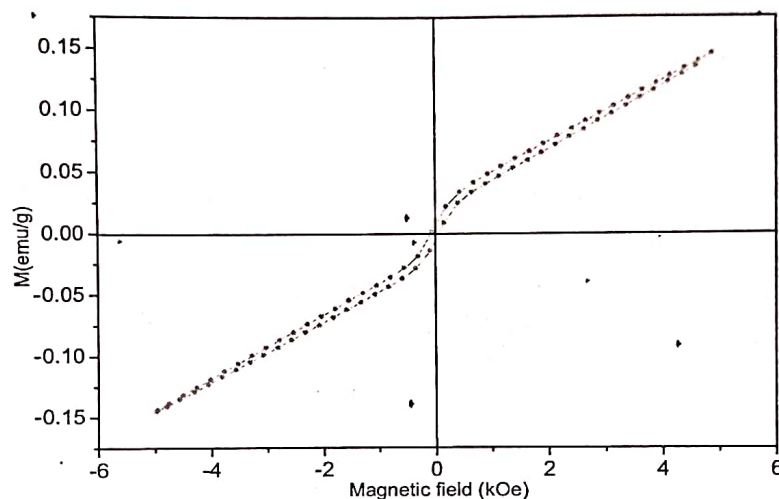


Fig 2 M-H hysteresis loop recorded at room temperature of $\text{Bi}_{0.80}\text{Ho}_{0.20}\text{Fe}_{0.80}\text{Ti}_{0.20}\text{O}_3$

REFERENCES

1. N.Kumar, A. Shukla, R.N.P. Choudhary, J Mater Sci: Mater Electron **28**, 6673(2017).
2. A. Shukla, N. Kumar, C. Behera, R.N.P Choudhary, J. Mater. Sci. Mater. Electron. **27**, 1209(2015)
3. A. Shukla, N. Kumar, C. Behera, R.N.P Choudhary, J. Mater. Sci. Mater. Electron. **27**, 7115(2016)
4. F. Beshkar, S. Z. Ajabshir, M. S. Niasari, J. Mater. Sci. Mater. Electron. **26** 5043(2015)
5. M. Yadav, A. Agarwal, S. Sanghi, R. K. Kotnala, J. Shah, T. Bhasin, M. Tuteja, J. Singh, J Alloys Compd. **750**, 848(2018)

Gandhi and Global Peace गाँधी और विश्व शांति

Editor

Prof. Subhash Chander Dabas

Prof. Sanjay Kumar

ANN-III(B)

[Signature]



SHIVALIK PRAKASHAN

Dehra

Bharat

[Signature]

First Edition : 2022

ISBN : 978-93-91214-21-0

Price : 1295/-

No part of this book may be reproduced or utilized in any form or by any means without prior permission from the Author.

© Contributors

Publisher:

SHIVALIK PRAKASHAN

4648/21, Ansari Road

Delhi-110002

Phone : 011-42351161

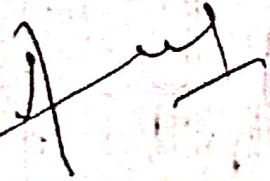
Mob. : +91-9811693579

E-mail : shivalikprakashan@gmail.com

Branch Office

Plot No. 394, Sanjay Nagar Colony

Pahriya, Ramdattpur, Varanasi, Uttar Pradesh



Published in India

Published by Virendra Tiwari for Shivalik Prakashan,
4648/21, Ansari Road, Delhi-110002. Type Setting Friends
Graphics and Printed by R.K. Offset Printers, Delhi.

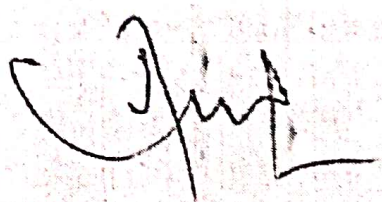
Gandhi and Global Peace

गान्धी और विश्व शांति

Editors :

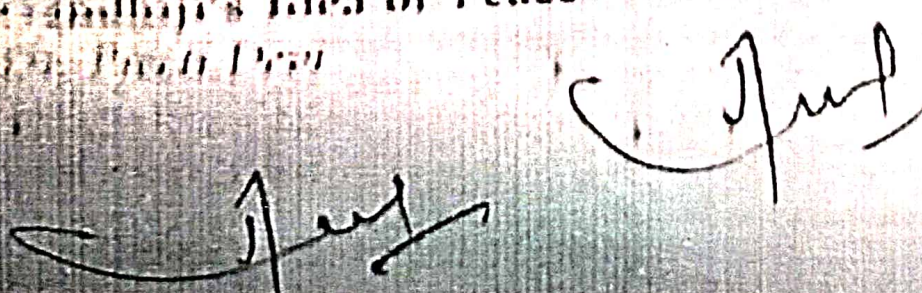
Prof Subhash Chander Dabas
and

Prof. Sanjay Kumar

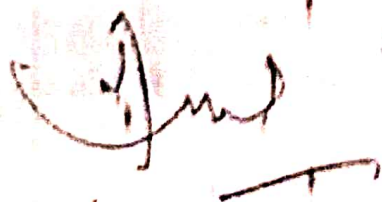


Contents

| | |
|---|----|
| Preface | v |
| 1. Relating Gandhi's Focus on Decentralization and Nonviolent Peace to Issues of Nonviolence, Globalism, and Global Peace | 1 |
| Prof. Douglas Allen | |
| 2. Gandhi, Truth and Terrorism | 18 |
| Prof. Mark Juergensmeyer | |
| 3. Gandhiji's Search for the Individual's Moral Foundations | 33 |
| Prof. Gianluigi Segalerba & Kathrin Bouvot | |
| 4. Truth, God and Justice: Walking and Meditating with Gandhi | 47 |
| Prof. Ananta Kumar Giri | |
| 5. Relevance of Gandhi's Ahimsa in Modern World: Cultural Identity and Social Responsibility | 58 |
| Prof. Uday & Dhanuolalu Panmei | |
| 6. Mohandas Karamchand Gandhi: From Local to Global | 67 |
| Dr. Lachman Gopal Tyagi | |
| 7. How Gandhian Views on Labour are Relevant in Present Context? | 72 |
| Anurag Singh | |
| 8. Accelerating Nation's Growth Through Adopting Gandhiji's Idea of Peace | 82 |
| Dr. Pooja Devi | |

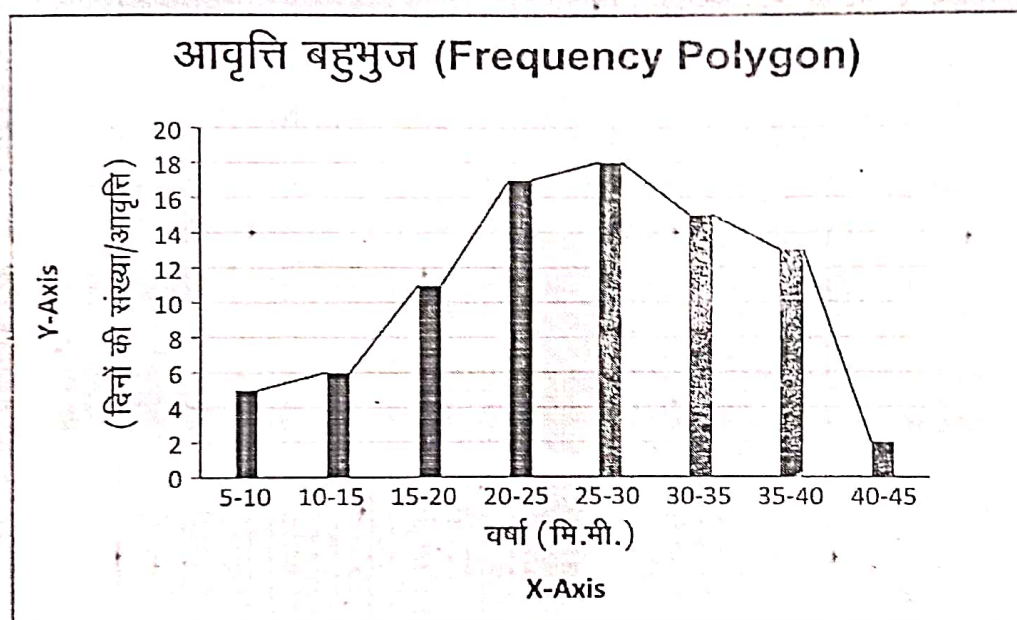


| | |
|---|-----|
| 11. नफरत से सन्तुष्ट | 201 |
| डॉ. लक्ष्मण तिवारी | |
| 12. गाँधी: एक वैश्विक विचारधारा | 210 |
| डॉ. अनिल कुमार | |
| 13. महात्मा गाँधी और विश्व शांति | 216 |
| डॉ. साधना तोगर | |
| 14. विश्व शान्ति पर गाँधी जी के विचारों की प्रासंगिकता | 220 |
| डॉ. जसवेन्द्र सिंह | |
| 15. स्वातंत्र्योत्तर हिन्दी नाटकों में अभिव्यक्त गाँधीवादी विचार | 226 |
| डॉ. राजवीर वर्मा | |
| 16. कलम के जरिए शांति का संदेश | 234 |
| डॉ. अटल तिवारी | |
| 17. गाँधी जी की विकेंद्रीकरण की अवधारणा और विश्व शान्ति | 246 |
| डॉ. सुरेंद्र सिंह | |
| 18. गाँधी का वैश्विक परिदृश्य | 254 |
| डॉ. कुसुम लता | |
| 19. शान्तिदूत महात्मा गाँधी | 260 |
| डॉ. मानवेश नाथ दास | |
| 20. गाँधी और उनके हरिजन समाज के उत्थान के प्रयास और कार्य- मावी समाज सुधारों के लिए एक दृष्टिकोण | 265 |
| डॉ. अरविन्द | |
| 21. वैश्विक शान्ति के गाँधीवादी उपाय | 272 |
| डॉ. अमित कुमार पाण्डेय | |



पेरियार

भूगोल में सांख्यिकीय विधियाँ



डॉ० अनिल कुमार सांगवान

Publisher & Distributor :

Periyar Prakashan

A/44, Ashokpuri Colony,
Khajpura, Patna-800014

Mob. : +91-9263544674
+91-8285348797

ISBN : 9789385675171

First Edition : 1 January, 2023

©: Author

Price : Rs. 389.00

Statistical Methods in Geography

DIFFERENTIAL EQUATION WITH NUMERICAL METHODS

Author

Dr. Garima Kumari (NET, PhD)
Assistant Professor - Mathematics, GCW Badhra, Charkhi Dadri (Haryana)

Mrs. Seema Duhan
(Pursuing PhD) Assistant Professor in Mathematics,
JLN Government College, seemaduhan89@gmail.com

Sh. Kamal
Assistant Professor of Mathematics
Govt College For Women Badhra, Charkhi Dadri (Haryana)
sahjukamal@gmail.com

Mr. Baldev (Net)
Mathematics Department, baldevsir111@gmail.com

Mrs Richa Rani
(Net, Pursuing PhD) Assistant Professor
in Mathematics, Government College Hisar
richasardana7@gmail.com



**HORIZON
BOOKS**
(A DIVISION OF IGNITED MINDS EDUTECH (PVT) LTD)
www.horizonbooks.in

Disclaimer

The contents and context of this book are written by the author. Although every care has been taken to avoid errors and Omissions. This compendium is being published on the condition and understanding that the information given in this book is merely for reference and must not be taken having authority of binding way the author, editors or publisher.

Copyright © 2022 Author
ISBN- 978-93-91150-35-8

Printed and Published by:
HORIZON BOOKS
(A DIVISION OF IGNITED MINDS EDUTECH PVT. LTD)
www.horizonbooks.asia

MRP: ₹ 549/-

ALL RIGHTS RESERVED.

No part of this publication may be reproduced or stored in a retrieval system or transmitted in any form or by any means electronic or mechanical, photocopying, recording or otherwise without the prior written permission of the publisher.

iii

Table of Contents

| PREFACE | | iv |
|-------------|--|----------|
| Chapter No. | Chapter Name | Page No. |
| 1 | A STUDY OF FUZZY GRAPH ENERGY AND ITS APPLICATIONS Mr. Baldev | 1-17 |
| 2 | METHODS OF GROUP TRANSFORMATION IN THE INVESTIGATION OF SOME FLUID FLOW PROBLEMS Mr. Baldev | 18-33 |
| 3 | USING SPLINE COLLOCATION, A NUMERICAL STUDY OF ENGINEERING BOUNDARY VALUE PROBLEMS Mrs. Richa Rani | 34-43 |
| 4 | A STUDY OF GRAPHS IN CERTAIN KINDS OF DOMINANCE Mrs. Seema Duhan | 44-62 |
| 5 | A COMPARISON OF HERMITEGALERKIN METHODS FOR NUMERICAL SOLUTION OF SECOND ORDER BOUNDARY VALUE PROBLEMS WITH OTHER NUMERICAL METHODS Mrs. Richa Rani | 63-76 |
| 6 | A STUDY OF USING THE ADOMIAN DECOMPOSITION METHOD IN FRACTIONAL DIFFERENTIAL EQUATIONS OF FLOW PROBLEMS Dr. Garima Kumari | 77-98 |
| 7 | A STUDY OF DIMENSIONAL ANALYSIS AND DIFFERENTIAL EQUATIONS Dr. Garima Kumari | 99-121 |
| 8 | AN ALGEBRAIC AND GRAPH THEORETIC STUDY OF POSETS AND RELATED ASPECTS Mrs. Seema Duhan | 122-139 |
| 9. | A STUDY ON GRAPHS FROM THE RING OF MATRICES Mr. Kamal | 143-161 |
| 10. | APPLICATIONS OF ALGEBRAIC CONCEPTS OF HYDROCARBON IN GRAPH THEORY Mr. Kamal | 162-183 |

[Back](#)

Advertiser

Chapter in Edited Book

Chapter 13

**Functionalized Nanomaterials for Catalytic Application:
Trends and Developments**

Meena Kumari ✉ Badri Parshad, Jaibir Singh Yadav, Suresh Kumar ✉

Book Editor(s): Chaudhery Mustansar Hussain, Sudheesh K. Shukla, Bindu Mangla

First published: 14 June 2021 | <https://doi.org/10.1002/9781119809036.ch13> | Citations: 1 Get access to this single chapter. View access options below.**Institutional Login**Access through your
Institution**Purchase single chapter**☐ 48-Hour online
access \$10.00

Details

☐ Online-only access \$18.00

Details

Log in to Wiley Online LibraryIf you have previously obtained access with your
personal account, please log in.Functionalized
Nanomaterials for Catalytic
Application

References Related Information

RecommendedPreparation and CatalyticPerformance of Carbon NanotubeSupported Palladium CatalystYan Zhang, Wei Chu, Lijuan Xie,
Wenjing Sun

Chinese Journal of Chemistry

One-pot and Environmentally FriendlySynthesis of New Spiroindolones

[Back](#)

One account for all your research.

Wiley Online Library is part of the CONNECT Network.

[Details](#)[Check out](#)

Summary

Catalysis by functionalized nanomaterials is the contemporary discipline of nanoscience which is expanding exceptionally to meet the upcoming global demands of mankind. Nanocatalysts, being lying at the frontier of homogeneous and heterogeneous catalysts, offer multiple benefits of atom economy, remarkable stability, enhanced activity, better selectivity, recoverability, reusability, and energy efficiency, thereby allowing optimum feedstock utilization and minimal chemical waste. However, with time, it was diagnosed that some of these very active nanocatalysts suffer with the limitation of stability causing them to agglomerate during catalysis, which was later resolved to a great extent by modifying their surface composition via functionalization. The functionalization of these nanocatalysts with various biocompatible and active species serving as weak ligands not only enhances their stability and selectivity but also facilitates their easy separation along with preventing their undue coagulation during catalysis. Besides these, the functionalization of nanomaterials also has considerable effect reflected in their structure, morphology, optical, electrical, magnetic, and other properties owing to the novel theory of quantum effects, enabling a control of their catalytic activity.

Catalysts

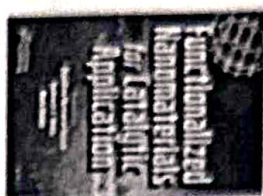
Allmorad Rashidi, Ziba Tavakoli,
Yaser Tarak, Saeed Khodabakhshi,
Masoud Khaleghi Abbasabadi

Journal of the Chinese Chemical Society

Carbon Nanotubes Loaded on

Graphene Microfolds as Efficient
Bifunctional Electrocatalysts for the
Oxygen Reduction and Oxygen
Evolution Reactions

Advertisement



Functionalized Nanomaterials for Catalytic Application

Editor(s): Chaudhery Mustansar Hussain, Suchneesh K. Shukla, Bindu Mangla

First published: 14 June 2021

Print ISBN: 9781119808978 | Online ISBN: 9781119809036

| DOI: 10.1002/9781119809036

© 2021 Scrivener Publishing LLC


About this book

This is the first handbook that provides an integrated approach for functionalized nanomaterials (FNMs) based catalytic materials.


With the rapid development in nanotechnology, it is now possible to modulate the physical and chemical properties of nanomaterials with molecular recognition and catalytic ... Show all

Table of Contents

Export Citation(s)

 Buy this Book

 Contact your account manager

 For authors

 Free Access

Front Matter (Pages: i-xviii)

Summary PDF Request permissions

CHAPTER 1

**Functionalized Nanomaterial (FNM)-Based Catalytic Materials for Water Resources
(Pages: 1-51)**

S. Sreevidya, Kirtana Sankara Subramanian, Yokraj Katre, Ajaya Kumar Singh, Jai Singh

Summary PDF References Request permissions

CHAPTER 2

**Functionalized Nanomaterial (FNM)-Based Catalytic Materials for Energy Industry
(Pages: 53-88)**

Amarpreet K. Bhatia, Shippi Dewangan, Ajaya K. Singh, Sónia. A.C. Carabineiro

Summary PDF References Request permissions

CHAPTER 3

**Bionanotechnology-Based Nanopesticide Application in Crop Protection Systems
(Pages: 89-107)**

Abhisek Saha

Summary **PDF** **References** **Request permissions**

CHAPTER 4

Functionalized Nanomaterials (FNMs) for Environmental Applications (Pages: 109-134)

M.B. Bhavya, Swarnalata Swain, Prangya Bhol, Sudesh Yadav, Ali Altaee, Manav Saxena, Pramila K. Misra, Akshaya K. Samal

Summary **PDF** **References** **Request permissions**

CHAPTER 5

Synthesis of Functionalized Nanomaterial (FNM)-Based Catalytic Materials (Pages: 135-168)

Swarnalata Swain, Prangya Bhol, M.B. Bhavya, Sudesh Yadav, Ali Altaee, Manav Saxena, Pramila K. Misra, Akshaya K. Samal

Summary **PDF** **References** **Request permissions**

CHAPTER 6

Functionalized Nanomaterials for Catalytic Applications—Silica and Iron Oxide (Pages: 169-184)

Deepali Ahluwalia, Sachin Kumar, Sudhir G. Warkar, Anil Kumar

Summary **PDF** **References** **Request permissions**

CHAPTER 7

Nanotechnology for Detection and Removal of Heavy Metals From Contaminated Water (Pages: 185-226)

Neha Rani Bhagat, Arup Giri

Summary **PDF** **References** **Request permissions**

CHAPTER 8

Nanomaterials in Animal Health and Livestock Products (Pages: 227-250)

Devi Gopinath, Gauri Jairath, Gorakh Mal

Summary **PDF** **References** **Request permissions**

CHAPTER 9

Restoring Quality and Sustainability Through Functionalized Nanocatalytic Processes (Pages: 251-259)

Nitika Thakur, Bindu Mangla

Summary **PDF** **References** **Request permissions**

CHAPTER 10

Synthesis and Functionalization of Magnetic and Semiconducting Nanoparticles for Catalysis (Pages: 261-302)

Dipti Rawat, Asha Kumari, Ragini Raj Singh

Summary **PDF** **References** **Request permissions**

CHAPTER 11

Green Pathways for Palladium Nanoparticle Synthesis: Application and Future Perspectives (Pages: 303-328)

Arnab Ghosh, Rajeev V. Hegde, Sandeep Suryabhan Gholap, Siddappa A. Patil, Ramesh B. Dateer

Summary **PDF** **References** **Request permissions**

CHAPTER 12

Metal-Based Nanomaterials: A New Arena for Catalysis (Pages: 329-353)

Vats Monika, Sharma Gaurav, Varun Sharma, Varun Rawat, Kamalakanta Behera, Arvind Chhabra

Summary **PDF** **References** **Request permissions**

CHAPTER 13

Functionalized Nanomaterials for Catalytic Application: Trends and Developments (Pages: 355-415)

Meena Kumari, Badri Parshad, Jalbir Singh Yadav, Suresh Kumar

Summary **PDF** **References** **Request permissions**

CHAPTER 14

Carbon Dots: Emerging Green Nanoprobes and Their Diverse Applications (Pages: 417-492)

Shweta Agarwal, Sonika Bhatia

[Summary](#) [PDF](#) [References](#) [Request permissions](#)[Free Access](#)[Index \(Pages: 493-503\)](#)[First Page](#) [PDF](#) [Request permissions](#)[ABOUT WILEY ONLINE LIBRARY](#)[Privacy Policy](#)[Terms of Use](#)[About Cookies](#)[Manage Cookies](#)[Accessibility](#)[Wiley Research Data Statement
and Publishing Policies](#)[Developing World Access](#)[HELP & SUPPORT](#)[Contact Us](#)[Training and Support](#)[DMCA & Reporting Piracy](#)[OPPORTUNITIES](#)[Subscription Agents](#)[Advertisers & Corporate Partners](#)[CONNECT WITH WILEY](#)[The Wiley Network](#)[Wiley Press Room](#)

Functionalized Nanomaterials for Catalytic Application: Trends and Developments

Meena Kumari^{1*}, Badri Parshad², Jaibir Singh Yadav³ and Suresh Kumar^{4†}

¹Department of Chemistry, Govt. College for Women, Badhra,
Charkhi Dadri, Haryana, India

²Department of Chemical Engineering and Biotechnology,
University of Cambridge, Cambridge, United Kingdom

³Department of Chemistry, AIJHM PG College Rohtak, Haryana, India

⁴Department of Chemistry, Kurukshetra University, Kurukshetra, Haryana, India

Abstract

Catalysis by functionalized nanomaterials is the contemporary discipline of nano-science which is expanding exceptionally to meet the upcoming global demands of mankind. Nanocatalysts, being lying at the frontier of homogeneous and heterogeneous catalysts, offer multiple benefits of atom economy, remarkable stability, enhanced activity, better selectivity, recoverability, reusability, and energy efficiency, thereby allowing optimum feedstock utilization and minimal chemical waste. However, with time, it was diagnosed that some of these very active nanocatalysts suffer with the limitation of stability causing them to agglomerate during catalysis, which was later resolved to a great extent by modifying their surface composition via functionalization. The functionalization of these nanocatalysts with various biocompatible and active species serving as weak ligands not only enhances their stability and selectivity but also facilitates their easy separation along with preventing their undue coagulation during catalysis. Besides these, the functionalization of nanomaterials also has considerable effect reflected in their structure, morphology, optical, electrical, magnetic, and other properties owing to the novel theory of quantum effects, enabling a control of their catalytic activity.

This Chapter will cover nanocatalysis, factors affecting catalytic performance, different functionalization strategies and application of these functionalized nanocatalysts in various fields.

*Corresponding author: jakhar7meena@gmail.com

†Corresponding author: suresh_dua47@rediffmail.com

Chaudhery Mustansar Hussain, Sudheesh K. Shukla and Bindu Mangla (eds.) Functionalized Nanomaterials for Catalytic Application, (355–416) © 2021 Scrivener Publishing LLC

PROOF