Anekant Education Society's
Jaysingpur College, Jaysingpur
FACULTY OF COMMERCE
2018-19

17th Sept. 2018

Guest Lecture on Entrepreneurial Skills

Faculty of Commerce organized lecture on 'Entrepreneurial Skills' on 17th Sept. 2018 for B. Com. II and B. Com. III students.Dr. N. L. Kadam introduced and welcomed the Chief Guest Mr. Narendra Ambi, Promotion Manager of Samrudhi Industries.

Chief Guestshared his thoughts regarding Samruddhi industries and TBI Foundation. He guided to the students regarding Skill Development, Entrepreneurship Development, various internship opportunities and the objective of forming Samrudhi TBI Foundation for start up project. As well as he stated the online courses offered by different authorities even from abroad such as Singapore,Hongkong, China etc. which are signed MOU's with TBI. He motivated the students to actively participate in internship and get the benefits given by this industry.This foundation will help to develop the career of the students having some different talent, innovative skill and idea.STBI Foundation has created a website 'JugadFunda' where they can seek guidance.

Mrs. S. R. Nakate extended vote of thanks. Total 74 students were attended for this lecture.




Welcome to Chief Guest Dr. N L Kadam.Mr. Narendra Ambi

Lecture by:Active participation of the students

Vote of thanks by Mrs. S R Nakate.

Anekant Education Society's
Jaysingpur College, Jaysingpur
FACULTY OF COMMERCE
2018-19

17th Sept. 2018

Guest Lecture on Job Opportunities in Commerce

Faculty of Commerce organized lecture on 'Job opportunities in Commerce' on 17th Sept. 2018 for B. Com. I students. Dr. N. L. Kadam introduced and welcomed the Chief Guest Mr. Narendra Ambi, Promotion Manager of Samrudhi Industries.

Chief Guestshared his thoughts regarding Samruddhi industries and TBI Foundation. He guided to the students regarding Skill Development, Entrepreneurship Development, various internship opportunities and the objective of forming Samrudhi TBI Foundation for start up project. As well as he stated the online courses offered by different authorities even from abroad such as Singapore, Hongkong, China etc. which are signed MOU's with TBI. He motivated the students to actively participate in internship and get the benefits given by this industry. This foundation will help to develop the career of the students having some different talent, innovative skill and idea. STBI Foundation has created a website 'JugadFunda' where they can seek guidance.

Miss. A. J. Kamble extended vote of thanks. Total 112 students were attended for this lecture.




Welcome to Chief Guest Dr. N L Kadam. Lecture by: Mr. Narendra AmbiGuestof students Guidance by Chief Active participation

Anekant Education Society's
Jaysingpur College, Jaysingpur
FACULTY OF COMMERCE
2018-19

19th Sept. 2018

Guest Lecture on Job Opportunities in Commerce

Faculty of Commerce organized lecture on 'Job opportunities in Commerce' on 19th Sept. 2018 for M. Com. I students. Dr. N. L. Kadam introduced and welcomed the Chief Guest Mr. Narendra Ambi, Promotion Manager of Samrudhi Industries.

Chief Guestshared his thoughts regarding Samruddhi industries and TBI Foundation. He guided to the students regarding Skill Development, Entrepreneurship Development, various internship opportunities and the objective of forming Samrudhi TBI Foundation for start up project. As well as he stated the online courses offered by different authorities even from abroad such as Singapore, Hongkong, China etc. which are signed MOU's with TBI. He motivated the students to actively participate in internship and get the benefits given by this industry. This foundation will help to develop the career of the students having some different talent, innovative skill and idea. STBI Foundation has created a website 'JugadFunda' where they can seek guidance.

Mr. N. B. Gangdhar extended vote of thanks. Total 37 students were attended for this lecture.




Welcome to Chief Guest Dr. N L Kadam.

Lecture by: Mr. Narendra Ambi

Guidance by Chief Guest

Active participation of students

Anekant Education Society's

Jaysingpur College, Jaysingpur

DEPARTMENT OF COMMERCE, MANAGEMENT & ACCOUNTANCY
&
COMMERCE ASSOCIATION – 2017-18

Faculty Visit to Samrudhi TBI Foundation

17th January, 2018

Faculty of Commerce visited on 17th January, 2018 to Samruddhi TBI Foundation for the discussion on development of entrepreneurial talent among the college students. As a part of Corporate Social Responsibility all the faculty members from various colleges gathered to know the object of this workshop. Under the guidance of Mr. Omprakash Malu (Founder of Samruddhi Industries) and Mr. Manish Patil (Coordinator of Samruddhi Industries). Mr. Manish Patil (Coordinator of Samruddhi Industries) discussed with faculty members about startup India which is the project of Government.

Mr. Patil guided the faculty members about what is the motto of this TBI Foundation, what is the Government project and prospects for startup India, what is the role of faculty members in this project, what is the actual role and part of the students who are interested to develop their future as a businessman.

The student who has something different talent, innovative skill that if he has only idea this industry will give each and every support to start and develop his vision. For securing his idea they have created 'Jugad Funda' where they put their idea safe and there will be no any misuse of anyone's idea.

This workshop is good transformer of such students who are seeking to guidance to be an entrepreneur. Mrs. Nakate S. R. and Mr. Gangdhar N. B. visited to this industry.

Anekant Education Society's

Jaysingpur College, Jaysingpur

DEPARTMENT OF COMMERCE, MANAGEMENT & ACCOUNTANCY
&
COMMERCE ASSOCIATION – 2017-18

Visit to Dr. J J Magdum College of Engineering for
"Innovation and Entrepreneurship Awareness Programme"

6th February, 2018

Students from B. Com. II and B. Com. III visited to Dr. J J Magdum College of Engineering for Innovation and Entrepreneurship Awareness Programme on 6th February. 2018. This activity was conducted by Samruddhi TBI Foundation. In this programme all students who are involved in Samruddhi TBI Foundation as entrepreneurial development activity are gathered. This programme means direct guidance to the students in detail about Samruddhi TBI Foundation and its mission. Mr. Manish Patil (Coordinator of Samruddhi Industries) discussed with students about Samruddhi and startup India which is the project of Government.

In this programme students get clear about their doubts. More than 100 students were participated in this programme where 34 students and 2 faculties were from this college. This programme was really beneficial for the students.

Jaysingpur College Jaysingpur and

Anil alias Pintu Amgdum Memorial Pharmacy College, Dharangutti

Outward No. AAPM/2020/001 Date- 01.01.2020

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is made at Dharangutti on **1st January 2020** between Jaysingpur College, Jaysingpur and Dr. J.J.Magdum Trust's, Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti.

The multi disciplinary and multi institutional approach is necessary in the field of teaching, learning and research to enhance the quality for the said cause, Dr. Mrs. Manisha V. Kale, Head, Department of Botany, Jaysingpur College, Jaysingpur will represent Jaysingpur College, Jaysingpur henceforth will called as party I and Dr. Nitave S.A. Principal, Dr. J.J.Magdum Trust's, Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti, Jaysingpur, henceforth it will be called as party II.

The party I wish to extend its cooperation and exchange of faculty, authentification of plants and sharing of research facilities. The party II has specialized required for high quality research in crude drugs, raw materials, laboratory sharing and collaborative research on projects for pharmacy students and Teachers. In addition to that there will be faculty exchange programme in both institutes.

The faculty and students from party II will visit the party I college laboratory for academic exchange or sharing of research facilities. Party I has botanical garden, herbarium specimens with authentic floras for identification of plant drugs. Both the parties will provide the laboratory facilities free of cost or with minimum charges.

In witness where of the parties here to have executed the present Memorandum of Understanding the day & the year first here in above written.

Signed by

Dr. Rajendra R. Kumbhar
Authorized Signatory of
First Part

Dr. Sachin A.Nitave
Authorized Signatory of
Second Part

JAYSINGPUR COLLEGE SR. COLLEGE JAYSINGPUR

Anil Alias Pintu Magdum Memorial Pharmacy College DHARANGUTTI Tal Shirol, Dist. Kolhapur

Witness- 1. Dr. Mrs. Manisha V. Kale

2 Dr. Sandip K. Gavade

3 Mrs. V.A.Patil

Jaysingpur College Jaysingpur and 2018-19

Oasis Biocontrol Laboratory, Shirol, Dist.-Kolhapur

Memorandum of Understanding (MOU)

The

1) **Principal,**
Jaysingpur College, Jaysingpur, Affiliated to Shivaji University, Kolhapur
Tal-Shirol, Dist-Kolhapur. PIN-416101

Wishes to sign MOU with,

2) **Mr. Pravin Chandrakant Mali,** Oasis Biocontrol Laboratory, Shirol, Dist-Kolhapur. PIN-416103 (owner)

The multi disciplinary and multi institutional approach is necessary in the field of teaching, learning and research to enhance the quality for the said cause, Dr. Mrs. Manisha V. Kale, Head, Department of Botany, Jaysingpur College, Jaysingpur will represent Jaysingpur College, Jaysingpur henceforth will called as party I and Mr. Pravin Chandrakant Mali, Oasis Biocontrol Laboratory, Shirol henceforth it will be called as party II.

The party I wish to extend its cooperation and exchange of faculty, infrastructure and sharing of research facilities. The party II has specialized technical and marketing support for tissue culture laboratory setup, required for high quality research in raw materials, laboratory sharing and collaborative research on projects for students and farmers materials will be made available from Party I. In addition to that there will be faculty exchange programme in both laboratories. The principal of party I will allow to teachers and students to visit laboratory of party II for learning and research purpose. The travelling charges will be browned by visiting laboratory.

The faculty and students from party II will visit the party I college laboratory for academic exchange or sharing of research facilities. Party I has state of tissue culture laboratory with Laminar air flow, UV visible spectrophotometer, Centrifuge, autoclave etc. Both the parties will provide the laboratory facilities free of cost or with minimum charges.

The MOU will effect from the date of signing of both the parties and ATR and review report will be shared every year so as to increase fruitfulness of the linkage.

Date- 24.04.2019

Activity Report

2019-20

The MoU signed between Principal, Jaysingpur College, Jaysingpur and Mr. Nitave S. A. Principal, Dr. J. J. Magdum Trust's, Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti. on 18th June, 2019.

The request received from students of Pharmacy, Dr. J. J. Magdum Trust viz; Ms. V. A. Patil, Ms. M. Y. Sonalkar., Ms. M. M. Bhide, Miss A. A. Gaikwad., Miss P. P. Bhoi., Miss. P.P. Patil etc. under the guidance of Dr. M. V. Kale, Head department of Botany Jaysingpur College, Jaysingpur.

Following activities are conducted during the academic year 2019-20

- Based on microscopic examination of fresh plant materials the authentification of plant specimens has been done.
- Field work has been done in Nakshatra botanical garden of college to identify crude drugs for research purpose by these students.

Kale

Dr. Mrs. Manisha V. Kale
Head,
Department of Botany
Jaysingpur College, Jaysingpur

Outward No. AAPM/2019/ Date- 24.04.2019

Activity report

2019-20

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The request received from students of Pharmacy, Dr. J.J.Magdum Trust viz; Ms. Patil V.A., Ms. Sonalkar M.Y., Ms. Bhide M.M., Miss A.A.Gaikwad., Miss P.P.Bhoi., Miss Patil P.P. etc. under the guidance of Dr. M.V.Kale, , Head department of Botany Jaysingpur College, Jaysingpur.

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Kale

Dr. Mrs. Manisha V. Kale
Head department of Botany
Jaysingpur College, Jaysingpur.

Dr. Sachin A.Nitave
Authorized Signatory of
Second Part

Outward No. AAPM/2019/ Date- 24.04.2019

Activity report

2019-20

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Dr. Mrs. Manisha V. Kale
Head department of Botany
Jaysingpur College, Jaysingpur.

Dr. Sachin A.Nitave
Authorized Signatory of
Second Part

Outward No. AAPM/2019/ Date- 24.04.2019

Activity report

2019-20

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Kale

Dr. Mrs. Manisha V. Kale
Head department of Botany
Jaysingpur College, Jaysingpur.

Dr. Sachin A.Nitave
Authorized Signatory of
Second Part

Dr. J. J. MAGDUM TRUST'S

Outward No. : AAPM/2018/257

Date: 15.12.2018
By Hand

To,

The Principal
Jaysingpur College,
Jaysingpur.

Subject: - Regarding Authentication.

Respected Sir / Madam,

Following staff of Dr. J. J. Magdum Trust's, Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti, Tal-Shirol, Dist-Kolhapur, going to do research by using following crude drugs.

Sr. No.	Botanical Name	Marathi Name	Part Used	Name of Researcher
1	Momordica charantia L.	कारले	Fruit	Mr. Nitave S. A.
2	Citrus Limetta Risso	मोसंबी	Peel	
×3	Adhatoda vasica	आडुळसा	Leaves	
4	Curcuma aromatica Salisb.	आंबे हाळद	Rhizome	Ms. Patil V. A.
5	Psidium guajava L.	पेरु	Leaves	
6	Luffa acutanguia (L.) Roxb.	दोडका	Leaves	
7	Aegle marmelos (L.) Correa	वेल	Leaves	Ms. Bhide M. M.
8	Saraca asoca (Roxb.) Wild	अशोका	Bark	
9	Carica papaya L.	पपई	Leaves	
10	Moringa oleifera Lam.	शेवगा	Leaves	Ms. Sonalkar M. Y.
11	Hibiscus rosa-sinesis L.	जास्वद	Leaves	
12	Piper betel L.	खाऊचे पान	Leaves	

So it is our sincere request to do the needful regarding authentication of the above crud drugs.

3) Justicia adhatoda L.

Thanking you,

Yours Faithfully,

15/12/18

Mr. Nitave S. A.
Principal
Dr. J.J. Magdum Trust's
Anil Alias Pintu Magdum Memorial
Pharmacy College, Dharangutti

Anil Alias Pintu Magdum Memorial Pharmacy College
DHARANGUTTI. Tal. Shirol, Dist. Kolhapur

221974

Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti.

D.T.E. CODE - 6494 (Approved by State Govt., A.I.C.T.E., P.C.I., D.T.E. & Affiliated to MSBTE.) M.S.B.T.E. CODE - 0635

Gat No. 345/2 B, Shirol-Kolhapur Bypass Road, Tal. : Shirol, Dist. : Kolhapur (Maharashtra) Pin Code - 416101.

Phone & Fax : 02322-221929

Email : aapmpharmacy@gmail.com Website : www.aapmpharmacy.com

01c

Dr. Mrs. Manisha V. Kale
Associate Professor
Department of Botany
Jaysingpur College Jaysingpur,
Mobile- 9730009918

Ref. No - AAPM/2018/257
Dated - 15/12/18

Date- 18-12-2018

PLANT AUTHENTIFICATION CERTIFICATE

Based upon macroscopic examination of fresh sample, it is certified that the specimen given by Ms. Patil V.A., student of Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti is identified as below:

1 Binomial: *Curcuma aromatica* Salisb.
Family : Zingiberaceae
Regional name: Marathi-Amba halad
Part used: Rhizome

2 Binomial: *Psidium guyava* L.
Family : Myrtaceae
Regional name: Marathi- Peru
Part used: Leaves

3 Binomial: *Luffa actangula (L.)Roxb.*
Family : Cucurbitaceae
Regional name: Marathi- Dodka
Part used: Leaves

Somalkar M.J.
15/12/18
(Ms. Somalkar M.J.)

References: 1 Flora of Bombay by Theodore Cooke, C.I.E.
2 Flora of Kolhapur by S.R.Yadav & Sardesai, S.U.Kolhapur

Date: 18/12/2018

Kale
(Dr. M.V.Kale)

JAYSINGPUR COLLEGE DR. COLLEGE

Dr. Manisha V. Kale
M.Sc., Ph.D.
Associate Professor
Dept. of Botany
Jaysingpur College,
Jaysingpur-416 101.

0/c

Dr. Mrs. Manisha V. Kale
Associate Professor
Department of Botany
Jaysingpur College Jaysingpur,
Mobile- 9730009918
Date- 18-12-2018

Ref·NO-AApm/2018/257
Dated-15/12/18

PLANT AUTHENTIFICATION CERTIFICATE

Based upon macroscopic examination of fresh sample, it is certified that the specimen given by Mr. Nitave S.A. student of Anil Alias Pintu Magdum Memorial Pharmacy College, Dharangutti is identified as below:

1 Binomial: *Momordica charantia* L.

Family : Cucurbitaceae

Regional name: Hindi- Karela, Marathi- Karle, Bitter gourd

Part used: Fruit

2 Binomial: *Justicia adhathoda* L.

Family : Acanthaceae

Regional name: Marathi- Adulsa

Part used: Leaves

3 Binomial: *Citrus limietta* L.

Family : Rutaceae

Regional name: Marathi- Mosambi, Sweet lime

Part used: Peel of Fruit

Received
Somalkar M.Y.
19/12/18
(Mr. Somalkar M.Y.)

References: 1 Flora of Bombay by Theodore Cooke, C.I.E.

2 Flora of Kolhapur by S.R.Yadav & Sardesai, S.U.Kolhapur

Date: 18/12/2018

Hale
(Dr. M.V.Kale)

JAYSINGPUR COLLEGE JAYSINGPUR

Dr. Manisha V. Kale
M.Sc.,Ph.D.
Associate Professor
Dept. of Botany
Jaysingpur College,
Jaysingpur-416 101.

Dr. J. J. Magdum Trust's (No. E/902)

Dr. J. J. Magdum College of Engineering, Jaysingpur.

An 'A' Grade Institution (Awarded by Govt . of Maharashtra)
Approved by A. I. C. T. E., New Delhi. Recognised by; Govt of Maharashtra (DTE)
& Affiliated To SHIVAJI UNIVERSITY, KOLHAPUR.
Gat No. 314/330, Shirol –Wadi Road, Agarbhag, JAYSINGPUR – 416101. Dist.- Kolhapur.

Ref No.:-

Date: - 7 / 3 / 2019.

To,
1) Dr. M. V. Kale
2) Mr. Gawade Sir,
Jaysingpur College,
Jaysingpur

Sub: - Regarding permission to our students to carry out study in your organization/ industry for Academic purpose (Educational requirement.) Authentification of plants

Respected sir,

Our educational institute imparts in Civil, Mechanical, Computer Science, Information Technology, Electronics and Electronics & communication Engineering. Shivaji University, Kolhapur has introduced subject 'Environmental Studies' at second year degree course in all faculties of Engineering. This is an important step put forward to provide adequate attention towards the study of Environment in academic programme.

As a part of curriculum of subject, field work reporting is expected from students. For this purpose, you are requested to give permission to our student to carry out their study at your organization/village.

Hoping for favorable response.

Yours faithfully,

06/03/2019
Subject In charge.

H. O. D.

6.3.19
Principal.

List of students

Sr.No.	Name of students	Signature
01	Ankita Anandrao Gaikwad	
02	Pranali Pradip Bhoi	
03	Priyanka Prakash Patil	
04		
05		
06		

Tel No. : (02322) 221825, 221827
Fax No. : (02322) 221831

Chairman : (0) : 221830, (R) : 228273
Exe. Dir. : (0) : 221828, (R) : 221292

o/c

Dr. M. V. Kale
Associate Professor
Department of Botany
Jaysingpur college, Jaysingpur.
Date- 09/03/2019

Subject: Regarding the Authentication of plant specimens provided
Reference: Your letters dated on 05 March 2019

Plant Authentication Certificate

Based on the microscopic examination of fresh plant materials, it is certified that the specimen provided by ..1)...Nemane...Bhagyashri...Balwant.....
.....2)....Mate...Samiksha...Santosh.....
.....3)...Khokaralkar...Poonam...Prakash.....
is identified as below- 4) Khatib Muskan Aftab

	Botanical names	Family
1.	*Nerium indicum* Mill.	Apocynaceae Juss.
2.	*Hibiscus rosa-sinensis* L.	Malvaceae Juss.
3.	*Dypsis lutescens* (H. Wendl.) Beentje & J. Dransf.	Arecaceae Bercht. & J. Presl
4.	*Artabotrys hexapetalus* (L. f.) Bhandari	Annonaceae Juss.
5.	*Araucaria columnaris* (J. R. Forst.) Hook.	Araucariaceae Henkel
6.	*Schefflera arboricola* (Hayata) Merr.	Araliaceae Juss.
7.	*Terminalia catappa* L.	Combretaceae R. Br.
8.	*Dracaena fragrans* (L.) Ker Gawl.	Asparagaceae Juss.
9.	*Caesalpinia pulcherrima* (L.) Sw.	Leguminosae DC.
10.	*Syzygium cumini* (L.) Skeels	Myrtaceae Juss.
11.	*Calophyllum inophyllum* L.	Calophyllaceae J. Agardh
12.	*Bauhinia variegata* L.	Leguminosae DC.
13.	*Adhatoda vasica* Nees	Acanthaceae Juss.
14.	*Pongamia pinnata* (L.) Pierre	Leguminosae DC.
15.	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae R. Br.
16.	*Morus alba* L.	Moraceae Gaudich.
17.	*Gardenia gummifera* L. f.	Rubiaceae Juss.
18.	*Tradescantia spathacea* Sw.	Commelinaceae Mirb.
19.	*Plumbago zeylanica* L.	Plumbaginaceae Juss.
20.	*Ruellia brittoniana* Leonard	Acanthaceae Juss.
21.	*Pithecellobium dulce* (Roxb.) Benth.	Leguminosae DC.
22.	*Hamelia patens* Jacq.	Rubiaceae Juss.
23.	*Parkia biglandulosa* Wight & Arn.	Leguminosae DC.
24.	*Codiaeum variegatum* (L.) Rumph. ex A. Juss.	Euphorbiaceae Juss.
25.	*Bougainvillea spectabilis* Willd.	Nyctaginaceae Juss.

References: 1. Flora of the presidency of Bombay Theodore Cook

2. Flora of Kolhapur district S. R. Yadav and M. M. Sardesai

Received
10/3/19

Head Department of Botany
Jaysingpur College, Jaysingpur

Date: 28-09-2019

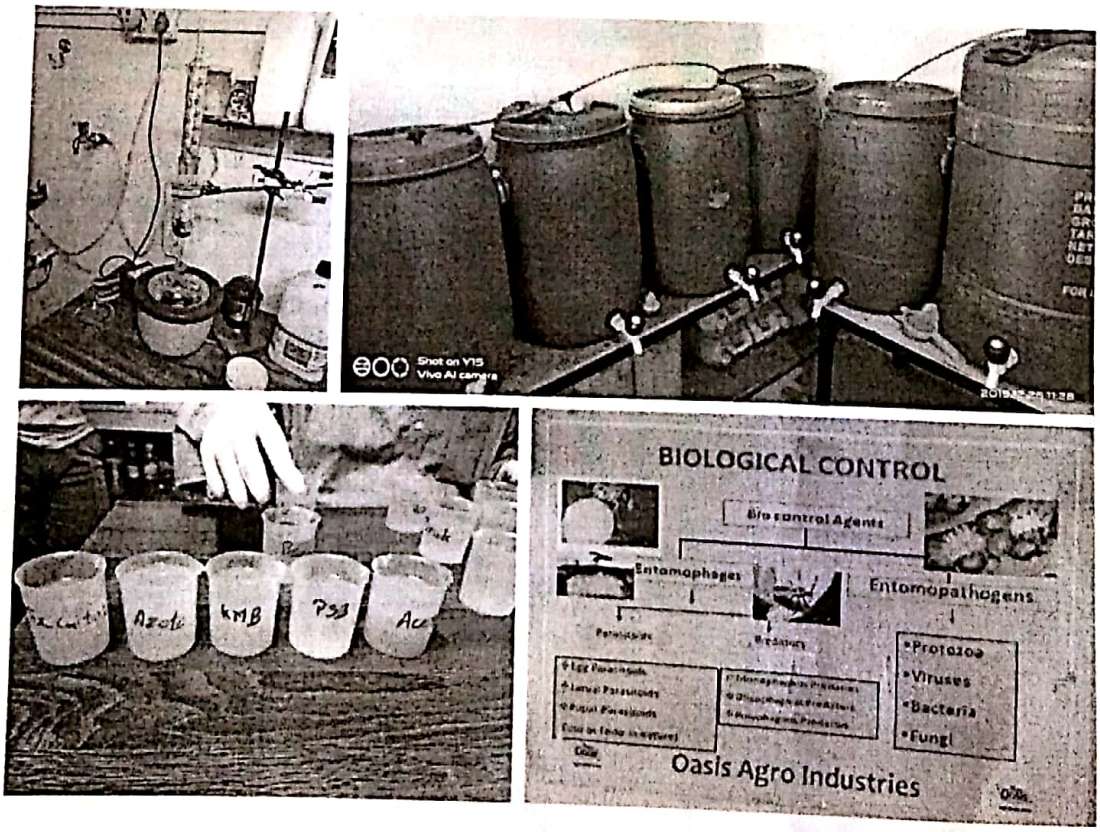
ATR & Review report

2019-20

The MoU signed between Principal, Jaysingpur College, Jaysingpur and Mr. Pravin C. Mali, Oasis Bio-control Laboratory, Shirol on 9th July, 2018.

The request received from Dr. M. V. Kale, Head department of Botany, Jaysingpur College, Jaysingpur. A meeting was held 0n 20th September 2020 and it was decided to arrange two day workshop for third year students to train about bio culture reagent- low cost technology, cultivation of exotic vegetables- its practices and opportunities and demonstration of fruit enzyme.

Accordingly B.Sc. III students have attended workshop on 23rd and 24th September, 2019 to share collaborative research for projects. They studied bio culture reagent- low cost technology & how to prepare fruit enzyme. Fruit enzyme also called garbage enzyme are produced from fruits peels or waste. It is a natural multi-purpose, chemical free, eco-friendly cleaner. It is biodegradable & eco-friendly alternative to harsh chemicals. Students trained about this project. Hence the report is given.



Dr. M. V. Kale
HOD, Botany Department
Jaysingpur College, Jaysingpur

Visit Report - 2019

Company name: Chowgule Industries Pvt. Ltd., Miraj	Department: B.Voc. Automobile
Visit month: Dec 2019	Jaysingpur College Jaysingpur
No. of students : 20 no.	

Date of visit : 5 Dec 2019
Visited time (IN) : 9.00 am
Visited time (OUT): 1.00 pm

Purpose of visit:

- 4 Wheeler maintenance
- Denting
- Painting
- Wheel Alignment
- Wheel balancing
- Various departments in company

Photo

Under Supervision of

Dr. P.P. Chikkode
(B.Voc. Automobile Co-ordinator)

भारतीय गैर न्यायिक

एक सौ रुपये

Rs. 100

रु. 100

ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

महाराष्ट्र MAHARASHTRA

बांधकाम परवाना

SG 835649

दस्त नोंदणी करणार आहेत का? होय/नाही

नोंदणी होणार असल्यास दुय्यम निबंधक कार्यालयाचे नांव

मुद्रांक विक्रेत्याचे नांव :- श्री. विद्या सुकुमार कन्याप्पा, रा.जयसिंगपूर

कोड नं.२६१२०२५,प.क्र.२७/१९९७,ठिकाण-प्लॉट नं.३३ यशवंत हौ.सोसा.जयसिंगपूर

मुद्रांक विक्री अ.क्र. :- ८४८० दिनांक :- 08/01/2018

08 DEC 2017

SUB - TREASURY OFFICER SHIROL

मुद्रांक शुल्क किंमत रुपये :- 100/-

मुद्रांक विकत घेणाऱ्याचे नांव :- सचिव, अनेकांत एज्युकेशन सोसा. स्थानिक समिती, जयसिंगपूर

दुसऱ्या पक्षकाराचे नांव :- जयसिंगपूर कॉलेज, जयसिंगपूर

हस्ते असल्यास त्याचे नांव व पत्ता :- संजय आण्णासो चावरे, जयसिंगपूर

मिळकतीचे वर्णन :- (DLNO.MH09 2010014409)

मोबदला रक्कम रुपये :-

V.S.Kampp

मुद्रांक विक्रेत्याची सही

मुद्रांक विकत घेणाऱ्याची सही

ज्या कारणासाठी ज्यांनी मुद्रांक खरेदी केला त्यांनी त्याच कारणासाठी मुद्रांक खरेदी केल्यापासून ६ महिन्यात वापरणे बंधनकारक आहे.

Memorandum of Understanding (MOU)

Between

1) **Principal,**
Jaysingpur College, Jaysingpur, Affiliated to Shivaji University, Kolhapur
Tal-Shirol, Dist-Kolhapur. PIN-416101

JAYSINGPUR COLLEGE SR COLLEGE JAYSINGPUR

Wishes to sign MOU with,

2) **Principal,**
D.B.F. Dayanand College of Arts and Science, Solapur, Affiliated to Solapur University, Solapur. Dist-Solapur. PIN-413003

The multi disciplinary and multi institutional approach is necessary in the field of teaching, learning and research to enhance the quality for the said cause, Dr. Mrs. S.S. Mahajan, Head, Department of Physics, Jaysingpur College, Jaysingpur will represent Jaysingpur College, Jaysingpur henceforth will called as party I and Dr. D.S. Sutrave on behalf of Dept. of Electronics, D.B.F. Dayanand College of Arts and Science, Solapur henceforth it will be called as party II.

The party I wish to extend its cooperation and exchange of faculty, infrastructure and sharing of research facilities. The party II has specialized equipment's required for high quality research in materials science like spray pyrolysis, Chemical Bath Deposition (CBD), SILAR, Potentiostat etc. will be made available to the students and researchers from Party I. In addition to that there will be faculty exchange programme in both colleges. The principal of party I will allow to teachers and students to visit college of party II for learning and research purpose. The travelling charges will be browned by visiting college while if possible both the college will try to provide temporary accommodation in hostel or elsewhere.

The faculty and students from party II will visit the party I college for academic exchange or sharing of research facilities. Party I has state of art analytical laboratory with UV visible spectrophotometer, HPLC, FTIR, BET apparatus, Density meter, Atomic Absorption Spectrometer etc. Both the parties will provide the laboratory facilities free of cost or with minimum charges.

The MOU will effect from the date of signing of both the parties and ATR and review report will be shared every year so as to increase fruitfulness of the linkage.

The memorandum may be terminated by either party after mutual discussion or it can be extended to five years. A small apex committee (not more than five members) will coordinate the exchange activities between the two parties.

The Apex committee will be as bellow.

1) Principal Rajendra R. Kumbhar, Jaysingpur College, Jaysingpur
2) Principal VIjaykumar P. Ubale, D.B.F. Dayanand College of Arts and Science , Solapur.
3) Dr. Mrs.Smita S. Mahajan, Jaysingpur College, Jaysingpur
4) Dr. Dattatraye S. Sutrave, D.B.F. Dayanand College of Arts and Science , Solapur.
5) Dr. Prashant P. Chikode, Jaysingpur College, Jaysingpur

1-7-2018

Principal Rajendra R. Kumbhar
Jaysingpur College, Jaysingpur

01-07-2018

Principal VIjaykumar P. Ubale
D.B.F. Dayanand College of Arts and Science, Solapur

Witness :- (1) Dr. Mrs. Smita S. Mahajan

1-7-2018

(2) Dr. Dattatraye S. Sutrave

1/7/2018

Dr. D. S. Sutrave
M.Sc., M.Phil., Ph.D
DEPARTMENT OF ELECTRONICS
D. B. F. Dayanand College of Arts & Science, Solapur, M.S, India- 413002
(NAAC Accredited 'A' Grade)
(College with Potential for Excellence)

Email: sutravedattatray@gmail.com
Mobile: 9422026583
Office: 0217-23231 93
Fax: 0217 2728900

- Life Member Semiconductor Society of India
- Principal Investigator UGC MRP F. No. 42-123/2013(SR)

ACTIVITY REPORT

The MoU signed between Principal Jaysingpur College, Jaysingpur and Principal DBF Dayanand College of Arts and Science, Solapur on 1st July 2018

The request received from Miss Savita Gavandi a research scholar working for Ph.D. under the guidance Dr. S. S. Mahajan, from Jaysingpur College, Jaysingpur.

The Following activities are conducted in the month of December 2018 and January 2019

- Miss Savita Gavandi worked in our research laboratory for the deposition of thin film of binary metal oxide (NiCu and CoCu) by Sol-Gel Spin Coating technique for this Millman Spin Coater System is used. The candidate is given training how to deposit the samples. How to set the different parameter like Spin time, deposition time etc.
- Miss Savita Gavandi is trained for the Electrochemical Characterisation by using "ELECTROCHEMICAL WORK STATION".
- The candidate is trained how the system parameters are set.

SSMahajan
Head
Department of Physics
(Jr. College)

1/2/2019.
Dr. D.S. Sutrave

Dr. D. S. Sutrave
M.Sc., M.Phil., Ph.D
DEPARTMENT OF ELECTRONICS
D. B. F. Dayanand College of Arts & Science, Solapur, M.S, India-413002
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1 July 2019

ACTIVITY REPORT

The MoU signed between Principal Jaysingpur College, Jaysingpur and Principal DBF Dayanand College of Arts and Science, Solapur on 1st July 2018

The request received from Miss Savita Gavandi a research scholar working for Ph.D. under the guidance of Dr. S. S. Mahajan, from Jaysingpur College, Jaysingpur.

The Following activities are conducted in the month of 1st January 2019 to 30th June 2019.

- Miss Savita Gavandi is trained to identify the research problem.
- The candidate did literature survey of the material and synthesis technique.
- Miss Savita Gavandi presented research topic to University.
- Approval for research topic.

SSMahajan

Head
Department of Physics
(Sr. College)

Prof. D. S. Sutrave.

Dr. D. S. Sutrave
M.Sc., M.Phil., Ph.D
DEPARTMENT OF ELECTRONICS
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1 January 2020

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The request received from Miss Savita Gavandi a research scholar working for Ph.D. under the guidance of Dr. S. S. Mahajan, from Jaysingpur College, Jaysingpur.

The Following activities are conducted in the month of 1st July 2019 to 31st December 2019

- Miss Savita Gavandi did arrangement of high purity A.R grade chemicals like Nickel Chloride, Cupric Chloride, isopropyl alcohol, acetone etc. for synthesis of Nickel copper oxide thin films.
- The candidate collected high purity glass and steel substrates for deposition of Nickel Copper Oxide thin films.
- The candidate is trained for substrate cleaning in the laboratory.
- Miss Savita Gavandi is trained to collect the double distilled water using Double distillation plant in the laboratory.
- The candidate tried to deposit Nickel Copper Oxide thin films on glass and steel substrates.

SSMahajan
Head
Department of Physics
(Jr. College)

Prof. D. S. Sutrave.

Dr. D. S. Sutrave
M.Sc., M.Phil., Ph.D
DEPARTMENT OF ELECTRONICS
D. B. F. Dayanand College of Arts & Science, Solapur, M.S, India- 413002
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ACTIVITY REPORT

1 July 2020

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The request received from Miss Savita Gavandi a research scholar working for Ph.D. under the guidance of Dr. S. S. Mahajan, from Jaysingpur College, Jaysingpur.

The Following research activities are conducted in the month of 1st January 2020 to 30th June 2020.

- Miss Savita Gavandi deposited Nickel Copper oxide thin films on quartz glass and stainless steel using high purity AR grade chemicals like Cupric Chloride and Nickel Chloride by Sol-Gel Spin Coating technique. For this Millman Spin Coater System is used.
- Miss Savita Gavandi worked in our research laboratory to set different parameter like temperature, deposition time, spin time etc.
- The candidate synthesized uniform thin films of Nickel Copper oxide on glass as well as on steel substrate.
- The samples were tested for the phase formation by X- ray diffraction pattern.

SSMahajan

Head
Department of Physics
(Sr. College)

Prof D S. Sutrave

Scanned with CamScanner

Dr. D. S. Sutrave
M.Sc., M.Phil., Ph.D
DEPARTMENT OF ELECTRONICS
D. B. F. Dayanand College of Arts & Science, Solapur, M.S, India- 413002
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ACTIVITY REPORT

1 January 202

The MoU signed between Principal Jaysingpur College, Jaysingpur and Principal DBF Dayanand College of Arts and Science, Solapur on 1st July 2018

The request received from Miss Savita Gavandi a research scholar working for Ph.D. under the guidance of Dr. S. S. Mahajan, from Jaysingpur College, Jaysingpur.

The Following research activities are conducted in the month of 1st July 2020 to 31st December 2020.

- Miss Savita Gavandi is collected data from XRD pattern obtained.
- The candidate analyses collected data in last 1 year.
- The reference work was done.

SSMahajan

Head
Department of Physics
(Jr. College)

Prof. D. S. Sutrave

Action taken report for the academic year 2019-20 for the MoU signed between

Jaysingpur College, Jaysingpur and Mahavir College, Kolhapur

Mahavir College, Kolhapur is one of the renowned college affiliated to Shivaji University and is situated in the Kolhapur city Maharashtra where the students taking opportunity for best education. The college has signed MoU with Jaysingpur College Jaysingpur on 5th March 2020 for the following fields,

1. To exchange expert faculty
2. To exchange the students
3. To share laboratory and library facilities
4. To organise joint workshops, seminars, conferences etc.
5. To organise the training programs

Under this MoU, the following activities has been done to benefit both the parties,

1. Exchange of faculty under which Mr. Astavinayak Dabhole delivered lectures on topic Screen printing (14.10.2019) and Basic printing techniques (06.01.2020) in Mahavir College, Kolhapur.

2. Miss. Shubhangi Pathade delivered lecture as part of faculty exchange and contributed to B.Voc. Printing and Publishing in the Topic Reproduction Photography on 16.09.2019 and 04.01.2020 at Jaysingpur College, Jaysingpur.

3. Under Student Exchange program and laboratory sharing 8 Students and 2 faculty members from Mahavir College, Kolhapur visited to laboratory of Jaysingpur College Jaysingpur on 12/08/2018 for hands on training of offset machine.

4. The students of Jaysingpur College, Jaysingpur from Department of Printing and Publishing attended a one day workshop on Recent trends in Screen Printing Technology by Mahavir College, Kolhapur on 23.09.2019, Dr. S.R. Sabale delivered his lecture on career opportunities in Printing industry.

5. Under the MOU Jaysingpur College and Mahavir College organised joint One day State level conference on "Recent trends in Screen Printing and Publishing Technology at Mahavir College on 6th March 2020. The students of Jaysingpur College, Jaysingpur from Department of Printing and Publishing attended a one day workshop and also presented paper and model.

During the Conference, Mr. Dhavale, Lakamat Priting Press delivering his speech, on the dais from right Principal Dr. R. P. Lokhande, P. R. Patil, Memebr of Management, Mahavir College, Principal Dr. R. R. Kumbhar, Mr. P.P. Patil Treasurer Local Committee Jaysingpur College.

Signing a trilateral MOU between Mahavir College, Kolhapur, Jaysingpur College, Jaysingpur and K.R.T. Arts, B.H. Commerce, and Science College, Nashik on 6th March 2020

Date: 09.07.2020

Dr. Sandip R. Sabale
In-charge of MoU
Jaysingpur College, Jaysingpur

Action Taken Report Date- 15/03/2021

Jaysingpur College, Jaysingpur
&
Oasis Bio-control Laboratory, Shirol

As per the MoU made between Botany Department and Oasis Bio-control Laboratory, Shirol dated 9th July, 2019, research projects were allotted to students of class B.Sc.III. for the year 2020-21. The projects are to be carried out in collaboration with Botany department. The owner of laboratory Mr. Pravin Mali has provided seed money (funding) of Rs.10,000/- to carry out the projects. (Cheque No. 041458 dated 15/3/2021 Central Bank of India). Following projects were allotted to the students-

1 Effect of Bio-proming on growth parameters of maize.

2 Antimicrobial and Insecticidal activities of some plant parts.

3 Effect of organic manure enriched with beneficial microbial culture on tomato plantation in saline soil.

Head
Department of Botany

Action taken report for the academic year 2018-19 for the MoU signed between Jaysingpur College, Jaysingpur and Devchand College, Arjunnagar

Devcahnd College, Arjunnagar is one of the renowned college affiliated to Shivaji University and is situated on the Maharashtra-Karnataka border where the students from both the sates taking opportunity for best education. The college has signed MoU with Jaysingpur College Jaysingpur on 27th July 2018 for the following fields,

1. To exchange expert faculty
2. To exchange the students of UG and PG
3. To exchange and promote research activities
4. To share laboratory and library facilities
5. To organise joint workshops, seminars, conferences etc.
6. To organise the training programs

Under this MoU, the following activities has been done to benefit both the parties,

1. Exchange of faculty under which Dr. Sandip Sabale delivered lectures on topic Chromatography (1.10.2018); Atomic Absorption Spectroscopy and Inductively Coupled Plasma Spectroscopy (25.02.2019).

2. The students of Jaysingpur College, Jaysingpur from Department of Chemistry attended a one day workshop on spectroscopy organised by Devchand College, Arjunnagar participated in 7.09.2018

3. 3 Students and 2 faculty members name Prof. Sugam Chavan and Mr. Sudhir Kurade from Devchand College Arjunnagar were participated and made poster presentation on research work in One Day National conference on

4. Mr. Sandeep Kenawade worked as guest lecturer as part of faculty exchange and contributed to M.Sc. organic Chemistry in the Topic Reaction mechanism and aliphatic nucleophilic substitution reactions on 9.11.2018.

5. As part of research activity two book chapters published with following details by Springer International Publishing AG 2018
   A. Kallel et al. (eds.), Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions, **Advances in Science, Technology & Innovation,** https://doi.org/10.1007/978-3-319-70548-4_87
   a. Multivariate Statistics of Physico-Chemical Parameters to Develop the Baseline Level of Water Quality Around the Proposed Jaitapur Nuclear Power Plant, India, Ramesh Shinde, Prashant Chikode, Sugam Chavan, and Sandip Sabale, Page no. 747
   b. Magnetically Separable Low Cost Adsorbent for Bioremediation of Th(IV) and Methylene Blue Dye from Water Sample Sugam Chavan, Sandip Sabale, Vikas Jadhav, and Prashant Chikode, Page No. 277

Date: 22.04.2019

Dr. Sandip R. Sabale
In-charge of MoU
Jaysingpur College, Jaysingpur

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Principal Cell : 9901573365
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principal@devchandcollege.org

Janata Shikshan Mandal's

DEVCHAND COLLEGE

(Jain Religious Minority Institution)
Arjun Nagar, Tal. Kagal, Dist. Kolhapur, Near NIPANI, PIN - 591237
(Affiliated to Shivaji University) 'A' Grade Accredited by NAAC (3rd

• Govt. App. Notification (AFF) Dt. 7-11-1969
• Jr. College - HSC -1076/419XX-XII Dt. 6th May 1976
• Jr. Code - 23.07.001 • M.C.V.C. Code - 23.07.901
• U-Dise No. - 27340806306

Principal :
Dr. P. M. Herekar
M. Com. M. Phil. Ph. D.

Ref. No. :

Date : '27 SEP 2018

Dr. S. R. Sabale

Assistant Professor

PG Department of Chemistry

Jaysingpur College

JAYSINGPUR

Subject: - Invitation as a **Guest lecturer**

Dear Sir,

We are very much happy to invite you as a **Guest lecturer** for our PG Department of Chemistry. The objective of this lecture is to create interest among PG students regarding the research in the field of **CHROMATOGRAPHY**. We are confident that this lecturer will provide a meaningful platform for the student community. This guest lecture is a part of MoU between the institutions (Devchand College,Arjunnagar,Shivraj College,Gadhinglaj & Jaysingpur College,Jaysingpur) under the faculty exchange program as mentioned in the MoU signed on 27th July 2018. Kindly note that the said lecture is scheduled on 1st October, 2018 at 9.30 am. May we look forward to your acceptance of the invitation?

With regards,

Yours faithfully,

PRINCIPAL

Janata Shikshan Mandal's

DEVCHAND COLLEGE

(Jain Religious Minority Institution)
Arjun Nagar, Tal. Kagal, Dist. Kolhapur, Near NIPANI, PIN - 591237
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• U-Dise No. - 27340806306

Principal :
Dr. P. M. Herekar
M. Com. M. Phil. Ph. D.

Ref. No. :

Date : 21 FEB 2019

Dr. S. R. Sabale

Assistant Professor

PG Department of Chemistry

Jaysingpur College

JAYSINGPUR

Subject: - Invitation as a **Guest lecturer**

Dear Sir,

We are very much happy to invite you as a **Guest lecturer** followed by demonstration of AAS in our DST-FIST Lab.for our PG students of Chemistry. The objective of this lecture & demonstration is to create interest among PG students regarding the research in the field of **AAS & ICPS**. We are confident that this will provide a meaningful platform for the student community. This guest lecture is a part of MoU between the institutions (Devchand College,Arjunnagar,Shivraj College,Gadhinglaj & Jaysingpur College,Jaysingpur) under the faculty exchange program as mentioned in the MoU signed on 25th July 2018.

Kindly note that the said lecture is scheduled on 25th February, 2019 at 8.30 am. May we look forward to your acceptance of the invitation?

With regards,

Yours faithfully,

PRINCIPAL

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Principal :
Dr. P. M. Herekar
M. Com. M. Phil. Ph. D.

Ref. No. :

Date : 01 OCT 2018

Dr. S. R. Sabale
Assistant Professor
Department of Chemistry
Jaysingpur College,
JAYSINGPUR

Sub-: Letter of Thanks

Respected Sir,

I on the behalf of PG department of chemistry of our college express my sincere thanks for having accepted our invitation as a **Guest Lecturer** and delivered a very thought provoking speech on **Chromatography** held on **1st, October 2018.** All the students have highly appreciated your lecture and also enlighten by the same.

I am sure that you will cooperate in future programme those will be organized by our PG department of chemistry.

Thank You

Yours Faithfully

PRINCIPAL

Janata Shikshan Mandal's

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- M.C.V.C. Code - 23.07.901
- U-Dise No. - 27340806306

Principal :
Dr. P. M. Herekar
M. Com. M. Phil. Ph. D.

Ref. No. :

Date : 25 FEB 2019

Dr. S. R. Sabale
Assistant Professor
PG Department of Chemistry
Jaysingpur College,
JAYSINGPUR

Sub-: Letter of Thanks

Respected Sir,

I on the behalf of PG department of chemistry of our college express my sincere thanks for having accepted our invitation as a **Guest Lecturer** and delivered a very thought provoking speech on **Chromatography** held on **25thFebruary, 2019**. All the students have highly appreciated your lecture and also enlighten by the same.

I am sure that you will cooperate in future programme those will be organized by our PG department of chemistry.

Thank You

Yours Faithfully

PRINCIPAL

Action taken report for the academic year 2019-20 for the MoU signed between Jaysingpur College, Jaysingpur and Devchand College, Arjunnagar

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1. To exchange expert faculty
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3. To exchange and promote research activities
4. To share laboratory and library facilities
5. To organise joint workshops, seminars, conferences etc.
6. To organise the training programs

Under this MoU, the following activities has been done to benefit both the parties,

1. Exchange of faculty under which Dr. Sandip Sabale delivered lectures on topic Chromatography on 27.01.2020; Atomic Absorption Spectroscopy and Inductively Coupled Plasma Spectroscopy on 27.09.2020

2. Attended and presented paper on Analysis of curriculum and review of evaluation and assessment procedure of under graduate science courses of Shivaji University, Kolhapur, India at WORLD SCIENCE AND TECHNOLOGY EDUCATION CONFERENCE 2019, December 2-6, 2019, Thailand

Date: 30.06.2020

Dr. Sandip R. Sabale
In-charge of MoU
Jaysingpur College, Jaysingpur

Certificate of Participation

SANDIP RAVSAHEB SABALE

has given a valuable presentation at the 6th ICASE
"World Science and Technology Education Conference 2019"
Suan Nong Nooch Garden and Resort, Pattaya, Thailand.

Dec 2-6, 2019.

Krongthong Khairiree

Asst.Prof.Dr.Krongthong Khairiree
Dean, International College
Suan Sunandha Rajabhat University

Prof.Dr.Bulent Cavas
President,
International Council of Associations for Science Education

Analysis of Curriculum and Review of Evaluation and Assessment Procedure of Undergraduate Science Courses of Shivaji University, Kolhapur, India

Prashant Chikode

Jaysingpur College Jaysingpur, Maharashtra, India
Email: prashantchikode@gmail.com

Sugam Chavan

Devchand College, Arjunnagar, Nipani
Email: second_author@second.author.affiliation

Sandip Sabale

Jaysingpur College, Jaysingpur
Email: srsabale@gmail.com

Abstract: To build any nation to a desired standard education plays an important role. Education at any level includes three pillars viz. curriculum, evaluation and assessment process. The paper emphasis on the analysis of choice based credit system (CBCS) implemented by Shivaji University to its affiliated colleges of the science streams. The parent syllabus formulated by University Grants Commission (UGC), New Delhi was not implemented as such by the university. The critical analysis of not accepting the parent syllabus as such with subsidiary reasons is assigned in the paper. The retrospective effect of curriculum is judged by the evaluation process amongst student and teachers. The paper mentions modern evaluation processes other than the traditional methods which are suggested. Assessment refers to the wide variety of methods or tools that educators use to evaluate, measure, and document the academic readiness, learning progress, skill acquisition, or educational needs of students. An attempt has been made to describe the multiple assessment methods for science under graduate courses to implement the curriculum that relate the social and economic means of society.

Keywords: Curriculum, Evaluation, Assessment, Impact

ICASE

International Council of Associations for Science Education

THE 6th ICASE

WORLD SCIENCE AND TECHNOLOGY EDUCATION CONFERENCE 2019

Pattaya, THAILAND 2-6 December 2019

Co organizer : INTERNATIONAL COLLEGE SUAN SUNANDHA RAJABHAT UNIVERSITY

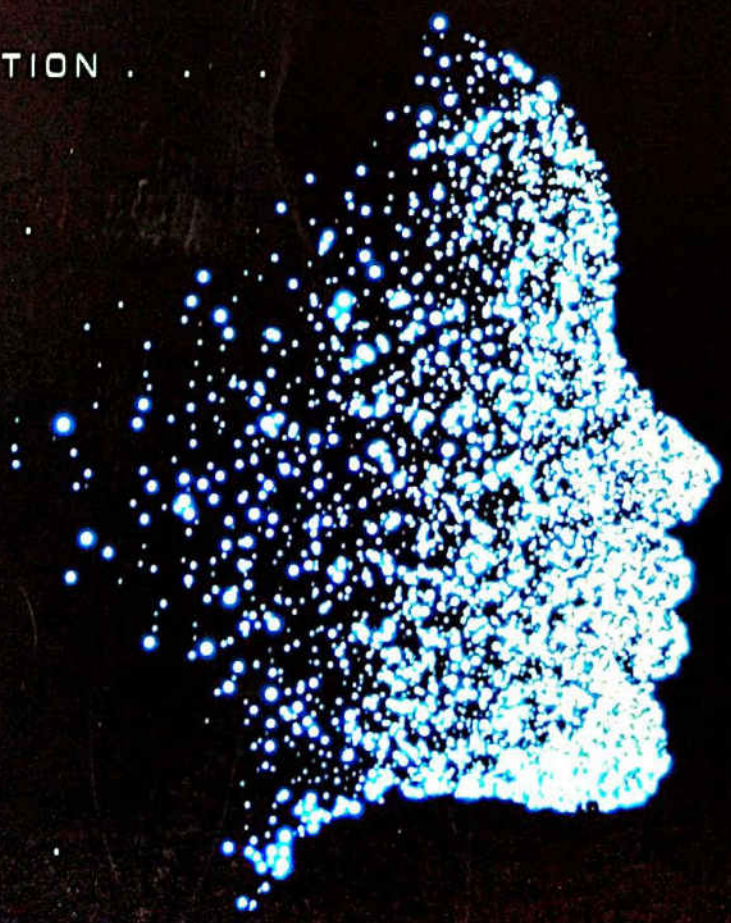
EDUCATION . . .

TECHNOLOGY . . .

FUTURE . . .

SCIENCE . . .

AI . . .



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• Jr. Code - 23.07.001 • M.C.V.C. Code - 23.07.901
• U-Dise No. - 27340806306

Principal :
Dr. P. M. Herekar
M. Com. M. Phil. Ph. D.

Ref. No. :

Date : 27 JAN 2020

Dr. S. R. Sabale

Assistant Professor

Department of Chemistry

Jaysingpur College,

JAYSINGPUR

Sub:-A letter of thanks

Respected Sir,

I on the behalf of PG Department of Chemistry of our College express my sincere thanks for having accepted our invitation as a **Guest Lecturer** and delivered a very thought provoking lecture on **ICPS-AAS** (Analytical Chemistry) held on 27 th January,2020. All the students have highly appreciated your lecture and also enlighten by the same.

I am sure that you will cooperate in future programme those will be organized by our PG Department of Chemistry.

Thank you

Yours faithfully

PRINCIPAL

Phone : Office : 08338-220112,
Website : www.devchandcollege.org
Principal Cell : 9901573365
email : devchand_college@rediffmail.com
principal@devchandcollege.org

Janata Shikshan Mandal's

DEVCHAND COLLEGE

(Jain Religious Minority Institution)
Arjun Nagar, Tal. Kagal, Dist. Kolhapur, Near NIPANI, PIN - 591237
(Affiliated to Shivaji University) 'A' Grade Accredited by NAAC (3rd Cyle)

• Govt. App. Notification (AFF) Dt. 7-11-1969
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• Jr. Code - 23.07.001 • M.C.V.C. Code - 23.07.901
• U-Dise No. - 27340806306

Principal :
Dr. P. M. Herekar
M. Com. M. Phil. Ph. D.

Ref. No. : 2019/Sr./Che/P.G./

Date : 27 SEP 2019

Dr. Sandip.R.Sabale
Assistant Professor
Department of Chemistry
Shivaji University, Kolhapur

Sub-: Letter of thanks

Respected Sir,

I on the behalf of Chemistry department of our college express my sincere thanks for having accepted our invitation as a Resource Person and delivered a very thought provoking guest lecture on 'CHROMATOGRAPHIC METHODS' on 27th, September 2019. All the students have highly appreciated your lecture and also enlighten by the same.

I am sure that you will co-operate in future programme those will be organized by our Chemistry department.

Thank You

Yours faithfully

PRINCIPAL

Anekant Education Society's

Jaysingpur College, Jaysingpur

Department of Psychology

And

PARIS Institute,Sangli.

Action Taken Report

2018-19

1. Department of Psychology, Jaysingpur College, Jaysingpur and PARIS Institute Sangli signed a three year MoU on Thursday 30/08/2018:-

2. A Program jointly organised by Department of Psychology and PARIS institute on "Goal Setting" under MoU on 20/12/2018 :-

Anekant Education Society's

Jaysingpur College, Jaysingpur

Department of Psychology

And

PARIS Institute,Sangli.

Action Taken Report

2019-20

1. **On Sunday 8th September 2019 , a training program was organised at Collector office, Kolhapur on Counselling for flood affected people in Sangli and Kolhapur district:-**

2. **Counselling session was given to the flood affected children of Kumar and kanya Vidya Mandir, Ghalwad on 26th September 2019:-**

3.A program organised on "Self development through Self –awareness" on 28th September 2019 :-

Action taken report for the academic year 2019-20 for the MoU signed between Jaysingpur College, Jaysingpur and D. Y. Patil University, Kolhapur

Dr. D. Y. Patil Universaity is one of the renowned Deemed University in Kolhapur District. The Centre for Interdisciplinary Research of this university has signed MoU with Jaysingpur College Jaysingpur on 28.05.2019 for the following fields,

1. To exchange expert faculty
2. To exchange the students and research scholar
3. To exchange and promote research activities
4. To share laboratory and library facilities
5. To organise joint workshops, seminars, conferences etc.
6. To organise the training programs

Under this MoU, the following activities has been done to benefit both the parties,

1. 35 students and staff are involved in this MOU, and shared a research facilities like IR, UV, BET and XRD.
2. Satish Jadhav is worked in chemistry department from 1st June 2020 to 30th June 2020 for his collaborative research work.
3. Dr. C. D. Lokhande, Dean of Centre for Interdisciplinary studies delivered lecture on IPR on 17th Nov. 2019 during short term teachers training programme for College Teachers in Jaysingpur College, Jaysingpur organised by IQAC.

Date: 30.06.2020

Dr. Sandip R. Sabale
In-charge of MoU
Jaysingpur College, Jaysingpur

Visit & Activities of DYPU under MOU.

Sr No.	Date	Name of Research Student	purpose	No. of samples	sign	sign of authority / Remark
2.	03/06/2019	S. B. Jadhav	BET analysis	01	Jadhav	5.6.19
3.	05/06/2019	S. Pujari.	BET analysis	01	Jadhav	5.6.19
4.	07/06/2019	S. B. Kale	BET analysis	03		7.6.19
5.	21/06/2019	T. T. Ghogare patil	UV-vis Spectrofloremeter BET analysis	4 4 3		21.6.19
6.	21/06/2019	Vikas J. Mane	UV-Vis, spectrometer BET analysis	2 3 3		21.6.19
7.	27/6/2019	shrikant Sadavar	FT-IR BET			27.6.19
8.	27/6/2019	Navanath Padalkar	FT-IR BET			
9.		Trupti Ghogare	BET PL,			29.7.19
10.	29/7/2019	sachin pujari	BET FT-IR (KBr)	03 05		29.7.19

7. Staff members
18 - student

11.	28/08/19	Dhanaji malavekar	BET	03	Danaji	28.8.19
12	3/09/19	sachin pujari	BET	01	Sachin	25.7.19
13	3/09/19	Rohini shinde	BET	05	Shinde	
14.	5/09/2019	vikas mane	BET	04		
15.	14/10/2019	Dhanaji Malavekar	BET	05		
16	14/10/2019	Akash Patil	BET	04		
17)	7/11/2019	Navajshaikh	BET, FT-IR	14		Analysis done
18)	11/11/2019	Jadhav Satish	BET, UV-DRS. pL, FTIR	01		
19)	28/11/2019	Pujari Sachin	BET	03		
20]	21/01/2020	Gurav Nishikant (DCA)	FT-IR	04		
21]	07-02-2020	Ubale Shivaji Balasaheb	U.V. VIS	11		
22)	1.06.2020	Jadhav Satish	Experiment of potentiometer for electrodeposition	29 days		

staff - 4 + 2 = 6

students - 4

MOU for Research & Exchange

Jaysingpur college, visit to DYPU

GoodLuck | Page No. | Date

Sr. NO.	Date	Name of Research Student	purpose	No. of samples	sign	Remark / sign of authority
1.	31/5/2019	A. A. Koli.	XRD analysis	01	AKa.	31/5/2019
2.	08/06/2019	V.V. Gawade	XRD Analysis.	01		8/6/2019
3.	24/06/2019	A.A.Koli	XRD Analysis.	02	AKa	24/6/2019
4.	06/09/2019	A.A.Koli	XRD analysis	02	AKa.	

'Social Transformation Through Dynamic Education'

Bharati Vidyapeeth's

Dr. Patangrao Kadam Mahavidyalaya, Sangli

(Arts, Science, Commerce College)

DST-FIST funded College (Level 0)

Affiliated to Shivaji University, Kolhapur.

Accredited with 'B^{++}' Grade by NAAC, Bengaluru (CGPA 2.96)

P. O. Box No. 74, Sangli- 416416. Phone: (0233) (O) 2535229, Tele. Fax.- 2535993

Email:-bvpkc_sangli@yahoo.co.in; Website: http://dpkmsangli.bharatividyapeeth.edu

Founder

Dr. Patangrao Kadam
M. A., L. L. B., Ph. D.

Principal
Dr. D. G. Kanase
M. Sc., Ph. D.

No.: B.V.D.P.K.M.S./by hand /2018-19 Date: 31/03/2019

To,
Dr. S. R. Sabale
Department of Chemistry,
Jaysingpur College,
Jaysingpur.

Dear Sir,

We are very much thankful to you for working as Resource person to deliver guest lectures for M.Sc. I and II year class on topics Chromatography and HPLC respectively, during academic year, 2018-19.

Expecting the same co-operation in future.

Thanking you in anticipation.

Regards,

(Dr. D. G. Kanase)
Principal
Bharati Vidyapeeth's
Dr. Patangrao Kadam Mahavidyalaya, Sangli

'Social Transformation Through Dynamic Education'

Bharati Vidyapeeth's

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Email:-bvpkc_sangli@yahoo.co.in; Website: http://dpkmsangli.bharatividyapeeth.edu

Founder

Dr. Patangrao Kadam
M. A., L. L. B., Ph. D.

Principal
Dr. D. G. Kanase
M. Sc., Ph. D.

No.: B.V.D.P.K.M.S./ by hand /2019-20 **Date:** 31/03/2020

To,
Dr. S. R. Sabale
Department of Chemistry,
Jaysingpur College,
Jaysingpur.

Dear Sir,

We are very much thankful to you for working as Resource person to deliver guest lectures for M.Sc. I and II year class on topics Chromatography and HPLC respectively, during academic year, 2019-20.

Expecting the same co-operation in future.

Thanking you in anticipation.

Regards,

(Dr. D. G. Kanase)
Principal
Bharati Vidyapeeth's
Dr. Patangrao Kadam Mahavidyalaya, Sangli

॥ सिद्धिरनेकान्तात ॥

Estd. - June 1964

Anekant Education Society's

JAYSINGPUR COLLEGE, JAYSINGPUR

Jaysingpur 416 101 Dist. Kolhapur, Maharashtra State, India

AFFILIATED TO SHIVAJI UNIVERSITY, KOLHAPUR

Ref. No. AES/JCJ/ Date :- 10.02.2019

To
Dr. A. R. Supale
Department of Chemistry
Dr. P. K. Mahavidyalaya, Sangli

Subject: Regarding Invited Talk

Dear Sir,

We are thankful to you for delivering a valuable and inspiring invited talk for M.Sc.I students on **Thermodynamics** (Date: 15.08.2018) **and M.Sc. II students on Cyclic Voltametry** (Date: 15.09.2018). We are extremely grateful to you for sharing your expertise as resource person with our students and they will be benefitted much from your lecture.

Thanking You.

JAYSINGPUR COLLEGE SR JAYSINGPUR

Co-ordinator
M.Sc. Analytical Chemistry
Jaysingpur College,Jaysingpur

॥ सिद्धिरनेकान्तात ॥

Estd. – June 1964

Anekant Education Society's

JAYSINGPUR COLLEGE, JAYSINGPUR

Jaysingpur – 416 101 Dist. Kolhapur, Maharashtra State, India

AFFILIATED TO SHIVAJI UNIVERSITY, KOLHAPUR

Ref. No. AES/JCJ/ Date :- 21.01.2018

To
Dr. A. R. Supale
Department of Chemistry
Dr. P. K. Mahavidyalaya, Sangli

Subject: Regarding Invited Talk

Dear Sir,

We are thankful to you for delivering a valuable and inspiring invited talk for M.Sc.I students on **Thermodynamics** (Date: 10.08.2017) and M.Sc. II students on **Cyclic Voltametry** (Date: 30.08.2017). We are extremely grateful to you for sharing your expertise as resource person with our students and they will be benefitted much from your lecture.

Thanking You.

JAYSINGPUR COLLEGE SR JAYSINGPUR

Co-ordinator
M.Sc. Analytical Chemistry
Jaysingpur College,Jaysingpur

Bharati Vidyapeeth's

Dr. Patangrao Kadam Mahavidyalaya, Sangli

Accredited with 'B^{++}' grade by NAAC, Bengaluru (CGPA-2.96)
DST-FIST Funded College (Level 0)
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Second National Conference on
Recent Trends in Pure and Applied Sciences
(RTPAS-2020)

Saturday, 11th January 2020

Organized by

INTERNAL QUALITY ASSURANCE CELL

Souvenir

10. *CARAMBOLA* FRUIT AND *CALOTROPIS GIGANTEA* LATEX MEDIATED CU NPS FOR ANTIBACTERIAL ACTIVITIES

Shubhangi Mane-Gavade[1], Pravin Patil[1], Amruta Koli[1], Vinayak Gawade[1],

Raju Tasgaonkar[1], Amit Supale[2], Sandip Sabale[1*]

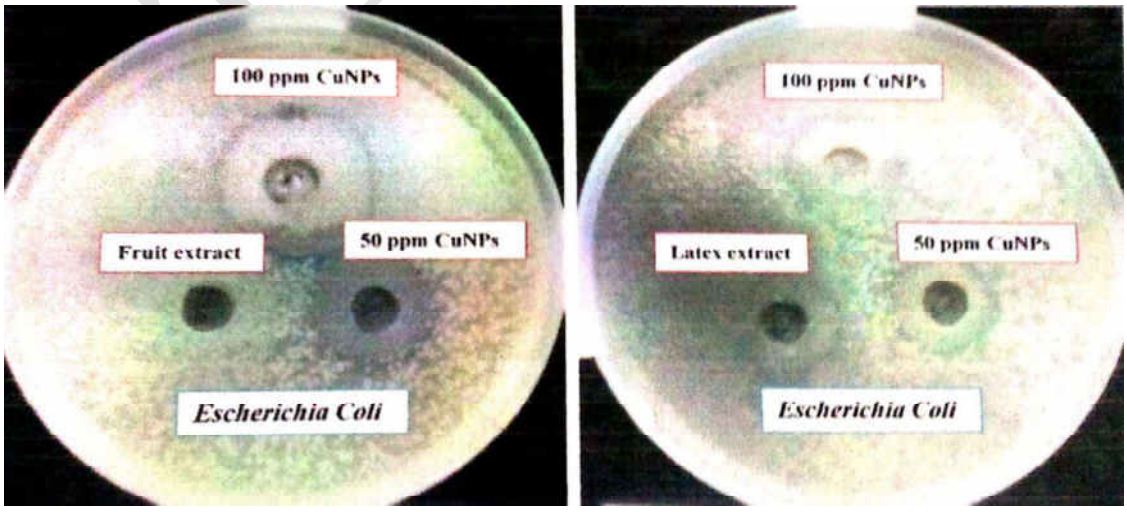
[1]P.G. Department of Chemistry, Jaysingpur College, Jaysingpur-416101, Maharashtra

2 Bharati Vidyapeeth's Dr. Patangrao Kadam Mahavidyalaya, Sangli-416416, Maharashtra

**Email:srsabale@gmail.com*

ABSTRACT:

Carambola fruit extract and *Calotropis gigantean* Latex were used as mediator for the green synthesis of Cu Nanoparticles (NPs). The obtained Cu NPs were analyzed using XRD for structural properties, UV-Vis and FTIR for optical properties. The antibacterial activity was determined for *Escherischia coliwas* using both the obtained NPs by agar well diffusion method. *Carambola* fruit extract mediated NPs shows higher antibacterial activity as compared to the fruit extract, latex as well as Latex mediated Cu NPs. The Antibacterial activity trend was found to be Carambola fruit mediated Cu NPs>Latex mediated Cu NPs > Calotropis gigantea Latex > *Carambola* fruit extract.



Bharati Vidyapeeth's

Dr. Patangrao Kadam Mahavidyalaya, Sangli

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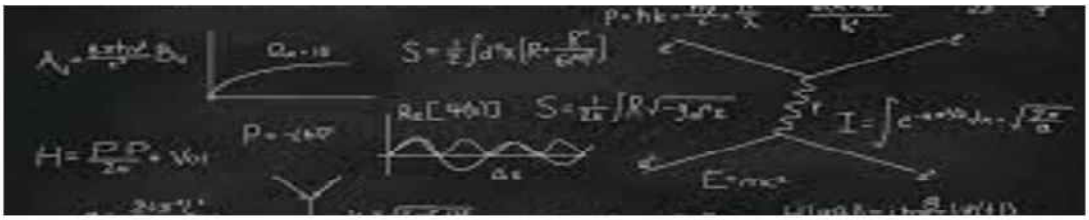


Souvenir

Third National Conference on
Recent Trends in Pure and Applied Sciences
(RTPAS-2021)

Saturday, 13th March 2021

Organized by

INTERNAL QUALITY ASSURANCE CELL

PP-4

SYNTHESIS OF COUMARINE DERIVATIVES CATALYZED BY NI-SUBSTITUTED HPA

Amit R. Supale[1] and Sandip R. Sabale[2]

1 Department of Chemistry, Bharati Vidyapeeth's Dr. Patangrao Kadam Mahavidyalaya, Sangli, M.S., India, 416416
2 Department of Chemistry, Jaysingpur College, Jaysingpur 416101
Email: amitsupale@gmail.com

Abstract

A methodology for synthesis of coumarin derivatives by using Ni-MPA catalyst is reported. The reaction was carried out in ethanol under reflux condition. The method gave good yields of products in short reaction time compared with previous methods. This methodology offers significant improvements for the synthesis of coumarin derivatives.

Keywords: Heteropoly acid, Pechmann condensation, Coumarin derivatives, One pot reaction.

J Mater Sci: Mater Med (2015) 26:127
DOI 10.1007/s10856-015-5466-7

Superparamagnetic MFe_2O_4 (M = Ni, Co, Zn, Mn) nanoparticles: synthesis, characterization, induction heating and cell viability studies for cancer hyperthermia applications

Sandip Sabale · Vidhya Jadhav · Vishwajeet Khot · Xiaoli Zhu · Meiling Xin · Hongxia Chen

Received: 10 October 2014 / Accepted: 25 January 2015 / Published online: 18 February 2015

Abstract Superparamagnetic nanoferrites are prepared by simple and one step refluxing in polyol synthesis. The ferrite nanoparticles prepared by this method exhibit particle sizes below 10 nm and high degree of crystallinity. These ferrite nanoparticles are compared by means of their magnetic properties, induction heating and cell viability studies for its application in magnetic fluid hyperthermia. Out of all studied nanoparticles in present work, only $ZnFe_2O_4$ and $CoFe_2O_4$ MNPs are able to produce threshold hyperthermia temperature. This rise in temperature is discussed in detail in view of their magneto-structural properties. Therefore $ZnFe_2O_4$ and $CoFe_2O_4$ MNPs with improved stability, magnetic induction heating and cell viability are suitable candidates for magnetic hyperthermia.

1 Introduction

After decades of intense study, the superparamagnetic nanoparticles have been explored for various biomedical applications, including magnetic resonance imaging [1, 2], drug targeting [3] magnetic separation [4–6] and hyperthermia [7–9]. In hyperthermia, an AC magnetic field is used to induce a temperature increase. This magnetic heating of superparamagnetic nanoparticles originates from two relaxation processes, namely Néel and Brownian relaxations [6, 7, 10]. Néel relaxations is the reorientation of the magnetic moment within the particles in which an anisotropy barrier is crossed, thereby causing increase in temperature. Brownian relaxation is the reorientation of the magnetic particle itself in a fluid, resulting in friction between the particle and the fluid. In spite of extensive research is carried out in synthesis and large scale production of superparamagnetic nanoparticles for application in magnetic particle hyperthermia; only limited number of magnetic nanoparticles are commercially available [11, 12]. Magnetic iron oxide (magnetite) nanoparticles such as Fe_3O_4 due to their proven biocompatibility as well as high saturation magnetization have been explored extensively for various biomedical applications [13, 14]. Indeed, they are stable in water and are able to form aqueous colloids. They are also assumed to be biocompatible within certain threshold limits. Their magnetic properties can be tuned through their chemical composition by doping M^{2+} ion like Zn^{2+}, Co^{2+}, Ni^{2+}, Mn^{2+}, Mg^{2+} etc. and cation distribution. The substitution of a large part of Fe^{2+} cations by nonmagnetic M^{2+} in A sites (general chemical formula of ferrite is written as AB_2O_4) greatly reduces the resultant magnetization according to the canted ferrimagnetic Yafet–Kittel-like model [15]. However, if M^{2+} ions are simultaneously located in A and B sites, the cation is weakened and the magnetization reduction is limited, still leading to suitable saturation magnetization values as well as biocompatibility [16, 17]. Hence M^{2+} ion substituted ferrite synthesis and studies on its properties are planned in this work.

In recent years, synthesis of MFe_2O_4 (M = Zn, Ni, Mn and Co) nanoparticles of desired size and magnetic

S. Sabale (✉) · X. Zhu · M. Xin · H. Chen
Laboratory of Biosensing Technology, School of Life Sciences, Shanghai University, Shanghai 200444, People's Republic of China
e-mail: srsabale@gmail.com

S. Sabale · V. Jadhav
P.G. Department of Chemistry, Jaysingpur College, Jaysingpur 416101, MH, India

V. Khot
Center for Interdisciplinary Research, D. Y. Patil University, Kolhapur 416006, MH, India

Available online at www.sciencedirect.com

ScienceDirect

Materials Today: Proceedings 23 (2020) 139–146

www.materialstoday.com/proceedings

ICMES-2018

Studies on catalytic activity of $MnFe_2O_4$ and $CoFe_2O_4$MNPsas mediators in hemoglobin based biosensor

Sandip R. Sabale[1,2,*]

1P.G. Department of Chemistry, Jaysingpur College, Jaysingpur, (Shivaji University, Kolhapur)M.S., India, 416101.
2 Center for Molecular Recognition and Biosensing, School of Life Sciences, Shanghai University, Shanghai-200444, P.R. China

Abstract

$MnFe_2O_4$ and $CoFe_2O_4$ magnetic nanoparticles (MNPs) were synthesized using simple polyol method by refluxing in diethylene glycol. The size of obtained $CoFe_2O_4$ MNPs was found to be 4.0 nm and $MnFe_2O_4$ MNPs was found to be 7.0 nm with surface area 291.04 M^2/g and 165.39 M^2/g respectively. These MNPs due to its high surface area and nanosize were used in the hemoglobin based biosensor for the detection of H_2O_2 as a mediator. The EIS measurements show that the $CoFe_2O_4$ MNPs are more conducting than the $MnFe_2O_4$ MNPs. The surface area of $CoFe_2O_4$ MNPs was found to be higher than the $MnFe_2O_4$ MNPs. The GCE/CS/$CoFe_2O_4$/Hb modified biosensor shows wider linearity range (1×10^{-7} to 8×10^{-4} M) than the GCE/CS/$MnFe_2O_4$/Hb modified biosensor (1×10^{-6} to 4×10^{-4} M) because of higher conductivity and greater surface area of $CoFe_2O_4$ which increases the catalytic activity.

Peer-review under responsibility of the scientific committee of the International Conference on Materials and Environmental Science, ICMES 2018.

Keywords:$CoFe_2O_4$; $MnFe_2O_4$; H_2O_2, Hemoglobin; Biosensor

1. Introduction

Nowadays, there has been considerable interest among the chemists and biochemists in the detection of H_2O_2 as it is a byproduct of enzymatic reactions in the field of biosensing [1]. Various methods have been employed for the analysis of H_2O_2 such as volumetry, spectrophotometry, chemiluminescence, chromatography and electrochemistry. The electrochemical methods are more preferable due to its low cost, simplicity, efficiency and high sensitivity. The redox enzyme (Horse radish peroxidase, cytochrome and hemoglobin) based biosensors are extensively employed for the detection of H_2O_2 due to their high selectivity and specificity [2-3]. The known

* Corresponding author. Tel.: +91-9371594299,
E-mail address: srsabale@gmail.com

Peer-review under responsibility of the scientific committee of the International Conference on Materials and Environmental Science, ICMES 2018.

Pacific Northwest
NATIONAL LABORATORY

Tel: (509) 372-4524
Xiaoying.yu@pnnl.gov

REPORT FROM HOST INSTITUTE

1. Name of the Raman Fellow : Dr. Sandip R. Sabale
2. Name of Host and address of the overseas host institute : Dr. Xiao-Ying Yu, Senior Scientist
   Earth & Biological Sciences Directorate
   Pacific Northwest National Laboratory, Richland, WA 99354, USA
3. Area of research : Materials Science
4. Duration : September, 4th 2016 to September, 02nd 2017
5. Brief highlights of achievement (techniques learnt/research work carried out/papers published/prepared):

a) $CoFe_2O_4$, $MnFe_2O_4$, and $ZnFe_2O_4$ MNPs were synthesized by complex decomposition method and characterized for structural, morphological and magnetic properties. The $CoFe_2O_4$ showed high magnetization with high SAR values. Hence this material is explored for the formation of core/shell structure. $CoFe_2O_4$@Au is prepared by reduction method and studied for induction heating studies to determine the hyperthermia application f or cancer treatment.

b) **Papers prepared:**

1. Recent development in synthesis, properties, and biomedical applications of core/shell superparamagnetic iron oxide nanoparticles with gold, Biomaterials Science, Revision Submitted
2. Superparamagnetic $CoFe_2O_4$@Au with high specific absorption rate and intrinsic loss power for magnetic particle hyperthermia therapy, J. Materials Science:Materials in Medicine, Communicated
3. Probe for molecular imaging of metal organic frameworks using SIMS and SALVI device, Under preparation

Paper Published:

1. Ravi Kamble, Sandip Sabale*, Prashant Chikode, Vijaya Puri, Xiao-Ying Yu and Smita Mahajan, Studies on the Fe^{3+} Doping Effect on Structural, Optical and Catalytic Properties of Hydrothermally Synthesized TiO^2 Photocatalyst, Nanoscience & Nanotechnology-Asia, 2017, 7(2), 231-242.
2. Sandip Sabale, Jian Zheng, Rama S Vemuri, Xiao-Ying Yu, B Peter McGrail and Radha Kishan Motkuri, Recent advances in metal organic frameworks for heterogeneous catalyzed organic transformations, Synth Catal., 2017, 1(1):5,1-8.

6. Has the fellow visited other labs/institutes/attended conferences in host country?
   Yes. Visited the following institutes and attended conferences with prior permission
   1. Prof. Richard Weiss, Department of Chemistry, Georgetown University, Washington DC for fluorescence studies of MNPs. 27th Jan to 3rd Feb. 2017
   2. Attended conference Quark, April Meeting 2017, American Physical Society, on 31st January 2017.
   3. Attended and presented in ACS 253rd National Meeting and Exposition, San Francisco, April 2-6, 2017 on Hyperthermia properties of superparamagnetic ferrite NPS synthesized via the thermal decomposition method.

7. Has the fellow participated in other activities? Please specify:
    - Worked on Secondary Ion Mass Spectrometry
    - Worked on Quanta chrome for gas adsorption
    - Attended Publishing symposium in PNNL with ACS, IEEE, Elsevier, RSC
    - Participated in editorial discussion for How to publish
    - Training on Cyber security
    - Training on waste hazardous and management
    - Training for Matlab and origin software

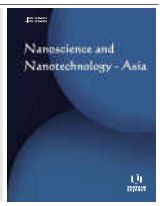
Certified that *Dr. Sandip R. Sabale,* Assistant Professor, Jaysingpur College, Jaysingpur, worked as a Raman Postdoctoral Fellow, for the period of 4th September 2016 to 2nd September 2017 at the Pacific Northwest National Laboratory, Richland, WA 99354, USA.

Xiao-Ying, Yu, Ph.D.
Sr. Scientist,
Pacific Northwest National Laboratory
P.O. Box 999, MSIN K3-90
Richland, WA, USA 99354
Tel: 1-509-372-2700
Fax: 1-509-372-4524
xiaoying.yu@pnnl.gov

Nanoscience & Nanotechnology-Asia, 2017, *7*, 230-242

RESEARCH ARTICLE

Studies on the Fe^{3+} Doping Effect on Structural, Optical and Catalytic Properties of Hydrothermally Synthesized TiO_2 Photocatalyst



Ravi Kamble[1], Sandip Sabale[2,4,*], Prashant Chikode[1], Vijaya Puri[3], Xiao-Ying Yu[4] and Smita Mahajan[1$]

[1]*Department of Physics, Jaysingpur College, Jaysingpur-416101, India;* [2]*P.G. Department of Chemistry, Jaysingpur College, Jaysingpur-416101, India;* [3]*Department of Physics, Shivaji University, Kolhapur-416004, India;* [4]*Earth and Biological Sciences Directorate, Pacific Northwest National Laboratory (PNNL), Richland, WA 99352, USA*

Abstract: ***Objective*:** Pure TiO_2 and Fe^{3+}-TiO_2 nanoparticles have been prepared by a simple hydrothermal method with different Fe^{3+} concentrations.

***Method*:** The synthesized nanoparticles are analysed to determine its structural, optical, morphological and compositional properties using X-ray diffraction, Raman, UV-DRS, photoluminescence, Mossbauer, XPS, TEM and SEM/EDS. The EDS micrograph confirms the existence of Fe^{3+} atoms in the TiO_2 matrix with 0.85, 1.52 and 1.87 weight percent. The crystallite size and band gap decrease with increasing Fe^{3+}concentration. The average particle size obtained from TEM is 7-11 nm, in good agreement with XRD results. Raman bands at 640 cm^{-1}, 517 cm^{-1} and 398 cm^{-1} further confirm pure phase anatase in all samples. XPS results show the proper substitutions of a few sites of Ti^{4+} ions by Fe^{3+} ions in the TiO_2 host lattice.

***Conclusion*:** The intensity of PL spectra for Fe^{3+}-TiO_2 shows a gradual decrease in the peak intensity with increasing Fe^{3+} concentration in TiO_2, and it indicates a lower recombination rate as the Fe^{3+} ion concentration increases. These nanoparticles are further studied for its photocatalytic activities using malachite green dye under UV, visible and sunlight.

ARTICLE HISTORY

Received: November 16, 2016
Revised: December 19, 2016
Accepted: December 20, 2016

DOI:
10.2174/2210681207666161227160317

Keywords: Hydrothermal synthesis, Fe^{3+}-TiO_2, properties, visible light photocatalyst, nanoparticles, UV-DRS.

1. INTRODUCTION

Nanocrystalline titanium dioxide (TiO_2) is a widely used semiconductor material for photocatalytic applications due to its outstanding properties such as high stability, low-cost and abundance. In addition to its high catalytic activity, it has effective applications in solar cells, photoconductors, coatings, fillers, pigments, gas sensors, optics, cosmetics, biomaterials and self-cleaning materials [1-5]. Industries such as textile, paper, printing and dying produce a large amount of toxic and non-biodegradable dye effluents which enter into the environment. Hence this work focuses on the removal of these toxic dyes using photocatalytic methods with TiO_2 photocatalyst. The photocatalytic degradation of a dye involves formation of electrons (e^-) and holes (h^+) on the surface of catalyst, their serving as redox sources which react with adsorbed reactants, leading to the destruction of pollutants [2, 6-7]. Anatase TiO_2 has a band gap of 3.2 eV, thus its photocatalytic property can be activated under the UV light (λ< 400 nm). The energy produced by sunlight in the visible region is less than the UV region [8, 9].

The photocatalytic activity of TiO_2 can be increased by shifting its band gap less than 3.2 eV in

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RESEARCH ARTICLE

Green Synthesis and Spectroscopic Studies of Ag-rGO Nanocomposites for Highly Selective Mercury (II) Sensing

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Abstract: ***Introduction*:** Herein we report the green synthesis and characterization of silver-reduced graphene oxide nanocomposites (Ag-rGO) using *Acacia nilotica* gum for the first time.

***Experimental*:** We demonstrate the Hg^{2+} ions sensing ability of the Ag-rGO nanocomposites form aqueous medium. The developed colorimetric sensor method is simple, fast and selective for the detection of Hg^{2+} ions in aqueous media in presence of other associated ions. A significant color change was noticed with naked eye upon Hg^{2+} addition. The color change was not observed for cations including Sr^{2+}, Ni^{2+}, Cd^{2+}, Pb^{2+}, Mg^{2+}, Ca^{2+}, Fe^{2+}, Ba^{2+} and Mn^{2+}indicating that only Hg^{2+} shows a strong interaction with Ag-rGO nanocomposites. Under the most suitable condition, the calibration plot (A_0-A) against concentration of Hg^{2+} was linear in the range of 0.1-1.0 ppm with a correlation coefficient (R^2) value 0.9998.

***Results & Conclusion*:** The concentration of Hg^{2+} was quantitatively determined with the Limit of Detection (LOD) of 0.85 ppm. Also, this method shows excellent selectivity towards Hg^{2+} over nine other cations tested. Moreover, the method offers a new cost effective, rapid and simple approach for the detection of Hg^{2+} in water samples.

Keywords: Green synthesis, Ag-rGO Nanocomposites, *Acacia nilotica* gum, Hg^{2+} sensing, Limit of Detection (LOD).

1. INTRODUCTION

Mercury and its derivatives are widespread pollutants with distinct toxicological profiles. These are major aqueous contaminants and with high toxicity is a risk to human health. Even a small amount of mercury intake can result in acute or severe damage to the human body. Additionally, mercury and its compounds also cause detrimental effects to the ecosystem. Therefore, it is important to develop methods to efficiently and effectively detect their presence in water systems, especially eco-friendly methods [1-4].

Traditionally, Hg^{2+} ions are detected by chromatographic separation or cold vapor generation, atomic absorption or emission spectroscopy, inductively coupled plasma mass spectrometry, selective cold vapor atomic fluorescence spectrometry and ion selective electrodes. But, these methods share several disadvantages such as expensive and sophisticated instrumentation, low throughput, complicated sample preparation and the possibility of introducing additional contamination. Thus there is a high need to develop a low-cost, portable and user friendly analytical platform for the detection of mercury ion concentrations [5-6] Compared to these techniques, spectrophotometer techniques are simple, inexpensive and show a rapid response in combination with high sensitivity and selectivity.

Graphene is a two-dimensional (2D) sheet of sp^2-bonded carbon atoms, with honeycomb structure like arrangement of the carbon atoms. It is an ideal supporting material for anchoring metal nanoparticles, offering a very high electrochemically active surface area, effective acceleration for electron transport, chemical inertness and moreover the control over metal nanoparticle size, thus making itself an effective candidate for sensor and catalyst [7-10]. Ag, Au, Pt and Pd are the most frequently investigated nanoparticles in combination with graphene. Silver nanoparticles (AgNPs) possess outstanding physical, chemical, electrical, thermal, high catalytic properties. Moreover, AgNPs exhibits surface plasmon resonance, a way to manipulate light on nanometer scale [11-13]. The AgNPs possess high surface energy, and undergo oxidation easily. This may result in color change of the AgNPs dispersion and shift or disappearance of the UV-Vis absorption, which provide the feasibility of Hg^{2+} ion detection by AgNPs. Thus the new hybrid structure of reduced graphene oxide and Ag NPs presents useful characteristics for optical sensing [14-18].

To date several investigations have been reported on the synthesis of silver-reduced graphene oxide (Ag-rGO) nano-

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Research Article

Understanding Time Dependence on Zinc Metal–Organic Framework Growth Using in Situ Liquid Secondary Ion Mass Spectrometry

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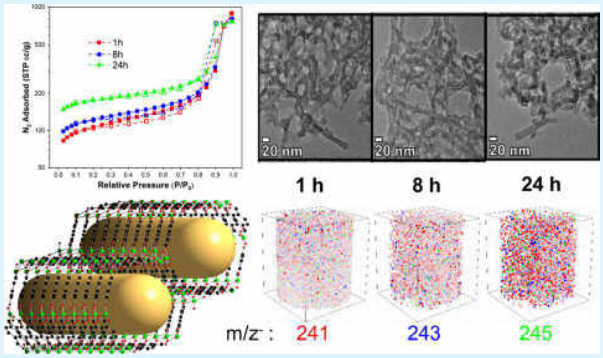
ABSTRACT: The abundance of novel metal–organic framework (MOF) materials continues to increase as more applications are discovered for these highly porous, well-ordered crystalline structures. The simplicity of constituents allows for the design of new MOFs with virtue of functionality and pore topology toward target adsorbates. However, the fundamental understanding of how these frameworks evolve during nucleation and growth is mostly limited to speculation from simulation studies. In this effort, we utilize a unique vacuum compatible system for analysis at the liquid vacuum interface (SALVI) microfluidic interface to analyze the formation and evolution of the benchmark MOF-74 framework using time-of-flight secondary ion mass spectrometry (ToF-SIMS). Principal component analysis of the SIMS mass spectra, together with ex situ electron microscopy, powder X-ray diffractometry, and porosimetry, provides new insights into the structural growth, metal–oxide cluster formation, and aging process of Zn-MOF-74. Samples collected over a range of synthesis times and analyzed closely with in situ ToF-SIMS, transmission electron microscopy, and gas adsorption studies verify the developing pore structure during the aging process.



KEYWORDS: *molecular imaging, metal–organic framework, structure and growth, in situ liquid SIMS, SALVI*

INTRODUCTION

The modular nature of metal–organic framework (MOF) materials, synthesized with a combination of metal clusters and organic linkers, has been utilized to engineer various porous sorbents catered toward potential applications such as storage, catalysis, and separation among many others.[1−16] Although many synthesis procedures for a wide range of MOFs have been widely reported in the literature, limited experimental research has focused on investigating the mechanism of MOF nucleation and growth.[17−22] To date, there still persists a lack of understanding during the process of reaction discovery and optimization of MOF synthesis, thus presenting significant obstacles to the synthetic realization of promising new MOF structures. The relationship between reaction parameters such as concentration, time, temperature, or solvent conditions required for a specific MOF structure is challenging to interpret. The development of new MOF materials and establishment of new synthesis procedures are typically based not only on rational design but also on trial and error, combinatorial screening, and chemical intuition. In limited instances, simulation studies have provided speculation on the interaction of linker and metal nodes that construct the framework and have guided the development of new MOF materials.[23−25] However, very few attempts have used experimental techniques to provide clues about MOF growth that would help support conclusions from computational work. These techniques typically utilize X-ray scattering, spectroscopy, or microscopy to probe crystallinity and provide clues toward MOF nucleation and growth.[17] Due to the risk of probing unintended species from ionization and fragmentation of the mother liquor during analysis, mass spectrometry (MS) has rarely been used to characterize the fundamental nucleation building units during MOF synthesis. Only a handful of studies have used MS to interpret formation and growth during MOF crystallization and typically rely on either electrospray or cryospray ionization methods.[26−30] Accordingly, the aim of this study is to provide direct experimental insight into the growth and aging process of a zinc carboxylate-

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Review Article

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Recent Advances in Metal-Organic Frameworks for Heterogeneous Catalyzed Organic Transformations

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Abstract

In this review, we summarize recent advances on Metal-Organic Framework (MOF) based heterogeneous catalytic chemistry. Catalytic performance of varied configurations of MOFs including active sites, post synthetic modification, and MOF derived catalysts, is summarized in the context of various organic transformation reactions. Post synthetic modification of MOFs via functionalization of organic linkers with active catalytic moieties is deliberated. Also, efficacy of carbonaceous catalysts derived from MOFs is discussed. Overall, an outlook on MOF's application in heterogeneous catalysis is presented.

Keywords: Metal-Organic Framework (MOF); Heterogeneous catalysis; Post synthesis modification; Organic transformations; Catalyst

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Introduction

Nanoporous Metal-organic frameworks (MOFs) are an important class of new materials that have attracted researchers owing to their special properties [1-7]. The main advantage of MOFs is their versatility in chemical composition, organic and inorganic building units, and the bifunctional metal/acid sites for insertion using isoreticular chemistry [8,9]. Owing to their crystalline characteristics, tunable porous structure with high surface areas (up to 10000 m^2/g) and large pore volumes, made them superior materials for various applications in gas/vapor sorption, separation, drug delivery and heterogeneous catalysis [10-15]. Specifically, the potential inner porosity similar to that of zeolites and the ease of access to the metal ions in the pore, made them superior in heterogeneous catalysis [16,17]. Moreover, both metal centers and organic linkers contribute to the catalytic activities while pores serve as a host for small molecules and/or supports for metal/metal oxide nanoclusters [18,19]. Though the low thermal and chemical stability of MOFs definitely limit the use of MOFs in high temperature vapor phase catalysis reactions, MOFs can compete with or even outperform the existing zeolites in low temperature liquid phase reactions [20]. Here, we report a brief overview on the recent progress of MOFs used in heterogeneous catalysis of different organic reactions. We evaluated the heterogeneous catalysis of MOFs by considering: (i) Active sites in MOFs for organic transformations; (ii) Post-synthesis modification; and (iii) MOF derived catalysis.

Active sites in MOFs for organic transformations

MOFs with exotic topologies and chemical activities have shown outstanding catalytic performance in various organic transformation reactions and to name a few are oxidation, acetylation, epoxidation, hydrogenation, coupling, condensation, alkylation, hydroxylation and cyclization. The catalytic activity in MOFs is generated at both metal nodes (largely acting as Lewis acids) and also any exposed terminal ligands (usually Lewis basic sites). Specifically, the Lewis acid sites from the metal nodes can be generated by removing the coordinated water molecules from the MOF framework by exposing the metal sites. Kaskel et al. demonstrated the dehydration of HKUST-1 ($Cu_3(btc)_2$) to produce open Cu(II) sites for cyanosilylation of aldehydes, but later when they attempted with large pore Cr-MIL-101 ($Cr_3F(H_2O)_2O(BDC)_3$), where Cr(III) sites showed higher Lewis acidity than Cu(II) sites for the same cyanosilylation reactions [21,22]. A specific list of

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Superparamagnetic CoFe O @Au with High Specific Absorption Rate and Intrinsic Loss Power for Magnetic Fluid Hyperthermia Applications

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Abstract

$CoFe_2O_4$ nanoparticles (NPs) and surface modified with gold (Au) have been synthesized by a thermal decomposition method. The obtained NPs and formation of $CoFe_2O_4$@Au core–shell (CS) were confirmed by characterizing their structural and optical properties using X-ray powder diffraction (XRD) patterns, Fourier transform infrared spectroscopy, Raman spectroscopy, UV–Visible and photoluminescence studies. Morphological and compositional studies were carried out using high-resolution transmission electron microscopy and energy-dispersive X-ray spectroscopy, while the magnetic properties were determined using alternating gradient magnetometer and Mossbauer to define the magneto-structural effects of shell formation on the core NPs. Induction heating properties of $CoFe_2O_4$ and $CoFe_2O_4$@Au CS magnetic nanoparticles (MNPs) have been investigated and correlated with magneto-structural properties. Specific absorption rate and intrinsic loss power were calculated for these MNPs within the human tolerable range of frequency and amplitude, suggesting their potential in magnetic fluid hyperthermia therapy for possible cancer treatment.

Keywords $CoFe_2O_4$@Au · Superparamagnetic · Specific absorption rate (SAR) · Intrinsic loss power (ILP) · Magnetic fluid hyperthermia

1 Introduction

Magnetic nanoparticles (MNPs), especially superparamagnetic iron oxide nanoparticles (SPIONs), have shown to have potential for use in biomedical applications such as in targeted drug delivery, imaging, magnetic fluid hyperthermia (MFH) and biosensors [1–3]. The ability of SPIONs to convert the electromagnetic energy into heat is the main reason for SPION-based biomedical applications. This heat generation technique by SPION mediators plays an important role in cancer treatment with hyperthermia and multimodal imaging [4, 5]. Recently, MNP-based MFH proved more therapeutically efficient than the common chemotherapeutic drugs (i.e., doxorubicin and Feridex) [6]. Different types of SPIONs have been studied for their effectiveness as hyperthermia agents [3]. These SPIONs are either magnetite (Fe_3O_4) or maghemite (γ-Fe_2O_3), stabilized by coating with a variety of ligands such as dextran, cationic liposomes, polyvinyl alcohol, lauric acid and oleic acid [3]. Another category of these SPIONs is the metal-doped ferrites, MFe_2O_4, ($M = Co^{2+}$, Mn^{2+}, Ni^{2+}, Zn^{2+}, Mg^{2}) [7–9]. Biomedical applications for such MNPs have been limited so far due to their instability under physiological conditions, harmful free radical formation and inappropriate surface binding of the ligand. In particular, SPIONs are cytotoxic to different types of cells because of Fe-induced intracellular formation of reactive oxygen species as Fe seeps into the cellular milieu [3]. Cytotoxicity arises due to the absence of biocompatible or protective coating which prevents the seepage of Fe from SPIONS surfaces. Hence, coating with biocompatible

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Biomaterials Science

REVIEW

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Recent developments in the synthesis, properties, and biomedical applications of core/shell superparamagnetic iron oxide nanoparticles with gold

Sandip Sabale, *[a,b] Priyanka Kandesar,[a] Vidhya Jadhav,[a] Rachel Komorek,[b] Radha Kishan Motkuri [b] and Xiao-Ying Yu *[b]

In the last decade, magnetic nanoparticles (MNPs), especially superparamagnetic iron oxide nanoparticles (SPIONs), have immensely promoted the advancement of diagnostics and theranostics in the biomedical field. The unique properties of the SPIONs-core and the functional gold (Au)-shell together (SPIONS/Au core/shell or CS) have a wide range of biomedical applications including, but not limited to, magnetic resonance imaging (MRI), dual modality MRI/computed tomography (CT), photo-induced and magnetic fluid hyperthermia (MFH), drug delivery, biosensors, and bio-separation. Researchers have made much effort to develop synthesis strategies for size control and surface modifications to achieve the desired properties of these CSs for applications in *in vitro* and *in vivo* studies. This review highlights recent developments in the synthesis and biomedical applications of SPIONs/Au CSs, including γ-Fe_2O_3/Au (maghemite), Fe_3O_4/Au (magnetite), and MFe_2O_4/Au (M = divalent metal ions) in the past seven years. More importantly, current trends of SPIONs/Au in relation to the biochemical industry are surveyed. Finally, we outline the developmental needs of SPIONs/Au from the perspective of material synthesis and their novel applications in disease diagnosis and treatment in the near future.

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1. Introduction

Different types of magnetic nanoparticles (MNPs) have been well reported in the literature for decades due to their countless biomedical applications, including magnetic resonance imaging/bioimaging, targeted drug delivery, immune assays, bio-sensors and bio-separation, and photothermal and magnetic fluid hyperthermia cancer therapy.[1–5] These applications are based on features such as superparamagnetism, prevention of aggregation, possibility of tuning of particle size (for desired electrical, optical and magnetic properties), monodispersity, stability, biocompatibility, and large surface areas that can be easily functionalized. MNPs with metal (Fe, Co, Ni, Nd),[6] metal oxides (NiO, SiO_2, ZnO, MnO_3),[6–8] and superparamagnetic iron oxide nanoparticles (SPIONs)[9] have different properties and applications based on synthesis methods. Among these MNPs, SPIONs have versatile properties including high magnetic susceptibility, low coercivity, high saturation magnetization, slow oxidation, and low toxicity when compared to other MNPs; these differences have made SPIONs prominent candidates for biomedical applications.[10] However, some disadvantages such as instability under physiological conditions, harmful free radical formation, and inappropriate surface binding of the ligand restrict the use of bare SPIONs for biomedical applications. These disadvantages can be overcome by coating these SPIONs with suitable substances, which can make them an extraordinary material for biomedical use.[11–13]

Throughout this past decade, many reports have been published concerning the coating of SPIONs with different organic and inorganic agents such as polymers, organic monolayers, oxides, and metals to form core/shell (CS) MNPs. These studies especially highlighted inorganic shells such as carbon, noble metals, and silica, and served to show a wide variety of biomedical applications. Most notably, gold (Au) has been used amongst the noble metals, due to its promising properties such as low reactivity and good biocompatibility, making Au CS MNPs applicable for *in vivo* applications in cancer treatment. High affinity for the thiol groups and surface plasmon resonance properties contribute to its use in drug delivery, imaging/MRI, and sensor applications. Hence, Au is the most prominent material used for shell formation on SPIONs. The difficulties of coating Au on MNPs and the excep-

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Research Article

Magneto-structural and induction heating properties of MFe_2O_4 (M = Co, Mn, Zn) MNPs for magnetic particle hyperthermia application

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Abstract
The complex decomposition approach was used for the synthesis of MFe_2O_4 magnetic nanoparticles (MNPs) by substituting M as Co, Mn, and Zn. The obtained MNPs were characterized for magneto-structural properties using X-Ray diffraction patterns, FTIR, Raman and Mossbauer spectroscopy techniques which validate the synthesis of phase pure cubic spinel ferrite (space group *Fd3m*) with five Raman active modes. Magnetic properties confirmed using Mossbauer spectroscopy. The size, morphology, and compositional analysis was performed using HRTEM and EDX where the size of MNPs was found to be less than 10 nm that attains superparamagnetism with 39.0, 58.28, and 44.24 emu gm^{-1} moment for $CoFe_2O_4$, $MnFe_2O_4$, and $ZnFe_2O_4$, respectively. The magnetic hyperthermia performance of obtained MNPs was evaluated by induction heating experiments at magnetic field range 13.3–26.7 kAm^{-1}. The specific absorption rate (SAR) and intrinsic loss power (ILP) values were determined at different magnetic fields and mutually related with magneto-structural properties to evaluate its potential for magnetic particle hyperthermia therapy. The $CoFe_2O_4$ MNP exhibits a maximum temperature rise of 25 and 35 °C for 5 and 10 $mgmL^{-1}$ concentrations with threshold temperature rise.

Keywords Complex decomposition · Magnetic nanoparticles · Magneto-structural properties · Magnetic fluid hyperthermia (MFH) · Saturation magnetization

1 Introduction

The use of magnetic nanoparticles (MNPs) has interestingly increased due to its application in many fields such as magnetic storage, catalysis, photocatalysis, sensor, and biomedical applications [1–5]. In recent days, the MNPs are the best option in various biomedical fields like cancer treatment by magnetic fluid hyperthermia (MFH), targeted drug delivery, bioimaging, bioseparation, and biosensor [6–10]. Many researchers have reported that MFH is an alternative technique for cancer treatment without damaging normal cells as in chemotherapy. There have been different classes of MNPs, namely, metals, metal oxides (Fe_2O_3, Fe_3O_4, Mn_3O_4), ferrites (MFe_2O_4), and alloys [11–15]. Ferrites (MFe_2O_4) are much more influential MNPs among others due to its simple synthetic process, distinctive chemical properties, biocompatibility and non-toxicity to human, controllable size, dispersibility and magnetism for manipulation with an external magnetic field, and these features make them potentially applicable in the biomedical fields [9, 16–19]. The doping of metal ions shows superlative effect in physicochemical properties, stability

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PAPER

Structural and photocatalytic studies of hydrothermally synthesized Mn^{2+}–TiO_2 nanoparticles under UV and visible light irradiation

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Keywords: Mn^{2+}–TiO_2, synthesis, characterization

Abstract

Pure TiO_2 and Mn^{2+}–TiO_2 nanoparticles have been prepared by simple hydrothermal method with different Mn^{2+} concentrations. Obtained samples were analysed to determine it's structural, optical, morphological and compositional properties using x-ray diffraction, UV-DRS, Raman, photoluminescence, XPS, TEM and EDS analysis. The EDS micrograph confirms the existence of Mn^{2+} atoms in TiO_2 matrix with 0.86, 1.60 and 1.90 wt%. The crystallite size as well as band gap decreases with increase in Mn^{2+} concentration. The average particle size obtained from TEM was found 8–11 nm which is in good agreement with XRD results. Raman bands at 640, 518 and 398 cm^{-1} further confirmed pure phase anatase in all samples. XPS shows the proper substitutions of few sites of Ti^{4+} ions by Mn^{2+} ions in the TiO_2 host lattice. The intensity of PL spectra for Mn^{2+}–TiO_2 shows a gradual decrease in the peak intensity with increasing Mn^{2+} concentration in TiO_2, it implies lower electron-hole recombination rate as Mn^{2+} ions increases. The obtained samples were further studied for its photocatalytic activities using malachite green dye under UV light and visible light.

1. Introduction

Semiconductor photocatalysis (TiO_2) has been widely used in cleaning the living environment, because of its outstanding properties like high stability, low cost, abundant in resources and non-toxicity. TiO_2 has extensive applications such as photocatalysis, dye-synthesized photoanodes in new type solar cells, opacifiers in pigments, catalytic supports, self-cleaning materials, cosmetics, plasma coatings etc [1–3].

Among various photocatalysis, titania, particularly anatase TiO_2 has been extensively used in photocatalytic environmental applications. Especially, textile industries produce large amount of colour dye effluents which are toxic and non-biodegradable. The photocatalysed degradation of dye in solution is initiated by illuminating the TiO_2 photocatalyst with light of energy higher than its band gap, electron excite from valence band to conduction band leaving holes in valence band. These photo excited electrons and holes oxidizes or deoxidizes adsorbates on the surface of catalyst [4–6]. The hole (h^+_{VB}) with high oxidative potential permits the direct oxidation of the dye to reactive intermediates. Hydroxyl radical (•OH) is also responsible either for decomposition of water or it is formed by the reaction of the hole with (OH^-). •OH radical is an extremely strong, non-selective oxidant ($E_0 = +3.06$ V), which leads to the partial or complete mineralization of several organic chemicals [5] equations (1)–(4).

$$TiO_2 + h\upsilon \rightarrow TiO_2(e^-_{CB} + h^+_{VB}), \quad (1)$$

$$h^+_{VB} + \text{dye} \rightarrow \text{dye}^{\bullet +} \rightarrow \text{oxidation of the dye}, \quad (2)$$

$$h^+_{VB} + H_2O \rightarrow H^+ + \bullet OH, \quad (3)$$

$$\bullet OH + \text{dye} \rightarrow \text{degradation of the dye}. \quad (4)$$

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α-MoO_3-C composite as counter electrode for quantum dot sensitized solar cells

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ABSTRACT

Counter electrodes plays a vital role in electron transport in operation of QDSSCs. The lower charge transfer resistance at counter electrode - electrolyte interface fecilitates improvement in photoconversion efficiency. The present study describes a novel and facile Spray Pyrolysis method for fabrication of low cost α-MoO_3-Carbon composite (α-MoO_3–C) material which is used as counter electrode (CE) in QDSSCs. The QDSSC with TiO_2 photoanode sensitized by cadmium sulphide (CdS) QDs and polysulfide as electrolyte and α-MoO_3-C composite as counter electrode exhibited solar energy-to-electricity conversion efficiency of 1.29%, which is better than those of the cells that used platinum and Cu_2S as counter electrodes. QDSSCs with α-MoO_3-C composite used as counter electrode gives stable and reproducible performance. The improvement in efficiency with α-MoO_3-C composite Counter electrode was mainly driven by the improvement in photocurrent density and decrease in charge transfer resistance at counter electrode – electrolyte interface. Electrochemical impedence spectroscopy studies are carried out to understand electron transport in the device at various interfaces. α-MoO_3-C composite has shown more electrocatalytic response for the reduction of redox species of the polysulfide than platinum and Cu_2S.

1. Introduction

The quantum dot-sensitized solar cells (QDSSCs) are emerging third-generation photovoltaic technologies with efficiencies that have reached over 11% [1]. QDs as sensitizers have several merits including possibility of multiple exciton generation [2]. higher light extinction coefficient [3], larger intrinsic dipole moment that lead to rapid charge separation [4]. Also quantum confinement in these nanostructures allows for tunable optical properties across the solar spectrum [5]. In view of the above, number of parameters of QDSSC are responsibe for improvement in efficiency of QDSSC like photo anode structure, the type of QD sensitizers, counter electrode material and electrolyte composition. Among all the prominent materials for QD sensitizers, CdS is widely used due to their easy preparation. Counter electrode is also an important component in QDSSCs that affects the performance of cell. There are number of materials used as counter electrodes in QDSSC like noble metals i.e. Platinum [6,7], metal sulphides like CuS [8], CoS [9], PbS [10], Cu_2S and carbon derivatives like graphene oxide [11], metal sulphide composite like CuS/CoS [12] and CuS/PbS [13], nanosulfide/carbon composite [14], GO/CuS composite [15], GO/CoS composite [16], NiS [17], MoS_2[18]. MoO_3 so far has not been considered as counter electrode in QDDSCs, but is used in DSSCs [19]. We herein, Probabaly first time report use of α-MoO_3-carbon composite as counter electrode, which employs a cost effective and facile method of preparation as compared to the existing CE Materials.

Molybdenum oxide (MoO_3) is a wide band gap n-type Semiconductor material and one of the transition metal oxides. Some of the MoO_3 compounds are thermodynamically stable having orthorhombic phase (α-MoO_3), metastable phase of monoclinic & hexagonal respectively (β-MoO_3 and h-MoO_3). Among them, α-MoO_3 has attracted more attention because the orthorhombic α-MoO_3 has a layered structure, containing two layers of octahedral MoO_6, held together by double covalent bonding and Van der Waal's forces. Some of the reserchers reported synthesis of MoO_x-C composite by various methods. Ko et.al. have reported synthesis of ant cave structured microballs of MoO_2-C composite by using Ultrasonic spray pyrolysis method using molybdenum salt, polystyrene nanobeads and sucrose at 900 °C in N_2 atmosphere and MoO_2–C microballs were oxidized at 300 °C under an

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RESEARCH ARTICLE

Studies on the Fe^{3+} Doping Effect on Structural, Optical and Catalytic Properties of Hydrothermally Synthesized TiO_2 Photocatalyst

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Abstract: Pure TiO_2 and Fe^{3+}-TiO_2 nanoparticles have been prepared by a simple hydrothermal method with different Fe^{3+} concentrations. The synthesized nanoparticles are analysed to determine its structural, optical, morphological and compositional properties using X-ray diffraction, Raman, UV-DRS, photoluminescence, Mossbauer, XPS, TEM and SEM/EDS. The EDS micrograph confirms the existence of Fe^{3+} atoms in the TiO_2 matrix with 0.85, 1.52 and 1.87 weight percent. The crystallite size and band gap decrease with increasing Fe^{3+}concentration. The average particle size obtained from TEM is 7-11 nm, in good agreement with XRD results. Raman bands at 640 cm^{-1}, 517 cm^{-1} and 398 cm^{-1} further confirm pure phase anatase in all samples. XPS results show the proper substitutions of a few sites of Ti^{4+} ions by Fe^{3+} ions in the TiO_2 host lattice. The intensity of PL spectra for Fe^{3+}-TiO_2 shows a gradual decrease in the peak intensity with increasing Fe^{3+} concentration in TiO_2, and it indicates a lower recombination rate as the Fe^{3+} ion concentration increases. These nanoparticles are further studied for its photocatalytic activities using malachite green dye under UV, visible and sunlight.

Keywords: Hydrothermal synthesis, Fe^{3+}-TiO_2, properties, visible light photocatalyst, nanoparticles.

1. INTRODUCTION

Nanocrystalline titanium dioxide (TiO_2) is a widely used semiconductor material for photocatalytic applications due to its outstanding properties such as high stability, low-cost and abundance. In addition to its high catalytic activity, it has effective applications in solar cells, photoconductors, coatings, fillers, pigments, gas sensors, optics, cosmetics, biomaterials and self-cleaning materials [1-5]. Industries such as textile, paper, printing and dying produce a large amount of toxic and non-biodegradable dye effluents which enter into the environment. Hence this work focuses on the removal of these toxic dyes using photocatalytic methods with TiO_2 photocatalyst. The photocatalytic degradation of a dye involves formation of electrons (e^-) and holes (h^+) on the surface of catalyst, their serving as redox sources which react with adsorbed reactants, leading to the destruction of pollutants [2, 6-7]. Anatase TiO_2 has a band gap of 3.2 eV, thus its photocatalytic property can be activated under the UV light ($\lambda < 400$ nm). The energy produced by sunlight in the visible region is less than the UV region [8, 9].

The photocatalytic activity of TiO_2 can be increased by shifting its band gap less than 3.2 eV in

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Synthesis, Characterisation of Barium Calcium Zirconate by Combustion Method

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ABSTRACT : BaxCa1-x Zro3 (0.1<x<.5) have been prepared by combustion method. The structural and morphological properties were investigated for calcium barium zirconate. The synthesized powders of various compositions were sintered at 900 ^{0}c for five hours with the heating rate 5^0 per min.XRD and SEM properties of different powders were studied.XRD shows prominent peaks at 25 and 30, which becomes more prominent at x=0.5. SEM images show porous natures of powder. Nano size particles were obtained.

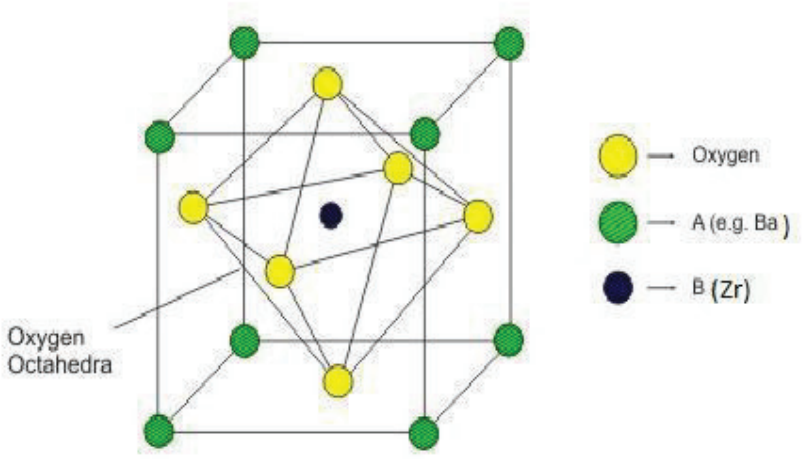
INDEX TERMS : Combustion, XRD, SEM

I. INTRODUCTION

Inorganic perovskite-type oxides are fascinating nonmaterials because of their wide applications in catalysis, fuel cells, and electrochemical sensing. They exhibit attractive physical and chemical characteristics such as electronic conductivity, electrically active structure, the oxide ions mobility through the crystal lattice, variations on the content of the oxygen, thermal and chemical stability, and super-magnetic, photo catalytic, thermoelectric, and dielectric properties. Pervoskite oxides exhibit an array of electrical properties and a variety of solid-state phenomena from insulating, semiconducting, metallic, and superconducting characters; therefore, they are very fascinating to be studied and applied in a large scale. (1) Many of ABO3 pervoskite are cubic or nearly cubic in structure in their ideal form; however, one or more phase transitions may be achieved particularly at low temperature.(1)

The ceramic material belongs to the family pervoskite with general ABO3 type structure that exhibits different electric and magnetic properties such as ferromagnetism and superconductivity (2)

Pervoskite of type ABO3 has the structure as, B site atom is at the centre of the cube. A site atom is at the corners of the cube and o atoms are at the centre of the face. As shown in figure



ABO_3

Barium zirconium titanate ceramics are attractive candidates for dynamic random access memories and tunnable microwave devices. Such a lead free, envoirnment friendly materials are known to exhibit relaxor behaviour in bulk materials with increase in Zr content.The interest in high strain materials is incresing for electromechanical transducers and various related applications.(3)

CaZrO3 possesses an orthorhombic structure of slightly domed octohedra. It undergoes polymorph transformation from Orthorhombic CaZrO3to cubic CaZrO3 at 2750^{0}c .(4) Scientists are focused on CaO-ZrO2 system as a main research topic.Most of investigations are aimed the synthesis and characterisation of CaO stabilised ZrO2 solid solution,very little attension is paid to study of CaZrO3 Phase .Although for several decades the existence of CaZrO3 in CaO-ZrO2 equilibrium diagrame is known.(5).CaZrO3 is potential candidate for use of mechanical filters, coatings and electrical applications such as resonators and capacitors(4). CaZrO3 is orthombic pervoskite consist of slightly deformed (ZrO6)octohedra and (CaO8).(6) CaZrO3has wide

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Investigations of defects in ceramic tiles using Double Exposure Digital Holographic Interferometry (DEDHI) technique

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ABSTRACT

Glazed ceramic flooring tiles have a protective layer that rests over the material, making them impervious to water and stain penetration. A typical defect found in the ceramic tile is delamination. This paper describes the problem of detecting delamination and defects of typical ceramic tiles by using Double Exposure Digital Holographic Interferometry (DEDHI), as a non-destructive technique. The specimen tiles of different qualities (defected) having dimensions 10 cm × 12 cm are used as the sample tiles. These tiles are subjected to mechanical and thermal stressing and their double exposure digital interferograms are recorded. Digital reconstructed images show various fringe patterns. It is found that the defected samples show the irregularity in the fringe patterns and the shape of the fringes changes accordingly the defect, crack and debonds present in the samples. The compared fringe patterns, with fringe patterns of high quality on ceramic samples give reasonably interesting results.

1. Introduction

Silica and ceramic based materials are widely used in industry as well as in construction of buildings all over the worlds. Ceramic materials, which include monolithic ceramics and ceramic-matrix composites, have been identified as potential candidates for high-temperature structural applications because of their high-temperature strength, light weight and excellent corrosion and wear resistance [1]. In order to encourage the expanded application of engineering ceramics, the use of appropriate non-destructive evaluation approach is critical to effective process control and the assurance of high-quality products and reliable performance in service [2–5]. There are many methods such as pulsed tomography, radiography, liquid penetrant method, ultrasonic inspection etc., and many acoustic methods were reported for the non-destructive testing of ceramics. But these methods are difficult and expensive. Hence there is wide scope in this field to use a method which is cost effective and easy to implement.

As ceramic materials are widely used in space shuttle tiles, thermal barriers, high temperature glass windows, fuel cells glassware, windows, pottery, corning ware, magnets, dinnerware, ceramic tiles, lenses, home electronics and microwave transducers, it is necessary to study the strength and capability of these materials by using suitable methods. Minor cracks and defects plays important role in these applications. It is well known that double exposure holographic interferometry (DEHI) technique is a well-established optical method where two image holograms are recorded before and after an object's deformation. DEHI measures displacement maps that can be used to determine the surface deformation [6,7], Young's modulus [8,9], Poisson's ratio [10], thermal expansion coefficient [11], diffusion coefficient [12,13], thickness of thin films [14–17] etc. In recent years, DEHI technique has received

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Determination of Young's Modulus of Silica Aerogels using Holographic Interferometry

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Abstract: Digital holographic interferometry technique is used to determine elastic modulus of silica aerogels. Tetramethoxysilane precursor based Silica aerogels were prepared by the sol-gel process followed by supercritical methanol drying. The alcogels were prepared by keeping the molar ratio of tetramethoxysilane: methyltrimethoxysilane: H2O constant at 1:0.6:4 while the methanol / tetramethoxysilane molar ratio (M) was varied systematically from 12 to 18. Holograms of translucent aerogel samples have been successfully recorded using the digital holographic interferometry technique. Stimulated digital interferograms gives localization of interference fringes on the aerogel surface and these fringes are used to determine the surface deformation and Young's modulus (Y) of the aerogels.

Keywords: Aerogels, Holographic interferometry, Mechanical stressing, Surface deformation

INTRODUCTION

Silica aerogels are highly porous (> 98%) [1] nanostructured materials with the bulk density as low as 0.02g/cm^3 and composed of as low as 0.2 % microscopic strands of silicon-dioxide as a tenuous web. But due to the high porosity and small solid content, determination of various mechanical properties of silica aerogels is a major challenge. Efforts have been made in the past to use non-destructive techniques like sound velocity measurements through aerogels[2, 3]. But there are no reports available on the use of digital holographic interferometry for the determination of mechanical properties of the aerogels. Even though the aerogels have very low densities (~ 0.05 g/cm^3) and very low Young's modulus (10^6-10^7 N/m^2), aerogels behaves as linear elastic materials [4, 5].

Holographic interferometry has been widely accepted as a viable tool for non-destructive testing of materials. It permits the qualitative and quantitative study of minute changes in object contours [6, 7]. Currently, new techniques are also available to analyze the interference fringes using high speed computers and charge coupled device (CCD) cameras and it is possible to record the digital holograms of aerogel samples with such a device [8-11].

We report here the use of Digital holographic interferometry [12], to study the surface deformation of mechanically stressed aerogel samples In this technique, the stressed state of the sample is compared with its unstressed normal state, which causes interference fringes to localize on the object. From the study of interference fringes, information about object deformation can be obtained with very high precision [13, 14]. As this technique is sensitive to the deformation of a sample on the order of the wavelength of the source (He-Ne laser, wavelength λ~6328 A), application of a small stress can give rise to interferometric fringes and hence the sample under test remains intact, reusable and crack free.

The paper reports the experimental work on digital double exposure holographic interferometric technique to study the surface deformation of silica aerogels, due to given variable mechanical loading.

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Modified DJ method: Application to Boussinesq equation

Jayvant Patade, Sachin Bhalekar

In this paper we present a modification of DJ Method [J. Math. Anal. Appl. 316 (2006), 753-763] to solve the nonlinear equations more efficiently. It is observed that the modified DJ method is faster and hence it has accelerated convergence rate as compared to the old one. We use this new method to find the analytical solutions of Boussinesq equation. The reported results are compared with the exact solutions. Further, we compare the absolute error in our solution with those in other iterative methods. It is observed that the presented method is simple and generates more accurate solutions as compared with other methods.

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Modified DJ method: Application to Boussinesq equation

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Abstract

In this paper we present a modification of DJ Method [J. Math. Anal. Appl. 316 (2006), 753-763] to solve the nonlinear equations more efficiently. It is observed that the modified DJ method is faster and hence it has accelerated convergence rate as compared to the old one. We use this new method to find the analytical solutions of Boussinesq equation. The reported results are compared with the exact solutions. Further, we compare the absolute error in our solution with those in other iterative methods. It is observed that the presented method is simple and generates more accurate solutions as compared with other methods.

Keywords: Boussinesq equation, DJ method, modified DJ method, series solution.
2010 MSC: 35G25, 35C10, 81Q05

1. Introduction

Boussinesq equation introduced by French mathematician Joseph Boussinesq has the form

$$u_{tt} + pu_{xx} + q\left(u^2\right)_{xx} + ru_{xxxx} = 0, \tag{1.1}$$

where p, q and r are constants. The Boussinesq equation have several applications in the real world. This equation play an important role in modeling various phenomena such as long waves in shallow water [1], one dimensional nonlinear lattices waves [2], vibration in a nonlinear string [3], electromagnetic waves in dielectric materials [4] and so on. Many researchers have been used analytical methods to solve Boussinesq equation such as variational iteration method [5], modified variational iteration method [6, 7], Adomian decomposition method and homotopy perturbation method [8, 9]. Recently Malek et al. [10] have used potential symmetries method to solve Boussinesq equation.

The Daftardar-Gejji and Jafari Method (DJM) [11] is a simpler and more efficient technique used to solve various equations such as fractional differential equations [12], partial differential equations [13], boundary value

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