PROCEEDINGS

33RD ANNUAL CONFERENCE OF ORISSA CHEMICAL SOCIETY (OCS-2019)

&

5TH NATIONAL CONFERENCE ON RECENT ADVANCEMENT IN MATERIAL SCIENCES (RAIMS-19)

DEPARTEMENT OF CHEMISTRY
VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY
BURLA, SAMBALPUR, ODISHA

PROCEEDINGS

33^{rd} Annual Conference of
Orissa Chemical Society
&
5^{th} National Conference on
"Recent Advancement in Material Sciences"
(RAIMS–2019)

December 24-25, 2019

Organized by

Department of Chemistry

Veer Surendra Sai University of Technology

Burla, Sambalpur – 768018, Odisha

Dedicated to ....

Prof. (Dr.) Lalit Narayan Patnaik

Birth: 17.11.1944 **Death: 4.3.2019**

Prof. (Dr.) Lalit Narayan Patnaik was born on 17th November 1944. He obtained his M.Sc. Degree in Chemistry from Ravenshaw College, Cuttack in 1965, standing First Class First in the Batch. He was a College Teacher in Chemistry in various Govt. Colleges of Odisha from July 1967 to March 1988 for 21 years as Lecturer and Reader in Chemistry. Subsequently, he was Senior Scientist in the State Pollution Control Board, Odisha, from March 1988 to May 1993. He was also a Senior Scientist in the Department of Environment, Govt. of Odisha from May 1993 to September 1997. He became Director (Environment), Govt. of Odisha from September 1997 to November 2000 in the rank of Professor from April 1999. He was also Director (Vocational Education), Govt. of Odisha from December 2000 to November 2002 in the rank of Professor. He was superannuated from the services of Govt. of Odisha on 30th November 2002. He was appointed as the Chairman of Odisha State Pollution Control Board in July 2004 and remained in the position till January 2008. He specialized in Physical Chemistry, Environmental Chemistry & Management Sciences. He obtained his Ph.D. Degree in Chemistry from Sambalpur University in 1973. He has 57 research publications, including 36 in International Journals. He has guided six students as an Independent Research Guide and four students as a Joint Research Guide for their Ph.D. Degrees. He has visited Norway in the year 1994 as a Member of the Govt. Team to Study Environmental Management Practices in that Country. He has represented India in the International Workshop on Environmental Performance Disclosure, Beijing, China. He has also visited London & Hong Kong as a Tourist. He is a Member of the Indian Science Congress Association, Kolkata; Patron Member of Orissa Environmental Society, Bhubaneswar, and Fellow of National environmental association, etc. He is widely known and respected in the State of Odisha for his Significant Contribution to Pollution Control & Protection of Ecology & Environment of the State. He is a Life Time Bachelor. He became President of Orissa Chemical Society during 2008. During his term as the President, the Annual Conference of OCS was held on Dec 27-28, 2008 at North Orissa University, Baripada. Prof. Patnaik passed away on March 4, 2019.

Obituary......

Prof. (Dr.) Chitta Ranjan Das

Birth: 20.10.1938 **Death: 17.01.2019**

Prof.(Dr.) Chitta Ranjan Das was born on October 20, 1938 at Cuttack. He did his Matriculation at Ranihat High School and completed his M.Sc. in Chemistry from Ravenshaw College, Cuttack, in 1960. While he was a Lecturer in Chemistry in B. J. B. College, Bhubaneswar, he carried out research under the supervision of Prof. N. Bose, Professor of Chemistry, Regional College of Education, Bhubaneswar, which earned him the Ph. D. Degree of Utkal University. He was a Visiting Scientist at Norwegian Technical University, Norway, with a Royal Norwegian Government Fellowship; at Louisiana State University, USA, with a Sea Grant Fellowship; and at Leeds University, England, with a Royal Society of England Fellowship. From his professional career as a Lecturer in Chemistry, he rose to become Professor Grade-I Principal. He collaborated with Prof.(Dr.) P. K. Jena, Director, Regional Research Laboratory, Bhubaneswar, on study of corrosion and rose to fame in this line of research. His expertise in extensive corrosion studies was well recognised in the country and abroad. He became Chief Executive and Director in the Department of Environment, Govt. of Odisha, and was trained in Environmental Management at the Asian Institute of Technology, Bangkok, Thailand. He was responsible for the implementation of Integrated Sustainable Environment Management Plans for the famous wetlands like Chilika Lake and Ansupa Lake. He was Advisor to Govt. of Odisha (Planning & Coordination Department), Govt. of Madhya Pradesh on Wetland Management, and was also an advisor to UNESCO at Nairobi, Kenya. He also carried out extensive research work on Environmental Conservation of Heritage like Sun Temple, Konark, and Lord Jagannath Temple at Puri. He has published 30 research papers in various fields of Chemistry in different Indian & Foreign Journals. Fourteen students got their Ph.D. degree working under his supervision. His name has been enlisted as an Eminent Scientist of 20th Century in Marquis Who's Who. He was also Chairman of Environment Impact Assessment Authority of Odisha and was responsible for giving prior environmental clearance to all types of projects. He was an Advisor to many public and private sector undertakings. Prof. C. R. Das was the President of OCS in 2006. During his term as the President, the Annual Conference of OCS was held on Dec 16-17, 2006 at NIST, Berhampur. He breathed his last in his residence at Bhubaneswar on January 17, 2019.

ज्ञान-विज्ञान विमुक्तये
प्रो० धीरेन्द्र पाल सिंह
अध्यक्ष
Prof. D. P. Singh
Chairman

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University Grants Commission
(मानव संसाधन विकास मंत्रालय, भारत सरकार)
(Ministry of Human Resource Development, Govt. of India)
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MESSAGE

I am pleased to know that the Department of Chemistry, Veer Surendra Sai University of Technology, Sambalpur, Odisha, is organizing 33rd Annual Conference of Orissa Chemical Society and National Conference on "*Recent Advancement on Material Sciences (RAIMS-2019)*" on 24th & 25th December, 2019. On this occasion, the Department is planning to publish conference proceedings.

I hope the Conference will provide an excellent opportunity to the active researchers and scientists to share their research ideas, experiences and experimental results in different areas of Chemistry and Materials Science and to gain knowledge to develop further to attain new heights. It also provides an international platform for researchers and academicians to discuss the most recent innovations, trends, practical challenges encountered and the solutions adopted in the fields of Chemical Sciences, Materials Science and Technology. It is expected that the Conference will yield constructive results.

I extend my best wishes to the Organizers of the International Conference and the participants and wish the publication every success.

(Prof. D.P. Singh)

1st October, 2019

बीर सुरेन्द्र साए प्रोद्योगिकी विश्वविद्यालय
बुर्ला - 768018, सम्बलपुर, उडिशा, भारत
Veer Surendra Sai University of Technology
Burla - 768018, Sambalpur, Odisha, India

Prof. (Dr.) Atal Chaudhary
Vice Chancellor
VSSUT Burla

MESSAGE

I am delighted to know that the Department of Chemistry of Veer Surendra Sai University of Technology Burla is going to organize their33rd Annual Conference of Orissa Chemical Society (OCS) and 5th National Conference on Recent Advancement in Material Sciences (RAIMS–2019) during December 24–25, 2019.

The National Conference RAIMS–19 and 33rd Annual Conference of OCS are designed and organized to provide an interdisciplinary and multidisciplinary intellectual forum for pioneering academicians, frontier researchers, and distinguished industrialists to exchange and share their brainstorming ideas and important thoughts on the recent innovations, trends, developments, practical challenges confronted in the field of Science, Engineering, and Technology.

I heartily congratulate the Organizing Committee Members for hosting and successfully organizing the conference and wish the conference a grand success.

Prof. (Dr.) Atal Chaudhary

Bhola Nath Shukla
Chairman-cum-Managing Director

ମହାନଦୀ କୋଲଫିଲ୍ଡସ ଲିମିଟେଡ
महानदी कोलफील्ड्स लिमिटेड
Mahanadi Coalfields Limited
(A Subsidiary of Coal India Ltd.)
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MESSAGE

It gives me immense pleasure to learn that Department of Chemistry & Production Engineering, VSSUT, Burla is organising the 33rd Annual Conference of Orissa Chemical Society and National Conference on 'Recent Advancement in Material Sciences' RAIMS-2019 from 24-25 December, 2019.

Material Science plays a vital role in our lives because of its uniqueness in properties and extended application in various industries. These are the basis of modern science and technology. Material Science are at the heart of many technological developments that touch our lives and find applications such as electronic materials for communication and information technology, biomaterials for better health care, sensors for intelligent environment, energy materials for renewable energy and environment, light alloys for better transportation, materials for strategic applications and more.

The conference may aims to provide a platform for researchers to share their research ideas and to gain updated information/knowledge, advancement in the field of Material Sciences.

I wish this Conference a great success.

18/12/19
(B.N. Shukla)
Chairman-cum-Managing Director

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(Formerly University College of Engineering, Burla, ESTD:1956)
(A UGC Recognised StateGovernmentUniversity by an Act of Assembly)

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Prof. (Dr.) Amar Nath Nayak
Professor, Department of Civil Engineering
& Coordinator, TEQIP-III

MESSAGE

I am happy to know that Department of Chemistry of Veer Surendra Sai University of Technology (VSSUT), Burla, Sambalpur, Odisha is organizing 33rd Annual Conference of Orissa Chemical Society and National Conference on Recent Advancement in Material Sciences (RAIMS–2019) during December 24-25, 2019. I am sure that the technical and scientific programs of the seminar would certainly give the delegates an opportunity for fruitful discussions and stimulating interactions.

On behalf of TEQIP-III VSSUT Burla, I congratulate the organizers for arranging this conference and my best wishes for making this event a grand success.

Prof. (Dr.) Amar Nath Nayak

Prof.(Dr) Ajaya Kumar Patnaik
President OCS

Message

I am extremely glad to announce that the Dept. of Chemistry VSSUT, Burla is hosting 33rd Annual Conference of Orissa Chemical Society along with organising a National conference on Recent Advancement in Material Science during 24-25th Dec. 2019. It is the best platform for young scientists, academicians, research scholars, industrial personals etc. from all over the country to participate and to share innovative ideas and their result output on the same dais. The key objective of the conference is to promote material science research for betterment of human life through its applications.

The conference will have memorial Lectures, invited talks, oral presentation, poster presentation and awards for best oral and poster presentation. All publications will be reflected in the conference souvenir.

I am sure that the in-depth discussion in this academic event will be helpful to all participants. I am very much thankful to vice-chancellor VSSUT, Local Organising committee, Dept. of Chemistry for hosting 33rd Annual Conference of Orissa Chemical Society.

I congratulate all participants. I wish all the best for grand success of the conference.

A K Patnaik
President of OCS

ORISSA CHEMICAL SOCIETY
Regd. No.18990/28-87/XXVII-22/87 OF 1987-88
http://www.ocs.in, E.mail: info@ocs.org.in

ANNUAL REPORT OF THE SECRETARY
ORISSA CHEMICAL SOCIETY FOR THE YEAR-2019

Honourable Vice-chancellor of Veer Surendra Sai University of Technology, Burla and Chief Guest of the functionProf. Atal Chaudhuri,Esteemed Guest of Honour, Padmashree J.P.Mital, Respected President of Orissa Chemical Society Prof. Ajaya Kumar Patnaik, Head of the Department of Chemistry and Chairman of the conference Prof. Sukalyan Dash, Convenor Prof. Sarat Kumar Swain, Organising Secretary Dr. Achyut Kumar Panda, Joint Secretaries Dr. Monalisa Mohapatra and Dr. Arun K. Barick, Treasurer Dr. Bigyan R. Jail and distinguished members of the local organising committee, faculty and staff members of department of chemistry and other departments, revered members of executive committee of Orissa Chemical Society, esteemed former Presidents and Secretaries of Orissa Chemical Society, members of award committee, co-ordinator, deputy co-ordinator and members of Olympiad committee, delegates and invitees, print and electronic media persons, students and distinguished audience.

Today Orissa Chemical Society is celebrating the 33rd Annual Conference at Veer Surendra Sai University of Technology (VSSUT), Burla. On this occasion I, on behalf of the society extends my warm welcome to you all to this conference. The Orissa Chemical Society was formed in the year 1985 by the founder President Prof. Mahendra K. Rout. The 1st Annual conference of the Society was held at Ravenshaw College (now University), Cuttack in the year 1986. The society has come a long way overcoming all hurdles and has attained the young age to celebrate 33rd Annual Conference.

It is a privilege and pleasure on my part to present the Annual Report of the society for the year 2019. The 32nd Annual Conference was held at National Institute of Science & Technology (NIST), Palur Hills, Berhampur. In the meeting of General Body on 23rd December 2018, the new Executive Committee was formed with the following office bearers and members for the year 2019.

President: Prof. Ajay Kumar Patnaik
Vice-Presidents: 1) Prof. Sarat Kumar Swain
2) Dr. Arun Kumar Padhy
3) Dr. Bamakanta Garnaik
Secretary-cum-Treasurer: Shri Pravat Kumar Swain
Joint Secretaries: 1) Dr. Manabendra Patra
2) Dr. Pradeep Kumar Jena
Members : 1) Prof. Ajay Kumar Behera
2) Dr. Ashok K. Roul
3) Dr. N C Pati
4) Dr. Jaya Prakash Das
5) Dr. Gokarneswar Sahoo
6) Dr. Debasis Mohanty
7) Prof. Baman Acharya
8) Prof. Sukalyan Dash
9) Prof. Ashok Kumar Mishra

This 33rd Annual conference is dedicated to the memory of our revered teacher and former Presidents of Orissa Chemical Society late Prof. Lalit N. Patnaik. His dedication and love for chemistry will be remembered by all the distinguished members of chemistry family.

It is sadnews for all of us that three members of the chemistry family have passed away from November 2018-till date. They are: - (i) Prof. C. R. Das (ii) Prof. Lalit N. Patnaik (iii) Mr. Mayadhar Behera.

That this year the prestigious Prof. Mahendra K. Rout (the founder President of Orissa Chemical Society and former Vice-Chancellor, Utkal University, Vani Vihar, Bhubaneswar) Memorial Lecture will be delivered by a renowned Organic Chemist Prof. Dilip K. Maiti, FRS, Organic Catalysis and Materials Division, University of Calcutta,& Prof. S. R. Mohanty memorial Lecture which was instituted in the memory of Late Prof. S. R. Mohanty, the founder Head of Chemistry Department Utkal University, Vani Vihar & former Vice-Chancellor, Berhampur University, will be delivered by Padma Shri Prof. J. P. Mittal, FASc, FNA and former Director, Chemistry and Isotope Group, Bhabha Atomic Research Centre (BARC), Mumbai.

Besides the memorial lectures, the Orissa Chemical Society presents awards to deserving students, research scholars, teachers and scientists in order to encourage the chemistry education and research.

This year the following Scholars/teachers/scientists are selected by the award committee to receive different awards and prizes.

1.	Prof. R.C. Tripathy Memorial Award (Outside the state,Odisha)	:	Dr. Bishnu Prasad Biswal Max Planck Institute, Germany
2.	Prof. R.C. Tripathy Memorial Award (inside the state,Odisha)	:	Dr. Bibhuti Bhusan Parida Berhampur University, Berhampur
3.	Prof. Dayanidhi Patnaik Memorial Award for best research paper published in current year	:	Miss Monidipa Konar NIT, Rourkela
4.	Prof. G. B. Behera best Ph.D. Thesis award	:	Dr. Srikanta Moharana Sambalpur University, Sambalpur
5.	Kulamani Das Memorial Award for best paper on Environmental science	:	Mr. L. Satish Kumar Achary NIT Rourkela
6.	Prof. Donald S. Matteson & Prof. P. K. Jesthy Memorial Award for best paper on organometallics	:	Dr. Santosh Kumar Behera Madrid Institute for Advance Studies, Spain
7.	Prof. Sripati Pani Memorial Award for best paper on inorganic chemistry	:	Mr. Abhinav Mohanty NIT Rourkela
8.	Prof. K.K. Patnaik Memorial Award for Highest percentage of marks in M.Sc. Chemistry	:	Miss Swati Samantaray Berhampur University, Berhampur
9.	Smt. Parvati Mishra Memorial Award for Highest percentage of Marks among lady candidate in M.Sc. Chemisty	:	Miss Minaz Parbin Sambalpur University, Sambalpur
10.	B.K. Mohanty Memorial Book Grant for highest percentage in B.Sc. (Chem. Hons)	:	Miss Soumya Subhashree Mohapatra Utkal University, Bhubaneswar
11.	Smt. Subhadra Devi Memorial Award for highest % in GATE Score	:	Mr. Ashok Kumar Pusti Utkal University, Bhubaneswar
12.	Dr. Pranabandhu Tripathy Award for securing highest mark in CSIR-UGC NET (JRF category from the state)	:	Mr. Jyotiranjan Mishra Berhampur University, Berhampur
13.	Prof. R.K. Nanda Award for best Oral presentation in the current Annual conference	:	To be declared in the valedictory function
14.	Dr. Subasini Lenka Award for best Poster Presentation in the current Annual Conference	:	To be declared in the valedictory function

15. OLYCHEM – 2019**:**

1st - Mr. Priyabrata Mohanty, DAV School, Dera, Talcher.

2nd- Mr. Tushar Kanta Patel, DAV School, Dera, Talcher.

3rd- Mr. Divya Darshan Panigrahi, Saraswati Vidya Mandir, Berhampur.

16. Prof. M. K. Rout Memorial Essay Competition- 2019 **:**

1st-Mr. Dibyajyoti Mohanty,

Utkal University, Bhubaneswar

2nd-Miss Nibedita Barik, Vikram Deb (Autonomous) College, Jeypore

3rd-Miss Trishala Giri, College of Basic Sciences and Humanities (OUAT), Bhubaneswar

3rd-Miss Jasmine Panigrahi, Sushilavati Government Women's, Rourkela

I convey my thanks and gratitude to the members of Award Committee to decide the different awards. The revered members of the award committee are:

(i) Prof. Anadi Charan Dash
(ii) Late Prof. Lalit Narayan Patnaik
(iii) Dr. (Mrs.) Subasini Lenka
(iv) Prof. Satyaban Jena
(v) Prof. Prakash Kumar Mohanty
(vi) Dr. C. R. Mishra (included due to sudden demise of Prof. L. N. Patnaik)

I also offer my thanks to Dr. Subhra Prakash Das, Associate Professor in English (Retd), Ravenshaw University, Cuttack who has taken all pain to evaluate the scripts on essays of Prof. M. K. Rout Essay Competition-2019.

The Orissa Chemical Society has been conducting Chemistry Olympiad for +2 Science students (equivalent to 11th and 12th standard of CBSE) of the state from the year 2003. This year the Olympiad Co-Ordinator Dr. P. K. Dash, Reader in Chemistry, Bhadrak Autonomous College and Deputy Co-Ordinator Dr. Asit Parija, Reader in Chemistry, Salipur Autonomous College, Salipur have left no stone unturned to conduct it successfully and about more than 3100 students have appeared the Olympiad exam out of which 20 students will be given certificate and cash prize and all other students will be given participation certificate. The best three students will be given prize in the Annual Conference.

This year 22nd Regional Conference of Orissa Chemical Society was held on 3rd November 2019 at Kendrapara Autonomous College, Kendrapara and the theme was **"Green Chemistry: Solution To Environmental Crisis''**. The Hon'ble Dean, Academic Research at IIT Madras Prof. Ashok Kumar Mishra, FNASc was the Chief Guest.

On behalf of the society I convey my heartfelt thanks and gratitude to the Vice-chancellor of Veer Surendra Sai University of Technology (VSSUT) Burla, Prof. Atal Chaudhuri for his keen interest and love towards Orissa Chemical Society to hold the Annual conference for this year (2019). I also convey my thanks to the HoD Chemistry and Chairman of the conference Prof. Sukalyan Dash and Convenor Prof. Sarat Kumar Swain & the Organising Secretary Dr. Achyut Kumar Panda, Joint Secretaries Dr. Monalisa Mohapatra and Dr. Arun K. Barick, Treasurer Dr. Bigyan R. Jail and other faculty and staff members who have taken lot of pain to organise this conference successfully. I hope their interest and love for Orissa Chemical Society will continue for all times to come.

Last but not the least I also convey my thanks to the students of both U.G, P.G and research scholars who have worked hard to make the conference a great success. Before I conclude, I wish everyone a very happy, prosperous and joyful merry Christmas and let the ensuing New Year-2020 embrace you with new dreams and thoughts. Thank you all.

Jai Jagannath

Pravat Kumar Swain
Secretary-Cum-Treasurer,
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Dr. Monalisa Mohapatra
Dr. A. K. Barick

From the editor's desk......................

Materials Engineering and Materials Science is an interesting, multi-disciplinary area to study. In studying materials, there are elements of physics, mathematics, biology and chemistry, all taught in a cohesive, and self-contained way within the course. This makes for a varied and stimulating experience, giving you the tools to make a real difference in industry and research. Some of the themes prominent at the moment are biomaterials, nanomaterials, advanced manufacturing, smart materials, composites, energy generation and storage, green and sustainable materials. The ability to create new materials and to make existing materials perform better is the key to many advances in areas of science and engineering, be it in industry or research organizations. New materials have emerged from research in the field of medicine, communication, physical sciences. As a result of development in material science and technology society is marching on towards uncharted path be it in astronomy, surgery, finding life on other planets. As we move on nature possess new challenges for material scientists to tame its effects. Research is going on to develop new materials in the field of energy generation substituting fossil fuel, waste disposal, sustainable development, rocket technology, cheaper communication, potable drinking water, target medicine.

On this backdrop, Department of Chemistry of Veer Surendra Sai University of Technology, Burla is organizing a 33rd Annual Conference of Orissa Chemical Society & National Conference on "Recent Advancement in Material Sciences" (RAIMS–2019). RAIMS 2019 is the fifth such event of RAIMS series being organized successfully since 2013 and could attract renowned scientists and academicians during last four series. This year the event is being organized with the Annual Conference of Orissa Chemical Society and aims to bring together academicians, leading engineers, industry researchers and research scholars to share their experience, expertise and research results of their respective research areas.This conference would alsoprovidea premier interdisciplinary forum for researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns, practical challenges encountered and the solutions adopted in this field. On this occasion, a session on the Periodic table is being delivered by three eminent speakers from different parts of country are invited to establish and celebrate the 150 years of Periodic table year 2019. The students of different school and colleges are invited for participation toward propagation of knowledge regarding importance of periodic table in chemistry.

Editorial team has given their optimum effort to present the content of the proceedings in systematic manner. Typographical errors if any are unintentional and highly regretted.

Prof. S. K. Swain
Dr. A.K. Panda
Dr. Monalisa Mohapatra
Dr. A. K. Barick

Organisers: A Profile

The Department of Chemistry was established in 1956 with the establishment of University College of Engineering (UCE Burla), presently transformed to Veer Surendra Sai University of Technology, a UGC Recognized Unitary Technical University Established by Government of Odisha in 2009. It is one of the oldest Chemistry Departments in the State started under the founder headship of Late Prof. Sripati Pani. The department has been engaged in providing highest level and quality of academic education. The main focus of the teaching and research in the department is centred on interdisciplinary themes, which have gained attention and appreciation. This department features a 12-member faculty with expertise in frontier areas of research. Active research in the areas of design of Nano hybrid materials, synthesis of Biomaterials, Nanohydrogels, synthesis, characterization and applications of Quantum Dots and Graphene based nanocomposites, Physico-organic chemistry, Corrosion chemistry, Alternate/Renewable energy, Polymer chemistry, Catalysis, Asymmetric synthesis Environmental chemistry, Photochemistry, Biophysical Chemistry, Fluorescence Spectroscopy, Supramolecular Chemistry, X-ray crystallography, Crystal engineering etc. are being pursued. The faculty members have contributed towards the publication of 4 patents, over 10 books and more than 250 research papers in the peer reviewed journals. There are about 10 research projects sponsored by various Government organizations (UGC, DST, CSIR, AICTE, BRNS-DAE, and DBT) and many consultancies from nearby industries.

The Department infuses the fundamentals of Chemistry to the students at B Tech level. In addition, it offers 2 year M.Sc. (Organic Chemistry, intake capacity-18) from 2018, 2 year M.Sc. (Industrial Chemistry, intake capacity-18), 5-Year Integrated M.Sc. (Intake capacity-18), M.Phil. (Intake capacity-08), and Ph.D. programme (Continuing-25). Students get admission in to the Masters programme through career marks. Integrated M. Sc. students get admission on the basis of the university entrance test. One of the unique features of the postgraduate course in the department is, it offers courses from emerging areas of Chemical Science such as Nano chemistry, Green Chemistry, Supramolecular Chemistry in addition to core courses as per UGC norms to cater the industry and academia requirements. In addition, credits for seminar talk and project is compulsory for the partial fulfilment for the award of degree. In this period, the students acquire opportunity to improve their communication skill and perform basic research in frontier areas. Furthermore, research scholars are enrolled in the department leading to degree.

MEMBERS OF THE CHEMISTRY DEPARTMENT

Prof Sarat Kumar Swain
Professor of Chemistry and Dean Academic Affair, VSSUT

Prof Pravin Kumar Kar
Professor

Prof Rahas bihari Panda
Professor

Dr Sukalyan Dash
Professor& Head Chemistry

Dr Trinath Biswal
Associate Professor

Dr Priyaranjan Mohapatra
Associate Professor

Dr. Achyut Kumar Panda
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Dr Ramakrishna D S
Assistant Professor

Dr. Monalisa Mohapatra
Assistant Professor

Dr. Aruna Kumar Barick
Assistant Professor

Dr. Bigyan Ranjan Jali
Assistant Professor

PROGRAMME

Conference Venue: Biju Patnaik e-Learning Centre

Monday, 23rd December, 2019

Pre-Conference Sessions and Opening Reception *Coordinator: Dr.Achyut Kumar Panda*	
6:00 PM-9.00 PM	Pre-conference Registration
8:00 PM-9.00 PM	Executive body meeting of OCS
9PM	Working Dinner

Tuesday, 24thDecember, 2019

Pre-Conference Sessions and Opening Reception *Coordinator: Dr.Monalisa Mohapatra*		
08:00 AM-09.00 AM	Breakfast	
08:00 AM-10.00 AM	Pre-conference Registration	
10:00 AM-11.30 AM	Inaugural Session	
Conference Process		
Technical Session 01 Chairperson: Prof Ajay K. Patnaik Coordinator: Dr. Trinath Biswal		
11:45AM-12.25 PM	Prof.M.K.Rout Memorial lecture	Prof. Dilip K. Maiti, FRS Catalysis and Materials Division, University of Calcutta, 92 A. P. C. Road, Kolkata *Talk Title: Diverse Organic Synthesis, Functional Materials for Nanoelectronics, Sensors and Smart Devices*
Technical Session 02 Chairperson: Dr.S. C. Das Coordinator: Prof. S. K. Swain		
12:25PM-1.00 PM	Talks on Periodic Table (*Celebration of 2019 as International Year of the Periodic Table*)	i) Nageswara Rao Gollapalli, Former Vice-Chancellor of Andhra University *Talk Title:Evolution of Periodic Table*
1.00 PM-1.15PM		ii)Prof. H.C.Rai, Ex-professor , B.R.A.Bihar University, Muzaffarpur *Talk Title: Precursors, cocursors and reinforcers of Mendeleev's Periodic Table*
1.15 PM-1.30PM		iii) Prof.Balaram Sahoo, Retd. Prof. IIT Kharagpur
1.30 PM- 2-30PM	Lunch Break (In front of Biju Patnaik e-learning center)	

Technical Session 03 Chairperson: Prof.Dilip K. Maiti Coordinator: Dr. Bigyan Jali			
2.30 PM- 3-00 PM	Key Note Address-01	Chemistry of Pb(II) in Light Emitting Perovskite Nanocrystals	Prof. Narayan Pradhan School of Materials Sciences, IACS, Kolkata, 700032 INDIA
3.00 PM- 3-25PM	*IL-01*	Generating white-light emission from a single nano-assembly with its potential application in the detection of alkaline phosphatase activity in biological samples	Dr. Suban K Sahoo, Department of Applied Chemistry, SV National Institute of Technology (SVNIT), Surat, Gujarat
3.25 PM- 3.40 PM	*AP-01*	Prof.R.C.Tripathy Memorial award Presentation (outside the state)	Dr. Bishnu P. Biswal Max Planck Institute for Solid State Research, Germany
3.40 PM- 3.55 PM	*AP-02*	Prof. Dayanidhi Patnaik Memorial award Presentation	Ms. Monidipa Konar National Institute of Technology, Rourkela
3.55 PM- 4.00 PM	Tea Break		
Technical Session 04 Chairperson:Prof. B.K.Mishra Coordinator: Prof. Sukalayan Dash			
4.00 PM- 4.15 PM	AP-03	Prof. GB Behera best PhD thesis award presentation	Dr. Srikanta Moharana Sambalpur University, Burla
4.15PM – 4.30 PM	AP-04	Kulamani Das Memorial award presentation	Mr. L. Satish K. Achary NIT, Rourkela
4.30PM – 4.40 PM	OP-01	Ultrasensitive Detection of Aqueous Cu^{2+} Ions by a Coumarin-Salicylidene based AIEgen†	Subrata Kumar Padhan Sambalpur University, Burla
4.40PM – 4.50 PM	OP-02	Pyrophosphate ion sensing by a Zn(ll)-terpyridine complex in aqueous medium at physiological pH	Aditya Kumar Purohit, VSSUT Burla
4. 50PM – 5.00 PM	OP-03	MnCo2O4 Decorated rGO/gC3N4-based Sensor for Highly Selective and Sensitive Detection of Chlorpyrifos	BanalataMaji, National Institute of Technology, Rourkela
Technical Session 05 Chairperson: Prof. Nigamananda Das Coordinator:Dr. Arun Barick			
5. 00PM – 5.10 PM	OP-04	Adsorptive Removal of Congo Red dye from Aqueous Solution using Mg-doped ZnO Nanoparticles: Kinetics, Thermodynamics and Isothermal Insights	Pragyan P. Rath KIIT deemed to be University, Bhubaneswar
5. 10PM – 5.20 PM	OP-05	Preparation of High-performance Graphene Geopolymer Composites	R.S. Krishna, Dr. Ambedkar Memorial Institute of Information Technology and Management Science, Rourkela

5. 20PM – 5.30 PM	OP-06	Effect of Phosphate on Iron Mineralization and Mobilization in Non-hemeBacterioferritin B from *Mycobacterium tuberculosis*	AkankshikaParida, National Institute of Technology, Rourkela
5. 30PM – 5.40 PM	OP-07	Incorporation of Silver Nitrate into embedded Nano Boron Nitride for the Preparation of Polyethyl Methacrylate/Polyvinyl Alcohol Nanocomposite Layered Material	Jayaprakash Behera, VSSUT, Burla
5. 40PM – 5.50 PM	OP-08	Reaction of 2,4,5-trisubstituted-1-hydroxy Imidazoles with Epichlorohydrin	M. Panda, Central University of Jharkhand, Ranchi
5. 50PM – 6.00 PM	OP-09	Experimental and Theoretical Studies on the Structure of 2-chloro (o-hydroxyBenzylideneaniline)	Supriya P. Biswal, Sambalpur UniversityBurla,
6. 00PM – 6.10 PM	OP-10	Impact of Inclusion Complexes of 2(([1,3,4] Thiadiazino [6,5- b] indol-3-ylimino) methyl) Phenol and Its Derivatives with β –Cyclodextrin: Spectral, Thermal and Antimicrobial Study	RabinarayanaSahu Berhampur University, Berhampur
6. 10PM – 6.20 PM	OP-11	Functionalization of Ferrocene by Hydrazone and Thiosemicarbazone Fragments: Significant Cyclopalladation and Biological Properties Study	TulasiBarik National Institute of Technology, Rourkela
6. 20PM – 6.30 PM	OP-12	Removal of Some Cationic Dyes from Organic Medium by the Application of unmodified Silica	Raisarani Sharma, VSSUT, Burla, Sambalpur
6. 30PM – 7.30 PM	OCS General Body Meeting		
7.30PM- 9.00PM	Cultural Programme		
8.00 PM -10 PM	Dinner		

Wednesday, 25th December, 2019

8.00AM-9.00AM	Breakfast	e-Learning Centre, VSSUT	
Technical Session 06 Chairperson: Prof. G.B.Behera Coordinator: Dr. Priyaranjan Mohapatra			
9:30 AM-10.15 AM	Prof.S.R.Mohanty Lecture	Prof (Dr.) Jai Pal Mittal Distinguished Professor, Chairman, Academic Board. University of Mumbai - Department of Atomic Energy, Centre for excellence in basic sciences	
Technical Session 07 Chairperson: Prof. Nageswara Rao Gollapalli Coordinator: Dr.Ramakrishna DS			
10:15AM-10.40 AM	Key Note Adress-02	Emerging Facets of Nitrogen Centered Radicals	Prof. Bhisma K. Patel Department of Chemistry, IIT Guwahati

10:40 AM-10.55 AM	*AP-05*	Prof.R.C.Tripathy Memorial award Presentation (Inside the state)	Dr. Bibhuti Bhusan Parida Berhampur University, Berhampur
10.55 AM-11.10 AM	*AP-06*	Prof. Donald S Matteson and Prof.P.K.Jesthy award Presentation	Dr.Santosh Kumar Behera Indian Institute of Science, Bangalore
11.10 AM-11.20 AM	*Tea Break*		
Technical Session 08 Coordinators: Dr. Priyaranjan Mohapatra & Bigyan Jali			
11.20AM-1.00 PM	Poster Presentation		
Technical Session 09 Chairperson: Prof.B.K. Patel Coordinator:Dr.Bigyan Jali			
2.00PM-2.25PM	*IL-02*	Designing of Nano-biomaterials for Therapeutic Applications	Dr. Sangram Keshari Samal Laboratory of Biomaterials and Regenerative Medicine for Advanced Therapies, ICMR-Regional Medical Research Center, Bhubaneswar
2.25PM-2.40PM	*AP-07*	Prof.Sripati Pani Memorial award Presentation	Mr. Abhinav Mohanty National Institute of Technology, Rourkela
2.40 PM-2.50 PM	OP-13	Partitioning Addition and Substitution Reaction: Effect of Solvent	Lopamudra Satpathy Sambalpur University, Burla
2.50 PM- 3.00 PM	OP-14	Room Temperature Synthesis of Nanoporous SBA-1	N. Parida Utkal University, Bhubaneswar
3.00 PM-3.10PM	OP-15	Membrane Cholesterol Modulates Oligomeric Status and Peptide-membrane Interaction of Severe Acute Respiratory Syndrome Coronavirus Fusion Peptide	Geetanjali Meher Sambalpur University, Burla
3.10 PM-3.20PM	OP-16	Synthesis and Evaluation of Dendritic CarboranylGlycoconjugates: Promising Dual Mode Candidates for Cancer Treatment	BiswaRanjan Swain Ravenshaw University, Cuttack
Technical Session 10 Chairperson: Prof.A.K.Behera Coordinator: Dr. Trinath Biswal			
3.20 PM-3.30PM	OP-17	Effect of Different Functional Groups in UiO-66 Metal Organic Frameworks for the Adsorption of Anionic Dyes: An Experimental and Molecular Docking Study	Jagannath Panda KIIT Deemed University, Bhubaneswar
3.30 PM-3.40PM	OP-18	Optoelectronic Materials based on Donor-Acceptor Conjugated Systems	Barada P. Dash Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar

3.40 PM-3.50PM	OP-19	Removal of Congo Red Dye from Aqueous Solution using Zinc Oxide Nanoparticles derived from Tulsi Leaf (Ocimum Sanctum): A Green Approach	AnsumanNayak GIET University, Gunupur
3.50 PM-4.00PM	OP-20	OH/HO_2 Radical Measurements in the Troposphere	Manas Ranjan Dash National Institute of Technology, Raipur
4.00 PM-4.10PM	OP-21	Synthesis and Magnetic Behaviour of Mg-Zn Nano Ferrites by Using Aloe Vera Extract Solution	Himansulal Nayak CBS&H, OUAT Bhubaneswar
4.10 PM-4.20PM	OP-22	Microwave assisted Synthesis of Thiazolo-Pyrimidine Derivatives	Sabita Shroff Sambalpur University, Burla
4.20 PM-4.30PM	OP-23	Photovoltaic Performance of Natural Dye sensitised Ni-Cd-S Photoelectrode fabricated by Dip Coating Technique	B.B. Panda Department of Chemistry, IGIT, Sarang, Dhenkanal
4.30 PM-4.40PM	OP-24	Kinetic and thermodynamic study for the co-pyrolysis of beeswax and plastic wastes	Narayan Gouda CUTM Paralakhemundi
4.40 PM-4.50PM	OP-25	Removal of Cationic Dye by using Polyaniline/Maleic Acid Composite	Nehapadma Mohanty Utkal University, Bhubaneswar
4.50 PM-5.30PM	***Valedictory Function***		

CONTENTS

16	OP-16	Biswa Ranjan Swain, Bismita Nayak, Rashmirekha Satapathy, and BaradaPrasanna Dash	Synthesis and Evaluation of Dendritic Carboranyl Glycoconjugates: Promising Dual Mode Candidates for Cancer Treatment	35
17	OP-17	Jagannath Panda, Satya Narayan Sahu, Bankim Chandra Tripathy, Raghabendra Samantaray, and Rojalin Sahu	Effect of Different Functional Groups in UiO-66 Metal Organic Frameworks for the Adsorption of Anionic Dyes: An Experimental and Molecular Docking Study	36
18	OP-18	Barada P. Dash	Optoelectronic Materials based on Donor-Acceptor Conjugated Systems	37
19	OP-19	Ansuman Nayak, Jitendra Kumar Sahoo, Arati Senapati, and Duryodhan Sahu	Removal of Congo Red Dye from Aqueous Solution using Zinc Oxide Nanoparticles derived from Tulsi Leaf (*Ocimum Sanctum*): A Green Approach	37
20	OP-20	Manas Ranjan Dash	OH/HO_2 Radical Measurements in the Troposphere	38
21	OP-21	Himansulal Nayak	Synthesis and Magnetic Behaviour of Mg-Zn Nano Ferrites by Using *Aloe Vera* Extract Solution	39
22	OP-22	Sabita Shroff and Ajaya K. Behera	Microwave assisted Synthesis of Thiazolo-Pyrimidine Derivatives	39
23	OP-23	B.B. Panda, P.K. Mahapatra, and M.K.Ghosh	Photovoltaic Performance of Natural Dye sensitised Ni-Cd-S Photoelectrode fabricated by Dip Coating Technique	40
24	OP-24	Narayan Gouda and Achyut K. Panda	Kinetic and Thermodynamic Study for the Co-pyrolysis of Beeswax and Plastic Wastes	41
25	OP-25	Nehapadma Mohanty and Braja N. Patra	Removal of Cationic Dye by using Polyaniline/Maleic Acid Composite	42
Poster Presentations				
1	PP-01	Shreetam Parida, Deeptanjali Sahoo, and Pratima Kumari Mishra	Study of Metals Characterization of *AndrographisPaniculata* Plant of Khordha Region, Odisha, India	44
2	PP-02	Lipsa Shubhadarshinee, Priyaranjan Mohapatra and Aruna Kumar Barick	Effect of Nanosilver decorated functionalised Single-Walled Carbon Nanotube Hybrid Nanofiller based Polyaniline Nanocomposite on the Thermal and Dielectric Properties	44
3	PP-03	Rabinarayana Sahu	Synthesis, Characterization, Thermal Study, Antimicrobial and Antioxidant Study of Some Pyrazole Derivatives with and without Inclusion Complex Formation with B-Cyclodextrin	45
4	PP-04	Bharat Chandra Kalapahad, Saradendu Acharya, and Prativa Kar	Water Pollution: A Great Concern in Chilika Lake, Odisha, India	45
5	PP-05	Omkar Patra, Subrat Nayak,Suman Sethi, and Bamakanta Garnaik	Impact of Inclusion Complex of Ibuprofen with β-CD: A Brief Study	46

35	PP-35	Tikina Rani Sethyand Prafulla Kumar Sahoo	Polymer Bionanocomposite (PNC): An Ecofriendly and Novel Adsorptive Tool for Removal of Rare Earth Metals from e-Waste in the Environment	67
36	PP-36	Gurudatta Mahakur, Aditya Kumar Purohit, Ankita Upadhyay, and Pravin Kumar Kar	Sustainable Biodiesel Production from Microalgae *Chlorella Vulgaris*	68
37	PP-37	Sunasira Misra	Fuel Gas Production using Solar Radiations	69
38	PP-38	Sandhyamayee Sahu and Bijay Kumar Mishra	Cyclic Voltammetry Study of a Novel Phase Transferring Oxidant Cetyltrimethyl Ammonium Ferricyanide (CTAFC) in Organic Medium	70
39	PP-39	Asit Parija	Characteristic Studies of One Dimensional Nanocomposites	71
40	PP-40	Priyanka Priyadarsini Mishra, Raisarani Sharma, and Sukalyan Dash	Solvent Polarity Sensing using Some BischromophoricStyrylpyridinium Dyes	72
41	PP-41	Supriya Kar, Raisarani Sharma, and Sukalyan Dash	Unmodified and modified Silica Scaffolds for the Adsorption of a Methine Dye from Organic Solvent Medium	73
42	PP-42	Supriya Priyadarshini and Sukalyan Dash	Cr(VI) Oxidation using Cetylpicolinium Dichromate (CPDC) – Kinetics of Oxidation of Aliphatic Alcohols	73
43	PP-43	Kalyani Prusty and Sarat K. Swain	Nano Silver decorated Propylene Oxide/Polyethylene Oxide-Cellulose Nanohybrid Composite Hydrogels for Drug Delivery Applications	74
44	PP-44	Priyanka Sahu, Kalyani Prusty, and Sarat K. Swain	Nano ZnO imprinted poly (N-isopropylacrylamide)/Polyacrylamide Nanocomposite Hydrogels for *in vitro* Release of Olifloxacin	75
45	PP-45	Mamata Sahuand Sanjay Rout	Plastics and Bioplastics in Packaging: An Overview	76
46	PP-46	SwapnitaPatra, Deepak Sahu, and Sarat K. Swain	Nano Silver based Composites for Catalytic Reduction of 4-nitrophenol	77
47	PP-47	Deepak Sahu, Priyaranjan Mohapatra, and Sarat K. Swain	Rhodamine based Nano Silver decorated Graphene Oxide Nanocomposites for Sensing of Hg^{2+} Ion	78
48	PP-48	Sudipti Priyadarshinee, Deepak Sahu, and Sarat K. Swain	Green Synthesis of Water Soluble Gold Nanoclusters for the Detection of Hg^{2+} Ions	78
49	PP-49	Pramod K. Sethy, Priyaranjan Mohapatra and Sarat K. Swain	Nano Silver incorporated Polyacrylic Acid/GO Hybrid Nanocomposites as Packaging Material	79
50	PP-50	Satyanarayan Patnaik and Achyut K. Panda	Thermal Degradation Behaviour and Kinetics of Pyrolysis of Electronic Plastic Waste	79
51	PP-51	Rita Dasand B. S. Mohanta	Photocatalytic Activity of mixed Oxides derived from ZnAlTi-Ternary Layered Double Hydroxides (LDHs)	80

52	PP-52	Sunita Behera, Rubi Behura, and Bigyan R. Jali	Recogination of a Bromnide Ion by the protonated form of 2-(1-H-Imiddazole2-ylthio)-3-methylnapthalene-1,4-dione	81
53	PP-53	Anusruta Pradhan, Jimmy Manisha Lakra and Bigyan R. Jali	Unusual C–H Bond Activation at Ambient Condition of 2,2'-(1,4-dihydro-1,4-dioxo-naphthalen-2,3-diylthio) dipropanoic Acid	82
54	PP-54	Diptibala Pradhan, Mitali Sahoo, and Bigyan R. Jali	Phosphoric Acid (H_3PO_4) promoted [2+2] Cycloaddition of 2-methyl-1,4-naphothoquinone Derivatives *via* C–S bond Cleavage and Study of Their Protein Interactions	83
55	PP-55	S. P. Singh andU. P.Tripathy	Extraction of Nano-silica from Wheat Straw Black Liquor: A Green Route	84
56	PP-56	Sanjaya Kumar Muduli, Narasimham Mangalampalli, and Prakash Chandra Mishra	Equilibrium and Kinetic Study of Lead (II) Sorption from Aqueous Medium by a Fibrous Ion Exchanger	84
57	PP-57	I. Siva Ram and Achyut K. Panda	Recycling of Waste Plastics to Nanocomposites	85
58	PP-58	Rojalin Pradhan and Prabhat K. Sahu	Computer Aided Drug Design on HIV-1 Protease Inhibitors	86
59	PP-59	Anita Kabi, Pradipta K. Behera, Prabhat K. Sahu	Theoretical Investigation on Spectral Signature of Astro Molecules: Glycine and Aminoacetonitrile	86
60	PP-60	S. K. Sahoo, P. K. Swain, and R. S. Palaiah	Studies of the Formation of Iron Oxide Nanocrystals Synthesized by Emulsion Method	87
61	PP-61	Itismita Sukla, Raisarani Sharma, and Sukalyan Dash	Synthesis, Characterization and Study of Sensor Properties of Some Xylene based Molecular Tweezers	87
62	PP-62	Tanushree Patnaik, Pratap C. Pattnaik, S .K. Swain, Smrutiprava Das, and R.K.Dey	Defluoridation of Drinking Water using New Adsorbent Materials	88
63	PP-63	Subhashree Mishra, Rajaram Baland R.K.Dey	One Pot Hydroxylation of Benzene to Phenol using Metal supported Red-Mud	89
64	PP-64	Somya Ranjan Kar, Priyaranjan Mohapatra, and DebasisMohanty	Purification of Contaminated Water by using Novel Chelating Resins Containing Heterocyclic Moiety	90
65	PP-65	Debasmita Mishra, Sabyasachi Mohapatra, and Alok Satapathy	A Study of Physical, Mechanical and Thermal Aspects of Polyester Composites with Inorganic and Organic Fillers	91
66	PP-66	Debajani Tripathy, Chandana Adhikari, and Dipankar Bhattacharyay	Double Emulsion: An Ideal Candidate to Deliver the Drugs	92
67	PP-67	Monidipa Konar and Harekrushna Sahoo	Spectroscopy and Molecular Docking based Biophysical Characterization of the Binding Interaction between Bone Morphogenetic Protein – 2 and Quercetin	92
68	PP-68	AnshumikaMisra, Achyuta K. Biswal, and Pramila K. Misra	Physicochemical, Functional and Morphological Characterization of Starch isolated from Palm Tuber (*Phoenix Dactylifera)* for Prospective Applications	93

Popular Article

Memorial Lectures

Prof.M.K.Rout Memorial lecture

Diverse Organic Synthesis, Functional Materials for Nanoelectronics, Sensors and Smart Devices

Dilip K. Maiti, *FRS*

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Abstract: My research group is dedicated for diverse synthesis of organic compounds through C-H Activation, Photocatalysis, NHC-Catalysis, Organocatalysis and Dual Catalysis.[1]The organic electronic products are also lighter, more flexible, biodegradable, inexpensive, and ease to purify, fabricating devices and modify electronic environment. Thus, semiconducting, electronic and optoelectronic properties can easily be modified through changing size, shape, chemical structure, morphology and installation of a wide range of functional groups, which in turn generates innovative semiconducting, conducting, photoluminescence, storage, display and chemosensing performances to achieve highly efficient new generation electronic devices.[2] Thus, design and synthesis of new organic compounds as varied probes, their fabricated unidirectional materials and development of especially new chemo sensing property are desirable for achieving sensor devices of ultimate sensitivity.We have developed several organic probes and materials for sensing poisonous gases. phosphates, hydrazines, cyanide, heavy metal ions and other analytes.[3] For instance,fabrication of organic nanofibrils using 3-oxime-4-hydroxy-1,8-naphthalic-nbutylimide (**R1**)-doped polycaprolactone (PCL) electrospun used as a gaseous phosgene-specific sensing device. Herein, the higher surface to volume ratio and innovative properties of the nanofiber mats exhibits diminution of response time in comparison to the composite film of the same materials. Proficient gas penetration confers a fast chemical reaction, which is linear to the phosgene concentration and delivers a very low detection limit of 0.087 ppm. Importantly, LOD of gaseous phosgene in all type of solid-protocols used is far lower than the safety level phosgene concentration to human exposure.[3g]Our designed organic and polymer nanomaterials also capture heavy metals and gases and making our mother nature clean, safe and harmless.[4]

1. (a) R. R. Mondal, S. Khamarui, D. K. Maiti, *Org. Lett.***2017**, *19*, 5964-5967. (b) T. Das, S. Debnath, R. Maiti, and D. K. Maiti, *J. Org. Chem.* **2017**,*82*, 688-700. (c) Tanmay K. Pati,SudiptoDebnath,MrinalkantiKundu,UttamKhamrai,and D. K. Maiti, *Org. Lett.***2018**, *20*,5964-5968. (d) AnirbanKayet, SkAjarul, Sima Paul, and Dilip K. Maiti, *J. Org. Chem.* **2018**,*83*,8401-8411. (e) R. N. Mitra, K. Show, S. Sarkar, and D. K. Maiti, *J. Org. Chem.* **2019**,*84*, 42-52. (f) D. De Joarder, S. Gayen, R. Sarkar, R. Bhattacharya, S. Roy, D. K. Maiti, *J. Org. Chem.* **2019**,*84*,8468-8480. (g) D. Ghosh, R. Nandi, S. Khamarui, S. Ghosh and D. K. Maiti, *ChemCommun.* **2019**, *55*,3883-3887. (h) S. Naskar, S. Roy Chowdhury, S.Mondal, D. K. Maiti,S. Mishra, and I. Das, *Org. Lett.***2019**, *21*, 1578-1582. (i) SkAjarul, AnirbanKayet, Tanmay K. Pati and Dilip K. Maiti, *ChemCommun.* **2019**, *55*, 00-00 (DOI: 10.1039/c9cc07360d).

2. (a) Lee, Y. S. *Self-Assembly and Nanotechnology: A Force Balance Approach*, John Wiley and Son, Inc., Hoboken, New Jersey, 2008; (b) Waser,R.; Masakazu, A. *Nature Mater.* **2007**, *6*, 833; (c) Turner,M.;Golovko1, V. B.;Vaughan,O. P. H.;Abdulkin, P.;Berenguer-Murcia1, A.;Tikhov,M. S.; Johnson,B. F. G.; Lambert, R. M. *Nature***2008**, *454*, 981; (d) Halder, S.;Pandit,P.; Chatterjee, N.; De Joarder, D.;Pramanik, N.; Patra, A.;Maiti, P. K.;Maiti, D. K. *J. Org. Chem.* **2009**, *74*, 8086;(e) Ghosh, S.;Debnath, S.; Das,U. K.;Joarder, D. D.;Maiti,D. K.*Ind. Eng. Chem. Res.***2017**,*56,* 12056; (f)Maiti, D. K.;Debnath,S.; Nawaz,M.;Dey, B.;Dinda, E.; Roy, D.; Ray, S.; Mallik, A.; Hussain,S. A.*Sc. Rep.* **2017**, *7*, 13308; (g) Panda,T.; Panda,M. K.;Maiti, D. K. *ACS Appl. Mater. Interfaces* **2018**, *10*, 29100-29106.

3. (a) Mahapatra, A. K.;Mondal,S.; Manna, S. K.;Maiti, K.;Maji, R.; Uddin, M. R.;Maiti, D. K. *Dalton Trans.***2015**, *44*, 6490-6501; (b) Paul,S.;Ghoshal,K.; Bhattacharyya, M.;Maiti, D. K. *ACS Omega***2017**, *2*, 8633−8639; (c) Goswami, S.;Naskar, B.;Modak, R.; Drew, M. G. B.;Bauzá,A.;Frontera, A.;Maiti, D. K. *Dalton Trans.***2017**, *46*, 9498-9510; (d) Goswami, S.;Naskar, B.;Modak, R.;Sikdar, Y.;Bauzá,A.;Frontera, A.;Katarkar, A.;Maiti, D. K. *Sensors and Actuators B: Chem.***2017**,*239*, 1194-1204; (e) Naskar,B.;Bauzá, A.;Frontera, A.; Das Mukhopadhyay, C.;Goswami,S.;Maiti, D. K. ***Dalton Trans.*2018**,*47*, 15907-15916; (f)Paul, S.; Nandi, R.;Ghoshal, K.; Bhattacharyya,M.;Maiti,D. K. *New J. Chem.***2019**, *43*, 3303-3308. (g) Maiti, K.; Ghosh,D.;Maiti, R.; Vyas, V.;Datta, P.; Mandal, D.;Maiti, D. K. *J. Mater. Chem. A* **2019**,7, 1756–1767.

4.. (a) Singha,N. R.;Mahapatra,M.; Dutta,A.; Deb Roy,J. S. ; Das, U.; Banerjee,S.;Dey,S.; Chattopadhyay,P. K.;Maiti, D. K. *Chem. Eur. J.* **2019**, *25*, 00-00 (*https://doi.org/10.1002/chem.201903935*).(b) M.Karmakara, H. Mondal, T. Ghosh, P. K. Chattopadhyayc, N. R. Singha,D. K. Maiti, *Environmental Research*`**2019**, 00-00(https://doi.org/10.1016/j.envres.2019.108839). (c) T. Ghosh, S.Mitra, and D. K. Maiti, *ACS Appl. Nano Materials* **2019**, 00-00.(d) Several unpublished works.

Prof.S.R.Mohanty Lecture

BREAKING BONDS TO ORDER – A DREAM STILL ALIVE?

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Abstract: Skilled blending of the accumulated wisdom about electronic and vibrational excited states with new tools such as Lasers and High Energy Accelerators has opened new avenues of using photons as versatile chemical reagents to crack molecules to order and produce new Chemistry. The advent of high power infrared laser has given birth to a new Chemistry “Vibrational Photochemistry”. This selective Photochemistry has opened up new possibilities of probing molecular dissociation, isomerisation and finally raised hopes (!) of bond selective Chemistry.

Excitement and fun of participation in this Laser Alchemy (?) will be shared.

Periodic Table Presentations

Periodic Table Presentation:01

Evolution of Periodic Table

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Abstract: This year we are celebrating 150^{th} year of periodic table of elements on the eve of declaration of the first periodic table by Dmitri Mendeleev in 1869.

First systemization attempts of the then known 33 chemical elements were made in 1789 by Antoine Lavoisier who grouped them into gases, metals, nonmetals and earths. In 1829, Johann Wolfgang Döbereiner observed that many of the elements could be grouped into triads based on their chemical properties. Döbereiner also observed that, when arranged by atomic weight, the second member of each triad was roughly the average of the first and the third.In 1862, the French geologist Alexandre-Émile Béguyer de Chancourtois published an early form of the periodic table. He called it telluric helix or screw. He was the first person to notice the periodicity of the elements. With the elements arranged in a spiral on a cylinder by order of increasing atomic weight, de Chancourtois showed that elements with similar properties seemed to occur at regular intervals.

In 1864, Julius Lothar Meyer, a German chemist, published a table with 28 elements. A missing element between Si and Sn was predicted with atomic weight 73 and valency 4.In 1866, English chemist John Newlands when listed the elements in order of increasing atomic weight, similar physical and chemical properties recurred at intervals of eight. He likened such periodicity to the octaves of music.

Dmitri Ivanovich Mendeleev,a Russian chemist, formulated the Periodic Law. He is often referred to as the Father of the Periodic Table. He called his table or matrix, "the Periodic System". On 6 March 1869, he made a formal presentation to the Russian Chemical Society, titled *The Dependence between the Properties of the Atomic Weights of the Elements*, which described elements according to both atomic weight and valence. Mendeleev has the distinction of accurately predicting the qualities of what he called ekasilicon, ekaaluminium and ekaboron (germanium, gallium and scandium, respectively).

In 1911, Dutch Physicist Antonius van den Broek was the first to propose that “Atomic number (nuclear charge) determined the placement of elements in the periodic table”. Henry Moseley tested Broek’s hypothesis by investigating the Fraunhofer lines of various elements. He found a relationship between the X-ray wavelength of element and its atomic number.Later advances like discovery of electron and radioactivity by the end of 19th century revolutionized the modern structure of the elements and long form.

An extended periodic table theorizes about chemical elements beyond atomic number 118.If further elements with higher atomic numbers than this are discovered, they will be placed in additional periods. Any additional periods are expected to contain a larger number of elements than the seventh period, as they are calculated to have an additional so-called *g-block*, containing at least 18 elements with partially filled g-orbitals in each period.

Periodic Table Presentation:02

Precursors, cocursors and reinforcers of Mendeleev's Periodic Table

Harish Chandra Rai

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Abstract: The year 2019 marks the 150th anniversary of the birth of one of the most famous table of all time, "Periodic Table of Chemical Elements". The Periodic Table that was introduced in 1869 by Mendeleev was a monumental achievement- a wonderful mneumonic and a tool that serves to organize the whole of chemistry. The table is not outcome of the efforts of Mendeleev alone but a large number of scientists were precursors, cocursors and reinforcers of his periodic law. In the present talk I would like to highlight contributions of these scientists many of whose name did not catch the attention of the world. The notable amongst those starts from Dobereiner, Gladstone, Cooke, Odling, Lenssen, Boyle, Priestley, Davy, Faraday, Gmelin, de Chancourtois, Lother Meyer, Newland, Ramsay and Rayleigh, Thomson, Rutherford, Moseley, Bohr, Summerfield, Segre, Frankland, Lockeyer, Travers, Owen, Greger, Nilson, Del Rio, Vauquelin, Brandt, Stromeyer, Gadolin, Ekeberg, Wolaston, Mosander, de Broglie, Schrodinger, Planck, Heisenberg, Seaborg, Ghiorso, Oganessian, Flerov, Penzias, Wilson, Peebles, Goodenogh, Pykko, Poliakoff and Eric Scerri. I would also discuss the utility of lightest metal lithium which is the most useful element.

Key Note Address

Keynote address: 01

Chemistry of Pb(II) in Light Emitting Perovskite Nanocrystals

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Abstract: Unless one measures one cannot believe; the same was seen in perovskite nanocrystals. Simply connecting Pb-halide octahedras with specific cations at the lattice, all three prominent colors Red, Blue and Green could result near unity photoluminescence quantum yield. However, several sensitive issues related to the crystal chemist are associated to control this unique photoluminescence property. Similar, what one believes in classical mechanism of crystal growths in chalcogenide nanocrystals; all do not follow the same principles in making these nanocrystals in reaction flask. Lots of fun during synthesis of these colorful nanocrystals and also very much excitements seeing these crystal iunder microscope. This talk would focus on some critical issues related to brightening these nanocrystals, defect states, shape manipulations and doping in perovskite nanocrystals.

Keynote address: 02

Emerging Facets of Nitrogen Centered Radicals

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Abstract: Radicals are generated via cleavage of *tert*-butyl nitrite (TBN), organic peroxides, or using photo-catalysts, which in turn creates nitrogen centered radicals. If placed suitable the *N*-radical can trigger cascade cyclization in *o*-alkynylated *N*,*N*,-dialkylamines leading to 3-aroylindoles.[1] The higher propensity of C□N over C□S bond forming ability has been demonstrated through formal C-H functionalization during the construction of 4,5-disubstituted 1,2,4-triazole-3-thiones from semicarbazides.[2] Intramolecular C-N bond formation via cross-dehydrogenative coupling (CDC) of aryl ethers and tetrazoles have been accomplished using TBAI/TBHP with a high level of regioselectivity for substrates possessing multiple sp^3 C-H bond adjacent to the ethereal oxygen.[3]

The reagent tert-butyl nitrite (TBN) is emerging as a versatile synthons in organic synthesis.[4a] TBN serves as a "N□O" synthon during the construction of isoxazolines from terminal aryl alkenes[4b] and as a "N1" synthon in the construction of imidazo[1,2-a]quinolines.[4c] Interestingly, TBN serves the dual role of "N1" and "N-O" synthon in the construction of 1,2,4-oxaziazole-5(4*H*)-ones from terminal aryl alkenes.[4d]A visible-light-mediated

concomitant C3 oxidation and C2 amination of indoles has been achieved at room temperature using an Ir (III) photocatalyst.[5]

A Bu_4NI-catalyzed regioselective N^2-methylation, N^2-alkylation and N^2-arylation of tetrazoles have been achieved using *tert*-butyl hydroperoxide (TBHP) as the methyl, alkyl diacyl peroxides as the primary alkyl, alkyl peresters as the secondary and tertiary alkyls and aryl diacyl peroxides as the arylating sources. Based on DFT calculations, it was found that spin density, transition state barriers and thermodynamic stability of the products play essentials roles.[6]

Reference :

1. (a) Gogoi, A.; Guin, S.; Rout, S. K.; Patel, B. K. *Org. Lett.* 2013, *15*, 1802. (b) Gogoi, A.; Modi, A.; Guin, S.; Rout, S. K.; Das, D.; Patel, B. K. *Chem. Commun.,* 2014, *50*, 10445.
2. Gogoi, A.; Guin, S.; Rajamanickam, S.; Rout, S. K.; Patel, B. K. *J. Org. Chem.* 2015, *80*, 9016.
3. Rajamanickam, S.; Majji, G.; Santra, S. K.; Patel, B. K. *Org. Lett.* 2015, *17*, 5586.
4. (a) Dahiya, A.; Sahoo, A. K.; Alam, T.; Patel, B. K. *Chem. Asian, J.* 2020, *DOI: 10.1002/asia.201901072* (b) Sau, P.; Santra, S. K.; Rakshit, A.; Patel, B. K. *J. Org. Chem.* 2017, *82,* 6358;(c) P. Sau, A. Rakshit, A. Modi, A. Behera, B. K. Patel, *J. Org. Chem.* 2018, *83,* 1056; (d) Sau, P.; Rakshit, A.; Alam, T.; Srivastava, H. K.; Patel, B. K. *Org. Lett.* 2019, *29*, 4966. (e)
5. Shukla, G.; Alam, T.; Srivastava, H. K.; Kumar, R.; B. K. Patel,*Org. Lett.* 2019, *21*, 3543.
6. Rajamanickam, S.; Sah, C.; Mir, B. A.; Ghosh, S.; Sethi, G.; Yadav, V.; Venkataramani, S.; Patel, B. K. *J. Org. Chem.* (under revision).

Invited Lectures

Invited Lecture:01

Generating white-light emission from a single nano-assembly with its potential application in the detection of alkaline phosphatase activity in biological samples

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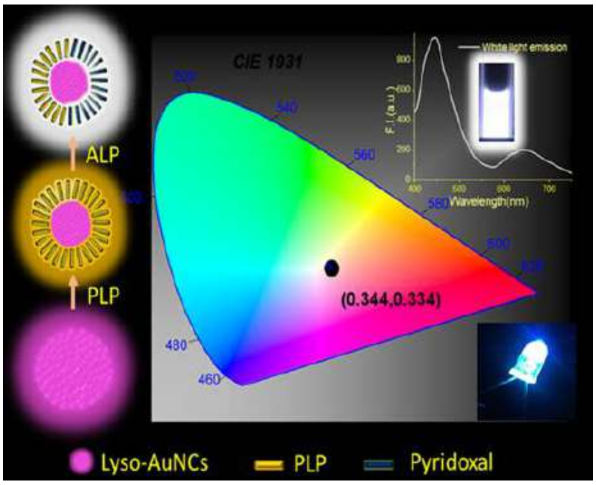
Abstract: The fluorescent dyed, optically active nanomaterials, polymers and nanoclusters are extensively studied for the generation of white-light emission owing to their potential use in lighting devices and display systems. Also, the fluorescent active molecular/nano systems are applied for theselective, sensitive and cost-effective detection of various toxic and bioactive analytes.[1] In this presentation, the designing of two novel highly selective, sensitive and cost-effective bioassays to detect alkaline phosphatase (ALP) activity using the lysozyme-stabilized and ovalbumin-stabilized fluorescent gold nanoclusters conjugated with the vitamin B6 cofactor pyridoxal 5'-phosphate (PLP) as the monophosphate ester substrate will be discussed. The cofactor PLP was conjugated with the red-emitting nanoclusters to obtain the probes*via* forming imine linkage between the $-NH_2$ group present in the coated lysozyme/ovalbumin and the -CHO group of PLP. At pH = 10.08, with the addition of ALP to the solution of PLP conjugated nanoclusters catalyzes the hydrolysis of PLP and converted in to pyridoxal, which produced a distinct ratiometric fluorescence response and the fluorescent colour turned to pale-white. The fluorescence spectral changes of the probes allowed to detect ALP activity selectively in various biological environmental samples. Further, pure white-light emitting nano-assembly was developed by conjugating optimized amounts of both PLP and pyridoxal over the surface of lysozyme-stabilized and ovalbumin-stabilized fluorescent gold nanoclusters.



References

1. Sahooet. al., Colloids and Surfaces B: Biointerfaces, 2019, Accepted;InorganicaChimicaActa, 2019, 489, 198; Physical Chemistry Chemical Physics, 2019, **21**, 11839; Journal of Materials Chemistry B, 2018, **6**, 4872; Photochemical &Photobiological Sciences, 2019, **18**, 1533; Biosensors and Bioelectronics, 2018, 102, 196; Analytical and Bioanalytical Chemistry, 2018, 410, 201; ChemistrySelect, 2018, 3, 6892; Dalton Transactions, 2018, 47, 742; Biosensors and Bioelectronics, 2017, 90, 329;ChemistrySelect, 2017, 2, 6023.

Invited Lecture:02

Designing of Nano-biomaterials for Therapeutic Applications

Rajashree Sahoo, A.Swaroop Sanket, Swarnaprabha Pany, Sanghamitra Pati,
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Abstract:

Nano-biomaterials are categorized on the basis of their different chemical, functional, structural dimension, and architecture. Designing of advanced nano-biomaterials with outstanding therapeutic potential are of paramount importance in tissue engineering and drug delivery applications. This talk will discuss on utilization of nano-biomaterials in combination with laser for targeted controlled delivery of different biomolecules in to various cell lines. Nanographene functionalized with hydrophobic aromatic drugs and organic fluorophores were delivered to living cells by using laser for controlled targeted delivery and bioimaging applications. The stability and release efficacy of different drug delivery nanocarrier systems in extracellular medium will be discussed in detail. For macroscale drug delivery systems transport the nanocarrier loaded drug to the targeted site and control the release via laser or by degradation of polymer backbone. Furthermore, in recent years, it has been observed that the bacterial resistance develops faster than invention of new antibiotics. There is an urgent need to design alternative anti-microbials to replace existing antibiotics for treating a whole spectrum of bacterial diseases. To overcome this problem worldwide bacteriophage-based therapeutics appears to be a potential alternative. Bacteriophage functionalized with nanocarriers to explore the antibacterial and biofilm removal potential under laser irradiation will be discussed. The development of cationic polymer systems for enhancing antimicrobial and mineralization ability for tissue engineering applications will be outlined. Another

important development in the field of tissue engineering so far has been the utilization of magnetized nano-biomaterials, which involves the utilization of biopolymers and magnetic nanoparticle, featuring magnetic gradients for therapeutic applications.

References:

1. S.K. Samal *et al.Chemical Society Reviews,* 2012, 41, (21), 7147-7194.
2. S.K.Samal *et al.Acta Biomaterialia,* 2013, 9, (9), 8192-8199.
3. S. K.Samal *et al.Macromol Biosci,* 2014, 14, (7), 991-1003.
4. S.K. Samal *et al.ACS Applied Materials & Interfaces,* 2015, 7, (41), 23098-23109.
5. S.K.Samal *et al.ACS Applied Materials & Interfaces,* 2015, 7, (11), 6282-6292.

Award Presentations

Prof. R.C. Tripathy Memorial Award Presentation (Outside the State)

Porous Crystalline Frameworks towards Molecular Storage, Separation and Solar to Chemical Energy Conversion

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Abstract: Porous crystalline frameworks (PCFs) such as metal-organic frameworks (MOFs) and covalent organic frameworks (COFs) are gaining increasing attention as new age materials due to their diverse practical applications in gas storage, separation, catalysis, sensing etc.[1] Despite such advancement, the chemical stability and synthetic difficulty are the two major challenges, which hinder their applicability. Moreover, storage, separations and catalytic conversion of gases to value added chemicals are becoming very important for many industrial applications. Although, PCFs have characteristics to being a good candidate for gas separation and photocatalysis, however, they are scarcely explored. Therefore, easy and scalable methods to synthesize these porous materials and their application as membrane materials for gas separation and photocatalytic fuel production remains a key challenge. In our research, we emphasize on simple design and easy synthesis of chemically stable MOFs and COFs;[2] their polymer composite membranes to enhance gas separation performance[3] and engineering them for solar-driven renewable fuel production[4].

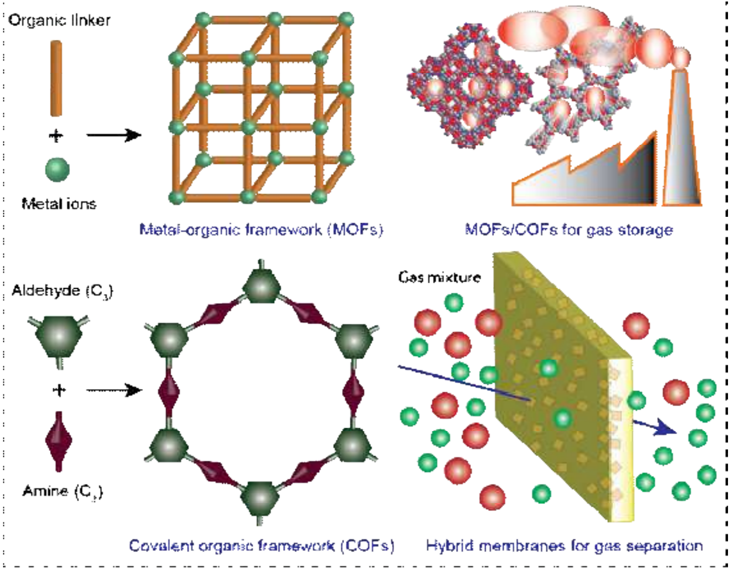

Figure 1:*Advanced Porous Materials for Gas Storage and Separation.*

References

1. C. Dey, T. Kundu, B. P. Biswal, A. Mallick and R. Banerjee, *Acta Cryst. B70*, **2014**, 3-108.

2. B. P. Biswal, S. Chandra, S. Kandambeth, B. Lukose, T. Heine and R. Banerjee, *J. Am. Chem. Soc.*,**2013**, *135*, 5328–5331.
3. B. P. Biswal, H. D. Chaudhari, R. Banerjee and U. K. Kharul, *Chem. Eur. J.*, **2016**, *22*, 4695-4699.
4. B. P. Biswal, H. A. Vignolo-González, T. Banerjee, L. Grunenberg, G. Savasci, K. Gottschling, J. Nuss, C. Ochsenfeld, and B. V. Lotsch, *J. Am. Chem. Soc.*, **2019**, *141*, 11082-11092.

Prof. Dayanidhi Patnaik Memorial Award Presentation

Impact of Bone Extracellular Matrix Mineral based Nanoparticles on Structure and Stability of purified Bone Morphogenetic Protein–2 (BMP–2)

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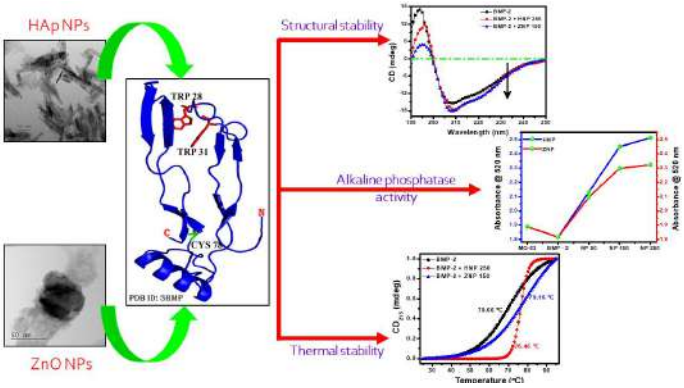
Abstract: Bone morphogenetic protein–2 (BMP–2) is an osteoinductive protein, which has been overexpressed, refolded and purified by using heparin affinity chromatography. Refolding of BMP–2 was based on urea gradient dialysis. The main objective of the present work is to unravel the impact of the inorganic minerals of bone extracellular matrix on conformation, stability and activity of BMP–2. We tried to elucidate the interaction of the bone matrix minerals in the form of nanoparticles with the osteoinductive protein. We chose hydroxyapatite nanoparticles (HAp NPs) which is the most abundant bone mineral and the other being a trace mineral in our bones i.e., zinc oxide nanoparticles (ZnO NPs) as the potential nanoparticles for this study. The isolated protein is found to be a β- sheet type with melting temperature being approximately 70.66 ˚C. Upon interaction with HAp NPs and ZnO NPs, the absorbance and the fluorescence intensity indicates the interaction with the protein as there was an upsurge in both the cases. Circular Dichroism (CD) spectroscopy revealed that ZnO NPs are having more dominant secondary structure and thermal stabilizing effect as compared to HAp NPs. Alkaline phosphatase activity confirmed the positive impact of the NPs on biological activity of BMP–2.



Prof. G.B. Behera Best Ph.D Thesis Award Presentation

High Dielectric Constant Polymer Composite Materials: A Potential Candidate of Energy Storage Devices

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Abstract: The interest of polymer nanocomposite research is growing day by day due to its wide range of potential applications. To have an idea of polymeric composites of higher dielectric strength and minimized loss, the properties are evaluated and the composites were prepared by using surface functionalized ceramic/carbon particles with various surface treating agents by solution casting technique. This study suggested strong interaction between particles and the polymer matrix, which played a key role for the improvement of the dielectric properties. The dielectric measurement results showed that the presence of surface functionalized ceramic/carbon particles enhanced the dielectric constant and relatively reduced the dielectric loss values as compared to that of untreated particles. The AC electrical conductivity of such composites was relatively high than that of the untreated one. Furthermore, the addition of surface treating agents results in enrichment of interfacial area which tightly bounded by the polymer matrix and thus responsible for the enhancement of dielectric properties. Moreover, our findings can be extended to carbon based composite material. In addition, the interfacial interaction governed by the surface treating agents play a greater role for making dielectric materials of choice for energy storage capacitors and other electronic devices.

Key words: Polymer, Nanocomposites, Surface treating agents

Kulamani Das Memorial Award Presentation

Reduced Graphene Oxide-$CuFe_2O_4$Nanocomposite: A Highly Sensitive Room Temperature NH_3 Gas Sensor

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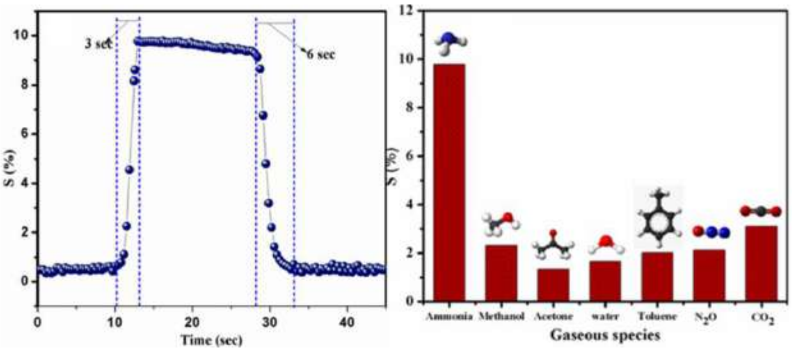
Abstract: Reduced graphene oxide (rGO) has received increasing attention since its discovery due to its variety of applications in the field of science like catalysis, sensing, drug delivery and hydrogen storage [1, 2]. The availability of oxygen-containing functional groups on the rGO sheets makes them suitable to modify with a wide range of organic and inorganic materials in covalent or non-covalent approaches to further enhance its properties [3]. Towards this objective, the present work presents a successful synthesis of $CuFe_2O_4$ nanoparticle doped rGO composite (rGO-$CuFe_2O_4$) via solution combustion method and use of this material as solid state gas sensor material. The nanocomposite was thoroughly

characterized by various sophisticated techniques such as FTIR, XRD, XPS, Raman, HRTEM with EDS mapping and TGA techniques. XRD reveals the successful formation of CuF_2O_4 structure, further supported by XPS study, which reveals the chemical environment of rGO modified by $CuFe_2O_4$ structure. High resolution transmission electron microscope (HRTEM) analysis demonstrated that the $CuFe_2O_4$ nanoparticles are uniformly distributed on rGO surface. Later on, the composite was used as a highly sensitive and active room temperature NH_3 gas sensor. The as-prepared nanocomposite acts as a very sensitive (response: 2.3%) sensor for NH_3 gas even at a very low NH_3 concentration (5 ppm). The sensing conditions were optimized by changing different parameters such as material loading (rGO:$CuFe_2O_4$), concentration of NH_3 gas and also different oxidizing and reducing organic vapours. The sensor shows very fast response time (3sec) and recovery time (6sec) towards ammonia as compare to other available sensors. Later on, the reusability and stability of the sensor were also studied for 45 days and it was found that our sensor shows response (9.3%) with respect to initial response (9.7%) for a concentration of 50 ppm of ammonia with a minimal loss of its sensing activity.



References

1. A.K. Geim and K.S. Novoselov, *Nat. Mater.*, **6**, (2007), 183.
2. D.R. Dreyer, S. Park, C.W. Bielawski and R.S. Ruoff, *Chem. Soc. Rev.*, **39**, (2010), 228.
3. M. Mohai and I. Bertoti, *Surf. Interface Anal.*, **48**, (2016), 461.

Prof. R.C. Tripathy Memorial Award Presentation (Inside the State)

Versatile Access to Bioactive N-heterocycles

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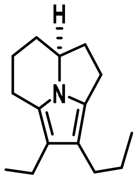
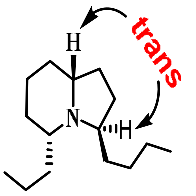
Abstract: New cases of cancer emerge in high rate, which pose challenges for chemist and biologists to fight cancer and other deadly diseases. Design and synthesis of new efficient drugs is a challenge to drug development due to several factors including drug resistances. N-Heterocycles, which are widely distributed in nature, have better oral absorption, bio-availability and displays wide array of biological activities and play very important role in metabolic activities. N-heterocycles constitute a major component in the existing anticancer

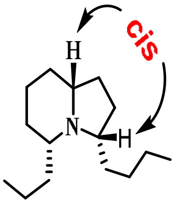
drugs. Indolizidine and isoquinoline molecules constitute such important classes of N-heterocycles having wide spectrum of biological activities. Indolizidine, isoquinoline compounds show various important bioactivities importantly anticancer, antimalaria among others. Total synthesis of Indolizidine natural products and isoquinoline derivatives have been successful by simple, versatile approach developed in the group could be useful in scaling up multi-gram batch in the drug discovery programme.



Myrmicarin 217



(-)-indolizidine 223AB



3-*epi*-(-)-indolizidine 223AB

(S,R)-Noscapine

Prof. Donald S. Matteson and Prof. P. K. Jesthi Award Presentation

Excited State Dynamics of Energy Harvesting Iridium Complexes

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[2]*Department of Physical and Inorganic Chemistry, Indian Institute of Science, Bangalore 560012, Karnataka, India*
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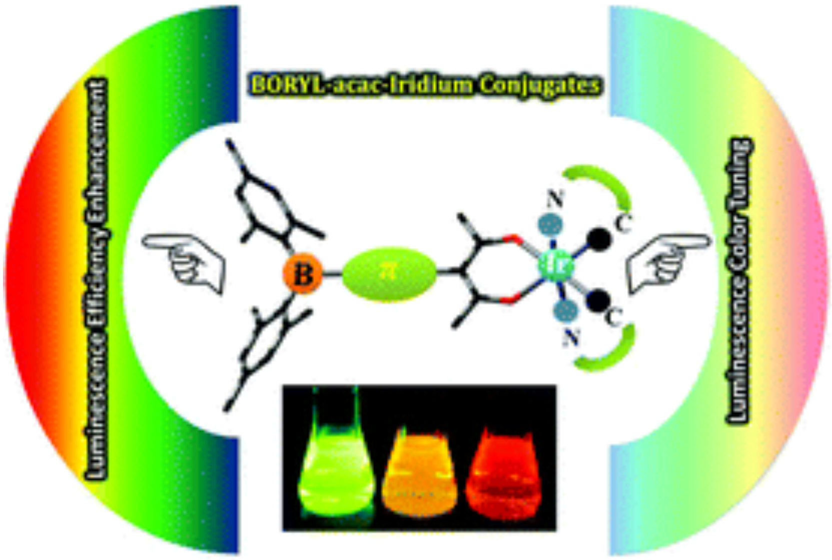
Abstract: Phosphorescent organometallic compounds have attracted a lot of attention owing to their potential applications optoelectronics and device fabrication. Studies revealed that phosphorescent cyclometalated iridium [Ir(III)] complexes have received special attention owing to their interesting optical characteristics such as high luminescence quantum yield and long lifetime.Here, we studied a series of room temperature phosphorescent compounds composed of triarylborane (TAB) and cyclometalated iridium complexes.[1] The optical characteristics such as energy of transition and luminescence quantum yield of these compounds can be conveniently fine-tuned by judiciously varying the cyclometalating ligand and the spacer between boron and iridium centers. Compounds exhibit bright phosphorescence with the emission color ranging from green to red under N_2 atmosphere and exhibit a rare type of dual emission from singlet and triplet excited states under ambient conditions. The experimental observations are well supported by the theoretical calculations. The room temperature phosphorescence features of complexes can also be exploited for device fabrications.Apart from this, I will be taking briefly on third generation of organic light emitting diodes, the thermally activated delayed fluorescence (TADF) of pure organic molecules.



Reference

1. R. Kumar, S. K. Behera and P. Thilagar, *Dalton Transactions*, 2019, 48, 6817-6823.

Prof. Sripati Pani Memorial Award Presentation

Iron Mineralizing Bacterioferritin A from *Mycobacterium tuberculosis* Exhibits Unique Catalase-Dps-like Dual Activities

Abhinav Mohanty and Rabindra Kumar Behera*

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Abstract:*Mycobacterium tuberculosis* (*Mtb*) expresses heme binding protein nanocages, bacterioferritin A (BfrA), along with nonheme bacterioferritin B (BfrB). BfrA are unique to bacteria and like BfrB, carries out ferroxidase activity to synthesize iron oxide bio-minerals. The expression of BfrA, in the presence of BfrB, indicates that *Mtb* may utilize it for some additional purpose apart from its natural iron storage activity. During host-pathogen interaction, host secretes H_2O_2 to exterminate the pathogens; but pathogens synthesizes Dps (DNA binding protein during starvation) to detoxify H_2O_2 by utilizing it during their ferroxidase activity. Interestingly, *Mtb* lacks the gene for Dps, which protects DNA from H_2O_2, induced oxidative cleavage. Therefore, the current work investigates the kinetics of O_2/H_2O_2 dependent rapid ferroxidase reaction and DNA protection activity of recombinant *Mtb* BfrA. Ferroxidase activity of *Mtb* BfrA was found to proceed *via* the formation of a transient intermediate and exhibited sigmoidal behavior, with increasing substrate concentration, indicating the existence of cooperativity phenomenon similar to multi-subunit proteins. *Mtb* BfrA protected plasmid DNA from Fenton reagents (Fe^{2+} and H_2O_2), similar to Dps, by forming BfrA-DNA complexes. Moreover, *Mtb* BfrA exhibited catalase-like activity

by an unknown mechanism, which gets inhibited in the presence of NaN_3 and NaCN. Thereby, *Mtb* BfrA executes multiple functions (ferroxidase, catalase and Dps-like activities) (**Fig. 1**) to cope up with the host generated oxidative stress and to promote pathogenesis.

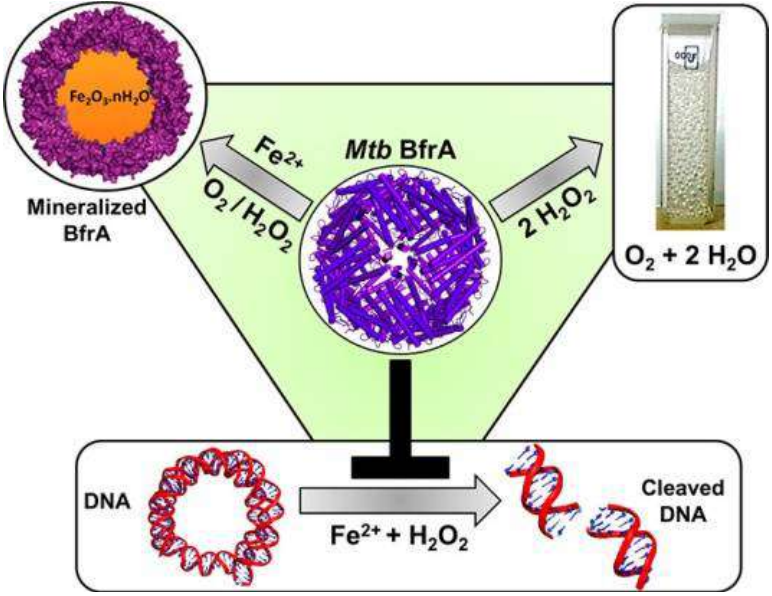

Figure 1: *Heme binding Bacterioferritin A (BfrA) Protein Nanocages from Mycobacterium tuberculosis (Mtb) Mimics Catalase (O_2 Evolution) and Dps (DNA Protection), in addition to Its Rapid Iron Mineralization Activity.*

Oral Presentations

Oral Presentation-01

Ultrasensitive Detection of Aqueous Cu^{2+} Ions by a Coumarin-Salicylidene based AIEgen

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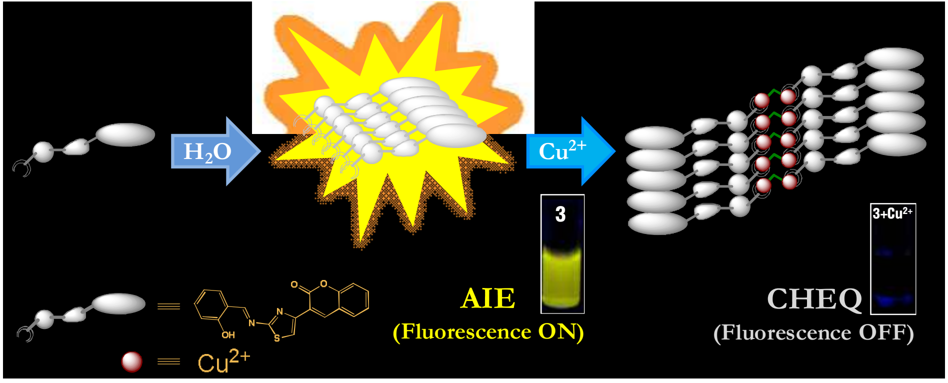
Abstract: In this work we reports the aggregation induced emission (AIE) behaviour of a coumarin-salicylidene Schiff base (**3**) bearing a bright yellow AIE fluorescence in DMSO-water medium (f_w 80 %) buffered by 10 mM HEPES at pH 7.4. The aggregated probe (AIEgen-3) selectively discriminates Cu^{2+} ions over other interfering metal ions *via* a fluorescence "ON-OFF" strategy through a CHEQ process. DLS measurements revealed an average particle size of 372 nm for AIEgen-3 at 80% water fraction that dramatically increases to 656 nm in presence of Cu^{2+} ions indicating the formation of more structured aggregates, which was further supported by TEM and ESI-MS experiments. The binding characteristics and interference studies of AIEgen-3 with various metal ions have been carried out by fluorescence and UV-visible experiments. AIEgen-3 shows a fluorescence detection limit (LOD) of 24 nM (□1.5 ppb) for Cu^{2+} ions which is considerably far below the values of detection limits recently reported by other Cu^{2+} ion sensors in aqueous medium. Further, the analytical applications of AIEgen-3 have been demonstrated by the estimation of Cu^{2+} ions in tap water and pharmaceutical samples both in solution and solid phase which shows the potentiality of the probe for on-site detection Cu^{2+} ions in chemical, environmental and biological samples.



Oral Presentation-02

Pyrophosphate Ion Sensing by a Zn(ll)-Terpyridine Complex in Aqueous Medium at Physiological p^{H}

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Abstract: A highly fluorescent and conjugated 4′-(3,4-dimethoxyphenyl)-2,2′:6′,2″-terpyridine ligand **L** was synthesized by refluxing 3,4-dimethoxy benzaldehyde and 2-acetylpyridine in ethanol medium at room temperature. Then by taking this synthesized ligand, a simple Zn(ll)-terpyridine complex was synthesized by the reaction with $ZnCl_2$ in 1:1 ratio in dichloromethane methanol mixture. Further the synthesized complex was treated as a selective fluorescent probe for pyrophosphate $P_2O_7^{4-}$ (PPi) among other anions like F^-, Cl^-, Br^-, I^-, AcO^-, CO_3^{2-}, NO_2^-, SO_3^{2-}, $H_2SO_4^-$, HPO_4^- etc. This sensing behaviour was studied by both UV-visible and fluorescence photophysical methods. Moreover, an abnormal 1:3 binding stoichiometry was found from the job's plot analysis.

Keywords: Terpyridine, Pyrophosphate (PPi), Chemosensor

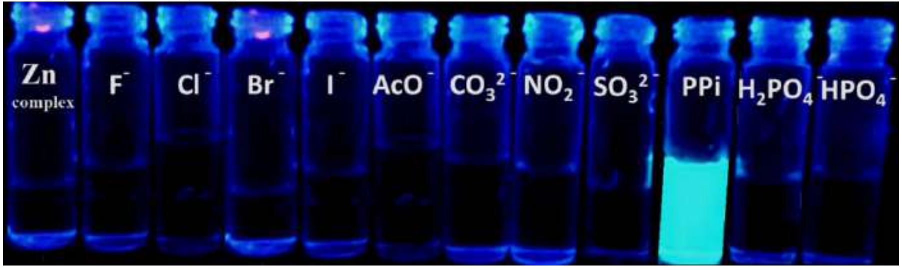

Figure 1:*Image of Zinc Terpyridine Complex (50 µL), in Presence of Sodium Salts of Various Anions under UV Chamber at 365nm.*

Oral Presentation-03

$MnCo_2O_4$ Decorated rGO/gC_3N_4-based Sensor for Highly Selective and Sensitive Detection of Chlorpyrifos

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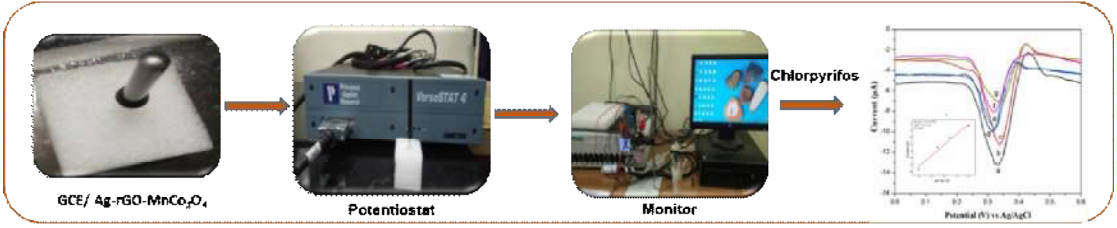
Abstract: Chlorpyrifos, the most toxic pesticide is used mostly in the field of agriculture and significantly affects the environment [2]. Therefore, the detection of Chlorpyrifos in various food samples and drinking water became essential for the protection of living beings as well as environment. In this regard, an easy, rapid, cost-effective nonenzymatic sensor involving $MnCo_2O_4$ decorated (2D/2D) rGO/gC_3N_4 modified glassy carbon electrode (GCE) is designed for the first time as a sensitive and selective electrochemical pesticide sensor. The designed nanocomposite has been synthesized via simple and rapid solution combustion route. Later on, the nanocomposite has been characterized thoroughly by various sophisticated analytical techniques such as FTIR, XRD, Raman, FESEM, TEM with EDS mapping to investigate the successful synthesis of desired nanocomposite. Later on, the electrocatalytic activity of the synthesized nanocomposite was investigated using Cyclic voltammetry and Differential Pulse Voltammetry. Then the optimized sensing conditions were obtained by varying different sensing parameters such as material loading, pH, temperature and incubation time. The designed nanomaterial was able to detect a wide range of pesticide concentrations (1µM-1nM) with a lower limit of detection (LOD= 0.3nM) (S/N = 3), which was further verified by Nyquist plot. Later on, the reusability and stability of the sensor were also studied for 30 days. Finally, the material was successfully applied in real sample analysis for ground water as well as fruits and vegetables.

1. T.H. Kim, K. Kuca, D. Jun, Y.S. Jung, *Bioorg. Med. Chem. Letters*, 15 (2005) 2914–2917.
2. H. Li, J. Li, Q. Xu, X. Hu, *Anal. Chem.*, 83 (2011) 9681–9686.



Graphical Abstract

<u>Oral Presentation-04</u>

Adsorptive Removal of Congo Red dye from Aqueous Solution using Mg-doped ZnO Nanoparticles: Kinetics, Thermodynamics and Isothermal Insights

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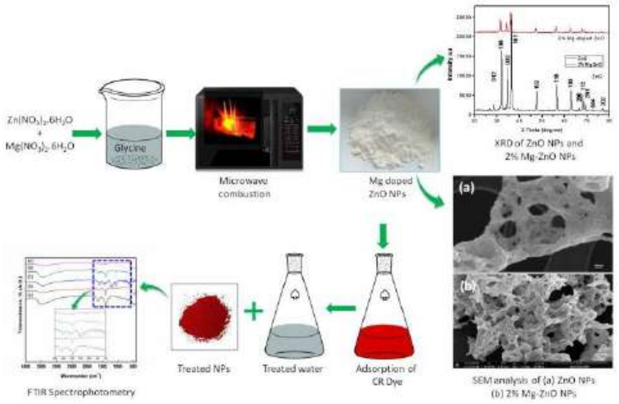
Abstract:A facile microwave-assisted combustion method was adopted to synthesize pure ZnO and Mg-doped ZnO nanoparticles (NPs), and characterization of the NPs and the sorption behaviour with Congo Red (CR) Azo dye was extensively investigated. The structure, morphology and chemical assay of the synthesized NPs were studied with respect to the pure and 2% Mg-doped ZnO samples. The X-ray diffraction pattern confirmed the presence of crystalline, cubic phase with fluorite structure of both the NPs. The morphological differences between the pure and Mg-doped ZnO NPs were evaluated by FE-SEM, which revealed that the NPs were in the nanoscale regime with irregular crystalline morphology having a grain size of ~18–45 nm. N_2 adsorption/desorption isotherms measured at −196 °C suggested a Type II structure with limited hysteresis loops, likely due to some inter particle porosity. The BET SSA ZnO NPs obtained was found to be 32m^2 g^{-1}, indicating about its potential in sorption processes. Batch adsorption study for the removal of CR carried out showed that, the

Mg-doped NPs showed higher loading efficiency (125 mg.g−1) than the ZnO NPs (25 mg.g^{-1}) counterpart. This was corroborated by the isotherm results in which the CR dye sorption followed a Freundlich Isotherm model for both undoped ZnO and Mg-doped ZnO NPs. The sorption of CR dye followed a pseudo-second order kinetics. The negative ΔG° (−31.91 and −109.41 kJ mol−1) showed the feasibility of the adsorption process. The ΔH° was determined as +13.74 kJ mol^{-1} and 50.7 kJ mol^{-1} for ZnO NPs and Mg doped-ZnO NPs respectively, confirming the endothermic nature of the adsorption for removing CR dye from the solution.



Graphical Abstract

Oral Presentation-05

Preparation of High-performance Graphene Geopolymer Composites

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[1]*Dr. Ambedkar Memorial Institute of Information Technology and Management Science, Rourkela 769042, India*
[2]*Veer Surendra Sai University of Technology, Burla, Sambalpur, 768018, Odisha, India*
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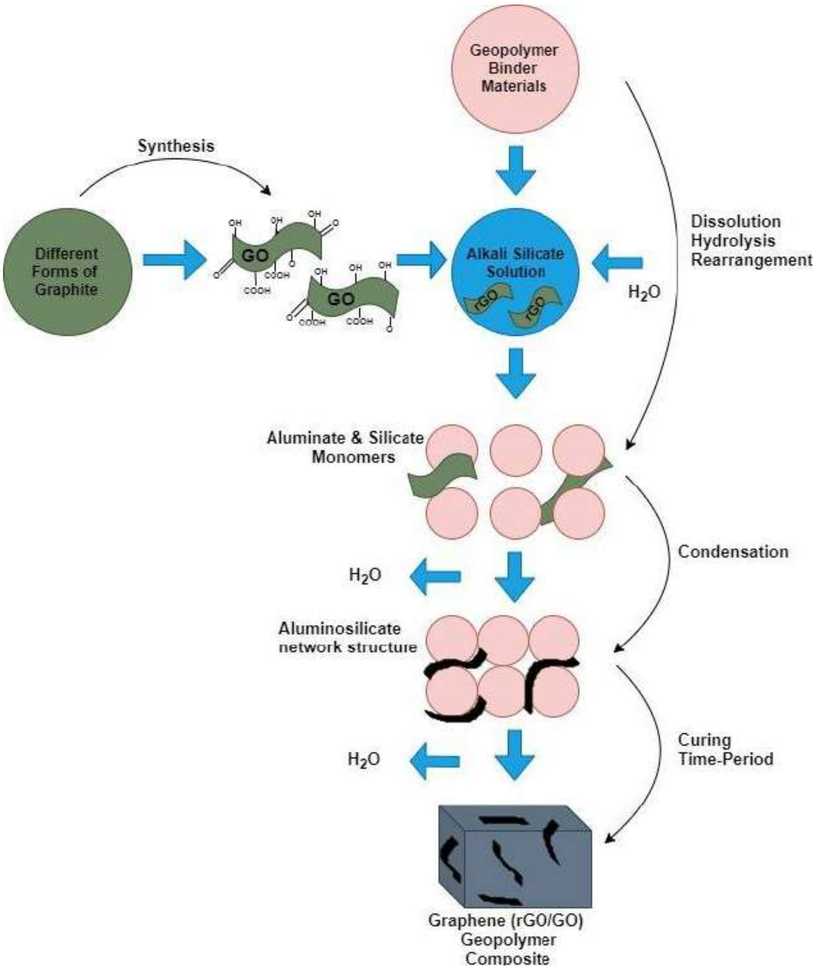
Abstract: Graphene geopolymer composites combine both the flexibility of geopolymers along with the strength of graphene. Most of the composite is primarily composed up of geopolymers. Hence, graphene is only used as a property enhancer. Geopolymer alone stands as an eco-friendly substitute for the most commonly used Portland cement, which has its own share of demerits. They consist up of binder material and an alkali solution, which ultimately helps in getting rid of water usage and Carbon dioxide (CO2), produced during the usage of Portland cement. The binder comprises of waste materials such as Fly-ash(FA), Ground granulated blast furnace slag (GGBFS), Ferro-chrome ash (FCA) or Rice husk ash (RHA), etc. while the alkali solution consists of Sodium Hydroxide (NaOH), Sodium Silicate (Na_2SiO_3) or Potassium Hydroxide (KOH). Throughout the years, numerous prominent scientists have explored significantly on the alkali activation reaction mechanisms of various aluminosilicate materials with different alkaline solutions. However, accurate reaction mechanism justifying the hardening and setting properties of geopolymer binders has not been comprehended by general scientific communities yet which establishes the fact geopolymerization primarily

depends on the choice of source material and alkaline solution and is a fast-complex multiphase reaction. Graphene additives play a significant role in determining the conclusive material properties of the composite. Various derivatives of graphene i.e. Graphene nanoplatelets (GNP's), Graphene Oxide (GO) or Reduced Graphene Oxide (rGO) have been experimented to determine the properties of the composite. The synthesis of graphene derivatives plays a crucial role in governing the quality of the derivatives. Among many of the adapted methods are Chemical Vapor Deposition (CVD), Chemical or Plasma Exfoliation from natural Graphite, Mechanical cleavage from natural Graphite, etc. Both of the materials prevail over each other's limitations, which results in high performance and more durable composite along with several other enhancing properties. Composites made of geopolymer and graphene can be extensively used in many sectors including construction, energy storage applications and many more. The illustrated figure follows a top-down approach by highlighting the important steps in the preparation of graphene geopolymer composites. This paper highlights the adapted methods for preparing durable and high-quality graphene reinforced geopolymer composites.



Oral Presentation-06

Effect of Phosphate on Iron Mineralization and Mobilization in Non-heme Bacterioferritin B from *Mycobacterium Tuberculosis*

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Abstract: Iron acts as a double-edged sword, both essential as well as toxic, due to its redox activities. Inside the cell, ferritin sequesters excess of free Fe(II) and detoxifies it by synthesizing hydrated ferric oxyhydroxide mineral via protein mediated mineralization reaction. Unlike mammalian ferritins, the native bacterial/plant ferritins contain significant amount of phosphate in their mineral cores. In aqueous buffer, phosphate preferentially stabilizes Fe(III) and hence alters its redox properties but its impact during the oxido-reductase (ferroxidase) reaction, occurring inside the supramolecular ferritin nanocage, is less studied. Moreover, like iron, phosphate also regulates the pathogenesis of *Mycobacterium tuberculosis* (*Mtb*), which expresses two types of ferritins: a heme-binding bacterioferritin A (BfrA) and a non-heme binding bacterioferritin B (BfrB). Therefore, the effect of phosphate on the synthesis, structure and reactivity of iron mineral core in *Mtb* BfrB was investigated. The stopped-flow rapid kinetics of ferroxidase activity of BfrB revealed the formation of a di-ferric peroxo like transient species during the initial stage of biomineralization. The presence of phosphate not only affected the kinetics of rapid iron oxidation but also decreased the size/crystallinity of the iron mineral core and inhibited the reductive iron mobilization (Fig.1). The current work demonstrates the unique ability of BfrB to rapidly sequester iron even under high phosphate concentrations indicating the role of its ferroxidase centers during *Mtb* pathogenesis.

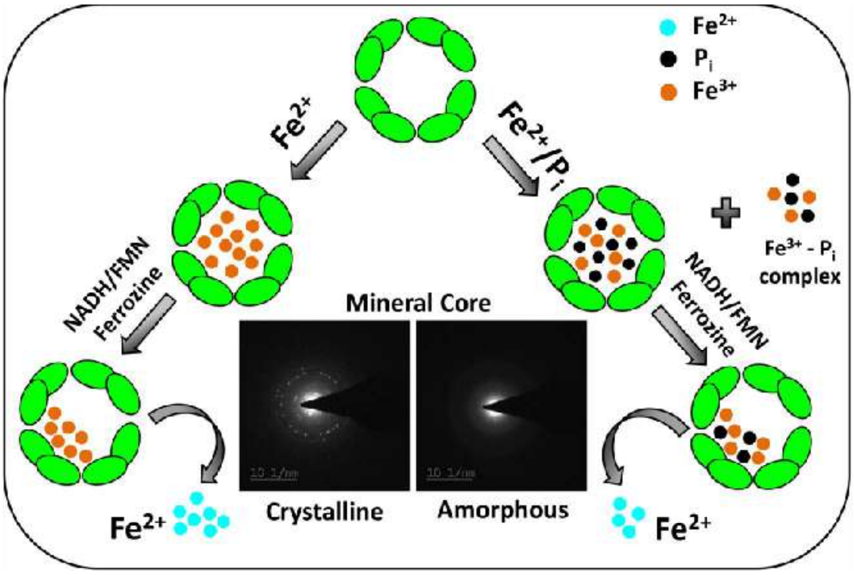

Figure 1: *Inorganic Phosphate alters Iron Mineralization in BfrB, lowers the Crystallinity/Size of the Iron Mineral Core, and inhibits Reductive Iron Mobilization.*

Oral Presentation-07

Incorporation of Silver Nitrate into embedded Nano Boron Nitride for the Preparation of Polyethyl Methacrylate/Polyvinyl Alcohol Nanocomposite Layered Material

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Abstract: A chemical dependable process for the EMA monomer used to synthesize polymer layered material was developed in laboratory. Purification of EMA is carried out first by monomer washing process. Then synthesis of composite material is carried by simple in situ technique maintaining temperature between 50 to 60 degree. It was properly dried for the formation of a thin film; five different nanocomposite samples were prepared by varying the concentration of $BNNP_{S.}$ Such as 1%, 2%, 3%,4% and 5%.Phase analysis, microstructure, and chemical composition are examined by X-ray diffraction (XRD), Fourier transform Infrared Spectroscopy (FTIR), field emission scanning electron microscopy (FESEM), X-ray phoelectron spectroscopy (XPS) and high resolution transmission electron microscopy (HRTEM). The surface and nano-tribological characteristics of the polymeric nanocomposite are investigated by atomic force microscopy (AFM). The thermal, antibacterial, and oxygen barrier properties of the polymeric nanocomposite are studied. The incorporation of the BNNPs enhances the barrier, thermal, and antimicrobial properties enhanced by incorporation of AgNPs into the PEMA/PVA matrix by which the material is suitable for good packaging applications.

Oral Presentation-08

Reaction of 2,4,5-trisubstituted-1-hydroxy Imidazoles with Epichlorohydrin

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Abstract: Nucelophilic substitution reactions of epichlorohydrin with various nucleophiles have been reported since a quite long time. Sivastava and coworkers have attempted the synthesis of aryloxy-propanol amines. The key step is the reaction of aryloxy ion with epichlorohydrin. This indeed tempted us to study the reaction of hydroxy imidazole derivatives with epichlorohydrin. N_1-hydroxy-2,4,5-trisubstituted imidazole derivatives were prepared as per the reported procedure. The tendency of such hydroxy imidazoles to undergo easy oxidation as well to be converted to oxide ion in alkaline medium ignited our minds to use it as a nucleophile and carry out substitution reactions to afford new derivative, which might have potential biological applications. To study we have chosen epichlorohydrin, which is very much susceptible to nucelophilic attack. Contrary to the earlier reported studies, we have obtained three different products whose structures were established with respect to ^{1}H, ^{13}C NMR and mass spectral data. Work is in progress to find their potential applications.

Oral Presentation-09

Experimental and Theoretical Studies on the Structure of 2-chloro (o-hydroxy Benzylideneaniline)

Supriya P. Biswal, Prabhudatta Hota, Amitabh Mahapatra and Pramila K. Misra*
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Email: supichemistry@gmail.com, pramilamisra@rediffmail.com

Abstract: The UV, FT-IR, SC-XRD studies of the Schiff's base, 2-chloro (o-hydroxy benzylideneaniline) were carried out in order to determine the optimized structural parameters of the compound and compared with the optimized data obtained theoretically following density functional theory analyses. The FT-IR and UV-VIS spectroscopic analyses were carried out at B3LYP/6-311G (d, p) level of theory. The molecular electrostatic potential surfaces were plotted to elucidate the reactivity of the molecule. The lowest spin-allowed (singlet-singlet) excited states were subjected to investigate possible electronic transitions. HOMO–LUMO energy gap of the energy levels corresponding to each of the transition were determined. A good agreement was observed between the optimized geometry obtained from Density Functional Theory and experimental single crystal X-ray diffraction (SC-XRD) structure. The occurrence of hydrogen bonding in the molecule was suggested. The FT-IR and MEP analyses also affirmed the hydrogen bonding in the compound postulated by SC-XRD results.

Oral Presentation-10

Impact of Inclusion Complexes of 2(([1,3,4] Thiadiazino [6,5- b] indol-3-ylimino) methyl) Phenol and Its Derivatives with β –Cyclodextrin: Spectral, Thermal and Antimicrobial Study

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Abstract: Extensive biochemical and pharmacological studies of indole derivatives have confirmed their highly effectiveness against various strains of microorganisms as well as have various therapeutic effects. Inspired by these observations, in this research work, some substituted indoles i.e. 2(([1,3,4] Thiadiazino [6,5- b] indol-3-ylimino) methyl)substituted phenols are synthesized and their inclusion complexes have been prepared with β - Cyclodextrin to enhance their stability, solubility, bio-accessibility and hence pharmacological properties. The formation of both synthesized pharmacophores and their inclusion complexes are established based on elemental, thermal and spectral (UV, FT-IR, ^{1}HNMR, etc.)studies. The comparative biological screening of the synthesized compounds and their inclusion complexes are made for different bacterial strains, fungi and antioxidant character. The results of the research authenticate the fact that the inclusion complexes of the synthesized compounds exhibit profound antibacterial, antifungal and radical scavenging property with respect to their bared compounds.

Oral Presentation-11

Functionalization of Ferrocene by Hydrazone and Thiosemicarbazone Fragments: Significant Cyclopalladation and Biological Properties Study

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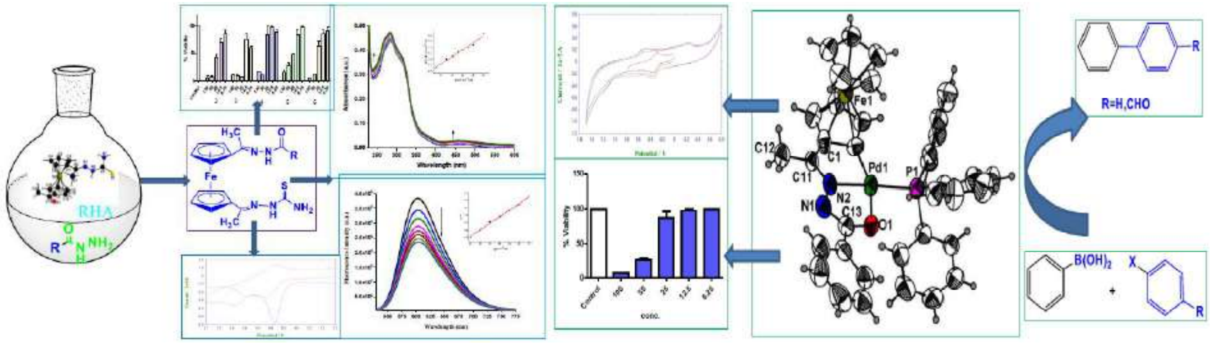
Email: bariktulsi693@gmail.com

Abstract: Ferrocene based organometallic moieties are the most versatile molecular entities in organometallic chemistry because of their distinctive structural integrity, reversible redox behavior and enormous potential in the development of material science, molecular wires, catalysis, sensing, electronic communication and bio-organometallic chemistry.[1] Recent research supports the application of ferrocenyl compounds for a diversity of therapeutic uses in which ferrocene substituted tamoxifen and ferrocenyl chloroquine derivative shows higher inhibitory activity compared to their organic analogue.[2] Our research group have currently explored the potential of several mono- and di-ferrocenyl hydrazone and chalcone based compounds which showed exciting biological and sensing properties.[3] In addition, we have also been able to synthesize unsymmetrical ferrocenyl hydrazone derivativesusing a novel solvent free synthetic method by using RHA for various biological applications.[4] This encouraged us to focus on the synthesis of 1,1'- unsymmetrical ferrocenyl linked mixed hydrazones, thiosemicrabazones and study their reactivity towards metallation and CH-activation technique. A systematic stepwise / multicomponent solid supported synthetic method using precursors involving diacetyl ferrocene, thiosemicarbazide and different organic hydrazide led to the isolation of mixed ferrocenyl hydrazone-thiosemicarbazone derivatives. The intermediate was structurally confirmed by single crystal X-ray diffraction study and their electrochemical properties was studied using cyclicvoltammogram. The interaction of unsymmetricalferrocenyl compounds with calf-thymus DNAhas been explored by using absorption and emission studies to observe potent cytotoxic effect on human leukemia (THP-1) cell line. Similarly, some of these ferrocenyl hydrazone and thiosemicrabazone derivatives display interesting metal binding behavior towards transition metals through imine nitrogen, enolate oxygen and enolate sulphur ligation. A unique CH-activation of the ferrocenyl ring was observed, when the complexation behavior of some hydrazones and thiosemicarbazones were carried out with tetrakistriphenylphosphine palladium to yield a rarely known ortho cyclopalladated complexes. The structural confirmation of the cyclopalladated ferrocenyl complexes was obtained from single crystal X-ray diffraction study. Investigation of their electrochemical properties also showed ferrocene based redox processes and distinct electronic communication behavior among the electroactive species. These types of cyclopalladated complexes have promising cytotoxic effect on human leukemia (THP-1) cell line and act as efficient reusable catalyst in Suzuki-Mayura cross coupling reactions.



References

1. H. Qian, Z. Yin, T. Zhang, S. Yan, Q. Wang, C. Zhang, *Organometallics*,**2014**, *33,* 6241
2. R. H. Fish, G. Jaouen, *Organometallics*,**2003**, *22*, 2166.
3. (a) S. Mishra, S. Dewangan, S. Giri, S. M. Mobin, S. Chatterjee,*Eur. J. Inorg. Chem.*, **2016**, 5485; (b) S. Dewangan, T. Barik, S.Mishra, S. Mawatwal, S. Kumari, S. Giri, S. Das, R. Dhiman, C. Wolper, S.Chatterjee, *Appl. Organomet. Chem.,***2018**, *32*, 4612.
4. (a) A. Ghosh, T. Barik, S. Dewangan, P. K. Majhi, T. Sasamori, S. M. Mobin, S. Giri, S. Chatterjee, *Appl. Organomet. Chem.,***2019,***33,*4838 (b) S. Dewangan, T. Barik, R. Parida, S. Mawatwal, R. Dhiman, S. Giri, S. Chatterjee , *J. Organomet. Chem.,***2019,** 120999

Oral Presentation-12

Removal of Some Cationic Dyes from Organic Medium by the Application of unmodified Silica

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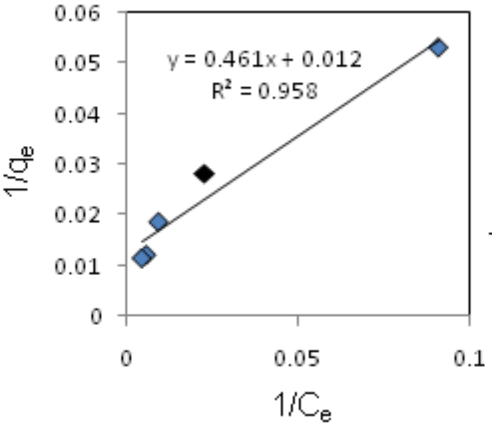
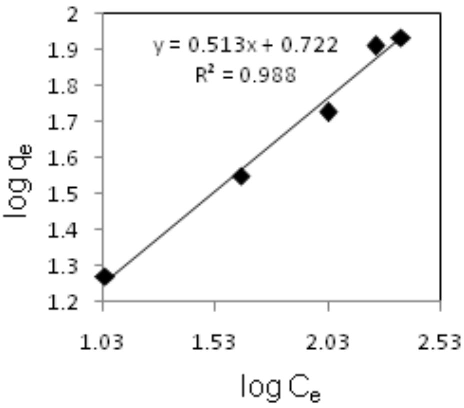
Abstract: Removal of some cationic dyes with varying substituents and alkyl chain lengths has been carried out on unmodified silica from organic solvents. Textural property of unmodified silica was analyzed employing Scanning Electron Microscope (SEM) and X-ray Diffraction (XRD) techniques. The influences of different adsorption factors like contact time, adsorbent dosages, varying concentrations of dyes and temperature on the rate of adsorption of dyes have been studied. The mechanism of removal of dyes is in agreement with the pseudo second order kinetics. The α–styryl pyridinium dye with hydroxy substituent shows maximum adsorption as compared to that of dye with dimethylamino substituent. This can be attributed to the existence of strong Hydrogen bonding between the most electronegative element Oxygen of OH group of adsorbate and the silanol units of adsorbent. Further the dye with dodecyl alkyl chain length exhibits better adsorption rate as compared to the dyes with methyl and butylchain length, which may be due to the excellent interaction between the hydrophobic group of adsorbate and adsorbent in non-polar medium. All the data fit well to the Freundlich

adsorption isotherm. The adsorption isotherm shows multilayer stacking of the dye molecules on the silica surface. Thermodynamic modeling has been done from three temperatures such as 20, 25 and 30^0CThe thermodynamic parameters have been investigated to understand the feasibility of application of unmodified silica surfaces in the removal of dyes from organic solvent. A comparative study has been carried out between the rates of adsorption of dye in organic medium to that in water medium.



Langmuir Fit



Freundlich Fit

Oral Presentation-13

Partitioning Addition and Substitution Reaction: Effect of Solvent

LopamudraSatpathy and Bijay K. Mishra*

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Abstract: Reaction of F^- with bromoethane leads to fluoroethane as the substituted product and ethylene as the elimination product. The present investigation reports the effect of solvents on the partition of transition state to two different pathway through potential energy surfaces (PES) and structures of the species. The PESs in gas phase have been computed at MP2 level and CCSD(T) level. The performance of several hybrid density functional, such as B3LYP, M06, M06L, BHandH, X3LYP, M05, M05-2X, M06-2X have also been investigated towards describing the elimination and nucleophilic substitution reactions. With respect to MAE values and to make the computation cost effective, we have explored the implicit continuum solvent model, CPCM in solvents like cyclohexane, methanol, acetonitrile, dimethyl sulphoxide and water. The calculated relatives energies values which are negative in gas phase are found to be positive in polar solvents since the point charge in the separated reactants are more stabilized than the dispersed charge in the transient complex, which has also been analysed through NBO analysis.

Oral Presentation-14

Room Temperature Synthesis of Nanoporous SBA-1

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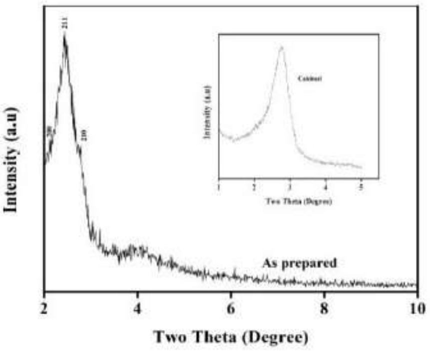
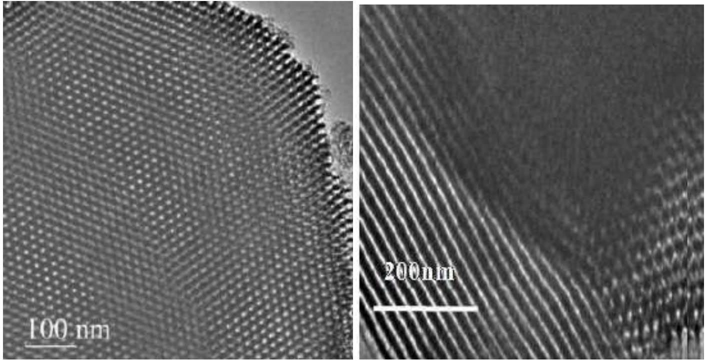
Abstract: Nanoporous solids possessing open nanodimensional channels find widespread applications in adsorption, catalysis and host guest chemistry. Herein, we report the synthesis of a nanoporous silica (SBA-1) based material having 3-D pore architecture. The samples were prepared at RT from a gel containing TEOS, CTAB and dil. HCl and characterized by XRD, TG, FTIR, Raman and TEM studies. XRD patterns of both as-synthesized and calcined SBA-1 shows a strong reflection at d=35.81Å which is typical of ordered SBA-1 structure [1]. TGA curves of as-synthesized SBA-1 gave about 48% of total weight loss noticed in three steps indicates the porous nature of the material. FT-IR and Raman spectra of the both as-synthesized and calcined SBA-1 samples showed various bands that can be attributed to silica structure. SBA-1 possesses large number of internal surface hydroxyl groups. This observation is consistent with the TGA results of calcined SBA-1. TEM micrographs clearly showed regular long range ordered pore channels having average diameter of ~30Å.



XRD Pattern of SBA-1



TEMPatterns of SBA-1

References

1. L.X. Dai, K. Tabata, E. Suzuki, *J. Mater. Sc. Lett.*,**19** (2000) 2071-2073.
2. H.M. Kao, C.C. Cheng, *Mater. Lett.*,**60** (2006) 2594-2599.

Oral Presentation-15

Membrane Cholesterol Modulates Oligomeric Status and Peptide-membrane Interaction of Severe Acute Respiratory Syndrome Coronavirus Fusion Peptide

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Abstract: The N-terminal fusion peptide of S2 glycoprotein of the SARS Co-Virus, which is exposed upon receptor binding, is crucial for its entry into the host cell. The fusion peptide

alters the membrane organization and dynamics of the host membrane to facilitate membrane fusion. Generally, the effect of fusion peptide on the membrane is sensitive to the lipid composition of target membranes. In this present work, we have utilized steady state and time-resolved fluorescence spectroscopy in tandem with CD spectroscopy to elucidate the binding, oligomeric status, secondary structure of the fusion peptide and its impact on the depth-dependent membrane organization and dynamics. We have used depth-dependent fluorescent probes, DPH and TMA-DPH, to evaluate the effect of the peptide-binding along the bilayer normal as well as energy transfer efficiency of tryptophan between TMA-DPH and DPH to determine the relative location of tryptophan present in the membrane-bound fusion peptide. We have further evaluated the effect of membrane cholesterol on the binding and organization of the peptide on the membrane at various cholesterol concentrations. Our results clearly demonstrate that the membrane cholesterol alters the oligomeric status of the membrane-bound peptide and the effect of peptide-binding on the depth-dependent membrane organization and dynamics.

Oral Presentation-16

Synthesis and Evaluation of Dendritic Carboranyl Glycoconjugates: Promising Dual Mode Candidates for Cancer Treatment

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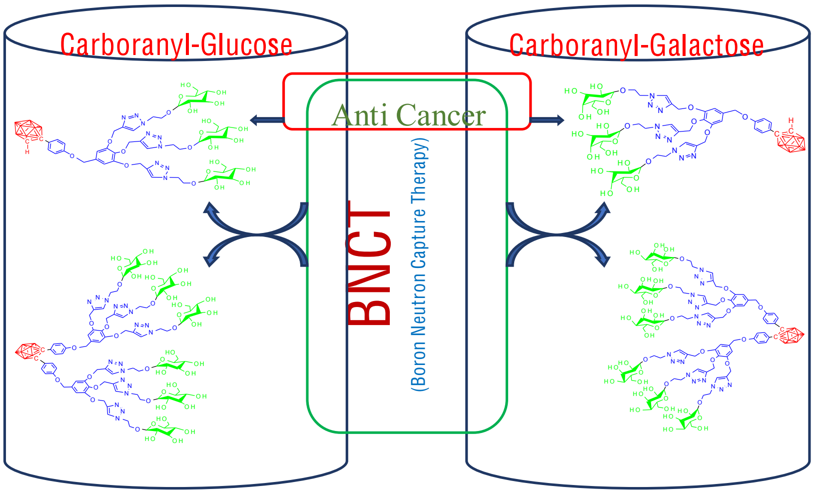
Abstract: There are many cancer treating methods developed until today, but none of the method is fully effective because of their limitations to use. The mostly used chemotherapy method limits its effectiveness due to its toxicity to other healthy cells in the body. Several glycoconjugates of polyhedral boron clusters have been synthesized for tumor targeted delivery of boron for treatment of cancer via boron neutron capture therapy, but lacks its effectiveness. In our present work, we have synthesized four numbers of highly water soluble, active drug delivery agents which should have an ability to overcome the limitations for acting as BNCT drug, with the potential to deliver the drug to the targeted area and accumulate within tumor cells in a controlled manner, as well as the potential to show anti-cancer efficacy investigated by MTT assay. These findings could be useful for successful treatment of cancer.



Oral Presentation-17

Effect of Different Functional Groups in UiO-66 Metal Organic Frameworks for the Adsorption of Anionic Dyes: An Experimental and Molecular Docking Study

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Abstract: Water contamination from various noxious industrial wastes is a major environmental concern. Theses have much adverse effect on the living ecosystem. Organic dyes mostly used in textile, plastic, cosmetic and pharmaceutical industries are among the major pollutants, which affect the water quality badly. Adsorptive removal of this hazardous waste from water have been used as a successful method and exhaustive studies have been reported. However, a major challenge is to develop adsorbent materials that can selectively remove dyes from the water system. Metal Organic Frameworks (MOFs) are smart materials, which comprised of metal ions or clusters connected by organic linker molecules and form crystalline coordination polymer networks. Among these MOFs, UiO-66 MOFs stands out as a superior class of materials for their robust chemical nature, that have been successfully used for the removal of toxic dyes for e.g. methylene blue dye from aqueous solutions. Adsorption behavior of two anionic dye Congo red and reactive blue on two type of Zirconium MOF (UiO-66-NH_2 and UiO-66-NO_2) has been investigated using adsorption experiment, spectroscopic analyses, and mechanism of adsorption by theoretical calculations. Firstly, the nano-MOFs has been synthesized by hydrothermal process using a small screw cap glass tube and characterized by powder X-ray diffraction, FT-IR, UV-DRS, SEM, TEM, specific surface area by N_2 adsorption, TGA and the mechanism by molecular docking method. The adsorption process mainly controls by hydrogen bonding and π-π stacking interaction between the MOF and dye molecule. The UiO-66-NH_2 have greater adsorption capacity as compared to UiO-66-

NO_2. This is because of a greater number of binding sites presents in UiO-66-NH_2 for having the NH_2 group.

Oral Presentation-18

Optoelectronic Materials based on Donor-Acceptor Conjugated Systems

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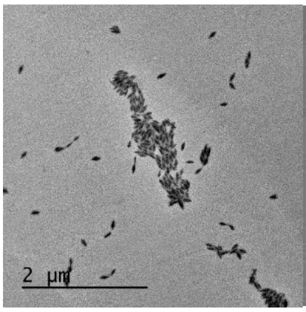
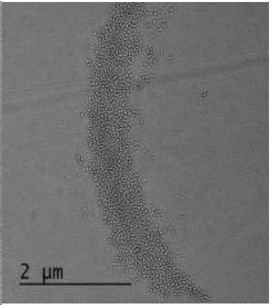
Abstract: Electron-rich donor (D) and electron-poor acceptor (A) units in a conjugated material leads to reduction in the HOMO-LUMO separation. The intramolecular charge transfer between donor and acceptor units significantly reduces the band gap of such materials. Benzothiadiazole has been extensively used as an acceptor unit leading to materials with high charge carrier mobilities in OFETs, near infrared emission in OLEDs and effective light harvesting in OPVs. Incorporation of benzothiadiazole units into polyfluorene backbone results in reduction of HOMO-LUMO band gap of about 0.5 eV. Subsequent borylative fusion further reduces the HOMO-LUMO separation up to 0.6 eV. In addition, Suzuki polycondensation has been employed to synthesise a variety of benzothiadiazole-based blue, green and red emitting donor-acceptor polymers and polymer nanoparticles. The synthesis and properties of these optoelectronic materials will bepresented.



140-150 nm x 40-50nm rods



40-60 nm x 15 nmrods

Oral Presentation-19

Removal of Congo Red Dye from Aqueous Solution using Zinc Oxide Nanoparticles derived from Tulsi Leaf (*Ocimum Sanctum*): A Green Approach

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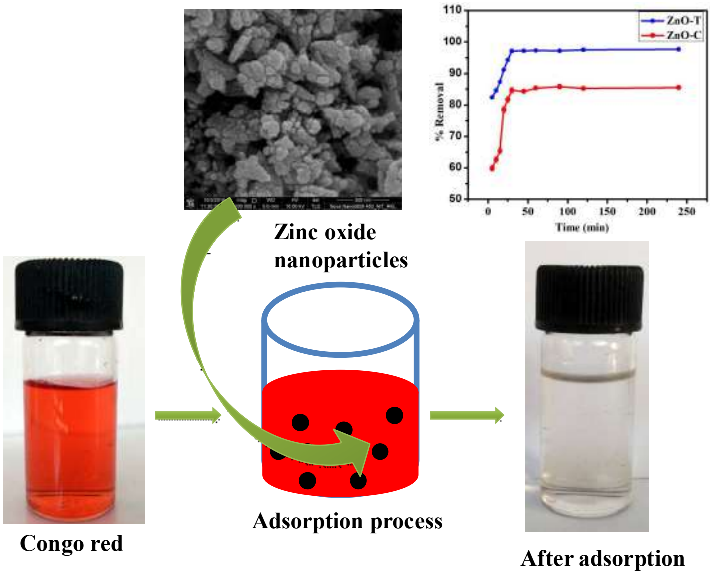
Abstract: The main goal of the present work is to deal with the green synthesis of zinc oxide nanoparticles using aqueous leaf extract of *Ocimum tenuiflorum.* In synthesis of zinc oxide

nano particles, zinc nitrate and sodium hydroxide were used as main materials and *Ocimum tenuiflorum* leaf extract as a precursor. The resulting product was characterized by UV-visible, FT-IR, XRD, FE-SEM, EDX analysis and N_2- adsorption-desorption isotherm. The green synthesis of zinc oxide nanoparticles used as a novel and more efficient material for Congo red dye adsorption as compared to commercial available zinc oxide. The adsorption studies were carried out under various parameters such as adsorbent dosage, initial dye concentration, pH, stirring speed and time. To understand the mechanism of Congo red dye on zinc oxide nanoparticles, we have investigate two adsorption kinetics like pseudo-first order and pseudo second order. Due to high correlation coefficient value of the pseudo-second order (R^2=0.99) kinetics, the adsorption process follows chemisorption. The experimental data for the isotherm followed the Langmuir isotherm model. The outcome obtained from this research suggested that zinc oxide nanoparticles could be a potential adsorbent with its reusability of Congo red from aqueous solution.



Oral Presentation-20

OH/HO_2 Radical Measurements in the Troposphere

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Abstract: The removal of OH radicals to all sinks in the troposphere can be define by its total pseudo first order loss rates coefficient (*k*OH) and which is generally termed as total OH reactivity. At MPIC, Germany, I developed and characterized an OH reactivity instrument using laser flash photolysis combined with laser induced fluorescence (LFP-LIF) technique for

wide ranges in hydrocarbon and NOx variations during field campaigns. The Middle East has exceptional environmental qualities, with intense solar radiation, extensive deserts and water scarcity that promotes dust mobilisation. Furthermore, it is subject to high levels of air pollution due to emissions from traffic and petrochemical industry. The AQABA (Air Quality and climate in the Arabian BAsin) field campaign took place in summer 2017 covering a ship track from Toulon to Kuwait through the Mediterranean and around the Arabian Peninsula and back. During the AQABA campaign, our group measured HOx (OH+HO_2) radicals using laser-induced fluorescence (LIF) to investigate the regional influences on HOx concentrations and budgets.

Oral Presentation-21

Synthesis and Magnetic Behaviour of Mg-Zn Nano Ferrites by Using *Aloe Vera* Extract Solution

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Abstract: $Mg_xZn_{1-x}Fe_2O_4$ (x = 0.25, 0.55, 0.75) ferrite nanoparticles were prepared by a modified sol-gel method using high purity metal nitrates and Aloe-Vera plant extract solution. Using of Aloe-Vera extract simplifies the process and provide an alternative process for a simple and economical synthesis of nanocrystalline ferrite. The structural characteristics of calcined sample of $Mg_xZn_{1-x}Fe_2O_4$ (x = 0.25, 0.55, 0.75) ferrite nanoparticles were determined by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR) and transmission electron microscopy (TEM). The prepared samples have spinel structure. From XRD, it was observed that particle size decreases with increasing Mg content. All the prepared samples have spinel structure with particle size of 33 nm-55 nm. Nano size of the particles was confirmed by TEM measurement. FTIR spectral analysis helps to confirm the formation of spinel structure in ferrite samples. Magnetization measurements were obtained at room temperature by using vibrating sample magnetometer (VSM), which showed that the calcined samples exhibited magnetic behaviour.

Keywords: *Aloe vera*, Electron microscopy, Magnetic properties, Sol-gel, Synthesis, Vibrating sample magnetometer

Oral Presentation-22

Microwave assisted Synthesis of Thiazolo-Pyrimidine Derivatives

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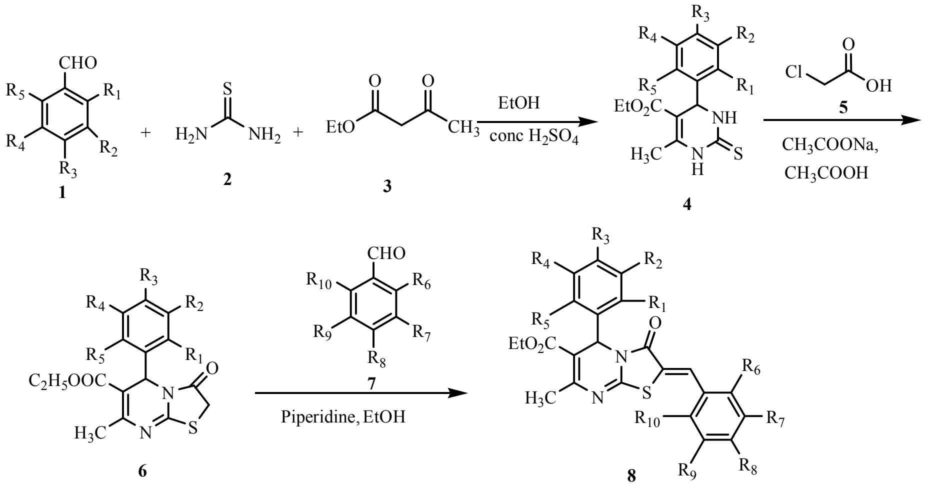
Abstract: Nitrogen containing heterocycles especially thiazolopyrimidines, at present era have become the focal point for medicinal chemists owing to their broad spectrum of pharmacological activities, e.g. antimicrobial[1], antitumour[2], anti-inflammatory[3] and anti-

biofilm properties[4]. Further, the arylidene derivatives of nitrogen and sulphur containing heterocycles with α, β - unsaturated carbonyl scaffold are found to be potent anticancer agents[5]. In view of the importance of such heterocyclic molecules, a fascinating synthetic protocol was adopted for synthesis of some novel arylidene derivatives of thiazolopyrimidine using thiourea and acetoacetic ester as synthetic precursors under microwave irradiation technique.



$R_1, R_2, R_4, R_5 = H, R_3 = Cl, CN$
$R_1, R_3, R_4 = H, R_2, R_5 = OCH_3$
$R_2, R_3, R_5 = H, R_1 = OH, R_4 = Br$

$R_6, R_9, R_{10} = H, R_7, R_8 = OCH_3$
$R_6, R_7, R_9, R_{10} = H, R_8 = Cl$

References

1. Youssef, A.M.S.; Fouda, A.M.; Faty, R.M. *Chem. Cent. J.*,**2018**, *12*, 50.
2. Abuhashem, A. A.; Youssef, M. M.; Hussein, H. A. R. *J. Chin. Chem. Soc.*,**2011**, *58*, 41.
3. Tozkoparan, B.; Ertan, M.; Kelicen, P.; Demirdamar, R. *Farmaco*,**1999**, *54*, 588.
4. Pan, B.; Huang, R.; Zheng, L.; Chen, C.; Han,S.; Qu, D.; Zhu, M.; Wei, P. *Eur. J. Med. Chem.*,**2011**, *46*, 819.
5. Satam, V.; Bandi, R. K.; Behera, A. K.; Mishra, B. K.; Brockway, O.; Tzou, S.; Zeller, M.; Lee, M.; Pati, H. *Lett. Drug. Des. Discov.*, **2011**, *8*, 704.

Oral Presentation-23

Photovoltaic Performance of Natural Dye sensitised Ni-Cd-S Photoelectrode fabricated by Dip Coating Technique

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Abstract: Colossal exploitation of fossil fuel has created noticeable pollution problems leading to climate change and health adventure, which stimulates research to develop cheap, low-cost

and clean energy technologies to the society. In this context herein, Ni-Cd-S photoelectrode has been prepared using dip coating technique on ITO glass substrate and sensitised by using chlorophyll as sensitizer. The electrode and sensitised electrode have been characterised by fabricating solar cell of configuration:

Photoelectrode+Dye// Na_2S(1M)+NaOH (1 M)+S (1 M)//C (Graphite)

The photo-electrochemical characterizations of the thin film photoelectrodes take account of the measurement of current vs voltage (I-V) in dark and light, photoresponse and power output. I-V curves show that the thin films photoelectrodes are n-type semiconductors. The power output curves show that the power conversion efficiency of electrode and dye sensitised electrode (dye- chlorophyll, deposition time- 6 hours) increases from 1.9 to 2.4 with the enhancement of short circuit current (I_{sc}) from 5.5 mA to 6.6 mA at constant open circuit voltage (V_{oc}) 0.27 V. Structural analysis has been performed by PXRD (powder x-ray diffraction) technique. The PXRD results show that the Ni-Cd-S thin films formed is nano-crystals of size ~11.12 nm. Scanning electron microscope (SEM) technique has also been performed to study the surface morphology of the fabricated films. SEM micrograms establish the polycrystalline nature of synthesised Ni-Cd-S thin films. The EDAX (energy diffraction analysis of x-ray) results demonstrate the presence of Ni, Cd and S in the thin films.

Oral Presentation-24

Kinetic and Thermodynamic Study for the Co-pyrolysis of Beeswax and Plastic Wastes

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Abstract: Continuous growth of industrialization as well as human population has increased the energy demands all over the world and this has caused in a number of energy related challenges including depletion of fossil fuels and environmental pollution. In order to overcome these problems, bio-oil is chosen as a substitute for the fossil fuel. This study reports the co-pyrolysis of beeswax and five different plastics such as high density polythene (HDPE), polypropylene (PP), polymethyl methacrylate (PMMA), polystyrene (PS) and polyethylene terephthalate (PET) with the aim to understand the effect of beeswax on the thermal degradation kinetics of the plastics using thermogravimetric analysis. TGA-DTG curve shows single stage degradation pattern of all the samples and there is change of degradation temperature of plastics due to the addition of beeswax in the co-pyrolysis experiments. Addition of beeswax to plastics is found to decrease the activation energy of the reaction, which is more pronounced in PET and PS. Thermodynamic parameters of the thermal degradation of plastics are also found decreased due to the blending of beeswax. The enthalpy value in plastic-beeswax blend is found lower than that of from respective waste plastics. For all blend samples, the maximum conversion at the peak temperatures ranged

between 661.22 and 762.11 K. The peak temperature of blend is less than that of the peak temperature of plastics. Gibbs free energies ranged between 2.011 $\times 10^5$ and 1.722 $\times 10^5$ J/mol for plastic and 2.041 $\times 10^5$ to 1.791 $\times 10^5$ J/mol for the blend. The Gibbs free energy of the plastic was close to the values of the plastic samples due to the low entropy at the maximum differential mass conversion.

Keywords- Co-pyrolysis, beeswax, plastic wastes, thermal degradation

Oral Presentation-25

Removal of Cationic Dye by using Polyaniline/Maleic Acid Composite

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Abstract: Rapid industrialization and the advent of modern technology in developing countries are the major causes of water pollution. Dyes present in the industrial effluents are stable towards light and difficult to degrade. Though several techniques are well documented for removal of dyes, adsorption is considered as a most effective technique due to its cost effectiveness and efficiency. Considerable efforts are now being made in the research and development of polymeric materials and its derivatives as basic materials for adsorption because of their simple processing, relatively easy regeneration, the possibility to shape them into most suitable form and cost effective than conventional adsorbents. In this work, a simple ecofriendly approach by using water as solvent and ammonium persulfate (APS) as an oxidant was used for the synthesis of PANI-maleic acid (PANI/MA) composites and utilized as an adsorbent for the removal of cationic dyes such as Methylene Blue (MB) from water medium. It is found that the composite selectively adsorbs cationic dye (MB) and does not adsorb anionic dye like Methyl orange (MO) (Figure-1).The prepared composites were characterized by scanning electron microscopy (SEM), transmission electron microscopy (TEM), Nuclear magnetic resonance (NMR) and Fourier transform infrared (FTIR) spectroscopy. The adsorption parameters like pH, temperature, adsorbent dosage, dye concentration along with kinetics and thermodynamic parameters (ΔG^o, ΔH^o, ΔS^o)are evaluated for the potential application in the real field.

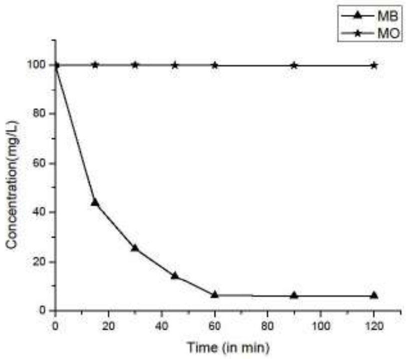

Figure 1:*Concentration Profile of Cationic and Anionic Dyes in Presence of PANI-MA.*

Poster Presentations

Poster Presentation-01

Study of Metals Characterization of *Andrographis Paniculata* Plant of Khordha Region, Odisha, India

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Abstract: Today plant materials represent a substantial proportion of the global drug market today. More often plant based medicines are derived from many kinds of plant leaves, stems and roots are taken by rural and urban people without knowing its toxicity effects despite of having therapeutic significance. According to a recent estimate of WHO, 80% of the world population relies on traditional or herbal medicines for their primary health. One such herbal plant is *Andrographis Paniculata*(Bhuin Nimb in Odia).This study represents characterization of different metals present in *A. Paniculata*. The plant samples were collected from urban and rural areas of Khordha region. The solid powdered sample from different parts of the plant were taken for XRF to know the presence of different metals qualitatively. Then these samples were taken for ashing and followed by acid digestion using (Aqua regia). Then the solutions were analyzed using ICP-OES (Pb, Cr, Mn, Co, Zn, Cu, Cr, V, Na, Ca and Mg), FES (Na & K) respectively. Details data are given project thesis. All the data provides a clear description about the metal and mineral contents in the plant parts qualitatively and quantitatively as well.It has been found that leaves of the plants of both the region are rich in Fe, Mg, Ca, K, Mn etc. But Pb, Cr, Co, Pd, V exist but in low concentration which have negligible impact on the medicinal characters of the plant. Further study on structural characterization (FESEM) is under process.

Keywords:*Andrographis Paniculata*, Acid digestion, heavy metals, AAS, ICP-OES

Poster Presentation-02

Effect of Nanosilver decorated functionalised Single-Walled Carbon Nanotube Hybrid Nanofiller based Polyaniline Nanocomposite on the Thermal and Dielectric Properties

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Abstract: The present study reveals the synthesis of silver nanoparticles (AgNPs) decorated functionalised single walled carbon nanotubes (*f*-SWNTs) based polyaniline (PANI) matrix, carried out through *in situ* polymerization process to study the thermal and dielectric properties. The nanostructured morphology and chemical interaction of the synthesized nanocomposites are investigated by using ultraviolet-visible (UV-Vis), X-ray diffraction (XRD), and Fourier-transform infrared (FTIR) spectroscopic techniques. The hydrodynamic diameter and particle size distribution of the nanocomposites in the solution medium is studied through dynamic light scattering (DLS) method. The morphological characterization of the nanocomposites are carried out by scanning electron microscopy (SEM) and Transmission electron microscopy. The thermal and dielectric properties of the nanocomposites are investigated by employing thermogravimetry-differential scanning calorimetry (TG-DSC) and dielectric relaxation spectroscopy (DRS). The main objective of the research work is to decorate the AgNPs on the surface of the *f*-SWNTs to fabricate hybrid nanofiller and the synthesized Ag@*f*-SWNT hybrid nanofillers are dispersed within the PANI matrix to enhance the overall materials properties of the nanocomposites.

Keywords: Silver Nanoparticles; Single-walled Carbon Nanotube;Polyaniline; Nanocomposites; Thermal and Dielectric Properties

Poster Presentation-03

Synthesis, Characterization, Thermal Study, Antimicrobial and Antioxidant Study of Some Pyrazole Derivatives with and without Inclusion Complex Formation with Β-Cyclodextrin

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Abstract: Pyrazole and their derivatives are regarded as versatile pharmacophore moieties. But poor solubility in polar medium may be a limiting factor reducing their pharmacological activity. In order to increase solubility and bio-accessibility, the inclusion complexes of the compounds have been synthesized with β-cyclodextrin by co-precipitation method. The formation of inclusion complexes have been ascertained by changes in melting point and spectral data (UV, IR, NMR, XRD etc). The determination of thermodynamic parameters like ΔH, ΔG and ΔS suggest that the inclusion complexes have appreciable stability and their formation is thermodynamically allowed. The study of the antibacterial and antioxidant activities of the compounds and their inclusion complexes concludes that inclusion formation increases antibacterial and antioxidant activities significantly.

Poster Presentation-04

Water Pollution: A Great Concern in Chilika Lake, Odisha, India

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Abstract: Chilika lake is that the largest coastal lake in India and also the second largest salt water lake within the world.The lake has rocks and stratum drainage area, a transitory atmosphere and water character. Chilika water is contaminated due to discharge of effluents from industrial units, fishponds, constant discharge of untreated water into the lake from drains, significant metals pollution in coastal lagoons, significant inflow of waste matter, domestic and agricultural waste that consists of variable risky chemical and inflicting hurtful effects on fish and different aquatic-organism. The physico-chemical parameters like pH, chloride, nitrate, phosphate,silicate,DO,BOD and COD from water samples were studied.The water is alkaline and pH starting from 7.1 – 9.6.Higher pH was due to the decomposition of submerged weeds.Highest pH scale and TDS at some places was thanks to evaporation,complex mix of fresh discharge,wind condition and periodic event influx of ocean water.The DO values were between 3.3–18.9mg/l.The vary of phosphate: 0 – 0.4 ppm, nitrate: 10–60 ppm and silicate:1–8 ppm were high within the north and northwest a part of the lake wherever most of the rivers discharge into the lake with giant amounts of mud or clay and nutrients.COD was terribly less thanks to absence of organic pollution.Chloride content of lake water ranged from 19.86g/l in ocean mouth space in summer to minimum 2.87g/l.To revive the lake, Chilika Development Authority (CDA) is established in 1991 by the Odisha government. Gap of natural new mouth helped to rise to salinity throughout the lake, disintegrate the weeds, and flush out the sediment load from lake increase the multifariousness and ecology.Detailed study is required to safeguard the lake scheme, migratory and home ground improvement of birds,preparation of atmosphere standing report,establishment of education centre for the lake,control of silt load of streams and rivers, property development of fisheries and aquacultures and desiltation.

Keywords: Fishponds, Physico-chemical parameters,DO,BOD,COD, CDA

Poster Presentation-06

Impact of Inclusion Complex of Ibuprofen with β-CD:A Brief Study

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Abstract: Ibuprofen is an anti-inflamatory drug used in many medical complications. However, poor solubility in polar medium may be a limiting factor reducing their pharmacological activity. In order to increase solubility and bio-accessibility, the inclusion complexes of the compounds have been synthesized with β-cyclodextrin by co-precipitation method. The formation of inclusion complexes have been ascertained by changes in melting point and spectral data (UV, IR, NMR, XRD etc.). The formation of inclusion complex reduces the side effects of the drug. The determination of thermodynamic parameters like ΔH, ΔG and ΔS suggest that the inclusion complexes have appreciable stability and their formation is thermodynamically allowed.

Poster Presentation-06

Synthesis and Characterization of highly Active and Selective, Mononuclear Cobalt(II)-salen Complex as Efficient Catalyst for the Formation of Cyclic Carbonates by Fixation of Carbon Dioxide

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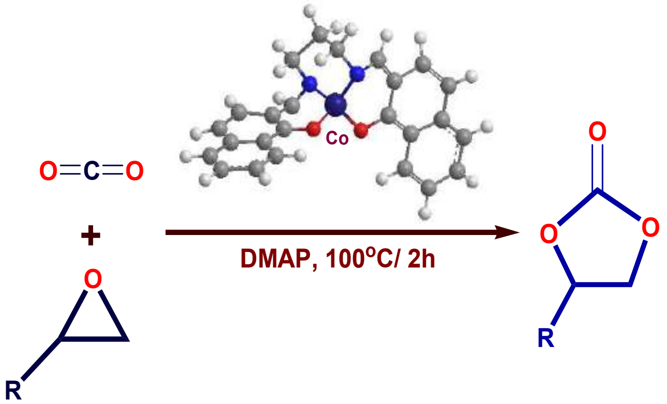
Abstract: In this novel, A new efficient mononuclear cobalt(II)-salen complex has been developed successfully by the reaction of [-ONNO-] tetra dentate Schiff base ligand, i.e., N,N′-bis(2-hydroxy-1-naphthaldehyde)-1,3-diaminopropane with anhydrous cobalt(II)chloride salt in ethanol solvent under N_2 atmosphere with optimum reaction condition. The ligand and its complex have been characterized by NMR, FTIR, UV-Visible, elemental analysis, Vibrating sample magnetometer (VSM) and melting point (incorrect). The complex has a square planar coordination geometry, as determined by X-ray diffraction studies. The synthesized Co(II) complex as a catalyst with DMAP as a co-catalyst were found to play an important role in enhancing the catalytic activity for the formation of cyclic organic carbonate from carbon dioxide and liquid epoxides which served as both reactant and solvent. Cyclic carbonates are used as a polar aprotic solvent, electrolyte in lithium secondary batteries, precursors for the formation of polycarbonates, and intermediates in the production of pharmaceuticals and fine chemicals.

References

1. H.C. Pradhan, S. Mantri, A. Routaray, T. Maharana, A.K. Sutar, *J. Chem. Sci.* (**2019**) accepted.
2. Z. Tasci, M. Ulusoy, *J. Organomet. Chem.*, 713 (**2012**) 104–111.

Graphical Abstract



Poster Presentation-07

Water in Cuttack Statistical Evaluation with Study of WQI of Different Parameters of Taladanda Canal and Paradeep City, Odisha, India

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Abstract: The precious natural resource is water. Canal is an artificial constructed channel; carry water from source (River/Reservoir) to fields.*"Life is the matrix of water. Within water life is originated, thriving and also it's medium and solvent."*The longest canal in Odisha is Taladanda canal. The canal was designed to provide irrigation, recreation and navigation and finally mixed with Bay of Bengal at Paradeep town. The total length of the canal is 82.3 km.The canal is contaminated by different polluting sources at its off taking locations. The water has become unfit for human consumption. Realising the importance of this problem the aims of our study is to determine the present pollution load of the canal with different physico-chemical parameters and based on the finding suitable models for prediction of the pollution behaviour at different locations of canal and its remedial measures.

Keywords: Canal water, WHO, Drinking water, Water quality.

Figure 1: *Talanda Canal Water.*

Figure 2: *At Laboratory.*

Poster Presentation-08

A Simple Synthesis of Ketone from Carboxylic Acid using Tosyl Chloride as an Activator

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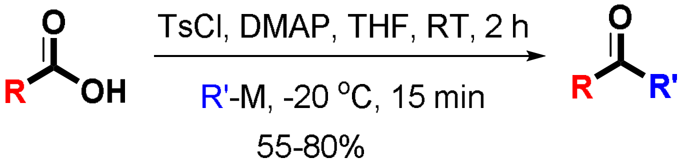
Abstract: An effective process for the conversion of carboxylic acid to ketone has been discovered. In this process, carboxylic acid has been activated using p-toluene sulphonyl group. Under the optimized condition, aromatic, aliphatic heteroaromatic carboxylic acids have been proved to be good substrates for this methodology. The byproduct of this reaction can be removed very easily during work up process. In addition, one equivalent of organometallic reagent is sufficient to complete this transformation. The key advantage of this process is the ketone has been accessed from acid using one equivalent of organometallic reagent.



R = Aromatic, aliphatic; R'= Me, *n*-Bu; M = Li, Mg

Figure 1: *Scheme for Synthesis of Ketone.*

Reference

1. D. Sahoo, S. Sarkar, S. Jana, *Tetrahedron Lett.*, **2019,**60,151084.

Poster Presentation-09

Single Walled Carbon Nanotubes

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Abstract: The different variations used for the production of SWNTs with the laser ablation process are briefly presented in this article. An attempt is made to point out the major differences and similarities of methods used by several researchers. Possible growth mechanisms for pulsed and CW laser excitations are presented. Several questions still remain about the role of small and large carbon clusters, the mechanism and growth of catalyst clusters, the dynamics of carbon–metal interactions including diffusion and surface adsorption, and finally how, when, and where the SWNT growth stops. It is hoped that additional work in the near future will provide answers to these questions and will help the community develop methods to improve SWNT production. This may enable choosing

parameters for large-scale production and controlling growth of SWNTs of a particular chirality and diameter.

Poster Presentation-10

What the Mutation Actually Does on Proteins:Loss or Gain of Function?

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Abstract: Regardless of advances in *in-vivo ,in-vitro and in-silico* studies, impact of the mutations on the protein structure remains an immense challenge.Recently, the computational programming particularly molecular dynamics based on Newton's equation and docking process are used to predict the structural and dynamical properties of small molecules has become an important component in the drug discovery process[1-13]. Molecular docking study has been carried out to study the molecular interaction between mutant and wild type models of the Podocin protein with biological active compounds of *Boerhaavia diffusa* plant extracts. Both boeravinone B and F are having higher binding energy as compared to others in mutant protein. Furthermore, molecular dynamics simulation study was carried out for both the wild type and mutant model and revealed that, flexibility nature decreases in the mutant protein[14].From the molecular docking study, it was found that, due to mutation the binding energy was decreased for aegeline, berberine diterpenoid and roseoside with mutant of PLCE1protein at S1484L compared to wild type. These dynamical behavior results of wild type protein show similar behavior with mutant protein [15].Several strategies are being needed to address this issue in future.

References

1. S.K. Pattanayak, S.Chowdhuri, *J. Phys. Chem. B*, 115 (**2011**) 13241-13252.
2. S.K. Pattanayak, N. Prashar, S. Chowdhuri, *J. Chem. Phys.*, 134 (**2011**) 154506.
3. S.K. Pattanayak, S.Chowdhuri, *J. Mol. Liq.*, 172 (**2012**) 102-109.
4. S.K. Pattanayak, S.Chowdhuri, *J. Theor. Comput. Chem.*, 11 (**2012**) 361-377.
5. S.K. Pattanayak, S.Chowdhuri, *Mol. Phys.*, 111 (**2013**) 3297-3310.
6. S.K. Pattanayak, S.Chowdhuri, *J. Mol. Liq.*, 186 (**2013**) 98-105.
7. S.Chowdhuri, S.K. Pattanayak, *J. Mol. Liq.*, 180 (**2013**) 172-178.
8. S.K. Pattanayak, P. Chettiyankandy, S. Chowdhuri, *Mol. Phys.*, 112 (**2014**)2906-2919.
9. S.K. Pattanayak, S. Chowdhuri, *J. Mol. Liq.*, 194 (**2014**) 141-148.
10. A.Chand,P.Chettiyankandy,S.K. Pattanayak,S.Chowdhuri, *J. Mol. Liq.*, 225 (**2017**)926-935.
11. S.N.Sahu, M.Moharana,R.Sahu,S.K. Pattanayak,*AIP Conf. Pro.*,2142, 060001 (**2019**).
12. J. Panda, J.K. Sahoo, P.K.Panda, S.N.Sahu, M.Samal,S.K.Pattanayak,R.Sahu,*J. Mol. Liq.*, 278 (**2019**) 536-545.
13. S.Sahu, M.Moharana, S.Martha, A.Bissoyi, P.K.Maharana, S.K.Pattanayak, *Acad. Press*, **2019**.
14. S.N. Sahu, M. Moharana, R.Sahu, S.K. Pattanayak, *J. Mol.Liq.*, 281 **(2019)** 549-562.
15. S.N.Sahu, S.K. Pattanayak, *J.Mol.Struct.*, 1198 (**2019**)126936.

Poster Presentation-11

Photo Catalytic Applications of doped g-C_3N_4towards Energy and Environment

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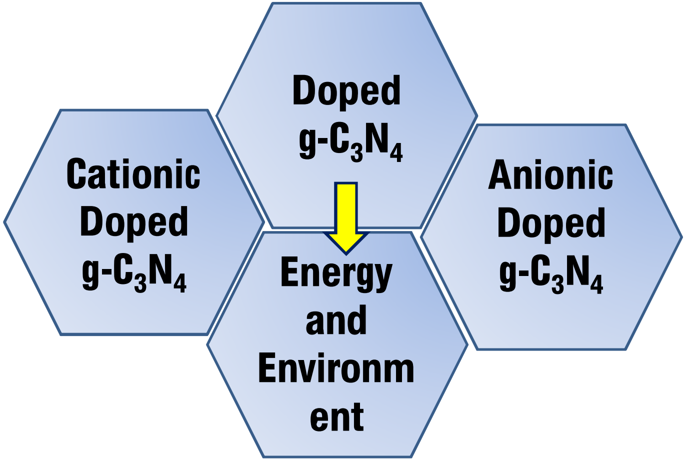
Abstract: In the last few years, tremendous theoretical as well as experimental efforts have been made to understand the characteristic properties of graphitic-C_3N_4, an organo-polymeric semiconducting material. However, owing to its low-dimensionality and quantum confinement effect various modifications including doping, defecting and forming heterojunction/composites etc. are proposed to extend its potential applications. Among all, band gap engineering through elemental doping is reported as an effective strategy to tune its optical as well as electronic properties. "Structural doping" has been attracted researcher's attention since long and supposed to be the best method to enhance the photocatalytic ability. Doping significantly introduces impurity levels in the band gap, broadens the light absorption and increases the electron-hole separation efficiency. In case of anionic doping, the dopants either through substitutional or interstitial doping, modulate the textural as well as electronic structure. Whereas, in case of cationic dopants, orbital hybridization may also occur among the dopant's orbital and molecular orbital of g-C_3N_4, leading to tunable VB and CB potentials. Incorporation of non-metallic/metallic dopants play an exceptional role to enhance light absorption and change the band edge potentials to carry out targeted photo catalytic redox reactions to carry out pollutant remediation and hydrogen energy generation. Doped g-C_3N_4 photo catalytic systems can pave a novel avenue towards visible-light driven photocatalysis.



Poster Presentation-12

Synthesis of $CuSbS_2$ Nanoplates and $CuSbS_2$-Cu_3SbS_4 Nanocomposite: Effect of Sulfur Source on Different Phase Formation

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Abstract: In the recent decades, Cu-Sb-S ternary nanomaterials have been attractive for their wide potential and technological applications in solar cell as well as in supercapacitors. In particular, Cu-Sb-S nanomaterials exhibit exclusive optical properties such as unique band gap, p-type conduction and high absorption co-efficient. Moreover, the components Cu, Sb and S are earth abundant, low/nontoxic and economic. In the present work, we developed a facile approach for synthesis of $CuSbS_2$ nanoplates and $CuSbS_2$-Cu_3SbS_4 nanocomposite using hot injection method with varying sulfur precursors. The role of solvent, sulfur precursor and reaction temperature has been investigated. As prepared nanomaterials were characterized by PXRD, UV-Vis, XPS, TEM, FESEM, etc. Further, the Electro chemical measurements were thoroughly studied for supercapacitor applications.

References

1. X. Qiu, S. Ji, C. Chen, G. Liu, C. Ye, *CrystEngComm*, **2013**, 15, 10431.
2. S. Suehiro, K. Horita, M. Yuasa, T. Tanaka, K. Fujita, Y. Ishiwata, K. Shimanoe, T. Kida, *Inorg. Chem.*, **2015**, 54, 7840–7845.

Poster Presentation-13

Preparation and Study of Antimicrobial Properties of Chitosan/Cu-Al LDH/Ag Bio-nanocomposites

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Abstract: Biopolymer based nanocomposites (bio-nanocomposites) are an emerging class composites, which are formed by the combination of a polymer and an inorganic or organic nanoparticle. Chitosan is among one of the most important and most studied natural polymers. The present work deals with the application of a relatively new class of hybrid filler such as Cu-Al LDH/Ag, for synthesizing polymer based bio-nanocomposites. The CS/Cu-Al LDH/Ag bio-nanocomposite materials were synthesized by a simple and environmentally friendly *in situ* polymerization technique. The CS/Cu-Al LDH/Ag bio-nanocomposites were characterized using Field emission scanning electron microscopy (FESEM), High-resolution transmission electron microscopy (HRTEM), X-ray diffraction (XRD), and Fourier-transform infrared spectroscopy (FTIR). The antibacterial activity the bio-nanocomposites film against pathogenic bacteria viz. *Escherichia coli, Staphylococcus aureus* and *Bacillus subtilis* was measured by agar diffusion method. The XRD pattern indicated the presence of Cu-Al LDH, silver and chitosan in the bio-nanocomposites. The spherical morphology of silver nanoparticles was confirmed from the FESEM and the HRTEM images. FTIR spectroscopy was used for the structural elucidation. It is observed that CS/Cu-Al LDH/Ag bio-nanocomposites film exhibits good antimicrobial and antitumor properties.

Keywords: Chitosan, nano silver, bio-nanocomposites, morphology, antimicrobial activity

Poster Presentation-14

Probing the Conformations of Intrinsically Disordered Protein Utilizing Fluorescence Spectroscopy

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Abstract: The intrinsically disordered proteins (IDPs) belong to an important class of proteins due to their higher structural flexibility and diverse functions. IDPs lack stable three-dimensional structure and exist as structural ensemble in solution. Furthermore, IDPs have been found to be associated with various neurodegenerative diseases like Alzheimer's, Parkinson's, diabetes and spinocerebellar ataxia. Several spectroscopic techniques are being employed to predict the structure of IDPs as the X-ray crystallography is immensely challenging due to their structural dynamism. κ-Casein, an important milk protein containing net negative charge, belongs to the class of IDPs. κ-Casein has been found to assume different structural conformations at various pH and surfactant concentrations. In this work, we have utilized quenching efficiency of ionic liquid (1-butyl-3-methylimidazolium bromide) and energy transfer efficiency between tryptophan and 1,6-Diphenyl-1,3,5-hexatriene (DPH) to evaluate the conformation of κ-casein at various pH and cetyltrimethylammonium bromide (CTAB) concentrations. Our results validated the applicability of above-mentioned methods to determine the polarity of tryptophan environment in κ-casein at different conditions, where κ-casein assumes diverse structural conformations. The present work opens up the possibility to employ quenching properties of ionic liquid in conjunction with energy transfer efficiency between tryptophan and DPH for the elucidation of protein conformation.

Poster Presentation-15

Interaction of Eugenol with α- and β- cyclodextrins: Implication in Drug Delivery

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Abstract: Eugenol, a natural compound available in clove, serves as an analgesic, anti-inflammatory, antiviral, antifungal, antiseptic and a local anesthetic that is widely used in the pharmaceutical world. The major challenge with eugenol is its lower cellular partitioning and that has been improved significantly by utilizing macromolecular carriers. In this work, we have evaluated the partitioning efficiencies of eugenol with α- and β- cyclodextrins using steady state and time resolved fluorescence methodologies in tandem with molecular docking to find out a better carrier for eugenol to overcome its lower partition coefficient in biological systems. Our experimental results suggest that eugenol has relatively higher affinity toward β-CD compared to α-CD. The relatively higher partition coefficient leads to preferential binding of eugenol in β-CD, which was evident from fluorescence lifetime measurements in a competitive experiment. However, the molecular docking results indicate that the α-CD-eugenol inclusion complex is more stable compared to the β-CD counterpart. This could be due to the molecular docking experiment in vacuum, which ignores the interaction of eugenol and/or cyclodextrins with water. Taken together, our results demonstrate that eugenol is having adequate affinity toward α- and β-CD and CD-Eugenol inclusion complexes could be used for delivering eugenol in biological system.

Poster Presentation-16

Construction of Fluorophoric Thiazolo-[2,3-b]quinazolinone Derivatives: A Multicomponent Domino Synthetic Approach

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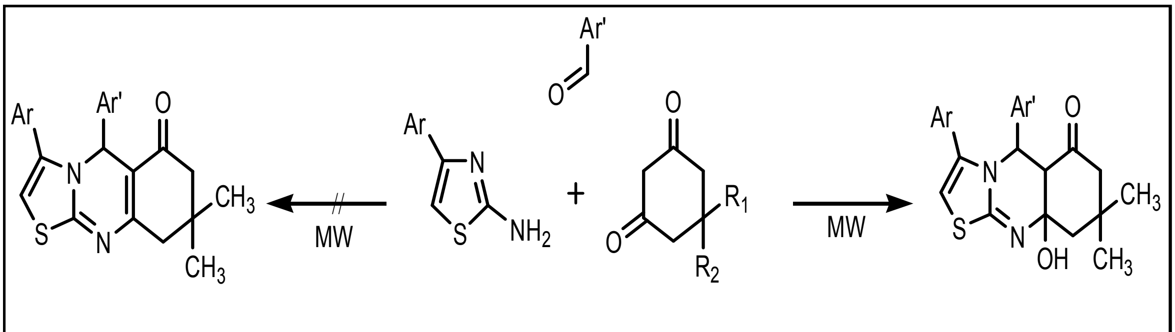
Abstract: Fusion of biodynamic heterosystems for designing new molecular framework has pivotal importance in the process of drug discovery. Thiazole serves as a privileged scaffold in many natural and synthetic medicinal compounds. Conversely, quinazolinones have interesting structural architecture, which contribute to develop the medicinally relevant products along with the fluorescence properties. Assembling such vital nuclei make them intriguing scaffold not only in pharmacology, but also in photochemistry. Benzothiazolo[2,3-b]quinazolinone scaffolds exhibit assorted biological and pharmaceutical properties such as cytotoxicity against HL-60, inhibitory activities towards EGFR, anti-bacterial, antiviral, antitumor activities, electrochemical sensors for glutathione, amoxicillin or L-cysteine and

photo-antiproliferative activity.As, the syntheses of diverse heterocycles are important in all facets of chemistry, we herein, developed a one-pot domino reaction of substituted 2-amino thiazole, benzaldehyde and cyclic diketone for the synthesis of novel thiazolo[2,3-b]quinazolinone possessing angular –OH group (Scheme 1). The unique structural arrangement is found to be potential fluorophore which gave us an inducement to synthesize a library of such type of fluorescence molecules with various substituents. All the newly synthesized compounds were elucidated on the basis of elemental and spectral (NMR and Mass) analysis and their fluorophoric properties were explored with respect to various substituents.



Ar = C_6H_5, 4-$OCH_3C_6H_4$, 4-ClC_6H_4, 4-BrC_6H_4, 4-OHC_6H_4
Ar' = C_6H_5, 4-$OCH_3C_6H_4$, 4-$CH_3C_6H_4$, 4-ClC_6H_4, 4-BrC_6H_4,
4-OHC_6H_4, 4-$N(CH_3)_2C_6H_4$, 4-$NO_2C_6H_4$
R_1=R_2= CH_3, H

Scheme 1

Poster Presentation-17

Science of Materials Components, Composition, and Configuration

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Abstract: Materials are made up of chemical elements. Smartness of materials depends on its components, composition and configuration, which can be explained with the help of masterpiece of arrangement of chemical elements the Mendeleev's Periodic table. In the 150th birth anniversary of table precursors, co-cursors and rein forcers of the table will be dealt in the present talk. Story of two and a half millennium starting from Democritus (500BC) to the present day Pekka Pykko(2019) will be narrated in a lively style so as to attract experts and curious laymen alike. The notable amongst those starts from Dobereiner, Gladstone, Cooke, Odling, Lenssen, Boyle, Priestley, Davy, Faraday, Gmelin, de Chancourtois, Lother

Meyer,Newland, Ramsay, Rayleigh, Thomson, Rutherford, Moseley, Bohr, Summerfield, Segre, Frankland, Lockeyer, Travers, Owen, Nilson, Del Rio, Vauquelin, Brandt, Stromeyer, Gadolin, Ekeberg, Wollaston, Mosander, de Broglie, Schrodinger, Planck, Heisenberg, Seaborg, Ghiorso, Oganessian, Flerov, Penzias, Wilson, Peebles, Goodenogh, Poliakoff and Eric Scerri.The most smart material of the present millennium is Graphene, a 2D material whose use as a superconductor by adjusting quantum band gap and magic twist angle in bilayer Graphene is occupying the frontline in material science research.

Poster Presentation-18

Cholesterol Alters the Inhibitory Efficiency of Peptide-based Membrane Fusion Inhibitor

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Abstract: Membrane fusion is one of the most important events in the entry of enveloped viruses in the host cell. The membrane composition modulates membrane fusion by altering membrane physical properties as well as the structure, organization and dynamics of fusion proteins and peptides. The journey of developing peptide-based inhibitors for viral fusion is often stalled by the change in lipid composition of the viral and target membranes. This makes it important to study the role of membrane composition on the organization, dynamics and fusion inhibiting abilities of the peptide-based fusion inhibitors. Cholesterol, an important constituent of mammalian cell membrane, modulates bilayer properties in multiple ways and impart its effect on the membrane fusion. We have previously shown that TG-23 peptide derived from coronin 1, a phagosomal coat protein, show significant inhibition of fusion between membranes without cholesterol. In this work, we have studied the effect of the TG-23 peptide on the polyethylene glycol-mediated membrane fusion in presence of different concentrations of membrane cholesterol. Our results show that the inhibitory effect of peptides is being completely reversed in the membrane containing cholesterol. We have measured the effect of these peptides on the depth-dependent membrane properties, organization and dynamics of the peptides to elucidate the composition-dependent fusion efficacy of the peptides. Our results demonstrate that cholesterol alters the membrane organization and dynamics of TG-23 peptide and thereby manifest differential efficacies on membrane fusion. Therefore, we envisage that the study of peptide organization and dynamics is extremely important to determine the effect of peptide on the membrane fusion.

Poster Presentation-19

Fluorescence Spectroscopic Study on Interaction of Anticancer Drug Molecule Doxorubicin and Pluronics

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Abstract: The study on drug release in a precisely controlled and active way is highly demanding and challenging for tumor precision therapy. Techniques to improve the accumulation of therapeutic agents in tumors, which subsequently enhance the therapeutic efficacy of anticancer drugs against malignant tumors and reduce their side effects remains a great challenge. Doxorubicin is one of the most powerful anticancer drug molecule known for its sustained and target delivery to tumor cell, although its clinical use is impaired by severe undesired side effects.[1]Use of amphiphilic copolymers such as pluronics is being studied widely for the formulation of doxorubicin.[2,3] In this fundamental work, the interaction of doxorubicin with the pluronics F127 and P123 has been studied extensively using steady state and time dependent fluorescence measurements at different pluronics concentrations and temperatures.It has been observed that, doxorubicin is experiencing change in its microenvironment on increasing temperature and concentration of pluronics. From the quenching experiment, it was found to locate itself near the hydrophobic-hydrophilic interfacial region of the pluronics network. Quenching in the fluorescence intensity of doxorubicin could be due to collisional quenching and transient effects at the concentration of the drug used.The particle size study shows that the D_h of copolymer F127 is larger than that of P123. This may provide more information on encapsulation of the drug molecule.

References

1. Carvalho, C., Santos, R. X., Cardoso, S., Correia, S., Oliveira, P. J., Santos, M. S., and Moreira, P. I., *Curr. Med. Chem.*, **2009**, *16*(25), 3267-3285.
2. Cambón, A., Rey-Rico, A., Mistry, D., Brea, J., Loza, M. I., Attwood, D., and Mosquera, V., *Int. J. Pharm.*, **2013**, *445*(1-2), 47-57.
3. Tasca, E., Del Giudice, A., Galantini, L., Schillén, K., Giuliani, A. M., and Giustini, M., *J. Colloid Interf. Sci.*, **2019**, *540*, 593-601.

Poster Presentation-20

Impact of Size and Charge of the Flavin Mediators on Reductive Iron Mobilization from *Mycobacterial* Ferritin

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Abstract: Nature uses flavin, both in its free and protein-bound form as electron relay molecule (mediator) for various oxidation and oxygenation reactions. As reported earlier, the reductive iron mobilization from ferritin nanocage largely depends upon the reduction

potential of electron transfer mediators. However, the current work utilizes three flavin analogues (Riboflavin, FMN, and FAD), which differ in size and charge but have similar redox potentials, to mediate electron transfer from NADH to the ferritin mineral core. Of these, the smallest/neutral analogue, riboflavin, exhibited the fastest kinetics of NADH oxidation, dissolved O_2 consumption and released higher amount of iron than the larger and negatively charged FMN and FAD. The presence of O_2 under normoxic conditions marred the process of ferritin iron mobilization by oxidizing the reduced form of flavins, resulting in initial lag phase, which further, gets inhibited in the presence of superoxide dismutase ($O_2^{\cdot-}$ scavenger) indicating the generation of $O_2^{\cdot-}$ *in situ*. Overall, the flavin mediated reductive iron mobilization occurs via two competitive pathways (Fig.1). One, the formation of reduced form of mediator which participates in long range electron transfer to facilitate iron release and second, the generation of $O_2^{\cdot-}$, which acts as an intermediate to assist the reduction of iron mineral core and its release.

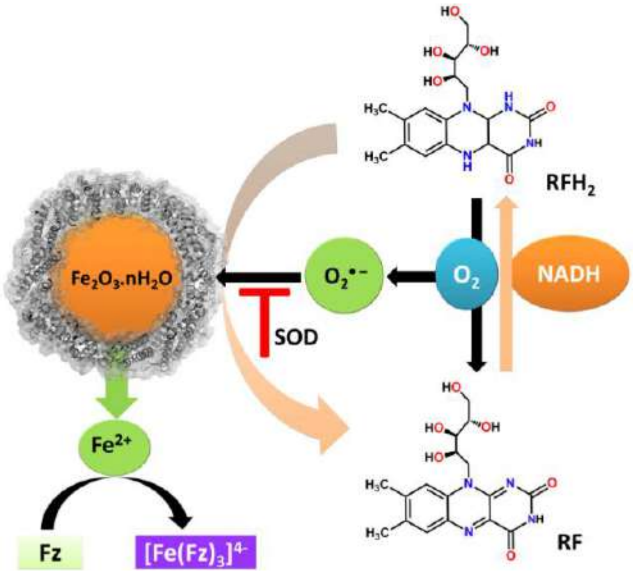

Fig.1. Competitive pathways of Flavin mediated reductive iron release from ferritin nanocage

Poster Presentation-21

Reusable Pd-Catalyzed Oxidative Coupling between Amides with Olefins towards Stereoselectve Synthesis of Z-enamides

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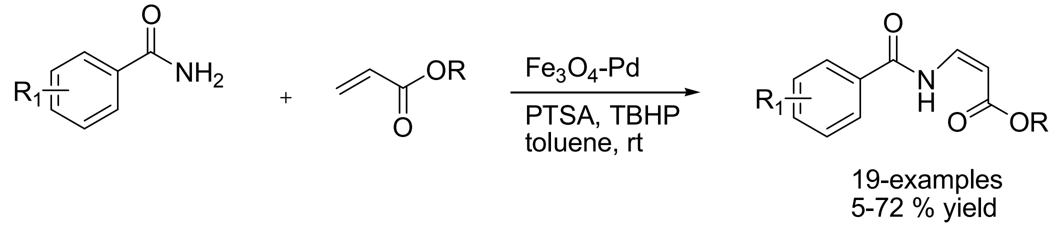
Abstract: Over the past few years, transition□metal□catalyzed oxidative coupling reactions have received much attention due to their being atom□ and step□economic approaches for the preparation of complex molecules.[1] In oxidative coupling reactions, two C—H and heteroatom—H bonds are directly coupled to form C—C and C- heteroatom bonds in the

presence of oxidant and transition metal catalyst.[2] Here in we described a convenient method for the synthesis of palladium decorted ferrite nanoparticles (Fe_3O_4□Pd). The catalytic application of the Fe_3O4□ Pd nanoparticles was explored for the first time in oxidative coupling between amides and olefins. p□Toluenesulfonic acid plays a significant role in the oxidative amidation reaction. The reaction proceeds at room temperature, resulting in stereoselective synthesis of (Z)□enamides under ambient air in the absence of co□catalyst and ligand.[3] The superparamagnetic nature of Fe_3O_4□Pd facilitates easy, quantitative recovery of the catalyst from a reaction mixture, and it can be reused for up to three consecutive cycles with a slight decrease in catalytic activity.



References

1. (a) C. Liu, J. Yuan, M. Gao, S. Tang, W. Li, R. Shi, A. Lei, *Chem. Rev.*, 2015, 115, 12138. (b) H. Alamgholiloo, S. Rostamnia, A. Hassankhani, J. Khalafy, M. M. Baradarani, G. Mahmoudi, X. Liu, *Appl. Organometal. Chem.*,**2018**, *32*, e4539.
2. (a)P. Xi, F. Yang, S. Qin, D. Zhao, J. Lan, G. Gao, C. Hu, J. You, *J. Am. Chem. Soc.*, 2010, 132, 1822. (b)T. W. Lyons, K. L. Hull, M. S. Sanford, *J. Am. Chem. Soc.*,**2011**, *133*, 4455.
3. C. K. Pal, S. Sahu, R.K. Sahu, R. K Singh, A. K. Jena, *Appl. Organometal. Chem.*,**2019**, *33*, e4985.

Poster Presentation-22

A Defect Study in TiO_2-rGO-ZnS Composite for Photocatalytic Applications

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Abstract: Developing an efficient photocatalyst for environmental remediation from solar energy is a challenge. Defect engineering although offers a strategical promise to enhance the photocatalytic performance. In the current work, a comprehensive study on defects in TiO_2-rGO-ZnS compositewas done. The composites were synthesized by one pot solvothermal method. The content of graphene was varied to study its effect on the defect sites in the

composites. Characterization techniques such as FTIR, SSA, XPS, ESR and PL were employed to characterize the composites. The photocatalytic performance was studied by conducting degradation of methylene blue (MB) under solar radiation. Graphene acted as an effective electron sink as understood from luminescence spectra. The superior activity of TiO_2-ZnS-rGO is attributed to low bandgap and rapid separation of photo-excited charge carriers. This work may assist to explore the fundamental role of defects in the photocatalytic processes and improve the selectivity in heterogeneous catalysis.

Poster Presentation-23

Synthesis, Characterization and Thermal Property of $Cu_3(PO_4)_2\cdot 2H_2O\cdot Na_3PO_4\cdot NaHSO_4\cdot H_2O$

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Abstract: The phosphate compounds of copper and sodium along with sodium hydrogen sulfate monohydrate mixture has been synthesized and characterized with different measurement techniques such as Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA) and Differential Thermal Analysis (DTA), Fourier Transform Infrared (FT-IR) Spectrometry, C-H-N-S elemental analyzer, Inductively Coupled Plasma -Atomic Emission Spectrometry (ICP-AES), Ultraviolet–Visible and near Infrared (UV–Vis-NIR) Absorption Spectrophotometry and X-ray Powder Diffraction (XRD). The thermal property of this mixture has been studied up to 573 K from 173 K in different thermal cycles with DSC. The specific heat capacity of this mixture has been measured in atmospheric O_2 at a rate of 10 K min^{-1} in all cycles. The net specific heat capacity of this mixture is found endothermic in all thermal cycles. So, it can be used as heat storage material as a combination of sensible and latent heat technique.

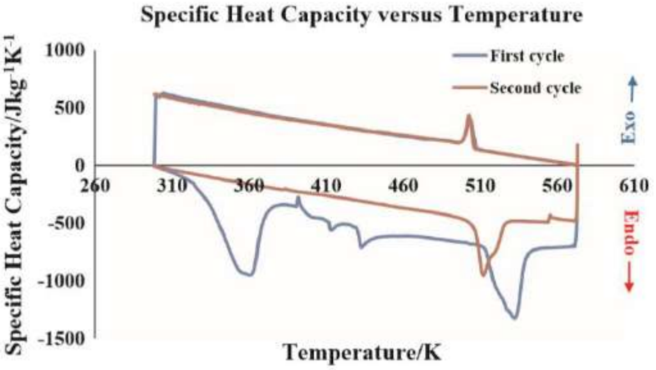

Figure 1:*DSC Graph of Specific Heat Capacity Versus Temperature in the Temperature Range 298 K to 573 K and Vice Versa in Two Thermal Cycles and Kept at 573 K for Two Minutes of the Mixture $Cu_3(PO_4)_2\cdot 2H_2O\cdot Na_3PO_4\cdot NaHSO_4\cdot H_2O$.*

Poster Presentation-24

Nano Silver embedded Chitosan incorporated Polymethyl Methaacrylate/Graphene Oxide Nanocomposite as Packaging Materials

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Abstract: A simple *in situ*polymerization technique is used to synthesize polymeric nanocomposite of PMMA/Chitosan-GO@Ag. The thickness of the PMMA/Chitosan/GO@Ag nanocomposite mainly depends on the polymerization of the methylmethaacrylate and concentrations of the GO. Phase analysis, microstructure, and chemical composition are examined by X-ray diffraction (XRD), Fourier transform Infrared Spectroscopy (FTIR), field emission scanning electron microscopy (FESEM), X-ray photoelectron spectroscopy (XPS) and high resolution transmission electron microscopy (HRTEM). The surface and nano-tribological characteristics of the polymeric nanocomposite are investigated by atomic force microscopy (AFM). The thermal, antibacterial, and oxygen barrier properties of the polymeric nanocomposite are studied. The incorporation of the Ag NPs enhances the barrier, thermal, and antimicrobial properties of the PMMA/chitosan-GO matrix by which the material is suitable for good packaging applications.

Keyword: Nano silver; nanocomposite; AFM; FESEM; Packaging

Poster Presentation-25

Synthesis of Pd decorated Carbon Quantum Dots modified Fe_3O_4 Nanoparticles: Application in C–C bond Forming Reactions

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Abstract: Carbon nanodots (C-dots) constitute a fascinating new class of carbon structures showing size and excitation wavelength dependent photoluminescence (PL) behaviour.[1]With their high photostability and lack of known cytotoxicity, C-dots are considered to be a green alternative to fluorescent semiconductor nanoparticles and have shown potential use in optical detection, bioimaging, light emitting diodes, fluorescent ink and photocatalysts.[2] C-dots might also function as excellent supports for nucleation and growth of nanoparticles leading to the formation of new functional materials where C-dots play a critical role in prevention of agglomeration and effective catalysis by the metallic component. In this respect, carbon quantum dots coated Fe_3O_4 magnetic nanaoparticles were synthesized and used for the reduction of Pd(II). The synthesized catalysts Fe_3O_4@CQDs@Pd were characterized by PXRD, SEM, TEM, EDS and VSM. The synthesized catalysts were applied for the coupling

reactions between aryl halides with olefins. Interestingly, the reaction proceeds in aqueous medium using triethanol amine as the base. Subsequently, the scope and mechanism of the reactions were investigated. The easily synthesized and air-stable catalyst Fe_3O_4@CQDs@Pd NPs could be separated from the reaction mixture by using an external magnet and reused in eight consecutive runs with no significant loss of catalytic activity.

References

1. (a) S. N. Baker and G. A. Baker, *Angew. Chem., Int. Ed.*, 2010, 49, 6726; (b) H. Li, Z. Kang, Y. Liu and S.-T. Lee, *J. Mater. Chem.*, 2012, 22, 24230.
2. (a) V. Gupta, N. Chaudhary, R. Srivastava, G. D. Sharma, R. Bhardwaj and S. Chand, *J. Am. Chem. Soc.*, 2011, 133 , 9960; (b) P. Mirtchev, E. J. Henderson, N. Soheilnia, C. M. Yipc and G. A. Ozin, *J. Mater. Chem.*, 2012, 22, 1265.

Poster Presentation-26

Green Synthesis of Gold Nano-Particle and Its Applications

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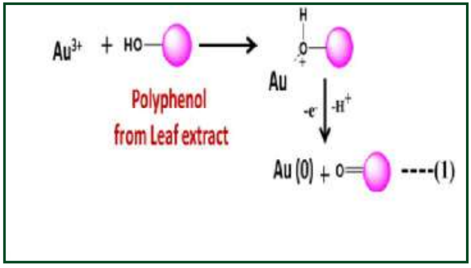
Abstract: Nanoparticles are particles that exist on a nanometre scale (i.e., below 100 nm in at least one dimension).These can possess properties such as uniformity, conductance or optical properties that make them desirable in materials science and biology. Green chemistry is the utilization of a set of principles that reduces or eliminates the use or generation of hazardous substances in the design, manufacture and application of chemical products. An *insitu* green synthesis of gold nanoparticles using Hirakud sand as source of gold solution and red tea infusion as a reducing and stabilizing agent and their applications have been presented. The size and shape of gold nanoparticles are modulated by varying the ratio of metal salt and tea leaf extract in the reaction medium. The nanoparticles obtained can be characterised by UV-vis, transmission electron microscopy (TEM) and X-ray diffraction (XRD) (continuing) A special attention to varying nano gold particle size, Tyndall effect and Target drug delivery have been presented in the form protocol.



References

1.H. Qian, L. A. Pretzer, J. C. Velazquez, Z. Zhao, M. S. Wong. J. Chem. Technol. Biotechnol. 2013, 88,735-41.

2.B.S. Bhau, S. Ghosh, S. Puri, B. Borah, D.K. Sarmah, R. Khan. Adv. Mater. Lett.2015, 6(1), 55-58.

Poster Presentation-27

Effect of Metallic Ions, pH, Moisture Content of Host Plant Leaves on Silk Formation in Tasar Silkworm *Antheraea Mylitta*Drury: A Review

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Abstract: Sericulture is the term associated with silk industry, which involves rearing of silkworm using advanced scientific and technological knowledge to enhance silk productivity. Tasar silkworm *Antheraea mylitta* Drury is one of the important *Vanya* silkworms that produces commercially important silk. This silkworm is polyphagous in nature, inhabits in Sal forests and also reared on its primary host plants *viz. Terminalia tomentosa* (Asan) and *T. arjuna* (Arjun). Leaf nutrients have direct bearing on the quality as well as quantity of silk. Tasar silkworm converts concentrated fibroin and sericin solutions to insoluble silk fiber and adhesive gum respectively, through silk ducts instantly before the silk is drawn down into filament. Silk fibers possess dramatic mechanical properties and are partly dependent on the crystalline β-sheet silk conformation under shear or rapid elongation flow. The protein conformation to β-sheet is dependent on several factors such as concentration of metal ions in the soil and host plant leaves (Na^+, K^+, Mg^{2+}, Cu^{2+}, Zn^{2+}), pH of the soil besides the moisture content in the soil as well as leaves. In this paper, we present a detailed review on the impact of metallic ion, pH and moisture content of host plant leaves in relation to silk production and productivity of tasar silkworm.

Keywords:*Antheraea mylitta*, host plant, metallic ions, moisture content, tasar silkworm, soil

Poster Presentation-28

Nano Gold based Composites for the Reduction of Cu^{2+}Ion

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Abstract: Recently, researchers are running behind the developing of nanosensor for the detection of toxic metal ions from the environmental and biological samples. Among different metalions, Cu^{2+} ion is one of the important environmental pollutant. Generally, Cu^{2+} ions are third abundant metals in the human body. However, excessive amount of Cu^{2+}ion not only imbalance the cellular process that lead to Wilson's disease, Parkinson's disease.According to

World Health Organization (WHO) maximum permissible limit is 20.5 μM in drinking water. We have designed metal induced aggregation of gold nanocomposites; an efficient approach for the detection of Cu^{2+} ion. Sensing of Cu^{2+} ion using gold nanocomposites is based on aggregation of gold nanoparticles in nanocomposites. The as-synthesized gold nanocomposites in contact with Cu^{2+} ion forms co-ordinate bond which leads to aggregation of gold nanoparticles (AuNP). Therefore, the surface plasmon resonance peak of AuNP in nanocomposites is decreased with a red shift. Scanning electron microscope (SEM) micrograph reveal the aggregation of gold nanoparticles in the nanocomposites. The limit of detection and limit of quantification for Cu^{2+} ion are 40 nM and 133nM respectively.

Keywords: Nano Gold; L-alanine; Copper; Metal induced aggregation

Poster Presentation-29

Solvent Free Green Synthesis of Porphyrin and Metalloporphyrin

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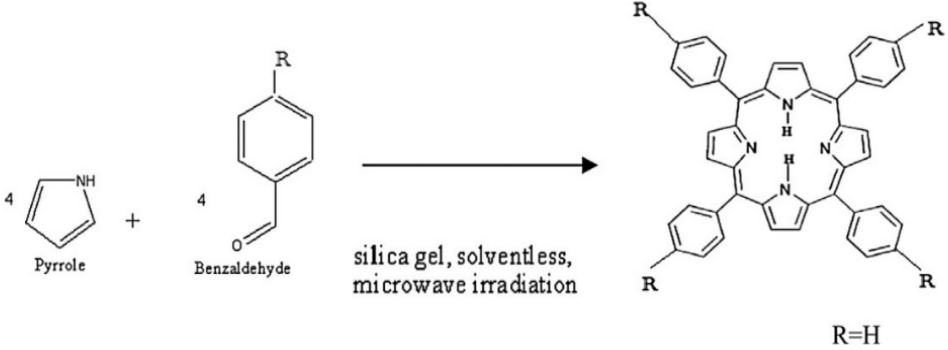
Abstract: Traditionalmethodofsynthesisofchemicalcompoundsinvolvesuseoftoxic,corrosive chemicals, which affect very badly our environment. Again, during these reactions the byproducts also create harmful effect on environment. To overcome this difficulty, researchers developednearlyadecadeanalternativemethodofecofriendlysynthesisofcompounds.

Environment friendly synthesis or green synthesis of small molecules is comparatively easy compare to synthesis of macrocyclic molecules. Porphyrin, a macrocyclic molecule consists of four pyrrole rings joined together through methine (=CH−) bridge are synthesized in various conventional methods by using high boiling propionic acidor large amount of halogenated solvents containing corrosive lewis acid catalysts. In many cases, toxic oxidizing compounds are used to convert porphyrinogen to porphyrin. A solvent free microwave assisted synthesis of porphyrin using benzaldehyde and pyrrole followed by the preparation of the nickel porphyrin by a solvent free microwave assisted reaction using 1,8-diazabicyclo [5.4.0] undec-7-ene (DBU) as base.



The use of mechanochemistry to bring about an acid-catalysed condensation between aldehydes and pyrrole followed by oxidation of the intermediates to produce porphyrin, which enables the elimination of both solvent and high temperatures from the synthesis of these important compounds. It represents a significant reduction in environmental impact.

Keywords: porphyrin, Microwave irradiation, Green synthesis, Solvent, Silica gel

References

1. Geier, G.R. Cirigh, Y. Li, F. Haynes, D.M. Lindsey, J.S., *Org. Lett.*,**2000**, 2, 1745-1748.
2. Sharma,R.K.;AhujaA.;SidhwaniI.T.;*GreenChem.Lett. Rev.*,**2009**, 2(2),101-105.

Poster Presentation-30

A Comprehensive Review on Biopolymers with Special Reference to Fire Retardant Property

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Abstract: The impact of pollution load in the world by the use of synthetic non-biodegradable plastics materials increases day by day, which forced us for searching of new materials from natural renewable sources, having the property of biodegradability and nontoxicity in nature. The important biomaterials that replace the synthetic polymeric materials are the biopolymers and its composites. The biopolymers can be synthesized from plant and animal products by using variety of microorganisms in controlled environmental condition. In this work, we discuss about the present development, synthesis, characterization and application of biopolymers and biopolymer composites with special reference to fire retardant materials, which becomes new construction materials and helps our society for dangerous fire hazards. The emphasis given in this chapter is different characterization specifically thermal stability and fire retardancy along with some specific application in the field of nanotechnology.

Keywords: Biopolymers, Fire retardancy, Nano composite. Biomolecule, biopolymer

Poster Presentation-31

Biodegradable, Superabsorbent with Potential Biomedical Application as Drug Delivery System of "Pectin-g-P (AN-co-AM)/Chicken Eggshell" Biocomposite

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Abstract: The outer cover of the Chicken egg having a mesh size of 100-350 µm serves as a good bio-filler and a versatile material for manufacturing of advanced composite materials. Pectin-g-P(AN-co-AM)/chicken eggshell which was synthesized by using water soluble cobalt complex as catalyst and its properties were studied by using FTIR and on-off switching swelling graph. Moreover, water absorbency and biodegradability along with a drug delivery property of the prepared material was studied by using the conventional method. It was observed that the synthesized material shows property of super absorbency (hydrogel) and demonstrate interesting results at pH= 2 and 8 being responsive to swelling-de-swelling behaviour. This material also shows potential application in drug delivery system. This bio-composite is environmentally friendly as it is synthesized in microwave assisted medium without emission of any gaseous toxic materials to the environment.

Keywords: Pectin, Hydrogel, Acrylonitrile, Acrylamide, Drug Delivery, Ibuprofen

Poster Presentation-32

Assessment of Pollution Load of Taladanda Canal in and arround Paradip City, Odisha, India in terms of Physico-Chemical and Bactriological Analysis

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Abstract: The quality of the water was usually analyzed in terms of its physical, biological and chemical characteristics. From the present analysis, it was found to be revealed that TC and FC of all the sampling points are much higher than the standard actable limit. The TC value ranges from 52.9 to 25.3 whereas FC value ranges from13.1 to 6.4 per 100 ml as per MPN test. The pH value of the water is less than 6.7and is acidic in most of the sampling point. The TDS values and SS values are much higher than the permissible limit. All other water parameters are also more than the permissible limit but less than the tolerance limit. Due to high bacterial contents, acidic properties and much higher value of TSS, TDS the water is almost not suitable for human use and it affects the socio-economic conditions of the dwellers living nearby the Taladanda Canal in and around Paradip area.

Keywords: Water quality, Pollution, Physicochemical assessment, bacteriological parameters. FC.

Poster Presentation-33

Sustainability and Eco-Utilization of Blast Furnace Slag Generated From Rourkela Steel Plant, Odisha, India

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Abstract: During the production of Iron, the major solid waste obtained is BF slag, which can be utilized as a resource material in the manufacturing of bricks and concrete slab with high value of tensile strength, load bearing capacity and durability. The Rourkela steel plant generated huge amount of BF slag at every day and creating increase in pollution load, if it is eco-utilized in the manufacturing of bricks and concrete slab, it will be more economical, energy saving and eco-friendly to our environment. The aim of our the present work is designing and manufacturing of bricks and concrete slabs of high stability and strength by