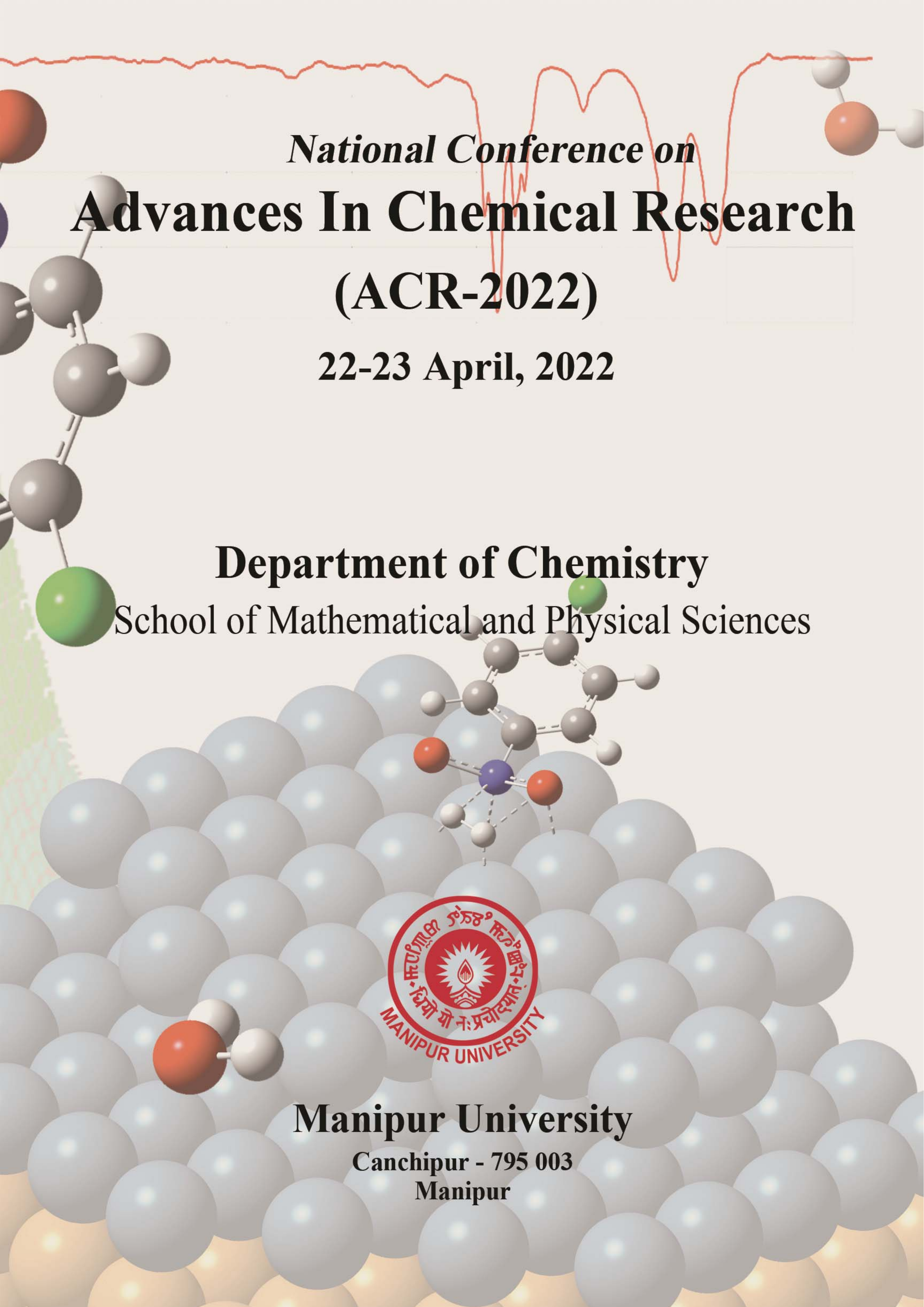

National Conference on

Advances In Chemical Research

(ACR-2022)

22-23 April, 2022

Department of Chemistry

School of Mathematical and Physical Sciences

Manipur University

Canchipur - 795 003
Manipur

National Conference

on

Advances in Chemical Research
(ACR-2022)

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Manipur

Link for Google Meet: **meet.google.com/zsa-ycxg-uta**

Or open Meet and enter this code: **zsa-ycxg-uta**

Day 1: 22nd April 2022 (Friday)			
9:30AM-10:00AM	**Registration and High Tea**		
10:00AM-11:00AM	**Inauguration**		
Technical Session I Chairperson: **Prof. R. K. Hemakumar Singh**		**Technical Session II** Chairperson: **Prof. Homendra Naorem**	
11:10AM - 1:40AM	Plenary Lecture: **Prof. Subrata Ghosh** *IACS Kolkata*	2:00PM - 2:20PM	IL-04 **Dr. Keisham Sarjit Singh** *NIO Goa*
11:45AM - 12:05PM	IL-01 **Prof. P. Phukan** *Gauhati University*	2:25PM - 2:45PM	IL-05 **Dr. N. Raghumani Singh** *BARC Mumbai*
12:10PM - 12:30PM	IL-02 **Prof. R. K. Goswami** *IACS Kolkata*	2:50PM - 3:40PM	**OP-01** to **OP-05**
12:35PM - 12:55PM	IL-03 **Prof. Anil K. Saikia** *IIT Guwahati*	3:40PM - 4:00PM	**TEA BREAK**
1:00PM - 2:00PM	**LUNCH BREAK & POSTER SESSION**		
Technical Session III Chairperson: **Prof. Okram Mukherjee Singh**			
4:00PM - 4:20PM	IL-06 **Dr. M. N. Luwang** *NCL Pune*	4:20PM - 5:30PM	**OP-06** to **OP-12**
Day 2: 23rd April 2022 (Saturday)			
Technical Session IV Chairperson: **Prof. R. K. Lonibala**		**Technical Session V** Chairperson: **Prof. Nongmaithem Rajen Singh**	
9:30AM - 9:50AM	IL-07 **Prof. M. R. Maurya** *IIT Roorkee*	11:30AM - 11:50AM	IL-10 **Prof. K. K. K. Sharma** *Shivaji University*
9:55AM - 10:15AM	IL-08 **Prof. G. Krishnamoorthy** *IIT Guwahati*	11:55AM - 12:15PM	IL-11 **Dr. T. Sanjoy Singh** *Assam University*
10:20AM - 10:40AM	IL-09 **Prof. R. C. Deka** *Tezpur University*	12:20PM - 12:40PM	IL-12 **Dr. Ch. Brajakishor Singh** *IBSD Imphal*
10:45AM - 11:15AM	**OP-13** to **OP-15**	12:40PM - 1:00PM	**OP-16** to **OP-17**
11:15AM - 11:30AM	**TEA BREAK**	1:00PM - 2:30PM	**LUNCH BREAK & POSTER SESSION**
Technical Session VI Chairperson: **Prof. R. K. Bhubon Singh**		**Technical Session VII** Chairperson: **Dr. W. Rameshwor Singh**	
2:30PM - 4:20PM	**OP-18** to **OP-28**	2:30PM - 4:10PM	**OP-29** to **OP-38**
4:20PM - 4:40PM	**TEA BREAK**		
4:45PM - 5:15PM	**Valedictory Function**		

*Technical Sessions VI and VII are parallel sessions

Vice-Chancellor

Manipur University
Canchipur
Imphal-795003
Manipur, India

No. MU/VC/2022-23/

6th April 2022

MESSAGE

I am immensely happy to learn that the Department of Chemistry, Manipur University is organizing a National Conference on Advances in Chemical Research (ACR-2022) during 22-23 April 2022 through both offline and online modes making best use of the currently available information technology.

I am confident that deliberations and discussions among eminent resource persons, scholars and students on the research findings presented in this conference ACR-2022 will motivate and enlighten young participants to take up various challenges in the frontiers of chemical research which will address the need of our society.

I wish the event and publication of proceedings of ACR-2022 a grand success.

(Prof. N. Lokendra Singh)
Vice-Chancellor

Telephone: 91-385-2435143 / 2435765
Cable: MANVARSITY, Imphal
Fax: 91- 385-2435145
email: vcoffice@manipuruniv.ac.in ; pa_to_vc@bsnl.in

From the Desk of the Organizing Committee ACR-2022

Department of Chemistry, Manipur University

Prof. O. Mukherjee Singh

Dr. Keisham Surjit Singh

Dr. Francis A.S. Chipem

The organizing Committee of the National Conference on Advances in Chemical Research (ACR-2022) takes a great privilege to welcome all the eminent resource persons and participants. This conference is being organized by the Department of Chemistry through blended mode (both online and offline modes) to refresh minds of chemists post COVID-19 pandemic.

The conference focuses on different frontier areas of chemical research which include Synthetic Organic Chemistry, Natural Products and Medicinal Chemistry, Organometallic Chemistry, Catalyst and Green Chemistry, Theoretical and Computational Chemistry, Material Science, Physical Chemistry, Coordination Chemistry and Bio-inorganic Chemistry and Spectroscopy.

The prime goal of the conference is to provide a forum for discussions, deliberations and exchange innovative ideas in the field of Frontiers Chemical Research. Large number of eminent resource persons and academicians working in diverse field of chemical research responded positively to our invitation and are going to take part during the proceedings of this conference.

We do hope that the paper presented in this conference will benefit the participants and also young researchers will get an opportunity to present their latest research findings through oral presentations and poster sessions.

We are grateful to all our eminent resource persons for accepting our invitation to give Plenary Lecture and Invited Talks during our national conference and share their valuable expertise and ideas with our participants.

We extend our gratitude to Prof. N. Lokendra Singh, Vice-Chancellor Manipur University and all faculty members of our Department for encouragement and guidance in organizing this national conference.

We are also thankful to all research scholars, staff and students who have been working hard as a team and rendering their best effort to give a concrete shape of the conference.

Our special thanks to UEICO and Sharma Bros Scientific Instruments Co. for sponsoring our conference.

Once again, we heartily welcome all the resource persons, speakers and participants who have contributed their valuable research findings in this conference. We hope the participants will have memorable experience in our beautiful green campus and will enjoy listening to the excellent scientific sessions during this national conference.

Prof. O. Mukherjee Singh
Chairman

Dr. Keisham Surjit Singh
Convener

Dr. Francis A. S. Chipem
Convener

National Advisory Committee

Prof. Subrata Ghosh
IACS, Kolkata

Prof. Ashutosh Ghosh
University of Calcutta

Prof. Pradeep Phukan
Gauhati University

Prof. M. R. Maurya
IIT Roorkee

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Chief Patron : **Prof. N. Lokendra Singh**
Vice-Chancellor
Manipur University

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Dean
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Prof. L. Warjeet Singh
Director
Research & Development Cell, MU

Chairman : **Prof. O. Mukherjee Singh**
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Department of Chemistry, MU

Conveners : **Dr. Keisham Surjit Singh**

Dr. Francis A. S. Chipem

Members : **Prof. R. K. Hemakumar Singh**

Prof. Homendra Naorem
Prof. R. K. Lonibala
Prof. Nongmaithem Rajen Singh
Prof. R. K. Bhubon Singh
Dr. W. Rameshwar Singh
Dr. Thongam Joymati Devi

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- R. K. Romeshkumar Singh
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- Khundongbam Bikensana Meitei

Finance:

- Dr. Keisham Surjit Singh
- Dr. Thongam Joymati Devi
- Dr. Nahakpam Lokendrajit Singh
- Amar Ningthoujam

About the Department

The Department of Chemistry is a specialized centre for higher education in the country offering Master of Science (MSc) and Doctor of Philosophy (PhD) programmes in Chemistry with the vision to produce excellence in research and leaders as educators in the region. The department oversees the functioning of the programme of Bachelor of Science (BSc) also with Chemistry Honours and/or generic electives offered in affiliated colleges of the University. The feat of the department can be witnessed from a number of alumni of the department holding important positions in the society in the state or the country and even abroad.

In addition, the department is one of the major departments in Manipur University with credible infrastructural facilities such as UV-Visible Spectrophotometer, IR Spectrophotometer, Fluorimeter, Electron Paramagnetic Resonance Spectrometer, Thermogravimetric Analysis-Differential Thermal Analysis (TGA-DTA) Calorimeter, 60 MHz benchtop Nuclear Magnetic Resonance (NMR) Spectrometer, Atomic Force Microscope (AFM) for advanced research in emerging frontiers of chemistry and its related areas. Currently, the department has well qualified 12 regular faculty and 3 guest faculty members who are actively engaged in teaching and research activities. The output of the research works are published in reputed national and international SCI and UGC recognized CARE journals. The faculty members receive individual research project grants from various funding agencies such as Department of Science and Technology (DST), Department of Biotechnology (DBT), University Grants Commission (UGC), Council of Scientific and Industrial Research (CSIR). The department has received the second phase of Special Assistance Programme (SAP2) from the UGC for the maintenance, purchase and up-gradation of infrastructure and instruments of the department.

About the Conference

The Department of Chemistry, Manipur University is organizing the National Conference on Advances in Chemical Research (ACR-2022) from 22 to 23 April 2022 which aims to provide platform for sharing knowledge, expertise and latest innovation through presentations, interactions and discussions among scientists, academicians, research scholars and industrialists and also with eminent resource persons.

The main focus areas of the conference include (and not limited to):

- **Synthetic Organic Chemistry**
- **Natural Products and Medicinal Chemistry**
- **Organometallic Chemistry**
- **Catalysis and Green Chemistry**
- **Theoretical and Computational Chemistry**
- **Material Science/ Nano Science**
- **Physical Chemistry**
- **Coordination and Bio Inorganic Chemistry**
- **Spectroscopy**

Presentation of paper will be both in online and offline modes. Outstation participants can present through online. Local participants must present their papers by offline mode only. In the conference, there will be a series of Plenary and Invited talks, oral and poster presentation session. From the abstracts received, few abstracts will be selected for oral presentation while the remaining abstracts will be included for poster presentation.

Program Schedule

National Conference
on
Advances in Chemical Research (ACR-2022)
22-23 April, 2022

Venue: Department of Chemistry, Manipur University

Code for Google Meet: **zsa-ycxg-uta**

Day 1 : 22 April 2022 (Friday)

9:30 AM – 10:00 AM	:	Registration and Tea	
10:00 AM – 11:05 AM	:	Inaugural Programme	
		Chief Guest	**Prof. K. Yugindro Singh** *Dean, School of Mathematical & Physical Sciences*
		Guests of Honour	**Prof. Laitonjam Warjeet Singh** *Director, R&D Cell, MU*
			Prof. Ng. Nimai Singh *Controller of Examinations*
		President	**Prof. Okram Mukherjee Singh** *Head, Department of Chemistry, MU*

Technical Session 1

Chairperson: **Prof. R. K. Hemakumar Singh**

11:10 AM – 11:40 AM	: PL	**Prof. Subrata Ghosh**, IACS Kolkata Total Synthesis of Natural Products - A Never-Ending Challenge
11:45 AM – 12:05 AM	: IL-01	**Prof. Prodeep Phukan**, Gauhati University A Square Pyramidal [Cu(DMAP)$_4$I]I Catalyst for C-C and C-Heteroatom Bond Forming Reactions
12:10 PM – 12:30 PM	: IL-02	**Prof. Rajib Kumar Goswami**, IACS Kolkata Total Synthesis of Bioactive Natural Products: Carolacton and Alveolaride C
12:35 PM – 12:55 PM	: IL-03	**Prof. Anil K. Saikia**, IIT Guwahati Stereoselective Synthesis of Heterocyclic Compounds

Lunch Break & Poster Session (1:00 PM – 2:00 PM)

PP-01 to **PP-40**

Technical Session 2

Chairperson: **Prof. Homendra Naorem**

2:00 PM – 2:20 PM	: IL-04	**Dr. Keisham S. Singh**, CSIR-NIO Goa Ruthenium(II)-Catalyzed Synthesis of Heterocycles and Selected Marine Natural Product Analogues
2:25 PM – 2:45 PM	: IL-05	**Dr. N. Raghumani Singh**, BARC Mumbai Application of Nanoparticles in Cancer Therapy
2:50 PM – 3:00 PM	: OP-01	**Paresh Debnath**, NIT Agartala Synthesis, Characterization, Crystal Structures and Anti-Diabetic Assay of Dibutyltin(IV) Complexes with Azo-Carboxylates
3:00 PM – 3:10 PM	: OP-02	**Ningombam Ibenoubi Devi**, Manipur College Studies on the Stepwise Stability Constants and the Thermodynamic Quantities Pertaining to the Interaction of Some Bivalent Transition Metal Complexes with 1-Amidino-O-Isopropylurea
3:10 PM – 3:20 PM	: OP-03	**Pratima Debnath**, NIT Agartala Organotin(IV) Azo-Carboxylates: Synthesis, Characterization, Crystal Structures and Anti-Diabetic Activity
3:20 PM – 3:30 PM	: OP-04	**Sagolsem Nonganbi Chanu**, NIT Manipur Design and Preparation of Reduced Graphene Oxide/Vanadium Pentoxide/Polycaprolactone Nanofiber as Supercapacitor Electrode Material
3:30 PM – 3:40 PM	: OP-05	**Kriti**, Himachal Pradesh University Synthesis of Plantago Ovata and Vinylsulfonic Acid Sodium Salt based Polymeric Networks for Removal of Mercuric Ions from Wastewater

Tea Break (3:40 PM – 4:00 PM)

Technical Session 3

Chairperson: **Prof. Okram Mukherjee Singh**

4:00 PM – 4:20 PM	: IL-06	**Dr. T. Sanjoy Singh**, Assam University Photophysics of Donor-Acceptor Based Schiff Base Systems in Varying Solvents Polarities
4:20 PM – 4:30 PM	: OP-06	**Atom Rajiv Singh**, Manipur University Synthesis, DFT and Crystal Structure of Three Oxovanadium(IV/V) Complexes with Substituted 2,2-bipyridine

		Ligands and it's Antidiabetic Property Studies
4:30 PM – 4:40 PM	: OP-07	**Jhuma Debbarma**, NIT Agartala Synthesis of N/N-S Containing Graphene from Fruitwastes: Chemistry and Mechanism
4:40 PM – 4:50 PM	: OP-08	**Rameshor S. Atom**, Manipur University Phytochemical Profiling of Petroleum Ether and Chloroform Extracts of Curcuma Caesia Rhizome by GC-MS and Comparing Their Bioactivities
4:50 PM – 5:00 PM	: OP-09	**Nishithendu Bikash Nandi**, NIT Agartala Structures, Redox, Magnetic and Protein Binding Properties of Two Monomeric Copper(II) Complexes Derived From 1,3-Dimethyl-5-(4'/3'-pyridylazo)-6-aminouracil
5:00 PM – 5:10 PM	: OP-10	**M. Asharani Devi**, Manipur University Release of Iodine Entrapped in Hydrogels of Aloe Vera or Gelatin or Blended Hydrogels of Aloe Vera and Gelatin in Aqueous Media and the Kinetics of the Release Process
5:10 PM – 5:20 PM	: OP-11	**Puneet Kumar**, Himachal Pradesh University Synthesis of Guar Gum Based Potent Hydrogel for Dye Adsorption
5:20 PM – 5:30 PM	: OP-12	**Rakhi Khunjamayum**, Manipur University Antimicrobial Activities and Identification of Chemical Constituents from Endophytic Bacteria Associated with Ethnomedicinal Plants

Day 2 : 23 April 2022 (Saturday)

Technical Session 4

Chairperson: **Prof. R. K. Lonibala**

9:30 AM – 9:50 AM	: IL-07	**Prof. M. R. Maurya**, IIT Roorkee Synthesis, Reactivity and Catalytic Potential of Vanadium Complexes
9:55 AM – 10:15 AM	: IL-08	**Prof. G. Krishnamoorthy**, IIT Guwahati Proton Transfer Triggered Processes
10:20 AM – 10:40 AM	: IL-09	**Prof. Ramesh Chandra Deka**, Tezpur University QM/MM Studies on the Mechanism of CO Oxidation over Pd_4 Catalyst
10:45 AM – 10:55 AM	: OP-13	**Sophy A. Shimray**, Manipur University Assessment of Density Functional for Predicting Structural and Electronic Energies in Photoactive Biomolecules

10:55 AM – 11:05 AM	: OP-14	**Manish Rana**, Jamia Millia Islamia Pyrazoline Analogs as Potential Anticancer Agents and their Apoptosis, Molecular Docking, MD Simulation, DNA Binding and Antioxidant Studies
11:05 AM – 11:15 AM	: OP-15	**Pintubala Kshetri**, ICAR Imphal Extraction and Characterization of Melanin from Poultry Feathers Using Keratinolytic Bacteria

Tea Break (11:15 PM – 11:30 PM)

Technical Session 5

Chairperson: **Prof. Nongmaithem Rajen Singh**

11:30 AM – 11:50 AM	: IL-10	**Prof. Kiran Kumar K. Sharma**, Shivaji University Innovations in Nanoscience and Nanotechnology: Role of Chemistry
11:55 AM – 12:15 PM	: IL-11	**Dr. Meitram Niraj Luwang**, NCL Pune Graphene Nanogate Structure: A New Chemical Bond Entity and Its Energy Applications
12:20 PM – 12:40 PM	: IL-12	**Dr. Chingakham Brajakishor Singh**, IBSD Imphal Zerumbone, a Sesquiterpene from Zingiberaceae plant, *Zingiber zerumbet* Smith as Anti-Cancer Agents
12:40 PM – 12:50 PM	: OP-16	**Lisham Paris Chanu**, Manipur University Effect of Transition Metal Ions Substitution at Mn-Site on the Structural and Electrical Properties of Multiferroic Rare Earth Manganite $YMnO_3$
12:50 PM – 1:00 PM	: OP-17	**Sh. Anju Devi**, Manipur University Enhanced Visible Light Active Photocatalytic Performance of CdS/PVDF Nanocomposite towards Malachite Green Dye Degradation

Lunch Break & Poster Session (1:00 PM – 2:30 PM)

PP-01 to **PP-40**

	Technical Session 6 Chair: **Prof. R. K. Bhubon Singh**	**Technical Session 7** Chair: **Dr. W. Rameshwar Singh**
2:30 PM – 2:40 PM	: OP-18 **Reema Khangembam**, MU Evaluation of Acute Toxicity of Seed Extract of *Catunaregam spinosa* (Thunb.) (Rubiaceae) using Zebra Fish (*Dani rerio*) as a Model Organism	: OP-29 **Salam Asbin Singh**, MU Prospective Novel Bioactive Compound in Chloroform Fraction of Oroxylum indicum Leaves Induce Apoptosis in HeLa and PC3 Cells through Differential Molecular

		Mechanism
2:40 PM – 2:50 PM	: OP-19 **Yengkhom Dhanapriya Devi**, MU Synthesis and Characterization of Bi-Functional Magneto-Luminescent Fe3O4@SiO2@GdPO4:Tb3+,Ce3+ Composites for Hyperthermia Application	: OP-30 **S. Babeeta Chanu**, MU Oak tasar (Antheraea proylei J.) Cocoon Sericin Extract Exhibits both Chemical and Cellular Antioxidant Activities
2:50 PM – 3:00 PM	: OP-20 **L. Anju Chanu**, MU Bridging of ZnO Nanostructure with CuO to Form Nanocomposite for Enhanced Photocatalytic Activity	: OP-31 **S. Pramodini Devi**, MU Studies on DNA Interaction of bis(1-Phenylamidino-O-alkylurea)copper(II) Perchlorate Complexes (alkyl = methyl, ethyl, n-propyl, n-butyl, iso-butyl or n-pentyl)
3:00 PM – 3:10 PM	: OP-21 **Tanuj**, Himachal Pradesh University Green Synthesis of Metal Oxide Nanoparticles by Using Rhododendron Arboretum	: OP-32 **Khaidem Dilan Kumar Singh**, MU Effects of substitution on Excited State Intramolecular Proton Transfer (ESIPT) reactions in 12,12*a*-dihydrobenzo[*4,5*]imidazo[2,1-*a*]isoquinoline: A Density Functional Theory Study
3:10 PM – 3:20 PM	: OP-22 **Salima Begum**, MU Green Synthesis of Silver Nanoparticles Using Medicinal Plant Extract: Anticancer Activities and DFT Studies	: OP-33 **T. Suma Chanu**, MU Structural, Optical and Electrical Properties of PVA/Ag Doped ZnO Nanocomposite Films for Multifunctional Application
3:20 PM – 3:30 PM	: OP-23 **Chetan Chauhan**, Himachal Pradesh University Synthesis and Characterization of Copper (II) Complex of Sodium Salt of Chloro-Benzoic Acid	: OP-34 **Sangeeta Yanglem**, MU 2,2-Diphenyl-1-picryl-hydrazyl Free Radical Scavenging Activity of Different Parts of *Homalomena aromatica* (Spreng.) Schott
3:30 PM – 3:40 PM	: OP-24 **Ramina**, MU Synthesis, Characterization and CT-DNA Binding Studies On Co(III), Ni(II) and Cu(II) Schiff Base Complexes of (E)-6-hydrazinyl-N’-(1-(2,3-dihydro-1,3-dioxo-1Hinden-2-yl)ethylidene)pyridine-3-carbohydrazide (L)	: OP-35 **T. Kriyananda Singh**, Imphal College Comparative Study of Energy Interaction Parameters for the Complexation of Pr(III) with Cytidine in Absence and Presence of Zn(II)in Aqueous and Aquated Organic Solvents

3:40 PM – 3:50 PM	: OP-25 **L. C. Sonia**, MU Law of Approach to Saturation Magnetization and Induction Heating Study of Zinc Substituted CoFe2O4 for Magnetic Hyperthermia Applications	: OP-36 **A. Deepak Sharma**, MU The Impact of Co-Doping in Nanocrystalline Multiferroic Thin Films of Bismuth Ferrite on Transparent Substrate
3:50 PM – 4:00 PM	: OP-26 **Potsangbam Jolly Devi**, MU Sericin from *Antheraea proylei* J.cocoons Induces Cell Death through Activation of p38 in PC3 Cells	: OP-37 **Kshetrimayum Ophelia**, MU Antioxidant Activity Analysis of Methanolic Extracts from the Inflorescence of *Elsholtzia communis*
4:00 PM – 4:10 PM	: OP-27 **Amar Ningthoujam**, MU Effect of Various Ionic Liquid Media on the Energy Storage Performance of Cell Employing Coronene and Its Mono Heteroatom Substituted Analogues as Electrodes	: OP-38 **Khullakpam Shaheen**, MU Partial Characterization of Bioactive Metabolites from Streptomyces sp. MBRL 758 Associated with *Celtis timorensis* (Heigreng)
4:10 PM – 4:20 PM	: OP-28 **Langlen Meinam**, MU A Comparative Study Between Oak Tasar (*Antheraea proylei J.*) and Mulberry (*Bombyx mori L.*) Silk Cocoon Fibroin Thin Films with Respect to Biomaterial Application	

Tea Break (4:20 PM – 4:40 PM)

4:45 PM – 5:15 PM : Valedictory Function

Chief Guest **Prof. S. K. Srivastava**
Professor of Chemistry, MU & Former VC, NEHU Shillong

CONTENTS

Plenary Lecture

Invited Lecture

Oral Presentation

Poster Presentation

Plenary Lecture

Prof. Subrata Ghosh

IACS Kolkata

Prof. Ghosh obtained Ph. D. in 1978 under the supervision of Late Professor U. R. Ghatak at Indian Association for the Cultivation of Science (IACS), Calcutta. During his Ph. D. he joined the Department of organic Chemistry, IACS as Research Assistant in 1977. He worked as a postdoctoral fellow at Case Western Reserve University with Professor R. G. Salomon as the mentor during 1979-1981 and 1984-1986 on study leave from IACS. He joined the Department of Organic Chemistry at IACS as Lecturer in1982 and began his independent research career. Subsequently he was promoted to Reader in 1987, Professor in 1994 and Senior Professor in 2005. . He also served IACS as Dean during 2009-2012. He was a visiting scientist at Liecester University for the period October-December, 1997 under INSA-Royal Society Exchange Program. He served as an Editorial Board Member in Journal of Chemical Sciences. He was a member in DST Management Advisory Committee for young Scientists, DST Program Advisory Committee (Organic Chemistry) and in Sectional Committee (Chemical Sciences) of Indian Academy of Sciences, Bangalore. He retired from service in April, 2014. Since then he is continuing his research as a J. C. Bose National Fellow. Research interest includes total synthesis of natural products, development of new synthetic methodologies, cycloaddition reactions, olefin metathesis, Chiron approach to asymmetric synthesis etc.

PL

Total Synthesis of Natural Products - A Never-Ending Challenge

Subrata Ghosh

School of Chemical Sciences, Indian Association for the Cultivation of Science
Jadavpur, Kolkata 700 032
E-mail: ocsg@iacs.res.in

Abstract:

Natural products play important roles for the welfare of human being. One of the most important applications of natural products lies in the development of medicines. More than sixty percent of medicines available in the market today have natural products connection. For example, taxol, an anti-cancer drug, is a natural product and simvastatin, a cholesterol lowering agent, is a modified natural product. Natural products are available only in minute quantities. Alternative way to get them is by synthesis in the laboratory. Natural products are in general structurally complex organic molecules with multiple asymmetric centers. Synthesis of these compounds continue to be a challenging task. In this talk the challenges associated with synthesis of a few natural products will be highlighted.

Invited Lecture

Prof. Prodeep Phukan

Gauhati University

Education:

- Ph.D., National Chemical Laboratory, 1999

Research Interests:

- Asymmetric synthesis using Chiral Auxiliary
- Synthesis of heterocycles
- Synthetic methodologies using various catalyst
- Synthesis of Nanoparticles, Nanocatalyst
- Theoretical Studies on Organic reactions

Achievements:

- 12+ Research Pojects, 17+ Ph.D. students guided, 100+ Journal Publications, 2 Patents, 30+ Invited Lectures

Awards & Recognitions:

- Mentor, Indian delegation, 46th International Chemistry Olympiad, Vietnam (2014)
- Best Chemistry Teacher Award, Tata Chemicals Ltd., Association of Chemistry Teachers-India, Confederation of Indian Industries and Royal Society of Chemistry, UK (2013)
- Prof. H. C. Bhuyan Award, Assam Science Society (2013)
- Bronze Medal, Chemical Research Society of India (2013)
- Syamasri Gupta Memorial Young Scientist Award 2011, Indian Society for Surface Science and Technology (2011)
- B. M. Das Memorial Science Award, Assam (2009)
- J. N. Baruah Memorial Science Award, Assam Science Society, Jorhat Branch (2008)
- Most Cited Paper 2004-2007 Award, Tetrahedron Letters Elsevier, UK (2007)
- Ramanna Fellowship; Department of Science and Technology (DST), India (2007-2010)
- Alexander von Humboldt Post Doctoral Fellowship, Germany (With Prof. Martin E. Maier, University of Tuebingen, Tuebingen, Germany) and (Jan 2002 – March 2003; Revisits: 2007 (July-Sept); 2009 (July-Sept); 2010 (June-July)
- National Eligibility Test (CSIR-NET), 1994 – 1999
- State Merit Scholarship, Government of Assam, India (1990-1992)

IL-01

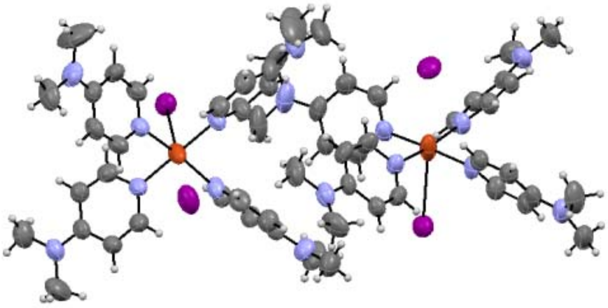
A Square Pyramidal [cu(DMAP)4I]I Catalyst for C-C and C-Heteroatom Bond Forming Reactions

Prodeep Phukan

Department of Chemistry, Gauhati University, Guwahati-781014, India
E-mail: pphukan@gauhati.ac.in; pphukan@yahoo.com

Abstract:

CuI has been used as a very powerful catalyst as well as reagent for various organic transformations for a long time. We have developed few synthetic methodologies using CuI as catalyst [2]. During the course of our investigations, we found that 4-(NN-dimethylamino)-pyridine (DMAP) is an excellent ligand for CuI catalyzed transformations. This observation resulted in the development of a new copper complex [Cu(DMAP)4I]I. The complex was synthesized by disproportionation reaction of CuI in DMSO in presence of DMAP. This complex was found to be an excellent catalyst for Chan-Lam coupling reaction for C-N and C-S bond formation reaction [2]. Many other organic transformations could also be achieved using the copper complex as catalyst [3]. This presentation will highlight the salient findings of our research group in this area.



References:

[1] Phukan, P. et al. *Catal. Commun* **2007**, *8*, 179; *Tetrahedron Lett*. **2007**, *48*, 5047; *Tetrahedron Lett*. **2008**, *49*, 5495; *Indian J. Chem*. **2013**, *52B*, 289; *C. R. Chimie* **2013**, *16*, 1055; *Tetrahedron Lett*. **2013**, *54*, 4442; *Indian J. Chem*. **2015**, *54B*, 662; *Tetrahedron Lett*. **2013**, *54*, 6324; *Tetrahedron Lett*. **2015**, *56*, 2426; *Tetrahedron Lett*. **2017**, *58*, 4855.

[2] Phukan, P. et al. Chem. *Commun*. **2016**, *52*, 1170; *Indian Patent Application No. 1160/KOL/2015*.

[3] Phukan, P. et al. *ChemistrySelect* **2018**, *3*, 2474; *ChemistrySelect* **2019**, *4*, 13094.

Prof. Rajib Kumar Goswami

IACS Kolkata

Education:

- Doctor of Philosophy (Chemistry): Indian Institute of Chemical Technology, Hyderabad, India, 2001-2007, Supervisor: Prof. Tushar K Chakraborty (Degree was awarded by University of Kalyani).
- M. Sc (Organic Chemistry): Calcutta University (Raja Bazar Science College, Kolkata, India), 2001
- B.Sc (Chemistry): Calcutta University (Krishnath College, Berhampore, India), 1999.

Professional Experiences:.

- Professor: Indian Association for the Cultivation of Science, Kolkata, India. 2020-Date.
- Associate Professor: Indian Association for the Cultivation of Science, Kolkata, India. 2016- 2020.
- Assistant Professor: Indian Association for the Cultivation of Science, Kolkata, India. 2011- 2016.
- Research Associate: The Scripps Research Institute, San Diego, California, USA. 2007-2011, Supervisor: Prof. Subhash C Sinha.

IL-02

Total Synthesis of Bioactive Natural Products: Carolacton and Alveolaride C

Rajib Kumar Goswami

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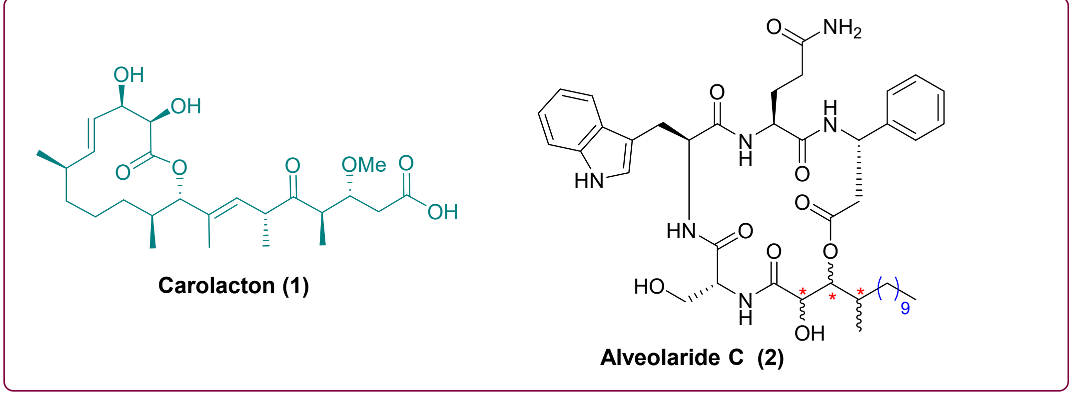
Abstract:

Total synthesis of natural product is one of the key backbones of many disciplines of science which attracted researchers due to their wide structural variations and broad range of biological activities. Carolacton (**1**) and alveolaride C (**2**) (Figure) are the bioactive secondary metabolites. Carolacton is a marine macrocyclic natural product which combats against *Streptococcus mutans* and *Streptococcus pneumonia*, the major bacterial pathogens responsible for human dental caries and pneumococcal infections, respectively, whereas. alveolaride C (**2**) is an antipathogenic marine natural product. The structure of alveolaride C was deduced partially by the isolation group. Attractive bioactivities of these secondary metabolites together with their natural scarcity as well as their structural uniqueness prompted us to develop synthetic routes to render them readily available which eventually would validate their structures. In this presentation, the state of art associated with the asymmetric total synthesis of bioactive carolacton (**1**)[1] and alveolaride C (**2**)[2] will be discussed.



Carolacton (1)

Alveolaride C (2)

Figure: Chemical Structures of Carolacton (**1**) and Alveolaride C (**2**).

References:

[1] Kuilya, T. K.; Goswami, R. K. *Org. Lett.*, **2017**, *19,* 2366–2369.
[2] Saha, S.; Paul. D.; Goswami, R. K. *Chem. Sci.,* **2020**,*11,* 11259-11265

Profl. Anil Kumar Saikia
IIT Guwahati

Qualifications

- Ph.D. Chemistry (Synthetic Organic Chemistry) CSIR-North East Institute of Science & Technology, 1996 P.Tech. Petroleum & Refining (PGD), Dibrugarh University, 1991
- M.Sc. Chemistry (Organic Chemistry) Dibrugarh University, 1990

Professional Experience

- Highest Academic Grade (HAG) Professor: 27th January, 2018
- Head, Central Instrument Facility (CIF): Indian Institute of Technology Guwahati, 2009-2013
- Professor: Department of Chemistry, Indian Institute of Technology Guwahati, India, 2011
- Assistant Professor: Department of Chemistry, IIT Guwahati, 2001
- Post Doctoral position: Florida State University, Florida (Prof. Robert A. Holton) USA, 2000-2001
- Post Doctoral position: Okayama University, Okayama (Prof. Sadao Tsuboi) Japan, 1998-2000
- Research Scientist: Chembiotek Research International, Salt Lake, 1998
- Research Scientist: Indian Institute of Chemical Biology (IICB), Kolkata, 1997-1998

Awards & Honours

- Fellow of the Royal Society of Chemistry (FRSC)
- Bronze Medal, Chemical Research Society of India (CRSI)

IL-03

Stereoselective Synthesis of Heterocyclic Compounds

Anil K. Saikia

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Abstract:

Cyclic ethers and their nitrogen and sulphur analogues have undoubtedly attracted the interest of synthetic chemists due to their occurrence in many natural products, and pharmaceuticals.[1] Development of novel highly efficient procedures for the synthesis of these molecules is of current interest. These procedures must be compatible with our environment and should have economical advantages. In such an approach the reduction of number of steps and increase in selectivity is a valuable standard for the quality of a synthesis. A general way to improve synthetic efficiency is the design of a selective transformations either in a diastereoselective or enantioselective fashion. Recently, we have developed a few methodologies for the diastero- and enantio-selective synthesis of oxygen, nitrogen and sulphur heterocyclic compounds.[2] Some of these methodologies are used for the synthesis of biologically active molecules. Detailed results will be discussed in the meeting.

References:

[1] (a) T. Yasumoto; M. Murata; *Chem. Rev*. **1993**, *93*, 1897-1909. (b) J. P. Michael; *Nat. Prod. Rep*. **2008**, *25*, 166-187.

[2] (a) Subhamoy Biswas, Bikoshita Porashar, Pallav Jyoti Arandhara and Anil K Saikia, *Chem. Commun*., **2021**, *57*, 11701- 11704. (b) Sudip Shit, Namita Devi, Ngangbam Renubala Devi and Anil K Saikia, *Org. Biomol. Chem*. **2019**, *17*, 7398-7407. (c) Upasana Borthakur, Subhamoy Biswas and Anil K. Saikia, *ACS Omega* **2019**, *4*, 2630−2636. (d) Ngangbam Renubala Devi, Madhurjya Borah, Sabera Sultana and Anil K. Saikia, *J. Org. Chem*. **2018**, *83*, 14987-14998. (e) Malay Das and Anil K. Saikia, *J. Org. Chem*. **2018**, *83*, 6178-6185. (f) Madhurjya Borah, Upasana Borthakur and Anil K. Saikia, *J Org. Chem*. **2017**, *82*, 1330−1339.

Keisham S. Singh

CSIR-NIO Goa

Dr. Keisham S. Singh is presently a Senior Scientist at the Bioorganic Chemistry Laboratory, CSIR-NIO, Goa. He received BSc and MSc. degrees in Chemistry from Manipur University. He did Ph.D. in Chemistry from the North-Eastern Hill University and postdocs in the field of Dihydrogen Chemistry at IISc. Bangalore and studied the Ruthenium-catalyzed C-H Bond Functionalization at the Centre for Catalysis and Green Chemistry, CNRS-University of Rennes 1, France. He was a visiting scientist at the Institute of Chemica & Biomolecular (ICB) Italy. He beg ISCA best paper award in Chemical Sciences and he is recipient of DST-BOYSCAST Fellow. His research interest lies on the discovery bioactive compounds from marine environment, Ruthenium-catalyzed synthesis of heterocycles including the synthesis of Marine Natural Product analogues and structural modification of polysaccharides. He has published over 50 scientific papers, review articles and book chapters.

IL-04

Ruthenium(II)-Catalyzed Synthesis of Heterocycles and Selected Marine Natural Product Analogues

Keisham S. Singh

Bioorganic Chemistry Laboratory, CSIR-National Institute of Oceanography, Dona Paula-403004, Goa

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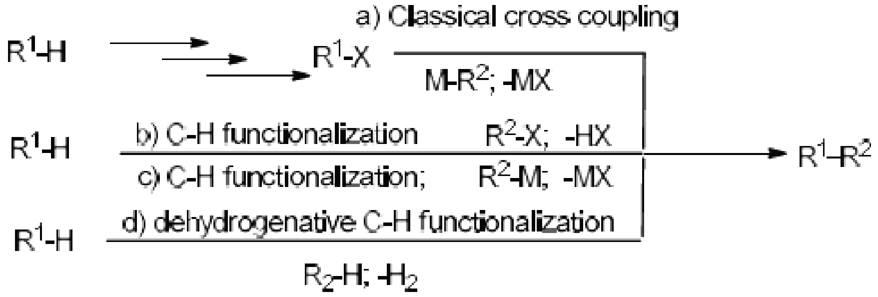
Abstract:

Transition metal-catalysed C-H bond functionalization is an efficient method for a ready access to various functional molecules from inexpensive reagents in a step/atom economy and in a highly selective manner [1]. Several complex molecules are readily accessible through C-H bond functionalization reactions such as direct C-H bond arylation, alkenylation, alkylation, halogenation, annulation, etc. Transition metals participated in the C-H bond functionalization of arene/ heteroarenes are mainly Pd, Rh, Ir, Cu and Ru and in few cases, Fe catalysts. Notably, ruthenium catalysts partner with a carboxylate ligand allowed various C-H bond functionalization reaction to perform in water which is cheap, safe and non-toxic solvent. Indeed numerous C-H bond functionalization reactions including

arylation [2], alkenylation [3], annulation [4] have been performed efficiently in water with ruthenium(II) catalysts. Relatively, inert C-H bond of ferrocene ring could also be activated efficiently with ruthenium(II) catalyst in the presence of a surfactant. Moreover, water soluble ruthenium complexes containing O^O, N^O or amine ligand promoted the C-H bond arylation in water [2a]. Catalytic C-H bond functionalization using ruthenium catalyst is now extended to the synthesis of certain natural product as well as pharmacological relevant compounds [5] and even for the selective bromination reaction using metal halides as bromine source instead of hazardous bromine. This presentation will discuss the recent development on ruthenium-catalysed C-H bond functionalization including those reactions in water and advantages of this powerful tool towards the synthesis organic compounds in particular heterocycles and also to the synthesis of selected marine natural product (MNP) analogues.



Scheme 1. Classical cross coupling (a); various strategies for C-H bond functionalization (b-d).

References:

[1] For selected review on ruthenium-catalysed C-H bond functionalization: (a) K. S. Singh, Catalysts, 2019, 9, 173 (b) P.B. Arockiam, C. Bruneau, P.H. Dixneuf, Chem. Rev. 2012, 112, 5879-5918.; (c) A. E. Wendlandt, A. M. Suess and S. S. Stahl, Angew. Chem., Int. Ed., 2011, 50, 11062; (d) C. L. Sun, B. J. Li and Z. J. Shi, Chem. Rev., 2011, 111, 1293.

[2] (a) K. S. Singh, P. H. Dixneuf, ChemCatChem, 2013, 5, 1313-1316; (b) P.B. Arockiam, C. Fishmeister, C. Bruneau, P.H. Dixneuf, Angew. Chem. 2010, 49, 6629 –6632.

[3] P. B. Arockiam, C. Fischmeister, C. Bruneau, P. H. Dixneuf, Green Chem. 2013, 15, 67–71.

[4] (a) K. S. Singh, S. G. Sneha, P. H. Dixneuf, ChemCatChem. 2016, 8, 1046 – 1050; (b) S.Warratz, C. Kornhaaß, A. Cajaraville, B. Niepçtter, D. Stalke, L. Ackermann, Angew. Chem. Int. Ed. 2015, 54, 5513-5517.

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Dr. N. Raghumani Singh

BARC Mumbai & Homi Bhabha National Institute Mumbai

Dr. Raghumani Singh Ningthoujam passed out M. Sc. in chemistry from Manipur University in 1994. He finished Ph. D. in Chemistry from IIT Kanpur in area of magnetic and superconductivity of metal nitrides in 2004. He joined BARC, Mumbai as Scientific Officer in 2006 after completion of Dr. K. S. Krishnan Fellowship. His present designation is Scientific Officer (F) at Chemistry Division, BARC, Mumbai. Presently, he is working in area of Luminescence and Cancer Therapy using nanomaterials. He did Post-Doctoral Fellowship at University of Victoria, Canada. He has published **160+ papers in Journals**, **12 Book Chapters** and **3 Books**. The citation index for his papers is **47 (h-index)** along with **total citations of ~ 6400+**. He is a reviewer of many journals (JACS, JPC Letters, ACS Nano, Scientific Reports, ACS Appl. Mater. Interf., JPC, JMC, DT, etc.).

Research Areas: Luminescent and Magnetic Nanomaterials and their applications in sensors, imaging, diagnosis and therapy.

Awards and Recognition:

- Among Top 2% of World Scientists
- Chemical Research Society of India (CRSI) Bronze Medal 2022
- Fellow, National Academy of Sciences, India (FNASc) 2016
- Fellow, Maharashtra Academy of Sciences (FMASc) 2013
- Scientific & Technical Excellence Award, DAE in 2012
- Young Achiever Award, SSPS 2010

IL-05

Application of Nanoparticles in Cancer Therapy

Raghumani Singh Ningthoujam

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Homi Bhabha National Institute, Mumbai 400094, India
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Abstract:

We have prepared the various magnetic and luminescenct nanomaterials such as Fe_3O_4, γ-Fe_2O_3, $La_{0.7}Sr_{0.3}MnO_3$, ferrites, ^{64}CuS, ^{166}Ho-Fe_3O_4, $NaYF_4$:Er^{3+}/Yb^{3+}@SiO_2@AuNP@Fe_3O_4, $NaErF_4$:0.5%Tm@$NaYF_4$:20%Yb, ^{177}Lu-labeled $NaGdF_4$:Ho-Yb@m-SiO_2, etc. These nanoparticles are properly surface functionalized. They (10-500 μg/ml) are highly bio-compatible. To treat cancer cells, magnetic based hyperthermia or FRET based photothermal techniques are used. To trace cancer cells, luminescence or radio-labelling based process is used. To target cancer cells, antibody molecules are added to surface of particles. In vitro and in-vivo experiments carried out in our lab will be discussed.

References:

[1] Super bright red upconversion in $NaErF_4$:0.5%Tm@$NaYF_4$:20%Yb nanoparticles for anti-counterfeit and bio-imaging applications. R. Joshi, R. S. Perala, S. B. Shelar, A. Ballal, B. P. Singh, R. S. Ningthoujam, ACS Applied Materials Interface 13, 3481 (2021).

[2] Insights into the structural and microscopic origin of magnetic properties of the γ-Fe_2O_3@Mn_xO_y nanostructure. R. Joshi, B. P. Singh, C. L. Prajapat, Y. Kashyap, C. Nayak, D. Bhattacharyya, R. S. Ningthoujam, J. Phys. Chem. C 125, 32 (2021).

[3] Smart YPO_4:Er-Yb nanophosphor for optical heating, hyperthermia, security ink, cancer endoradiotherapy and uranyl recovery. A. Kumar Soni, K. K. Yadav, B. P. Singh, R. Joshi, S. Chakraborty, R. Chakravarty, N. K. Nagaraja, D. K. Singh, V. Kain, A. Dash, and R. S. Ningthoujam, ACS Appl. Nano Mater. 4, 850 (2021).

[4] Near-infrared- and magnetic-field-responsive $NaYF_4$:Er^{3+}/Yb^{3+}@SiO_2@AuNP@Fe_3O_4 nanocomposites for hyperthermia applications induced by fluorescence resonance energy transfer and surface plasmon absorption. A. K. Soni, R. Joshi, B. P. Singh, N. Naveen Kumar, and R. S. Ningthoujam, ACS Appl. Nano Mater. 2, 7350 (2019).

[5] Induction heating studies of Fe_3O_4 magnetic nanoparticles capped with oleic acid and polyethylene glycol for hyperthermia. R. Ghosh. L. Pradhan, Y. P. Devi, S. S. Meena, R. Tewari, A. Kumar, S. Sharma, N. S. Gajbhiye, R. K. Vatsa, B. N. Pandey, R. S. Ningthoujam. J. Mater. Chem. 21, 13388 (2011).

Dr. T. Sanjoy Singh

Assam University

Brief Profile:

- Assistant Professor, 2011
- Post-Doctoral Fellow, 2010-2011
- Ph.D., NEHU, 2010
- M.Sc. (Chemistry), 2004

Research Interests:

- Experimental Spectrosopy
- Surface Chemistry

IL-06

Photophysics of Donor-Acceptor Based Schiff Base Systems in Varying Solvents Polarities

T. Sanjoy Singh
Department of Chemistry, Assam University, Silchar
E-mail: takhelsingh@gmail.com

Abstract:

Detailed photophysics of excited state intramolecular charge transfer process in few selected donor-acceptor systems in different pure solvents as well as in binary mixed solvents of varying polarities were studied using steady state absorption, fluorescence and time-resolved fluorescence spectroscopy in combination with density functional theory calculations. Large fluorescence spectral shift observed in polar solvents and large excited state dipole moment clearly indicates an efficient charge transfer behavior. Effect on addition of acid and pH variation studies as well as fluorescence decay time further reveals charge transfer character. The HOMO and LUMO molecular orbital picture for the optimized ground state, donor twisted and acceptor twisted geometry are obtained at density functional theory level using B3LYP functional and 6-311+g(d,p) basis set which also support excited state intramolecular charge transfer process. These molecular orbital diagrams corroborate the charge transfer process, depicting the transfer of electron density from the donor moiety to the acceptor part of the molecule. The MEP maps for the optimized ground state, donor twisted and acceptor twisted geometry shed insight on the electrostatic potential and charge distribution in a system which gives information about the reacting site of the probe and nature of the reaction.

Prof. Mannar R. Maurya

IIT Roorkee

Brief Profile:

- Post-Doctoral Fellow, NCL Pune, 1991-1993
- Post-Doctoral Fellow, Iowa State University, Ames, Iowa, USA, 1989-1991
- Post-Doctoral Fellow, Loyola University of Chicago, USA, 1987-1991
- Ph.D., Kurukshetra University (NIT Kurukshetra), Kurukshetra (1987)
- M.Sc., Bundelkhand University, Jhansi, 1981

Research Interests:

- Structural and functional models of haloperoxidase enzymes.
- Vanadium complexes relevant to biological systems.
- Vanadium and molybdenum complexes as catalysts in organic transformations.
- Catalytic applications of inorganic and organic polymer supported vanadium and molybdenum complexes for oxidation reactions and multicomponent one pot synthesis

Achievements: 170+ Journal Publications, 26+ Ph.D. students supervised, 11+ Research Projects, 15+ Invited Lectures,

Awards & Recognitions:

- Star Performer, IIT Roorkee, 2003-04, 2004-05 and 2005-06
- Best Teacher Award, IIT Roorkee, 2013
- 8 Best paper awards in Conferences/ Symposia

IL-07

Synthesis, Reactivity and Catalytic Potential of Vanadium Complexes

Mannar R. Maurya

Department of Chemistry, Indian Institute of Technology Roorkee, Roorkee 247 667
E- mail: m.maurya@cy.iitr.ernet.in

Abstract:

The interest in the coordination chemistry of vanadium has increased in the past two decades because of its biological, catalytic and medicinal importance. Most studied vanadium(V) complexes contain mainly three different vanadium motifs viz. the mononuclear $[VO]^{3+}$, mono- or dinuclear $[VO_2]^+$ and dinuclear $[V_2O_3]^{4+}$. The high-valent vanadium complexes having O and N functionalities show model character of enzymes vanadate-dependent haloperoxidases (VHPO) where vanadium(V) is in a trigonal-bipyramidal coordination environment. Their use as oxo-transfer catalysts and oxidative halogenation are remarkable. Intermediate species having $\{VO(H_2O)\}$, $\{VO_2\}$, $\{VO(OH)\}$ and $\{VO(O_2)\}$ cores have been postulated during catalytic turnover. The stability of vanadium(V) complexes under aerobic conditions has allowed the design of structural and/or functional models for the haloperoxidases and to isolate or generate species having above groups in solution. Reactivity of the resulting complexes with various substrates has also been carried out to explore the other aspects of these complexes. Catalytic potential of these complexes have been tested for the oxidation, oxidative halogenations and sulfoxidation of various substrates.

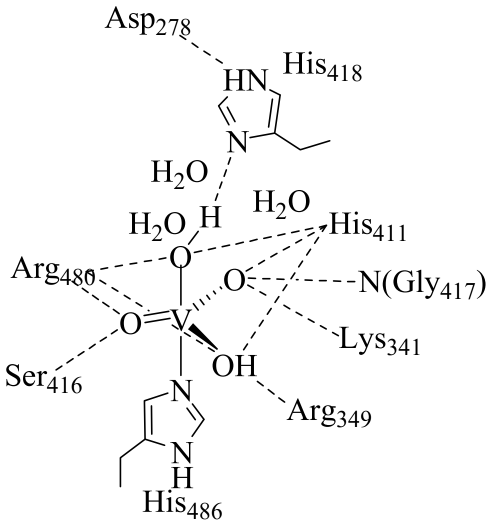

Figure 1. Active site structure of vanadate-dependent haloperoxidase from *Ascophyllum Nodosum*.

Prof. G. Krishnamoorthy

IIT Guwahati

Prof. G. Krishnamoorthy did his Ph. D. from IIT Guwahati. He was the postdoctoral fellow at Florida State University and University of Hawaii at Monoa. He received prestigious Camille and Henry Dreyfus Environmental Chemistry Postdoctoral Fellow and worked at Iowa State University. He joined the Indian Institute of Technology Guwahati in 2005 as an assistant professor in the department of Chemistry. Currently he is the Professor in the same department and School of Health Sciences & Technology. He held several administrative positions also. He was the Head of Central Instruments Facility of IIT Guwahati from June 2013 to September 2017, Associate Dean of Research and Development of the institute from August 2017 to April 2020. From May 2020 he is the Dean of Indutrial Interactions and Special Initiatives of IIT Guwahati. He works in the area of excited stated processes. He was invited by American Chemical Society's journal, Journal Physical Chemistry to submit an article for the special issue on 'Photoinduced Proton Transfer special issue'. He was also invited by Royal Chemical Society's journal, Physical Chemistry Chemical Physics to submit an article for the special issue on 'Hydrogen Bonding in the Excited State'. The article was one of the top 10 most read article of the journal in the month it was published.

IL-08

Proton Transfer Triggered Processes

G. Krishnamoorthy

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Guwahati, Assam 781039
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Abstract:

The proton transfer is a fundamental chemical process and play key role in several other processes. In some times it induces other interesting processes. Aminophenylimidazopyridines are interesting molecules, these emit normal emission even in polar solvents. But in protic solvents the proton transfer in the excited state induces twisted intramolecular charge transfer (TICT) in these molecules. under proton transfer induced charge transfer a and few some processes are proton transfer triggered intramolecular charge transfer. In 2-(4′-amino-2′-hydroxyphenyl)-1H-imidazo-[4,5-c]pyridine (AHPIP-c), the intramolecular proton transfer suppresses the inter molecular proton transfer induced TICT. However, in 2-(4′-diethylamino-2′-hydroxyphenyl)-1H-imidazo-[4,5-b]pyridine (DEAHPIP-b) depending on the solvent intramolecular or intermolecular proton transfer dominates. Therefore, it emits normal emission, tautomer emission and/or TICT emission. Recently, we have found that silver nanoparticle also induces the TICT by the proton transfer to dimethylforamide. Recently, we also observed new kind of proton transfer, ‘Proton Transfer Triggered Proton Transfer’ (PTTPT) in a triazole.

Prof. Ramesh Ch. Deka

Tezpur University

Prof. Deka has been working on fundamental aspects of catalysis, nanotechnology, drug design and atmospheric chemistry. He also carries out theoretical and experimental studies on heterogeneous catalysis with an aim to understand the nature of active sites and reaction mechanisms. He performs ab initio and density functional theory calculations to study electronic structure and reactivity of zeolite catalysts, metal clusters, supported metal clusters, carbon nanotubes, functionalized carbon nanotubes, varieties of drug molecules and volatile organic compounds. Prof. Deka's theoretical studies involve usages of new computational chemistry methodologies and expanding the scale and efficiency to provide realistic simulations. Prof. Deka also performs experimental studies in modifying zeolite, metal oxide nanoparticles and layered double hydrotalcite and uses them for various organic reactions. Professor Deka has published more than 200 research papers in international journals and 16 students got Ph.D. under his guidance.

IL-09

QM/MM Studies on the Mechanism of CO Oxidation over Pd_4 Catalyst

Ramesh Ch. Deka

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Napaam, Tezpur – 784 028, Assam, India
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Abstract:

Density functional theory calculation at PBE/DNP level shows an enhanced catalytic activity of CO + O_2 reaction catalysed by Pd_4 cluster. The rate-limiting step in this reaction is the dissociation of O_2 molecule on neutral Pd_4 cluster. When the Pd_4 cluster is supported on faujasite zeolite, the catalytic activity is found to enhance. Both Eley-rideal (ER) and Langmuir-Hinshelwood mechanisms are invested for the reaction between CO and O_2. The CO oxidation takes place via both Eley-Rideal mechanism and Langmuir-Hinshelwood mechanisms. Since the energy barrier for ER mechanism in the gas phase calculation is lower than that for LH mechanism, we performed only ER mechanism in the supported Pd_4 cluster.

Prof. Kiran Kumar K. Sharma

Shivaji University

Education:

- Ph.D. (Chemistry), Pune University, 2003
- M.Sc. (Chemistry), Manipur University, 1998

Teaching Experience: 13+ Years

Achievements: 33+ Journal Publications, 1 Book, 4 Ph.D. students supervised, 2 Patents, 6 Research Projects,

Awards & Recognitions:

- Best Research Award, North Maharashtra University, Jalgaon, 2015
- Awarded DST Fast Track Young Scientist Scheme, 2012
- Travel Award Support for International Conference on Radiation Research, San Francisco, California, USA, 2007
- Student in Training Travel Award for Radiation Research Society Meeting at Philadelphia and Colorado, USA, 2005 & 2006
- Young Investigator Award for Gordon Research Conference on Radiation Chemistry, Maine, USA, 2004
- State Government Merit Scholarship for Post Graduate Studies in Chemistry, 1996
- International Universite Presidential Postdoctoral Fellow (LCAM-CNRS, Universite Paris Sud-XI, France), 2009-2010
- NIH Postdoctoral Research Associate, Department of Biochemistry & Biophysics, School of Medicine & Dentistry, University of Rochester, Rochester, New York, USA), 2004-2007
- Research/Teaching Associate (Department of Biotechnology, University of Pune, 2003-2004 & 2008-2009
- Visiting Researcher, Radiation and Genome Stability Unit, Medical Research Council, Harwell, Oxford, UK, 2001 and 2002
- JRF & SRF (UGC-DAE-CRS, Kolkata Centre), 1998-2003

IL-10

Innovations in Nanoscience and Nanotechnology: Role of Chemistry

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Abstract:

Nanoscience and Nanotechnology is foreseen to contribute to major changes to the global economy, workforce, and way of living. It has been one of the most talked about industries of the last few years. The predicted value of US$173.95 billion globally by 2025, this fast-moving sector is already delivering major sustainability, health and well-being benefits to society. Applications range from automotive, computing, electronic, cosmetics, sports and healthcare industries all benefit from nanotechnology innovations. New fields have also emerged, such as nanomedicine, which aims to dramatically improve our future ability to treat disease. New electronic devices and the means to fabricate them to materials for health and environmental uses. Some nanotech products are already on the market while others are decades away from realization outside the lab. Unlike the transistor or steam engine, nanotechnology is not a single material and are concerned with the development of new technologies at the size scale of about 1 to 100 nanometers. The main reason being, at the nanoscale, the physical, chemical, and biological properties of materials differ from those of individual atoms or bulk matter. The nanoscale is an intermediate regime where classical physical laws overlap with quantum effects and hence nanotechnologies involve creating structures and devices that have novel properties, applications, and behaviour because of their intermediate size. Further, nanotechnologies are based on the ability to precisely control and manipulate these materials and devices on the atomic or near-atomic scale. Therefore, commercialization of nanotechnology as of today, however suffers from several fundamental killing problems that may slow its realization as the platform technology of the 21st century. The bottlenecks and problem face for development of nanotechnology based products for society will be discussed with emphasis on the underlying chemistry through examples like mimicking lotus effect on fabrics, greener sustainable water purification and Virus Kavach Fabric Spray Technology, which can deactivate >99% of bacteria and SARS-CoV2 virus developed in Advanced Nanomaterial Laboratory, School of Nanoscience and Technology.

Dr. Meitram Niraj Luwang

NCL Pune

Education:

- Ph.D. (Chemistry), Manipur University, 2012
- M.Sc. (Chemistry), Manipur University, 2004
- B.Sc. (Chemistry, Imphal College, 2002

Research Interests:

- Synthesis and surface engineering of nanostructured materials.
- Investigation for potential applications of nanomaterials in luminescence, catalysis, sensing and biomedical applications.
- Theoretical aspect of novel materials.
- Developments and fabrication of low cost sensor device, smart appliances, etc.
- Scale up of materials synthesis.

Achievements: 26+ Journal Publications, 7 Patents, 2 Ph.D. students supervised, 2 Research Projects, 6+ Invited Lectures

Awards & Recognitions:

- UGC Research Fellowship in Sciences for Meritorious Student, from UGC, New Delhi (2008- 2009).
- Mahatma Gandhi Fellowship from Gandhi Darshan and Gandhi Smriti, New Delhi (2007-2008).
- Post Graduate Merit Scholarship from the Directorate of University & Higher Education, Government of Manipur (2003-2005).
- Certificate of Merit under National Scholarship Scheme, Govt. of India (1997-98).

IL-11

Graphene Nanogate Structure: A New Chemical Bond Entity and Its Energy Applications

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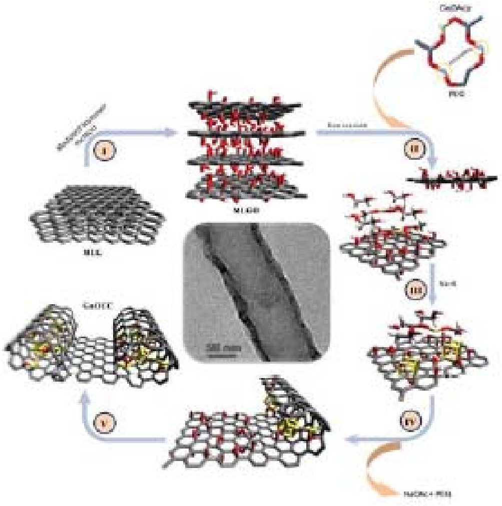
Abstract:

The present work largely centers on the discovery of grapheme 'Nanogate' structure (GNS). It is new type of chemical bond entity between the bilayers of reduced graphite oxide (rGO). This intercalated between rGO layers by metal sulfides (M = Zn, Cd), as well on the rGO surface. This work forcuses on the design, systhesis, mechanism, theoretical study, catalytic and energy conversion applications of the GNS with two different metal sulfides. The literature report on the grapheme and graphite oxide (GO) based sandwiched-composite materials were highlighted. Later on, the challenge in this field were discussed and the motivation behind this structure (GNS). The design and optimization of the synthesis of the 'Nanogate' structure as well as theoretical study supported via density function theory (DFT) calculations.

Further, the discovery of GNS with metal sulphides as well as the composite sandwiched structure of rGO and metal sulfides quantum dot which shows the superior photocatalytic application like dye degradation, hydrogen generation through water splitting and its enhanced piezoelectric properties were presented.



References:

[1] M. N. Luwang et. al; *Nature Scientific Reports* **2019**, *9*, 937.
[2] M. N. Luwang et. al.; *Mater Sc. Eng. – B* **2022**, *276*, 115528.
[3] M. N. Luwang et. al.; *ACS Inorganic Chemistry* **2022**, *61* (1), 279.

Dr. Chingakham Brajakishor Singh

IBSD Imphal

Brief Profile:

- Research Associate, IIT Guwahati, 2005-2008
- Research Associate, Manipur University, 2004-2005
- Ph.D. (Chemistry), Manipur University, 2004
- M.Sc. (Chemistry), Manipur University, 1997

Research Expertise:

- Survey and Documentation of important medicinal and aromatic plants used in traditional / folklore medicines of North-East India.
- Isolation, Purification and structure elucidation of bioactive components by bio-activity guided fractionation of potent extracts of the plants used in traditional / folklore medicines of North-East region .
- Standardization of technology for the production of essential and aromatic oils from the potential plant resources of North-East India for commercialization.

Achievements: 60+ Publications, 1 Patent, 2 Ph.D. students supervised, 5 Book Chapters, 6 Research Projects

Awards & Recognitions:

- Post-graduate scholarship, Government of Manipur, 1995-1997

IL-12

Zerumbone, A Sesquiterpene from Zingiberaceae plant, *Zingiber zerumbet* Smith as Anti-Cancer Agents

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Abstract:

Zerumbone,a sesquiterpene with the molecular formula ($C_{15}H_{22}O$) is present in *Zingiber zerumbet* Smith, a zingiberaceae plant under the Zingiberaceae family, one of the largest group under plant kingdom. The rhizomes present the highest amount of zerumbone followed by the leaves. Chemically, zerumbone is a sesquiterpenoid and cyclic ketone that is (1E,4E,8E)-alpha-humulene which is substituted by an oxo group at the carbon atom attached to two double bonds. It can be obtained from rhizomes oil by column chromatography using medium polar solvent. There are various studies on zerumbone which shows that zerumbone is a promising drug for the treatment of certain cancer types such as colon, breast, cervix, and liver cancer and that it inhibits their proliferation with selective action towards cancer cells compared to normal ones. Whereas other studies have shown that zerumbone can prevent the growth of cancer cell because of some interference of few important proteins which cause an anti-proliferative influence on several cancer cell lines like blood, skin, breast, liver, lung and colon . In fact, zerumbone has been known to inhibit various proteins and drug target especially in diseases such as cancer and inflammatory diseases.

Keywords: Zingiberaceae family, Zingiber zerumbet, Zerumbone, Anti-cancer

Oral Presentation

OP-01

Synthesis, Characterization, Crystal Structures and Anti-Diabetic Assay of Dibutyltin(IV) Complexes with Azo-Carboxylates

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Abstract:

Dibutyltin (IV) complexes **1**-**3** were synthesized by the reaction of either dibutyltin (IV) oxide or dibutyltin (IV) dichloride with azo-carboxylic acid ligands *viz*. 2/4-(2-hydroxynaphthylazo)-benzoic acids in different stoichiometric reaction ratios. They were characterized by elemental analysis, UV, IR and multinuclear [^{1}H and ^{13}C- and ^{119}Sn]-NMR spectroscopy. The geometry and the mode of coordination around tin atoms in the complexes in solid state were determined by X-ray crystal structure analysis. Complex **1** exhibit a dinuclear structure with a distorted square-pyramidal geometry around each Sn atom. Compound **2** showed bis[dicarboxylatotetraorganodistannoxane] type structure $\{[R_2Sn(O_2CR')]_2O\}_2$ which contain a centrosymmetric Sn_2O_4 core in which Sn_2O_2 ring is connected to *exo*-cyclic tin atom through μ_3-oxo O-atoms. The coordination geometry around *exo*- and *endo*-cyclic tin atoms is an intermediate between square-pyramidal and trigonal bipyramidal and distorted octahedral respectively. In **3**, the coordination sphere around tin atoms adopts a skew-trapezoidal bipyramid geometry. ^{119}Sn NMR study suggests 5-coordinate structures in complex **1** and **3** in solution state while in **2**, the geometry around *exo*- and *endo*-cyclic tin atoms was found to be five and six coordinate structure respectively. The anti-diabetic activity of the complexes was also studied and the results of the assays showed effective activity of compound **2** as compared to **1** and **3**.

Key words: Dibutyltin (IV) complex; NMR spectroscopy; crystal structures, *endo*- and *exo*-cyclic, antidiabetic activity.

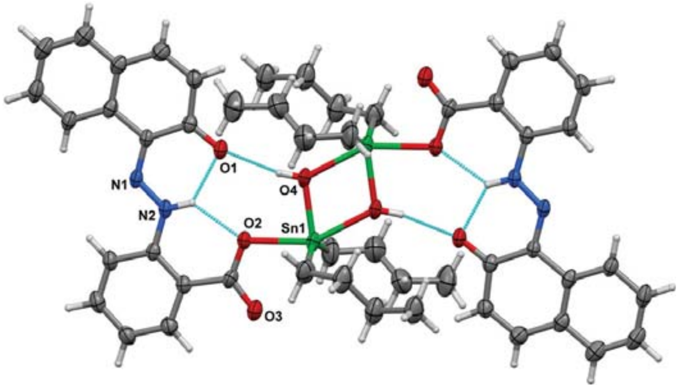

Fig. 1 The molecular structure of **1**. Displacement ellipsoids drawn at 50% probability level.

Reference:

[1] P. Debnath, K.S. Singh, K.K. Singh, S.S. Singh, L. Sieroń, W. Maniukiewicz, New J. Chem. 44 (2020) 5862.

OP-02

Studies on the Stepwise Stability Constants and the Thermodynamic Quantities Pertaining to the Interaction of Some Bivalent Transition Metal Complexes with 1-Amidino-O-Isopropylurea

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Abstract:

The developments in the field of co-ordination chemistry are mostly based on the complexation reaction between the different transition metal ions and the various ligands and their characterisation. Interaction of 1-amidino-O-isopropylurea with bivalent transition metal ions Zinc(II), Cadmium(II) and Manganese(II) in aqueous media have been studied pH-metrically. Since most of the ligands are either acids or bases displacement or association of one or more protons takes place during complexation. This results in the changes of the hydrogen ion concentration of the system. These changes can be found by titration of acid, ligand and metal-ion solution against a standard alkali. The pH measurements were done by a digital pH -meter after each addition of known amount of the alkali solution from a micro burette to the reaction cell. The pH-values thus obtained were plotted against the volume of the alkali added.

Stepwise proton-ligand and metal-ligand formation constants have been evaluated at 0.05, 0.10, 0.15 and 0.20M ionic strengths at a fixed temperature of 293K and also at 298K, 303K, 308K and 313K at a fixed ionic strength of 0.10M KNO_3.The change in the thermodynamic parameters, free energy(ΔG°),enthalpy(ΔH°) and entropy(ΔS°) have been studied by accompanying the complexation reaction using temperature co- efficient and Gibb's Helmholtz equation.

The higher negative values of ΔG° indicate the greater complexing tendency. Both ΔH° and ΔS° changes favour the formation of complexes. The ΔH° values are all negative while ΔS° values are all positive showing the formation processes of these complexes are spontaneous. The order of stability of the metal complexes were found as
Zinc(II) > Cadmium(II) >Manganese(II).

Keywords: Stability constants, 1-amidino-O-isopropylurea, thermodynamic parameters, ionic strength, Gibb's Helmholtz equation

OP-03

Organotin(IV) Azo-Carboxylates: Synthesis, Characterization, Crystal Structures and Anti-Diabetic Activity

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Abstract:
Organotin (IV) complexes **1**-**3** were synthesized by the reaction of 2-(4-hydroxynaphthylazo)-benzoic acid with *bis*-tributyltin (IV) oxide (**1**) or dibutyltin (IV) oxide (**3**) or trimethyltin (IV) chloride (**2**). They were characterized by elemental analysis, IR and multinuclear [^{1}H- and ^{13}C- and ^{119}Sn-] NMR spectroscopy. The coordination geometry around tin atom in **1** and **2** is TBP where the equatorial plane is occupied by the three alkyl groups (Bu or Me) and the axial positions in **1** are being occupied by carboxylate and phenoxide oxygen atoms giving rise to a polymeric structure. In **2**, a hydroxy oxygen atom bridges two tin atoms occupying each axial position while the other axial positions in each tin atom are being occupied by a carboxylate oxygen atom or oxygen atom of a water molecule respectively thereby completing TBP geometry. The structure of **3** is a di-nuclear complex with six-coordinate distorted skew trapezoidal and seven- coordinate pentagonal bipyramidal geometry around the two tin atoms respectively in the dinuclear structure. The complexes are suggested to adopt four-coordinate geometry in **1** and **2** while five-coordinate structure is indicated in **3** in solution state. The complexes were screened for antidiabetic activity against α-glucosidase enzyme and showed significant inhibition activity.

Key Words: Organotin (IV) complexes, spectroscopy; crystal structures, antidiabetic activities.

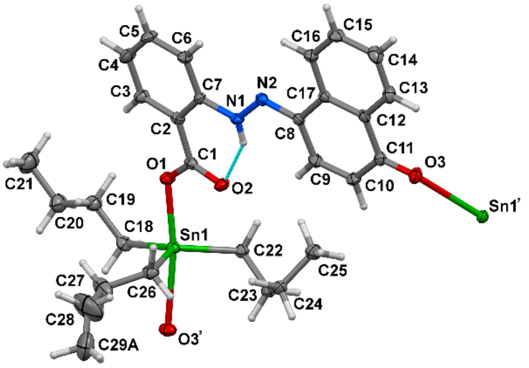

Fig. 1 The molecular structure of **1**. Displacement ellipsoids drawn at 50% probability level.

Reference:
[1] P. Debnath, K.S. Singh, T.S. Devi, S.S. Singh, R.J. Butcher, L. Sieroń, W. Maniukiewicz, Inorg. Chim. Acta 510 (2020) 119736.

OP-04

Design and Preparation of Reduced Graphene Oxide/Vanadium Pentoxide/Polycaprolactone Nanofiber as Supercapacitor Electrode Material

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Abstract:
Electrospun rGO/V_2O_5/PCL nanofiber was prepared with different concentrations of rGO contain on aluminum foil. The electrospun rGO/V_2O_5/PCL nanofibers were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier transforms infrared spectroscopy (FTIR), Raman spectroscopy, and electrochemical properties. Form XRD observed that peaks at 21.3, 24.3 corresponding to the plane (110), (200) for PCL exhibit two strong diffraction peaks at 20.4, 30.9 and 26° corresponding to the plane (001) (301) and (110) for V_2O_5 in the rGO/V_2O_5/PCL nanofiber. In the Raman parameter, the intensity ratio of D and G bands, (ID/IG) is varied from 0.9 and 0.8 the value of ID/IG decreases suggesting an increase in ordering of sp^2 bonded graphitic domains. FTIR results show the chemical bonding V-O-V, SO_2, C-O-C, C-S, C=O, C-H, and O-H respectively. Cyclic voltammetry analysis of the maximum specific capacitance of 508 F/g at scan rate 5mV/s with capacitance retention of 82.5% at $5Ag^{-1}$ over 1000 cycles.

Keywords: Supercapacitor; electrospun nanofiber; reduced graphene oxide.

OP-05

Synthesis of *Plantago ovata* and Vinylsulfonic Acid Sodium Salt based Polymeric Networks for Removal of Mercuric Ions from Wastewater

Kriti,* and Kiran Kumar

Chemistry Department, Himachal Pradesh University, Shimla

Abstract:
Present era is facing a great threat of scarcity of freshwater suitable for drinking. Increasing population, urbanization and industrialization are the major reasons behind this menace. Unplanned industrial and domestic waste-management, letting tonnes of toxic metal ions and other toxic chemicals drive into the water bodies, has led to high level of risk to underground as well as ground freshwater present worldwide. Tremendous research has been carried-out to cope up with the problem. Present study therefore, deals with the synthesis of *Plantago ovata* and vinyl-sulfonic acid sodium salt based crosslinked networks, Psy-cl-poly(VSA), using N,N'-methylenebisacrylamide-ammonium persulfate as crosslinker-initiator system. The polymers synthesized at different crosslinker concentrations (0%, 1% and 2%) were optimised with respect to their swelling studies. The optimised Psy-cl-poly(VSA) was further used for removal of mercuric ions (Hg^{2+}) from aqueous medium. The polymeric network showed uptake of 91.95% at 120 minutes, 30°C and at 1 ppm concentration. Hence, it can be concluded that the synthesized polymeric material has a great potential as adsorbent in wastewater treatment.

Keywords: Adsorbent, wastewater treatment, metal ion sorption, polymeric material.

OP-06

Synthesis, DFT and Crystal Structure of Three Oxovanadium(IV/V) Complexes with Substituted 2,2-bipyridine Ligands and it's Antidiabetic Property Studies

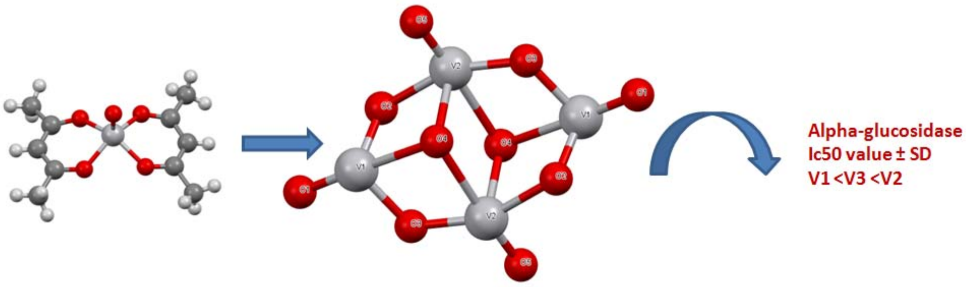
Atom Rajiv Singh[1], Lhaineichong Khongsai[2], Ch. Brajakeshor Singh[3], Rajkumari Lonibala*[1]

[1]Department Of Chemistry, Manipur University, Canchipur, Imphal-795003, Manipur, India
[2]Institute of Bioresources and Sustainable Development, Imphal 795001, Manipur, India
[3]Institute of Bioresources and Sustainable Development, Imphal 795001, Manipur, India (i/c Aizawl)

Abstract:

Three oxovanadium(IV/V) complexes using 5,5-Dimethylbipyridine, 4,4-Dimethoxy-2,2 bipyridine and 4,4-Dimethylbipyridine as ligands namely **V1**,**V2** and **V3** were synthesized by using appropriate methods .Single crystal XRD confirms the formation of defective dicubane core {V4O8} in all the three complexes.**V1** crystallizes as triclinic with space group P-1 possessing tetranuclear vanadium cluster with two oxidation state i.e +4 and +5.Similarly, **V2** and **V3** possess the same vanadium cluster as **V1**.However, V2 and **V3** crystallizes as monoclinic with space group $P2_1/n$. The oxidation states of vanadium centers in V1,V2 and V3 are determined using bond valence sum (BVS) calculations and X-ray Photoelectron spectroscopy (XPS). α-glucosidase inhibitors are shown by all the three complexes and no inhibition over α -amylase. Complexes **V1**, **V2** and **V3** are characterized using Infra Red Spectroscopy, absorption spectroscopy, TGA/DTA, XPS, DFT and Single Crystal XRD.

Graphical abstract:



OP-07

Synthesis of N/N-S Containing Graphene from Fruitwastes: Chemistry and Mechanism

Jhuma Debbarma, and Mitali Saha*

Department of Chemistry, National Institute of Technology Agartala, Tripura-799046, India

Abstract:

The present work deals with the synthesis of N/N-S containing graphene from nitrogen rich fruit wastes in the presence of urea and thiourea. Since, pure graphene exhibited limited electrocatalytic activity due to low number of active sites, it is highly recommended to introduce multi-heteroatoms into the graphitic lattice which can increase electrical conductivity as well as interlayer spacing of graphene. The results suggested that both urea and thiourea played a dual role as not only they involved in the cyclization and aromatization to form graphitic lattice but also introduced nitrogen and sulfur atoms within the lattice during pyrolysis. The utilization of urea and thiourea facilitated the development of N-S containing graphene from fruitwastes and also prevented the attack of oxygen in between 250-350 ^{o}C under normal atmospheric conditions.

OP-08

Phytochemical Profiling Of Petroleum Ether and Chloroform Extracts of *Curcuma Caesia* Rhizome by GC-MS and Comparing Their Bioactivities

Rameshor S. Atom,[1] and Warjeet S. Laitonjam[2,*]

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[2]Department of Chemistry, Manipur University, Imphal 795003, India
** E-mail: rameshoratom@gmail.com Phone: 8787319276*

Abstract

The study characterise the putative phytochemical constituents of petroleum ether (CC-P) and chloroform (CC-C) extracts of *Curcuma caesia* rhizome by GC-MS analysis and compare their bioactivities (antioxidant, antibacterial and antifungal) using bioassays. GC-MS analysis facilitated the documentation of a total of 16 and 20 volatile constituents in CC-P and CC-C extracts respectively. Out of which the major constituents present in CC-P were cycloisolongifolence,8,9-dehydro-9-formyl- (19.64%), 4-oxo-β-isodamascol (16.05%), 6,10-dimethyl-3-(1-methylethyl)-6-cyclodecene-1,4-dione (13.80%), 2H-cyclohepta[b]furan-2-one,6-[1-(acetyloxy)-3-oxobutyl]-3,3a,4,7,8,8a-hexahydro-7-methyl-3-methylene- (9.08%), tricyclo[5.1.0.0(2,4)]oct-5-ene-5-propanoic acid,3,3,8.8-tetramethyl- (6.39%), 2(3H)-benzofuranone,6-ethenylhexahydro-3,6-dimethyl-7-(1-methylethenyl)-,[3S-(3α,3aα,6α,7β,7aβ) (4.18%) and 7a-isopropenyl-4,5-dimethyloctahydroindene-4-carboxylic acid (4.01%). Similarly, the major constituents present in CC-C were cycloisolongifolence,8,9-dehydro-9-formyl- (15.69%), 6,10-dimethyl-3-(1-methylethyl)-6-cyclodecene-1,4-dione (13.38%), 2H-cyclohepta[b]furan-2-one,6-[1-(acetyloxy)-3-oxobutyl]-3,3a,4,7,8,8a-hexahydro-7-methyl-3-methylene- (4.55%), tricyclo[5.1.0.0(2,4)]oct-5-ene-5-propanoic acid,3,3,8.8-tetramethyl- (7.50%), 2(3H)-benzofuranone,6-ethenylhexahydro-3,6-dimethyl-7-(1-methylethenyl)-,[3S-(3α,3aα,6α,7β,7aβ) (6.15%), 7a-isopropenyl-4,5-dimethyloctahydroindene-4-carboxylic acid (6.43%) and 2-(4a,8-Dimethyl-6-oxo-1,2,3,4-4a,5,6,8a-octahydro-naphthalen-2-yl) propionaldehyde (6.57%). The two extracts, CC-P and CC-C exhibited almost similar antibacterial and antifungal potentials but differ in antioxidant activity. The IC_{50} values of CC-P and CC-C extracts by DPPH scavenging were 0.68±0.02 mg/ml and 0.13±0.01 mg/ml respectively. Together, above results provide an important basis for the isolation of bioactive compounds from *Curcuma caesia* rhizome extract and for their use as traditional medicine.

Keywords: *Curcuma caesia*, rhizome, extracts, phytoconstituents, GC-MS, bioactivities

OP-09

Structures, Redox, Magnetic and Protein Binding Properties of Two Monomeric Copper(II) Complexes Derived From 1,3-Dimethyl-5-(4'/3'-pyridylazo)-6-aminouracil

Nishithendu Bikash Nandi, and Tarun Kumar Misra

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Abstract:
Two new monomeric copper(II) complexes $Cu^{II}L1_2.MeOH$ (**1**) *and* $Cu^{II}L2_2.H_2O$ (**2**) *synthesised* based on 1,3-dimethyl-5-(4'/3'-pyridylazo)-6-aminouracil (L1:4'-pyridylazo and L2:3'-pyridylazo) .The complex **1** is in monoclinic space group C2/c, Z = 4 and the complex **2** is in triclinic space group P-1, Z = 2. The coordination environment about Cu(II) is distorted square planar with the involvment of $d_{x^2-y^2}$ orbitals confirmed by the study of EPR spectra with well-resolved hyperfine features with $g_{||} > g_{\perp} > g_e$ ($g_{||}$ =2.20 and $g_{\perp}$ =2.05). The $E_{½}$ values for oxidative response of Cu(III)/Cu(II) couple are 1.030 V (ΔE = 133 mV) for **1** and 0.982 V (ΔE = 128 mV) for **2**, indicating high redox stability of Cu(II) ions in the complex environment. Magnetic property of **1** was investigated in the temperature range 1.8-300K indicate a weak antiferromagnetic interaction between Cu(II) ions in the crystal lattice below 25 K. The study of Bovin Serum Albumin (BSA)-complex interactions reveals that the BSA binds the complexes through the sites of tryptophan residues in 1:1 manner (n = 0.9007 & $K_A = 1.482 \times 10^4\ M^{-1}$ for **1** and 0.7433 & $K_A = 2.394 \times 10^3\ M^{-1}$ for **2**). Moreover, the results of BSA interaction with complexes further supported by molecular docking. Thus the complexes could be treated as multi-functional materials in the field of structure, optical, magnetism and protein-binding activity.

Keywords: 6-Aminoazouracil; mononuclear copper(II); weak antiferromagnetic coupling; BSA study; docking

OP-10

Release of Iodine Entrapped in Hydrogels of Aloe Vera or Gelatin or Blended Hydrogels of Aloe Vera and Gelatin in Aqueous Media and the Kinetics of the Release Process

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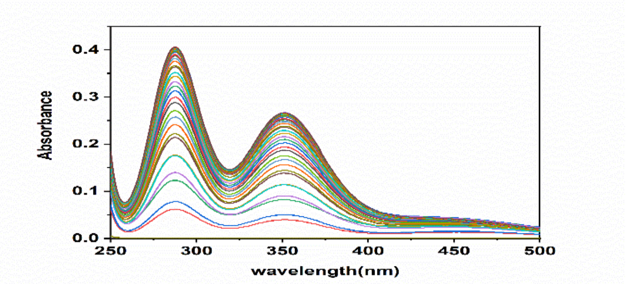
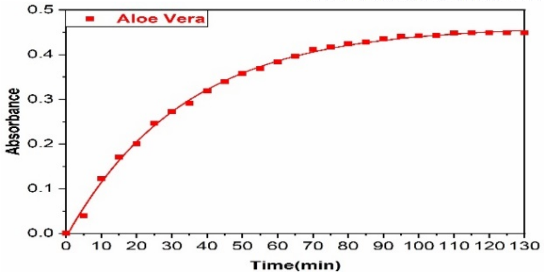
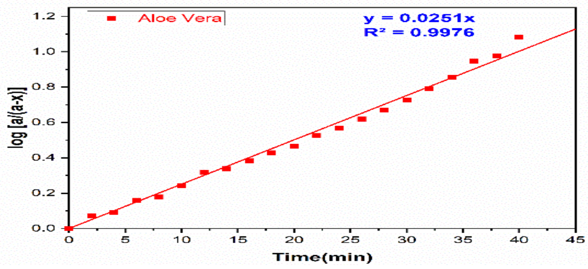
Abstract:

The Aloe vera plant and its extract specially the aloe vera gels have been reported to possess a number of health benefits including many medicinal properties. Earlier studies from our Laboratory have shown that Aloe vera or blend of Aloe vera – Gelatin hydrogels can be effectively employed as template for the entrapment of iodine. The present study reports the release of iodine from the iodine entrapped Aloe vera or blends of 80%, 50% and 20% w/w Aloe vera – Gelatin hydrogels. The release behavior of the entrapped iodine in the hydrogel was studied by dispersing the iodine entrapped hydrogel in aqueous media and monitoring the amount of iodine released spectrophotometrically against time until the saturation point. The results showed that almost the total amount of iodine entrapped in Aloe vera gel is released within a very short time – in about 180 minutes.







On the other hand, iodine entrapped in Gelatin hydrogel is released relatively much slower as compared to that of Aloe vera gels. The release of the entrapped iodine from Aloe vera gels may be controlled to be in a slow and sustainable way by blending the Aloe vera gel with gelatin. The kinetics of the iodine released from the Aloe vera gels or its blends has also been studied and was observed to follow first order kinetics. The variation of sol-gel transition temperature of pure Gelatin and Aloe vera/ Gelatin mixed hydrogels were studied using a Vibro-Viscometer. Characterisation of the hydrogels were done using physical methods like XRD and IR spectrophotometer.

Keywords: Aloe Vera, Iodine, Gelatin, Hydrogels.

OP-11

Synthesis of Guar Gum Based Potent Hydrogel for Dye Adsorption

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Email: puneetchandel1997@gmail.com; sandeepchauhanin2020@gmail.com

Abstract:

In the recent times researchers are exploring materials which are sustainable and efficient for the removal of pollutants like dyes, heavy metal ions and other industrial effluents. Guar gum, a gallactomannan polysaccharide is a suitable candidate for this purpose owing to properties like biocompatibility, non toxic nature, high abundance and low cost. In the present paper, we report the synthesis of potent hydrogel of guar gum for effective adsorption of dyes. Guar gum has been grafted with 2-Acrylamido-2-methylpropane sulfonic acid (AMPS) and cross linked with three different concentrations (2%, 5% and 10%) of Ethylene glycol dimethylacrylate (EGDMA). Thus synthesized hydrogels have been characterized by FTIR spectroscopy and SEM studies. Detailed swelling studies of the hydrogels have been carried out as a function of time, temperature and pH. The hydrogels were investigated for their adsorption for two cationic dyes, malachite green and crystal violet. Preliminary studies revealed best uptake of dyes for the hydrogel synthesized by using 5% EGDMA which was further investigated for uptake of dyes as a function of time, temperature, pH and concentration of the dyes. The hydrogel showed tremendous potential upto 93.13% or 46.56mg/g for removal of malachite green and upto 91.49% or 45.74 mg/g) for crystal violet at 30°C in 30 minutes. The results of this study can be highly valuable for future use of such materials for real time waste water treatment technologies.

Key words: Guar gum; 2-acrylamido-2-methylpropane sulfonic acid; malachite green; crystal violet; hydrogel.

OP-12

Antimicrobial Activities and Identification of Chemical Constituents from Endophytic Bacteria Associated with Ethnomedicinal Plants

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Abstract:
Resurgence of old diseases and emergence of new epidemics such as Malaria, TB, AIDS, SARS, Ebola, H1N1 (Avian flu) pose serious health challenges. The rise of drug-resistant bacteria and opportunistic fungal infections dictate the search for new sources of bioactive compounds. Several novel antibiotics including alnumycin, munumbicin, kakadumycin, geldanamycin, kasugamycin, coronamycin and lupinacidin have been reported from endophytic actinomycetes (Strobel *et al.,* 2007). Thus, endophytic bacteria are highly promising sources of new species and novel bioactive agents. Ninety-nine (99) endophytic bacterial isolates were obtained from 4 ethnomedicinally important plants. Of the 99 endophytic isolates, 30 were found to show antibacterial activities against one or more of the bacterial test pathogens and 43 could inhibit one or more of the fungal test pathogens. Ethyl acetate extracts of five (5) potent endophytic bacterial isolates (AcRz3*, AnR10, SxF2, SxL10 and TgR6) were shortlisted for identification of chemical constituents. Preliminary and final confirmation using High Performance Thin Layer Chromatography (HPTLC) and High Performance Liquid Chromatography (HPLC) showed p-coumaric acid was present in 2 extracts (AnR10 and SxL10).

Keywords: Endophytic bacteria; ethnomedicinally important; ethyl acetate extract; High Performance Thin Layer Chromatography; High Performance Liquid Chromatography (HPLC); p-coumaric acid

OP-13

Assessment of Density Functional for Predicting Structural and Electronic Energies in Photoactive Bio-organic Molecules

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Abstract:

Density Functional Theory (DFT) is the most widely used electronic structure method due to its simplicity and cost effectiveness. The accuracy of a DFT calculation depends not only on the choice of the density functional approximations adopted but also on the electron density produced by it. This work presents an efficient and compatible approximations amongst Density functional Approximations for the study of photoactive molecules by considering two systems - curcumin and green fluorescent protein (GFP) chromophore as the test molecules. Different ab initio methods and functionals: Hartree Fock, MP2 and 22 DFT functionals, including GGA, meta-GGA, hybrid meta-GGA, range separated hybrid functional, were considered. In addition to the different methods employed, the effect of pople's and Alhrichs basis sets, on the calculated parameters were taken into consideration. The calculations show that the overall performance of pople's basis set, 6-31G(d,p) on every parameter surpasses the other basis sets. Meanwhile, the functional fluctuates for every parameter under study.

OP-14

Pyrazoline Analogs as Potential Anticancer Agents and their Apoptosis, Molecular Docking, MD Simulation, DNA Binding and Antioxidant Studies

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Abstract:

N-formyl pyrazoline derivatives (**3a-3l**) were designed and synthesized via Michael addition reaction through cyclization of chalcones with hydrazine hydrate in presence of HCOOH and characterized by various spectroscopic techniques such as ^{1}H, ^{13}C NMR, FT-IR, UV-visible spectroscopy, mass spectrometry and elemental analysis. Anticancer activity of **3a-3l** was evaluated against human lung cancer (**A549),** fibrosarcoma cell lines (**HT1080)** and human primary normal lung cells (**HFL-1)** by MTT assay. The results of anticancer activity showed that potent analogs **3b** and **3d** exhibited promising activity against **A549** (IC_{50} = **12.47±1.08** and **14.46±2.76** μM) and **HT1080** (IC_{50} = **11.40±0.66** and **23.74±13.30** μM) but low toxic against the **HFL-1** (IC_{50} = 116.47±43.38 and 152.36±22.18 μM). DNA binding interactions of the pyrazoline derivatives **3b** and **3d** have been carried out with DNA using absorption, fluorescence and viscosity measurements, circular dichroism and cyclic voltammetry. In silico molecular modelling and ADMET properties of pyrazoline derivatives were also studied.

OP-15

Extraction and Characterization of Melanin from Poultry Feathers Using Keratinolytic Bacteria

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Abstract:
Melanins are natural biopolymers that are known to contribute to different biological processes and protect organisms from adverse environmental conditions. These molecules absorb more light than other pigments due to their highly conjugated structure. During the past decades, melanins have attracted increasing attention for their use in organic semiconductors and bioelectronics, drug delivery, photoprotection, and environmental bioremediation. Although considerable advances in these fields have been achieved, real-world applications of melanins are still scarce, probably due to the limited and expensive source of natural melanin. Melanin is also present in poultry feathers and its colour ranges from pale yellow, red to black. As feathers are generated in huge amounts, coloured feathers could be a good source of melanin. The present study aims at the extraction and characterization of melanin by using keratinolytic bacteria. Two poultry bird's feathers- Kuroiler and Vanaraja were used for the study. Vanaraja and Kuroiler are two popular poultry strains in India. Crude melanin extract was prepared by hydrolysing the coloured feathers with *Bacillus* sp. RCM-SSR-102 followed by centrifugation and acid precipitation. The crude melanin extract was characterized in terms of UV-Vis absorption spectra, FTIR and colour measurement using Hunter-Lab colour spectrophotometer. The crude melanin extract also showed antioxidant activity in the ABTS assay and FRAP assay. The EC50 value of Kuroiler and Vanaraja feather melanin was recorded as 22.47 µg/mL and 28.9 µg/mL respectively in ABTS assay. Whereas FRAP value was found to be 1.21 mM and 0.13 mM of Fe^{2+} respectively.

Keywords: Antioxidant activity; Coloured feather; Keratinolytic bacteria; Melanin

OP-16

Effect of transition metal ions substitution at Mn-site on the structural and electrical properties of multiferroic rare earth manganite $YMnO_3$

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Abstract:

Rare earth manganite $YMnO_3$ and $YMn_{0.9}Cr_{0.1-x}M_xO_3$ (where x = 0,0.04; M = Fe, Ni) compounds were synthesized via sol-gel auto combustion route. The present work aims to study the effect of transition metal ions substitution at Mn-site of $YMnO_3$, on their structural and electrical properties. The structural and morphological studies were performed using X-ray diffraction (XRD), Raman spectroscopy, and field emission scanning electron microscopy (FESEM). The XRD pattern confirmed the existence of monophasic hexagonal structure for YMnO3 while the onset of few orthorhombic peaks was observed for the substituted samples. The A_1 Raman scattering line at ~ 676 cm^{-1} was observed to be much stronger than the other Raman modes. Uniform and dense morphological structure were observed in the FESEM micrographs. Enhanced dielectric properties were observed in the substituted sample. The frequency dependence of AC conductivity was investigated using Jonscher's law. Non-overlapping small polaron tunnelling (NSPT) model was predicted for the conduction model in $YMnO_3$ and Correlated barrier hopping (CBH) in the substituted samples to elucidate the conduction mechanism of the system. The activation energy for intrinsic charge carriers was calculated using Arrhenius equation. The impedance spectroscopy study indicates the non-Debye type of relaxation in the synthesized manganite samples.

OP-17

Enhanced Visible Light Active Photocatalytic Performance of CdS/PVDF Nanocomposite towards Malachite Green Dye Degradation

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Abstract:
The present work focuses on the development and characterization of an efficient polymer-based metal sulfide photocatalyst. The efficiency of the synthesized photocatalyst was checked by degradation study of Malachite green dye under visible light. Chemically synthesized CdS nanoparticles were incorporated on the polymer matrix to obtain CdS/PVDF nanocomposite by solution casting technique. XRD, UV-Vis absorbance, reflectance and transmittance spectroscopy, FTIR, SEM and EDX were used to characterize the samples. Photocatalytic study shows that CdS/PVDF nanocomposite was observed to be more efficient degrading 97% of the dye in 4 hours of visible light irradiation as compared to pure CdS nanostructures whose degradation percentage is 88% under same condition. The stable nanocomposite, whose degradation activity does not decrease even after three consecutive runs of the experiment, can be utilized for large scale commercial use of wastewater treatment.

Keywords: Metal sulfide, polymer, photocatalyst, stability.

OP-18

Evaluation of Acute Toxicity of Seed Extract of *Catunaregam spinosa* (Thunb.) (Rubiaceae) using Zebra Fish *(Dani rerio)* as a Model Organism

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Abstract:

The aim of the present study focuses on the acute embryonic toxicity in early embryonic development of zebrafish (*Dani rerio*) treated with seed extract of *Catunaregam spinosa* ((Thunb.) (Rubiaceae) which is a crucial ethno-medicinal plant, locally known as Ching Kaboklei (Manipuri) which is found distributed throughout hills and valley areas of Manipur, North Eastern part of India. Literature review of the plant reported that different parts of the plant are used as anthelmintic, antipyretic and for the treatment of diarrhea and dysentery like problems (Patil M.B.and Khan P.A.2017) and have showed properties like hypoglycaemic, piscidal, insecticidal and anti-cancer activity (Senthamarai R et al.2011). Due to limited information regarding the adverse effects and the toxicity of the plant the current study was conducted to examine the effects of exposure of seed extract on the embryonic development of zebrafish embryos during different time intervals post-fertilization by treating with different concentrations of plant extract following Organisation for Economic Co-operation and Development (OECD) Guidelines for Testing of Chemicals. The present study revealed that seed extract produced embryonic lethality and developmental defects in zebrafish embryos in a dose dependent manner following the LC50 determination of the plant extract.

Keywords: Acute Toxicity; *Catunaregam spinosa* (Thunb.) (Rubiaceae); Ethno-medicinal plant; LC50 (lethal concentration)

OP-19

Synthesis and Characterization of Bi-Functional Magneto-Luminescent $Fe_3O_4@SiO_2@GdPO_4:Tb^{3+},Ce^{3+}$ Composites for Hyperthermia Application

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Abstract:

A step-wise synthetic method has been developed for the synthesis of multifunctional, magnetic and luminescent composites with silica coated Fe_3O_4 as the core and Ce^{3+} sensitized Tb^{3+} doped $GdPO_4$ embedded into the carboxymethyl cellulose (CMC). The phase composition, infrared spectra, luminescent and magnetic properties were characterized by X-ray diffraction (XRD), FTIR, photoluminescence spectra (PL) and vibrating sample magnetometer (VSM). Additionally, the materials exhibit high saturation magnetization and excellent luminescence properties. The composites showed the intense green emission at 276 nm excitation. They attain the hyperthermia temperature (~42°C) within the threshold alternating magnetic field (5×10^6 kAm^{-1} s^{-1}). The samples exhibit efficient induction heating properties which is highly desirable for magnetic hyperthermia application in cancer therapy.

OP-20

Bridging of ZnO Nanostructure with CuO to Form Nanocomposite for Enhanced Photocatalytic Activity

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Abstract:
ZnO/CuO composites with different compositional ratio 1:1, 1:4, 4:1, 3:2 and 2:3 were successfully synthesized through hydrothermal method. Characterization of samples prepared were performed using X-Ray Diffraction (XRD), Fourier Transform Infra-Red (FTIR), EDX and UV-Visible spectroscopy. Photocatalytic efficiency of the samples was examined for the degradation of Malachite green (MG) dye in aqueous solution under UV light irradiation. Kinetic study using Langmuir-Hinshelwood model showed that the experimental data is in good agreement with the model predicted. Under same experimental condition (0.2g/L catalyst loading and 10 ppm neutral MG dye), an improved activity for the compositional ratio 4:1, 3:2 and 1:1 was observed compared to that of pure ZnO and the best activity is obtained for 3:2 degrading upto 82% within 4 hrs. Several parameters that hinder the photocatalytic activity were optimized and complete decolourization of 15 ppm of MG dye solution at pH-10 with catalyst loading 0.2g/L was achieved in 2 hrs. Reusability test of the photocatalyst was conducted upto 6th consecutive runs using the optimized parameters. The activity of the photocatalyst was not affected upto four runs and a slight decrease in the activity was observed after 4th run.

OP-21

Green Synthesis of Metal Oxide Nanoparticles by Using Rhododendron Arboretum

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Abstract:
Materials having size in nano range (1-100) nm like nanoparticles of different metal oxides have been in focus in recent times because of unique properties like very large surface area to volume ratio and small size. Nanoparticles of metal oxides shows more advanced properties like mechanical strength, electrical conductivity and thermal stability than bulk material. They also express effective antibacterial activity against various bacteria. Nanoparticles of different metal oxides have been synthesized from various conventional methods like solvothermal, hydrothermal, sol-gel, microwave method and green synthesis. Out of those, some are not easy to operate, expensive, unsafe to environment, labor intensive and some require special vessels. If some harmful residues are present due to use of toxic chemicals, it may cause dangerous effects in biomedical applications. While green synthesis is an eco-friendly approach for synthesis of nanoparticles compared to other methods. Synthesis of different metal oxide nanoparticles can be done by using leaves, flower extract of *Rhododendron arboreum* rather than difficult experimental processes. Rhododendron species is used traditionally in medicine for treating many diseases like cold, inflammation and asthma. Most remarkable species which is most widespread Rhododendron in world also grow in Himalayas, from Kashmir-Himachal through Nepal is *Rhododendron arboreum*. Green approach is used nowadays to form metal oxide nanoparticles that can largely decline pollution in environment and can also decrease the danger to human lives due to excessive use of harmful solvents as well as chemicals.

Keywords: Rhododendron arboretum, Nano materials, Metal Oxide, Green Approach

OP-22

Green Synthesis of Silver Nanoparticles Using Medicinal Plant Extract: Anticancer Activities and DFT Studies

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Abstract:

To the best of our knowledge, this is the first report in the literature on synthesis of silver nanoparticles (AgNPs) by using leaf extract of medicinal plant *Elsholtzia Ciliata* (*E. Ciliata)* as a reducing agent. Analysis of XRD diffractogram revealed the formation of silver nanocrystals with face centred cubic structure. The average crystallite size was found to be 14.24 nm. Chlorogenic acid which is one of the phenolic acids presented in *E. Ciliata* is responsible for the reduction of Ag^+ to Ag^0. Density Functional Theory (DFT) calculations were also performed to study the mechanism of reduction of silver ions to silver atoms by chlorogenic acid and the formation of AgNPs. The biosynthesized AgNPs showed potent anticancer activity against human colorectal cancer (HCT15) and Human Lung Cancer (A549) and their IC_{50} values for these cell lines were 28.74 and 23.44 µg mL^{-1}, respectively. These results confirmed that the *Elsholtzia Ciliata* leaf extract could be a low-cost, nontoxic and eco-friendly natural resource for the synthesis of AgNPs, which might be useful for the development of new anticancer agents in biomedicine.

OP-23

Synthesis and Characterization of Copper (II) Complex of Sodium Salt of Chloro-Benzoic Acid

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Abstract:
Single crystal and correlated crystalline structure are reviewed by emphasizing the last 10-20 years of research on fundamental concepts, single crystal engineering and applications. The synthesis of Copper (II) complex of composition having general formula $[Cu(H_1L)_2]$ (where $H_1L = C_6H_5ClCOO^-$) have been carried out with sodium salt of respective 2-benzoic acid in aqueous medium. The newly synthesized complex have blue coloured and round shape crystals were characterized by elemental analysis, molar conductivity measurements, FT-IR and ^{1}H-NMR spectral analysis techniques. The results of the spectral technique have substantiated the formation of new complex. However, the confirmation of these results can be ascertained by other spectral by other spectral techniques.

Keywords: Crystalline engineering, Copper (II), Co-ordination Chemistry, FT-IR.

OP-24

Synthesis, Characterization and CT-DNA Binding Studies On Co(III), Ni(II) and Cu(II) Schiff Base Complexes of (*E*)-6-hydrazinyl-*N'*-(1-(2,3-dihydro-1,3-dioxo-1*H*inden-2-yl)ethylidene)pyridine-3-carbohydrazide (L)

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Abstract:

Three transition metal complexes of Co(III) (**1**), Ni(II) (**2**) and Cu(II) (**3**) metal ions were isolated and characterized by various other spectroscopic techniques. Metal:primary ligand molar ratio was found as 1:1 in all complexes. All the complexes are neutral. Schiff base ligand remains in keto form while in metal complexes, one exo-cyclic C=O converts to enol form. Ligand participates in metal complexes as ONO neutral donor. Tentative structures of the complexes are octahedron. Powder X-ray diffraction studies dictate the ligand crystallize in a triclinic system whereas all complexes are amorphous. Presence of lattice as well as coordinated water molecules in the complexes could be thoroughly confirmed by thermal analysis. EPR study in solid form confirmed a paramagnetic nature of copper complex. CT-DNA binding studies clarify the primary interaction mode for complex 3 was an intercalative whereas for Schiff base ligand (**L**) and complexes (**1-2**), interaction mode may possibly a partial intercalative.

OP-25

Law of Approach to Saturation Magnetization and Induction Heating Study of Zinc Substituted $CoFe_2O_4$ for Magnetic Hyperthermia Applications

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Abstract:
The present work reports the synthesis and characterization of ferrites nanoparticles (NPs) having the composition $Co_{1-x}Zn_xFe_2O_4$ (x=0, 0.5). Various structural, microstructural, optical and magnetic characterizations have been carried out using XRD, FTIR, FESEM, UV-Visible spectroscopy, VSM and ESR. XRD and Rietveld refinement confirm the face centered cubic spinel structure of the synthesized samples, which is further supported by the observation of absorption bands characteristic of the spinel ferrites in the FTIR spectra. Optical energy band gaps have been calculated using Tauc's plot. Magnetic parameters like the remanence (H_r) and coercivity (H_c) have been tuned to a lower value with zinc substitution and is desirable for clinical application. The magnetic data at saturation obtained from VSM measurement have been analysed by adopting the law of approach to saturation (LAS) technique. The ESR parameters like peak-to-peak line width (ΔH_{pp}), g-value and resonant magnetic field (H_{rf}) have been determined and the relaxation mechanism taking place in the NPs have been studied. Induction heating studies of the NPs has been carried out. These characterizations and their analysis help to find suitability of the NPs as a potential heating medium for magnetic hyperthermia applications.

Keywords: Cobalt ferrite; Rietveld refinement; ESR; LAS; Induction heating

OP-26

Sericin from *Antheraea proylei* J. cocoons Induces Cell Death through Activation of p38 in PC3 Cells

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Abstract:
Sericin is a protein present in the silk fibre along with another protein, fibroin. It is produced by the silkworm larva in its 5th instar stage. Although sericin has wide range of potential biomedical applications, it is usually wasted as a by-product during degumming in silk industries. Sericin protein from the commonly domesticated silkworm, *B.mori* has been extensively studied while the sericin from the wild silkworm, *Antheraea proylei* J. remains rather unexplored. The study envisages use of sericin protein as an anticancer agent in prostate cancer by using PC3 cells as a model. The study reports a caspase-3 and PARP independent cell death mechanism in PC3 cells treated with sericin and its ability to induce apoptosis through activation of p38 and arrests of cell cycle at G0/G1 phase.

Keywords: Sericin, p38, caspase-independent, apoptosis.

OP-27

Effect of Various Ionic Liquid Media on the Energy Storage Performance of Cell Employing Coronene and Its Mono Heteroatom Substituted Analogues as Electrodes

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Abstract:

In today’s situation of ever increasing demand for energy, intriguing properties of graphene, a two dimensional material, has attracted intense interest due to its high stability, huge specific surface area, superior mechanical flexibility, large carrier mobility, excellent conductivity, etc. Integration or fabrication of graphene into traditional electrodes has increased energy storage performance. Here in this report, Coronene, which is a computationally appropriate section of 2D material graphene is utilized using density functional theory (DFT). This work mainly focuses on tuning the energy storage capacity of the proposed cell consisting of coronene and its boron/nitrogen substituted analogues as electrodes in various Ionic Liquid (IL) media. Decrease in free energy of the cell is observed in the case of *either increasing alkyl substitution or increasing chain length of the alkyl substituent* in the IL ion NH_4^+.

Keywords: Coronene, Density Functional Theory, Ionic Liquid

OP-28

A Comparative Study Between Oak Tasar (Antheraea proylei J.) and Mulberry (Bombyx mori L.) Silk Cocoon Fibroin Thin Films with Respect to Biomaterial Application

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Abstract:
The mulberry (*Bombyx mori* L.) cocoon fibroin thin film is being used at present as biomaterial, particularly in the field of tissue engineering. However, only a few studies have been carried out using non-mulberry cocoon fibroin thin films. In the present investigation, a comparative study between the mulberry (*Bombyx mori* L.) and non-mulberry (*Antheraea proylei* J.) cocoon fibroin thin films was carried out with respect to biomaterial application. The thin films were prepared by dissolving the cocoon shell in calcium nitrate followed by casting the resulting fibroin solution upon a polypropylene sheet. The physicochemical properties of the two different thin films were assessed by x-ray diffractometry (XRD), thermogravimetry (TG), and atomic force microscopy (AFM) analyses. XRD analysis showed the non-mulberry thin film to have a lower crystalline character than that of the mulberry thin film. The thermal stability of the non-mulberry thin film was found to be more than that of mulberry thin film. AFM analysis showed the surface roughness was more with non-mulberry thin film. Upon biodegradability analysis by an enzymatic method, both the thin films were found to have more or less the same degree of biodegradability.

Keywords: *Antheraea proylei*, *Bombyx mori*, fibroin, thin film, silk fibroin thin film, biodegradability.

OP-29

Prospective Novel Bioactive Compound in Chloroform Fraction of *Oroxylum indicum* Leaves Induce Apoptosis in HeLa and PC3 Cells through Differential Molecular Mechanism

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Abstract:

A number of anticancer compounds have been isolated from the root, seeds and stem bark of *Oroxylum indicum,* though the leaves remains largely unexplored. A recent discovery of Oroxyquinone, a novel compound, from the chloroform extract of the leaves of the plant in our laboratory have shown to be anti-metastatic as well as exhibit anticancer potential against different cancer cell line such as A549, PC3 and HeLa. Another bioactive compound showing unique physical properties was found to form crystals in pure form from the same extract. The purified compound is brownish white in colour with needle like crystal shape with melting point of 236 °C. The observed physical properties of the compound are unique to compounds earlier isolated from different parts of the plant. The compound shows Caspase-3 independent cell death in PC3 with IC50 of, and Caspase-3 and PARP dependent cell death in HeLa cells with IC50 of 23.4 ng/µl in HeLa cells. Investigation of involvement of MAPK signaling pathway revealed that the activation of p38 and inhibition ERK1/2 respectively in HeLa cells. The isolated compound presents a promising finding of being a novel anti-cancer compound with differential molecular activities in different cancer cell lines.

OP-30

Oak tasar (Antheraea proylei J.) Cocoon Sericin Extract Exhibits both Chemical and Cellular Antioxidant Activities

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Abstract:
The silk cocoon produced by mulberry (*Bombyx mori* L.) silkworm consists of the silk proteins, fibroin and sericin, and a trace amount of minerals, tannins, phenolic compounds, waxes, etc. Sericin extract obtained by degumming process, an essential step of silk reeling, has been shown to have antioxidant, antityrosinase, antielastase, antimicrobial, and antitumor activities, and the extract has potential applications as nutraceuticals and cosmetics. The present investigation is concerned with preparation of sericin extract from non-mulberry oak tasar (*Antheraea proylei* J.) cocoon, designated APHWE), and its characterization with respect to both in chemical and cellular antioxidant activities. Sericin extract obtained from the mulberry (*Bombyx mori* L.) cocoon, designated BMHWE, was used as the positive control. APHWE and BMHWE resolve, on SDS-PAGE, into different sericin species having a MW distribution in the range of 10-200 kDa. APHWE is rich in glycine and serine, whereas BMHWE has high contents of serine, histidine, and threonine. APHWE has higher phenolic and flavonoid contents than BMHWE. GC-MS analysis was also performed to identify the secondary metabolites present in the sericin extracts. The chemical antioxidant potential (DPPH, hydroxyl radical, H_2O_2 scavenging activities, and FRAP) and cellular antioxidant potential using human peripheral blood lymphocytes (hPBL) were determined. APHWE was found to have higher antioxidant activity than BMHWE. Since the sericin extract obtained from oak tasar (*Antheraea proylei* J.) cocoon was shown to scavenge free radicals and exhibit strong antioxidant potential, it could have potential applications in the areas of food additives, nutraceuticals, and cosmetics.

Keywords: sericin, cocoon, silkworm, free radical, antioxidant

OP-31

Studies on DNA Interaction of *bis*(1-Phenylamidino-O-alkylurea)copper(II) Perchlorate Complexes (alkyl = methyl, ethyl, n-propyl, n-butyl, iso-butyl or n-pentyl)

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Abstract:
Copper(II) perchlorate complexes of bis(1-phenylamidino-O-alkylurea), (where alkyl = methyl, ethyl, n-propyl, n-butyl, iso-butyl or n-pentyl) have been synthesized. The complexes were characterized by elemental analysis, electronic spectra, IR spectra, thermo gravimetric analysis, magnetic moment, conductance and EPR studies. Electronic spectra and EPR spectral studies show that the complexes have square planar geometry. The DNA interaction studies show that the complexes can bind to CT-DNA by non-intercalative mode. The interaction studies were investigated by absorption spectral studies, ethidium bromide displacement assay and DNA thermal denaturation.

Keywords: phenyldicyandiamide, copper(II) perchlorate, EPR, DNA, square planar

OP-32

Effects of substitution on Excited State Intramolecular Proton Transfer (ESIPT) reactions in 12,12a-dihydrobenzo[4,5]imidazo[2,1-a]isoquinoline: A Density Functional Theory Study

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Abstract:

The photophysical properties of **12,12a-dihydrobenzo[4,5]imidazo[2,1-a]isoquinoline** was studied by substituting electron donating dimethyl amino {-N(CH_3)$_2$} group and electron withdrawing Trifluoromethyl(-CF_3) group at different positions exclusively at the level of density functional theory(DFT). Three different geometrical isomers has been considered *viz* closed enol, open enol and keto tautomer for each substitution as well as the unsubstituted one. Among them, closed enol form is found to be the most stable in the ground state for all substitutions. In all the Trifluoromethyl substituted ones, keto tautomer is the most stable in the first excited state as that of the unsubstituted ones as compared to the one substituted by dimethyl amino group. Moreover, Open enol form is the least stable form in the first excited state except in the one in which dimethyl amino is substituted at C-6 position. Bathochromic shifts for both absorption as well as emission in all the three geometrical isomers for each substituted molecule along with the unsubstituted molecule under study. Further, Stoke shift for tautomer emission is found to be largest in molecule in which dimethyl amino is substituted at C-12 position. Intramolecular proton transfer (IPT) processes were also analysed in S_0 as well as S_1 state following the potential energy surface curves and found to be almost barrierless in both the state.

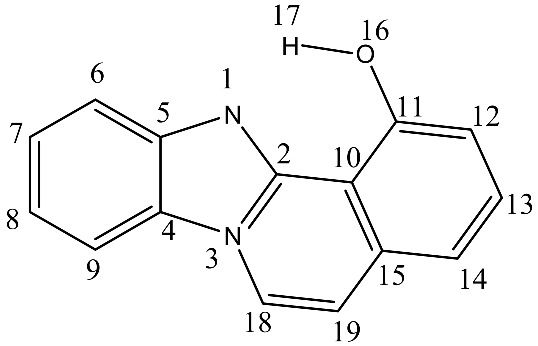

Fig: 12,12a-dihydrobenzo[4,5]imidazo[2,1-a]isoquinoline

Keywords: Excited State Intramolecular Proton Transfer, Density Functional Theory, Stoke shift.

OP-33

Structural, optical and electrical properties of PVA/Ag doped ZnO nanocomposite films for multifunctional application

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Abstract:

Polyvinyl alcohol/Ag doped ZnO nanocomposite films (PVA/x wt% Ag doped ZnO having x=0, 5, 10 ,15 and 20) were prepared by solution casting method. The structural, optical and electrical properties of the synthesized samples were characterized by X-ray diffraction (XRD), Fourier transform infra-red spectroscopy (FTIR), UV-visible spectroscopy and LCR meter. The UV-visible spectroscopy measurement revealed a decreased transmittance with the rise of Ag doped ZnO concentration into the PVA matrix and completely blocked in the UV region. The frequency and temperature dependence dielectric and AC conductivity measurement showed that dielectric properties and AC conductivity could be enhanced by increasing the wt% of Ag doped ZnO into PVA matrix. These observed properties suggests that the materials could used as a potential candidate for flexible type microelectronic devices and as UV-shielders.

OP-34

2,2-Diphenyl-1-picryl-hydrazyl Free Radical Scavenging Activity of Different Parts of *Homalomena aromatica* (Spreng.) Schott

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Abstract:
Biological systems produce as well as exogenously encounter free radicals. Free radicals are known to cause oxidative degradation of biomolecules leading to many degenerative disorders. Various plants with traditional medicinal use have been found to have antioxidant activity. The present study assessed the antioxidant potential of different parts of *Homalomena aromatica* (Spreng.) Schott, a medicinal aromatic herb of Manipur and North-east India. Plants were collected from Jiribam district of Manipur. Plant body was separated into leaf lamina, petiole and rhizome. The different parts were thoroughly washed and oven-dried at low temperature. They were then ground to fine powder and used for extraction with 100% methanol at 1:10 sample/solvent ratio (w/v). The methanolic extracts of leaf lamina (MEL), petiole (MEP) and rhizome (MER) were evaluated for potential antioxidant activity using the 2,2-diphenyl-1-picryl-hydrazyl (DPPH) free radical scavenging assay. MEL was found to have the highest free radical scavenging activity with 98.66 µg ascorbic acid equivalent/100 mg dried extract followed by MER with 57.34 µg ascorbic acid equivalent/100 mg dried extract. MEP showed the least activity with 20.29 µg ascorbic acid equivalent/ 100 mg dried extract. The results may be indicative of differential distribution and concentration of biologically active compounds in the different plant parts. Further studies on bioassay-guided isolation of active fractions and subsequently bioactive compounds is imperative.

Keywords: Free radicals, antioxidant activity, *Homalomena aromatic*

OP-35

Comparative Study of Energy Interaction Parameters for the Complexation of Pr(III) with Cytidine in Absence and Presence of Zn(II)in Aqueous and Aquated Organic Solvents

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Abstract:
Lanthanide (III) has capacity of being hard acceptor in HSAB (hard and soft acid and base) and it shows preference for binding towards oxygen and nitrogen donor sites of nucleoside. Interaction of Pr(III) with Cytidine in aqueous and different aquated organic solvents CH_3OH,CH_3CN, DMF(dimethyl formamide) and Dioxane and their equimolar mixtures at pH=6 and at 298K have been carried out using adsorption difference and comparative absorption spectroscopy.Further, interaction of soft metal ion Zn(II) is also discussed.Variation in the spectral energy parameters Slater condon (Fλ)factor,Lande spin orbit coupling constant(ξ4f),nephelauxetic ratio(β),bonding parameter ($b^{1/2}$) and percent Covalency (δ) are calculated.

Keyword: Cytidine, Absorption spectra,Hypersensitive, Pseudo-hypersentive,Nephelauxetic effect.

OP-36

The Impact of Co-Doping in Nanocrystalline Multiferroic Thin Films of Bismuth Ferrite on Transparent Substrate

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Abstracts:

Multiferroic thin films attract flurry of research due to its multifunctional applications in various fields. In this work, nanocrystalline bismuth ferrite thin films co-doped with Gd and Mn were successfully fabricated via sol-gel spin coating technique deposited onto the corning glass substrate. The effect of Gd and Mn incorporation at *A* and *B* site of bismuth ferrite perovskite on its structural, microstructural and its optical properties was studied systematically. X-ray diffraction analysis reveals the existence of distorted rhombohedral perovskite structure with preferred orientations along (101) plane. The incorporation of Gd and Mn in bismuth ferrite perovskite was confirmed from Raman spectra measured at room temperature. Surface morphology and microstructural studies were carried out using Atomic Force Microscopy (AFM) and Field Emission Scanning Electron Microscopy (FESEM). Different optical parameters like bandgap energy, Urbach energy, Extinction co-efficient, Near Edge Absorption ratio were determined from Ultraviolet-Visible spectra of the film prepared. The correlation between the structural and the microstructural parameters with the optical parameters was investigated in this work. Reduction in optical bandgap with high absorptivity is essential for potential applications in thin-film solar-cell and other optoelectronic devices, which may be realized with doping. Further, the structural distortion with the increase in doping amount was studied to fabricate multiferroic thin films with improved quality.

OP-37

Antioxidant Activity Analysis of Methanolic Extracts from the Inflorescence of *Elsholtzia communis*

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Abstract:
Lamiaceae (Labiatae) is also known as the mint family. They are a group of aromatic plants which are used in culinary, medicinal and cosmetic purposes. This large family contains 236 genera and about 7173 species (Harley, R.M. et al.,2004). According to WHO, 70% to 80% of global population use medicinal and aromatic plants for their medicinal and therapeutic effects (Sharafzadeh, S. et al., 2011).

Elsholtzia is a genus containing at least 33 species under Lamiaceae family. *Elsholtzia communis* is a rare species of the genus *Elsholtzia.* It is mainly distributed in China, Korea, Japan and India (Guo, Z. et al.,2012).

In this study, the purple and white inflorescence of the plant are tested for antioxidant activity. The inflorescence collected are air dried and oven dried. They were then used for methanolic extraction. The resulting extract was collected and used for 2,2-diphenyl-1-picryl-hydrazyl (DPPH) free radical scavenging assay. DPPH free radical scavenging activity was examined by following the methodology of (Blois.,1958). In this study, the antioxidant activity was found to be higher in purple inflorescence of *E. communis* than in white inflorescence. The in-depth antioxidant and radical scavenging studies pave the scope for its genetic enhancement for wide adaptability.

Keywords: Lamiaceae, Aromatic, Medicinal, *Elsholtzia communis*, DPPH.

OP-38

Partial Characterization of Bioactive Metabolites from *Streptomyces* sp. MBRL 758 Associated with *Celtis timorensis* *(Heigreng)*

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Abstract:

There is great promise for discovery of novel bacterial strains from underexplored habitats such as Manipur for potential applications in medicine, agriculture and industry. Eighteen (18) endophytic bacteria were isolated from *Celtis timorensis*, locally known as *Heigreng*. The putative endophytic isolates were subjected to antibacterial screening against four (4) bacterial test organisms and antifungal assays against six (6) rice fungal pathogens. Of these 18 endophytic isolates, CtR2 was found to be the most potent antimicrobial strain. The strain was also positive in several PGP traits, producing significant amounts of ammonia (**80 µg/mL**), siderophore (**89.94 %**), IAA (**19 µg/mL**) as well as efficiently solubilizing phosphate (**23 µg/mL**). The endophytic strain was further subjected to rice seedling vigor assay and it showed higher vigor index (199.8) relative to the control (181.5). The endophytic bacterial isolate, CtR2, was assayed for rice growth promotion under nethouse conditions. Bioinoculant treated plants showed relatively higher root and shoot lengths as well as fresh and dry root and shoot weights relative to the control. The bioactive strain was characterized by 16S rDNA sequence analysis and designated as *Streptomyces* sp. MBRL 758. The ethyl acetate extract of the MBRL 758 were further subjected to UPLC-MS analysis to profile the bioactive secondary metabolites generated. Some of the potent antibacterial, antifungal as well as plant growth promoting compounds detected in the extract include Istamycin C1, Ferimzone, 7, Leucomycin A13, Oxolucidine B, Isepamicin, Mycinamicin V, Telithromycin, Fistuloside A etc. The bioactive endophytic bacterial strain MBRL 758 holds promise for development as a potential bioinoculant for rice cultivation as well as a good biocontrol agent.

Keywords: endophytic bacteria, ethnomedicinal plants, plant growth promoting, seed vigor assay, pot trials, UPLC MS, bioactive compounds

Poster Presentation

PP-01

Anti-Elastase and Anti-Collagenase Activities of Sericin Extracts From Oak Tasar (*Antheraea Proylei* J.) Cocoon

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Abstract:
Cocoon of silkworm consist of two types of proteins, *viz*. sericin and fibroin. Sericin is the glue-like protein which binds the silk fibroin fibres together to form the cocoon which protects the developing pupa during metamorphosis. The silk fibroin fibres are reeled from the cocoon to obtain the silk yarn after a process known as degumming. During degumming of the cocoons, the sericin solution obtained was considered as a waste by-product. However, this sericin solution is now found to have many biological activities including antioxidant, anti-inflammatory, anti-tyrosinase, anti-cancer, anti-hyaluronidase, anti-microbial, wound healing, and moisturizing properties. Till now, most of the studies have been carried out with the sericin obtained from the mulberry (*Bombyx mori* L.) cocoon. The present investigation is concerned with the preparation of sericin extracts from the non-mulberry oak tasar (*Antheraea proylei* J.) cocoon, and their inhibitory activities on elastase and collagenase, the enzymes involved in skin ageing. The porcine pancreatic elastase was found to be inhibited by the sericin extracts with IC_{50} in the range of 0.51-5.28 mg/mL. The collagenase from Clo*stritdium histolyticum* was also found to be inhibited by the sericin extracts with IC_{50} in the range of 0.61-13.0 mg/mL. Thus, the sericin extracts obtained from the oak tasar (*Antheraea proylei* J.) cocoon might have potential applications as an anti-skin ageing compound in pharmaceutical and cosmetic industries.

Keyword: *Antheraea proylei* J., anti-elastase, anti-collagenase, anti-skin ageing, sericin

PP-02

Dispersion of Essential Oil Extracted From the Peels of *Citrus Reticulata* in Mixed Aqueous Isopropanol Media as Microemulsion With or Without a Surfactant

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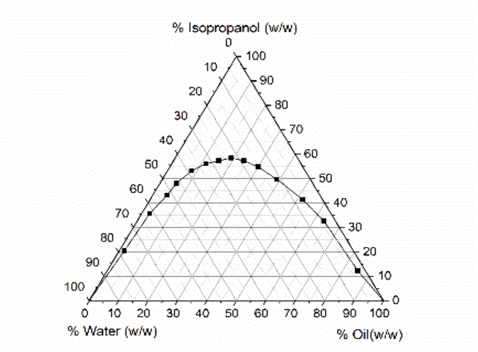
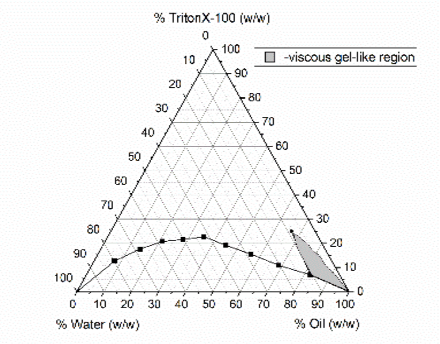
Abstract:

Essential oil from the peels of *Citrus reticulata* harvested from Tamenglong district of Manipur was extracted using an improvised hydrodistillation technique designed and developed in the laboratory. The essential oil thus extracted yield strong orange colored oil with typical orange aroma with a yield as high as up to 4%. The oil is not miscible with water. However, it can be dispersed in mixed aqueous isopropanol media as microemulsion. The formation dispersion of the oil as microemulsion in presence of water and isopropanol has been investigated from the ternary phase diagram of the oil, water and isopropanol.





The oil can also be dispersed in aqueous TritonX-100 media and the ternary phase diagram of oil and water and TritonX-100 has also been studied. The results showed that TritonX-100 is much better dispersing agent as compared to isopropanol. Unlike in case of isopropanol, formation of gel in aqueous TritonX-100 media was observed in certain region with clear separation of crystal-like phase with intense orange color. We have also studied the ternary phase diagram of the oil using mixed isopropanol-TritonX-100 as the dispersing agent with a view to examine if any synergistic effect can be observed. It has been observed that increase in surfactant percentage enhances the region of formation of the microemulsion. From the outcome of the study it is apparent that the microemulsion of the essential oil in aqueous isopropanol may be formulated with or without the surfactant and we can also isolate the region where there is formation of gel with good stability. The study also showed the feasibility of the orange essential oil to be effectively used as culinary essence or food additives.

PP-03

Determination of Oil Yield, Bioactive Compounds and Free Radical Scavenging Activity of Elsholtzia Blanda Oil

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Abstract:
Elsholtzia blanda Benth (family Lamiaceae) is an aromatic shrub or under shrub plant distributed upto an altitude 1500 m. Its aerial parts are used for the treatment of fever, cholera, skin diseases and inflammation. It is one of the important plant in traditional and Chinese medicine which is used in Dysentery, Nephrititis, Hepatitis, Paryngitis and acute Enteritis. The essential oil of this plant was isolated by the process of hydrodistillation using Clevenger apparatus. The chemical component of the E.O. of plant oil was investigated by GCMS. The oil was also determination of free radical scavenging activity by DPPH antioxidant assay. A total of 53 compounds were identified. The highest and lowest compounds were found to be Cineole and Epicubenol respectively.

Keywords: *Elsholtzia blanda, Lamilaceae, Essential oil, Gas Chromatography.*

PP-04

A Highly Efficient Ullmann Reaction Catalyzed by *Trapa natans* (Heikak Yeli)/$Cu(OAc)_2$ as Bio-Catalyst at Room Temperature

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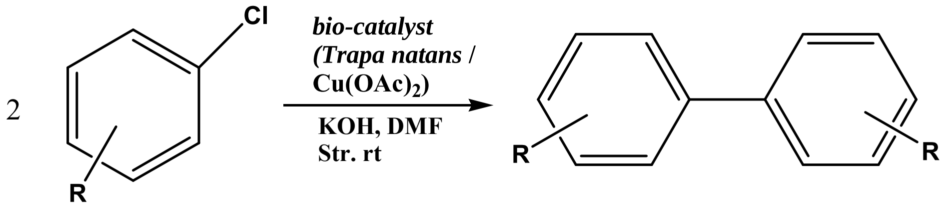
Abstract:
The bio-catalyst[1] synthesized by using *Trapa natans* (Heikak Yeli) with Copper acetate is subjected for the coupling reaction of derivatives of aryl chlorides and aryl bromide (a classic Ullmann Reaction). The synthesis of bi-aryl derivatives undergoes in room temperature for 15-20 hr in the presence of the bio-catalyst in 65-88% overall yields. The reaction goes through DMF as solvent and a base, potassium hydroxide (KOH).[2] Amount of bio-catalyst required is about 0.3−3 mol % for complete conversion, representing the lowest amount of catalyst used for a general catalytic Ullmann reaction.[3] The synthesized compounds are characterized and confirmed by IR & ^1H NMR spectral data.



R = 4-NH_2, 4-CN, 2-NH_2, 2-CN, 2-CHO, 2-NO_2

Scheme[2-3]. Ullmann Reaction catalyzed by Bio-catalyst

References:

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3. Zhai, Y.; Chen, X.; Zhou, W.; Fan, M.; Lai, Y.; Ma, D. Copper-Catalyzed Diaryl Ether Formation from (Hetero)aryl Halides at Low Catalytic Loadings, *J. Org. Chem*. **2017**, *82*, 4964–4969.

PP-05

Synthesis of Bi-aryl Compounds by Using [C_4dabco]OH as Catalyst

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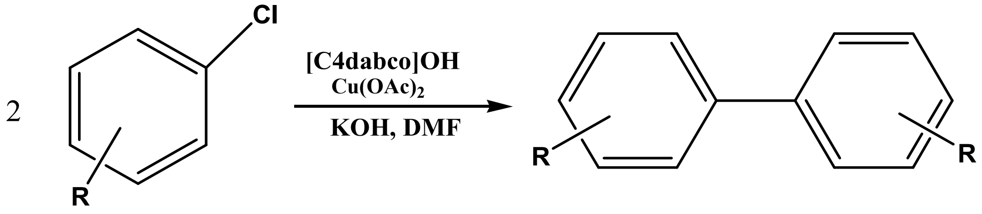
Abstract:

Ionic liquid of [C_4dabco]OH is used as catalyst for the homocoupling of aryl chlorides, bromides and derivatives of aryl chloride in the presence of Copper acetate. The reaction undergoes in DMF as solvent and KOH as the base. The reaction generated the corresponding homocoupling product in good to excellent yields. The structure of bi-aryl compounds are confirmed by using IR & ^{1}H NMR spectral data.



R = 4-NH_2, 4-CN, 2-NH_2, 2-CN, 2-CHO, 2-NO_2

Scheme. Ullmann Reaction catalysed by [C_4dabco]OH

References:

1. Choong Jian Fui, Mohd Sani Sarjadi, Shaheen M. Sarkar and Md Lutfor Rahman (2020). *Recent Advancement of Ullmann Condensation Coupling Reaction in the Formation of Aryl-Oxygen (C-O) Bonding by Copper-Mediated Catalyst. Catalysts 2020, 10, 1103.*
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PP-06

Phytochemical Studies of Pure Compounds Isolated from *Mesosphaerum Suaveolens* (Lanchak)

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Abstract:
Mesosphaerum suaveolens locally known as Lanchak, belongs to the lamiaceae family of class angiosperms. It was consumed during war by the locals as minimal amount of these seeds were sufficient to sustain the energy and quench the hunger for longer period of time, hence the Meitei word 'Lanchak' was named thereafter. It is also used to treat numerous ailments such as anti-inflammatory and anti-diabetic respiratory and gastrointestinal infections, cold, fever, wounds and various skin complaints, etc.

Two pure compounds have been isolated in good quantity by the process of fractional distillation (refluxing) using Soxhlet extractor for isolation of crude product. Purification of this crude product was undertaken with the help of Column Chromatography techniques and further re-crystallised to produce the desired product. Characterisation of these two isolated pure compounds are being done by FT-IR, HR-Mass spectroscopy, UV-visible, NMR and importantly single X-ray crystallography are being used for identification of the newly extracted compounds.

The anti-inflammatory and anti-diabetic activities of the isolated two pure compounds from this plant are being studied.

PP-07

Synthesis, Crystal Structure of Manganese(II) Chloride Complex using 5,5-Dimethyl 2,2-bipyridine and 4-Hydroxybenzoic Acid

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Abstract:

A Mn(II) complex(**1**) [Mn(55Dm2,2-Bpy)$_2$Cl$_2$][4HBA]$_2$ (55Dm2,2-Bpy=5,5-Dimethyl2,2-bipyridine and 4HBA=4-Hydroxybenzoic acid has been prepared by refluxing at 80^{o}C using methanol. Single crystal X-ray diffraction analysis confirms the coordination of 5,5-Dimethyl 2,2-bipyridine. 4-hydroxybenzoic acid doesn't bind directly with the central metal Mn however, it forms a dimeric unit through intermolecular hydrogen bonding inside a crystal lattice. The complex (**1**) crystallizes in monoclinic with space group P2$_1$/c and the Mn (II) adopts distorted octahedral geometry. Complex (**1**) has been characterized using Infra-Red Spectroscopy, absorption spectroscopy and TGA/DTA.

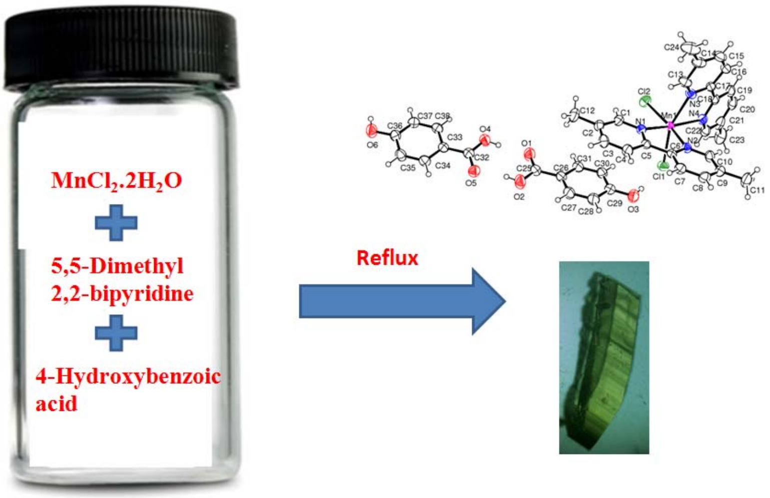

Fig.1: Reaction scheme of Complex(**1**) synthesis

PP-08

A Simple and Efficient Procedures for Henry Reaction Catalyzed by Pb-proline Complex

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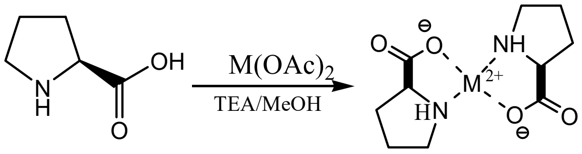
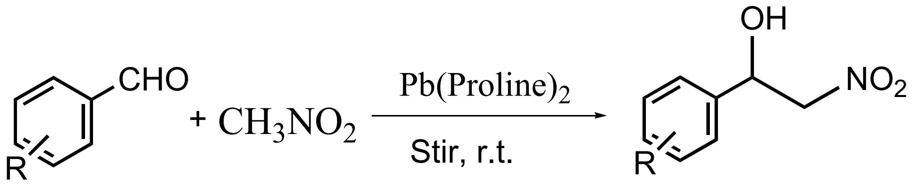
Abstract:
Henry reaction is one of the most versatile carbon–carbon bond forming reaction having wide synthetic applications. This reaction involves coupling between a carbonyl compound and an alkyl-nitro compound with the help of a basic organic, inorganic catalyst, quaternary ammonium salts and organic solvents under different reaction conditions.[1] In continuation of our ongoing studies on the synthesis of new variants of metal-proline complexes[2,3] (**Scheme 1**) and to investigate the catalytic activities in water medium, here we report the use of lead-proline complexes for Henry reaction (**Scheme 2**).



M = Pb

Scheme 1. Synthesis of catalyst



R = 4-Me, 2,4-Cl, 2-Cl, 3-NO_2, 4-OMe, 4-$N(Me)_2$, 2-OH, 4-F, 2,5-OMe

Scheme 2. Henry reaction catalyzed by $Pb(proline)_2$

References:
1. Luzziao, F.A. The Henry reaction: recent examples. *Tetrahedron*, **2001,** 57, 915.
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3. Medhabati, T.; Ranjana, T.D.; Warjeet, S.L. *Ind. J. Chem*. **2021**, *60B*, 1230-1242.

PP-09

Capsaicinoid Quantification of Different Cultivars of Hao Morok (*Capsicum*) from Manipur.

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[b]School of Biotechnology, Kalinga Institute of Industrial Technology, Bhubaneswar - 751024, Odisha India

Abstract:

Capsicum belongs to Solanaceae family and it is one of the oldest domesticated spices around the world. *Capsicum annum*, *Capsicum chinense* and *Capsicum frutescens* are the commonly cultivated species in Manipur. Capsaicinoid are the secondary metabolites responsible for the unique pungency of the chillies. The amount of capsaicinoids (mostly capsaicin and dihydrocapsaicin) are the determining factor for commercial and medicinal purposes. The hotness of the *Capsicum* is measured in Schoville Heat Unit (SHU) which is influenced by the maturity of the fruit, light intensity, temperature, elevation and moisture availability. Capsaicin and dihydrocapsaicin are the major alkaloids accounting for 91% (approximately) of the hotness found in chilli and the remaining 9% by homocapsaicin, homodihydrocapsaicin and nordihydrocapsaicin. Ethanolic fruit extracts were analysed in HPLC using the two markers compound i.e., capsaicin and dihydrocapsaicin. A total of 10 samples from different parts of Manipur (Ukhrul and Churachandpur) were collected and percentage yield of the ethanolic extract range from 16.12% to 40.08%. Out of the 10 samples quantified, accession CA 32 had the highest capsaicin and dihydrocapsaicin content while CA 23 was the lowest. Quantification of capsaicinoids provides a background for future commercialization and value addition of the existing cultivar/genotype.

Keywords: Capsaicinoid; *Capsicum*; HPLC

PP-10

MOF of Flexible Dicarboxylic Acid 2,2'-(9,10-dioxo-9,10 dihydroanthracene-2,6-diyl)bis(oxy) Diacetic Acid Derived from Anthraflavic Acid

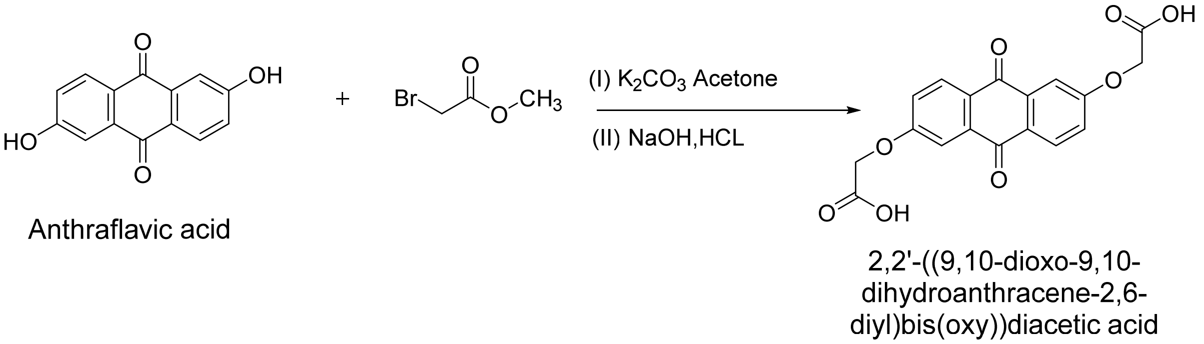
Th. Anjali Devi and W. Marjit Singh*

Department of Chemistry, G.P.Women's College, Dhanamanjuri University, Imphal – 795001, Manipur India

Abstract:

A new flexible dicarboxylic acid, i.e. 2,2'-(9,10-dioxo-9,10dihydroanthracene-2,6-diyl)bis(oxy) diacetic acid have been synthesized on reaction of Anthraflavic acid as starting compound with Methylbromoacetate and anhydrous Potassium Carbonate which on further hydrolysis results into synthesis of desired ligand. The synthesis ligand was characterized by UV-Visible spectrophotometer, Infrared Spectrometer, Nuclear Magnetic Resonance and Mass Spectroscopy Techniques.

The resulting ligand are being used to bind with transition metal(II) ions,viz. Cobalt, Copper, Nickel, Manganese, etc. to form a new metal organic framework or coordination complex which are being further characterized by single X-ray Crystallography.



Scheme 1 : Synthesis of 2,2'-((9,10-dioxo-9,10-dihydroanthracene-2,6-diyl)bis(oxy))diacetic acid.

PP-11

Nutraceutical Properties of *Euryale ferox* Salisb Seeds

Khumukcham Ranjana Devi

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Abstract:
The present paper highlights the nutraceutical property of *Euryale ferox* Salisb. This plant is also commonly known as prickly waterlily or Gorgon plant or Foxnut. It is an aquatic macrophytic plant that belongs to the Nymphaeaceae family. Nutraceuticals can be defined as substances that are food or part of a food that provides health benefits and are used for the mitigation or treatment of a disease. *Euryale ferox* Salisb seed contains a wide range of nutrients including carbohydrates, protein, minerals, and fats. The protein present in seeds of *Euryale* contains a unique composition of amino acids and also has high Essential Amino Acid Index (EAAI). Besides the nutritional superior quality the *Euryale ferox* Salisb whole plant parts have reported for many ethnomedicinal properties. They are being used in treatment of diseases including chronic diarrhea, kidney problems, excessive leucorrhea and hypofunction of the spleen in traditional medicine. The pharmaceutical properties of *Euryale ferox* Salisb have been scientifically validated by many researchers. The plants have been reported to have antioxidant, antidiabetic, antidepressant, anticancer, cardioprotective, hepatoprotective etc. Therefore, *Euryale ferox* Salisb seed will be a potential candidate/ingredient for formulation of nutraceutical/functional foods. And this present paper will be helpful in understanding the economic importance *Euryale ferox* Salisb in food industry.

Keywords: *Euryale ferox* Salisb, Nutraceutical, Functional food, Pharmaceutical , Foxnut

PP-12

Synthesis and Luminescence Properties of $CaMoO_4$:Eu^{3+} Nanoparticles Prepared via Ethylene Glycol Route

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Abstract:

Out of the many inorganic materials, scheelite type (AXO_4, A = Ca, Sr and Ba; X = Mo and W) nanomaterials has been an active area in research due to their good thermal, chemical and luminescence properties. Rare-earth ion doped calcium molybdate ($CaMoO_4$) has attracted much interest due to its numerous applications in optical filters, solid state lasers, LED (light emitting diodes), scintillators, microwave dielectrics etc. Eu^{3+} doped in $CaMoO_4$ nano- sized phosphor powders have been prepared at comparatively low temperature (130 ^{o}C) using ethylene glycol as the reaction medium following the previous reaction conditions. [1] The excitation spectra of Eu^{3+} doped in $CaMoO_4$ shows a broad band at around 277 nm. Under ultra-violet excitation, the $CaMoO_4$ shows a broad band at 498 nm which originates from the MoO_4^{2-} group. The luminescence study reveals emission peaks of Eu^{3+} at 535, 595 and 614 nm when irradiated with short UV light (277 nm). The strong emission is due to efficient energy transfer from MoO_4^{2-} to the Eu^{3+} ion. The electric dipole transition (red emission) is dominant over other transitions.

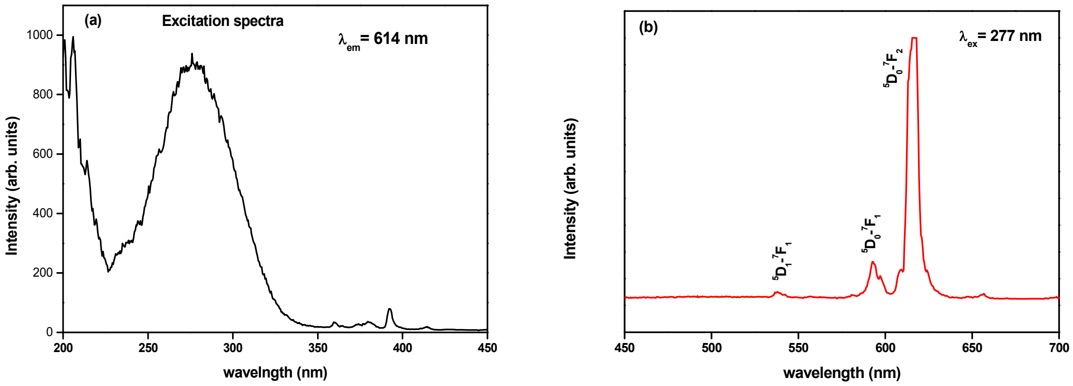

Fig. (a) Excitation and (b) Emission spectra of Eu^{3+} doped $CaMoO_4$ host.

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PP-13

GCMS Based Phytochemical Profiling and *in-vitro* Antidiabetic Studies of *Flemingia macrophylla* Willd. Kuntze ex Merr. of Manipur, North-East India

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Abstract:
In today's world, the number of people suffering from diabetes is believed to be raising steadily and the current antidiabetic therapies are frequently reported to have adverse side effects. Plants possess many concealed pharmacological potentials and therefore more elevated scientific techniques and pre-clinical studies with advanced methodology can be proceed to evaluate the safety, efficacy and other therapeutic effects. Ethnomedicinal plant use has shown promise for the development of cheaper, cost-effective antidiabetic agents with fewer side effects. Keeping in view the importance of medicinal plants and natural products , the current study is performed to investigate the antidiabetic activity of *Flemingia macrophylla* (Willd.**)** Kuntze ex Merr. of Manipur collected through prior knowledge of local traditional healers. The GCMS results have shown the presence of potential therapeutic compounds which are believe to give significant inhibition in the *in-vitro* antidiabetic activity performed in the current study.

Keywords: Anti-diabetic , GCMS , *Flemingia macrophylla* (Willd.) Kuntze ex Merr.

PP-14

Antimalarial Activity of *Mentha spicata* L. Collected Manipur,North East India

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Abstract:
There is an urgent need to identify a new malarial drug target for chemoprophylaxis, due to increasing problems of drug resistance to malaria parasite. The present study aims to discover novel, effective plant-base antimalarial drug. The crude and methanolic extract of *Mentha spicata* (Nungshihidak) showed promising *in-vitro* and *in-vivo* anti-plasmodial activity in *Plasmodium falciparum* 3D7 with cytotoxicity in Hela and Hek293t cancer cell lines. Growth inhibition sigmoid curve showed a decrease in parasite growth along a concentration gradient from 10-100 µg/mL of extract. Furthermore, the extract at different concentration did not cause significant haemolysis; more than 95% of RBCs were viable. Parasitemia and survival details are determined using Rane's test. The crude extract showed increase in parasitemia inhibition by 22.7 µg/mL, 36.6 µg/mL, 47.85 µg/mL at respective concentration of 500 µg/mL, 1000 µg/mL, 1500µg/mL. The methanolic extract showed 26% parasitemia inhibition at 500µg/mL and 47 µg/mL at 1000 µg/mL.

Keywords: *Mentha spicata,* malaria, parasitemia.

PP-15

Chemical Composition, Antioxidant, Antidiabetic and Anti-Inflammatory Activities of Essential Oil from Leaf and Rhizomes of *Alpinia calcarata* Roscoe from North East India

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Abstract:
The essential oil was isolated by hydrodistillation of the leaves and rhizomes of *Alpinia calcarata* Roscoe. The aim of the present study was to identify chemical ingredients in the essential oil of *A. calcarata* leaves (AC-L-EOil) and rhizomes (AC-Rh-EOil) by GC/MS technique for volatile components and their antioxidant (by 2 methods: DPPH free radical and Reducing power assay), antidiabetic (by 2 methods: α-glucosidase and α-amylase inhibition assay) and anti-inflamatory (by 2 methods: Heat induced haemolysis and Albumin test) activities. A total of 38 and 65 components were identified, representinSg 99.98% and 99.61% of the essential oil composition of *A. calcarata* leaves and rhizomes respectively. The main chemical constituents of the oils obtained were Eucalyptol (28.74% in AC-L-EOil and 25.4% in AC-Rh-EOil), Camphor (12.84% in AC-L-EOil and 4.28% in AC-Rh-EOil) and Carotol (9.86 in AC-L-EOil and 5.66 in AC-Rh-EOil). The essential oils showed antioxidant activities comparable to the standard, antioxidant of AC-L-EOil (IC_{50}=71.01±0.71 μg/mL) and AC-Rh-EOil (IC_{50}=73.83±0.49 μg/mL) in DPPH assay. Antidiabetic activity was evaluated based on α-glucosidase inhibition potential compared to a positive control, acarbose used as a standard drug. The essential oil of leaves and rhizomes showed concentration dependant against α-glucosidase inhibition that ranges from 14.25 to 92.39% for the concentration of 7.81 to 250 μg/mL. Anti-inflammatory activity was assessed by the albumin test and blood-induced hypotension. The present finding demonstrated that the leaf oil was slightly more promising than the rhizome oil which ultimately shows the medicinal potential of secondary metabolites with antioxidant, antidiabetic and anti-inflammatory activities. The current investigation found that essential oils of *A. calcarata* have a good pharmacological potential as well as promising antidiabetic effects.

Keywords: Acarbose; *Alpinia calcarata*; Antidiabetic; Eucalyptol; Essential oil; GC/MS.

PP-16

In Silico and In Vivo Studies of Antioxidant Activity of Naringin Isolated from Citrus Macroptera Montruz

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Abstract:
Citrus fruits are known for its rich antioxidant and *Citrus macroptera* Montruz. is one of the citrus fruits having certain bioactivities. In this study we attempted to isolate novel compounds from its peel. The chemical structure isolated from the peels of this citrus was identified as naringin, a flavanone glycoside based on NMR, Fourier transform infrared and mass spectroscopy. Naringin, a flavanone glycoside is a common compound present in citrus fruits which contributes to the bitterness in citrus juice as well as peels. Endogenous antioxidant enzymes which protects against oxidative stress are present in the liver tissues. The *in vivo* antioxidant activity of the liver enzymes were assessed using Swiss albino mice fed with naringin and ascorbic acid. Further, antioxidant activity was verified by subjecting naringin to in silico studies to examine its inhibitory effect against tyrosine kinase. The results showed that naringin has better protective effect against carbon tetrachloride-induced oxidative stress as compared to vitamin C (ascorbic acid) which is a popular standard antioxidant. The potential antioxidant therapeutic benefits of naringin deserves further studies.

Keywords: Naringin, *in vivo* antioxidant, ascorbic acid, in silico, molecular dynamics simulation

PP-17

Zanthoxylum acanthopodium: A Review on its Phytochemical and Pharmacological Profile

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Abstract:

Zanthoxylum acanthopodium is an important herbal medicinal plant of South-East Asian countries. The plant parts are used in several traditional medicines to cure various diseases. It has been known to possess antimicrobial, anti-inflammatory, anticancerous, antiulcer and hepatoprotective activities. A wide range of bioactive compounds (like aloe-emodin, chrysin, baicalein, oroxylin A, oroxin A-D, hispiludin and ursolic acid) have been isolated from it, of which flavonoids constitute major secondary metabolites. This review will highlight the ethnobotany, phytochemistry and pharmacological study of the plant.

PP-18

"MOF of Cobalt(II) with a New Flexible Dicarboxylic Acid 2,2'-([1, 1'-Biphenyl]-4,4'-diylbis(oxy))diacetic acid

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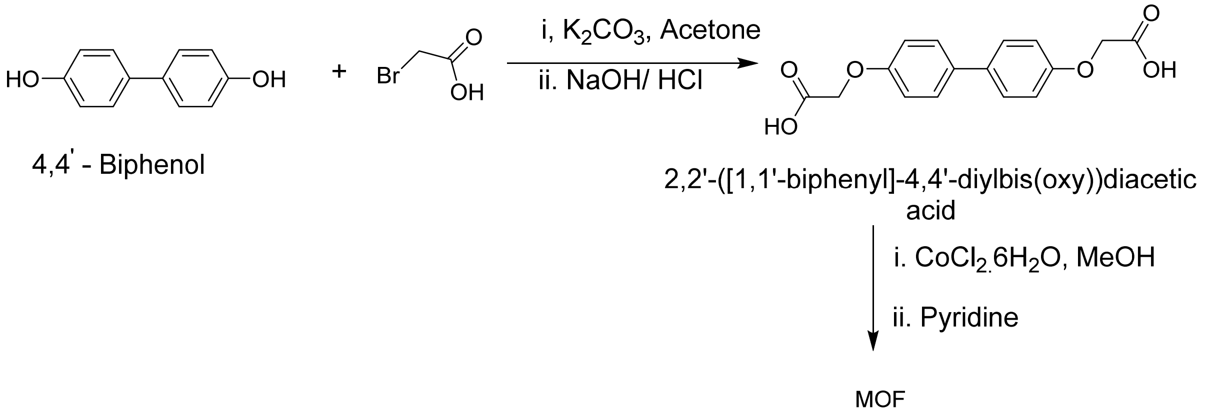
Abstract:

A new MOF of Cobalt (II) was synthesized from a newly synthesized flexible dicarboxylic acid derived from the 4,4'- Dihydroxyphenyl and ancillary ligand pyridine. The new flexible dicarboxylic acid i.e. 2,2'-([1,1'-biphenyl]-4,4'-diacetic acid is synthesized from the 4,4' dihydroxyphenyl on reaction with methylbromoacetate and anhydrous potassium carbonate in dry acetone which on further hydrolysis, obtained the desired ligand

The crystal structure of the MOF is found to have the distorted octahedral geometry at the cobalt centre, which is coordinated by two ancillary ligand pyridine four form oxygen atom of the new flexible dicarboxylic acid ligand



Scheme 1: Synthesis of 2,2'([1,1'-biphenyl]-4,4'-diylbis(oxy))diacetic acid.

PP-19

In-vitro Antidiabetic Properties of Some Wild Edible Fruits of Manipur

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Abstract:
Diabetes is one of the most prevalent non-communicable diseases (NCD) worldwide. There has been a rapid increase in type 2 diabetes (T2D) in developing countries. In addition to insulin supplements, many modern oral hypoglycemic agents and traditional medicines formulated with medicinal plants are also used for the treatment of diabetes. Fruits are important dietary components and contain various bioactive constituents. Many of these constituents have been proven to be useful to manage and treat various chronic diseases such as diabetes, obesity, cancer, and cardiovascular diseases. Ancient Chinese medicine heavily incorporates local fruits to treat diabetic patients. Given the above aspects, the present study dealt with the screening of eight wild edible fruits of Manipur viz. *Calamus tenuis* (Heiri), *Elaeagnus umbellate* Thumb (Heiyai), *Rhus semialata* Murr (Heimang), *Meyna laxiflora* Robyns (Heibi), *Spondias pinnata* (L. F.) Kurz (Heining), *Tetrastigma bracteolatum* Wall (Monjam hei), *Flacourtia jangomas (*Lour*)* Raeusch (Heitroi) and *Ziziphus mauritiana* Lam (Boroi) for an antidiabetic property using the α-amylase inhibitory assay. The fruits samples were extracted with methanol. Of these, four fruits namely *Rhus semialata* Murr, *Spondias pinnata* (L. F.) Kurz, *Tetrastigma bracteolatum* Wall, *Flacourtia jangomas (*Lour*)* Raeusch showed the α-amylase inhibitory activity. Among these *Rhus semialata,* Murr exhibited the highest activity corresponding to IC_{50} of 7.7 µg/ mL of the reaction which is comparable with the standard Acarbose (0.83 µg/ mL). The study showed that the wild edible fruits will be a good source for the formulation of supplements for diabetic management with further evaluation of potency and efficacy.

Keywords: Diabetes, Antidiabetic, Wild edible fruits, Manipur

PP-20

Synthesis of Polysubstituted Quinolines Using Deep Eutectic Solvent

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Abstract:

Polysubstituted quinolines have been synthesized by Friedlander annulation reaction of (2-aminophenyl)(phenyl)methanol with ketones mediated by $CuCl_2$ in choline-based deep eutectic solvents (DESs). The deep eutectic solvent acts as dual role of solvent as well as promoter and can be recycled. Mild reaction conditions, simple work-up procedure, excellent product yield, and use of recyclable catalyst are special features of this methodology, which makes the protocol a sustainable alternative to earlier reported methods of quinoline synthesis. The details will be presented.

Keywords: Quinoline, Friedlander reaction, DES.

PP-21

Determination of Traces Elements and Phytochemical Analysis of Bark of *Derris scandens* (Roxb.) Benth

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Abstract:

The Himalaya mountain Range is hub of medicinal plants. The Derris scandens (Roxb) Benth is a plant of fabaceae which has been used by indigenous people of Manipur, North-East India, for treatment of various purposes such as removal stones in kidney, loss of appetite, menstrual cycle in women, massage of body, solvent in laboratory, nourishment of child etc. It is commonly found in the forests of northern Oudh, in central and southern India, extending to Bengal, Assam, the Andaman and Nicobar Islands, Srilanka, Burma, southern China and North Australia (Duthie 1903–1929) The plant usually grows in the mountainous region of Manipur. The elemental analysis and phytochemical screening of the bark of the plant was carried out. Inductively coupled plasma -mass spectrometry and FAAS determined the presence of the elements Na (0.6μg/ml), K (10.9μg/ml), Fe (1.156μg/ml), Mg (2.2156μg/ml), Ca (13.0μg/ml), As (less than 5 ng/ml), V (less than 2 ng/ml), Cr (7 ng/ml), Mn (167 ng/ml), Ni (6 ng/ml), Co (less than 2ng/ml), Cu (31ng/ml), and Pb (12ng/ml). Phytochemical screening of the bark extracts of water, chloroform and petroleum ether confirmed that water extract contain maximum phytochemicals viz. glycosides, saponin, alkaloid, terpenoid, steroid, phenol and tannin as compounds. The present finding will definitely helpful in the preparation of further pharmaceutical formulations.

Keywords: Fabaceae, ICP-MS, FAAS, minerals, Phytochemicals, nourishment

PP-22

Assessment on Irrigation Water Qualities of Some Groundwater Samples from Imphal East District of Manipur, India

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Abstract:

Fifteen groundwater samples were collected from different parts of Imphal East District of Manipur during the monsoon period of 2019.They were analysed for irrigation(agricultural) water qualities based on the values of Sodium Adsorption ratio (SAR) and Residual Sodium carbonate (RSC).These two parameters were calculated based on the concentrations of Na^+, Ca^{2+}, Mg^{2+}, CO_3^{2-} and HCO^-_3. All the groundwater samples were found to be fit for irrigation or agricultural purposes as the values of SAR and RSC are below or within the good/ excellent category of water for irrigation purposes. So, all the fifteen groundwater samples are found to be fit for irrigation(agricultural) purposes.

Keywords: Sodium Adsorption Ratio,Residual Sodium Carbonate, irrigation and agriculture.

PP-23

Effect of Dy^{3+} Doping on $GdPO_4$ Nanoparticles: Structure, Luminescence and Chromaticity Studies

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Abstract:
$GdPO_4$ nanoparticles doped with Dy^{3+} ions have been prepared by co-precipitation method in an ethylene glycol solvent at a temperature of 160°C. All the prepared samples crystallize well to the monoclinic structure of $GdPO_4$. Luminescence study shows the presence of energy transfer from Gd^{3+} ions to Dy^{3+} ions. The luminescent spectra exhibit typical emission peaks of Dy^{3+} ions at 476nm due to magnetic dipole transitions ($^4F_{9/2} \rightarrow {}^6H_{15/2}$) and at 572nm due to electric dipole transition ($^4F_{9/2} \rightarrow {}^6H_{13/2}$). The magnetic dipole transition is dominant over the electric dipole transition indicating the presence of inversion symmetry of Dy^{3+} ions. The luminescent intensity also decreases upon increasing the concentration of Dy^{3+} ions. This is attributed due to the concentration quenching effect of Dy^{3+} ions. Moreover, the samples follow bi-exponential decay also suggesting the transfer of energy from Gd^{3+} ions to Dy^{3+} ions. The CIE chromaticity study of the prepared samples also show the presence of CIE chromaticity coordinates in the blue-violet and near white region. Thus, the prepared samples could find potential applications as white light emitting diodes.

Keywords: Co-precipitation, monoclinic, concentration quenching, chromaticity.

PP-24

Essential Elements Content in the Freshwater Snails Commonly Consumed by the Living Population of Manipur

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Abstract:

In India, snail consumption has been reported in 29 tribal groups especially in the states of Bihar, Jharkhand, Maharashtra, West Bengal and the entire North-eastern region. Snails locally known as “Tharoi” are consumed as an authentic cuisine and form a major dietary component of the ethnic people of Manipur. So far, no study has been undertaken regarding the elemental characterization on popularly consume freshwater snails in India. In this study essential major and trace elements analysis were carried out in the five species of freshwater snails namely, *Bellamya crassa*, *Cipangopaludina lecythis*, *Brotia costula*, *Thiara tuberculata* and *Angulyagra oxytropis* using Energy Dispersive X-ray spectroscopy (EDX). The studies revealed that five major elements namely Ca, K, P, S, Cl and eleven trace elements namely Fe, Zn, Cu, Co, Se, I, Mo, Mg, Cr, V and Mn detected in mg/kg unit were present in varying concentrations in the selected freshwater snails with high and notable concentration of Ca, P, Fe and Mo. This study supports the health benefits of the consumption of freshwater snails by the natives of Manipur since they are found to contain appreciable amount of the Ca, P, Fe and Mo.

Keyword: Metals, Energy dispersive X-ray spectroscopy, North eastern India, Manipur

PP-25

A Facile Conversion of Primary Amines Having no α-Methylene to Nitriles

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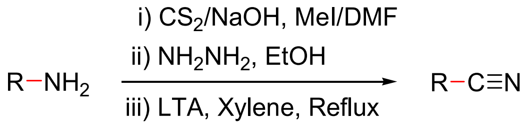
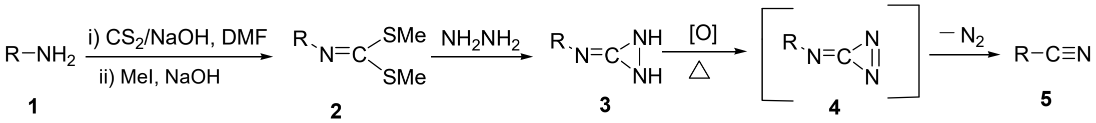
Abstract:
Conversion of primary amines, having no α-methylene, to nitriles *via* carbonimidodithioates by reaction with hydrazine followed by oxidation is highlighted.



$$R{-}NH_2 \xrightarrow[\text{iii) LTA, Xylene, Reflux}]{\substack{\text{i) } CS_2\text{/NaOH, MeI/DMF} \\ \text{ii) } NH_2NH_2\text{, EtOH}}} R{-}C{\equiv}N$$

Dimethyl carbonimidodithioates, **2** derived from various primary amines (**1**) by reacting with carbon disulfide and methyl iodide in dimethylformamide in the presence of concentrated sodium hydroxide, can be converted to the diaziridine derivatives, **3** by reacting with hydrazine in ethanol. The diaziridine, **3** on oxidation with lead tetra-acetate in refluxing xylene, extrudes nitrogen and intramolecular stabilization, particularly 1,2-carbon migration, takes place to give the product, **5**. The reaction may take place through the intermediates, diazirines, **4** which have not been isolated.



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PP-26

Phytochemical Screening; Total Phenolic Content and Determination of the Free Radical Scavenging Activity of *Lindernia ruellioides* and *Potentilla sundaica* using DPPH Free Radical Scavenging Method

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Abstract:

Lindernia ruellioides and *Potentilla sundaica* are a group of herbaceous plants from the Linderniaceae and Rosaceae family. They are native to warm regions in both Eastern and Western Hemispheres. Classified as Least Concerned in the **IUCN RED LIST**, both are considered to be under the category of important medicinal plant groups of Asia.

Lindernia ruellioides is often used by traditional herbal medicine practitioners for the treatment of urolithiasis (**Ahmed. M.M. and Singh. K.P., 2011**).The leaves of this plant are also reported for treatment of wounds, bruises, boils, jaundice, dysentery, anti HBV effects (**Jing Chen Wei et.al, 2018**). *Potentilla sundaica* is an astringent whose leaves, specially, are often decocted and used for the treatment of influenza and sore throat. Local people here in Manipur used it’s decoction in the treatment of urolithiasis.

In the present study, the plant samples were collected, dried and extracted using ethanolic, hydroethanolic, aqueous and methanolic solvents. The phytochemical constituents were screened, total phenolics content were estimated and DPPH assay was done for the samples.

The ethanolic and methanolic extracts showed good antioxidant properties where *Lindernia* showed better results. The presence of such properties provides the scientific evidence for the medicinal purposes of the plants. Further confirmations and investigations of the plant extracts can be done and pharmaceutical properties of the compounds can be identified.

Keywords: Linderniaceae, Rosaceae, urolithiasis, DPPH, Phenolic.

PP-27

Metal Analysis in Freshwater Edible Insects Commonly Consumed by the Natives of Manipur, a North Eastern State of India

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Abstract:
The practices of entomophagy and entomotherapy is quite common for both the people in the hills as well as in the valley region of Manipur, a northeastern state of India. Freshwater edible insects are consumed either as a delicacy, as medicines or source of food e.t.c. Available literature reveals that no study is done regarding the essential metals content on edible insects commonly consumed and found in Manipur. This study was carried out to analyze major and trace metal of four species of freshwater edible insects i.e. *Hydrous indicus*, *Odonata sp.*, *Gryllotalpa orientalis* and *Indochinamon manipurense* using Energy Dispersive X-ray spectroscopy (EDX) technique. The result of the study revealed that five major elements namely Ca, K, P, S and Cl and eleven trace elements namely Fe,Zn,Cu,Co,Se,I,Mo,Mg,Cr,V and Mn detected in mg/kg unit were found to be presented in varying concentration in the selected freshwater edible insects with high notable concentration of Ca, P, Cu, Fe, Mg, and Mo. This result of the study supports the therapeutics uses and health benefits of consuming freshwater edible insects by the natives of Manipur since they are found to contain appreciable amount of Ca, P, Cu, Fe, Mg, and Mo.

Keywords: Entomophagy, Entomotherapy, Energy dispersive X-ray spectroscopy, Essential metals.

PP-28

Phytochemical Screening, Biological Activity and Gas Chromatography Mass Spectrometry Analysis of *Allium hookeri* Thw. Collected from Ema market, Manipur

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4. Department of Chemistry, GP Women College, Imphal - 795001, Manipur India
**E-mail:* grihanjali@gmail.com
This work was carried out at the Advanced Level Institutional Biotech Hub, Imphal College, Imphal-795001, Manipur, India.

Abstract:

Allium hookerii Thwaites (*A. hookerii* Thw.) which is locally known as *Maroi napakpi* (Garlic chives) belongs to the Alliaceae family and is generally used as condiments/vegetables/spice and/or as a medicinal herb in Manipur since time immemorial. Studies from different groups have shown that the fresh leaves and roots of this herb are used as medicine in reducing temperature, in swelling, as anti-inflammatory, anti-ulcer agent and for reducing blood cholesterol etc [1, 2]. In view of the various health benefits, we aimed to study some of its biological activities such as antioxidant and antimicrobial activities and screen its phytochemical constituents through Gas Chromatography-Mass Spectrometry (GC-MS). The present study will discuss the preliminary findings observed with reference to the methanolic and aqueous extracts of *A. hookerii* Thw.

PP-29

Synthesis and Antimicrobial Activities of Thiazoles Conjugated with Schiff Bases

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Abstract:
Heterocyclic compounds have been proven to the backbone for the discovery of many bioactive compounds. Thiazoles in particular, disubstituted-2,4-thiazoles are among the various heterocyclic compounds that have received the most attention during last three decades as potential biomolecules. The majority of them have been exploited for anti-microbial, anti-convulsant, anti-tubercular, anti-cancer and anti-fungal activities. In 2003, Holla and co-workers showed that 2,4-disubstituted thiazoles have antibacterial and anti-inflammatory properties. The newly synthesized 2,4-disubstituted thiazoles were screened for their antibacterial activity against *Escherichia coli*, *Staphyllococcus aureus*, *Psuedomonus aeruginosa* and *Klebsiella pneumoniae* bacterial strains by disc diffusion method . An efficient & convenient procedure has been developed for the synthesis of thiazole derivatives by one – pot condensation reaction of haloketone with thiourea. Starting from 2- Amino 4-(2-hydroxy,4-methoxy phenyl) thiazole, different Schiff bases of thiazole were synthesized by condensing 2- amino group of thiazole with various aromatic aldehydes in the search for possible clinically suitable derivatives for antibacterial and antifungal studies. The structures of synthesized compounds were characterized by analytical and spectral (IR, 1H – NMR) methods. The synthesized compounds were screened for their antibacterial and antifungal activities. Minimum inhibitory concentrations are also calculated.

Keywords: Schiff bases,2,4-Disubstituted thiazoles ,Anti-bacterial ,Anti-fungal

PP-30

In Silico Analysis of Antagonist Effects of Phytocompounds Present in the Aqueous Methanol Leaf Extract of *Isodon ternifolius*(D.Don) Kudo on β$_1$- adrenergic Receptor

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Abstract:
β$_1$- adrenergic receptors regulate heart rate and myocardial contractility. Antagonistic effects of β$_1$-receptor drugs cause a decrease in myocardial contractility, and heart rate. The risks of coronary artery disease, stroke, and congestive heart failure can be reduced by administering β$_1$-blockers. They are mainly used for the treatment of chronic angina, hypertension, post-myocardial infarction, decreased left ventricular function, and heart failure. Metoprolol is one of the most widely prescribed cardio-selective β$_1$-blockers. Discovery and development of new and potent β$_1$-receptor antagonist drugs is important for saving the lives of heart patients. In the present investigation, two target compounds, viz. estran-3-one, 17-(acetyloxy)-2-methyl, (2alpha, 5alpha, and 17beta), and 1-linolensaeure-sn-glycerylester-2,3-diacetate were used as ligands to evaluate their antagonistic effects on the cardiac β$_1$ receptor using PyRx, a virtual screening software for computational drug discovery. These compounds, detected in GC-MS analysis of 80% aqueous methanol leaf extract of *Isodon ternifolius* (D.Don) Kudo, were selected based on their relative abundancy, drug-likeness model score, and toxicity.The docking analysis showed that estran-3-one, 17-(acetyloxy)-2-methyl, (2alpha, 5alpha, and 17beta), and 1-linolensaeure-sn-glycerylester-2,3-diacetate have a binding energy of-8.1 and -5.5 kcal/mol, respectively. When compared with metoprolol, the former showed less binding energy indicating that it has higher β$_1$-receptor inhibitoryactivity.The latter, on the hand, showed β$_1$-inhibitory activity lesser than that of metoprolol.

Keywords: β$_1$-adrenergic receptors, myocardial contractility, antagonistic effects, stroke.

PP-31

Effect of Temperature and Ionic Strength on the Formation Constants of Complexes of Salicylaldehyde (N – Benzoyl) Glycyl Hydrazone with Sm(III), Eu(III) and Gd(III) Ions

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Abstract:

Formation of complexes of Salicylaldehyde (N – Benzoyl) Glycyl Hydrazone, SalBzGH with Sm(III), Eu(III) and Gd(III) ions were studied pH - metrically at different temperature of 10, 20, 30, 40 and 50^0C and ionic strengths 0.05, 0.10, 0.15, 0.20 M using KNO_3 as the back electrolyte. The pH titration and the proton – ligand formation curves of the ligand showed the presence of two ionizable protons in the ligand. The ligand formed 1:1 and 1:2 complexes with all the Ln(III) ions in 20% (v/v) dioxane – water medium and the corresponding formation constants (log K_n) were determined from the formation curves. The formation constant values decreased with increase in temperature and ionic strength indicating that complex formation was more favorable at lower temperature and ionic strength. The trend in the constants of Ln(III) ions was found as Sm < Eu > Gd. Changes in free energy, enthalpy and entropy associated with the complexation reactions were evaluated. All the reactions were spontaneous, exothermic and enthalpy – driven processes.

Key words: Formation constants, pH - metric, hydrazone, lanthanide ions.

PP-32

MOF of Flexible Dicarboxylic Acid 2,2'-((9,10-Dioxo-9,10-dihydroanthracene-1,5-diyl)bis(oxy)diacetic acid Derived from Anthrarufin

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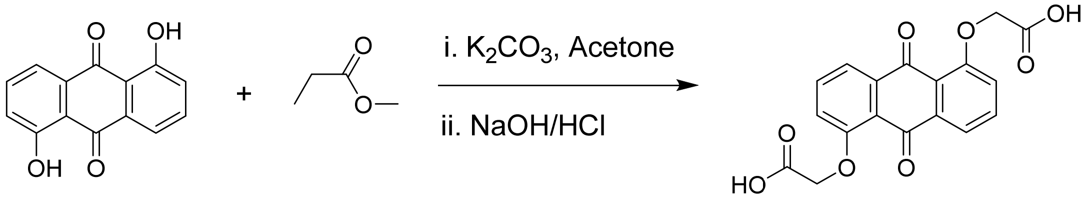
Abstract:

In this study, a new flexible dicarboxylic acid ligand i.e.2,2'-((9,10-dioxo-9,10-dihydroanthracene-1,5-diyl)bis(oxy) diacetic acid was synthesized on reaction with Anthrarufin as starting compound and methyl bromoacetate in presence of anhydrous potassium carbonate which on further hydrolysis results into the production of the desired ligand.

The characterization was done by using the spectroscopic technique such as UV-Visible spectrophotometer, Infrared spectrometer, Nuclear Magnetic Resonance and Mass Spectroscopy Techniques. The resulting flexible dicarboxylic acid ligand are being used to bind with transition metal(II) ions viz, Cobalt, Copper, Nickel, Cadmium, Manganese, etc to form a new MOF or Coordination polymer which are being further characterized by single X-ray Crystallography.



Anthrarufin

2,2'-((9,10-dioxo-9,10-dihydroanthracene-1,5-diyl)bis(oxy))diacetic acid

Scheme 1: Synthesis of 2,2'((9,10-dioxo-9,10-dihydroanthracene-1,5-diyl)bis(oxy))diacetic acid.

PP-33

Metals Content in the Ethnozoological Products used by the Tangkhul Tribe of Manipur, India

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Abstract:
Manipur lies in the north-eastern region of India in the Indo-Burma Biodiversity hotspot having rich variety of flora and fauna. Tangkhul tribes are mainly habitat in Ukhrul district of Manipur and popular for using the products of animal fauna as traditional medicines for curing many diseases like body pain, arthritis, cough, TB, anaemia, cancer, typhoid, stone case & urinating problem etc. The objective of the study was to determine the essential metals content in the ethno zoological products namely, *Periplaneta Americana, Python molurus, Cervus unicolor, Heterometrus bengalenesis, Hoplobatrachus tigerina, Upupa epops, Sus scrof, Tylotriton verrucosus, Pheretima pusthusma, and Cybister tripunctatus.* using **ICP-OES (Inductively Coupled Plasma Optical Emission Spectrometry),** one of the most powerful techniques for its quick multi elemental trace analysis capability and high sensitivity was used to detect and characterize the metals. The result of the study revealed that three major metals namely S, K, Ca and trace metals namely Fe, Zn, Mg, Cu, Co, Mn, Se, and V detected in mg/Kg unit were present in varying concentrations in the ethno zoological products with high and notable concentration of Fe, K, Ca, Zn, Mg & S. The results of the present study support the therapeutic usage of these ethnozoological products in folklore practices for curing various human diseases.

Key words: Folklore medicines, metals concentration, ethno medicine, NE India.

PP-34

Mixed Ligand Complexes of Copper (II) with O-Ethyl Pyridine -2-Carboximidate and Amino Acids

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Abstract:

Reaction of 2-cyanopyridine with hydrated copper chloride in ethanol resulted in the formation of dichloro O-ethyl pyredine-2-carboximidate copper(II) complex. The present work describes the results of our investigation on the synthesis and structural studies of mixed ligand complexes of O-ethyl pyridine-2-carboximidate with some amino acids. Reaction of [Cu(EtPy)Cl_2] with Glycine or Alanine or Valine in equimolar ratio in ethanol resulted in the formation of [Cu(EtPy)Gly]Cl , [Cu(EtPy) Ala]Cl. And [Cu(EtPy) Val]Cl.2H_2O respectively . IR spectra of the complexes shows absence of (C≡N) absorption band around 2235 cm^{-1} and appearance of new bands around 1568-1589 cm^{-1} for asymmetric stretching vibration of carboxylate group [υ_{as} (COO-)] and band around1373-1384 cm^{-1} for symmetric stretching vibration of carboxylate group [υ_{s} (COO-)] , which are assigned to coordination of carboxylate group in monodentate fashion . And band around 441-449 cm^{-1} assigned the coordination of nitrogen atom of amino group of amino acid to the metal ion. The molar conductance values of the complexes 95-112 omh^{-1}cm^{-2} mol^{-1} are indicative of uni-univalent electrolyte. The complexes show a magnetic moment values of 1.74-1.84BM. Electronic spectra of the complexes show two typical absorption bands around 720-889nm and 610-647 nm in methanol which may be assigned to $^2B_1g \rightarrow ^2B_2g$ and $^3B_1g \rightarrow ^2E_2g$ transition for square planar [CuN_3O] chromophore.

Keywords: EtPy = O-Ethyl pyridine-2-carboximidate, Gly = Glycine, Ala = Alanine , Val = Valine.

PP-35

Optimization of Extraction Process of Fibroin Protein from the Cocoon of *Antheraea frithi* Moore

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Abstract:

Silk fibroin is a high molecular weight fibrous protein polymer known for its extended use in biomedical applications as a regenerated biomaterial in various kinds of forms, such as films, fibers, gels, powders and sponges due to its processability, mechanical properties, biodegradability, and biocompatibility. Optimization of fibroin protein extraction from the cocoon of *Antheraea frithi* Moore was carried out by performing sequential steps of demineralization, degumming, and dissolution. The effectiveness of different parameters such as concentration, treatment temperature and time was examined to obtained optimum conditions for fibroin extraction from the silk cocoon. In this work surface characterization and mineral content of silk fibroin fibers was confirmed using SEM and EDAX. The optimization results are useful to obtained *Antheraea frithi* aqueous silk fibroin solution for further preparation of thin fibroin film.

Keywords: *Antheraea frithi* moore, Silk fibroin, Biomaterial, Demineralization, Degumming, and Dissolution

PP-36

GCMS Based Phytochemical Profiling and *In Vitro* Anti-Inflammatory Study of *Zanthoxylum armatum* DC

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Abstract:
The present study was designed for Gas Chromatography Mass Spectrometry (GCMS) based phytochemical profiling and assessment of *in vitro* anti-inflammatory activity of methanolic extracts of leaf, stem and fruit of *Zanthoxylum armatum* DC commonly known as "Mukthrubi" collected from the foothill of Nongmaiching Hill, Imphal East, Manipur. Samples were subjected to GCMS analysis (Shimadzu QP-2010 Plus with Thermal Desorption System TD 20). Further, *in vitro* anti-inflammatory activity was investigated by albumin denaturation assay and heat induced heamolysis assay. Gas Chromatography-Mass Spectroscopy of the crude methanolic extracts of leaf, bark and fruit yielded 74, 77 and 55 compounds respectively. The extracts showed potent anti-inflammatory activity with IC50 values significantly comparable to that of standard anti-inflammatory drug Indomethacin.

Keywords: *Zanthoxylum armatum* DC, GCMS, anti-inflammatory

PP-37

Synthesis of Novel Bioactive Quinoline Derivatives Using Aza Diels–Alder Reaction

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Abstract:

An efficient protocol for the synthesis of Quinolines, a bioactive N-based heterocycles using $FeCl_3$ as lewis acid *via* Aza Diels-Alder reaction has been developed. The cycloaddition takes place between imine as electron deficient diene and functionalized alkyne as electron rich dienophile. The novel Quinoline derivatives were synthesized in a one-pot system and were fully characterized by spectroscopic techniques such as FT-IR, NMR etc. The details will be presented.

Keywords: Quinoline, Aza Diels-Alder reaction, Lewis acid.

PP-38

Choline Based Deep Eutectic Mediated Synthesis of 2,4-Disubstituted Quinazolines.

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Abstract:
An efficient deep eutectic solvent (DES) promoted reaction of 2-amino-5-chlorobenzophenone, aromatic aldehydes (benzoyl alcohols) and ammonium acetate leading to the formation of quinazolines with excellent yields is described. The use of expensive catalysts and organic solvents are avoided in this protocol with the use of DES, which is biodegradable and renewable. The details will be presented.

Keywords: Quinazoline, Organic Catalyst, DES.

PP-39

Influence of Isomerism on the Vinylated Arene using Ru(II)-catalyst in Acetic Acid Solvent

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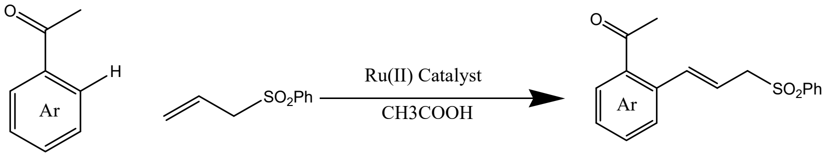
Abstract:

The synthesis of vinyl arenes has always been alluring, as they are prevalent structures in a the multitude of pharmaceuticals and organic materials and are often harvested as valuable building blocks for synthesising biologically relevant molecules. Direct olefination of arene using Ru(II)-catalyst has transpired to be exceptionally prominent. Due to its amphiphilic nature, Allyl sulfone could govern divergent reactivity with various electrophiles and nucleophile sulfones, especially allyl sulfones. Our investigation considers the theoretical study of the mechanism of acetophenone and allyl sulfone substrates in Ru(II)-catalyst using different orientations. We observed the involvement of four (4) possible pathways giving the vinylated product. Three of the pathways give a similar product, while one gives the same compound with a different orientation.



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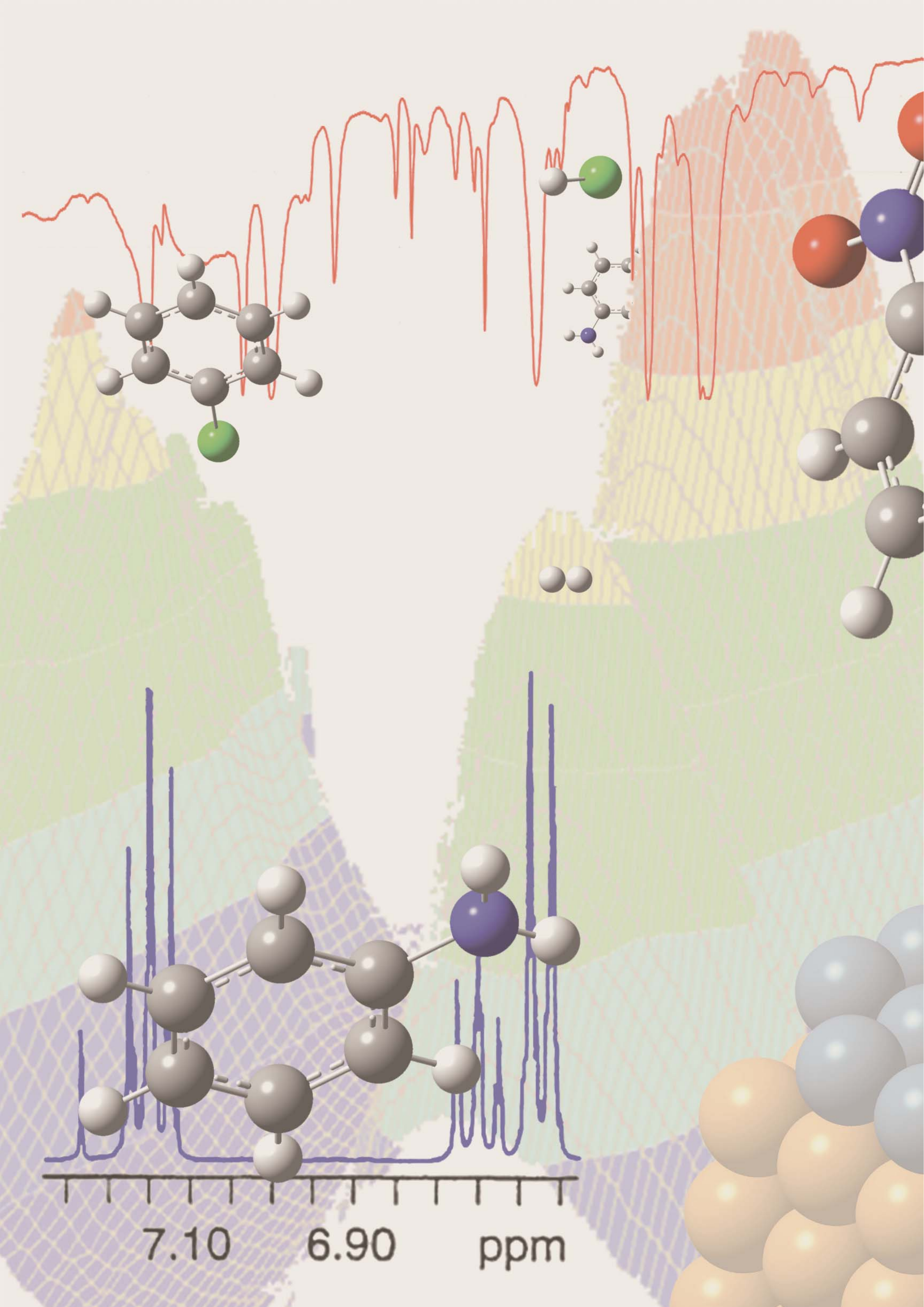
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