

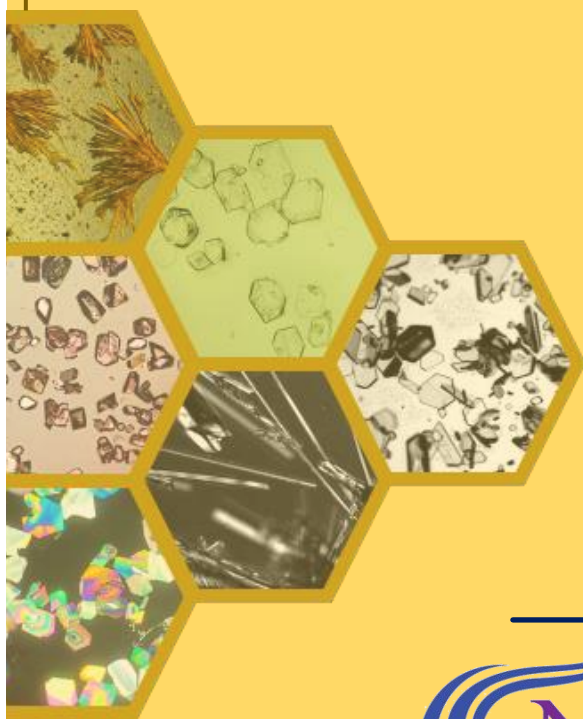
Abstracts of the International Conference on **Separation and Purification Technologies 2023, IIT Patna**



7-8 December 2023



Department of Chemical & Biochemical Engineering
INDIAN INSTITUTE OF TECHNOLOGY PATNA



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Jose V Parambil
(Editor)

*Abstracts of the International Conference on Separation
and Purification Technologies 2023, IIT Patna
ICSPT 2023 (7-8 December 2023)*

Organized by
Department of Chemical & Biochemical Engineering,
Indian Institute of Technology Patna, India

Published by
AIJR Publisher, Dhaurahra, Balrampur, India 271604



Abstracts of the International Conference on Separation and Purification Technologies 2023, IIT Patna
ICSPT 2023 (7-8 December 2023)

Editor

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Conference Organizer

Department of Chemical & Biochemical Engineering, Indian Institute of Technology Patna, India

Conference Venue

IIT Patna, India

ISBN: 978-81-965621-3-7

DOI: <https://doi.org/10.21467/abstracts.164>

Type

Abstract Book

Series

AIJR Abstracts

Published

16 January 2024

Number of Pages

62

Copyeditor

Ms. M. Sharifa Azmi

Imprint

AIJR Books

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AIJR Publisher, Dhaurahra, Balrampur, India 271604

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ICSPT 2023

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Preface

In chemical and allied industries, product pricing and application often depend on the purity or the material. Hence, separation and purification technologies act as the backbone of chemical industries. The final purification techniques may regulate not only the purity of the product but also other product attributes such as particle size, shape, stability, etc. However, many separation and purification techniques suffer from various limitations including high cost or energy requirements, utilization of harmful organic solvents, and production of secondary mixtures that require post-processing. Nonetheless, this is a constantly evolving field of research where novel techniques attempt to address several of these challenges. Green solvents, process intensification techniques, and biological processes are areas of intense research.

India has a high potential in the processing of bio-derived products, including food and other agricultural products. Technological advancement for the Indian environment and feed materials are essential for the nation to capture the global market. Researchers, academic and research organizations, and companies play a major role in ensuring the development of a suitable ecosystem for the translation of technologies for societal benefit. Scientific conferences are hotbeds for developing interdisciplinary works, collaborations, and ideas that shape the future course of researchers. By organizing this conference, we aim to bring together like-minded people researching these areas to analyze the technology development for the future and to work collaboratively. Having a startup meet along with the conference is also a conscious decision to bring the research scholars in touch with the market requirement and to find synergy between the entrepreneurs and researchers. We hope that the meeting will catalyze fruitful collaborations, both at academic and commercial levels and that the researchers and industry can inspire each other to work together.



Dr. Jose V Parambil
Conference Convenor
IIT Patna



Dr. Lalita Kanwar Shekhawat
Conference Co-Convenor
IIT Patna

About the Conference

The International Conference on Separation and Purification Technologies (ICSPT) aimed to highlight recent scientific developments in the area of separation and purification techniques and to bring together researchers working in these areas. The primary focus of the conference is on technology developments applicable in the Pharmaceutical Industry, Agrochemical Industry, and Food Industry.

The conference provided a platform to bring together academicians, industrialists, and entrepreneurs working in the above areas to share their knowledge. The conference also witnessed an agro-processing startup meet to facilitate interaction of startups with technical experts.

Shri. Vishwajeet Singh (Head Operations, CSM, AgChem, Pi Industries) inaugurated the conference in the presence of Dr. Anup K Keshri (ADean R&D, IIT Patna), and Prof. C. Malla Reddy (IIT Hyderabad). Plenary speakers included Prof. Jerry Heng (Imperial College London), Prof. C. Malla Reddy, and Prof. Ashutosh Singh (University of Guelph, Canada).

The technical sessions over the two-day conference explored cutting-edge methodologies and green initiatives in biochemical, environmental, and food application separation processes. These research were showcased by participants from different renowned institutes of the country such as IIT Madras, IIT Roorkee, IIT Gandhinagar, IIT BHU, IIT Patna, IIT Tirupati, NIT Jamshedpur, NIT Karnataka, NIT Rourkela, NIT Jalandhar, NIT Raipur, NIT Surathkal, and Tezpur University through their oral and poster presentations. The participants exhibited high -octane enthusiasm to show, discuss, and clarify the genesis and effect of their research work to both the technical and general audiences. Mr. Devargya Chakraborty from IIT Patna, Mr. Mohammad Irfan from IIT Tirupati, and Ms. Chahat Jain from IIT Gandhinagar, respectively were the winner, 1st runner-up, and 2nd runner-up in the oral presentation. For the poster presentation, Ms. Shamiran Baroi from Tezpur University, Assam emerged out to be the winner. In the research photography competition, Mr. Mahraj Din Malla from the University of Kashmir & Ms. Shristi Shefali Saraugi from NIT Rourkela were the winners in the respective online and offline phases of the competition.

About the Conference Organizer

IIT Patna

Indian Institute of Technology Patna is an institution of national importance, established on 6th August 2008. IIT Patna stands as a beacon of academic excellence and innovation, contributing significantly to India's technical education and research landscape. With its commitment to fostering a culture of research and development, IIT Patna has become a national hub for cutting-edge discoveries and collaborative initiatives. Currently, IIT Patna has six engineering departments, three science departments, and a humanities and social science department. There are over three thousand five hundred students and over three fifty staff and faculty members on the campus. The institute routinely hosts several international and national seminars, conferences, and other technical meetings to promote research in various fields. In this context, hosting an international conference at IIT Patna offers a unique opportunity for scholars, researchers, and industry experts worldwide to converge, share insights, and forge new collaborations. The institute has established partnerships with renowned international universities and research organizations, creating a network for collaborative projects and academic exchange programs. There are different centres of excellence, Incubation Centre, Technology Business Incubator, etc. on the campus that provides ample opportunity for enthusiastic researchers. Vibrant scholars, young faculty members, and new infrastructure make IIT Patna a desirable destination with huge potential for technology development and research.

Department Chemical and Biochemical Engineering

The Chemical and Biochemical Engineering Department of IIT Patna was instated in 2014. The department presently offers Bachelor of Technology, Master of Technology, and Doctor of Philosophy degrees in Chemical Engineering. These programs aim to develop highly qualified, self-motivated, independent, open-minded graduates capable of contributing to industry, academia, and research and development programs. Currently, the department has ten faculty members who are eager to contribute innovative solutions to meet societal needs. The department has established well-equipped laboratories for teaching and research purposes. The facilities in the department are focused on experiments and simulations applicable to various sectors like energy, specialty chemicals, materials, and waste management. Over 20 Ph.D. research scholars, 200 UG students, and over 100 alumni are proud department members. As the Department of Chemical and Biochemical Engineering at IIT Patna prepares to host this International Conference, it is not only a showcase of the department's achievements but also a commitment to advancing the global discourse in chemical and biochemical engineering. The conference is poised to catalyze collaboration, innovation, and the exchange of ideas, further solidifying IIT Patna's position as a leader in engineering education and research on the international stage. Beyond the academic sessions, the conference will include networking events, social gatherings, and cultural activities that promote camaraderie and the exchange of diverse perspectives.

Department of Chemical and Biochemical Engineering



Dr. Anoop K Gupta

Computational fluid dynamics, Energy storage, Lithium-ion battery, Phase change materials.

Dr. Atanu K Metya

Microscopic Structure and Dynamics of Materials, Molecular Modeling and Simulations, Interfacial Phenomena, Computational Drug Design.



Dr. Jose V Parambil

Separation processes, Crystallization, Process Development.

Dr. Lalita Kanwar Shekhawat

Bioprocessing and Bioseparation: Downstream processing of therapeutic proteins, Mechanistic modeling of chromatographic separation process.



Dr. Mahendra Ram

Thermochemical conversion, water treatment, Nutrition extraction, human genome editing.

Dr. Priyanka Gupta

Bio-electrochemical systems, Microbial fuel cells, Synthesis of value-added chemicals via CO₂ reduction.



Dr. Nitin D Chaturvedi

Process system engineering, Modelling and Simulation, Optimization.

Dr. Sandip Khan

Wetting and interfacial properties of complex molecules, Phase behavior of polar fluids, Evaporation and Condensation of nano-droplets.



Dr. Sujoy Kumar Samanta

Wastewater Treatment, Microwave Assisted Material Processing, Renewable Energy Applications.

Dr. Sushant Kumar

Heterogeneous Catalysis, Operando Spectroscopy, Clean Energy.





Director's Message



Prof. T. N. Singh

Director

Indian Institute of Technology Patna

I am happy to share that the Department of Chemical and Biochemical Engineering, IIT Patna, is organizing the International Conference on Separation and Purification Technologies (ICSPT) 2023, with a focus on separation and purification techniques applicable to pharmaceutical, agrochemical, and allied industries. To establish and strengthen a research culture, IIT Patna has taken various measures in addition to infrastructure development and support. Events and conferences are a part of the initiatives to give researchers a forum to share and publicize their results and get inspired by academics working hard in other areas of the world. An event like this conference is a valiant attempt to organize and develop each delegate's cognitive process and caters to the development of fruitful collaborations. This conference aims to bring together top academicians, researchers, and industry leaders in the area of separation processes to share their experiences and research findings about all facets of ongoing research and development work as well as the difficulties involved in achieving the desired goals.

I convey my best wishes to the organisers of the conference who have worked day and night in organizing this conference.

My best wishes for the grand success of the event.

Jai Hind!!

-T. N. Singh

Message from the A. Dean-R&D



Dr. Anup Kumar Keshri

A. Dean-R&D

Indian Institute of Technology Patna

With great enthusiasm, I would like to announce that the Department of Chemical and Biochemical Engineering at IIT Patna is organizing the International Conference on Separation and Purification Technologies. The conference's primary objective is to explore recent developments in separation and purification methods while providing a forum for scholarly discussion and exchange. International events and conferences provide platforms for researchers to disseminate and promote their findings while also providing opportunities for cross-pollination of ideas with scholars from diverse geographical locations. A conference of this nature represents a commendable endeavour to facilitate the organization and enhancement of the cognitive processes of each delegate.

I believe that the conference will result in several talks that are intellectually stimulating and in-depth discussions by the scholars and technical professionals in attendance. I wish that the deliberations at the event would result in joint efforts to develop new techniques that would have a lasting impact on society. I send a sincere welcome to all delegates and attendees to our beautiful campus and wish for productive and exceptional interaction between scholars with an interest in separation and purification technologies.

-Dr. Anup Kumar Keshri

Keynote Speakers



Dr. Jerry Y Heng

Prof. Jerry Heng is the Director of UG Studies, Department of Chemical Engineering, Imperial College London. He is an expert in the areas of particle engineering, crystallization, and downstream separation processes. He is the recipient of the prestigious EPSRC Manufacturing the Future Fellowship and has served on the editorial board of several journals, including Chemical Engineering Research and Design and Particuology. He received prestigious awards and recognition, including the McBain Medal, SCI and RSC, 2020; Royal Academy of Engineering ExxonMobil Teaching Excellence Award, 2013, 2010, AAPS New Investigator Grant, American Association of Pharmaceutical Scientist, 2010, AAPS Outstanding Graduate Research Awards in Pharmaceutical Technologies, AAPS, 2006, Weinberg Prize, Imperial College London, 2006, Young Researchers Award, PTSG IChemE, 2006.



Dr. Chilla M Reddy

Prof. C. Malla Reddy is a Professor at the Department of Chemistry, Indian Institute of Technology, Hyderabad. Before moving to IIT Hyderabad, he worked at the Department of Chemical Sciences, IISER Kolkata, for about 15 years. His research focuses on understanding the structural basis for the mechanical deformation of pharmaceutical crystals to address performance-related issues of pharmaceutical solids at the particle level. His pioneering work on flexible and self-healing single crystals has led to the growth of a field called “adaptive crystals.” He received the Swarnajayanti Fellowship in 2015 from DST, India, and was an elected fellow of the National Academy of Sciences, Allahabad.



Dr. Ashutosh Singh

Dr. Ashutosh Singh is presently the Area Head of Biological and Biomedical Engineering at the University of Guelph. His research work currently inclined on the work of designing, fabricating, and applying microfluidic electrochemical biosensors, Quartz-Crystal Microbalance (QCM) biosensors, and colorimetric biosensors for identifying food allergens and toxins. Dr. Singh has been honored with awards, including the Grad Mobility Award - AES in 2014, the Grad Excellence Award in 2012 from McGill University, and the Walter M. Stewart Post Graduate Scholarship Award in agriculture in 2011.

Glimpses from the Conference



Conference Schedule

Day 1 – 7th December 2023

Time	Program
09:45-10:15	Registration and Tea
10:15-10:45	Inaugural Ceremony
10:45-11:30	Plenary Talk by Dr. Chilla Malla Reddy, IIT Hyderabad - <i>Fracture-Induced Surface Charges, Crystal Morphology Impact on Bulk Solid Form Performance</i>
11:30-11:50	High-Tea
11:50-12:15	Dr. Sanjeev Kumar Prajapati, IIT Roorkee - <i>Microwave-assisted enzymatic pretreatment of microalgal biomass for recovery of valuable bioproducts</i>
12:15-12:40	Dr. Aijaz Dar, University of Kashmir - <i>Crystal engineering of the organic solid-state emitters</i>
12:40-02:20	Lunch & Poster Presentation
02:20-02:45	Dr. G. Muthuraman, Presidency College - <i>Removal and recovery of chromium from contaminated agricultural soil</i>
02:45-04:15	Technical Session 1
04:15-04:40	Tea & Poster Presentation
04:40-05:05	Dr. Somak Chatterjee, BITS Pilani - <i>Functionalized materials for water purification</i>
05:05-06:35	Technical Session 2
07:30	Gala Dinner

Day 2 – 8th December 2023

Time	Program
09:50-10:00	Welcoming of Delegate
10:00-10:45	Plenary Talk by Dr. Jerry Heng, Imperial College London - <i>Biocrystallisation for the Purification of Proteins from Impure Solutions: A Selective Nucleation Approach</i>
10:45-11:25	Plenary Talk by Dr. Ashutosh Singh, University of Guelph - <i>Application of separation, purification and concentration techniques in agri-food sector and their integration in the agri-food supply chain</i>
11:25-11:40	Tea
11:40-12:15	Dr. Sameer V. Dalvi, IIT Gandhinagar - <i>Antisolvent Crystallization of Active Pharmaceutical Ingredients: Controlling particle Size, Polymorphism, Non-Classical Crystallization Pathways, Cocrystallization</i>
12:15-12:40	Dr. Winny Routray, NIT Rourkela - <i>Pretreatment, Separation and Purification techniques for Food Industry Waste Utilization</i>
12:40-01:20	Technical Session 3 – Chair
01:20-02:30	Lunch & Poster Presentation
02:30-02:50	Dr. Pushpa Jha, Sant Longowal Institute of Engineering & Technology - <i>Agricultural waste assessment as adsorbents for the removal of pollutants from industrial effluents</i>
02:50-03:10	Dr. Nakkeeran Ekambaram, Sri Venkateswara College of Engineering - <i>Polygalacturonase from Aspergillus carbonarius - Production, Purification and its Applications in Food Industries</i>
03:10-04:00	Technical session 4
04:00-04:15	Tea and Snacks
04:15-05:00	Agro-Processing Startup Meet
05:00-05:25	Prize distribution and Valedictory Ceremony

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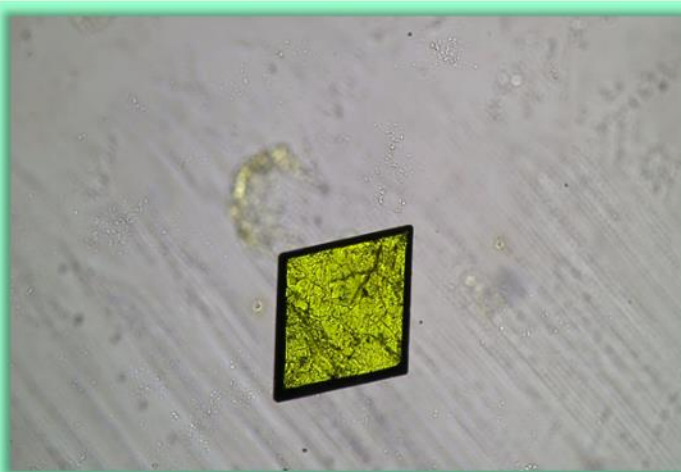
Technical Sessions

Sl. No.	Speaker, Institute	Abstract Title
Technical Session 1		
TS1.1	Ms. Priya Bisht, IIT Roorkee	<i>Advanced Extraction Methods for the Recovery of Organic Chemicals from Aqueous Phase derived through Hydrothermal Liquefaction</i>
TS1.2	Ms. Nivedita Bhardwaj, IIT BHU	<i>LCMS based Dereplication Guided Identification and Purification of Novel Metabolites using Silica Matrix from <i>Dysoxylum malabaricum</i></i>
TS1.3	Ms. Sanju Kumari, IIT BHU	<i>Extraction and Purification of New Compounds from <i>Murraya paniculata</i> to investigate their cytotoxic potential</i>
TS1.4	Ms. Sana Perween, IIT Patna	<i>Interfacial and dynamical behavior of droplet coalescence: A molecular dynamics study</i>
TS1.5	Mr. Harshit Tiwari, IIT Roorkee	<i>Microalgal biomass harvesting using sewage sludge cultivated in hydroponics effluent</i>
TS1.6	Mr. Kapil Dev Mahato, NIT Jamshedpur	<i>Prediction of Organic Dyes Absorption Wavelength Using Different Machine Learning Boosting Models</i>
TS1.7	Mr. Jeshurun A, IIT Madras	<i>A novel electric eel inspired microchannel for bio-nano particle separation</i>
Technical Session 2		
TS2.1	Mr. Vipin Kumar Sharma, IIT Tirupati	<i>Case study on advanced separation techniques used in alkali leaching-based mineral processing plant</i>
TS2.2	Mr. Shashi Prakash Gupta, IIT Patna	<i>Removal of Ciprofloxacin from Aqueous Solution Using Graphene Oxide and Reduced Graphene Oxide</i>
TS2.3	Ms. Arpita Padhan, NIT Jalandhar	<i>Wetting Modulation of Starch-Poly Vinyl Alcohol Based Membranes for Under Oil Recovery of Water</i>
TS2.4	Mr. Devargya Chakraborty, IIT Patna	<i>Wetting Behavior and Interfacial Dynamics of Aqueous Deep Eutectic Solvents on Diverse Substrates through Molecular Dynamics Simulations: Implications for Enhanced Oil Recovery and Sustainable Applications</i>
TS2.5	Mr. Mohammad Irfan, IIT Tirupati	<i>Fabrication of nonfluorinated and superhydrophobic/superoleophilic PDMS/PMMA electrospun membranes for vacuum-driven separation of moisture from virgin coconut oil</i>
TS2.6	Mr. Abhishek Keshav Sharan Saxena, NIT Raipur	<i>Effect of Sintering Temperature on Multipurpose Ceramic Membrane Fabricated Using Cheaper Raw Materials</i>

Technical Session 3		
TS3.1	Mr. Maan Singh, IIT BHU	<i>Sonocrystallization approach to modify crystal habit for improving powder processability</i>
TS3.2	Ms. Chahat Jain, IIT Gandhinagar	<i>Polymorphism in L-Glutamic Acid using Combined Cooling and Antisolvent Crystallization</i>
TS3.3	Ms. Chaitra Chandrakant Shanbhag, NIT Karnataka	<i>Encapsulation of Anthocyanins from Garcinia indica in the Nano-complexes formed by Sodium Caseinate and Carboxymethyl Cellulose</i>
Technical Session 4		
TS4.1	Ms. Subhanki Padhi, NIT Rourkela	<i>Extraction of cellulose from lignocellulosic biomass: Dependence of rheological properties on the concentration, ionic strength and pH of cellulose</i>
TS4.2	Ms. Monika Chandrakant Diwathe, NIT Raipur	<i>Ultrasound-assisted extraction and Quantification of Antioxidant Activity and Phenolic Content of Cordia Dichotoma leaf extracts</i>
TS4.3	Ms. Shristi Shefali Saraugi, NIT Rourkela	<i>Biochar as a potential filtration and separation media</i>
TS4.4	Ms. Aparna Singh, NIT Surathkal	<i>Harnessing Microbial cell -Biochar Synergy for Eco-Friendly Wastewater Treatment</i>
Poster Session		
PS1.1	Ms. Rituparna Saikia, Tezpur University	<i>Arresting ammonia evaporation by precipitation of calcium and magnesium ammonium phosphate fertilizer</i>
PS1.2	Ms. Tushmita Das, Tezpur University	<i>Simultaneous removal of Fluoride with Manganese and Mercury by Fluoride Nilogon (PACLT) Method</i>
PS1.3	Mr. Shamiran Baroi, Tezpur University, Assam	<i>Simultaneous Removal of Mercury, Lead, Manganese, and Iron from Groundwater by Arsiron Nilogon Method</i>
PS1.4	Mr. Neelesh Nandan, IIT Patna	<i>Crystallization of 4-acetaminophen (paracetamol) through continuous slug flow crystallizer</i>
PS1.5	Ms. Anindita Saha, IIT Patna	<i>A study on the synthesis and characterization of 1:1 SMZ-ASA cocrystal with improved aqueous solubility and dissolution rate</i>
PS1.6	Ms. Rashi Srivastava, IIT Patna	<i>Hydrophobic-Polar natural deep eutectic solvent-based phytochemical extraction from Aegle marmelos leaves</i>

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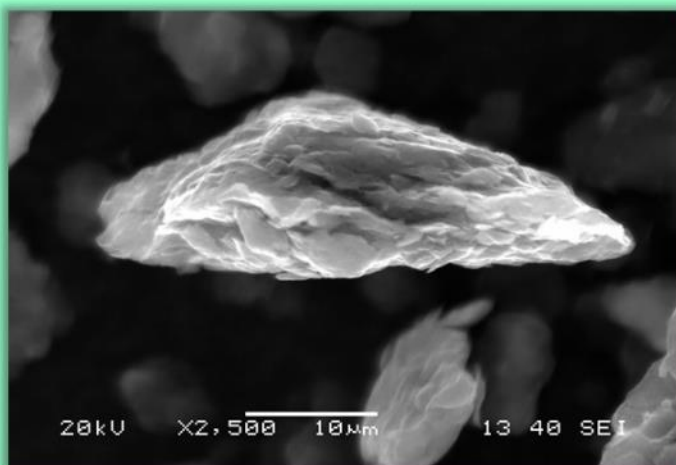
Research Photography Competition



"SINGLE CRYSTAL. CLUELESS BUT INTRIGUING."
Mahraj Din Malla, Dept. of Chemistry, University of Kashmir



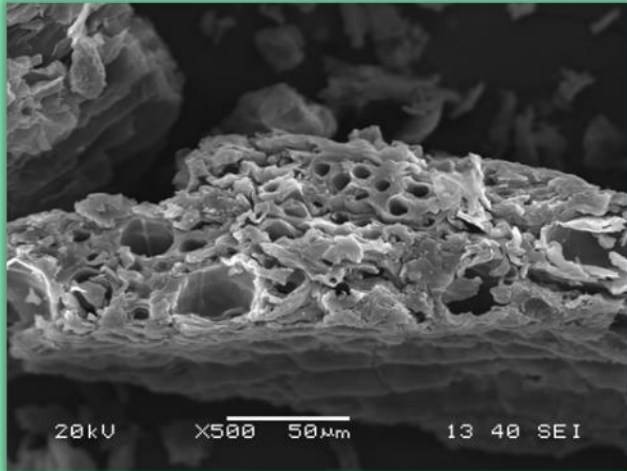
"DIFFERENT TYPES OF CARBOHYDRATES"
Alquama Shaibli, Delhi University



"U.F.O. OF THE NANO-WORLD - AGGLOMERATED GNP"
Dr. Shubham, IIT Bombay

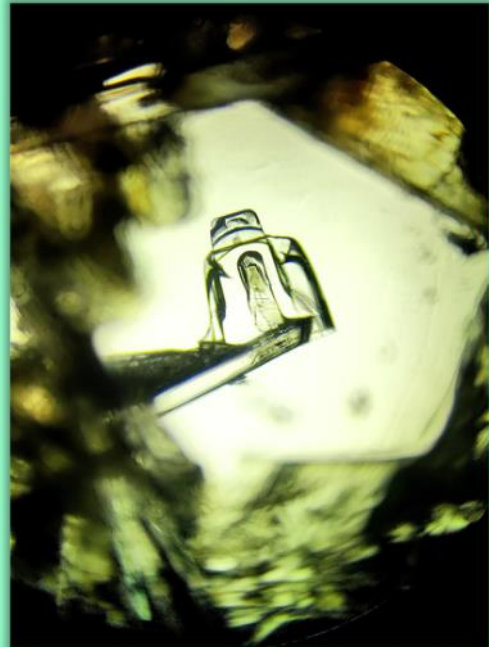


"MOSQUITO FOSSIL"
Neelesh Nandan, IIT Patna



"SEM IMAGE OF BIOCHAR DERIVED FROM COCONUT HUSK"

Shristi Shefali Sarangi, NIT Rourkela



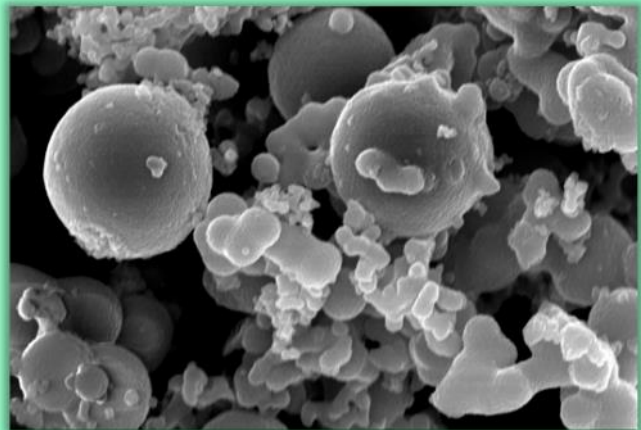
"A GLASS JUG AMIDST DENSE CRYSTALLINE WOODS-PECULIARITY OF THE MICROCRYSTALLINE WORLD!"

Anindita Saha, IIT Patna



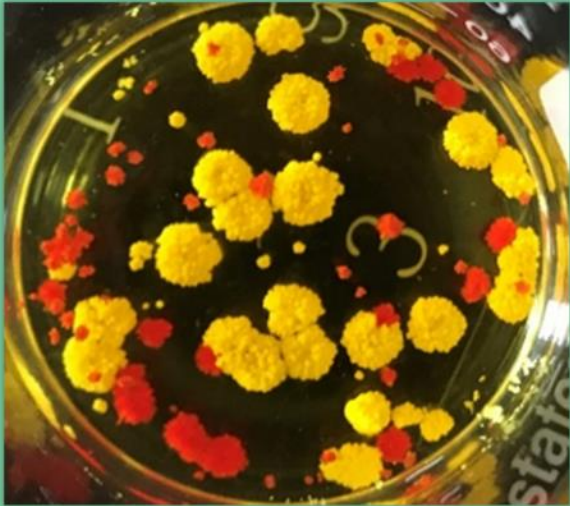
"UNLOCKING THE SECRETS OF PROTEIN STRUCTURES"

Chaitanya Deo, Materials and Metallurgical Dept., IIT Patna



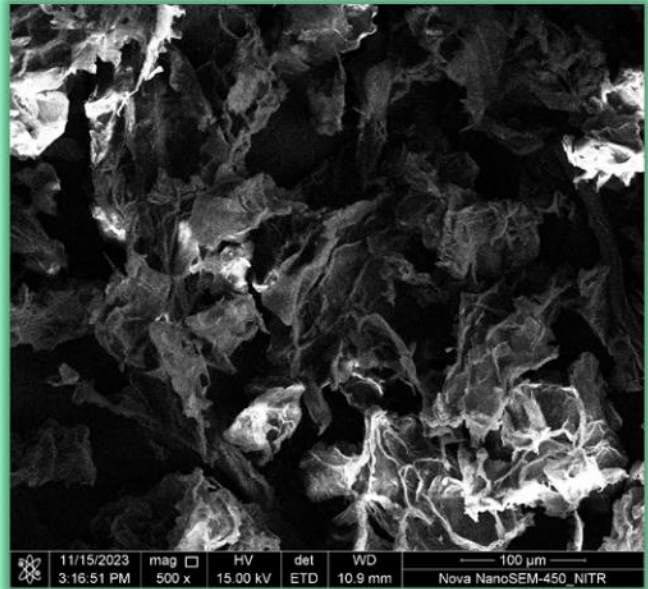
"CONNECTED NANOSPHERES FOR URANIUM SEPARATION"

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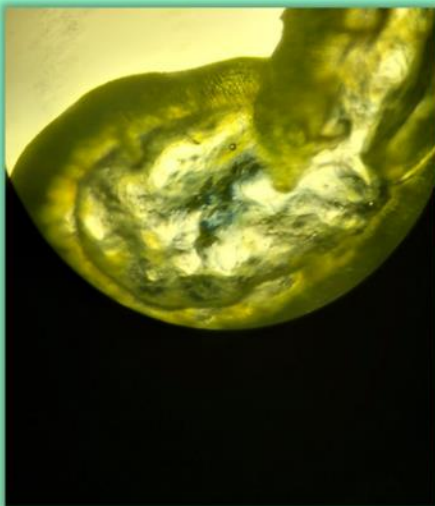
"TWO POLYMORPHS IN A SINGLE REACTION"

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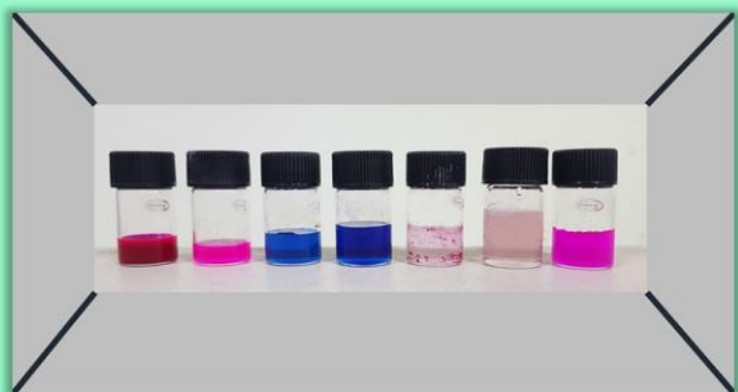
"FESEM IMAGE OF CELLULOSE POWDER"

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"MICROSCOPIC ALOE MAGIC"

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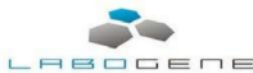
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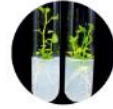
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