



DEPARTMENT OF CHEMISTRY

(DST FIST SUPPORTED)

BIT MESRA, RANCHI

NEWSLETTER

ChemOreiká
(JULY-DECEMBER '25)



Editors:

Dr. Sumit Mishra

Dr. Joydeep Dhar

Student Editors:

Abhijit Pingal Sanga

Nipun Tirkey



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The faculty members from the Department of Chemistry are engaged in research in pure chemistry, applied and interdisciplinary areas of all branches of chemistry, specializing in emerging materials for various applications from biomaterials, environmental remediation, energy harvesting materials, composites, sensors, supercapacitors, drug discovery and molecular modelling to theoretical chemistry and quantum chemistry research.

SPECIALIZATION IN CHEMISTRY

INORGANIC



Dr. Sumit Mishra



Dr. Subhendu Naskar



Dr. Barnali Dasgupta Ghosh



Dr. Deep Shikha



Dr. Atul Kumar

RESEARCH AREAS:
Biopolymers & Biomaterials,
Coordination Chemistry,
Bioinorganic Chemistry,
Nanomaterials &
Nanocomposites,
Supramolecular Chemistry.

PHYSICAL



Prof. P. K. Chattaraj



Dr. Gautam Sen



Dr. S. S. Mahapatra



Dr. Joydeep Dhar



Dr. Debdutta Chakraborty

RESEARCH AREAS:
Computational Chemistry,
Electrochemistry, Polymers, Energy
Materials and Devices.

ORGANIC



Prof. Ashoke Sharon



Dr. Pradip Kar

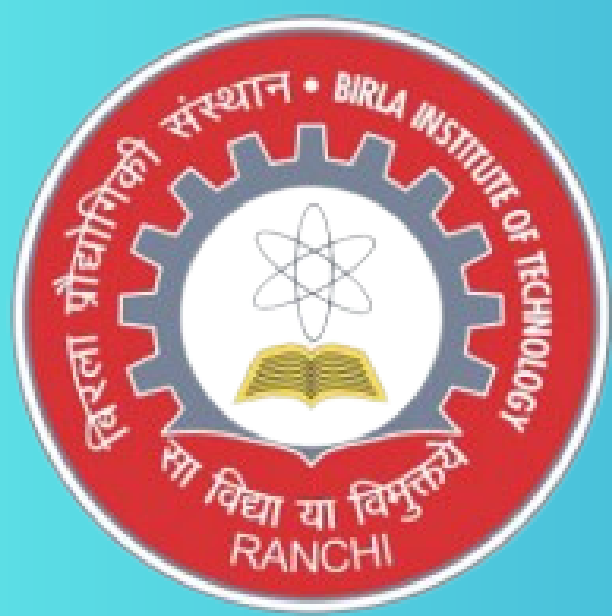


Dr. Anirban Pradhan



Dr. Monochura Saha

RESEARCH AREAS:
Medicinal Chemistry,
Molecular Modeling
and Drug Design,
Bionanomaterials,
Sensor Materials and
Devices, Novel
Aromatics,
Materials for Energy
Production and
Storage



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FACULTY PROFILE



DR. MONOCHURA SAHA

Dr. Monochura Saha is an Assistant Professor who has joined the Department of Chemistry, Birla Institute of Technology (BIT) Mesra, Jharkhand, India on September 2025. He obtained his M.Sc. in Organic Chemistry from the Indian Institute of Technology Madras, followed by Ph.D. from the Indian Institute of Science Education and Research (IISER) Kolkata. He then pursued postdoctoral research at the Massachusetts Institute of Technology (MIT) in the USA.

He grew up in Murshidabad, a historic town in eastern India. From an early age, he was fascinated by healthcare and the transformative potential of chemistry. He aspires to develop innovative therapeutic devices that go beyond conventional drug-based treatments for a range of diseases. He is motivated to push boundaries and create new frontiers by integrating chemistry with biology. Beyond the laboratory, he enjoys cooking Bengali cuisine, especially Kolkata-style biryani. He is passionate about playing football, badminton, squash, and volleyball. He also enjoys 5K-running and playing the synthesizer. In his free time, he loves traveling with his family and spending time with children.

RESEARCH HIGHLIGHTS

His research group (Synthetic Biocompatible Material Lab) focuses on developing novel biocompatible synthetic nanomaterials for healthcare applications.

Synthesis of organic nanomaterial for device fabrications

- Synthesis of stimuli-responsive new class of prodrug or pro-antibiotics
- Fabrication of biodegradable and biocompatible piezoelectric materials for therapeutic applications
- Therapeutic applications of organic devices for the milieu modifications of different diseases, such as diabetes or cancer
- Development of a point-of-care (POC) biosensor for pathogen detections

RECENT PUBLICATIONS

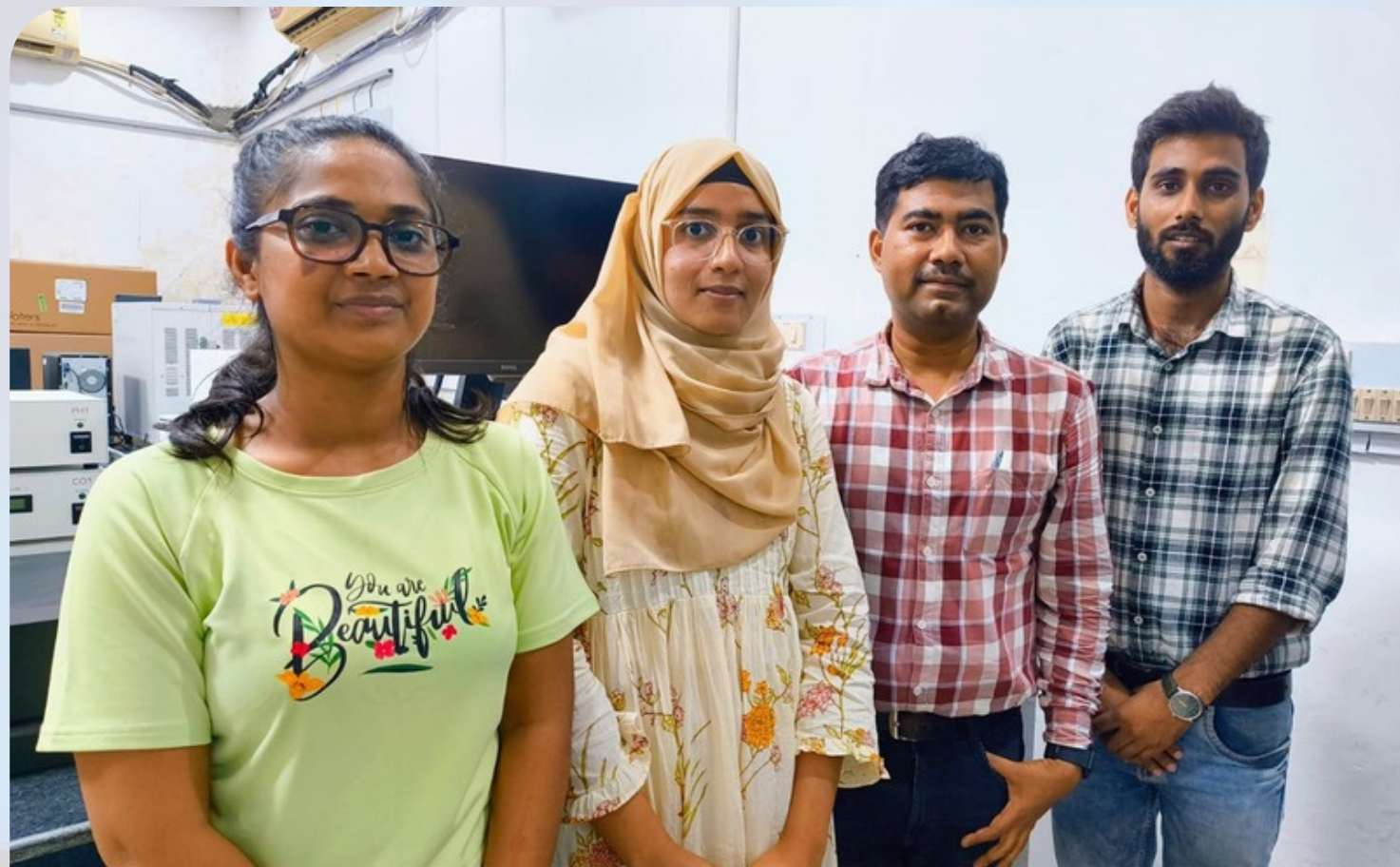
1. M.Saha*, P. Jana, S. Bandyopadhyay* A Photoregulated Peptidase Mimic, Angew. Chem. Int. Ed., 64, e202509194, 2025.
2. S. Yadav, R. Lee, S. N. Kajale, B. Joy, M. Saha, L. Bull, S. Cao, D. Bono and D. Sarkar* Nonsurgical bioelectronic implants for targeted focal brain stimulation, Nat. Biotechnol. 1-11, 2025.



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DR. JOYDEEP DHAR RESEARCH GROUP



SEMICONDUCTOR MATERIALS AND DEVICE LAB

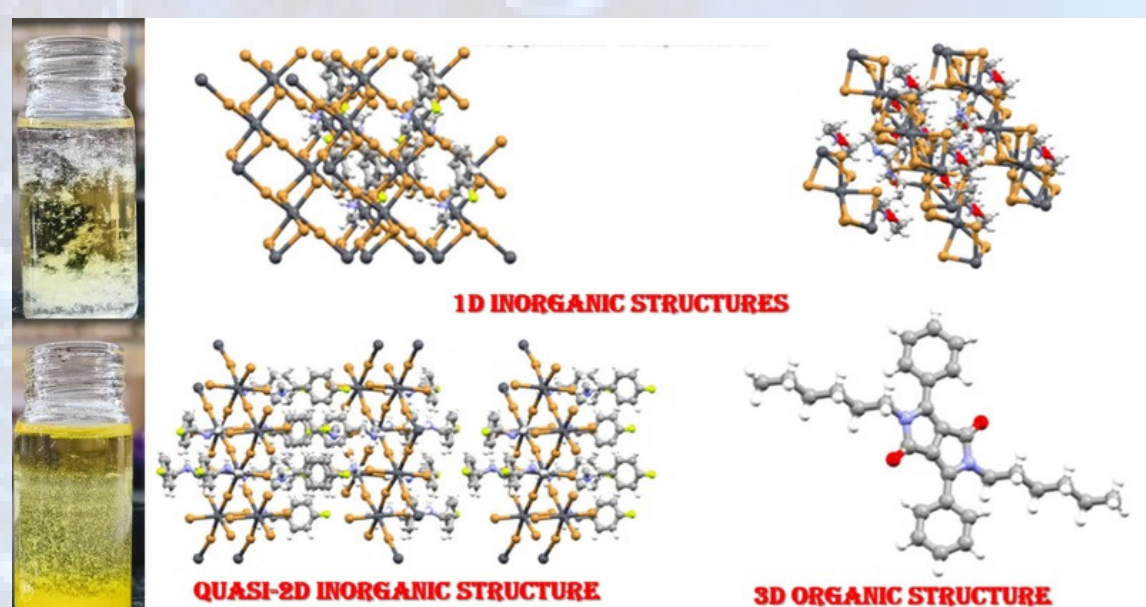
CURRENT GROUP MEMBERS

PhD: Vishal Singh, Bharti Kumari, Darakhshan Eqbal
M.Sc. Project : Ila Kashyap

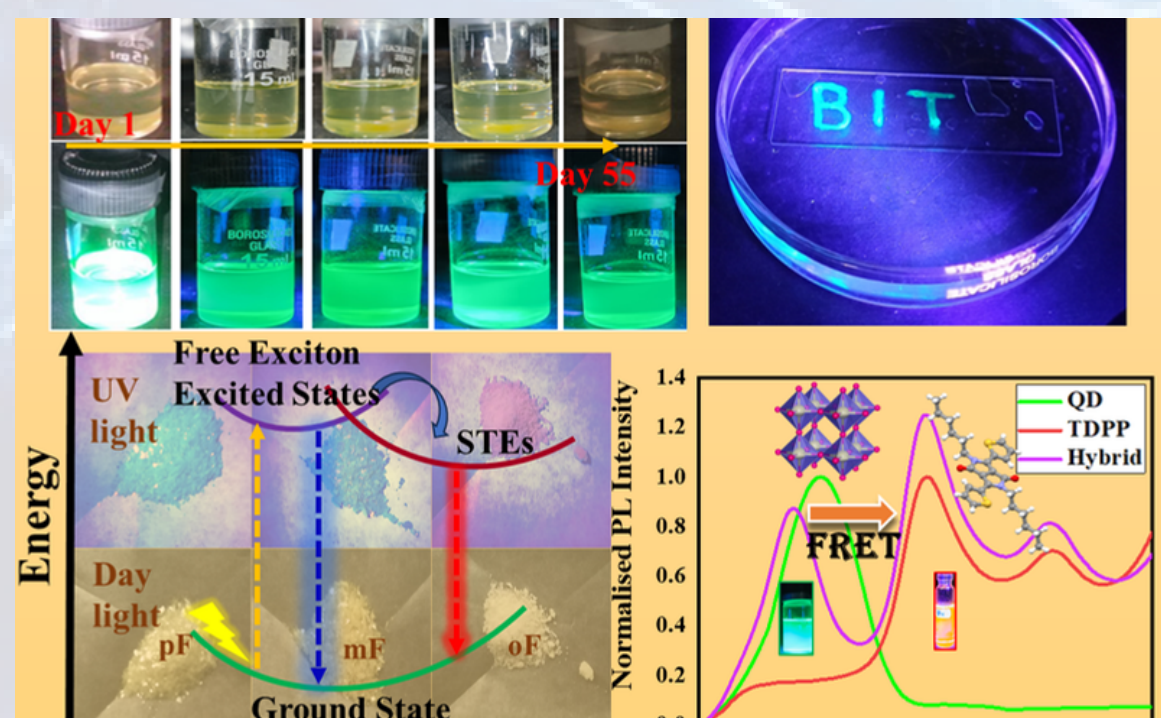
RESEARCH OBJECTIVES

- Perovskite Quantum Dots for Optoelectronics
- Hybrid semiconductors for engineered heterojunctions
- Photodiodes and piezo-nanogenerator device fabrication
- Molecular design for photoferroelectric functionality
- Next-generation materials for photovoltaic energy harvesting

RESEARCH HIGHLIGHTS



Novel Semiconductors with Varied Dimensionality



Improved stability of perovskite Quantum Dots in solution and solid state, novel luminescent bulk perovskites, and efficient hybrid heterostructure from organic and inorganic semiconductors

RECENT PUBLICATIONS

1. Singh, Vishal, and Joydeep Dhar. "Studying the effect of Mn^{2+} doping on structural and photophysical properties of morpholinium lead bromide perovskite." ChemPlusChem 90, 10 (2025): e202500241.
2. De, Asmita, Singh, Vishal, Dhar, Joydeep and Mishra, Sumit. "Zn (II) based fluorescent metal-organic framework as a 'turn-off' sensor for Al^{3+} and Fe^{3+} ions in aqueous solution: Synthesis, DFT calculations and Hirshfeld surface analysis" Journal of Molecular Structure 1329, (2025): 141426
3. Singh, Vishal, Das, Mainak, Mondal, Krishnakanta, Barua, Sourabh Sanyal, Dirtha, Ray, Partha Pratim and Dhar, Joydeep . "Investigating the effect of lead substitution on the optical, electrical, and photoresponse properties of quasi-2D double perovskites." Journal of Physics and Chemistry of Solids 192 (2024): 112082.
4. Moshat, Sudipta, Joydeep Dhar, Sayantan Sil, and Dirtha Sanyal. "Positron annihilation spectroscopic studies of ferromagnetic methylammonium lead iodide perovskite." Journal of Materials Science 59, 9 (2024): 3919-3929.
5. Moshat, Sudipta, Partha Pratim Ray, Sayantan Sil, Joydeep Dhar, and Dirtha Sanyal. "Positron annihilation studies of methylammonium lead bromide perovskite." Physica Scripta 98, 3 (2023): 035822.
6. Sil, Sayantan, Sudipta Moshat, Partha Pratim Ray, Joydeep Dhar, and Dirtha Sanyal. "Investigating the effect of applied bias on methylammonium lead iodide perovskite by electrical and positron annihilation spectroscopic studies." Journal of Physics D: Applied Physics 54, 46 (2021): 465502.



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DEPARTMENTAL ACTIVITIES

- Fresh 2026 Batches of NEP-based (4+1) Yr. BSc Chemistry (Honors/Honors with Research) and MSc Chemistry (Research) and also MSc Chemistry have joined the department.
- Dr. Snehangshu Patra, Director of Eliteck Industries Pvt. Ltd.& Eliteck Hydrogen Resources Pvt. Ltd, Kolkata, delivered a lecture in the Department of Chemistry, BIT Mesra, on 4th July, 2025.
- A school visit was organized in the Department of Chemistry as a part of the SSR activity of the ANRF project on 8th December, 2025.



A group photograph with school students



Ms Sonal Shruti was demonstrating about the NMR instrument



Mr Adnan Khan was demonstrating the instruments in the Sophisticated Instrument Lab (SIL)



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DEPARTMENTAL ACTIVITIES

CHEMISTRY RESEARCH COLLOQUIUM & ALUMNI MEET 2025 (CRCAM'25)

- Chemistry research colloquium & alumni meet 2025 (CRCAM'25) was organized with the aim of "Celebrating Scientific Research and Alumni Connection" on 28- 29 July, 2025.



Inauguration ceremony of the CRCAM-2025 Event



A group photograph with the alumni on the CRCAM-2025 Event



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DEPARTMENTAL ACTIVITIES

CHEMISTRY ANNUAL DAY

- Chemistry annual day was celebrated on 29th August, 2025, to honor the legacy of Acharya Prafulla Chandra Ray (Father of Chemical Science in India).



Inauguration Ceremony of Chemistry Annual Day



Invited Speaker, Prof. Srabani Taraphder
IIT Kharagpur



Guests, Faculty, and Students witnessing
the Chemistry Annual Day.



A group photograph on Chemistry Annual Day



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DEPARTMENTAL ACTIVITIES

FRESHERS PROGRAMME (BATCH- 2025)

- Fresher's welcome programme for 2025 batch was organized on 16th October, 2025.



Lightning of Lamp ceremony



Mr & Miss Freshers



Dance performed by IMSc students.



Mr Fresher being facilitated during the Fresher's Day celebration.



A group-photograph of BSc and IMSc students on Freshers program day.



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ACHIEVEMENTS

FACULTIES ACHIEVEMENTS

- Dr. Joydeep Dhar delivered an invited lecture at the 4th International Conference on Advances in Nanomaterials and Devices for Energy and Environment (CANDEE-2025), held on November 16-18, 2025, organised at Atal Bihari Vajpayee Indian Institute of Information Technology and Management (ABV-IIITM) Gwalior.
- Prof. Subhendu Naskar delivered an invited lecture at the International Symposium on “Recent Advances on Materials for Sustainable Energy 2025 (RAMSE 2025)”, with a special focus on Small Molecule Activation, at IIT-ISM, Dhanbad, on December 13, 2025.
- Dr. Anirban Pradhan delivered an invited talk on “Porous Carbon Materials based Green and Renewable Hydrogen Fuel Production” at the 31st ISCB International Conference (ISCBC-2025) hosted by KIIT Bhubaneswar, India, from 19th to 20th December 2025.
- Dr. Subhendu Naskar appointed as CIF In-Charge at BIT Mesra.

SCHOLARS ACHIEVEMENTS



Ms Sahina Khatun Awarded CSIR-Direct SRF Fellowship.

She also won the 1st Prize in Oral Presentation in the 5th Research Colloquium, BIT Mesra held from 13th -14th July, 2025.



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ACHIEVEMENTS

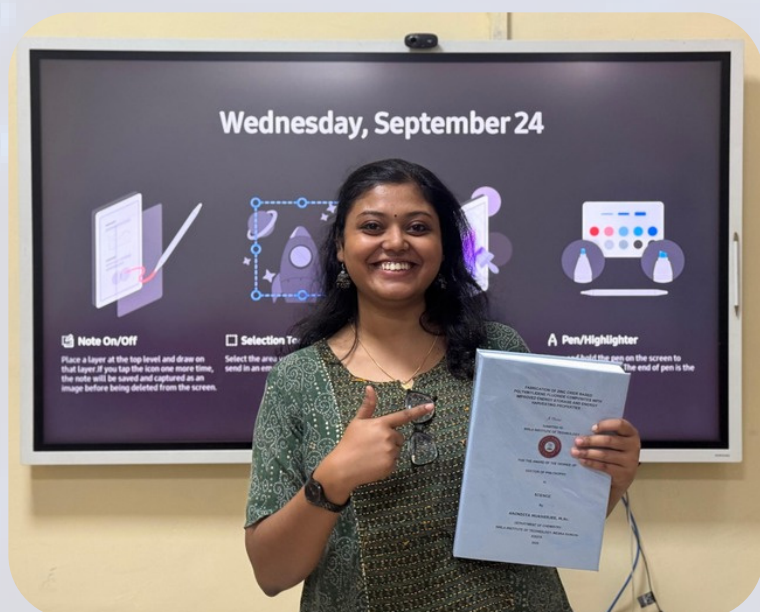


Mr Mukul Deo won the 1st prize for Best Poster in the 5th Research Colloquium, held from 13th to 14th July, 2025 at BIT Mesra.

Mr Adnan Khan received the best poster award by Bruker for Innovation in Material Characterization at (Research Advances on Materials for Sustainable Energy) RAMSE-2025: IIT ISM Dhanbad.



Mr. Ranbir Kumar defended his PhD thesis titled “Metal doped Hydroxyapatite Coatings on Alumina Substrate via RF Magnetron Sputtering” on 25th September, 2025.



Ms. Anindita Mukherjee defended her PhD thesis titled “Fabrication of Zinc Oxide based Polyvinylidene Fluoride Composites with Improved Energy Storage and Harvesting Properties” on 10th October, 2025.



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ACHIEVEMENTS



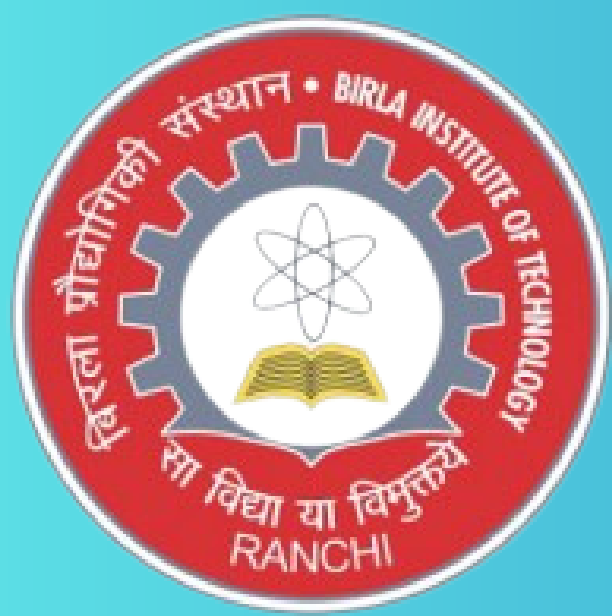
Mr. Siddhartha Samanta defended his PhD thesis titled "Bottom-up Synthesis of Porous Carbon Materials, Curved Polycyclic Aromatics and its Applications" on 10th November, 2025.



Mr. Bipin Kumar Singh defended his PhD thesis titled "Development and Characterization of Anode Materials for Direct Ethanol Fuel Cells and Supercapacitor" on 18th November, 2025.



Ms. Sadhana Kundu defended her PhD thesis titled "Synthesis of Functionalized Gold Nano-particles for Colorimetric Sensing of Anions in Water" on 10th December, 2025.



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MESSAGE FROM ALUMINI



Name: Dr. Smita Singh

PhD: BIT Mesra (2022-2025)

Current Designation: Assistant Professor

**Organization: Department of Chemistry, Gossner
College Ranchi**

E-mail: rajput24smita@gmail.com

During the whole journey of my doctorate, the departmental support and institutional role as been exemplary. Along with my PhD supervisor and Head of Chemistry department, all the faculties and staff of the department have been thoroughly cooperative and supportive in every need related to research, and beyond. The growthful environment of the department provided a very strong support indeed to withstand all the obstacles in the research journey with positive mindset. Faculties not only provide guidance in the research related areas, but are sincerely available and open to resolve every possible kind of issues faced during the entire journey. The departmental support and uplifting guidance led to the success in my research career, which is being pursued further to contribute to humanity and nature.



Name: Harish Gananathan S B

BSc: BIT Mesra

Current Program: MBA

Organization: Indian Institute of Foreign Trade (IIFT Delhi)

E-mail: ich10004.22@bitmesra.ac.in

My academic journey at BIT Mesra has been an immensely enriching and formative experience. I chose to pursue Chemistry at BIT Mesra because of its strong research ecosystem, distinguished faculty, and well-equipped laboratories. Learning under professors with impactful research backgrounds was deeply inspiring. For instance, Dr. Sen's work on Engineered Wood showed how meaningful scientific research can contribute to solving real world problems.

One of the most memorable academic experiences during my time here was my final end-term project with Dr. D. Chakraborty on wave packet dynamics. Working on this interdisciplinary topic allowed me to explore deeper scientific concepts and strengthened my analytical thinking. I am also grateful to the faculty for their constant guidance and mentorship throughout my academic journey. Receiving the GP Birla Scholarship was a proud moment and would not have been possible without their encouragement and support.

Inspired by discussions on bridging academia and industry, an idea often emphasized by Prof. Sharon, I decided to pursue management. During my CAT preparation and interview phase, the department was extremely supportive and did not bog me down with excessive academic pressure. Their understanding and encouragement played a major role in helping me secure admission into 10+ IIMs and the Indian Institute of Foreign Trade (IIFT Delhi), where I am currently pursuing my MBA.

BIT Mesra taught me resilience, curiosity, and the importance of collaboration. The legacy campus, inspiring alumni, and motivated peer group made my experience truly memorable, and I will always remain grateful to the institution.



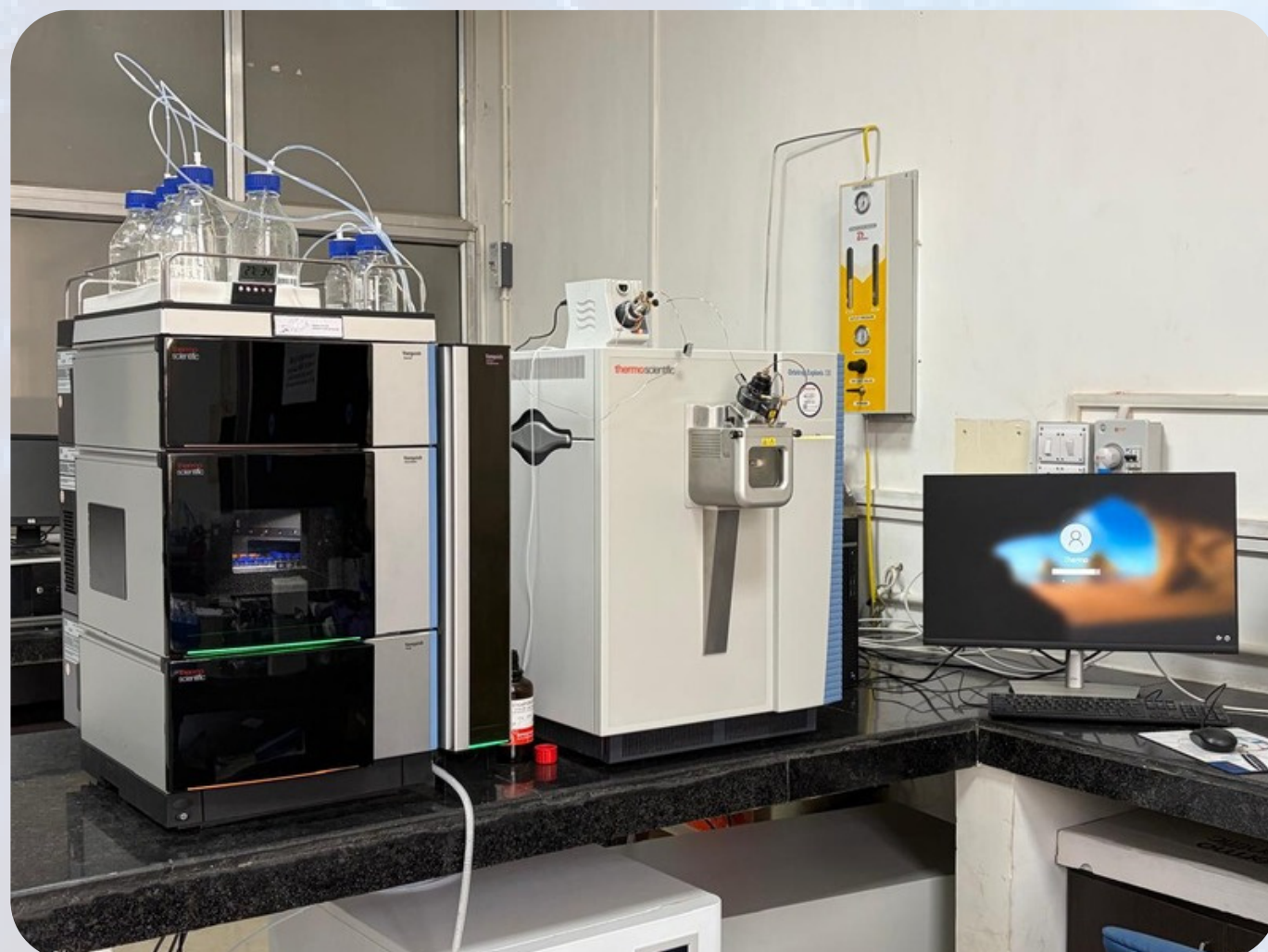
The Department of Chemistry is equipped with several state-of-the-art laboratories with advanced instruments.

The Department houses many sophisticated instruments for in-house and collaborative research

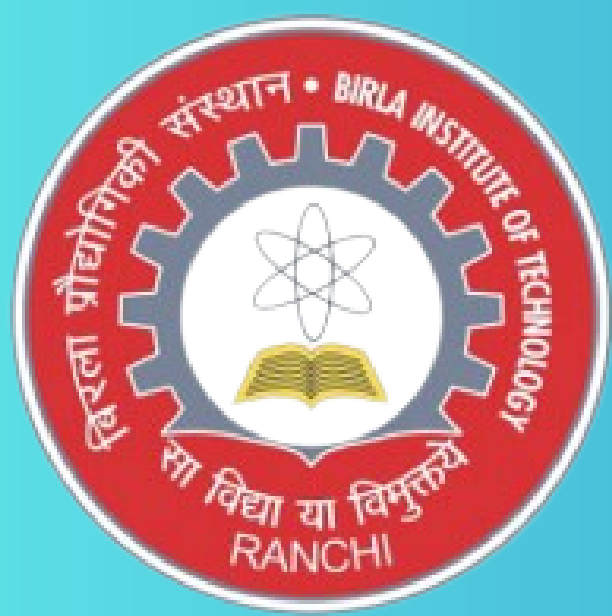
- NMR Spectrometer (400 MHz),
- UV-vis spectrophotometer,
- IR spectrometer,
- Solar simulator,
- Sourcimeter
- Microwave reactor,
- Rotary evaporator,
- Polarimeter,
- Advanced Polymer Chromatography,
- Gas Chromatography,
- Electrochemical analyzer and others

Recently, new instrumentation facilities added to the department:

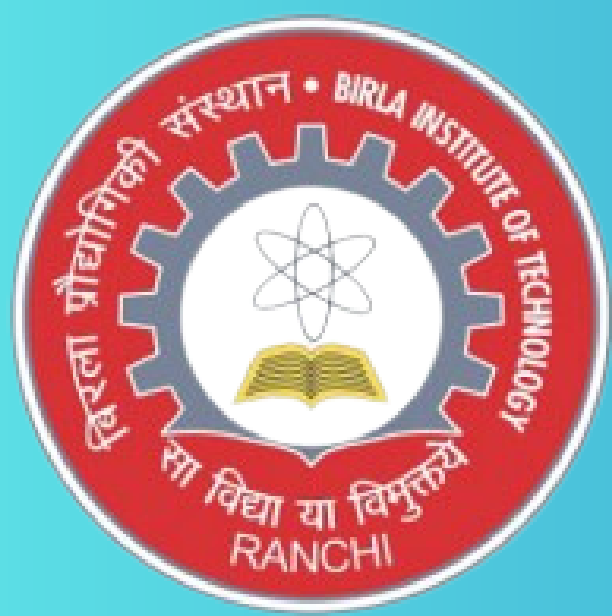
High Resolution Mass Spectrometer from ThermoFischer was installed on 9th-10th September'2025.



High Resolution Mass Spectrometer



Sr. No.	Project Title	PI/Co-PI/Collaborator	Funding Agency	Date of Sanction	Sanctioned Amount (Rs.)	Duration
1	Electrospun PVDF based piezoelectric nanocomposite energy harvesters for self-powered smart wearable and implantable electronics	Dr. Barnali Dasgupta Ghosh (PI)	ANRF	14/2/2023	4,819,474	3 Years
2	Investigating the Effect of Molecular Doping in Halide Perovskites Based Energy Harvesting Devices	Dr. Joydeep Dhar (PI)	SRG-SERB	22/12/2023	3,009,160	2 Years
3	Development of Low cost Electrocatalysts for the Hydrogen production by Water Splitting	Subhendu Naskar (PI) S.S. Mahapatra (Co-PI)	SERB (CRG/2023/001349)	16/3/2024	4,416,016	3 Yrs
4	Metal organic frameworks and sequential electrocoagulation for remediation of mining effluents	Dr Sumit Mishra (PI)	ANRF(CRG/2021/00740 2))	2/3/2022	2,501,400	3 Yrs
6	Facility for Material Characterization with solid state NMR & BET analyzer	Head, Dept of Chemistry	DST FIST (TPN 108047)	Dec 2024	27,000,000	5 Yrs
7	Polyphenylenediamine/silver hybrid based non-enzymatic gutamate sensor	Dr. Pradip Kar (PI)	ANRF-SERB (CRG)	21.05.2024	2656016	3 years
8	Collaborative research cum consultancy project: Synthesis and characterization of sustainable hydrogels, aerogels and Foams for advanced applications	Dr Sumit Mishra(PI) Dr Ashoke Sharon(Co- PI)	MMU Haryana	2025-2026	13,968,000	Ongoing

**RESEARCH PUBLICATIONS**

1. Samanta, S.; Pramanik, N.; Singh, N.; Maity, S.; Pradhan, A. Hyaluronic Acid Modified 2D Covalent Organic Framework for Targeted and Sustainable Drug Delivery. *ACS Appl. Bio Mater.* 2025, 8, 7139–7144.
2. Khatun, S.; Pradhan, A. Dual-Porous Holey Graphene for Supercapacitor Applications. *ACS Appl. Nano Mater.* 2025, 8, 14750–14758.
3. Satapathy, C.; Nalini, S. J.; Nayak, P.; Das, T. R.; Pradhan, A. Rare-Earth Doping in Aurivillius Phases: A Study on Sm^{3+} -Modified $\text{CaBi}_4\text{Ti}_4\text{O}_{15}$ Ceramics and Its Photoluminescent Response. *Inorg. Chem. Commun.* 2025, 182, 115369.
4. Mishra, S.; Choudhary, M. Recent Updates of Eco-Friendly Heavy Metal Reduction Methods. In *Heavy Metal Contamination in Wastewater and Its Bioremediation by Microbial-Based Approaches*; Springer Nature: Singapore, 2025; pp 261–288.
5. Mishra, S.; Srivastava, M. Impacts of Industrialization on Biosphere Integrity: Heavy Metal Contamination Threats to Water Resources and Ecosystem. In *Heavy Metal Contamination in Wastewater and Its Bioremediation by Microbial-Based Approaches*; Springer Nature: Singapore, 2025; pp 23–48.
6. Choudhary, M.; De, A.; Mishra, S. Cellulose and Metal–Organic Frameworks (MOFs): Synergistic Strategies for Developing High-Performance Cellulose/MOFs Composites. *Cellulose* 2025, 32 (12), 6891–6933.
7. Turkey, N.; Bhoutika, T.; Singh, S.; Sen, G.; Mishra, S. Synthesis of Casein-Grafted-Poly (Sodium Acrylate) from Waste Milk: A Sustainable Adhesive for Wood Binding. *Int. J. Adhes. Adhes.* 2025, 104251.
8. Kumari, C.; Kumar, A. Self-Assembled [2 + 3] Organic-Imine Cage as an Artificial Light Harvester for the Photocatalytic Organic Transformation in an Aqueous Medium. *RSC Adv.* 2025, 15, 43366–43376.
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10. Mukherjee, A.; Mahapatra, S. S.; Ruidas, B. C. Insertion of Indium on Bismuth Sulfide Nanorod Embedded on Graphitic Carbon Nitride for Enhanced Selectivity Toward Formate in Electrochemical CO_2 Reduction. *ACS Appl. Nano Mater.* 2025, 47, 22704–22721.
11. Mukherjee, A.; Ojha, N.; Pant, K. K.; Deb, A.; Abdinejad, M.; Mahapatra, S. S.; Ruidas, B. C. Recent Advances in Engineered MoS_2 -Based Nanomaterials for CO_2 Electro-Reduction to CO and Beyond. *Environ. Sci. Technol. Lett.* 2025, 12, 1113–1138.



12. Singh, R.; Kumar, A.; Mukhopadhyay, A.; Mahapatra, S. S.; Al-Humaidi, J. Y.; Choudhury, A.; Mukherjee, S. K.; Rahman, M. M. Enhancing Primer Performance: A Study of Graphene Blending Percentage and its Effects on Corrosion Resistance, Mechanical Strength, and Wettability. *J. Alloys Compd.* 2025, 1020, 179359.
13. Upadhyay, R. K.; Majhi, S. S.; Mahapatra, S. S.; Yadav, N.; Chakraborty, A. K.; Singh, A. C.; Kumar, B. A Comparative Study on Material Removal Rate and Surface Roughness During Electrochemical Machining of 100Cr6 Steel in Oxidizing and Reducing Electrolytic Environments. *Proc. Inst. Mech. Eng. Part E* 2025, 1–13.
14. Singh, B. K.; Kumar, R.; Satpati, A. K.; Mahapatra, S. S. Cerium Oxide Anchored Free-Standing Silicon Nanowires as Potential Anode Materials for Electrochemical Supercapacitor. *J. Indian Chem. Soc.* 2025, 102, 101504.
15. Das, S.; Anand, S.; Vishwakarma, P. A.; Singh, R.; Mukherjee, S. K.; Sinha, S. K.; Kumar, R.; Shikha, D.; Kale, A.; Mahtre, U.; Ojha, S.; Umapathy, G. R.; Gupta, M. Formation of TiN Protective Layer at 500 °C for Enhanced Oxidation Resistance of IMI 834 Titanium Alloy in Aerospace Engine Applications. *Ceram. Int.* 2025, 51 (27), 53508–53518.
16. Sanga, A.; Ghosh, B. D. Electrospun PVP-Barium Titanate Nanofibers: Tailoring Morphology and Enhancing Piezoelectric Performance for Advanced Applications. *Ceram. Int.* 2025, 51 (28), 57100–57114.
17. Mukherjee, A.; Roy, S.; Ghosh, B. D. Ultra-Enhanced Energy Harvesting and Storage in PVDF Composites via Flake-to-Rod Transformed Ag-Doped ZnO Nanorods for Smart Wearables and Embedded Security Devices. *Chem. Eng. J.* 2025, 522, 167751.
18. Sanga, A.; Nandi, S.; Roy, S.; Ghosh, B. D. Influence of Barium Titanate on Electrospun Piezoelectric and Non-Piezoelectric Polymer Nanofibers Toward Energy Harvesting Applications. *Innov. Chem. Mater. Sustain.* 2025, 2 (2), 135–150.
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24. Das, D.; Chakraborty, D. In-Silico Identification of a Doxorubicin Alternative with Reduced Cardiotoxicity Informed by LLM-Assisted Modeling. *J. Mol. Graph. Model.*, 2026, 142, 109217.
25. Mondal, P.; Das, S.; Mandodi, A.; Beck, P.; Chakraborty, D.; Sahoo, B. S_N2' -Type Alkylation of gem-Dichlorocyclobutenones with Organotrifluoroborates Enabled by Organophotoredox Catalysis. *Org. Lett.*, 2025, 27, 13614.
26. Khan, M. A.; Shruti, S.; Sengupta, S.; Khan, S.; Bhardwaj, P.; Kumar, P.; Naskar, S. Water-soluble binuclear aquo Cu(II) complex with an amide ligand as an electrocatalyst for the OER, HER and CO₂RR. *RSC Adv.*, 2025, 15, 46425.
27. Singh, S.; Sengupta, S.; Surin, P.; Sen, G.; Kumar, R.; Sinha, S. Synthesis and formulation of modified milk protein and its study as adhesive for wood binding, *J. Polym. Eng.* 2025, 45, 176-186.
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30. Poddar, A.; Chattaraj, P. K. Application of CDFT and IT-based Descriptors in Analyzing Structure, Properties, Reactivity and Toxicity. *J. Chem. Sci.* 2025, 137, 77
31. Srivastava, A. K.; Chattaraj, P. K. Exotic Molecules and Clusters, *ChemistryOpen*, 2025, 14, e202400343.
32. Patra, S. G.; Paul, C.; Dutta, N.; Chattaraj, P. K. Rationalizing the DCD Model in Transition Metal Carbonyls: A Conceptual Density Functional Theory Analysis. *J. Comput. Chem.*, 2025, 46, e70242
33. Patra, S. G.; Paul, C.; Saha, A.; Chattaraj, P. K. Computational Investigation on the Mechanism of Electrocatalytic Water Oxidation by Copper (II) Porphyrin - *Adv. Theory and Simul.*, 2025, e01442



PATENTS

1. Eco-smart Superhydrophobic Coating from Egg Shell Biowaste and a Method thereof, Application No.202531071643 A, Inventor: S.Roy, B. Dasgupta Ghosh, Published 08 August 2025.
2. A Method for Preparing Electrocatalyst-Modified Electrode for Electrochemical Hydrogen Evolution Reaction, Application Number - 202531133679 A, Applied on 31/12/2025 & Published on 16/01/2026; Inventor: S. Naskar, M. A. Khan, S. Shruti, S. Sengupta.

BOOK CHAPTERS

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