



CHEMISTRY CONNECT

IIT (ISM) DHANBAD

MESSAGE FROM HOD's DESK

INSIDE

Research Publications and Research Activity

Patents

Workshops and Seminars

Research Talks
Invited Talks
Academic Visits

Awards and Recognitions

Research Grant
Faculty Spotlight
Student Spotlight

Upcoming event

Alumni Corner



I am pleased to present the February 2026 edition of our departmental newsletter "**Chemistry Connect**". It is an honour to serve as the Head of the Department of Chemistry and Chemical Biology at Indian Institute of Technology (Indian School of Mines) Dhanbad.

The department has made strong progress in research and academic activities, with notable contributions in sustainable energy, catalysis, and computational chemistry. We successfully led the "Sustainable Energy" theme at Industry-Institute Interaction (III-2026), showcasing advancements in hydrogen generation, CO₂ conversion, and energy storage.

Key academic events included a five-day workshop on advanced microscopy and spectroscopy, and the celebration of National Science Day with distinguished speakers highlighting emerging areas in science and technology.

Our students achieved remarkable success, including excellent performance in CSIR-NET JRF 2025 and recognitions at national platforms such as poster awards and participation in the India AI Impact Summit 2026.

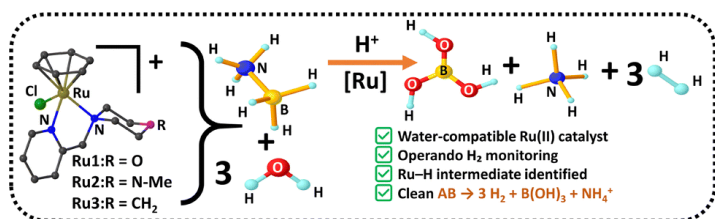
The department continues to grow with active research participation, new scholars, and strong alumni contributions, reflecting a vibrant and dynamic academic environment.

I encourage all members of the department to continue their dedication and enthusiasm as we work together to achieve greater milestones.



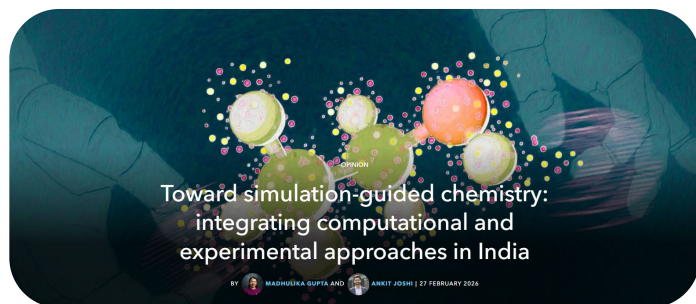
Research Activity

Prof. Sumanta Kumar Padhi and his team developed a special ruthenium-based catalyst that can release hydrogen from ammonia-borane in water at room temperature. The process is efficient, stable, and reusable, producing up to three times the hydrogen per molecule. Research advancing clean hydrogen energy was published in **Chemical Communications**. (*Chem. Commun.*, **2026**, 5880-5884. DOI: <https://doi.org/10.1039/D5CC06735A>)



Prof. Madhulika Gupta and her group emphasized the increasing importance of combining computational simulations with experimental methods to enhance chemical research. It highlights how this integrated approach can improve efficiency, deepen scientific understanding, and accelerate innovation in chemistry, contributing to the development of advanced and sustainable technologies.

<https://www.chemistryworld.com/opinion/integrating-computational-and-experimental-approaches-in-india/4022892.article>



Sustainable Energy @ Industry Institute Interaction (III-2026)

The Department of Chemistry led the "Sustainable Energy" theme at the Industry-Institute Interaction (III-2026), held from 6-8 February 2026 at IIT (ISM) Dhanbad, and contributed to the "Critical Minerals" theme. Under "Sustainable Energy," the team showcased innovative research and technologies focused on:

- Hydrogen generation via ammonia-borane dehydrogenation
- Electrochemical oxidation of ammonia,
- Energy storage from wastewater and MOF-based electrodes.
- Hydrogenation of CO₂ to methanol using a molecular nickel-based catalyst.



(Demonstration of H₂ generation from ammonia-borane to Dr. Shivkumar Kalyanaraman, CEO of Anusandhan National Research Foundation (ANRF), Prof. Sukumar Mishra, Director of the Indian Institute of Technology (ISM) Dhanbad and Prof. Arvind Kumar Mishra, Director, Central Institute of Mining and Fuel Research (CIMFR), Dhanbad in III-2026)

Patents

Prof. Biswajit Chowdhury along with Asim Bhaumik, Sudip Bhattacharjee and Anirudha Singha work "heterogeneous catalyst for the synthesis of acrylic acid" was granted patent at the Indian Patent Office (**Application No 202331021352, 2026**)



Workshop and Seminars

FIVE- DAY WORKSHOP on "Recent advances in Microscopy and Spectroscopy" (23rd to 27th February)

The workshop was organized as a part of the part of the Indo-Norwegian bilateral project "Bioscopy" by the **Department of Chemistry and Chemical Biology** and Department of Physics. **Prof. Biswajit Chowdhury** is the project coordinator for the Indo-Norwegian bilateral "Bioscopy" project in collaboration with UiT, The Arctic University of Norway and Academy of Scientific and Innovative Research (AcSIR).



Prof. Sourav Kumar Dey from Department of Chemistry and Chemical Biology was the convenor for the workshop. A total of fifteen lectures were delivered by eminent researchers from both India and abroad which included emerging topics such as label-free microscopy, super resolution microscopy, Raman spectroscopy, non-linear spectroscopy etc.



NATIONAL SCIENCE DAY (28 February)

National Science Day was celebrated with great enthusiasm in the Department, bringing together distinguished researchers who shared insights into recent advances in science and technology. The talks highlighted emerging trends in sustainable energy, catalysis, and advanced materials, with an emphasis on innovation and real-world impact. Key takeaways included the importance of fundamental research, interdisciplinary collaboration, and the development of scalable technologies to address global challenges.



Prof. Ramanarayanan Krishnamurthy

Professor of Chemistry, Scripps Research Institute, USA

Role of Organic Chemistry in Understanding the Chemical Origins of Life

Organic chemistry plays a crucial role in explaining the origin of life under early Earth conditions. The talk highlighted experimental approaches to model prebiotic pathways and emphasized that life may have emerged through multiple chemical possibilities rather than a single defined path.



Prof. Shankar Prasad Rath

Professor, Dept. of Chemistry, IIT Kanpur

Diheme Enzyme MauG: Understanding Nature's Design and Cooperative Catalysis

The talk explained the role of the MauG enzyme in cofactor biosynthesis, highlighting how two heme centres work together through long-range electron transfer. It also presented a stable synthetic model that mimics the enzyme's behaviour, providing insights into its catalytic mechanism and structure.



Prof. Sunil Pulletikurti

Assistant professor, IIT(ISM) Dhanbad

Rethinking the Formose Reaction: New Insights into Prebiotic Sugar Formation:

For over a century, the formose reaction has been considered the most plausible pathways for the synthesis of biologically relevant sugars from simple molecules. Their work challenges the classical Breslow autocatalytic pathway and suggests that selectivity producing biologically important aldose sugars may not be a significant pathway in the formose reaction.



Prof. Bikash Garai

Ramanujan Fellow, IIT (ISM) Dhanbad

Porous material for a sustainable future: Innovation, Energy Application and Water Purification:

The talk highlighted the importance of porous materials such as MOFs and COFs in addressing energy and water challenges. It focused on their application in CO₂ capture, catalysis, energy storage and water purification, emphasizing their role in sustainable and efficient technologies.



Research Talk

Prof. Manjeet Chhetri

Assistant Professor (Ramanujan Fellow), SRM University-AP

Electrochemical Modules for Sustainable Energy Applications Utilizing Small Molecules (11th February 2026)

The talk focused on advancing sustainable energy through electrochemical systems using hydrogen and carbon dioxide. It highlighted developments in low-temperature CO₂ electroreduction, catalyst design, and proton transport in electrochemical devices. Innovations such as electrochemical hydrogen pumps and ion-pair membrane technologies were also discussed for efficient energy conversion and storage.



Academic Visits

Prof. Madhulika Gupta was nominated by the institute to attend the **Bharat Bodhan AI Conclave 2026**, held on 12-13th February 2026 at Bharat Mandapam, New Delhi, where leading policymakers, academicians, industry experts, and innovators gathered to discuss the role of artificial intelligence in transforming India's education ecosystem and to promote responsible and scalable AI-driven educational solutions.



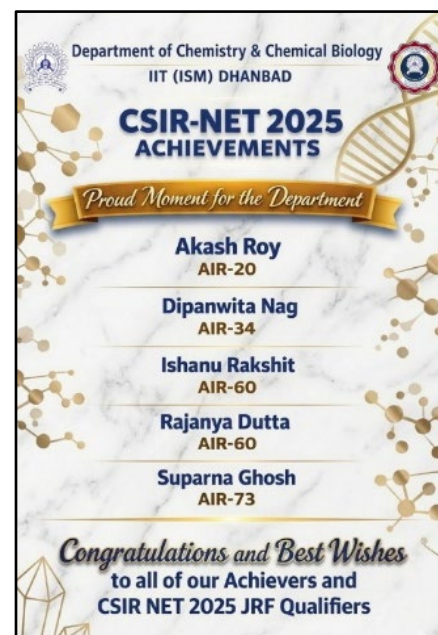
Awards and Recognitions

1. CSIR-NET JRF 2025

The Department of Chemistry & Chemical Biology at IIT (ISM) Dhanbad celebrates the success of five students in the CSIR-NET JRF 2025, who secured impressive All India Ranks:

- **Akash Roy (AIR-20)**
- **Dipanwita Nag (AIR-34)**
- **Ishanu Rakshit (AIR-60)**
- **Rajanya Dutta (AIR-60)** and
- **Suparna Ghosh (AIR-73).**

This achievement reflects the institute's strong academic environment and commitment to excellence in research.



2. RESEARCH GRANT

Prof. Chanchal Haldar has got the project approved for the “**Chemo-Catalytic conversion of cellulose to platform chemicals**” on 10th Feb, 26. The project has the overall budget of 61.2 lakhs. **File no.:** **ANRF/IRG/2025/001436/CS.**



Faculty Spotlight

Prof. Madhulika Gupta served as Convener of SRIJAN 2026 (7-8 Feb), facilitating prominent guests including Acharya Prashant and Benny Dayal. She also contributed as a member of the Organizing Committee of Industry-Institute Interaction (III) 2026, enhancing academia-industry engagement..



Prof. Sagar Pal, has been nominated by the Senate as a member of the Board of Governors of the Indian Institute of Technology (Indian School of Mines), Dhanbad. This prestigious appointment recognizes his academic leadership, contributions to the institute, and commitment to advancing higher education and research.



Student Spotlight

Mr. Prabhat Kumar Mishra has joined the department under Prof. Jadab Majhi



Mr. Prakash Ghosh has joined the department under Prof. Ananya Banik

Mr. Suman Bera has joined the department under Prof. Sagar Pal



Ms. Priya Kumari, (IndiaAI Fellow), under Prof. Madhulika Gupta, was selected by the Ministry of Electronics and Information Technology to present her poster at the India AI Impact Summit 2026 at Bharat Mandapam (16-20 Feb 2026), where her work was featured in the Student Showcase.

Ms. Palak Kumari Jaiswal presented a poster titled “*Terpyridine-Mediated Organo-Electrocatalytic CO₂ to CO Reduction Explored by DFT*” and was awarded the **Best Poster** at the National Science Day Symposium, organized by the Department of Chemistry and Chemical Biology, IIT (ISM) Dhanbad, on 28 February 2026.



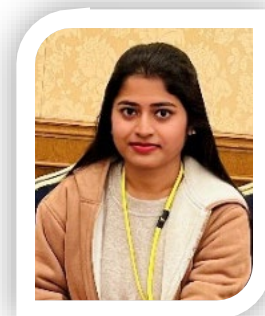
Upcoming events

National Conference on Catalysis in synthesis (CiS 2026): 13th to 14th March 2026

Alumni Corner

Dr. Puja Das Karmakar

Ph.D.(2016-2022),IIT(ISM)Dhanbad, JSPS Fellow, Kyoto University, Japan
Dr. Puja Das Karmakar completed both her M.Sc. and Ph.D. at IIT (ISM) Dhanbad under the guidance of Prof. Sagar Pal. She is currently a JSPS Fellow at Kyoto University, Japan, working in an international research environment shaped by strong academic foundations and independent research.



Could you briefly share your academic journey at IIT (ISM) Dhanbad and how it shaped your research interests?

IIT (ISM) Dhanbad holds a special place in my heart, where I completed both my M.Sc. and Ph.D., and each phase shaped my research outlook; during my M.Sc., the structured environment and supportive faculty built a strong foundation, and my research project in the Polymer Chemistry Laboratory under Prof. Sagar Pal was a turning point that inspired me to pursue research further.

What inspired you to pursue a PhD in your field, and how did your research evolve during your doctoral studies (2016-2022)?

My motivation developed during my M.Sc. with growing interest in polymer chemistry and hands-on research; during my Ph.D., my work evolved from theoretical foundations to advanced experimental techniques and independent problem-solving, and my work on biomaterials along with mentoring students strengthened my expertise.

You are currently a JSPS Fellow at Kyoto University, Japan – could you share your experience working in an international research environment?

Working as a JSPS Fellow has been highly enriching and promotes independent research; access to advanced facilities and a disciplined work culture has broadened my perspective, while collaboration with international researchers strengthened my communication and problem-solving skills.

How does research culture differ between India and Japan?

Indian research culture fosters creativity and flexibility, while Japanese culture emphasizes discipline and precision; exposure to both helped me blend innovation with efficient, meticulous execution.

What challenges did you face during your PhD or postdoctoral journey?

Challenges included limited facilities, experimental failures, data reproducibility issues, and balancing multiple responsibilities; I overcame them through perseverance, time management, regular discussions with my supervisor, and learning from setbacks, while adapting to an international environment further strengthened my resilience.

What skills should students develop for research abroad?

Students should build strong fundamentals, research ideas, hands-on skills, and the ability to analyze data and literature, along with communication, critical thinking, time management, independence, cultural adaptability, strong work ethics, discipline, and consistency.

Looking back, what would you do differently?

My time at IIT (ISM) Dhanbad was enriching and formative, and if I were to change anything, it would be to engage earlier in interdisciplinary collaborations and explore more research techniques and global exposure, although every experience contributed to my growth and research mindset.

Any final message for students?

Remain curious, disciplined, and persistent, learn from mentors, embrace failure, and keep improving; as Swami Vivekananda said, *"Arise, awake, and stop not till the goal is reached,"* and Dr. A. P. J. Abdul Kalam said, *"Dream, dream, dream. Dreams transform into thoughts and thoughts result in action."*

Editorial Note:

Dr. Karmakar's journey highlights how strong fundamentals, mentorship, and global exposure together shape a meaningful research career.

Dr. Soumyadeep Roy Chowdhury

Ph.D. (2015–2021), IIT (ISM) Dhanbad, Postdoctoral Fellow, Chung-Ang University, Seoul, South Korea

Dr. Soumyadeep Roy Chowdhury completed his Ph.D. at IIT (ISM) Dhanbad under the guidance of Prof. Soumitra Maity and is currently a Postdoctoral Fellow at Chung-Ang University, South Korea. His research journey in organic chemistry and catalysis reflects a strong blend of fundamental understanding and practical scientific application.



Could you briefly share your academic journey at IIT (ISM) Dhanbad and how it shaped your interest in organic chemistry and catalysis?

Growing up in a middle-class family motivated me to pursue a stable and meaningful academic path, and realizing how deeply our lives are connected with chemical products made organic chemistry a natural choice. I joined IIT (ISM) Dhanbad in 2015 as a research scholar, where I had the privilege of learning from dedicated professors who guided me in identifying research gaps and formulating meaningful questions; I sincerely acknowledge Prof. G. C. Nayek, Prof. Sagar Pal, Prof. H. P. Nayek, Prof. S. K. Padhi, and especially Prof. S. Maity for their mentorship, while the institute's facilities, funding, and instrumentation greatly supported my research development.

Your PhD focused on metal-free catalytic carbon-carbon and carbon-heteroatom bond formation. Could you explain your research in simple terms?

In organic chemistry, building molecules involves forming carbon-carbon (C-C) and carbon-heteroatom (C-X) bonds, which are essential in pharmaceuticals and materials; traditionally these rely on metal catalysts, but metal-free catalysis uses alternative systems such as small molecules or light, making processes more cost-effective, environmentally friendly, and sustainable, essentially focusing on cleaner and smarter ways to build important molecules.

You are currently a Postdoctoral Fellow at Chung-Ang University, South Korea – how has your experience been working in an international research environment?

Working in South Korea has been highly enriching due to its well-structured research ecosystem, strong funding, advanced instrumentation, and effective mentorship, all of which contribute to a highly productive scientific environment and enhance research output and global collaboration.

What differences have you observed in research culture between India and South Korea?

South Korea's strong investment in R&D, structured academic environment, consistent funding, and efficient access to resources create a highly productive research culture, supported by effective mentorship and global collaboration, making it a leading hub for scientific innovation.

What were some major challenges you faced during your PhD or postdoctoral journey?

A key challenge in catalysis is achieving sensitivity and selectivity, often amid repeated failures; overcoming it requires persistence, systematic analysis of reaction outcomes, attention to environmental and kinetic factors, and careful, patient refinement.

How can students prepare for PhD or postdoctoral opportunities abroad?

Students should build strong technical expertise in their field, including experimental techniques, data analysis, and tools like spectroscopy and chromatography, along with high-quality publications

and presentation skills; equally important are communication, independent thinking, leadership, time management, adaptability, and problem-solving abilities.

Looking back, what would you advise your junior self?

Just love your work and make yourself hungry for knowledge – that is enough.

Any final message for students aspiring to build a career in research and academia?

For students aiming to build a career in organic synthetic chemistry, cultivate a strong foundation in fundamental and advanced techniques, including reaction mechanisms, catalysis, stereochemistry, and analytical methods like NMR, mass spectrometry, and chromatography. Develop independent thinking—learn to design experiments, troubleshoot reactions, and interpret complex data.

Equally important are communication, perseverance, and collaboration. Publishing research, presenting at conferences, and engaging with the scientific community enhance visibility and credibility. Embrace curiosity and patience, as synthetic chemistry involves trial-and-error.

In short, technical excellence, independent thinking, and professional resilience are key to a successful research career.

Editorial Note:

Dr. Roy Chowdhury's journey highlights how curiosity, strong mentorship, and persistence in research can lead to meaningful contributions in modern chemistry and global scientific advancement.

Editorial Board



Chief editor: Prof. S.K. Padhi (HOD)



Editor: Prof. Asmita Singha (Assistant Professor)

Student Editors:



Raj Rani



Prabhat K. Mishra



Ashutosh Maji



Monojit Paul



Sonalika Sahoo



Tanmay K. Khandelwal



Mahika Sethia



Ashutosh Ghosh



Panvan Kumar



Yoganjani Nerusu

"Driving innovation at the interface of chemistry, biology, and sustainable technologies for a better future."



Website:

<https://www.iitism.ac.in/department-of-chemistry-and-chemical-biology>



Contact:

0326-223-5281



Email:

officeofccb@iitism.ac.in