



CHEMISTRY CONNECT

IIT (ISM) DHANBAD

From the Head's Corner

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We are pleased to present the fifth edition of *Chemistry Connect*, showcasing the achievements and activities of the Department of Chemistry and Chemical Biology at IIT (ISM) Dhanbad during April-June 2026.

This issue highlights the department's continued progress in research, featuring significant contributions across spectroscopy, photochemistry, organometallic chemistry, chemical biology, and materials chemistry. Research highlights include the development of environment-sensitive fluorescence probes for investigating protein conformational dynamics, a switchable synthetic strategy for pharmaceutically relevant spirocycles, the design of bifunctional organotin catalysts for efficient solvent-free hydroboration, and the development of high-efficiency lead-free chalcogenide perovskite solar cells through first-principles calculations, SCAPS-1D simulations, and machine learning. The faculty members of the Department of Chemistry and Chemical Biology have published fourteen research articles in reputed international journals, and a patent has been granted during this period.

The department also witnessed vibrant academic engagement through inspiring research talks and invited lectures delivered by eminent scientists. Academic visits and outreach initiatives further strengthened our collaborative and interdisciplinary research environment.

Student Spotlights, together with the Alumni Corner, reflect the broader impact of our academic community in nurturing talent, fostering innovation, and contributing to scientific advancements on a global scale.

As we look forward to upcoming events and new initiatives, the department remains committed to advancing excellence in research, education, and innovation. We extend our sincere appreciation to all faculty members, students, staff, and alumni for their dedication, enthusiasm, and invaluable contributions that continue to strengthen our academic community.

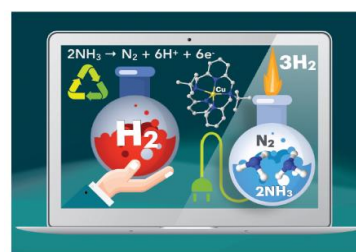
Research Activity

Prof. Niladri Patra and his team have published A comprehensive computational framework integrating MD simulations, two-dimensional Well-Tempered Metadynamics (WT-MetaD), and subsequent two-dimensional Umbrella Sampling (US) was employed to investigate the conformational variability of Leucine-rich repeat kinase 2 (LRRK2) and its correlation with the orientations of key structural regions, including loops, helices, and functional motifs. This integrated approach facilitated detailed monitoring of essential regulatory elements in both active and inactive conformational states of the apo wild-type and G2019S mutant systems. Specifically, the study examined the dynamics of the DYGI motif, activation loop, and α C-helix, together with their associated salt-bridge and hydrogen-bond interactions, thereby providing mechanistic insights into the conformational regulation of this Parkinson's disease-related kinase. *R. Ghosh, K. K. Bhanja, N. Patra. Journal of Chemical Information and Modeling, 2026, 66 (1), 554.*

His work on Photothermal amplification of Cu–porphyrin redox chemistry on Ti3C2 MXene for NIR-activated reactive oxygen species generation was featured on the Cover page of “*Dalton Transactions*” (DOI: 0.1039/D6DT00268D).



Prof. Sumanta Kumar Padhi's work was featured on the Cover page of “*Dalton Transactions*” (DOI: 10.1039/D6DT00268D).



Prof. Sumanta Kumar Sahu and his team have published an article entitled “Synergistically crosslinked alginate-CMC hydrogel reinforced with natural fibre for enhanced mechanical and antibacterial activity”. *S. Sahoo, A. Kumar, K. Negi, K., S. K. Mahapatra, S. K. Sahu, Eur. Polym. J. 2026, 114759.*

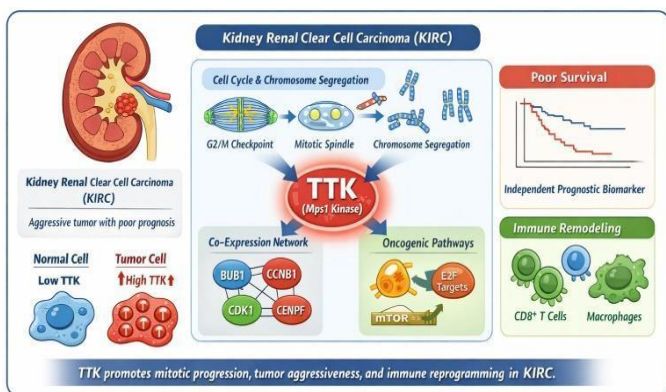
Another article published by the same group titled “NIR Light-activated polyphenol driven carrier-free self-assembled nanoparticles for synergistic chemoprevention (PDT)”. *K. Negi, S. Patra, G. Chakraborty, M. Dhoundiyal, S. K. Bhutia, S.K.Sahu, Langmuir, 2026, 42 (21), 14978.*

The team has developed a molecular Cu(II) catalyst for the electrocatalytic oxidation of NH₃ under ambient conditions, enabling the selective generation of dinitrogen, and dihydrogen through a hydrazine-mediated pathway. Detailed electrochemical, kinetic investigations revealed 1st-order behaviour with respect to both the catalyst and NH₃ concentration, while controlled potential electrolysis demonstrated high

faradaic efficiencies for H₂ (89%) and N₂ (91%) with a near-ideal molar ratio of 2.92:1. Spectroscopic, isotopic labelling studies confirmed the formation of hydrazine as a key intermediate, supporting a proton-coupled electron transfer (PCET) mechanism. Notably, the catalyst exhibited excellent stability, homogeneity, maintaining activity over prolonged electrolysis without degradation.

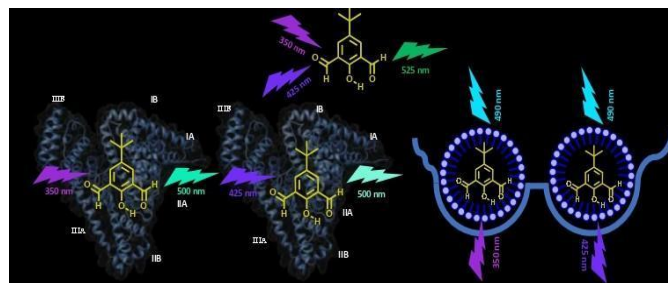
Prof. Naga Rajiv Lakkaniga and his team have published an article on breast cancer, entitled “Synergistic Combinations for Improved Therapeutic Outcomes in Triple Negative Breast Cancer” A. Jha, S. K. S. Venkatesh, A. Singh, and N. R. Lakkaniga, *Cell Biology International* **2026**, 50(4), e7015.

His team has performed a bioinformatics analysis of TTK/Mps1 in Kidney Renal Clear Cell Carcinoma (KIRC) using multi-omics and transcriptomic datasets from TCGA. The results demonstrated that TTK is significantly overexpressed in KIRC and is associated with poor patient survival. Univariate and multivariate Cox regression analyses identified TTK as an independent prognostic biomarker. Network and functional enrichment analyses revealed its involvement in key mitotic processes, including spindle assembly checkpoint regulation, G2/M cell-cycle transition, and chromosome segregation. A. Singh, N. R. Lakkaniga. *Mol. Carcinog.* **2026**, DOI: 0.1002/mc.70132.



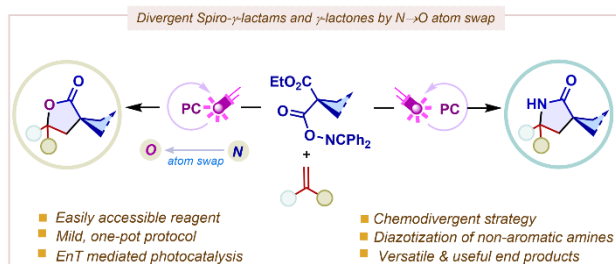
Prof. Soumit Chatterjee and his team have published pH dependent spectroscopic studies of solvent mediated intermolecular proton-transfer and binding characteristics of 5-(*tert*-butyl)-2-hydroxy-1,3-isophthalaldehyde (5-tBHI), a unique single benzene-

based fluorophore, with Human Serum Albumin (HSA) have been performed, to assess the impact of the protein conformational flexibility during the N → F transition. Despite ground state heterogeneity, comparable fluorescence responses suggest that the ligand binding is predominantly unaffected by N → F transition. Computational study indicates that all possible forms of 5-tBHI, in the respective pHs (pH 7.4 and 5.6), namely enolic, anionic, tautomeric, and the protonated forms, attach with the subdomain IIA of HSA. The incorporation of sodium dodecyl sulphate (SDS), at pH 5.6, results in significant spectral alterations, indicating cooperative protein-surfactant interactions, partial unfolding of HSA, and the development of necklace and bead model like structures. These structural reorganizations alter local polarity and hydrophobicity, disrupting the excited state proton transfer process. Overall, 5-tBHI is found to be an effective environment-sensitive probe for connecting proton transfer process to protein conformational states and surfactant-induced structural alterations. A. Shukla, A. S. Biswal, and S. Chatterjee. *Chem. Phys. Impact.* **2026**,

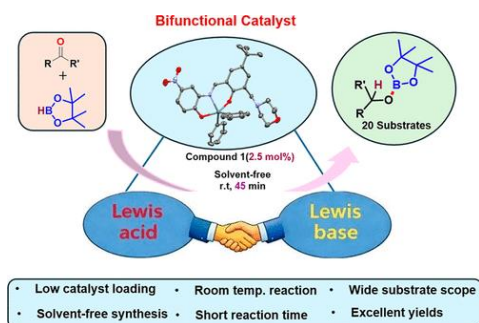


12, 101085.

Prof. Soumitra Maity and his team have published a switchable, one-pot strategy for the synthesis of spiro- γ -lactams and spiro- γ -lactones. Tactically merging the facile photo reactivity of specially designed Cycloalkane *gem*-dicarboxylate oxime esters with a diazotization mediated N → O atom-swap leads to two pharmaceutically relevant categories of spiro cycles from olefins in a divergent manner. This work features an extremely rare example of utilizing the diazotization reaction for non-aromatic amines. S. Debnath, M. Ray, and S. Maity. *Org. Lett.* **2026**, 28 (22), 6968.



Prof. Hari Pada Nayek and his team have published an article on organotin(IV) compounds that showed excellent catalytic efficiency in the solvent free hydroboration reaction of various carbonyl compounds. Both Lewis acidic and Lewis basic sites of the catalyst simultaneously activate the substrates and thus behave as a Bifunctional catalyst. *S. Chakraborty, D. Basu, G. Chakraborty, N. Patra and H. P. Nayek. Inorg. Chem. 2026, 65, 11628.*



Publications & Patent

Journal Publications

1. R. Ghosh, K. K. Bhanja, N. Patra. *J. Chem. Inf. Model.* **2026**, 66 (1), 554.
2. S. Raj N. Patra. *Phys. Chem. Chem. Phys.* **2026**, <https://doi.org/10.1039/d6cp01150k>.
3. S. Sahoo, A. Kumar, K. Negi, S. K. Mahapatra, S.K., Sahu. *Eur. Polym. J.* **2026**, 114759.
4. K. Negi, S. Patra, G. Chakraborty, M. Dhoundiyal, S. K. Bhutia, S. K. Sahu. *Langmuir* **2026**, 42 (21), 149782026.
5. T. Natarajan M., D. S. Teja, Sk S. Akhter, P. Bhardwaj, P. Kumar, B. S. Mallik, S. K. Padhi. *Dalton Trans.* **2026**, 55 (18), 7111.
6. A. Jha, S. K. S. Venkatesh, A., Singh, N. R. Lakkaniga, *Cell Biol. Int.* **2026**, 50(4), e7015.
7. A. Singh, N. R. Lakkaniga. *Mol. Carcinog.* **2026**, 65, 989.
8. A. Shukla, A. S. Biswal, S. Chatterjee. *Chem. Phys. Impact.* **2026**, 12, 101085.

9. S. Debnath, M. Ray, and S. Maity. *Org. Lett.* **2026**, 28 (22), 6968.
10. S. Chakraborty, D. Basu, G. Chakraborty, N. Patra, H. P. Nayek. *Inorg. Chem.* **2026**, 65, 11628.
11. A. Tripathi, S. Yadav, M. Gupta, B. K. Mishra. *Electrochim. Acta* **2026**, 573, 149415.
12. D. Sarkar, N. Sehrawat, S. Yadav, S. Palatasingh, P. Lama, M. Gupta, R. K. Metre. *Chem. Asian J.* **2026**, 21, e70853.
13. R. Singh, A. Joshi, T. Kundu, M. Gupta, M. Patel. *Cellulose* **2026**, <https://doi.org/10.1007/s10570-026-07106-z>.
14. U. Dey, A. Ghosh, N. Das, A. Singh, S. K. Sahu, *Dalton Trans.* **2026**, 55 (22), 8489.

Patents

1. A. Roy, S. Dey, K. Manna, S. Pal. *Indian Patent No* : 587141, Date of Grant : 07.04.2026.

Research Talks

Prof. Niladri Patra delivered an invited talk on “Unravelling the Biophysical Mechanism of MexAB-OprM Efflux Pump: Insights into OprM Pore Opening and pH-Responsive Dynamics for Drug Expulsion Modulation.” in Recent Advances in Chemistry on 15th April, 2026 at the **National Institute of Technology Durgapur**.

Prof. Biswajit Chowdhury delivered an invited talk in 5th Annual meeting of CO₂ India Network at IIT Ropar on “Carbon di Oxide as a feedstock for fine chemicals synthesis”.

He has been conferred as a **Life Member of Society of Carbon Dioxide Research and Innovation (CO₂ INDIA NETWORK)**.

Prof. Niladri Patra delivered an invited talk on “Biophysical Mechanism of MexAB-OprM Efflux Pump: Insights into OprM Pore Opening and pH-Responsive Dynamics for Drug Expulsion Modulation.” in Novel Approaches in Antibacterial Discovery, Bangalore, Gates Foundation, on 7-8 May, 2026.



Prof. Soumitra Maity has delivered an invited talk in National Workshop on “Chemistry in Drug Discovery” at IIT Patna during 1-2 May 2026.



of India’s flagship initiative, Ek Bharat Shreshtha Bharat, the programme brought together participants from Madhya Pradesh and delegates from IIT Indore, fostering cultural exchange, mutual understanding, and national unity among India’s youth.



Awards and Recognitions

RESEARCH GRANT & CONSULTANCY

Prof. Chanchal Halder has secured a consultancy sponsored research project titled “Critical Chemical Analysis of Coal Tars (Sample 1-3) for Controlling the Taphole Clay Properties” from **M/S Grindwell Norton Limited, Halo.**

Prof. Ananya Banik has secured a research grant from ANRF, Early Career Research Grant (ECRG), titled “Developing Cost-Effective Suzuki-Type Halide Conductors for Sodium Solid-State Batteries”.

Prof. Sunil Pulletikurti has secured a research grant from ANRF, Early Career Research Grant (ECRG), titled “Autocatalytic Modified Liposomal Systems for enhanced Ammonia Detoxification”.

Prof. Jadab Majhi has secured a research grant from ANRF, Early Career Research Grant (ECRG), titled “Sustainable Biocatalysis with Engineered Photoenzymes for Asymmetric Bond Formation and Therapeutic Molecule Development”.

Student Spotlight

Dr. Ashif Iqbal, Ph.D. student of Prof. Parthasarathi Das group has joined as process R&D scientist at Cohance Lifesciences.

Ms. Subarna Das (M.Tech.) has joined Hycon Laboratories, Hyderabad.

Ms. Shreya Arun Thool (M.Tech.) has joined Cadila Pharmaceuticals Ltd, Ahmedabad.

Mr. Sayak Das (M.Tech.) has joined Cadila Pharmaceuticals Ltd, Ahmedabad.

Ms. Sanchari Barman (M.Tech.) has joined Indence Health, Kolkata.

Mr. Rishi Raj (M.Tech.) has joined Shilpa Biologics Pvt. Ltd. Belur.

Mr. Arup Bairagi, Ph.D. student of Prof. Somanath Yadav, has been selected to present a poster in the international conference named Belgian Organic Synthesis Symposium (BOSS XIX), which is going to held during 5-10 July, 2026 in KU LEUVEN, Belgium.

Research Talk

Prof. Prabal Banerjee from IIT Ropar has talked about Electrochemical Generation of Ketyl Radical Anions, Synthetic Utilization in the Construction of Diverse Cyclic and Acyclic Scaffolds on June 22, 2026.

Outreach Program

Prof. Madhulika Gupta hosted the valedictory session of the Yuva Sangam programme held at IIT (ISM) Dhanbad from 12–20 June 2026. Organized under the Government

Ms. Segufa Rahaman successfully defended her doctoral thesis for the award of the degree of Doctor of Philosophy (PhD) on the 1st April'26.



Mr. Abhishek Bera has submitted his thesis under the supervision of Prof. Niladri Patra.



Dr. Kingshuk Debsharma secured a post-doctoral position in Hokkaido University, Japan under Prof. Tamaki Nakano.



Ms. Himayel Zehra Naqvi joined a Collaborative Program with an institute fellowship in the Department of Chemistry, KU Leuven, Belgium, under the supervision of Prof. Wim Dehaen.



Dr. Kajal successfully defended her Ph.D. thesis under the supervision of Prof. Hari Pada Nayek.



Ms. Tripti Kundu presented her pre-submission seminar under the supervision of Prof. Madhulika Gupta.



Mr. Gourav Chakraborty presented his pre-submission seminar under the supervision of Prof. Niladri Patra.



Mr. Kousik Kumar Bhanja has submitted his thesis under the supervision of Prof. Niladri Patra.



M.Sc. Batch of 2024-2026



Alumni Corner

Dr. Angshuman Ray Chowdhuri

Scientific Officer-D at the Electron Microscopy Facility of National Centre for Biological Sciences, where he oversees several advanced characterization instruments and research facilities. His responsibilities include managing high-end electron microscopes such as the Talos 200 and Tecnai 120 systems, FESEM, Cryo-SEM, Cryo-TEM facilities for biological samples, X-ray microscopy systems, and microtomy facilities. In addition to maintaining and upgrading these instruments, he actively collaborates with faculty members on interdisciplinary research projects and help operate a largely operator-free 24x7 facility. I also engage in teaching activities through lectures and credit courses

and serve as a visiting faculty member at Ashoka University.

Could you share your academic journey from MSc/PhD at IIT (ISM) Dhanbad to your present position?

After completing my B.Sc. in Chemistry, I joined the Department of Applied Chemistry at IIT (ISM) Dhanbad for my MSc during 2011–2013. During this period, I worked on a research project under Prof. Sahu involving the synthesis of nanoparticles for dye degradation and removal of toxic materials from water. This experience significantly shaped my interest in materials chemistry and nanoscience. I continued at IIT (ISM) for my Ph.D. beginning in 2013, focusing on multifunctional nanoparticles for chemotherapeutic drug delivery. My doctoral research involved developing Metal-Organic Frameworks (MOFs) for drug delivery applications, nanomorphs for targeted delivery, pH-responsive systems, and up-conversion nanoparticles, which were relatively novel at that time. I also extensively utilized electron microscopy facilities, which later became a major aspect of my career.

After completing my Ph.D. in 2017, I joined Indian Institute of Technology Madras as a postdoctoral researcher under Prof. T. Pradeep, where we developed a patented ambient microdroplet annealing technique for nanoparticles. Later, I moved to the National University of Singapore for postdoctoral research on semiconductor interconnect etching. Since 2024, I have been working at National Centre for Biological Sciences as Scientific Officer-D

What inspired you to pursue research in chemistry and materials science?

Initially, I aspired to become a teacher. However, my exposure to research during my time at IIT (ISM), especially under the guidance of Prof. Sahu, inspired me to pursue scientific research. I became deeply interested in the intersection of chemistry, medicine, and biology, particularly how materials science can contribute to healthcare and biomedical applications.

During your student days, which subjects or research areas fascinated you the most?



During my student years, I was particularly fascinated by nanomaterials, drug delivery systems, and interdisciplinary applications of chemistry in biology and medicine. The opportunity to work with advanced analytical techniques and nanostructured materials further strengthened my interest in materials science research.

How important are interdisciplinary collaborations in modern scientific research?

Interdisciplinary collaboration is extremely important in modern research. Many scientific challenges today require expertise from multiple disciplines, and collaborative research broadens both scientific understanding and technological capabilities. In the Indian research ecosystem especially, collaborations help maximize access to expertise and advanced facilities.

What technical skills should current MSc/PhD students focus on to build strong research careers?

Students should focus on understanding advanced technologies and instrumentation available within their departments and research areas. Hands-on technical expertise, analytical thinking, and the ability to adapt to emerging technologies are essential for building a strong research career.

How important are scientific communication and networking for young researchers?

Scientific communication and networking are extremely important for researchers. Communicating science effectively helps inspire people and increases the societal impact of research. At NCBS, for example, outreach programs and interactions with school students play an important role in motivating the next generation toward science and research careers.

What challenges did you face during your research journey, and how did you overcome them?

One of the major challenges during my research journey was limited access to high-end instruments and advanced facilities. This taught me the importance of adaptability and contingency planning. In research, it is always important to have alternative strategies and continuously work toward solutions despite obstacles.

What advice would you give to students who are unsure whether to pursue academia, industry, or research facilities?

Students should not be afraid of uncertainty or failure. Failures are often steppingstones toward success. Career growth takes time, dedication, and continuous effort. It is important to identify one's genuine interests and pursue them with patience and hard work rather than expecting overnight success.

Editorial Note:

We are delighted to feature Dr. Angshuman Ray Chowdhuri, an alumnus of IIT (ISM) Dhanbad and currently serving as Scientific Officer-D at the Electron Microscopy Facility of National Centre for Biological Sciences. His inspiring journey from nanomaterials and drug delivery research at IIT (ISM) to managing advanced microscopy facilities and contributing to interdisciplinary scientific research highlights the importance of innovation, adaptability, and continuous learning in modern science. Through this interaction, he shares valuable insights on research, advanced instrumentation, scientific collaboration, and career development for young researchers.

Mr. Shubham Sengupta

Account Manager & Service Sales at Agilent Technologies, Kolkata. Mr. Shubham Sengupta completed his M.Sc. from IIT (ISM) Dhanbad in 2008. His role at Agilent technologies includes training, comprehensive sales, applications, and maintenance. He is currently representing Agilent Technologies across 13 eastern states.



Could you share your academic journey from MSc/PhD at IIT (ISM) Dhanbad to your present position?

During the final semester of my M.Sc. program, I, along with two of my classmates, worked on an industrial project with ChemBiotech, now known as TCG Lifesciences. In addition, I served as the Class Representative for the Training & Placement Cell at Indian Institute of Technology (Indian School of Mines) Dhanbad. This role provided me with the opportunity to interact with Prof. Shalivahan from the Department of Applied Geophysics, IIT (ISM) Dhanbad, who is currently serving as the Director of Indian Institute of Petroleum and Energy. These experiences, combined with my industrial project work, helped me secure an opportunity with ChemBiotech (TCG Lifesciences) in 2008. In October

2009, I joined SGS, a Geneva-based Testing, Inspection, and Certification (TIC) company, as an Executive Chemist and Spectroscopic Technician. Later, in 2011, I received an offer from AIS Laboratories in Riyadh, Saudi Arabia. However, I chose to join Agilent Technologies as a Technical Support Engineer, where I worked extensively with various spectroscopic techniques. Since then, I have continued my journey with Agilent Technologies in multiple roles, including Technical Support Engineer, Product Specialist, and Account Manager.

What was the motivation to choose industry over academia after your masters?

To be honest, I was initially very interested in pursuing a Ph.D. after my master's degree. However, due to financial constraints at that time, I decided to join the industry instead. During the initial phase, I often felt uncertain and emotionally low about my decision. But over the years, as I gained experience and confidence in the industrial environment, I began to truly enjoy my work. After about three to four years, I felt professionally fulfilled and confident in my career path, and since then, I have never looked back.

What advice would you give to students who are unsure whether to pursue academia, industry, or research facilities?

This is an important question for many students. My advice would be to pursue a Ph.D. only if you genuinely have an interest in research and see yourself building a long-term career in academia or scientific research, rather than choosing it solely for financial reasons. On the other hand, industry careers may initially offer comparatively modest salaries for fresh graduates, but with consistent performance, dedication, and skill development, significant professional and financial growth can be achieved within a few years. Students considering an industry career should always think from a long-term perspective. Career growth in industry is highly dynamic and depends on several factors, including the domain or department one works in, adaptability, technical expertise, and overall performance. Ultimately, success in any path depends on passion, commitment, and continuous learning.

What technical skills should current MSc/PhD students focus on to build strong research careers?

To build strong research careers, students should focus on developing practical and application-oriented technical skills. It is highly beneficial to gain hands-on experience with advanced techniques and instrumentation available within the department as well as central research facilities such as TEXMiN Foundation. Fundamental analytical and spectroscopic techniques remain extremely important, as they continue to evolve and find applications across multiple research areas. In addition, expertise in chromatography, battery-related technologies, and advanced materials characterization can significantly enhance career opportunities for students pursuing research in chemistry and allied sciences. Overall, developing strong experimental skills along with interdisciplinary technical knowledge can provide students with a solid foundation for both academic and industrial research careers.

How important is industry-academia collaboration in modern scientific research?

Industry-academia collaboration is extremely important in modern scientific research, particularly in the Indian context. Such collaborations help bridge the gap between fundamental research and real-world industrial applications. For example, many raw materials used in the pharmaceutical sector are currently imported from other countries, especially China, which significantly increases the cost of final products. Strong collaboration between academic institutions and industries can help develop cost-effective indigenous research and development strategies, ultimately reducing production costs and strengthening self-reliance. In addition to technological advancement, these collaborations also create valuable career opportunities for students by exposing them to practical industrial challenges and application-oriented research. Furthermore, it is equally important to align academic curricula and research projects with industry needs so that students are better prepared for emerging scientific and technological demands.

Editorial Note:

We are pleased to feature Mr. Shubham Sengupta, an alumnus of IIT (ISM) Dhanbad and currently serving as Account Manager & Service Sales at Agilent Technologies. His journey from student research projects at IIT (ISM) to a successful career in scientific instrumentation and industrial applications highlights

the importance of technical expertise, adaptability, and continuous learning. Through this interaction, he shares valuable perspectives on industry careers, skill development, and the growing significance of industry-academia collaboration in modern scientific research.

Mr. Souvik Bag

Currently pursuing a Ph.D. at Indian Institute of Technology Kharagpur under the supervision of Prof. Nikhil K. Singha, his research focuses on MOF-based functional polymer materials, with emphasis on their design and applications in advanced materials science. He completed his graduation in Chemistry from University of Calcutta and carried out his M.Sc. project work under the guidance of Prof. Chanchal Halder at Indian Institute of Technology (ISM) Dhanbad in 2025.



Could you share your academic journey from IIT (ISM) Dhanbad to pursuing a Ph.D.?

After completing my M.Sc. in chemistry from IIT (ISM) Dhanbad, I appeared for the Joint CSIR-UGC NET (June 2025) and successfully qualified for the UGC JRF, which further motivated me to pursue a research career. To gain practical exposure, I joined HASETRI (JK Tyre) as a Research associate, where I worked for three months and gained some practical knowledge about characterization techniques of polymer materials. Finally, I took admission into Ph.D. program at IIT Kharagpur in December 2025 to start my research journey.

What motivated you to choose research as a career path?

During my M.Sc. project, I was introduced to the actual process of research, where I learned about various characterization techniques and how to interpret experimental data. This experience gave me my first real exposure to how research is carried out in practice. It was both challenging and exciting, and it sparked my curiosity to explore more. Overall, this hands-on experience strongly motivated me to pursue research as a career and continue with higher studies.

Which subjects or research experiences during your postgraduate studies influenced your decision to pursue higher studies?

In my coursework, the subjects like- Advanced Biocatalyst, Rechargeable Battery and Technology and mainly the M.Sc. project work influenced me toward higher studies.

How different is Ph.D. life compared to MSc/postgraduate studies?

For me, Ph.D. life is more research-focused, independent that needs to be handled in a professional way compared to MSc studies, which are mostly coursework and exam-oriented. In Ph.D. we work on open-ended problems with no fixed answers, whereas MSc follows a structured curriculum with clear goals and timelines.

What are the most exciting and most challenging aspects of doctoral research?

The most exciting aspect of doctoral research is the opportunity to explore new ideas, discover something original, and contribute to knowledge in that field. The most challenging part is dealing with uncertainty, repeated failures, and maintaining patience and motivation over a long period.

What laboratory techniques, computational tools, or technical skills have been most useful in your research journey?

For research in the field of polymer chemistry, the most useful analytical tools are- NMR, FT-IR, GPC, DSC, TGA, RPA, DLS, Goniometer, SEM, TEM, XRD, DMA.

What qualities are essential for students planning to pursue research careers?

Students aiming for research careers need curiosity and critical thinking ability to explore and analyse problems. Patience and consistency are essential to handle failures and long research processes. They should also have strong subject knowledge.

How should students prepare themselves for Ph.D. entrance interviews or research fellowships.

Students should prepare for Ph.D. interviews or research fellowships by understanding of basic concepts of core subjects, especially topics related to their intended research area. They should thoroughly revise their M.Sc./B.Sc. concepts, as questions are often fundamental but concept-based. It is also important to review their previous projects or thesis work, since

interviewers frequently ask about methodology, results, and reasoning. In addition, students should read recent research papers to show awareness of current developments and be ready to discuss their research interests clearly.

Editorial Note:

We are delighted to feature Mr. Souvik Bag, currently pursuing his Ph.D. at Indian Institute of Technology Kharagpur under the guidance of Prof. Nikhil K. Singha. His research on MOF-based functional polymer materials highlights the growing importance of advanced materials science and interdisciplinary research. From his M.Sc. project work at Indian Institute of Technology (ISM) Dhanbad to qualifying UGC-JRF and beginning his doctoral journey, his experiences reflect curiosity, perseverance, and dedication toward scientific research. Through this interaction, he shares valuable insights on research motivation, doctoral life, technical skill development, and preparation for higher studies and research careers.

Ms. Samreen Kour

Ms. Samreen Kour is currently working as an Analyst in the Health Economics and Outcomes Research (HEOR) domain. Her work involves analyzing healthcare data and generating evidence to



support decision-making in the pharmaceutical and healthcare industries. With expertise in healthcare analytics and outcomes research, she contributes to projects aimed at improving patient outcomes and informing healthcare strategies.

Can you tell us about your journey from IIT (ISM) Dhanbad to your current role as an Analyst in the HEOR industry?

My journey into HEOR began during my M.Tech at IIT (ISM) Dhanbad. I secured an internship with Indence Health, Kolkata, where I gained exposure to evidence-based healthcare research. The internship led to a Pre-Placement Offer, and I joined as an Associate Analyst. After a year of working on global healthcare and pharmaceutical research projects, I was promoted to Analyst. It has been a rewarding journey of continuous learning and professional growth.

How did your academic training at IIT (ISM) prepare you for a career in Health Economics and Outcomes Research?

My time at IIT (ISM) strengthened my analytical thinking, research skills, and problem-solving abilities. The rigorous academic training taught me how to critically evaluate evidence, analyze data, and communicate findings effectively—skills that are directly relevant to HEOR.

What does a typical day look like in your role, and what are the key responsibilities of an HEOR Analyst?

A typical day involves reviewing scientific literature, analyzing healthcare data, synthesizing evidence, and preparing reports for clients. As an HEOR Analyst, I help generate evidence that supports healthcare decision-making for pharmaceutical companies, healthcare providers, and policymakers.

From your experience, what skills should students develop to pursue careers at the intersection of healthcare, research, and data analytics?

Students should focus on developing strong research, analytical, and communication skills. Knowledge of data analysis, critical thinking, scientific writing, and evidence evaluation is valuable. Equally important are curiosity, adaptability, and a willingness to learn continuously.

How can academic institutions like IIT (ISM) collaborate more effectively with the healthcare and life sciences industry to create meaningful opportunities for students?

Institutions can strengthen industry partnerships through internships, live projects, guest lectures, and collaborative research initiatives. Such interactions help students gain practical exposure and better understand emerging career opportunities in healthcare and life sciences.

What advice would you give to current students and research scholars who are exploring non-traditional career paths beyond academia and laboratory research?

Be open to exploring opportunities beyond traditional academic roles. Skills developed during research, such as critical thinking, data analysis, and problem-solving, are highly transferable across industries. Seek internships, build professional networks, and embrace continuous learning to discover rewarding career paths.

Editorial Note:

We are delighted to feature Ms. Samreen Kour, an alumna of IIT (ISM) Dhanbad, who is currently working as an Analyst at a Health Economics and Outcomes Research (HEOR) organization. In this role, she applies data-driven approaches to evaluate healthcare outcomes, support evidence-based decision-making, and contribute to improving patient care. Through this interaction, she shares insights into her professional journey, the skills required for a career in HEOR, and the opportunities available for students aspiring to enter the healthcare analytics and pharmaceutical sectors.

Mr. Vishal

Mr. Vishal is currently working as an Forecast analyst at Pharma, Hyderabad. Mr. Vishal completed his M.Tech. from IIT (ISM) Dhanbad in 2008. As a Forecast Analyst, he analyzes market trends, patient populations, and sales data to predict the future demand and performance of pharmaceutical products, helping companies make informed commercial and strategic decisions.



How did your journey from IIT (ISM) Dhanbad to the pharmaceutical industry shape your career aspirations and professional growth?

Before IIT Dhanbad, I was more into IT. Still, the course and exposure made me more interested in the Pharma industry/junction of pharma-IT industry, and professional growth has resulted in a positive impact from IIT education as I'm able to grasp concepts and implement solutions in the industry faster than others.

Which skills or experiences gained during your time at IIT (ISM) have proven most valuable in your current role as a Forecast Analyst?

I did a forecasting project during my master's, and I also learned ML for it, and that impacted my current role the most.

From an industry perspective, how can institutes like IIT (ISM) better prepare students for the evolving demands of the pharmaceutical sector?

Considering people want to get into the analytics department of the pharma sector, analytics, data sources, and representation, CRM exposure, SAP module

exposure, and supply chain exposure should be included in the curriculum

What opportunities do you see for stronger collaboration between academia and industry, particularly in data analytics, pharmaceutical research, and innovation?

Bringing in younger industry employees who can educate the students on the implications of the latest trends in automation, cloud implications, AI-associated process developments, and so on would make the students future-ready instead of making them study old concepts

What advice would you give to current students and research scholars who are considering careers beyond traditional laboratory research?

Learn what tools are used in what verticals in the pharma industry; for example, Veeva CRM has around 80% of pharma companies as clients. If anyone studies that certification, most likely you will get a job; same for SAP. Then learn the fundamentals of cloud, automation (Power Automate), and analytics basics: SQL, Power BI, and Tableau.

How can alumni contribute to strengthening the connection between IIT (ISM) Dhanbad and the pharmaceutical industry for the benefit of future students?

Industry-focused lectures, alumni hires, internships, and so on

Editorial Note:

We are pleased to feature Mr. Vishal, an alumnus of IIT (ISM) Dhanbad, who is currently working as a forecast analyst at Pharma, Hyderabad. His journey from student research projects at IIT (ISM) to a successful career in data analytics and industrial applications highlights the importance of technical expertise, adaptability, and continuous learning. Through this interaction, he shares valuable perspectives on industry careers, skill development, and the growing significance of industry-academia collaboration in modern scientific research.

Dr. Diship Srivastava

Dr. Srivastava, a former PhD student of Prof. Niladri Patra, is currently working as a Post Doc under Prof. Emad Tajkhorshid, in Theoretical and Computational Biophysics Group (TCBG), Beckman



Institute for Advanced Science and Technology, University of Illinois Urbana-Champaign, USA.

Could you share your academic journey from MSc/PhD at IIT (ISM) Dhanbad to your present position?

During the last few months of my PhD, I began emailing various experts in my field (Molecular dynamics simulations of lipid bilayer membranes) to join their groups as a prospective postdoc. Prof Emad responded to my email, and after a presentation about my work and a short one-to-one meeting, I was able to join his group.

What inspired you to pursue research in chemistry?

During my B.Sc. and M.Sc. at IIT Kharagpur, the computational chemistry course taught by Prof. Sanjoy Bandyopadhyay inspired me to pursue research in computational and theoretical chemistry.

During your student days, which subjects or research areas fascinated you the most?

During my student days, I was fascinated with the topics related to quantum physics/ chemistry, algebra, complex number, vectors, and enzymatic chemistry.

How important are scientific communication and networking for young researchers?

I would say communication and networking are extremely important for young researchers. In my current group, we have set aside a separate time when anyone in the group or a guest from another group can present on a topic they think will be helpful to the people working in the group. The resulting discussions have proven very helpful in identifying new research avenues. Similarly, proper networking can open new opportunities for the researcher.

What advice would you give to students who are unsure whether to pursue academia, industry, or research facilities?

I believe that, rather than concentrating solely on academia, industry, or research facilities, students should reflect on the underlying motivations driving their interest in research and then identify the most suitable path to achieve their objectives. Acquiring firsthand experience through internships, research projects, and discussions with professionals can assist in determining which environment aligns best with their interests and career aspirations.

Editorial Note:

We are delighted to feature D. Diship Srivastava, an alumnus of IIT (ISM) Dhanbad and currently serving as a Post Doc under Prof. Emad Tajkhorshid, in Theoretical and Computational Biophysics Group (TCBG), Beckman Institute for Advanced Science and Technology, University of Illinois Urbana-Champaign. USA . His doctoral journey from IIT (ISM) Dhanbad to a successful Post doctoral journey inspire the younger researcher. Through this interaction, he shares valuable insights on research, Communication skill, scientific collaboration, and career development for young researchers.

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