ChemBio Bulletin

(A bi-monthly e-magazine of the department of chemical and biological sciences)

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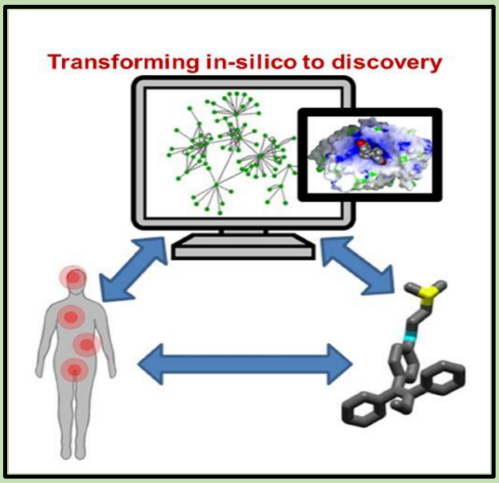
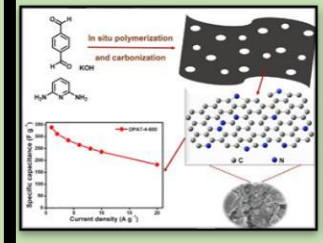
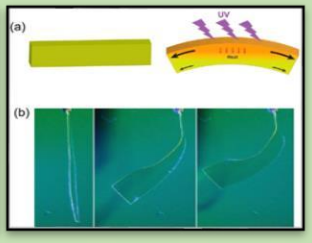
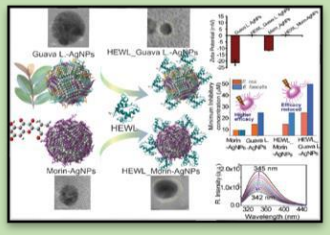
Science through Sohra's Lens



Featured article: Computational Chemistry: Introduction, Scope and Challenges







RESEARCH HIGHLIGHTS:

- *Single step process for creating Nitrogen and Oxygen-enriched Carbon using organic polymers for supercapacitor applications*
- *Photothermal Activation of Azine Derivatives: A Pathway to Smart Materials.*
- *Fundamental understanding of Bio-Nano Interface of Lysozyme on Polyphenols Coated Silver Nanoparticles*

Department of Chemical & Biological Sciences
National Institute of Technology Meghalaya
(An Institute of National Importance under MoE, Govt. of India)
Saitsohpen, Sohra, East Khasi Hills, Meghalaya, India, 793108

"It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with the experiment, it's wrong." **- Richard Feynman**

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Departmental magazine committee:

Editor: *Dr. Harshit Joshi (Asst. Prof., Dept. of Chemical & Biological Sciences)*

Editorial board members: *Basudha Deb, Satabdi Debroy and Marry Hazarika (Ph.D. Scholars, Dept. of Chemical & Biological Sciences)*

About the Institute

The National Institute of Technology (NIT) Meghalaya is one among the thirty-one NITs in India established under the NIT Act 2007 (Amended 2012) of the Parliament of India as Institutes of National Importance with full funding support from the Ministry of Education (Shiksha Mantralaya), Government of India. Ranked 68th in the NIRF 2024 rankings, NIT Meghalaya has been operational from its temporary campus in Shillong since 2012 and has made significant strides in becoming one of India's leading educational institutions.

The institute offers a diverse range of programs across nine academic departments, encompassing Engineering (Civil, Computer Science, Electrical, Electronics & Communication, Mechanical), Sciences (Physics, Chemistry, Mathematics), and Humanities & Social Sciences. Approximately 1000 students are enrolled in B.Tech., M.Tech., M.Sc., and Ph.D. programs, contributing to a vibrant learning community where faculty members are deeply involved in both teaching and cutting-edge research.

NIT Meghalaya's commitment to research is evident in its numerous publications, funded projects, and consultancy services. The institute has provided consultancy to prestigious organizations such as the Indian Air Force, Airport Authority of India, PWD, and CPWD, while fostering collaborations with industries like Vedanta Resources and Jindal Stainless Pvt. Ltd. It also maintains strong ties with research funding agencies such as DST-SERB and CSIR. Since 2018, the institute's international collaborations with institutions in countries like South Korea, France, Germany, and Austria have further enhanced its global research footprint.

In addition to academic excellence, NIT Meghalaya hosts a wide range of events, including workshops, conferences, and faculty development programs, aimed at fostering innovation and skill development. The Centre for Career Development plays a pivotal role in student success, with 80% of eligible students securing placements in top-tier companies such as Microsoft, Bharat Petroleum, Power Grid Corporation, and Infosys.

NIT Meghalaya continues to strive for excellence by blending high-quality education with impactful research and industry collaboration, preparing its students to become future leaders and innovators.

About the Department

Established in 2012, the Department of Chemical and Biological Sciences at the National Institute of Technology Meghalaya offers a comprehensive education in chemistry and related fields. Currently, the department offers M.Sc. and Ph.D. degree programs, along with undergrad level courses for B.Tech. students in Chemical and Biological Sciences. The M.Sc. program commenced in 2015 with an initial intake of 13 students, while Ph.D. programs have been available since 2014 in various disciplines, including Organic Chemistry, Inorganic Chemistry, Biophysical Chemistry, Materials Chemistry, Gut Microbiology, and Computational Chemistry.

Our mission is to deliver high-quality education and conduct both fundamental and industry-oriented research. Faculty research interests span a wide range of core and interdisciplinary areas within chemical and biological sciences, including electrochemical sensors, carbon-based and composite materials for energy storage devices, electrocatalysts for oxygen reduction reactions, biophysical chemistry, nanomaterials, solid-state forms of pharmaceuticals, stimuli-responsive materials, crystal engineering, energy-converting smart materials, synthetic organic chemistry, computational chemistry and gut microbiology.

Our department is equipped with advanced laboratory facilities, including a conductivity meter, pH meter, double beam UV-visible spectrophotometer with variable bandwidth and diffuse reflectance accessory, steady-state fluorescence spectrophotometer, Fourier transform infrared (FT-IR) spectrophotometer with ATR accessory, multichannel electrochemical analyzer including electrochemical impedance spectroscopy, differential scanning calorimeter, polarizing microscope with heating stage applications, and stereoscopic zoom microscope.

We are committed to fostering an environment conducive to innovative research and quality education in the fields of chemical and biological sciences.

Messages from the Director

It is with great pride and enthusiasm that I extend my warmest congratulations to the Department of Chemical & Biological Sciences on the publication of the new issue of its bi-monthly E-Magazine. This initiative truly reflects the vibrant academic and research culture upheld at NIT Meghalaya—centered on excellence, collaboration, and continuous innovation.

Our institute is committed to the holistic development of students, embracing core values such as academic integrity, excellence in teaching through student-centric pedagogy, and fostering interdisciplinary interaction through electives and projects. We also encourage creativity and innovation, skill development, and social responsibility. NIT Meghalaya's mission aligns with the goals of NEP-2020, offering skill-based multifaceted courses and implementing the Academic Bank of Credit for our students. Furthermore, NIT Meghalaya has shifted to its permanent campus at Sohra (Cherrapunji), which is equipped with world-class infrastructure and research facilities. I am confident that this transition will provide an even stronger foundation for academic and research excellence.

The publication of this magazine comes at a pivotal time when science and education are rapidly evolving. It serves as an excellent platform to showcase the strides we are making in both teaching and research. The dedication and talent of our faculty, staff, and students are evident in the numerous achievements we celebrate today. Through this magazine, we can ensure that these accomplishments receive the recognition they deserve, not only within our institute but also in the broader academic and professional communities.

At NIT Meghalaya, we foster a culture where knowledge is shared, ideas are nurtured, and everyone—from students just beginning their academic journey to established researchers—can contribute meaningfully. This E-Magazine is a testament to that belief, providing a space where creativity, intellect, and innovation can flourish. In addition to highlighting key research, it will amplify the voices of our students and alumni, inspiring continued excellence.

Congratulations to the entire team behind this initiative. I look forward to seeing the positive impact it will have.

- Prof. Pinakeswar Mahanta

Messages from the Head of the Department

Greetings from the Department of Chemical and Biological Sciences!

It gives me great pleasure to present an overview of the Department of Chemical and Biological Sciences on the occasion of the publication of this new issue of ChemBio Bulletin. I would also like to extend warm greetings to all faculty members, staff, and students of the department.

The department was founded in 2012, and it currently offers M.Sc. degree in Chemistry and Ph.D. degree in broad areas of chemical sciences like physical chemistry, organic chemistry, biophysical chemistry, materials chemistry, gut microbiology, and theoretical chemistry.

The department currently has 6 regular faculty members and 2 adjunct faculty members, along with 27 Ph.D. students and 37 M.Sc. students. To date, a total of 94 M.Sc. students have graduated from our department, and 16 students have received their Ph.D. degrees.

In 2024, the department's name was changed from "Chemistry" to "Chemical and Biological Sciences" to enhance our interdisciplinary approach in teaching and research. In alignment with NEP 2020, we have recently revised the course syllabi for the undergraduate programs.

Our department is equipped with essential research facilities, including a double-beam UV-visible spectrophotometer, fluorescence spectrophotometer, Fourier transform infrared (FT-IR) spectrophotometer, electrochemical workstation, differential scanning calorimeter, stereoscopic zoom microscope, and contact angle measuring equipment. Additionally, our research scholars regularly utilize instrument facilities at the Central Instrumentation Facility (CIF) on the main campus in Sohra.

Our faculty members have secured a total of 16 sponsored research projects from various funding agencies such as DST, SERB, ANRF, CSIR, and BIRAC. The department also organizes conferences and workshops to showcase our research activities.

Finally, I would like to extend my sincere gratitude to all past and present faculty members, students, staff, and alumni for their unwavering support and valuable contributions to the department and the institute over the past few years. The department is committed to quality research and teaching and to the growth and development of our nation.

-Prof. Gitish Kishor Dutta

Editor's Note: From NITM Sohra (Cherrapunji)

It is with immense pride and excitement that I introduce this fresh issue of the Department of Chemical & Biological Sciences' bi-monthly e-magazine, *ChemBio Bulletin*. We have now shifted to our permanent campus at Sohra.

The department has always been a hub of scientific discovery, collaborative research, and academic excellence. Through this magazine, we aim to bring to light the many efforts that often go unnoticed but contribute significantly to our academic and research ecosystem. Each edition will serve as a testament to the hard work and passion of everyone involved.

In this issue, you'll find an insightful message from our esteemed Director and Head of Department, reflecting on the future of science and education in our institution. Our faculty's latest research highlights and achievements are prominently showcased, alongside a corner dedicated to our alumni, whose professional journeys continue to inspire. Our students, the heart of the department, will find their voices amplified through contributions that showcase their creativity and intellect, whether through articles, event coverage, or career guidance.

In addition to this, we are thrilled to present a featured article on *Computational Chemistry: Introduction, Scope and Challenges*. The piece gives an overview on the state-of-the art of computational chemistry research.

This magazine is more than just a publication; it is a shared space for learning, celebrating success, and building a stronger, more connected community. It reflects the vibrant intellectual life we foster here at NIT Meghalaya. As we move forward, we hope this initiative will not only document our progress but also inspire future innovations.

I encourage you to engage with this magazine—whether by reading, contributing, or sharing your feedback. Together, we can make a meaningful and lasting contribution to our department's legacy.

Here's to the beginning of a new chapter in our academic journey!

-Harshit Joshi

Department Details

- ❑ Number of faculties : 6 (+2 adjunct faculty)
- ❑ Number of technical staff : 2
- ❑ Number of students enrolled in Ph.D. program : 27
- ❑ Number of students enrolled in M.Sc. program : 37
- ❑ Number of students enrolled in undergrad courses : 164

Our faculties:

Faculty	Research interest
 Dr. Gitish Kishor Dutta	Carbon-based composite materials for energy storage devices, fuel cells, electrocatalyst for oxygen reduction reactions and electrochemical sensors
 Dr. Atanu Singha Roy	Biophysical chemistry, protein-ligand interaction studies, biomolecular spectroscopy, protein denaturation studies, DNA-ligand binding and DNA damaging experiments, protein modification and impact on ligand biding, protein-nano particle interaction, quantum dots and their biological applications.
 Dr. Naba Kamal Nath	Crystal Engineering, Energy Converting Smart Materials, Solid State Forms of Pharmaceuticals
 Dr. Harshit Joshi	Synthetic organic chemistry, methodology development and total synthesis of natural and non-natural compounds of biological interest
 Dr. Kaushik Talukdar	Computational chemical physics, coupled cluster theory, relativistic quantum chemistry, noncovalent interactions, and chemical education

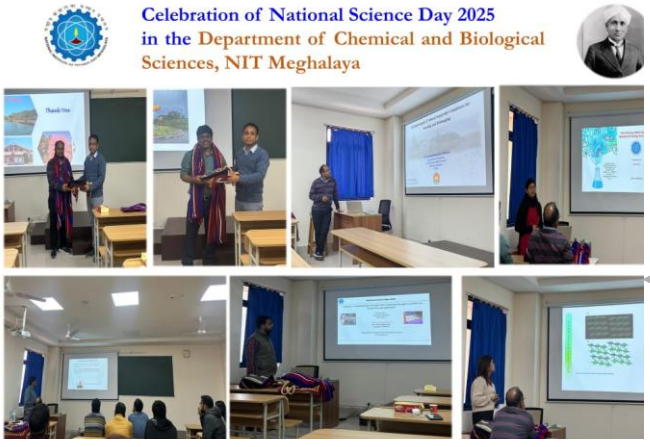
Dr. Rwivoo Baruah

Understanding the interactions of native and synthesized glycan with human gut bacteria.

Department News

New faculty joined: Dr. Kaushik Talukdar is an Assistant Professor in the Department of Chemical and Biological Sciences at the National Institute of Technology (NIT) Meghalaya, Sohra, Meghalaya, India. He earned his Ph.D. in Theoretical Chemistry from the Indian Institute of Technology Bombay in 2020, focusing on parity and time-reversal violating effects in molecules under the supervision of Prof. Sourav Pal and Dr. Nayana Vaval. Following his doctorate, Dr. Talukdar conducted postdoctoral research at Philipps University of Marburg, Germany, from December 2019 to April 2021, working with Prof. Robert Berger. He then served as a DST-INSPIRE Faculty Fellow at Tezpur University, Assam, and as an Assistant Professor in the Department of Chemistry at Bhattadev University, Assam, from March 2023 to February 2025. His research interests include computational chemical physics, coupled cluster theory, relativistic quantum chemistry, noncovalent interactions, and chemical education. Dr. Talukdar has been recognized with several awards, including the DST INSPIRE Faculty Fellowship in 2022 and the INSA Visiting Scientist Award in 2024.

Celebration of various events in the department: International Day of Women and Girls in Science was celebrated in the department where Faculties and PhD scholars forwarded speeches on the greatness of Women and their role in science. The department also celebrated National Science Day on 28 February with distinguished guests Prof. Subhas Chandra Pan and Dr. Snehadrinarayan Khatua.



Glimpse of the National Science Day (left) and International Day of Women and Girls in Science (right).

Featured Article

Computational Chemistry: Introduction, Scope and Challenges

Dr. Kaushik Talukdar, Assistant Professor
Department of Chemical and Biological Sciences, NIT Meghalaya

Anyone can do calculations nowadays.
Anyone can also operate a scalpel.
That doesn't mean all our medical problems are solved.
—Karl Irikura

Chemists can synthesize new molecules in laboratories and are also passionate about exploring their behavior and determining their properties, which is typically done through experiments. However, conducting these experiments can often be time-consuming, expensive, and hazardous. Is there an alternative to these experiments for predicting the chemistry of molecules? Can we avoid hazardous experiments or at least reduce their number? Yes, we can, with the help of computational chemistry. Computational chemistry is cost-effective, fast, and environmentally less hazardous than traditional experiments. It is a subfield of theoretical chemistry that focuses on applying computational techniques and computer simulations to solve chemical problems [1-3]. Theoretical chemistry involves the mathematical description of chemistry, primarily focusing on developing mathematical models and theories to predict and explain chemical phenomena. It uses computers to solve complex mathematical equations and validate the developed models or theories. In contrast, computational chemists employ well-established mathematical methods, implemented as computational techniques, to understand chemical phenomena. These methods are primarily grounded in quantum mechanics, statistical mechanics, and molecular mechanics. Recently, the integration of artificial intelligence (machine learning) into computational techniques has emerged as an exciting area of exploration for solving modern-day problems in chemistry and related fields.

Computational chemistry is a rapidly growing field within chemistry. Once limited to experts skilled in handling computational tools, it is now accessible to any chemist due to advancements in modern computer software. Computational chemistry tools are useful for predicting the energy and geometry of molecules, chemical reactivity, transition states, molecular spectra (e.g., IR, UV, NMR), interactions between substrates and enzymes, and various physical properties of materials. Modern software can handle everything from small molecules to complex biomolecules, crystals, and materials. It also allows for the study of chemistry of compounds and their behaviour in gaseous phases, solvent systems, or under extreme pressures and temperatures. Some of the

widely used software in computational chemistry are GAUSSIAN, GAMESS, SPARTAN, Q-Chem, CFOUR, DALTON, DIRAC, ReSpect, eT, Multiwfn, MRCC, PSI4, Firefly, Hyperchem, ADF, MOLPRO, MOLCAS, TRURBOMOLE, NWChem, ArgusLab, TINKER, Autodock, GROMACS, Quantum Espresso, VASP, Mercury, Avogadro, Molden, Chemcraft, etc. *ChemCompute* is a popular web platform where undergraduate students can perform calculations to solve problems in chemistry [4].

Computational chemistry plays a crucial role in drug discovery, allowing for the fast screening of potential drug candidates (Interested readers can see the review article by Cavasotto *et. al.* [5]). By forecasting the properties of molecules, researchers can identify compounds that are likely to interact effectively with biological targets. This approach can greatly shorten the time and reduce the costs involved in traditional drug development methods. In materials science, computational chemistry helps design new materials with tailored properties, such as advanced polymers for drug delivery systems or innovative battery materials. The ability to predict the characteristics of hypothetical materials enables scientists to suggest and test new compounds that could address critical technological challenges. In short, computational chemists focus on studying the structure, properties, spectroscopy, dynamics, and reactivity of molecules and materials. It is now justified to say that almost all experiments performed in a laboratory can also be conducted through computer simulations. The essence of computational chemistry can be summarized in E. G. Lewars' words [3]— "You can calculate molecular geometries, rates and equilibria, spectra, and other physical properties with the tools of computational chemistry (*see Table I*): molecular mechanics, *ab initio*, semiempirical and density functional methods, and molecular dynamics. Computational chemistry is widely used in the pharmaceutical industry to explore the interactions of potential drugs with biomolecules, for example by docking a candidate drug into the active site of an enzyme. It is used to investigate the properties of solids (e.g. plastics) in materials science, and to study catalysis in reactions important in the lab and in industry. It does not replace experiment, which remains the final arbiter of truth about Nature."

Table I: Traditional tools of computational chemistry

Method	**Description**
Molecular mechanics	Uses a ball-and-spring model to represent molecules
Molecular dynamics methods	Focus on studying the movement of molecules
Semiempirical methods	Involve approximate solutions to the Schrödinger equation, incorporating experimental fitting or parameterization.
Density functional theory (DFT) methods	Approximate solutions to the Schrödinger equation, avoiding the wavefunction central to ab initio and semiempirical methods
Ab initio methods	Rely on approximate solutions to the Schrödinger equation without incorporating experimental fitting.

According to Lewars, the philosophy of computational chemistry [3] is: "Computational chemistry is the culmination (to date) of the view that chemistry is best understood as the manifestation of

the behavior of atoms and molecules, and that these are real entities rather than merely convenient intellectual models. ***** In computational chemistry we take the view that we are simulating the behavior of real physical entities, albeit with the aid of intellectual models; and that as our models improve, they reflect more accurately the behavior of atoms and molecules in the real world."

As computational resources advance and machine learning techniques become more sophisticated, the scope of computational chemistry is growing exponentially. The goal of performing highly accurate calculations across the entire periodic table has the potential to revolutionize fields such as chemistry, biology, and materials science. With its ability to accelerate discovery and foster innovation, computational chemistry is poised to redefine how we approach complex scientific challenges in the coming years.

Even though computational chemistry is becoming more important and useful, it still faces some challenges, such as the accuracy and reliability of models, high computational costs, and the difficulty of combining it with experimental data. Although computational methods are improving, achieving accurate results, especially for large molecules or complex systems, is still computationally very expensive. For example, methods like ab initio calculations require a lot of computing power, which makes them less practical for large systems. While computational chemistry provides helpful insights, it often needs to be examined and supported by experimental data. The gap between what computational models predict and what happens in experiments can sometimes be hard to bridge because simulations are often idealized, while real-world conditions are more complex. However, the combination of quantum mechanics with new technologies like quantum computing could offer great potential for advancing computational chemistry.

In conclusion, computational chemistry is not merely a tool for researchers; it is a key to unlocking the mysteries of the molecular world. By harnessing the power of machine learning and cutting-edge simulations, scientists are pushing the boundaries of what is possible in drug discovery, materials science, and beyond. As the field evolves, we can expect transformative breakthroughs that will shape the future of science and technology.

References:

[1] D. C. Young, *Computational Chemistry: A Practical Guide for Applying Techniques to Real-World Problems*, John Wiley & Sons Inc. (2001).

[2] E. G. Lewars, *Computational Chemistry: Introduction to the Theory and Applications of Molecular and Quantum Mechanics*, Springer International Publishing Switzerland (2016).

[3] C. J. Cramer, *Essentials of Computational Chemistry: Theories and Models*, John Wiley & Sons Ltd (2004).

[4] H. Buragohain and K. Talukdar, *Resonance* **29**, 1095 (2024).

[5] C. N. Cavasotto, M. G. Aucar and N. S. Adler, *Int. J. Quantum. Chem.* **119**, e25678 (2019).

Research Highlights

Single-step process for creating nitrogen and oxygen-enriched carbon using organic polymers for supercapacitor applications

Ria Deb, Rimpi Gogoi, Gitish K. Dutta

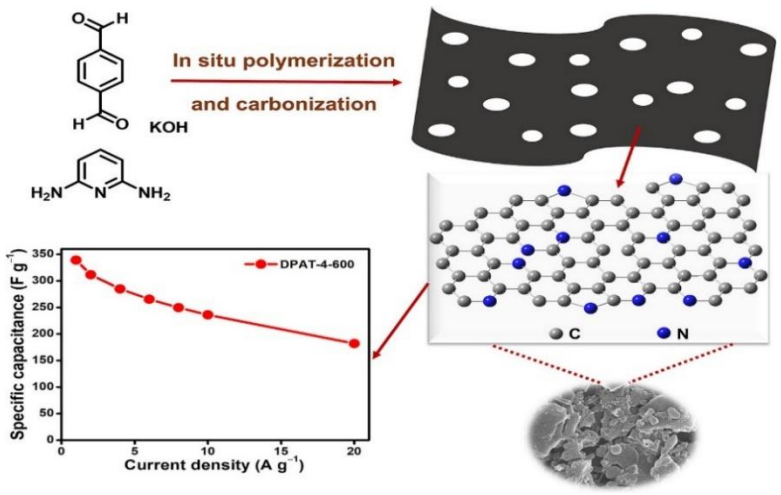


***Figure 1**. Pictorial representation of the reaction scheme and electrochemical performance of DAPT-4-600.*

Supercapacitors are considered a breakthrough in energy storage and delivery due to their high power density and superior cycle life. Heteroatom-doped carbon materials are garnering significant attention as electrode materials for supercapacitor applications. Considering this we have developed a nitrogen and oxygen-enriched carbon by carbonization of organic polymers in a single-step pathway. The incorporation of nitrogen and oxygen heteroatoms induces variations in electronegativity of the carbon framework, which in turn modifies the chemical and physical properties of the carbon network.

Our optimized material (DAPT-4-600) exhibits a specific capacitance of 339 F g^{-1} (at 1 A g^{-1}) in 1 M H_2SO_4 and complete capacitance retention after 10,000 cycles. The enhanced electrochemical behaviour of DAPT-4-600 can be attributed to its moderate surface area, pore volume, and nitrogen/oxygen functional groups. Also, the DAPT-4-600 symmetric device shows an energy density of 11.11 W h kg^{-1} at a power density of 250 W kg^{-1}.

Fundamental Understanding of Bio-Nano Interface of Lysozyme on Polyphenols Coated Silver Nanoparticles

Kakali Baruah, Ajit Kumar Singh, Sona Lyndem, Anupam Nath Jha, Atanu Singha Roy

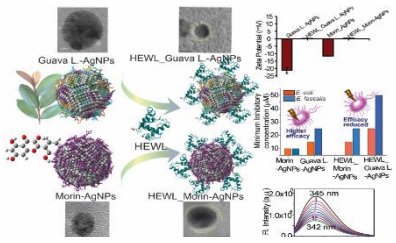


***Figure 2.** Formation of protein-corona on the psidium guajava (guava) leaves*

With recent progress of functionalized nanomaterials in biomedical applications, the understanding of their 'biological responses' is important for real clinical trials. Upon exposure to body system, the surrounding proteins mask the NPs surface forming the 'protein-corona', changing their biological identity. In this perspective, formation of 'protein-corona' on the surface of silver nanoparticle one is coated with the polyphenols of *psidium guajava* (guava) leaves extract and the other with morin

was analyzed by spectroscopic and MD simulation methods by taking hen egg white lysozyme (HEWL) as the model protein. HEWL shows moderate binding affinity (K_b in the order of 10^4) towards these polyphenols coated AgNPs in a spontaneous manner. The lysozyme protein-corona on these AgNPs altered their activity as revealed from the reduction of antibacterial efficacy against gram-positive (*Enterococcus faecalis*) as well as gram-negative (*Escherichia coli*) bacterial strains studied *in-vitro*.

Photothermal Actuation of Azine Derivatives: A Pathway to Smart Materials

Naba Kamal Nath

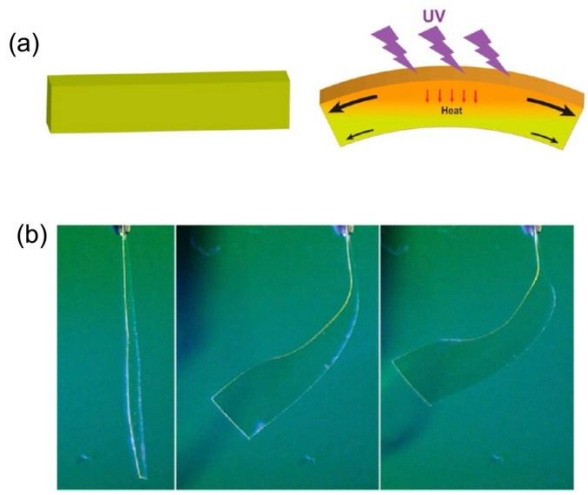


Figure 3 (a) Pictorial representation of photothermal bending of single crystal. (b) Photothermal bending of composite polymer film.

Photothermal bending of single crystals is a fascinating phenomenon demonstrated by crystalline materials undergoing mechanical deformation upon UV light exposure. This effect arises from the photothermal conversion of light energy into heat, which induces localized temperature changes, resulting in mechanical motion. The response can vary from bending to oscillatory motion, depending on the molecular structure and crystal morphology. Such properties have been widely explored for applications in soft actuators, micro-robotics, and smart materials. Among these materials, azine derivatives have garnered significant attention due to their unique structural properties. These organic compounds are characterized by the −C=N−N=C− functional group. Our recent studies on the photothermal vibration of single crystals of azine derivatives demonstrated fast and reversible motion under UV light exposure. The rapid temperature increase observed in the materials was attributed to the photothermal effect, which drove the bending motion of the crystals. In composite polymer films, the photothermal response resulted in a slow, irreversible curling motion. Although UV-vis spectroscopy did not establish photo switching behavior, computational calculations indicated the possible existence of different isomers in the gas phase. The elastic flexibility of the single crystals was further correlated with their crystal structures, aligning with established mechanisms of elastic bending in the literature. These findings highlight the potential of azine derivatives as responsive materials for future applications in soft actuators and smart devices.

Recent Publications

1. Surendra Barman, Kalpana Kumari, Atanu Singha Roy, Adsorption of plasma protein human serum albumin on surface functionalized multi-walled carbon nanotubes: Insights into binding interactions and effects on protein fibrillation. *International Journal of Biological Macromolecules*, **2025**, *304*, 140802. https://doi.org/10.1016/j.ijbiomac.2025.140802
2. Amarjyoti Mondal, Mahabul Haque, Aditi Aggarwal, Mitul Kalita, Atanu Singha Roy, Protein-based hydrogel for environmental remediation: Removal of hazardous metal ions and toxic organic dyes from wastewater. *Journal of Molecular Liquids*, **2025**, *423*, 127174. https://doi.org/10.1016/j.molliq.2025.127174

Achievements

I. Krishnandu Dey from Dr. Naba Kamal Nath's research group secured the best poster award in Anusadhan, a conference organized by Bose Institute, Kolkata, held from February 7th to 8th, 2025.

II. Plabon Saikia from Dr. Naba Kamal Nath's research group secured Best Oral Presenter award in Science Grad Conclave, organized by Tezpur University, Assam, held from February 9th to 11th, 2025.

III. Basudha Deb from Dr. Gitish K. Dutta's research group secured best poster award in Anusadhan, a conference organized by Bose Institute, Kolkata, held from February 7th to 8th, 2025.

Alumni Corner

I am grateful for the opportunity to reflect on my time at NIT Meghalaya, where I completed my MSc in Chemistry in the Department of Chemical and Biological Sciences. The department provided a nurturing and intellectually stimulating environment that was pivotal in shaping my academic and professional growth. The faculty members were not only exceptionally knowledgeable but also deeply committed to fostering a supportive and engaging learning experience. Their guidance, encouragement, and dedication were instrumental in helping me navigate the complexities of advanced chemistry. The department's emphasis on both theoretical and practical aspects of the field ensured a well-rounded education, and the collaborative atmosphere among peers further enriched my time there. My experience at NIT Meghalaya remains a cherished part of my academic journey, and I hold the institution and its remarkable faculty in high regard.

-Venkatesh N (NITM/MSc. 2021-24) currently pursuing PhD in Chemistry at IIT Patna

Opportunities with the Fulbright-Nehru fellowship for doctoral research

Dr. Rwivoo Baruah Assistant Professor
Department of Chemical and Biological Sciences, NIT Meghalaya

The United States – India Educational Foundation (USIEF) is dedicated to fostering mutual understanding between the people of India and the United States through educational exchanges involving outstanding scholars, professionals, and students.

USIEF offers a wide range of grants for Indian citizens, fostering opportunities for study, research, teaching, and professional development in the United States. These fellowships are designed to enhance academic and professional expertise, promote cross-cultural exchange, and build lasting relationships between India and the U.S.

Fulbright-Nehru Doctoral Research Fellowships:

The Fulbright-Nehru Doctoral Research Fellowships are designed to build long-term capacity to address global challenges and develop innovative solutions in key priority areas in both India and the U.S. Selected scholars will have the opportunity to conduct research, audit non-degree courses at U.S. academic institutions to enhance their knowledge and gain practical work experience in suitable settings in the U.S.

These fellowships are designed for Indian scholars who are registered for a Ph.D. at an Indian institution. These fellowships are for six to nine months.

Field of studies include:

Agricultural Sciences, Anthropology, Bioengineering, Chemistry, Computer Science (including, but not limited to, cyber security, digital economy, quantum computing, artificial intelligence, machine learning and big data analytics), Earth Sciences, Economics, Education Policy and Planning, Energy Studies Environmental Science/studies, History, Language/Literature/Linguistics, Materials Science (with emphasis on environmental applications), Mathematical Sciences, Neuroscience, Performing Arts, Physics, Political Science (including, but not limited to, International Security and Strategic Studies), Psychology, Public Health (including, but not limited to, pandemic preparedness and comprehensive surveillance (genomic surveillance, sewage surveillance, sero-surveillance), Public Policy, Sociology, Urban and Regional Planning (with emphasis on smart cities and waste management) and Visual Arts.

Affiliation: The applicant will be affiliated to one U.S. host institution. USIEF strongly recommends all applicants to indicate affiliation preference, and to correspond, in advance, with potential host institutions. If the applicant has secured a letter of invitation from a U.S. institution, they must include it as a part of the online application.

Benefits: The fellowships provide J-1 visa support, a monthly stipend, Accident and Sickness Program for Exchanges per U.S. Government guidelines, round-trip economy class air travel, applicable allowances and modest affiliation fees, if any.

Details for the application process can be found in the USIEF website: https://www.usief.org.in/fulbright-fellowships/fellowships-for-indian-citizen/fulbright-nehru-doctoral-research-fellowships/

Why apply?

For students in the Chemical and Biological Sciences department at NIT Meghalaya, the Fulbright-Nehru Doctoral Research Fellowship offers a valuable opportunity to advance their academic careers while contributing to scientific research. In addition to financial support, it provides a structured platform for conducting innovative studies that address societal challenges, promote national progress, and foster international collaborations. I strongly encourage all eligible students to explore this fellowship and take advantage of the opportunity to contribute to India's scientific growth on a global scale.

Best of luck with your research endeavors!