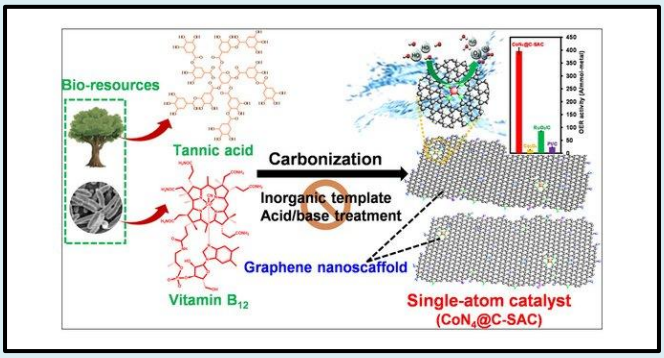
सीएसआईआर-उत्तर पूर्व विज्ञान तथा प्रौद्योगिकी संस्थान, जोरहाट
CSIR-North East Institute of Science and Technology

INFOWATCH

An In-house Monthly Communication (February, 2024)

BREAKTHROUGH RESEARCH ON SINGLE-ATOM CATALYSTS FOR HYDROGEN PRODUCTION

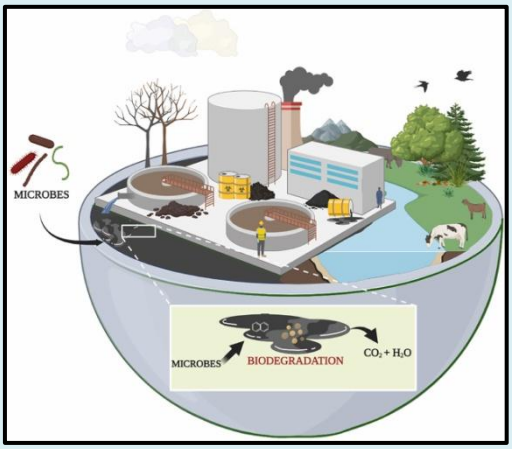


Dr Ashutosh Thakur and his team have published a significant research paper titled "Biomolecules-Derived Nitrogen-Doped Turbostratic Graphene Nanoscaffold Decorated with Cobalt Single Atoms for Enhanced Oxygen Evolution Reaction (Impact Factor: 5.2) in the journal *ACS Energy & Fuels*, presenting a novel approach to developing high-performance catalysts for sustainable energy applications.

The study introduces a simple protocol for synthesizing a carbon-based first-row transition metal single-atom catalyst (SAC) using bio-derived materials. The resulting SAC features less-defective turbostratic graphene-like surfaces with atomically dispersed cobalt species, leading to remarkable catalytic efficiency for the electrochemical oxygen evolution reaction (OER)—a critical step in hydrogen production from water.

The catalyst demonstrates exceptional performance, characterized by a low overpotential, high turnover frequency, and long-term stability, surpassing many existing nanostructured and single-atom cobalt catalysts. This advancement holds great promise for the development of cost-effective and sustainable hydrogen generation technologies.

GROUNDBREAKING RESEARCH ON SUSTAINABLE REFINERY WASTE MANAGEMENT



A research paper titled "Sustainable Refinery Waste Management through Biotechnological Intervention: Health Impacts, Historical Successes, and Emerging Solutions" by Ashique Ahmed, PhD Scholar, CSIR-NEIST, and Dr Sachin Rameshrao Geed, Scientist, BSTD, CSIR-NEIST, has been published in the journal *Environmental Research*.

The study highlights bioremediation as a key approach to managing refinery waste sustainably. The authors explore biological processes for treating refinery oily waste, emphasizing their potential to enhance environmental sustainability.

While challenges remain, the research underscores the ongoing advancements in optimizing microbial strains and bioreactor systems. These innovations could significantly contribute to transforming India's petroleum sector, aligning it with global sustainability objectives while safeguarding the rich biodiversity of the Northeast region.

CHAMOMILE CULTIVATION INTRODUCED IN ASSAM'S TEA ESTATES UNDER CSIR-NEIST INITIATIVE

In a significant step towards agricultural diversification, chamomile cultivation has been introduced at Thengalbari Tea Estate and Negheriting Tea Estate, Assam, under the leadership of Dr V M Tiwari, Director, CSIR-NEIST. The initiative was officially inaugurated by Hon'ble MP Kamakhya Prasad Tasa, marking a pioneering effort to integrate chamomile cultivation with traditional tea estates.

This initiative aims to enhance the economic potential of tea plantations by introducing high-value medicinal and aromatic crops, aligning with the broader vision of sustainable agriculture and value-added farming in the region.

CSIR-NEIST DISTRIBUTES 7,500 MARIGOLD SEEDLINGS UNDER FLORICULTURE MISSION PHASE 2

On February 10, 2025**,** a team led by Dr Sumit Singh, Scientist, CSIR-NEIST**,** distributed approximately 7,500 marigold seedlings as part of the CSIR-Floriculture Mission Phase 2 at Kaaliapani, Teok, Jorhat(Assam).

This initiative aims to promote floriculture as a viable source of income for local farmers, encouraging sustainable agricultural practices and enhancing the floriculture sector in the region. The distribution of marigold seedlings is expected to contribute to rural livelihood development while supporting India's growing floriculture industry.

WOOLAH TEA TEAM VISITS CSIR-NEIST, EXPLORES COLLABORATIVE RESEARCH OPPORTUNITIES

On 14th February 2025, a team from "Woolah Tea", a renowned Assam-based tea brand recently featured on "Shark Tank India" on Sony TV, visited CSIR-NEIST, Jorhat, to explore collaborative opportunities in innovative product development. The visiting delegation was warmly welcomed by the institute's scientists and technical officers.

The session commenced with the Woolah Tea team sharing their inspirational journey, detailing how they established their factories and expanded operations across the country. They highlighted the wide range of tea-based products they have developed and proudly mentioned their recently secured patent.

The primary objective of their visit to CSIR-NEIST was to engage with the institute's talented and innovative scientists to develop a patentable product utilizing rare natural resources exclusive

to the North Eastern Region (NER) of India. The scientists assured them of potential research collaborations to achieve this goal.

Dr Kalyani Medhi presented an overview of the various technologies developed by CSIR-NEIST, the ongoing research initiatives, and the institute's social contributions benefiting the people of NER. The Woolah Tea team expressed deep appreciation for the dedication and hard work of the scientists.

During the visit, the team showed interest in a unique product called "Tea Waste," developed by CSIR-NEIST scientists. They were highly impressed by its potential applications. Additionally, the team inquired about technologies used to produce sustainable products from banana fiber, bamboo, patchouli, etc. The scientists provided detailed insights into these innovations and assured their sustainability and feasibility.

Discussions also extended to the benefits of spices in immunity-boosting products. The scientists elaborated on their continuous research efforts in enhancing the medicinal and health-boosting properties of spices, reaffirming their commitment to developing scientifically-backed wellness solutions.

The visit marked the beginning of a promising collaboration between Woolah Tea and CSIR-NEIST, aiming to harness the rich biodiversity of the North East for groundbreaking innovations in the tea and wellness industries.

CSIR-NEIST ORGANIZES PROGRAMME AS PART OF JANJATIYA GAURAV VARSH CELEBRATIONS

As part of its year-long celebration of Janjatiya Gaurav Varsh**,** CSIR-NEIST organized a special programme at Shrimanta Sankardev Academy, Jorhat**.** The event was led by Dr Ravindra K Rawal, Principal Scientist, CSIR-NEIST and Er Dipak Basumastary, Principal Scientist, CSIR-NEIST, highlighting the institute's commitment to honoring the rich heritage, contributions, and achievements of tribal communities. The programme aimed to promote awareness and engagement with tribal traditions, fostering a deeper understanding of their cultural and scientific significance in the region.

CSIR-NEIST AND PANDU COLLEGE SIGN MOU FOR RESEARCH AND ACADEMIC COLLABORATION

CSIR-NEIST, Jorhat, and Pandu College, Guwahati, have signed a Memorandum of Understanding (MoU) to strengthen research and academic collaboration. The agreement was formally signed and exchanged by Dr V M Tiwari, Director, CSIR-NEIST, and Dr Sanchay Jyoti Bora, Principal, Pandu College, representing their respective institutions. This partnership aims to foster joint research initiatives, knowledge exchange, and capacity-building programs, promoting scientific advancements and academic excellence in the region.

CSIR-NEIST DIRECTOR DR. V. M. TIWARI PARTICIPATES IN ADVANTAGE ASSAM 2.0 DISCUSSIONS

Dr V M Tiwari, Director, CSIR-NEIST, actively participated in Advantage Assam 2.0, contributing to key discussions on Assam's economic growth and technological advancements.

Dr V M Tiwari, Director, CSIR-NEIST, while delivering speech

As a panelist in the session "Agarwood Processing and Value Addition: The Next Big Opportunity" , Dr Tiwari engaged in insightful deliberations alongside Shri Bimal Borah, Hon'ble Minister for Sports & Youth Welfare, Cultural Affairs, Power, and Tourism, among other dignitaries. The discussion emphasized the immense potential of agarwood-based industries in Assam's economic landscape.

Dr Tiwari also attended the Space and Geospatial Session, which explored the role of space and geospatial technologies in achieving Assam's ambitious $143 billion GDP target by 2030. The session highlighted innovative strategies to leverage these technologies for sustainable development, marking an important step toward the state's economic transformation.

CSIR-NEIST CELEBRATES NATIONAL SCIENCE DAY 2025 WITH A FOCUS ON YOUTH EMPOWERMENT

On 28th February, 2025, CSIR-North East Institute of Science and Technology (CSIR-NEIST), in collaboration with the Assam Science Society, Jorhat Branch, and the Indian National Young Academy of Science, celebrated National Science Day 2025 with the theme 'Empowering Indian Youth for Global Leadership in Science & Innovation for Viksit Bharat.'

The event, held at the J N Baruah Auditorium, CSIR-NEIST, was graced by esteemed dignitaries, including Shri Atul Bora, Hon'ble Minister of Agriculture, Horticulture, Animal Husbandry & Veterinary, Govt of Assam, as the Chief Guest. Shri Kamakhya Prasad Tasa, Member of Parliament, Lok Sabha, Kaziranga, and Dr Sekhar C Mande, National President of Vijnana Bharati and former Director-General of CSIR, attended as Guests of Honour. Dr Virendra M Tiwari, Director of CSIR-NEIST, presided over the event.

The celebration commenced with the registration of participants, followed by the inaugural session featuring lamp lighting and welcome address by Dr V M Tiwari.

Dr Binoy Kumar Saikia while delivering presentation

Dr Binoy Kumar Saikia, Principal Scientist, CSIR-NEIST, delivered an insightful talk on the significance of National Science Day, covering topics ranging from fundamental to advanced scientific concepts. He also elaborated on various carbon types and sources while engaging in an interactive session with students, research scholars, and scientists.

Dr V M Tiwari, Director of CSIR-NEIST, delivering speech

Dr V M Tiwari, Director of CSIR-NEIST, felicitated the distinguished guests and addressed the gathering. He acknowledged the contributions of CSIR-NEIST towards scientific and technological advancements in the Northeast region and highlighted various innovative technologies developed by the institute. He highlighted the institute's Floriculture Mission as a significant success and advocated for increased collaborative efforts among researchers and institutions. He also emphasized the role of the Science and Technology Innovation Hubs for the North East Region (STINER) and IICON facilities in supporting farmers and entrepreneurs.

Dr Bimala Prasad Baruah while delivering speech

Dr Bimala Prasad Baruah expressed gratitude to CSIR-NEIST for the invitation and briefly spoke about the importance of Science Day. He underscored the role of awards in encouraging scientists and lauded the contributions of the Assam Science Society, Jorhat Branch, since its inception. He also stressed the significance of science in national development.

Hon'ble MP Shri Kamakhya Prasad Tasa while delivering speech

Hon'ble MP Kamakhya Prasad Tasa emphasized the need to promote scientific awareness among young minds, recognizing them as the pillars of the nation's future. He acknowledged the continuous efforts of Prime Minister Narendra Modi in transforming India into a developed nation. He praised CSIR-NEIST's scientists for their dedicated research efforts and encouraged educators to adopt a practical approach to teaching science.

Hon'ble Minister Shri Atul Bora while delivering speech

Hon'ble Minister Atul Bora, Govt of Assam, addressed the audience, expressing his gratitude for the invitation and apologizing for his late arrival due to prior commitments. He spoke about the necessity of National Science Day in inspiring young minds toward scientific pursuits. He also emphasized the government's initiatives in promoting scientific research and innovation. Additionally, he highlighted the importance of collaborative efforts among scientists to tackle pressing global challenges such as climate change.

Hon'ble Minister Dr Ranoj Pegu while delivering speech

Hon'ble Minister Dr Ranoj Pegu, Govt of Assam, spoke on the state government's developmental projects and financial allocations for Assam's growth. He mentioned the establishment of the country's first multi-modal logistics park in Jogighopa and the recent government efforts to strengthen human resource development. He emphasized the need for skilled manpower and urged faculty members and scientists to contribute to building a Viksit Bharat.

In the Special Lectures session, Prof Bidyut Kumar Sarma, Director, DBT-North East Centre for Agricultural Biotechnology, Assam Agricultural University, Jorhat, highlighted the vast bio-resource potential of the North East and the opportunities it presents. Dr Sanjeev Kumar Vashney, Advisor, DST, Govt of India (Retd.), discussed research fellowship opportunities in India and abroad. Dr Amrita Kashyap Chaliha, Managing Director, Chroma Biotech Pvt. Ltd., Dibrugarh, shared insights on the prospects of

biotech startups. Additionally, a special talk was delivered by Ms Ananyaa Narain, Vice President, Geospatial World.

Dr Shekhar C Mande while delivering presentation

In the Valedictory and Science Day Lecture session, Dr Shekhar C Mande, National President of Vijnana Bharati and Former Director General of CSIR & Secretary, DSIR, Government of India, delivered a speech highlighting the significance of National Science Day. He elaborated on the Raman Effect and Dr C V Raman's pioneering research papers.

Additionally, Dr Mande discussed the advanced medical treatment and surgical practices of ancient India, which were later adopted by Western countries. He also addressed the challenges posed by infectious diseases and the strategies to combat them effectively.

In conclusion, Dr Mande emphasized the importance of maintaining good health through a balanced diet and regular exercise. The session concluded with a Vote of Thanks, followed by the inauguration of the Pro-DR AMR Surveillance Web Tool for Hospitals.

The session concluded with an interactive discussion, where faculty members and students engaged in a Q&A session, followed by a Vote of Thanks and National Anthem.

ACHIEVEMENTS:

The CSIR-NEIST Floriculture Team showcased its excellence at the 35th Annual Horticultural Show & Competition, organized by Assam Agricultural University, Jorhat, on 4th February 2025. Demonstrating their expertise in floriculture, the team secured multiple accolades, winning 1st prize in the Cut Flower category, 2nd prize in the Orchid category, and 3rd prize in the Pot Flower category. These achievements highlight CSIR-NEIST's commitment to advancing horticultural practices and promoting floriculture in the region.

(From left)Dr A Ibeyaima, Postdoctoral Researcher, CSIR-NEIST, receiving the award

Dr A Ibeyaima, Postdoctoral Researcher, CSIR-NEIST, Jorhat, has achieved a remarkable feat by securing 2nd place at the prestigious International Conference on Advances in Agricultural Biotechnology (ICAAB) 2025. Her research, focused on identifying natural anti-diabetic candidates from fermented soybean (Hawaijar) associated bacterial cultures, received well-deserved recognition at the event. This accomplishment highlights the potential of traditional fermented foods in therapeutic applications and underscores the significance of indigenous knowledge in modern scientific advancements.

PAPER PUBLISHED:

In International Peer Reviewed Journals

1. **Title**: **Computational approach to investigate the role of Myristica fragrans Houtt. compounds for human acetylcholinesterase**
   Authors: Prasanna Sarmah, Sourav Goswami, Jitendra Singh Verma, Dipanwita Banik
   Journal: *Journal of Molecular Structure 2025*
   https://www.sciencedirect.com/science/article/pii/S0022286025003436?via%3Dihub
   IF: **4.0**
2. **Title**: **Ru(ii)-catalyzed carbonylation reaction using ketosulfoxonium ylide as the carbonyl source: synthesis of indazolo-phthalazinetriones and indazolo-indazolediones**
   Authors: Priya Sonowal, Pratiksha Bhorali, Deep J. Kalita, Supriya Khundrakpam, Bidisha R. Boraab ,Sanjib Gogoi
   Journal: *NEW JOURNAL OF CHEMISTRY 2025*
   https://pubs.rsc.org/en/content/articlelanding/2025/nj/d4nj04706k
   IF: **2.7**
3. **Title**: **Transforming lignin into polymer film with improved physiochemical properties by modification with itaconic acid and grafting with polycaprolactone International**
   Authors: Koushik Dutta , Ankumoni Saikia, Ajit Singh
   Journal: *Journal of Biological Macromolecules 2025*
   https://www.sciencedirect.com/science/article/pii/S0141813025017751?via%3Dihub
   IF: **7.7**
4. **Title**: **NiCo2S4 Nanotube Decorated on Tea-Waste Derived Porous Carbon: A Dual-Purpose Nanocomposite for High-Performance Flexible Asymmetric Supercapacitor and Oxygen Evolution Reaction**
   Authors: Rajeshvari Samatbhai Karmur, Debika Gogoi, Manash R. Das, Narendra Nath Ghosh
   Journal: *CHEMISTRY-AN ASIAN JOURNAL 2025*
   https://aces.onlinelibrary.wiley.com/doi/10.1002/asia.202401711
   IF: **3.5**
5. **Title**: **Carbon nanotube/Fe2O3 nanocomposites for optimizing membrane-based separation of antibiotics: Experimental and computational approach**
   Authors: Parashmoni Rajguru, Kripa Dristi Dihingia, Achyut Konwar, Prarthana Bora,Chinmoy Bhuyan,Supriya Saha, G Narahari Sastry, Swapnali Hazarika
   Journal: *MATERIALS TODAY COMMUNICATIONS 2025*
   https://www.sciencedirect.com/science/article/pii/S2352492825004635?via%3Dihub
   IF: **3.7**
6. **Title**: **Impact of Tray and Freeze Drying on Physico-Chemical and Functional Properties of Underutilized Garcinia lanceifolia (Rupohi thekera)**
   Authors: Aradhana Boruah, Pinku Chandra Nath, Prakash Kumar Nayak, Maharshi Bhaswant, Sangeeta Saikia, Jatin Kalita , Sarvesh Rustagi, Ajita Tiwari, Kandi Sridhar
   Journal: *FOODS 2025*
   https://www.mdpi.com/2304-8158/14/4/705
   IF: **4.7**
7. **Title**: **Tracing Deep-Seated Saturated Fractures in Depleted Shallow Aquifer Systems in a Granitic Terrain: An Integrated Hydro-geophysical Approach**
   Authors: Sahebrao Sonkamble, Erugu Nagaiah, Enatula Appalanaidu, Joy Choudhury, Virendra M. Tiwari
   Journal: *Natural Resources Research 2025*
   https://link.springer.com/article/10.1007/s11053-025-10456-3
   IF: **4.8**