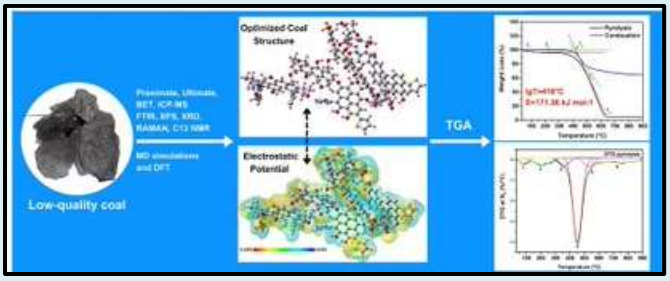
सीएसआईआर-उत्तर पूर्व विज्ञान तथा प्रौद्योगिकी संस्थान, जोरहाट
CSIR-North East Institute of Science and Technology

INFOWATCH

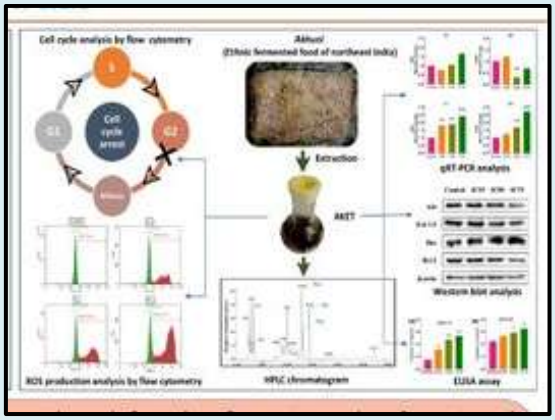
An In-house Monthly Communication (January, 2024)

DISCOVERS THE MACROMOLECULAR STRUCTURE OF HIGH-SULFUR INDIAN COAL FOR HYDROGEN



Dr Tonkeswar Das and his team from CSIR-North East Institute of Science and Technology (CSIR-NEIST), Jorhat, have achieved a groundbreaking milestone for the first time by establishing the molecular model structure of high-sulfur coal from India's northeastern region targeted for hydrogen production via plasma gasification. This coal, dating back to the Cenozoic era, holds approximately 1655.54 million tons in reserves but has long been underutilized dure to its high sulfur content and other unfavourable characteristics. The research team's addresses critical gaps in existing knowledge and opens up avenues for their use in hydrogen-rich syngas production via plasma gasification. With this breathrough, India's low-quality coal reserves could play a pivotal role in achieving the nation's clean energy goals.

TRADITIONAL WISDOM MEETS SCIENCE: AKHUNI'S ANTICANCER POTENTIAL DISCOVERED BY CSIR-NEIST



Dr Rinku Baishya and his team at CSIR-NEIST, Jorhat, have made a groundbreaking discovery by scientifically exploring the functional potential of Akhuni, a traditional fermented soybean delicacy from Nagaland, in the fight against cancer. Previously, the team demonstrated Akhuni extracts' antibacterial properties against *Staphylococcus aureus* and *Escherichia coli*. Their latest research has revealed its promising anticancer effects on B16-F10 (mouse melanoma) and MDA-MB-231 (human breast cancer) cell lines. This significant finding places Akhuni among globally recognized functional fermented foods like natto, kimchi, and tempeh, showcasing its potential for therapeutic applications and elevating the scientific value of traditional food practices in the region.

EVENTS:

(From left) Mr Madhujya Saikia, Sr Tech Officer, introducing the products developed by CSIR NEIST to the Honorable Minister Mr Atul Bora, Govt of Assam

The Regional Agriculture Fair 2025 was held at Assam Agricultural University (AAU), Jorhat, from January 4 to 6, 2025. CSIR-NEIST actively participated in the event, showcasing a range of innovative products & technologies developed by its scientists. The event was graced by the Hon'ble Minister Mr Atul Bora, Govt of Assam, who visited the CSIR-NEIST stall. During his visit, he commended the institute's contributions to agricultural innovation and expressed his appreciation for the impactful work being carried out by its researchers.

CSIR-NEIST INSPIRES STUDENTS THROUGH JANHATIYA GAURAV DIVAS CELEBRATION

On 7th of January 2025, CSIR-North East Institute of Science and Technology Jorhat organised its third school visit program under the Janjatiya Gaurav Divas and Vasha initiatives. The event, held at Sankardev Vidya Niketan Nausholia Jorhat, brought together scientists from CSIR-NEIST to inspire and educate students while celebrating the contributions of tribal leaders. Dr Prachurjya Dutta, Scientist, CSIR-NEIST, Covener of JGDV, started the event by welcoming the scientists and introducing the life legacy of Birsa Munda, a tribal independence activist and folk hero. Dr Dutta emphasized the pivotal role of science and encouraged students to explore career opportunities in science to drive innovation and progress.

Dr Dipak Basumatari, Principal Scientist, CSIR-NEIST, further enriched the discussion by elaborating the importance of civil engineering in development. He showcased CSIR-NEIST's innovative technology in creating modular bricks from sand extracted from the Brahmaputra River. This sustainable alternative not only aids in brick manufacturing but also contributes to flood controlling efforts.

Adding the education discourse, Mr Anshuman Goswami delivered a comprehensive talk on entrepreneurship carrier. He shared his personal entrepreneurship journey, mentioning the challenges he faced and the lessons learned. Mr Goswami underscored the importance of innovation, adaptability and strategic planning in building successful progress which inspired the students as well as the attendees offering practical insights into the dynamics of entrepreneurship.

Dr Ravindra K Rawal, Principal Scientist, CSIR-NEIST, Nodal Officer, JGDV, delivered an inspiring and educational speech on the significance of Janjatiya Gaurav Divas. Dr Rawal also discussed the vital role of natural product chemistry outlining how natural products, derived from plants and other organisms, have been central to the development of many pharmaceuticals.

The event concluded with the closing remarks by Dr Dutta and distribution of laboratory glassware to the school, marking another successful initiative by CSIR-NEIST to inspire young minds.

CSIR-NEIST TRANSFERS ADVANCED TECHNOLOGIES DURING MUMBAI'S CSIR-INNOVATION COMPLEX INAUGURATION CEREMONY

The CSIR-Innovation Complex (CSIR-IC), Mumbai, first-of-its-kindhas been established as a pivotal platform to promote scientific research, innovation, and industry-academia collaboration for the nation's development. This innovation hub was inaugurated and dedicated to the nation on 17 January 2025 by Dr Jitendra Singh, Hon'ble Minister of Science and Technology, GoI, in a virtual mode. The inaugural ceremony was organized at the CSIR-IC and was graced by Dr V K Saraswat and Dr VK Paul Members of NITI Aayog, and Dr. N Kalaiselvi, Secretary, of DSIR and the Director General of CSIR. Dr. V M Tiwari, Director of CSIR-NEIST, along with a group of scientists from the institute attended the programme.

On this significant occasion, CSIR-North East Institute of Science and Technology (CSIR-NEIST) transferred its following three technologies to three industry partners at the inauguration venue of the Complex in Mumbai.

The Process for the 'Synthesis of Graphene from Sub-bituminous Northeast Indian Coal' to M/S India Graphene Engineering and Innovation Centre (IGEIC), Trivandrum, Kerala, this breakthrough process leverages indigenous raw materials to produce high-quality graphene, catering to applications in advanced materials, electronics, and energy storage.

Another technology namely, 'Agrotechnology for LB L14' transferred to Oirabot Greens, Guwahati, Assam. This technology offers sustainable solutions for improving crop yields and supporting eco-friendly farming practices, particularly suited to the region's agro-climatic conditions.

The institute shared its otheragrotechnology for 'Jor Lab P1 Patchouli', a high-yielding and aromatic variety of patchouli, with Modinagar Tea Estate, Sivsagar, Assam. This technology is expected to contribute to the production of high-quality essential oils, boosting the region's aromatic crop sector and enhancing economic opportunities for local industries.

Representatives from the technology recipient organizations Dr.Kamesh Gupta (IGEIC), Mr Siddharth S Chaliha (Oirabot Greens), and Ms Stuti Modi (Modinagar Tea Estate) attended the event.

These technology transfers showcase the CSIR-NEIST's commitment to translating research into impactful applications, fostering industry partnerships, and promoting sustainable development.

REPUBLIC DAY CELEBRATION

CSIR-NEIST proudly celebrated the 76th Republic Day with patriotic fervor. On this

auspicious occasion, Dr Virendra M Tiwari, Director, CSIR-NEIST, hoisted the national flag and addressed the CSIR-NEIST family, highlighting the significance of the day and reaffirming the institute's commitment to scientific excellence and development.

NORTH EAST AROMA CONCLAVE 2025 INAUGURATED AT CSIR-NEIST JORHAT

Dr V M Tiwari, Director, CSIR-NEIST, delivering welcome address

CSIR-NEIST successfully organized the North East Aroma Conclave 2025, which was inaugurated by Dr Jitendra Singh, Hon'ble Union Minister of Science & Technology. During the event, Dr Singh also inaugurated & dedicated the Incubation and Innovation Complex (IICON) at CSIR NEIST, marking a significant milestone in fostering innovation and entrepreneurship in the region.

The conclave was graced by esteemed dignitaries, including Dr (Mrs) N Kalaiselvi, Director General of CSIR & Secretary, DSIR, GOI, Dr Ravi Kota, Chief Secretary of the Government of Assam, Hon'ble Member of Parliament Shri Kamakhya Prasad Tasa, Govt of Assam and Dr Prabodh Kumar Trivedi, Director, CSIR-CIMAP, Smt Sonali Ghosh, IFS, CEO, Assam Agroforestry Development Board and Director KNP, Dr Sinam Yoirentomba Meetei, Dy Director, MSME-Technology Centre, Imphal, Manipur, Dr Zahirul, Dr Rohit Seth, President, Sugandh Vyapar Sangh and many more guests.

With the participation of over 200 attendees, including 20 industrialists, the event served as a platform to strengthen collaborations between scientific research and business enterprises. A key highlight was the distribution of certificates to 23 entrepreneurs and startups, recognizing their contributions to the aroma industry.

Dr Jitendra Singh, Hon'ble Union Minister of Science & Technology, Govt of India, inaugurating IICON virtually

Additionally, the IICON initiative, which brings together 25 cutting-edge technologies under one roof, was showcased, reinforcing CSIR-NEIST's commitment to driving innovation, entrepreneurship, and economic growth in the region.

CSIR-NEIST Conducts Training and QPM Distribution Programs on Floricultural Crops in Sivasagar District

On 29th January 2025, CSIR-North East Institute of Science and Technology organized three training cum Quality Planting Materials (QPMs) distribution programs in Jhanji, Namti, and Kohargaon of Sivasagar District under the CSIR Floriculture Mission.

The programs aimed to enhance floriculture cultivation and commercialization by providing hands-on training to farmers and stakeholders. Experts from CSIR-NEIST shared insights on propagation techniques, soil management, pest control, and post-harvest handling to improve yield and quality.

High-quality planting materials were distributed to beneficiaries to ensure better productivity. Representatives from CSIR-NEIST emphasized that the initiative aligns with the broader vision of boosting the floriculture sector and creating market opportunities.

Farmers and local stakeholders appreciated the initiative for equipping them with valuable knowledge and resources. The program also facilitated discussions on market linkages and potential collaborations with industry stakeholders.

The training programs mark another milestone in CSIR-NEIST's efforts to strengthen floriculture in Assam, empowering farmers and entrepreneurs for economic growth.

ACHIEVEMENTS:

Dr Pankaj Bharali, Scientist in the CID division of CSIR-NEIST, has been honored with selection as a member of the prestigious Indian National Young Academy of Science (INYAS). Established by the Indian National Science Academy (INSA), INYAS serves as a platform to recognize and nurture young scientists, fostering excellence in research and innovation across the country. Dr Bharali's achievement reflects his outstanding contributions to the scientific community and underscores the high caliber research being conducted at CSIR-NEIST.

FAREWELL:

Dr Saurabh Baruah, Chief Scientist, CSIR-NEIST

Dr Saurabh Baruah, Chief Scientist at CSIR-NEIST Jorhat, retired in January after a distinguished career dedicated to scientific research and innovation. His contributions have significantly advanced the institute's research endeavors, leaving a lasting impact. CSIR-NEIST extends its gratitude and best wishes for his future endeavors.

PAPER PUBLISHED:

In International Peer Reviewed Journals

1. **Title**: **Bioremediation strategies for xenobiotic degradation in petroleum-impacted industrial ecosystems: Practical challenges and future directions**
   Authors: Bornali Bora, Heena Kauser, Sachin Rameshrao
   Journal: *Journal of Water Process Engineering 2025*
   IF: **7**
2. **Title**: **Physico-chemical, nutritional, and anti-inflammatory properties of processed Garcinia pedunculata fruit: A combined in vitro and in silico approach**
   Authors: Twinkle Borah, Prasanna Sarmah, Parthapratim Konwar, Jadumoni Saikia,Nooreen Washmin, Siddhartha Proteem Saikia, Dipanwita Banik
   Journal: *Food Research International 2025*
   IF: **8.1**
3. **Title**: **Synthesis of 6H-Benzo[c]chromene Scaffolds: A Synthetic Strategy of Pd-Catalyzed Annulation Followed by Aerial Oxidation**
   Authors: Kangkana Chutia, Priyanka Saikia. Dhiraj Dutta, Babulal Das, Pranjal Gogoi
   Journal: *JOURNAL OF ORGANIC CHEMISTRY 2025*
   IF: **3.6**
4. **Title**: **Electroconductive membrane for water treatment: A new paradigm for accessing clean water**
   Authors:
   Priyadarshini Gogoi, Prarthana Bora, S wapnali Hazarika
   Journal: *Desalination 2025*
   IF: **8.3**
5. **Title**: **Development of Biodegradable High-Alumina Clay-Modified Poly (Butylene Adipate-Co-Terephthalate) Composites for Sustainable Packaging Applications**
   Authors: Koushik Dutta, Rituparna Duarah, Ravi Purbey, Jayaramudu, Manash R Das
   Journal: *Journal of Applied Polymer Science 2025*
   IF: 2.7
6. **Title**: **Unveils the macromolecular structure of high-sulfur Indian coal for hydrogen production**
   Authors:
   Tonkeswar Das, Debashis Sarmah, Gau rav Jhaa, Bhargab Das, Preetom Kishore Nath, Abhishek Borborah, Mo usumi Bora
   Journal: *Journal of the Indian Chemical Society 2025*
   IF: 3.2
7. **Title**: Chiral Ni-Al LDH nanoparticle embedded electrospun nanofibrous membrane with high and stable permeance for enantioseparation of ketoprofen
   Authors: Akhil Ranjan Borah, Monti Gogoi, Rajiv Goswam, Preetom Kishore Nath, Swapnali Hazarika

Journal: *Separation and Purification Technology 2025*
IF: **8.1**

8. **Title**: **Development of poly(lactic acid) nanocomposite films with kaolin/bentonite blended clay for packaging applications**
   Authors: Ravi Purbey, Dipjyoti Bora, Chayanika Bharadwaj, Pubali Chetia, KoushikDutta, Uma Maheswari R, Jayaramudu Jarugala, Emmanuel Rotimi Sadiku,Sellamuthu Periyar Selvam
   Journal: *International Journal of Polymer Analysis andCharacterization*
   IF: 1.7
9. **Title**: **Green synthesis of peroxidase mimetic Cobalt ferrite nanoparticles for antioxidant, anti-bacterial and drug delivery studies**
   Authors: Satish Kumar Pandey, Zonunmawia Chawngthu , Gemin Modi, Sweety Basumatary, Lal Chuangsangi, Prasenjit Manna, Soumabha Bag, Bhaben Sharmah, Hiranmoy Barman, Amit Kumar Trivedi, Joydeep Das
   Journal: *Materials Today Chemistry 2025*
   IF: **6.7**
10. **Title**: **Deciphering the Effect of Fe and Cu in Pd Lattice for the Oxygen Reduction Reaction**
    Authors: Rashmi Chetry, Rypjyoti Dutta, Manash R Das and Pankaj Bharali
    Journal: *ENERGY & FUELS 2025*
    IF: **5.2**
11. **Title**: **A NiO/MnO_2 nanostructure for efficient reduction of 4-nitrophenol and chromium(vi)**
    Authors: Nand Kishor Gour, Manash J Baruah, Shivanee Borpatra Gohain, Eramoni Saikia, Amir Sohail, Mamon Dey, Abjana Parbin, Gitashree Darabdhara, Arup Jyoti Das, Rupjyoti Dutta, Young-Bin Park, Biraj Das and Mukesh Sharma
    Journal: *NEW JOURNAL OF CHEMISTRY 2025*
    IF: **2.7**
12. **Title**: **Rheological and morphological behavior of waxy crude with poly(octadecyl methacrylate) as flow modifier**
    Authors Pranjal P Dutta, Bitupan Mohan, Subasita Phukan, Subrat Saikia, Prakash J Saikia
    Journal: *JOURNAL OF VINYL & ADDITIVE TECHNOLOGY 2025*
    IF: **3.8**
13. **Title**: **Tuning the properties of soy protein isolate-based adhesive using various sustainable additives**
    Authors: Pubali Chetia, Ramesh Chand Bohra,Ravi Purbey , Chayanika Bharadwaj ,Dipjyoti Bora, Rituparna Duarah, Jayaramudu Jarugala, Emmanuel Rotimi Sadiku
    Journal: *International Journal of Biological Macromolecules 2025*
    IF: 7.7
14. **Title**: **Sustainable refinery waste management through biotechnological interventions: Health impacts, historical successes, and emerging solutions**
    Authors: Ashique Ahmed, Sachin Rameshrao Geed
    Journal: *Environmental Research 2025*
    IF: 7.7

RETIREMENT:

1. **Dr Saurabh Baruah, Chief Scientist, CSIR-NEIST**
2. **Mr Prasanta Nath, Lab Assistant, CSIR-NEIST**