



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



INFOWATCH

An In-house Monthly Communication (May, 2024)

CSIR-NEIST celebrated National Technology Day 2024



Padma Shri Dr P S Goel, FNA, FNAE, Former Secretary, Min. of Earth Sciences, Govt. of India delivering the Technology Day Lecture at CSIR-NEIST.

Along with the rest of the country, CSIR-North East Institute of Science & Technology, Jorhat celebrated the National Technology Day 2024 on 13 May at its premise. To mark the occasion, a special function was held at Dr J N Baruah Auditorium wherein Padma Shri Dr P S Goel, FNA, FNAE, Former Secretary, Min. of Earth Sciences, Govt. of India graced the occasion as Chief Guest and delivered the Technology Day Lecture while Shri Bhaskar Jyoti Phukan, Managing Director, Numaligarh Refinery Ltd., Assam was present as Guest of Honour

Dr Virendra M Tiwari, Director, CSIR-NEIST welcomed the gathering and mentioned that the day symbolizes the immense contribution of indigenous science & technology in the country's progress. He appealed to all to take this day as an inspiration to contribute to the country's development by inculcating the spirit of innovation and developing need based technologies.

In his Foundation Day Lecture on the topic "Future of Engineering Sciences" Dr Goel presented a whole gamut of opportunities for future engineers, scientists and innovators in various disciplines of science & technology. He explained that while science is understanding the nature of a concept, engineering is applying scientific knowledge for the benefit of the society. He delved deeper on discussing the evolution of modern science way back from the discovery of decimal system, zero and trigonometry by mathematicians & astronomers such as Aryabhatta, Bhaskara-I and Bhaskara-II to



From top photo: Shri Bhaskar Jyoti Phukan, Managing Director, Numaligarh Refinery Ltd., Assam delivering his speech on the occasion.
Dr Virendra M Tiwari, Director, CSIR-NEIST delivering welcome address.

the discovery of gravity, laws of motion, molecular structure and quantum mechanics by scientists like Isaac Newton, Bohr and Richard Feynman. Talking about the future of Engineering Sciences he encouraged the scientists, engineers & innovators to adopt the power of visualization and said that most scientific & technological evolutions are based on visualization and having the audacity to dream big. He spoke in detail about futuristic technologies for human habitat on Mars, Air taxis based on battery/fuel cell, Green Hydrogen, Quantum Computers & Quantum Communication, Gene Therapy, Large adaptation of Artificial Intelligence & Machine Learning, etc. Concluding his Lecture he said that everybody cannot be a scientist or an engineer but everybody can be an innovator. Addressing the audience, Shri Phukan discussed the various challenges of oil and gas sector with the intention to ignite young minds to come up with solutions. Sustainable Aviation Fuel is one global challenge where many countries are currently working on, he informed. He also informed that oil demand in the country will continue to grow till 2040 and further highlighted that some of the major

challenges faced by NRL are sustainability and achieving Net Zero emission by 2038. The other key challenges he highlighted were Green Hydrogen production & its logistics, Biofuel production and Compressed Bio Gas production.

To encourage young entrepreneurs and start-ups, the institute also invited some of its successful entrepreneurs cum technology licensees to participate in the event and share their experience with CSIR-NEIST technologies. Four entrepreneurs namely Mrs Alokanda Sengupta, Proprietor, Sewali Home Enterprise, Jorhat; Mr Raghubir Singh Nagi from Nagi Trade & Industries, Tinsukia; Mr Pankaj Sharma from an NGO in Jorhat and Mr Sanjeev Baruah from a Self Help Group, Titabor, Assam participated in the event and shared their individual experiences in terms of the challenges in setting up of their enterprise, association with CSIR-NEIST and acquiring the technology license to its product marketing. It may be mentioned that Mrs Sengupta is a technology licensee of Mosquito repellent candle, Mr Nagi is the licensee of the technology on Essential Oil Distillation Unit, Mr Sharma is a licensee of Liquid Deodorant Cleaner and Mr Baruah is a beneficiary engaged in Chamomile cultivation.

The programme was largely attended by invited guests, entrepreneurs, school students & teachers, besides CSIR-NEIST fraternity.

CSIR-NEIST celebrated National Intellectual Property (IP) Festival



Dr Nishad A Deshpande, Principal Scientist, CSIR-URDIP & Resource Person of the programme delivering his lecture.

CSIR-North East Institute of Science & Technology, Jorhat celebrated Rashtriya Boudhik Sampada Mahotsav/National Intellectual Property Festival on 06 May, 2024 with a day-long programme at its premise. The day kicked off from 1000 hrs with a special function at Dr J N Baruah Auditorium wherein Dr Nishad A Deshpande, Principal Scientist, CSIR-URDIP, Pune delivered a lecture on "Patentability Criteria- Basic Requirements". Dr Nishad presented a comprehensive overview of Intellectual Property and its different types such as Copyright, Trademarks, Tradesecrets, Geographical Indications, Integrated Circuits, Industrial Designs,



A view of the hands-on training in progress.

etc. with special reference to Patents and patentability aspects of an invention. Dr Nishad discussed in detail the patentable and non-patentable inventions laid down under sections 2, 3 & 4 of the Indian Patents Act 1970 and said that every invention must meet the requirement of novelty, non-obviousness and usefulness besides ensuring complete disclosure of the invention for it to be considered patentable. Later, he explained the procedure followed at CSIR-URDIP for assessing patentability of an invention. It may be mentioned that CSIR-URDIP is a specialized unit under CSIR which is involved in the pre-research and pre-development phase of the research projects, by providing intellectual property and techno-commercial information services to CSIR institutes besides conducting patentability analysis of various inventions generated from CSIR institutes.

Earlier, Dr Virendra M Tiwari, Director, CSIR-NEIST in his address spoke about the importance of Intellectual Property and emphasized on understanding how these legal frameworks are governed and enforced. He mentioned that IP is an asset for any organization as the world is shifting towards Industry 4.0 with various technological advancements and further emphasized the impact of Artificial Intelligence in various technological fields.

Mr Madhujya Saikia, IP Coordinator, CSIR-NEIST briefly shared about the National IP Festival wherein he mentioned that the event was launched by DSIR along with Department for Promotion of Industry and Internal Trade (DPIIT) in July, 2023, with the objective to spread awareness about generation & protection of Intellectual Property Rights (IPR). He informed that CSIR being a partner of the National Intellectual Property Festival decided to celebrate the occasion every year across all CSIR institutes and this year the festival is being celebrated between 23 April to 11 May together with the World Intellectual Property Day. He also highlighted the activities charted out for the day-long programme at CSIR-NEIST.

In the second half of the day, a hands-on training on Patent Search and Patentability analysis was conducted by Dr Nishad. Under this practical session, the participants were provided with

practical knowledge on how to conduct patent search on various free online patent databases such as USPTO database (United States Patent and Trademark Office Database), Espacenet, Patentscope, Indian Patent Office database and Lens.org database. CSIR-NEIST staff including research scholars and project fellows showed enthusiastic participation in the hands-on training session.

CSIR-NEIST research group develops a low cost, sensitive agarose/hBN QDs polymer film for detection of pathogenic bacteria

Considering the importance of pathogen detection for water quality surveillance and microbial risk assessment, a team of researchers have designed a facile and low-cost colorimetric sensing strategy for the selective and sensitive determination of β -galactosidase producing pathogens. This is a significant milestone in the utilization of hexagonal boron nitride quantum dots (h-BN QDs) embedded in a layer-by-layer solid –based polymer film. The flexible, portable nanosensor-based device (agarose/hBN QDs polymer) exhibits high sensitivity and specificity in detecting pathogens, thus aiding in the prevention of infectious disease outbreaks and the control of food and water contamination. This innovative sensing approach demonstrates promise in detecting pathogens such as E.coli in spiked water samples and other food products with high accuracy, showcasing its practical applicability in real sample analysis. In summary, this work underscores the visual detection of analytes using a flexible biopolymer film and its potential for further development in diagnostic assays and detection of environmental toxicants. This work has been published recently in ACS Applied Materials & Interfaces 2024.



CSIR-NEIST's contribution to Biodiversity preservation and restoration in NE region- A recount on the occasion of International Biodiversity Day

CSIR NEIST has been actively engaged in driving biodiversity conservation in the Northeast with various initiatives ranging from exploring local ecology and identifying floral resources to promoting pollinators for biodiversity restoration. The

programmes mainly advocated development of alternate sustainable material other than trees for bee hive, restoring pollutant degraded land and raising awareness among students and general public. CSIR NEIST's holistic approach sets a new standard for preserving the region's natural heritage.



CSIR-NEIST bags major project under State Disaster Mitigation Fund (SDMF), Govt. of Assam

Under the State Disaster Mitigation Fund (SDMF), a major project has been approved for CSIR-NEIST. The project worth at Rs.40.00 crore is one of the largest funded geoscience projects and part of the Rs 61.82 crore project approved for geoscience projects in the state. This allocation is distributed across 32 projects within the Public Works Department (Road), Irrigation and Soil Conservation departments in the state, besides CSIR-NEIST.

Swachhata Pakhwada observed at CSIR-NEIST

As a part of the Swachh Bharat Mission of the Government of India launched in the year 2016, CSIR-NEIST observed Swachhata Pakhwada at its premise during 1-15 May 2024 with an aim to bring collective focus and participation of the staff and students in raising awareness on the importance of Swachhata. The cleanliness drive started with a

pledge taking ceremony on 1 May, 2024 by the staff and students which was administered by Dr V M Tiwari, Director, CSIR-NEIST at Dr J N Baruah auditorium. The two-week long programme included various activities aimed at creating swachhta awareness, swachh parisar, swachh paryavaran, swachh anubhag, swachh karyalay, swachh jal-swachh naam, swachh samwad and swachh ghar parivaar. Various divisions/sections of the Institute actively participated in cleaning up the office and colony premises. Besides cleaning CSIR-NEIST premises, a drawing competition on swachhta was organized among the children of CSIR-NEIST staff members and essay & slogan competition on swachhta theme, "Garbage free India" was organized among staff members, research fellows, contractual staff, etc.



Glimpses of the Swachhta Pakhwada programme held at CSIR-NEIST.

AcSIR Lecture Series

Speaker: Prof. Sampat Kumar Tandon, former Pro-Vice Chancellor, Delhi University and Adjunct Professor, IISER Bhopal.

Title of the lecture: Anthropocene: A Paradigm for Sustainable Earth.

Date: 17 May, 2024.

Papers published

In International Peer Reviewed Journals

1. **Title:** Glycyrrhizin functionalized cus Nanoprobes for NIR Light-based therapeutic mitigation of acne vulgaris.

Authors: Srivathsan Ganeshan, Nidhi Parihar, Donker Chonzom, Dinesh Mohanakrishnan, Rajdeep Das, Dandadhar Sarma, Devipriya Gogoi, Manash Ranjan Das, Suryanarayana Murty Upadhyaya and Deepak Bharadwaj Pemmaraju.

Journal: *Drug Delivery and Translational Research* 2024

<https://link.springer.com/article/10.1007/s13346-024-01594-x>

IF: 5.4

2. **Title:** RAFT mediated dispersion copolymerization of glycidyl methacrylate and octadecyl methacrylate.

Authors: Prodip K Goswami, Prakash J Saikia and Jyotirekha G Handique.

Journal: *Journal of Macromolecular Science Part A-Pure and Applied Chemistry* 2024

<https://www.tandfonline.com/doi/full/10.1080/10601325.2024.2345918>

IF: 2.4

3. **Title:** Metal-organic framework/Nb₄C₃T_x MXene composites for ultrasensitive detection of dopamine.

Authors: Boruah, PK (Boruah, Purna K ; Sharma, N (Sharma, Nidhi) ; Das, MR (Das, Manash R.); Ohtani, R (Ohtani, Ryo) ; Le Ouay, B (Le Ouay, Benjamin); Ohba, M (Ohba, Masaaki).

Journal: *Chemical Communications* 2024

<https://pubs.rsc.org/en/content/articlelanding/2024/cc/d4cc00694a>

IF: 4.0

4. **Title:** Hexagonal Boron Nitride Quantum Dots Embedded on Layer-by-Layer Films for Peroxidase-Assisted Colorimetric Detection of β -Galactosidase Producing Pathogens.

Authors: Sristi Majumdar, Devipriya Gogoi, Purna K. Boruah, Ashutosh Thakur, Priyakhee Sarmah, Parishmita Gogoi, Sanjib Sarkar,

Priyakshi Pachani, Prasenjit Manna, Ratul Saikia, Vikash Chaturvedi, Manjusha V Shelke, and Manash R Das.

Journal: *ACS Applied Materials & Interfaces* 2024, 16, 20, pp: 26870–26885 <https://pubs.acs.org/doi/10.1021/acsami.4c01565>

IF: 9.5

5. **Title:** Lithium acetate mediated paper-based assay for absorbance analysis of E. coli concentrations.

Authors: Madhurima Borah, Jyoti Lakshmi Hati Boruah and Hemant Sankar Dutta.

Journal: *Sensors and Actuators B: Chemical* 2024, Vol. 414, 13592 <https://www.sciencedirect.com/science/article/abs/pii/S0925400524006567?via%3Dihub>

IF: 8.4

6. **Title:** Nano-enabled gas separation membranes: Advancing sustainability in the energy-environment Nexus.

Authors: Gauri Hazarika and Pravin G Ingole.

Journal: *Science of The Total Environment* 2024, 173264, <https://www.sciencedirect.com/science/article/abs/pii/S0048969724034119?via%3Dihub>

IF: 9.8 (Highest Impact Factor Paper)

7. **Title:** Synergistic CdS@CeO₂ nanocomposites: Harnessing Z-scheme electron transfer for enhanced photocatalytic CO₂ conversion and aqueous Cr(VI) reduction.

Authors: Lisamoni Kalita, Aishwarya Soni, Kalita, Jyoti Sanmilan, Purashri Basyach, Ankur Kanti Guha, Suman L Jain and Lakshi Saikia.

Journal: *Journal of Environmental Chemical Engineering Journal* 2024, Vol. 12, Issue 3, 112930

<https://www.sciencedirect.com/science/article/abs/pii/S2213343724010601#:~:text=Highlights&text=CdS%2DD%2FCeO2%20nanocomposites,systems%20follow%20Z%2Dscheme%20pathways>

IF-

8. **Title:** Screening for brown-spot disease and drought stress response and identification of dual-stress responsive genes in rice cultivars of Northeast India.

Authors: Debajit Das, Naimisha Chowdhury, Monica Sharma, Remya Suma, Banashree Saikia, Natarajan Velmurugan and Channakeshavaiah Chikkaputtaiah.

Journal: *Physiology and Molecular Biology of Plants* 2024, Vol. 30 Issue: 4, pp: 647-663

<https://scifindern.cas.org/searchDetail/reference/6656bc6a1d7c7f544fa5959d/referenceDetails>.

IF: 3.5

9. **Title:** Polymer-based hollow fiber membranes: A modern trend in gas separation technologies.

Authors: Gauri Hazarika and Pravin G Ingole.

Journal: *Materials Today Chemistry* 2024, Vol. 38, June 2024, Article 102109, <https://www.sciencedirect.com/science/article/pii/S2468519424002155>.

IF: 7.3

10. **Title:** Effect of covalently functionalized Indian bentonite clay on thermal, mechanical strength and morphology structure of extrusion/injection-molded nylon 6 composites.

Authors: Kumaresan Shanmugam, Dhammaraj S Rokade, Pravin G Ingole, Harshawardhan V Pol, Saravanakumar Arunachalam and Hari C Bajaj.

Journal: *Polymers for Advanced Technologies* 2024;35:e6412 <https://onlinelibrary.wiley.com/doi/epdf/10.1002/pat.6412>.

IF: 3.4

11. **Title:** Recycling of protein rich silk industry waste for potential food and therapeutic application.

Authors: Richa Dhakal, Ravi Kumar Sahu, Dipanneeta Das Gupta, Masoom Saikia, Sukanya Borthakur, Munmi Majumder, Shyamalima Mech, Mamta Thapa, Prachurjya Dutta and Jatin Kalita.

Journal: *Food Bioscience* 2024, Vol.60, Article 104461,

<https://www.sciencedirect.com/science/article/abs/pii/S2212429224008915>.

IF: 5.2

Farewell

The following member(s) of the staff have retired from Council's service on superannuation from CSIR-NEIST w.e.f 31 May, 2024.

1. Mr Ananda Saikia, Lab Attendant