VISION

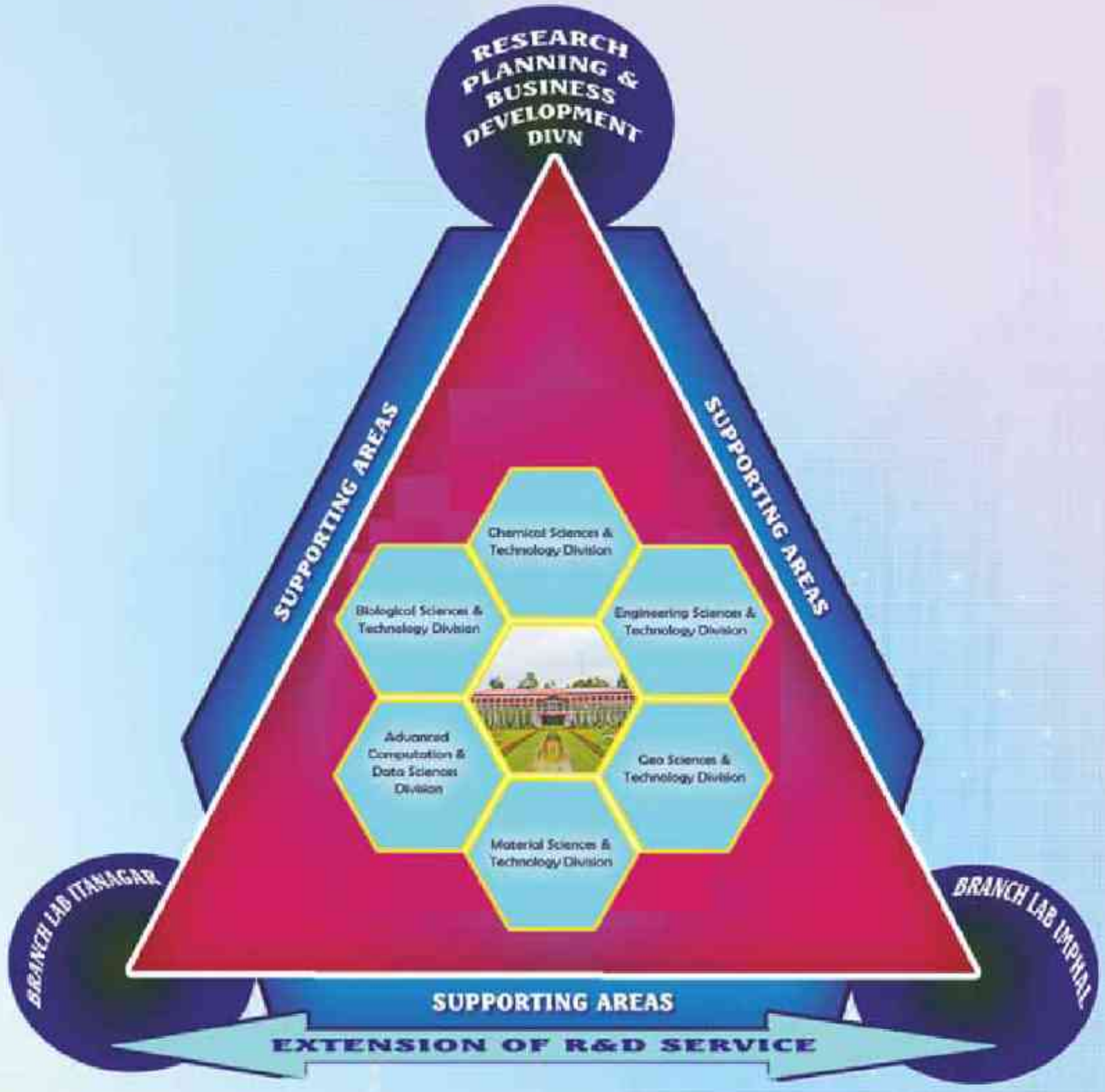
KNOWLEDGE FOR EMPOWERING, PARTICULARLY NORTH EAST REGION, THROUGH SCIENCE AND TECHNOLOGY INTERVENTIONS.

MISSION

TO NURTURE EXCELLENCE IN BASIC & APPLIED RESEARCH FOR DEVELOPING TECHNOLOGIES WITH SUSTAINABLE DEVELOPMENT GOALS TO IMPROVE THE QUALITY OF LIFE IN THE NORTH EAST INDIA.

THEME FOR 2020

REVITALIZING CSIR-NEIST FOR STRENGTHENING NORTH EAST



QUALITY POLICY OF CISR-NEIST

CSIR-North East Institute of Science & Technology is committed to achieve excellence with quality outputs in R&D in frontier areas, professional consultancy and contract services in Chemical, Biological and Allied Sciences to be offered to customers in public and private domains at National and International level.

CONTENT

ABOUT CSIR-NEIST, JORHAT

CSIR-NORTH EAST INSTITUTE OF SCIENCE & TECHNOLOGY, JORHAT

CSIR-North East Institute of Science and Technology (Formerly Regional Research Laboratory) Jorhat, Assam was established in 1961 under the aegis of Council of Scientific & Industrial Research (CSIR), New Delhi as one of the multidisciplinary CSIR laboratories. The constituent laboratories of CSIR are grouped into five broad areas such as Physical Sciences, Chemical Sciences, Biological Sciences, Engineering Sciences and Information Sciences depending upon the type of work, objective and the nature of responsibilities vested on these laboratories. On this basis, CSIR-NEIST is one among the seven laboratories under the Chemical Science group. Being the first and foremost R&D Institute in North East India, CSIR-NEIST has been engaged in multidisciplinary R&D activities contributing to the industrial growth and economic prosperity of the region as well as the country. The major thrust of R&D activities of CSIR-NEIST has been to develop indigenous technologies and knowledge base by utilizing the immense natural wealth of the North Eastern region of India. The North Eastern region of the country being bestowed with an abundance of material and bio-resources like petroleum, natural gas, minerals, tea, aromatic and medicinal plants, the laboratory was assigned to undertake research for development of expertise and know-how for a wide range of industries and extension works.

In accordance with the charter, goal and objectives, the Institute has focused its R&D mainly on five broad areas, viz., (i) Biological Science, (ii) Chemical Science, (iii) Engineering Science, (iv) Geo Science, and (v) Materials Science. But by considering the recent advance in artificial intelligence and machine learning, the institute currently added another broad area *i.e.* Advanced Computation and Data Sciences Division (ACDSD), for which the

institute's broad focused area is extended to six. The Institute has two branch laboratories one is at Itanagar, Arunachal Pradesh and another is at Imphal, Manipur which are involved in extension activities and locality based R&D works. The Institute has developed expertise in the areas like natural products chemistry, drugs and drug intermediates, VSK cement technology, agro-technologies, petrochemicals, crude-oil transportations, paper and paper products, beneficiation chemicals, ecology and environment studies, geotechnical investigations, foundation design engineering, soil investigation and building materials including testing & analyses. Over the years, the Institute has generated more than 130 technologies and developed expertise in multiple areas of which a large number, specially Micro, Small and Medium (MSM) technologies were commercially successful by setting up of various industries throughout the country. On the basis of the technologies developed, CSIR-NEIST bagged CSIR-Technology Award continuously for four years from 2010 to 2013, besides several awards received by the scientists of the Institute. CSIR-NEIST has transferred herbal drug technology to 6 pharmaceutical companies namely M/s Kudos Laboratories India Ltd, New Delhi, M/s Altis Life Sciences, Himachal Pradesh, M/s Multani Pharma Ltd., New Delhi, M/s Naturoveda Organics Pvt.Ltd., Kolkata, M/s Ayur Force Organics Pvt.Ltd., New Delhi and M/s Ridhi Sidhi Medicare, Noida, New Delhi, from various parts of the country. Over the years, CSIR-NEIST has also earned its name in the field of IPR with total 331 patents granted in India and 54 patents granted in abroad. Moreover more than 550 patents have been filed in India and abroad by CSIR-NEIST till date. In frontier areas of fundamental and applied research, more than 4100 research papers have been published in journals of high national and international repute.

Some major accolades received by CSIR-NEIST are (1) FICCI Award in the year 1982 & 1985 for development of technologies and rural development activities; (2) NRDC Awards for development of process technologies in the year 1972, 1984 & 1985; (3) SIDC Award in 1987; (4) Industrial Promotion Board Award in 1988; (5) CSIR Technology Awards for four consecutive years from 2010 to 2013 and State Science Award 2019.

The Institute has also earned its name by rendering quality testing/analytical services for various samples like water, soil, fertilizers, building materials, cement, iron & steel, stones, oil & petroleum products, coal, minerals, fibres, paper, boards, natural products, etc. The major beneficiaries of these services include industries, entrepreneurs, private and public enterprises, researchers, students and others.

The Institute is committed to focus and design its activities at different point of time in accordance with the national commitments and priorities. The Institute also has tie-up with other research and academic institutions for functional and other co-ordinations for HRD and S&T developments of the region in particular and the country as a whole. Efforts are being made to further evolve the Institute as a leading S&T player in the present global scenario.

FROM THE DIRECTOR's DESK

It gives me immense pleasure and pride to present the Annual Report of CSIR-North East Institute of Science and Technology for the year 2020-21. CSIR-NEIST has been engaged in research and development activities with a mandate to effectively use the immense material resources of North Eastern (NE) region and to provide R&D inputs for developing the economy of the NE region in particular and the country in general.

The year 2020-21 has been eventful in terms of refocusing our strengths, revaluation of our mission and vision statements and orienting our efforts towards science promotion & popularization, entrepreneurship development and creating knowledge for empowerment. The institute made considerable achievements in academic, technology, external cash flow and societal fronts. Two technologies namely- 'Improved variety of Citronella Jor Lab C-5' & 'Patchouli Jor Lab P-1' were transferred to two entrepreneurs and industries for commercial cultivation. On the publication side, the Institute published a total of 98 papers in reputed international and national journals with an average impact factor of 3.258. On the IPR front, 04 patents were granted in abroad while 06 patents were granted in India. CSIR-NEIST also signed 14 nos. of MoU agreements for Academic/Research collaboration with various prestigious institutes/organizations such as Numaligarh Refinery Limited, Jorhat; Brahmaputra Crakers and Polymers Ltd, Jorhat; Rain Forest Research Institute, Jorhat; Central Pollution control Board, Govt of India; Nagaland Science and Technology Council, Kohima (NASTEC), Nagaland; Department of chemicals and petrochemicals, Government of India; Mushroom Development Foundation, Guwahati etc.

As the world faces one of the biggest health crises due to the outbreak of COVID-19 pandemic causing unprecedented challenges to social, health and economic well being, CSIR-NEIST worked continuously and has undertaken various initiatives to tackle the situation. CSIR-NEIST has adopted various preventive measures right from the beginning by preparing and distributing hand sanitizer to various establishments and locations in the district. About 900 litres of hand sanitizer was prepared and distributed throughout its campus and various other establishments like SBI RRL Branch, Kendriya Vidyalaya, Post Office, Jorhat Airport, District Administration including Police Stations, Airforce Station, Jorhat and Railway Station, ONGC, BCPL, FCI etc. In Imphal (Manipur), CSIR-NEIST branch lab prepared 300 litres of hand sanitizer and distributed to the officials of NABARD bank, hospitals, Manipur University, district municipality, etc. Besides the hand sanitizer, the institute also prepared hand wash, liquid disinfectant, sanitized paper towel and anti-septic soap in large quantities. These materials have been distributed among the staff members, local community and to different essential service related establishment in Jorhat.

I am really joyful that a new COVID-19 testing laboratory has been established on 30 May 2020 in the CSIR-NEIST campus. Dr Himanta Biswa Sarma, then Minister of Health and Family Welfare, Finance, Education (Higher, Secondary and Elementary),

Transformation and Development, PWD, Govt. of Assam, inaugurated the laboratory. It was indeed a momentous event as an important milestone in the annals of CSIR-NEIST history.

I am delighted that CSIR NEIST was able to successfully organize few programs by observing and maintaining Covid-19 protocols. During the year, CSIR-NEIST organized "Online CSIR-SUMMER RESEARCH TRAINING PROGRAM (CSIR-SRTP) 2020" during 16 June – 22 August 2020 to aid to the quality manpower in Science and technology area where about 16,000 mentees and mentors from different subjects as well as from different institutes, colleges and organization were exposed to programs like eminent scientist lectures, special sessions, project specific classes, videos of experimental techniques, elocution video, poster designing, essay writing, assignment, Quiz, project work, etc. Also "Drug Discovery Hackathon 2020 Training Program" was organized during 13 July – 11 Sept 2020 with the objective to discover an effective molecule against COVID-19 virus and to inculcate the culture of developing and writing software codes for drug discovery

It is indeed a proud privilege to mention that some of our staff members were awarded with prestigious awards in recognition of their contribution in various field of research such as the prestigious "Young Associate Fellow" to Dr. Pravin G. Ingole, Scientist, and "Young Researcher Award-2020" to Dr Tonkeswar Das, Technical Officer.

The Institute continued to render its services to the people of the region through various programs and activities. On the societal front, the Institute along with its branch laboratories in Imphal (Manipur) and Itanagar (Arunachal Pradesh) imparted training and demonstration of its low cost technologies like Mushroom cultivation, Handmade Paper and Banana Fibre Extraction, and cultivation of Medicinal & Aromatic Plants to the rural masses to provide them avenues for earning livelihood. The programs under human resource development have been significant with an increased no. of students, of the region and outside.

I, sincerely, acknowledge the constant support, guidance and encouragement received from Director General, CSIR, Research Council & Management Council and also thank once again each and every member of the Institute for their sincere contributions, hard work and dedication in the overall achievements and progress of the Institute.

March, 2022

(G. Narahari Sastry)
Director, CSIR-NEIST

CSIR-NEIST AT A GLANCE
2020-2021

RESOURCE BASE

Infrastructural	
R&D Divisions	07
Branch Laboratories	02
Seismic Stations	27

HUMAN RESOURCES

Total S&T Staff	**174**
Scientists	80
Technical Officers/Assistants	38
Support Staff (Technicians/ Lab. Attendants/Assistants)	56
Administrative Staff	**50**

FINANCIAL

	(Rs in Lakhs)
Government Allocation	5128.835
From Contract R&D and Consultancy	1120.572
Testing/ Analytical Services	75.866
Royalty/ Premia	0.020

BUDGET

	Sanctioned (Rs in Lakhs)
Recurring	3651.805
Capital	1329.870
Network Project (task force)	
Capital	703.608
Recurring	651.192

R&D PERFORMANCE: 2020-2021

Knowledge Generation

Papers published	
National /International peer reviewed Journals	97
Conference Papers	02
Book Chapters	14
Average IF	3.258
Highest IF	12.279

Technological Output

Technologies developed	00
Technologies released to industry	02

Extramural & Human Resource Development

Project Fellows	187
Sr Research Fellows	29
Jr Research Fellows	40
CSIR-TWAS Fellows	01
DST Inspire Faculty	01
DST Ramanujan Fellow	01
DST-NPDF	03
Women Scientist	01
DBT-RA	02
CSIR-RA	02
DST ARITF	01
Tare Fellow	01

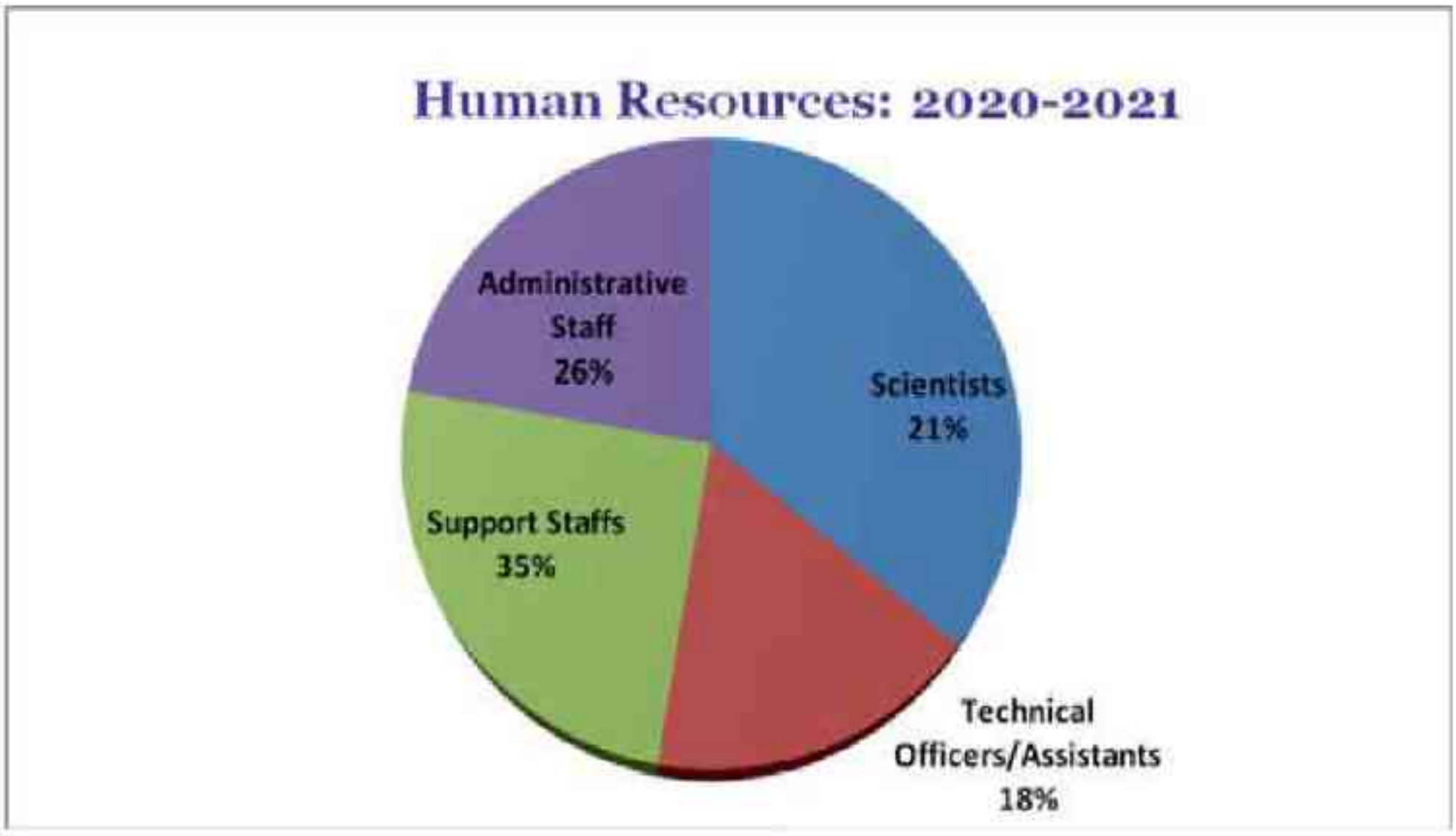
Patents Granted

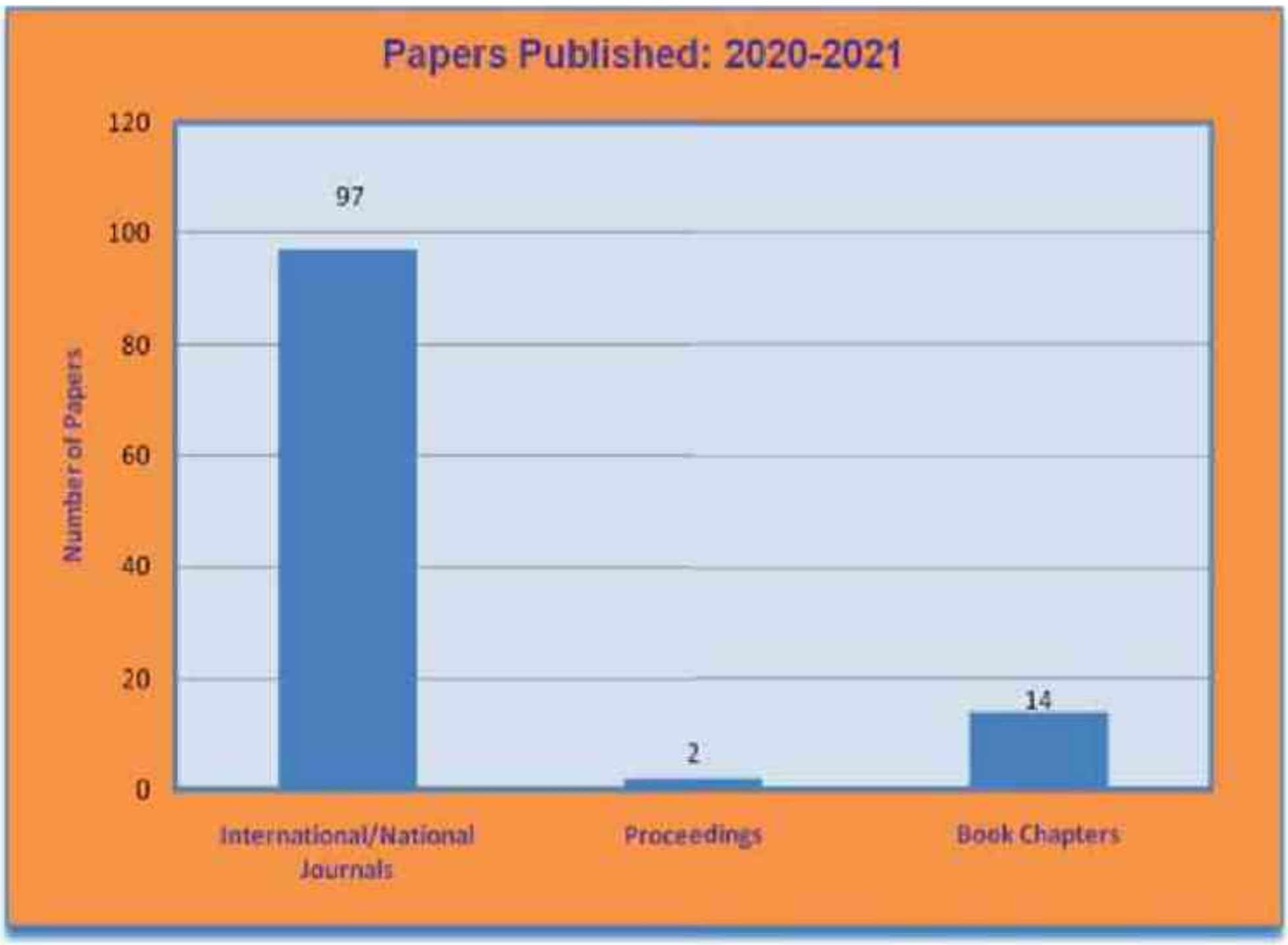
Abroad	04
India	06

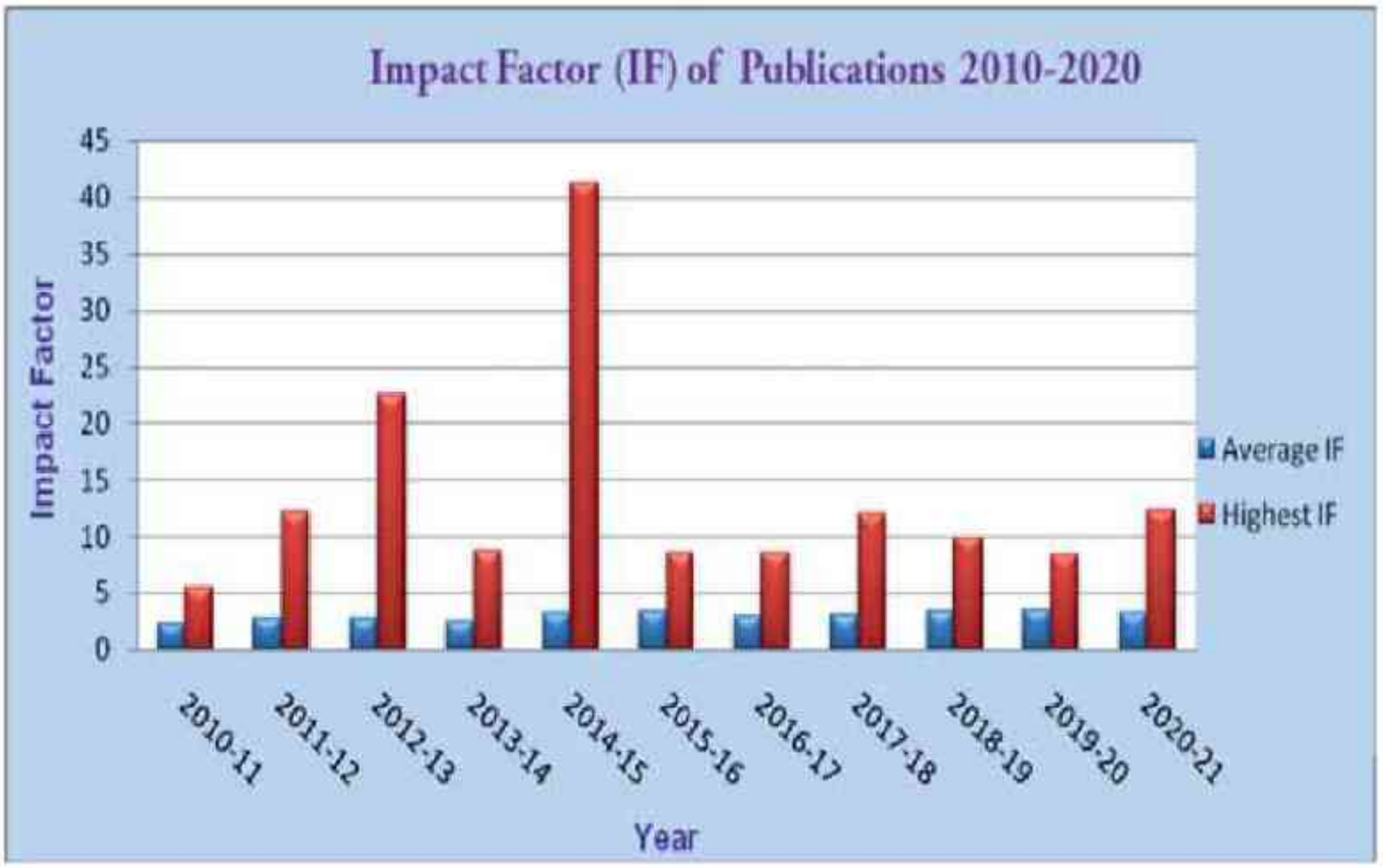
Patents Filed

Abroad	01
India	04

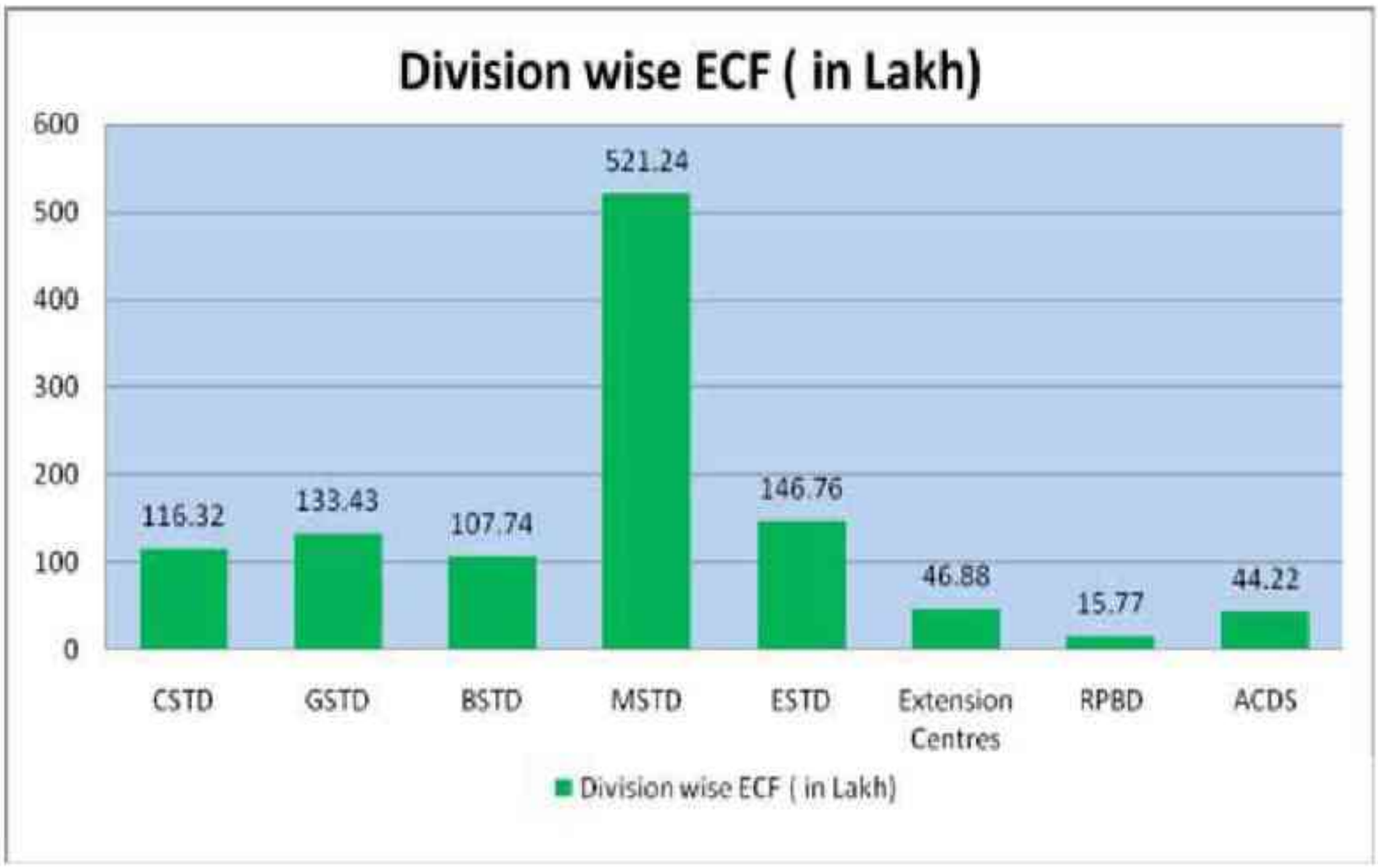
PERFORMANCE INDICATOR






Impact Factor (IF) of Publications 2010-2020
Impact Factor
45
40
35
30
25
20
15
10
5
0
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
Year
Average IF
Highest IF


External Cash Flow (ECF)
Rs in Crore
45
40
35
30
25
20
15
10
5
0
19.12
4.662
6.788
7.96
4.961
7.469
7.212
11.732
38.14
9.65
11.32
2010-11
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-2021
Year


Division wise ECF (in Lakh)
600
500
400
300
200
100
0
116.32
133.43
107.74
521.24
146.76
46.88
15.77
44.22
CSTD
GSTD
BSTD
MSTD
ESTD
Extension Centres
RPBD
ACDS
Division wise ECF (in Lakh)

R & D ACTIVITIES

ADVANCED COMPUTATION & DATA SCIENCES DIVISION

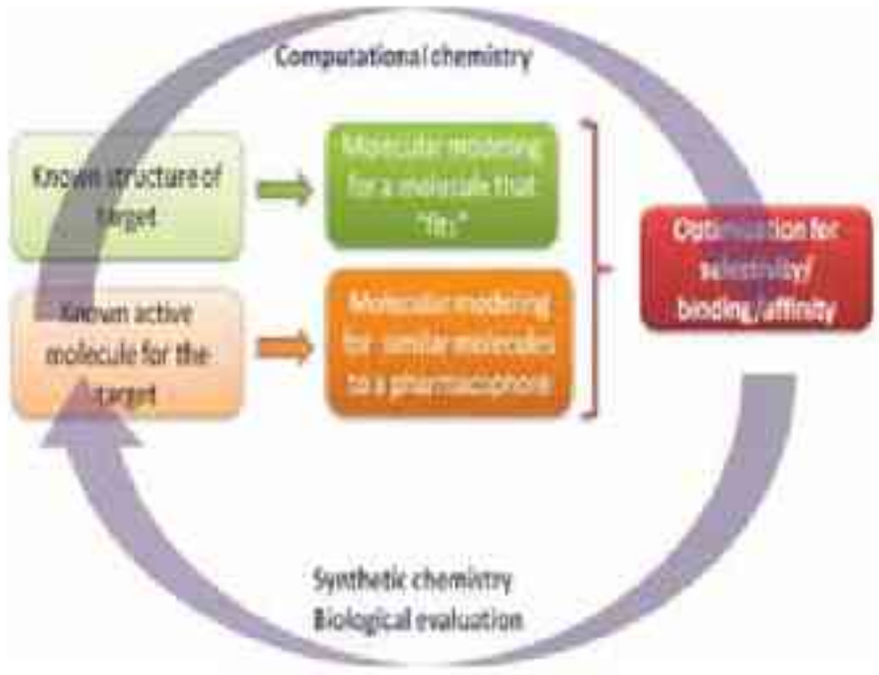
The Division was created by the institute and formally inaugurated by Dr. Shekhar C. Mande, Director General, CSIR & Secretary DSIR on 17 March 2019.

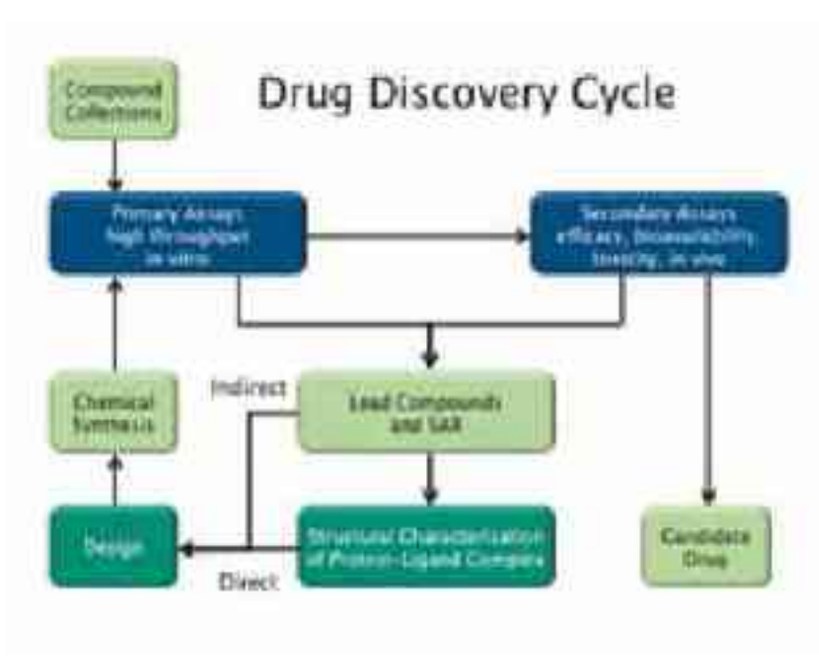
The division is expected to facilitate other R&D Divisions *viz.* Geosciences, Chemical Sciences, Materials Sciences, Biological Sciences and Engineering Sciences to perform big data analysis by adopting contemporary scientific and technological advances. It will also undertake the path of documentation, digitization, deposition of data and subjected these data for Machine Learning and Artificial Intelligence applications. The division also involves in the development of open source drug discovery software known as Molecular Property Diagnostic Suite (MPDS).

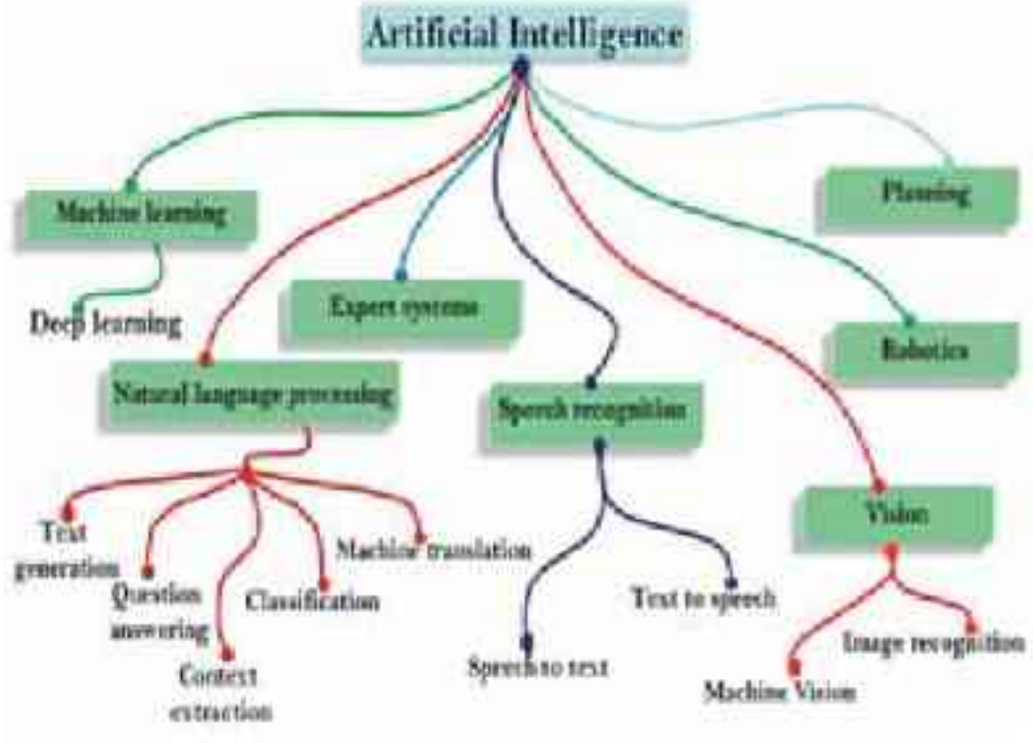
Mandate:

The mandate of the division is to conduct fundamental and applied research in Computational Modelling, Data Science Spanning, and indigenous open sources software development based on artificial intelligence (AI), machine learning (ML), deep learning (DL) and IoT.

Major Research Activities







Research Facilities

Configurations: *High Performance Computing Server 6 x Intel Xeon Processor, (20 Cores/Server), 64 GB RAM/Server, 24TB HDD Storage*	***Configurations:*** *12 Numbers of Workstations Intel Xeon Processor (18 cores), 32 GB RAM/Server, 1x512GB SSD 1x2TB HDD Storage NVIDIA 4GB Graphics card*	***Configurations:*** *10 Numbers of Servers Intel Xeon Processor (20 cores), 256 GB RAM/Server, 2x4TB HDD Storage*

Ongoing Projects

I. In-house, Grant in aid & Consultancy Projects

Project Title: **Development of IoT based health informatics for PAIN management**
Project No: **GAP**
Funding Agency: **Ministry of Health & Family Welfare**
PI & Members: Dr G Narahari Sastry(PI), Dr Mantu Bhuyan (Co-PI), Mr Debabrata Das (Co-PI), Mr Khirud Buragohain (Co-PI), Dr Uttam Kumar Nath, Jorhat Medical College (Co-PI), Dr Thaneshwar Bora (Co-PI)
Objectives:

- A cohort study to measure the level of pain associated markers (TNFα, IL1, IL2, IL6 etc.) and monitor treatment response of herbal anti-arthritis formulation developed by CSIR-NEIST where this data will be used to develop IoT based automatic pain monitoring device
- Development of web portal for the pain management using Data science, Bioinformatics and Molecular modeling approach

Salient Achievements:

- Newly Sanctioned: Work in Progress.

Project Title: **Centre of Excellence for Advanced Computation and Data Sciences**
Project No: **GAP**
Funding Agency: Department of Biotechnology (DBT), Govt. of India
PI & Members: Dr G Narahari Sastry(Co-ordinator), Dr. Selvaraman Nagamani (PI), Dr Hridoy Jyoti Mahanta (Co-PI), Mr Debabrata Das (Co-PI), Dr Ratul Saikia (Co-PI), Dr Saikat Haldar (Co-PI)

Objectives:

- Indigenous open-source software for computational drug discovery: development of disease-specific web portals
- Development of clinical data repository for Societal Health Advancement
- Computer-aided drug design and molecular modelling
- Harnessing NE biodiversity and traditional knowledge
- Machine learning and Data Science applications in food and nutrition in NE India.
- Development of databases, computing, modeling and informatics tools
- Human resources development in molecular modelling and data sciences integrated with bioinformatics applications

Salient Achievements:

- Newly Sanctioned: Work in Progress.

Project Title: **Advanced Hybrid Nanomaterials and their Photocatalytic Efficiency towards Solar Fuel Generation through CO2 Reduction: A Quantum Chemical exploration**

Project No: **GAP-0361**

Funding Agency: EMEQ, SERB-DST, New Delhi Govt. of India

PI & Members: Dr Supriya Saha (PI)

Objectives:

- Exploration of photocatalytic properties of composite nanomaterials, composed with inorganic-organic nanohybrids, semiconductor heterostructures and 2D nanomaterials, as a function of size, shape, and composition of the materials for CO2 reduction and fuel production.
- Static energy calculations will be performed using density functional theory (DFT) implemented in VASP and for larger system self-consistent charge density functional tight binding (SCC-DFTB) method will be used as it can handle large number of atoms within reasonable computational time and cost and mimic the real scenario.
- Full potential energy surface (PES) will be drawn considering lowest energy barrier path for all involved reactions for CO2 reduction reaction on different catalytic surfaces.
- Calculation of turn over frequency (TOF).

Project Title: **Designing advanced functional materials for better performingphotovoltaic devices through in-silico study**

Project No: **GAP-0360**

Funding Agency: Nanomission, DST, New Delhi, Govt. of India

PI & Members: Dr Supriya Saha (PI)

Objectives:

- Exploit the size-, shape- and composition dependent optoelectronic properties of nanostructured materials based on organic-inorganic nanocomposites, perovskite

materials, single walled carbon nanotubeSWCNT, fullerene, graphene nanoribbions etc.to design computationally the latest generation photovoltaic devices with higher efficiency.

- Besides single layered solar cell, multilayered tandem solar cell will also be module.
- Static energy calculations will perform using self-consistent charge density functional tight binding SCC-DFTB method and electron transport dynamics will be investigated using Non-Equilibrium Green Function NEGF formalism, an extension of gDFTB method.
- Development of SCC-DFTB parameters for necessary elements will perform using automatic DFTB parameter toolkit ADPT based on particle swarm optimization PSO algorithm.

AGROTECHNOLOGY AND RURAL DEVELOPMENT DIVISION

The main objectives of the division is Exploration of the Plant Resources of North-East India and identification of potential Medicinal and Aromatic plants and Industrial value up for development of technology for mass multiplication of commercially prospective species and their conservation. The value addition of the germplasm through development of different product and dissemination of proven technologies to indigenous people, governmental organizations, entrepreneur for overall economic development is an important focus in the group.

Ongoing Projects

I. Mission Mode Projects

Project Title: **CSIR Aroma Mission**
Project No: **HCP-007**
Funding Agency: CSIR, New Delhi
PI & Members: Dr Siddhartha Proteem Saikia (PI), Dr M Lal, Dr M Bhuyan, Dr S Haldar, Dr D Banik, Mr J J Bora, Mr D Neog, Dr S B Wann, Dr H B Singh, Dr B C Baruah
Objectives:

- Bring about 4500 hac. of additional area under cultivation of aromatic crops.
- Provide technical and infrastructural support for distillation and values-addition to farmers/growers all over the NE India.
- Enabling effective buy-back mechanisms to assure remunerative prices to the farmers/growers
- Value-addition to essential oils and aroma ingredients for their integration in global trade and economy.

Salient Achievements:

- Establishment of Germplasm Bank and Tissue Culture Plant Garden for storing and multiplication of RET species of MAPs:

Germplasm bank inaugurated by Dr. G Narahari Sastry, Director on 11 December 2020.

Tissue culture plant garden inaugurated by Dr. G Narahari Sastry, Director on 11 December 2020.

- Webinar organized with an attempt to connect to 500 villagers/ farmers involved in Aroma Mission during the period of pandemic. 320 farmers involved in CSIR Aroma Mission from entire North East participated.

Webinar organized on 2 June, 2020.

- Memorandum of Understanding (MoU) signed

MoU signed to establish knowledge partnership between Govt. of Manipur and CSIR-NEIST in presence of Chief Minister of Manipur on 14 December 2020.

MoU signed with industries to promote cooperation in scientific research and dissemination of technology with M/s Aroma India Pvt. Ltd., Rajapara, Kamrup, Assam on 15 September 2020 and M/s Indica Nutraceuticals LLP, New Delhi on 30 October 2020.

MoU signed with Indigenous Agricultural Farmers Producer Company, Dispur, Guwahati for implementation of the CSIR Aroma Mission in the state of Assam on 11 March 2021

Memorandum of Understanding (MoU) signed to promote cooperation in scientific research and dissemination of technology related to Aromatic, Medicinal, Floriculture and other important plants between the CSIR-NEIST, Jorhat and Bosing Bango Farmers Cooperative Society Ltd., Pasighat, Arunachal Pradesh at Runne, East Siang district, Arunachal Pradesh on 28 October 2020.

- Meeting with Agriculture Minister of Arunachal Pradesh

Meeting with Mr. Tage Taki, Minister of Agriculture, Govt. of Arunachal Pradesh to bring more areas under MAPs in the state of Arunachal Pradesh and also to promote commercial cultivation of MAPs in the state for entrepreneurship development on 20 January 2021.

- Establishment of "Multilocational Trail & Regional Research Experimental Farm" of CSIR-NEIST, Jorhat in different states of North East.

"Multilocational Trail & Regional Research Experimental Farm" of CSIR-NEIST, Jorhat established at Rajapara, Kamrup, Assam on 15 September 2020 ; at Pasighat, Arunachal Pradesh on 28 October 2020; at Yaongyimsen, Nagaland on 26 November 2020; at Bokakhat, Golaghat on 19 February 2021 and at Roing, Arunachal Pradesh on 27 February 2021.

Tweet by Hon'ble Minister of S&T (I/C) regarding establishment of the "Multilocational Trail & Regional Research Experimental Farm"

- CSIR Technology Window opened.

CSIR Technology Window opened at the Institute of Natural Resources, Mawpat, Shillong on 25 February 2021 to facilitate support services to the farmers that are engaged in the cultivation and production of MAPs.

- Distillation Units installed in different parts of North East India.

Essential Oil Distillation Units installed at Laimekuri, Dhemaji, Assam; Runne, East Siang, Arunachal Pradesh; Oyun, East Siang, Arunachal Pradesh; Roing, Lower Dibang Valley, Arunachal Pradesh and Changlang, Arunachal Pradesh

- One day and Three day Training programme on "Cultivation and Processing of Aromatic Plants" organized in different parts of North East India.

One day programme

Three day programme

❖ Media Coverage of the CSIR AROMA Mission Activities.


NORTHEAST NOW

Northeast Institute of Science and Technology to set up 15 research fields on medicinal plants


dailyhunt

The Sentinel

MoU signed for implementation of the CSIR Aroma Mission

JORHAT: The Council of Scientific and Industrial Research-North East Institute of Science and Technology (CSIR-NEIST), Jorhat is going in a big way to popularise the cultivation of Medicinal and Aromatic plants (MAPs) in North East India under CSIR Aroma Mission programme. CSIR laboratories have successfully completed the first phase of Aroma Mission, which is a flagship project of CSIR and is actively supported and monitored by the honourable


10:07

Trg programme on medicinal and aromatic plants held

NAHARLAGUN, 21 Jan: About 60 participants from different SHGs and NGOs, along with school students and others attended an 'Entrepreneur meet-cum-training programme on cultivation of medicinal and processing of aromatic plants', organised by Jorhat (Assam)-based CSIR-North East Institute of Science & Technology (NEIST) at the CSIR-NEIST branch here, under the CSIR-Aroma Mission.

Addressing the participants, CSIR-NEIST director Dr G Narahari Sastry delivered a speech on entrepreneurship development and utilization of natural resources, besides management and protection of the biodiversity.

Principal scientist Dr SP Saikia spoke on the CSIR-Aroma Mission, while the CSIR-NEIST's R&SD head Dr Jatin Kalita explained the "CSIR rural technologies and their importance in socioeconomic development."


The Arunachal Times

CSIR-NEIST signs MoU with farmers' org to expand floriculture activities

ITANAGAR, Oct 29: Jorhat (Assam)-based CSIR-NEIST on 28 October signed a memorandum of understanding (MoU) with the Bosing Bango Farmers' Cooperative Society Ltd in East Siang HQ Pasighat to promote cooperation in scientific research and dissemination of technology related to aromatic and medicinal plants and floriculture.

The CSIR-NEIST plans to set up about 15 multi-locational experimental research fields in the Northeast region (five farms in Assam, four in


The Sentinel

CSIR-NEIST starts second phase of 'Aroma Mission' in Nagaland

The Council of Scientific and Industrial Research-North East Institute of Science and Technology (CSIR-NEIST), Jorhat

By

KOHIMA: The Council of Scientific and Industrial Research-North East Institute of Science and Technology (CSIR-NEIST), Jorhat is going in a big way to popularise the cultivation of medicinal and aromatic plants (MAP) in Northeast India under the 'CSIR Aroma' programme. The CSIR


CSIR-NEIST Jorhat expands Aroma and floriculture Mission activities in Arunachal Pradesh


CSIR-NEIST expands aroma, floriculture mission activities in state

ITANAGAR, 29 OCT

The second multi-locational experimental research field was inaugurated by Council of Scientific and Industrial Research – North East Institute of Science and Technology (CSIR-NEIST) at Borpak in East Siang district yesterday.


ओमा के साथमिल सीएसआईआर-नेस्ट ने कृषि आय को दोगुना करने की बनाई योजना

प्रायोगिक फार्म का डा. शास्त्री ने किया उद्घाटन

Project Title: **CSIR-Floriculture Mission**
Project No: **HCP-0037**
Funding Agency: CSIR, New Delhi
PI & Members: Dr Mantu Bhuyan (PI), Dr Dipul Kalita (Co-PI), Dr K Medhi, Dr S P Saikia, Dr M Lal, Dr D Banik, Dr P Bharali, Dr K D Mudoi, Mr SChanda, Mr H Lekhok
Objectives:

- Increasing farmer's income through floriculture

Salient Achievements:

- The activities of development of floral varieties i.e. gerbera, gladiolus, carnation, geranium, lilium have already been started. For domestication of wild ornamentals, germplasms of *Hoya, Begonia, Agapetes seigera* var. *acuminate, Goodyera procera, orchid* were collected from various locations of North East India and have been introduced for acclimatization at CSIR-NEIST, Botanical Garden. Attempts are being initiated for propagation of *Nepenthes khasiana, a* Critically Endangered species collected from Meghalaya. One floriculture park with an area of 6318 m^2 have been established at CSIR-NEIST under the project for multiplication and raising floriculture plants. Already several species of floriculture plant species like Tuberose, Sewali (*Nyctanthes arbor-tristis*), different varieties of Togaor (*Tabernaemontana divaricata*), Kamini Kusum (*Murraya paniculata*), Khorikajai *(Jasminum multiflorum)*, Seni Chapma *(Jasminum sambac)* have been collected and grown in the nurseries of the floriculture park. 100 no. of each species have been conserved for using as mother plant during multiplication. Other flowering plant like Gerbera, Gladiolus, Carnation, Geranium, Impatients, Rose, petunia, begonia, Canna, Chrysanthemum, Dahlia, Pansy, Marigold, Hibiscus, Lilium, orchids have also been collected and planted in the nurseries for further propagation.
- A few honey bee colonies of *Apis cerana and A. mellifera* were established in the campus and standardization of rearing techniques are being carrying out. Techniques of multiplication of queen bee, management of bee hives during on and off seasons have been practiced to develop SOP for integration of apiculture with floriculture and other fruit bearing crops. Already attempts have been initiated to identify the farmers of citrus and other fruit crops from North Eastern states for installation of bee hive and providing necessary training for bee hive management.

II. Focused Based Research (FBR) Projects

Project Title: **Conservation of threatened plants of India**
Project No: **MLP-0041**
Nodal Laboratory: CSIR-IHBT
Funding Agency: CSIR, New Delhi
PI & Members: Dr Dipanwita Banik (PI), Dr S P Saikia, Dr M Bhuyan, Dr M Lal, Dr C Tamuly, Dr N Velmurugan, Dr H B Singh, Dr B C Baruah, Dr K D Mudoi

Objectives:

- Assessment of conservation status of 50 threatened plant species using IUCN criterion
- Assessment of genetic variability in Critically Endangered (CR) species
- Development of DNA bar-code for the threatened plant species
- Development of technologies for mass-multiplication of threatened plant species and its introduction in natural habitats
- Development of threatened plant species conservatory and gene bank at CSIR-NEIST

Salient Achievements:

- Secondary data of names and synonyms, distribution, characteristics and others of 14 species were compiled from databases, floras and published research papers. Collected distributional data from herbarium labels of the 178 herbarium sheets of 19 species from Herbarium of Botanical Survey of India, Eastern circle, Shillong (ASSAM). Based on herbarium data field survey was conducted on various locality in Meghalaya on *Nepenthes khasiana*. The threat and disturbances to the habitat of the species were recorded. Estimated the EOO and AOO of *Panax bipinnatifidus* and *Agapetes* sp. using (GeoCAT). Prepared Ecological Niche Modellingof *P. bipinnatifidus* based on the literature survey by using MaxEnt (V.3.4.4), DIVA-GIS (V.7.5.0) & QGIS (V.3.10). Initiated the micro-propagation of Critically Endangered species *Aquilaria malaccensis* and *Nepenthes khasiana* using different explants.
- Seeds explants of *N. khasiana* were collected from Jarain hills, Meghalaya & after surface sterilization, inoculated into half strength of MS medium along with phytohormones for *in vitro* germination. *In vitro* germination p.c. was recorded.

- Tender apical shoots of *A. malaccensis* were collected from CSIR-NEIST experimental farm and after proper surface sterilization, inoculated into nutrient media, enriched with plant growth regulators for initiation of aseptic cultures. After 15-25 days of culture, shoot buds were initiated from nodal explants.

Project Title: **Edible biocatalyst for the sensory alteration of essential oils**
Project No: **MLP-1017**
Funding Agency: CSIR, New Delhi
PI & Members: Dr Saikat Haldar (PI), Dr Jitendra Singh Verma (Co-PI), Dr Siddhartha Proteem Saikia (Co-PI), Dr Mohan Lal (Co-PI)
Objectives:

- Identification of edible biocatalyst(s) capable of altering the sensory properties of the commercially and economically viable essential oil(s)
- Insight into the molecular basis of the biocatalyst mediated sensory alteration of the essential oil(s)
- Scale-up of the efficient biocatalytic process(es) up to 5 litre capacity (fermentation broth/biocatalyst)
- To explore the scope of lyophilisate (of the biocatalyst) as a ready to use storable catalyst

Salient Achievements:

- Twenty different economically and commercially viable essential oils from Indian market have been screened with edible biocatalysts (seven mushroom cultures and 3 traditional beverages) aiming at their sensory alteration. Three potentially important biotransformations have been identified leading to significant sensory (odour) change of the original oils. The work is progressing towards finding out the chemical basis of sensory change and further optimization of the fermentation condition.

III. In-house, Grant in aid & Consultancy Projects

Project Title: **Agrotechnology & rural development (including floriculture, horticulture, apiculture, bamboo, ginger etc.).**
Project No: **OLP-2034**
Funding Agency: CSIR, New Delhi
PI & Members: Dr Siddhartha Proteem Saikia (PI), Dr Dipul Kalita (Co-PI)
Objectives:

- Establishment of micropropagation protocol of economically useful rare/ threatened/ endangered important medicinal and aromatic plants of N.E. India.

Salient Achievements:

- Developed *in vitro* micropropagation protocol of *Rauvolfia serpentina* (L.) Benth. - an important endangered medicinal plant, popularly known as Sarpagandha (the snake root) under the family Apocynaceae.

In vitro Micropropagation of *Rauvolfia serpentine.*

- A process/technology for conversion of office paper wastes to some value-added products like disposable paper plate, cup etc. is developed. Waste papers were collected from the office and recycled them into handmade paper. The recycled paper possesses good tensile strength that can be applicable for making disposal plate, disposal cup, paper bag, packing materials etc. Conversions of such office paper wastes into handmade paper of good quality have reduced the cost of paper and also help to combat environmental pollution. A technology package of 100 sheets per day is ready for transfer.

Conversion of office paper wastes to value-added products.

Project Title: Characterization and chemical composition of high yielding varieties of Amada Haldi (*Curcuma zedoaria* Rose) and Kali Haldi (*Curcuma caesia* Roxb): Endangered high value medicinal plants

Project No: GPP-312

Funding Agency: Ministry of AYUSH, Govt. of India

PI & Members: Dr Mohan Lal (PI), Dr Siddhartha Proteem Saikia (Co-PI)

Objectives:

- Collection, evaluation, characterization and assessing the genetic diversity of different accessions of *Curcuma zedoaria* and Curcuma *caesia*.
- To study the heritability, genetic variability and genetic advancement for morphological, oil yield, rhizome and starch characters etc.
- To find out the direct and indirect effects of some quantitative characters on oil, starch and rhizome yield.
- Selection of high rhizome and high quality oil varieties of both curcuma species and make a germplasm repository of both the species.

Salient Achievements:

- Multilocation trial of advance lines of *Curcuma longa*, *Curcuma zedoaria* and *Curcuma caesia* has been carried out in five locations (Jorhat, Lakhamijan, Imphal,

Pasighat and Madang) in North-East India. Morphological and other data were taken from average of five locations.

Project Title: **STINER-Technology Facility Centre (STINER-TFC) at SASRD Nagaland University, Medziphema Campus, Medziphema, Nagaland**

Project No: **GPP-335**

Funding Agency: Ministry of Development for North Eastern Region (MDoNER)/North Eastern Council, Govt. of India

PI & Members: Dr Mantu Bhuyan (PI), Er D Neog, Dr S P Saikia, Dr S Hazarika, Dr J Kalita, Dr D Kalita, Dr K Medhi, Dr B Das, Mr T H Ahmed

Objectives:

- Establishment of STINER-Common Facility Center (STINER-CFC) at Medziphema, Nagaland.

Salient Achievements:

- A list of online activities, such as webinars and virtual activity based learning (VABL) were conducted on entrepreneurship and skill development focusing on all categories of participants, including men, women and students. A total number of five webinars, five virtual demonstrations and five practical hands-on training programmes were also conducted in small groups following all necessary protocols during 2020-21. The centre could also manage to visit one district and give awareness programme on entrepreneurship. Besides these activities, an online competition on waste management was organized for the students during the lockdown period to encourage them and to bring out the creative skills in them. Also during this year, incubation of three entrepreneurs started at the Centre with the Multi-purpose drier, through which they could start a small business during the lockdown period.

Project Title: **Distinctness Uniformity and Stability (DUS), characterization of Lemongrass (*Cymbopogon flexuosus* L.) germplasm**

Project No: **GPP-339**

Funding Agency: Ministry of Agriculture, Govt of India

PI & Members: Dr Mohan Lal (PI),

Objectives:

- Collection and characterization of Lemongrass germaplsm.
- Development of DUS specific descriptors in *C. flexuosus*.

Salient Achievements:

- A total of 370 germplasms of lemongrass were collected and maintained at the CSIR-NEIST Experimental farm with regular maintenance of the field trial. During the year 2020-21 the evaluation and characterization of total 28 representative characters were completed.

Project Title: **Varietal development for high fruit yield and solasodine content of *Solanum khasianum*: A high value medicinal plant of North-East India.**

Project No: **GPP-343**

Funding Agency: National Medicinal Plant Board, Ministry of AYUSH

PI & Members: Dr Mohan Lal (PI)

Objectives:

- Germplasm collection, evaluation and characterization of the genetic diversity of different accessions of *Solanum khasianum*.
- Study of heritability, genetic variability and genetic advancement for morphological, and agronomic traits of *S. khasianum*.
- Establishment of plant tissue culture and extraction of plant stem cells from suitable explants of *S. khasianum* followed by quantitative estimation of solasodine content using U-HPLC.
- Varietal selection of *S. khasianum* with high fruit size, fruit yield and high solasodine content and multi-location trials.

Salient Achievements:

- Multilocation trial for advance high yielding, fruit size, color of berry, and solasodine content lines of *Solanum khasianum* has been planted in four different locations (Jorhat, Bhokakhat Pasighat and Madang) in North-East India. Morphological and other quality data were taken from average of four locations.

Project Title: **STINER common facility centre at CSIR-NEIST, Jorhat (Hub)**

Project No: **GPP-347**

Funding Agency: Ministry of Development for North Eastern Region (MDoNER)/North Eastern Council, Govt of India

PI & Members: Dr Mantu Bhuyan (PI), Er D Neog, Dr S P Saikia, Dr S Hazarika, Dr J Kalita, Dr D Kalita, Dr K Medhi, Dr B Das, Mr T H Ahmed

Objectives:

- Maintenance and operation of the technologies set-up through STINER for the purpose of demonstration and incubation by the entrepreneurs.
- Initial maintenance of the food testing facility set-up under STINER to make up it fully operational with self-sustainable business model.
- Providing necessary training.

Salient Achievements:

- **Infrastructure development:** Three numbers of STINER sheds with an area of 27x13 m^2 shed has been constructed at CSIR-Premise. Further, a STINER corridor is established with renovation of four existing buildings. Already renovation of 2 building is completed and another 2 are in progress, which will be completed soon. Several technologies have been installed at STINER Shed and Corridor. The food testing machineries are installed at one buildings of STINER Corridor.
- **Technologies for exhibition & incubation and equipments for CSIR-NEIST:** Already most of the major technologies which will be used for demonstration, exhibition, training as well as incubation has been installed. The installed

technologies are–Jacquard Weaving and product development facility, Oil Extraction Plant, Paper Plate Making Machine, Plastic Product Designing Facility- (a) Injection moulding facility, (b) Blow moulding facility, Automatic Paper Cup Making Machine, Lamination Machine, Machining Facility, Bio Fertilizer Unit (Bioreactor Plant), Milk Processing and Packing Plant, Banana Fibre Extraction Machine, Egg Setter cum Hatcher, Handmade Paper Unit and Supercritical fluid extraction system. Some other technologies like Sealing Filling and Packaging Facility, Modern Layer farm for training and Bamboo Product Development are in process of installation/ establishment.

- **Food testing facility:** Several important analytical equipments have been installed already for food testing facilities.
- **Skill development activities:** Several training programmes have conducted during 2020-21 on vermicompost, mushroom cultivation etc.

Training imparted to 16 people (10 from Majuli and 6 from Pulibar, Jorhat) on Mushroom Cultivation under the STINER programme at CSIR-NEIST, Jorhat on 12 November 2020.

BIOLOGICAL SCIENCES & TECHNOLOGY DIVISION

Biological Science & Technology Division is a multi-disciplinary division dedicated to frontline research in the areas of modern biology. The vision and mission of BSTD is to develop indigenous technologies by utilising the bio-resources of North East India. The division specifically engaged R&D particularly in the following areas-

- Soil microbiota for environmental care.
- Plant-microbe-soil interactions for sustainable crops production.
- Plant genomics and genome editing for plant stress tolerance.
- Molecular nutrition and functional foods for metabolic syndrome related disorders.
- Cellular and molecular biology of cancer and other non-communicable diseases.

Other major important activities of the division includes environmental monitoring of pollutants, routine analysis of water, food & beverages and soil samples, Thus the division is actively engaged in both basic and applied research by highly experienced professional researchers in different frontier areas of biological sciences.

The division has a DBT-sponsored Bioinformatics Infrastructure Facility (BIF) and DBT sponsored Institutional Biotech Hub which provides training, workshops and caters to the need of researchers and students communities on genomics, proteomics, application to the development of drugs/ drug designing, anti-microbial agents, microbial taxonomic data analysis, mathematical modelling/data analysis, etc.

Ongoing Projects

I. Fast Track Translation (FTT) Projects

Project Title: **Genome Editing for Crop Improvement (GE-Crops)**
Project No: **MLP-0007**
Funding Agency: CSIR, New Delhi
PI & Members: Dr C Chikkaputtaiah (PI), Dr N Velmurugan (Co-PI), Mrs A Yadav
Objectives:

- To dual-stress response analysis (brown spot disease and drought) and precision editing of target genes through CRISPR/Cpf1 mediated active genetics for dual-stress tolerance in North East Indian rice cultivar.

Salient Achievements:

- Sampling of fifteen different NEI rice cultivars which are responsive to BSD-drought have been successfully carried out from RARS, Titabar (Assam) and ICAR Complex, Barapani (Meghalaya).

- Ethylene binding protein, a family of EBP genes, a putative target host gene responsive to BSD-drought from the recent study on transcriptome-wide identification of negative regulatory genes has been selected for precision CRISPR/Cpf1 genome editing.
- CRISPR/Cpf1 mediated active genetics and *in vitro* tissue culture regeneration of Indica rice (Ranjit and Shasharang) is being established in the laboratory.

Project Title: **Understanding the rhizobacteria-induced resistance in Bhut Jolokia (*Capsicum chinense* Jacq.) against fungal diseases**

Project No: **MLP-1016**

Nodal Laboratory: CSIR-IHBT

Funding Agency: CSIR, New Delhi

PI & Members: Dr Ratul Saikia (PI), Dr Anil Kumar Singh (Co-PI) Dr Mantu Bhuyan (Co-PI), Dr Mohan Lal (Co-PI), Mrs A Yadav, Ms Priyanka Gogoi, Mr Priyankush P Bora, Ms Pooja Talukdar

Objectives:

- To elicit induction of systemic resistance in BhutJolokia (Ghost chili) by rhizospheric bacteria to the fungal diseases.
- Understanding of transcriptional as well as translational host responses during induction of systemic resistance.
- Selection of promising strains for suppression/control of the diseases.

Salient Achievements:

- The world's hottest chili pepper, 'Bhut Jolokia' is extensively grown in North East India. The fungal diseases like Collar rot caused by *Rhizoctoniasolani* and Fusarium wiltare causing great problems to the cultivators in North East India. Rhizobacteria (PGPR) mediated induced systemic resistance (ISR) is not just to control the disease, but to immunize the plant and to make them resistant against different diseases.In the present study, we are testing the tools of biochemistry and molecular biology to better understand how anti-pathogenic/resistance activities take place in BhutJolokia plant against *Rhizoctoniasolani*and*Fusariumoxysporum*on the induced systemic resistance (ISR) by already established PGPR strains, *Ochrobactrumpseudogrignonense* RJ12, *Bacillus megaterium*JPR68, *Serratiaureilytica* RJ21,*Bacillus subtilis* RJ46etc. (**Fig. a**). Our study observed that upon the seed/leaf/root priming, they significantly (p=0.05) reduced the disease incidence of BhutJolokia plant. The study indicated that the induction of resistance against pathogens are occurring through boosting the activities of defense-related enzymes. The studies are going on to understand the change occur in the transcriptome/metabolome of BhutJolokia plant during ISR. This

work will unravel the molecular mechanisms of host-pathogen interactions in Bhutjolokia.

Fig. a. Effect of different PGPR treatment on *Rhizoctonia solani* infected or control Bhut Jolokia plants.

II. In-house, Grant in aid & Consultancy Projects

Project Title: **Harnessing the soil microbiota for sustainable socio-economic upliftment of North-East India through multi-omics approach**

Project No: **OLP-2035**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Ratul Saikia (PI), Dr R Konwar, Dr C Chikkaputtaiah, Dr P Manna, Dr A K Singh, Dr H K Borah, Dr T Phukan, Mrs A Yadav, Dr.J L Hatiboruah, Ms P Bordoloi

Objectives:

- Profiling and characterization of soil microbiota for different functional perspectives using multi-omics approaches.
- Bio-prospection of microbes for biotechnological, health and environmental care applications.

Salient Achievements:

- **Isolation of bacterial isolates from soil contaminated with poultry faecal matter.**

Soil near or in contact to poultry faecal matter in two poultry farms of Jorhat district were collected. The freshly excreted poultry faecal matter was also collected. The soil samples along with the faecal samples used for bacterial isolation and their diversity pattern have been shown in **Fig. a.**

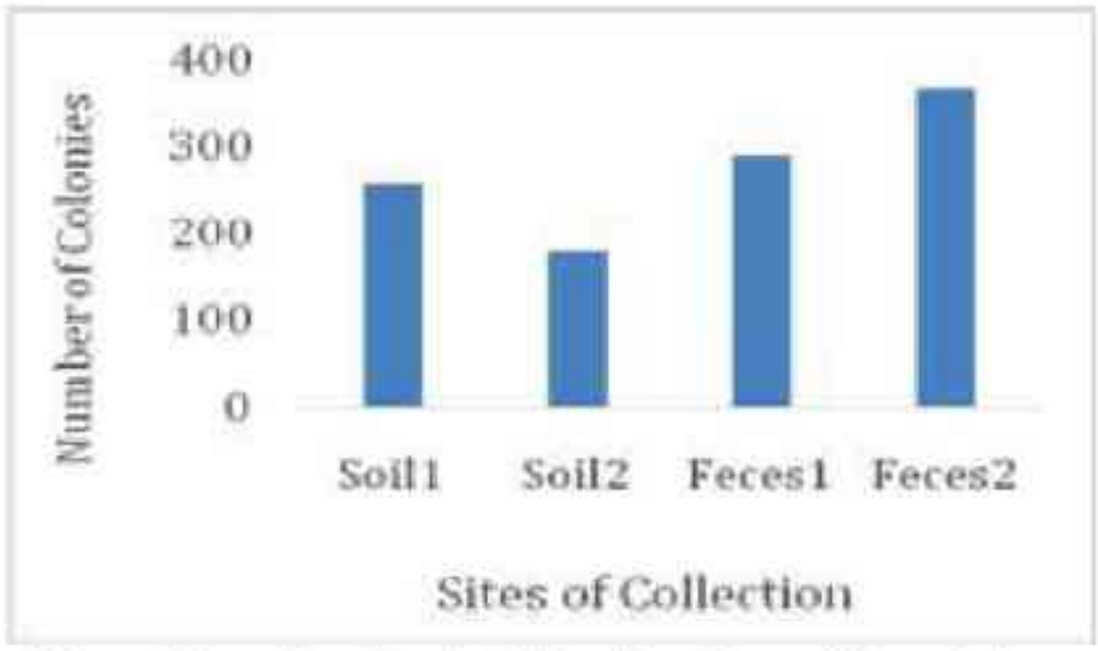


Fig. a. Diversity of bacterial isolates from different sites.

- **Study of antibiotic resistance in the isolated colonies.**

Since most of the poultry farms in Jorhat use antibiotics and other growth promoting chemicals for quick growth of their poultry such antibiotics may give rise to antibiotic resistance bacterial populations in their guts. To understand the extent of this effect, we performed antibiotic resistance determining assay of the bacterial isolates of both faecal and soil origin. We tested the isolates for 8 antibiotics and in their recommended concentrations these are as follows: Vancomycin (VAN30), Kanamycin (KAN30), Ciprofloxacin (CIF50), Cefepime (CIP50), Tetracycline (TE10), Ampicillin (AMP10) and Erythromycin (E10). The results indicate that highest resistance was observed in AMP10, followed by E10 and TE10 while the lowest resistant isolates were for VAN30 and CIP50. Most of these resistant isolates belonged to soil while some of the resistant isolates were from faecal matter as well. Samples from site 1 showed broader range of resistance than those from site 2. While the faecal samples from site 2 were had more resistant isolates than site 1 (**Fig.b**).

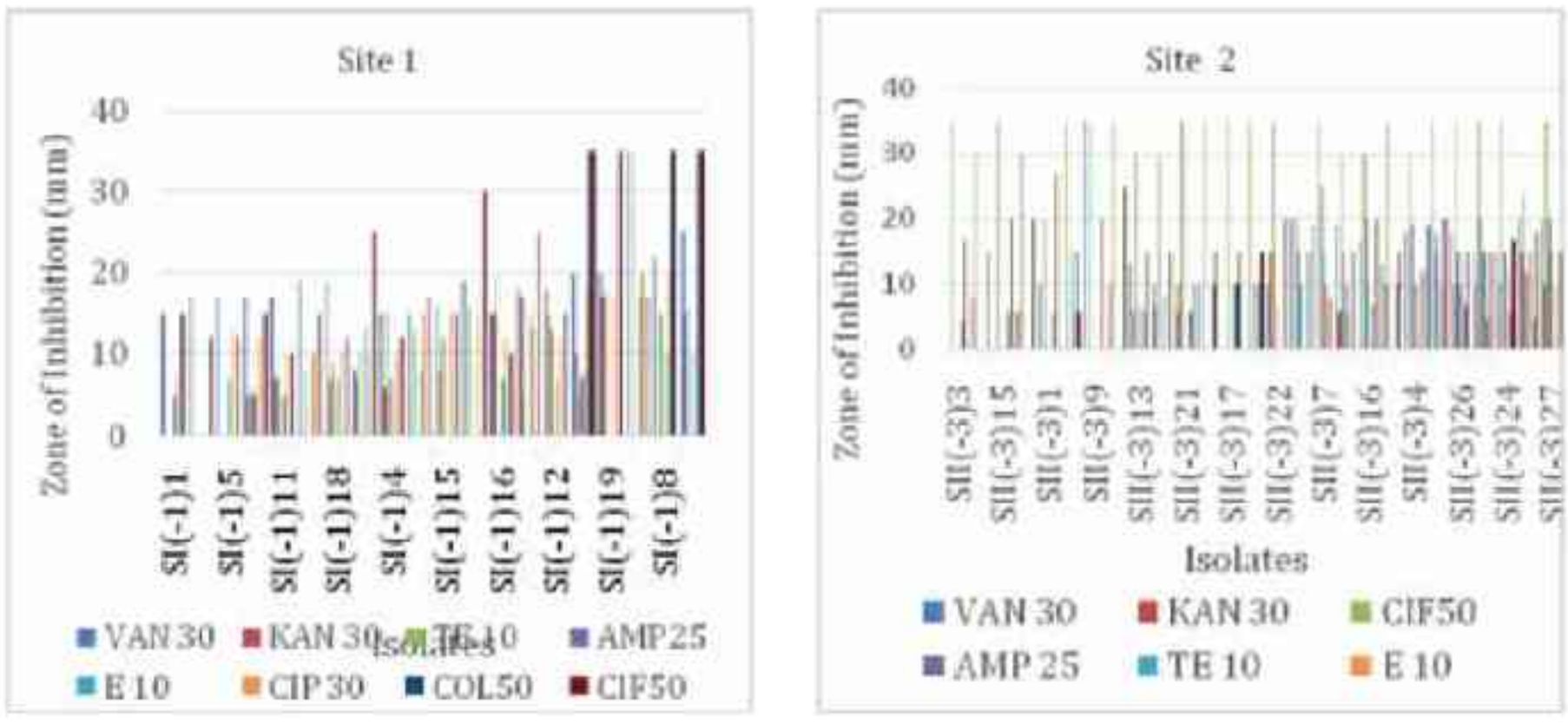


Fig. b. Resistance profiling of bacterial isolated from different sites.

- **Transcriptome analysis of crude oil degrading *Pseudomonas aeruginosa* strains.**

  The bacteria are the most effective agents in biodegradation of petroleum hydrocarbons (PHs), utilization/mineralization and they serve as essential degraders of crude oil contaminated environment. In this work, three crude oil utilizing *Pseudomonas aeruginosa* strains designated as N002, TP16 and J001 subjected to transcriptome analyses revealed a total of 81, 269 and 137 significant DEGs. Among them are 80 up-regulated genes and one downregulated gene of N002, 121 up-regulated and 148 down-regulated genes of TP16, 97 up-regulated and 40 down-regulated genes of J001 which are involved in various metabolic pathways. TP16 strain has shown more number of differentially expressed genes (DEGs) upon crude oil treatment in comparison to the other two strains. Through quantitative real time polymerase chain reaction (qRT-PCR), the selected DEGs of each strain from transcriptome data were substantiated. The results have shown that the up-regulated and down-regulated genes observed by qRT-PCR were consistent with transcriptome data. The transcriptome results have revealed that TP16 is a potential *P. aeruginosa* strain for functional analysis of identified potential DEGs involved in crude oil degradation.

Project Title: **CSIR-NEIST Covid-19 testing laboratory**
Project No: **OLP-2046**
Funding Agency: CSIR, New Delhi
Co-ordinator: Dr G Narahari Sastry
Nodal Officer: Dr Jatin Kalita, Dr Rituraj Konwar
PI & Members: Dr Mantu Bhuyan (PI), Dr R Saikia, Dr S B Wann, Dr S P Saikia, Mr R Deka, Dr R Baishya, Dr J L Hatibaruah, Dr A K Singh, Dr C Chikkaputtaiah, Mrs. A Yadav, Dr A Namdeo, Dr J S Verma, Dr S Haldar, Dr P Manna, Dr T Bora, Dr A Sharma, Dr D Banik, Dr T Phukan, Dr W Romi, Dr P Bharali, Mr S K Chanda, Mr H Lekhak
Objectives:

- Establishing Covid-19 Testing Facility for RT-PCR based diagnosis of SARS-CoV-2

Salient Achievements:

- CSIR-NEIST Covid-19 Testing Laboratory was inaugurated on 30th May 2020 by then Honorable Minister of Heath & Family Welfare, Dr Himanta Biswa Sarma.
- CSIR-NEIST Covid-19 Testing Laboratory started testing of samples from 8 June 2020.
- CSIR-NEIST Covid-19 Testing Laboratory completed testing of more than 37,000 samples for RT-PCR based diagnosis of SARS-CoV-2.

Project Title: **Indoor rearing of Muga silkworm and understanding host plant biology for increasing productivity**
Project No: **OLP-2049**
Funding Agency: CSIR, New Delhi
PI & Members: Dr Tridip Phukan

Objectives:

- To introduce technical support for indoor rearing of Muga silk for commercial production.
- To understand host and silk worm interaction.
- To identify suitable host plant for indoor Muga silkworm rearing.

Salient Achievements:

- Secondary metabolites extracted from primary host plant, Som (*Perseabombycina*Kost.) and secondary host plant, Soalu (*Litseamonopetela*), Dighloti (*Litseasalicifolia*) and Mejankari (*Litsaeacubeba*Lour.)in different solvents are now being under study using GC-MS and HPTLC. For keeping leaves fresh after cutting, different ways were studied to keep the leaf fresh and found that keeping high humidity environment was better to keep leaf fresh than spraying water frequently. It was found that the leaves were fresh up to 10 hours as the sealed bag did not allowed water to evaporate and maintained a high humid condition. Additionally, artificial diet for muga silkworm (*Antheraeaassamensis*) have been prepared based on current literature in the laboratory, but yet to evaluate its preference to the muga silkworm which will be done once building of climate controlled muga silkworm rearing house.

Project Title: **Development of a robust in vitro screening procedure for the immunomodulatory efficacy of the traditional medicinal plants**

Project No: **OLP-2052**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Prasenjit Manna (PI)

Objectives:

- To develop micronutrients (vitamins and minerals) based fingerprint algorithm for the robust *in vitro* screening of the plant materials having immunomodulatory efficacy.

Salient Achievements:

- Field survey was carried out in and around the CSIR-NEIST campus and a total of 130 different plant samples have been collected. The plant materials have been authenticated by the taxonomist Dr. Pankaj Bharali. The fresh plant materials were shed dried to reduce the moisture content less than 15%, powdered by using an electrical grinder, and stored in a dark glass bottle at a cool and dry place for further analyses. Lipid soluble vitamins were extracted following the standard procedure by using pyrogallic acid, ethanol, and KOH. RP-HPLC analysis of the standard was performed with the Waters HPLC System (Waters, Germany) equipped with C18 column (5 m, 4.6 × 150 mm) and UV /Visible detector. UV detection was recorded at 325 nm for vitamin A, 264 nm for vitamin D2, 290 nm for vitamin E, and 248 nm for vitamin K. Water soluble vitamins were extracted following the standard procedures by using the extracting solution containing metaphosphoric acid and acetic acid. A standard solution of water soluble vitamin B was run before analysing the plant samples. Chromatographic separation was achieved on a reversed phase HPLC column (C18 column, 5 m, 4.6 × 150 mm) through the isocratic delivery mobile

phase (A/B 33/67; A: MeOH, B: 0.023 M H_3PO_4, pH = 3.54) at a flow rate of 0.5 mL/min and UV absorbance was recorded at 270 nm. For vitamin C chromatographic separation was achieved on an RP-HPLC column through isocratic delivery of a mobile phase (water:acetonitrile 85:15) and UV absorbance was recorded at 254 nm. For the analyses of mineral (Zn, Fe, Cu, Se, Mg, Mn, and Cr) concentrations, plant samples were digested with HNO_3/ H_2SO_4 at 40-60°C until a clear solution is found. The solution was stored at room temperature for further analyses by atomic absorption spectroscopy.

Project Title: **Vitamin K as an adjuvant therapy for the prevention of insulin resistance and vascular inflammation in diabetes**

Project No: **GAP-733**

Funding Agency: Department of Biotechnology (DBT), Govt. of India

PI & Members: Dr Prasenjit Manna (PI)

Objectives:

- Aim 1: Does vitamin K supplementation prevent hepatic insulin resistance and upregulate glucose homeostasis in diabetic animals?
- Aim 2: Does vitamin K have any effect on glucose metabolism in adipose tissue to upregulate glucose homeostasis in the body?
- Aim 3: Does vitamin K supplementation have any effect on the pro-inflammatory cytokines to reduce vascular inflammation and improve insulin sensitivity and glucose metabolism in diabetic animals?
- Aim 4: Do the vitamin K-dependent proteins mediate the effect of vitamin K on insulin sensitivity, glucose homeostasis, and vascular inflammation?

Salient Achievements:

- The study demonstrated that circulating vitamin K (VK) has a positive effect on lowering fasting glucose, insulin resistance, and inflammation in type 2 diabetes via regulating SIRT1/AMPK signaling pathway. The discovery of this novel link between VK, insulin resistance, and glucose metabolism will increase the understanding about the role of VK in the pathogenesis of impaired glucose metabolism in T2D, which should in turn lead to the design of clinical interventions to improve glucose metabolism and the lives of the diabetic patient population.

Project Title: **Novel therapeutic against metabolic syndrome via activation of coagulation unrelated vitamin K dependent proteins**

Project No: **GPP-331**

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Prasenjit Manna (PI)

Objectives:

- To examine the link between activated/non-activated coagulation unrelated VKDPs and the determinants of metabolic syndrome among young adults.

- To examine the role of activated/non-activated coagulation unrelated VKDPs against adipogenesis, insulin resistance, glucose intolerance, hyperlipidemia, and inflammation in cell culture and animal models of metabolic syndrome.
- To investigate the molecular mechanism underlying the beneficial role of activated/ non-activated coagulation unrelated VKDPs against metabolic syndrome using both cell culture and animal models.
- To identify the potential therapeutic(s) for the treatment of metabolic syndrome.

Salient Achievements:

- The study demonstrated a significant decrease in plasma levels and hepatic protein expression of cGas6 (carboxylated growth arrest specific protein 6) in HFD (high fat diet)-fed mice and VK (vitamin K) supplementation dose-dependently increased both plasma concentration and protein expression of cGas6 in HFD-fed mice. However, different treatment did not cause any change in the circulating concentration or protein expression of Gas6 in all the experimental animals. This study suggests a beneficial effect of VK in upregulating the both circulatory levels and tissue protein expression of cGas6 but not Gas6 in HFD-fed mice. VK supplementation also dose-dependently reduced both hepatic and plasma levels of MCP-1 and ICAM-1 in HFD-fed mice. Cell culture studies with gamma-glutamyl carboxylase (enzyme causes VK-dependent carboxylation of Gas6) knockdown hepatocytes and monocytes dissected the direct role of Gla-Gas6 in inhibiting high palmitic acid (0.75 mM)-induced inflammation via arresting MCP-1/ICAM-1 mediated hepatocyte-monocyte adhesion. The present study demonstrated an important role of Gla-Gas6 in facilitating the prophylactic effect of VK against hyperlipidemia associated inflammation.

Project Title: **Molecular investigation into the Lignocellulolytic system of a few wild silkmoth in North-East India**

Project No: **GPP-359**

Funding Agency: Department of Biotechnology (DBT), Govt. of India

PI & Members: Dr Ratul Saikia (PI), Dr Jatin Kalita (Co-PI), Dr Pallab Pahari (Co-PI), Mrs A Yadav, Ms Parishmita Gogoi

Objectives:

- Impact of host plant range on the microbial community in *Antheraeaassamensis* Helfer and *Samiaricini* Donovan
- Lignocellulose degradation by the gut microbes associated with *Antheraeaassamensis* Helfer and *Samiaricini* Donovan
- Molecular characterization of the lignocellilotic biomass degrading enzyme

Salient Achievements:

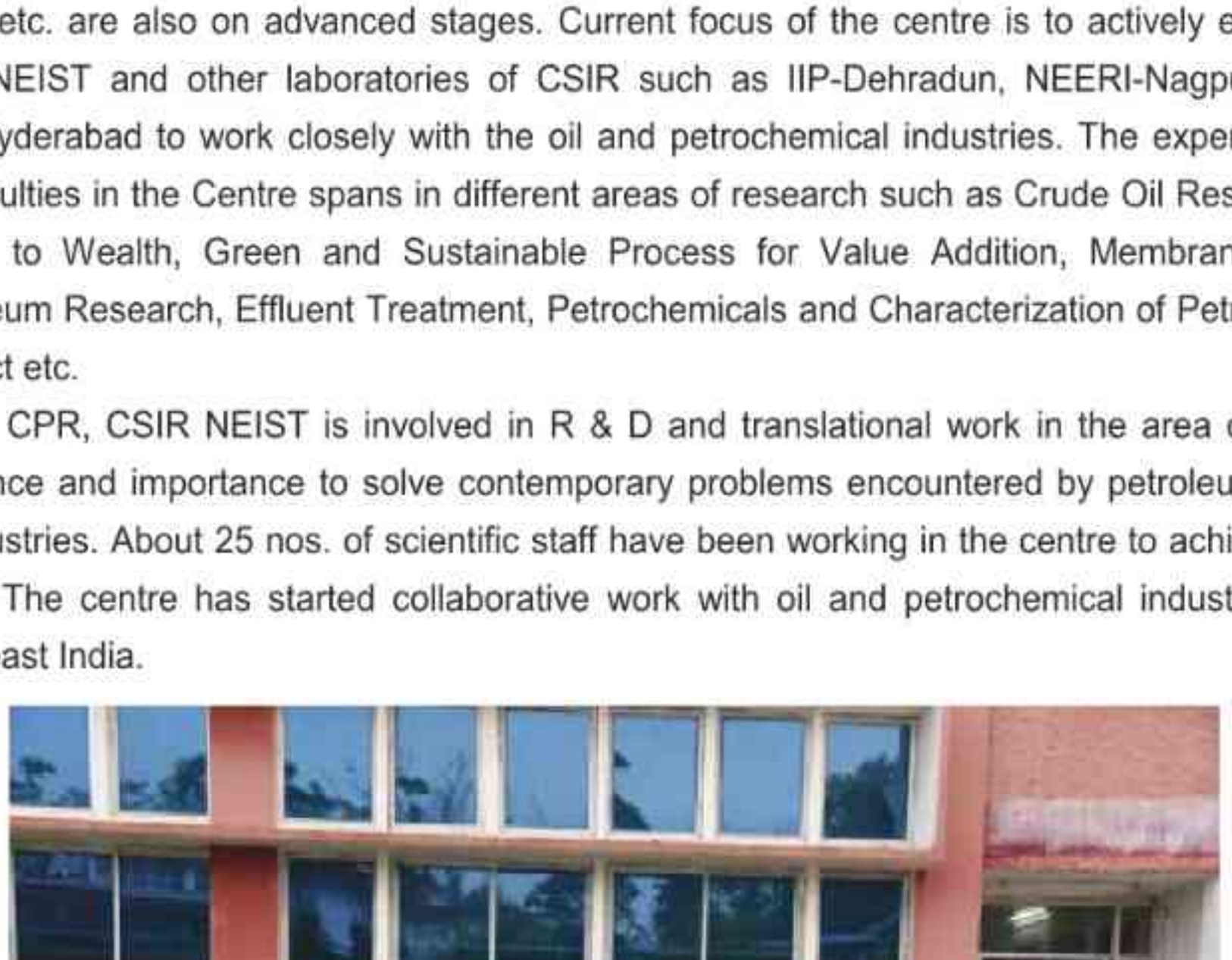
- Bacterial communities living inside the gut of the polyphagous Eri silk moth (*Samiaricini*) and Muga silk moth (*Antheraeaassamensis*) may provide several benefits to the host. A total of 250 putative gut bacteria were isolated from the different developmental stages of the larvae of *Samia ricini* based on colony morphology and 16S rRNA gene sequences (NCBI Accession No. MW784856 - MW784875). Most of the isolates belonged to *Bacillus*, *Staphylococcus*,

Pseudomonas, Paenibacillus, Acinebacter, Leclercia, Mammaliicoccus and *Ochrobactrum*. The present study suggests that the bacterial diversity in the gut of silkworm is diverse. While, 43 showed positive CM Case activity and 29 showed positive xylanase activity out of the 250 isolates, the maximum activity was recorded in *Bacillus subtilis* (SB11). The extracellular xylanase enzyme obtained from SB19 cultures was purified to homogeneity by ammonium sulfate (90%) precipitation; the enriched crude xylanase preparation was salted out with molecular weight cut of 10 kDa. The dominant populations can be used to make probiotic products for nutrient absorption and disease prevention in Eri-silkworm to improve yield as well as the quality also.

CENTRE OF EXCELLENCE (CoE) FOR PETROLEUM RESEARCH

Centre for Petroleum Research, CSIR NEIST, was established in the year 2019 under the leadership of Dr G Narahari Sastry, Director, CSIR NEIST to carry out research in the areas of high relevance and importance to solve contemporary problems encountered in petroleum research and oil industries. Due to the unique location of CSIR-NEIST in an area with high representation of many oil companies such as OIL, ONGCL, IOCL, APL, BCPL and NRL, etc. many have shown keen interest to work along with CSIR-NEIST. As a result, CSIR NEIST has signed MoU with NRL, BCPL, OIL, APL etc. Other additional MoU's with ONGC, IOCL, etc. are also on advanced stages. Current focus of the centre is to actively engage CSIR-NEIST and other laboratories of CSIR such as IIP-Dehradun, NEERI-Nagpur and IICT-Hyderabad to work closely with the oil and petrochemical industries. The expertise of the faculties in the Centre spans in different areas of research such as Crude Oil Research, Waste to Wealth, Green and Sustainable Process for Value Addition, Membranes for Petroleum Research, Effluent Treatment, Petrochemicals and Characterization of Petroleum Product etc.

CPR, CSIR NEIST is involved in R & D and translational work in the area of high relevance and importance to solve contemporary problems encountered by petroleum and oil industries. About 25 nos. of scientific staff have been working in the centre to achieve its goals. The centre has started collaborative work with oil and petrochemical industries of north east India.



CSIR-NEIST Centre for Petroleum Research

In March 2021, Ministry of Chemicals and Fertilizers, Department of Chemicals and Petrochemicals has sponsored a program for setting up a Centre of Excellence (CoEs) at

CSIR NEIST for the project titled "Polymers, their composites and polymeric membranes for sustainable development of Petroleum industries". The work is designed specifically with four work elements which are linked for different activities, primarily **1**. Development of polymeric products for packaging applications, **2**. Development of polymeric membrane for waste water treatment leading to environmental protection including recirculation, **3**. Development of polymer additives for improving the flow of the crude and **4**. Seismic hazard assessment and disaster management for OIL and Petrochemical industries. Towards the sustainable development in the petroleum industry, the product which will be developed under the project will have long term impacts on the Oil and Petrochemical Industries for their techno economic growth.

"Centre of Excellence" for Petroleum Research

Ongoing Projects

I. In-house, Grant in aid & Consultancy Projects

Project Title: **Centre of Excellence** "Polymers, their composites and polymeric membranes for sustainable development of Petroleum industries"

Project No: **GPP-373**

Funding Agency: Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers

PI & Members: Dr G Narahari Sastry (PI), Dr Swapnali Hazarika (Co-PI), Dr Sangeet Sharma (Co-PI), Dr J Jayaramudu (Co-PI), Dr Prakash Jyoti Saikia (Co-PI), Dr Upendra Nath Gupta (Co-PI)

Objectives:

- Design and development of composite polymeric materials (based on synthetic and bio based polymers) for packaging applications.
- Recycling of polymer waste viz. PET, PP, PE, PS, etc. to produce non-woven fabric / fibre for PPE/green applications
- Development of Carbon nanomaterial such as carbon nanotube, Grapheneoxide, Cellulose nanocrystals based engineered membranes for treatment of waste water of Oil and Petrochemical industries.
- Pilot tests of developed membranes for technology demonstration and to gather technical data for process scale up
- Development of polymers with controlled architecture and desired properties as flow improver for NE Indian waxy crude.
- To study the influence of resultant polymers on the flow behaviour of waxy crude and to understand the interaction mechanisms between polymer additives and wax crystals.
- Monitoring of land subsidence in and around oil field, crude pipelines and petroleum industries.
- Assessment of state of health oil installations so far as earthquake response is concerned.
- Seismic hazard assessment of Petrochemical industries and subsequent mitigation measures.

Salient Achievements:

- Designed and prepared nano-fillers using clay and other inorganic fillers and synthetic/bio-polymer based composite with improved thermal and mechanical properties.
- Developed a polymeric membrane with enhanced selectivity for separation of oil and water.
- Work is in progress for synthesis and characterization of alkyl (meth) acylate polymers.
- Collection of databases (22°N 87°E and 30°N 98°E) covering a period from 2012-2020 are derived from ISC (International Seismological Centre) catalogues.
- Synthesis and characterization of alkyl (meth)acylate polymers using different polymerization techniques as polymeric additive for NE waxy crude oil.
- **Design of Catalyst for Synthesis of Polypropylene carbonate (PPC):** Polypropylene carbonate (PPC) is thermoplastic material. It is used as sacrificial binder in preparation of electro-ceramics viz. dielectric materials and piezoelectric ceramics. It can be blended with bio and synthetic polymers to make plastics or films. In this work, PPC have been synthesised from its monomer i.e. propylene carbonate

over a catalyst. The polymerization of the monomer i.e. propylene carbonate is confirmed by the GPC analysis. The molecular weight of the PPC synthesized was found to be 13717 g/mol.

Mw : 102.9 g/mol Mw : 13717 g/mol

Project Title: **Assessment of air, water and soil quality in Baghjan oil blow out site and its vicinity, Tinsukia, Assam**

Project No: **GPP-375**

Funding Agency: Central Pollution Control Board (CPCB), New Delhi

PI & Members: Dr Saurabh Baruah (Co-ordinator), Dr Lakshi Saikia (PI), Dr Prakash Jyoti Saikia (Co-PI), Dr Prasenjit Saikia (Co-PI), Dr Sangeeta Sharma (Co-PI), Dr R Saikia, Dr S Deori, Dr A M Das, Dr S Hazarika, Dr Sangeet Sharma, Dr J Kalita, Dr C Rajkonwer

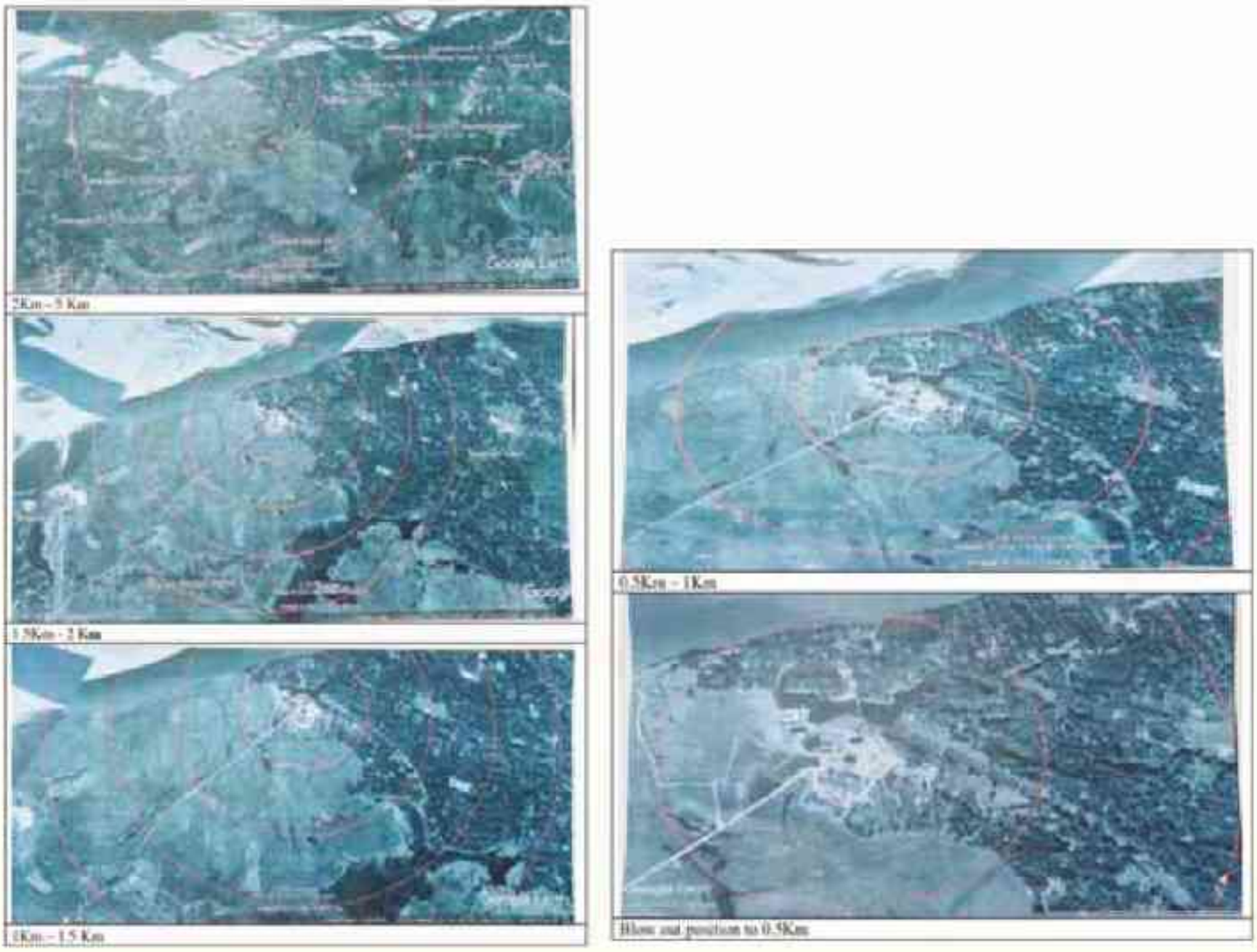
Objectives:

- To collect and monitor ambient air, surface water, ground water and soil pollution parameters in Baghjan oil blow out site and its vicinity
- To assess environmental conditions associated with blow out.
- To assess the interrelation between geo-bio-chemical processes in these areas.
- To quantify the pollution level in and around.
- To create environmental database in and around.
- To conduct Epidemiological study in and around the Baghjan site
- Analysis of Ground and Surface water (As per IS /APHA Guidelines)

Salient Achievements:

- The team of CSIR-NEIST, Jorhat has visited the site on 12.02.21 and identified the sites in and around the Baghjan blow out site. Samples were collected from the affected Baghjan area within a dimeter of 5 km. The zones within it have been divided into five segment rings of diameter 0-0.5 km,0.5-1.0 km (B), 1.0-1.5 km (C), 1.5-2 km (D) and 2-5 km (E). Based on agricultural land, Forest land and village areas of the baghjan sites as per the proposed distance from the blow out site has been identified for sampling based on the satellite image of the site as shown below. The sites of sampling have been distributed across the circular co-ordinates as per

the satellite image from bagjan village to Guijan village on east and west site the blow out site respectively and also from Hatibatgaon to Dibru-Choikhowa forest on the South and Northern part of the site.



- Collection of soil and water samples of different locations of two circles i.e. 0-5 km and 0.5-1.0 km around the blow out site were performed. The physic-chemical analyses of the soil samples as well as chemical analysis of the water samples are in progress. The rest of the samples from other circles will be done within short time and analysis of the remaining will be done.

Project Title: **Removal of phenol from sour/stripped water, It's value addition and recycling of water**

Project No: **CLP-289**

Funding Agency: Numaligarh Refinery Limited, Golaghat, Assam

PI & Members: Dr Swapnali Hazarika (PI), Dr Pravin G Ingole (Co-PI), Er Ravi Kumar Lingam (Co-PI), Dr R K Rawal, Er P Majumder, Er T H Ahmed

Objectives:

- To develop a suitable process for treatment of phenolic waste water generated from Sour water section of Sulphur recovery block of NRL and recycling of treated water.

Salient Achievements:

- Collected samples from refinery site and characterized them to know the wastewater composition. We have designed novel membrane and adsorptive materials for treatment of phenolic waste water.

CSIR-NEIST signed an MOU with Numaligarh Refinery Limited on 24th February 2021 for implementation of a project on Wastewater treatment. Dr. G N Sastry , Director, CSIR-NEIST and Mr. Ghanashyam Hazarika,General Manager(Chemical) Numaligarh Refinery Limited signed on behalf of respective institutes

Project Title: **Seismological and geophysical investigation at the Baghjan well blowout site and its vicinity, Tinsukia**

Project No: **CNP-475**

Funding Agency: Oil India Ltd., Duliajan

PI & Members Dr Saurabh Baruah (Co-ordinator), Dr Manoj Kumar Phukan (PI), Dr Santanu Baruah (Co-PI), Dr Sangeeta Sharma (Co-PI), Dr Bijit Kumar Choudhury (Co-PI), Dr G Baruah, Mr S M Bhattacharyya, Mr T Chetia, Mr C Dey, Mr A Gogoi, Mr P Borthakur, Mr P Kalita, Mr P Dutta

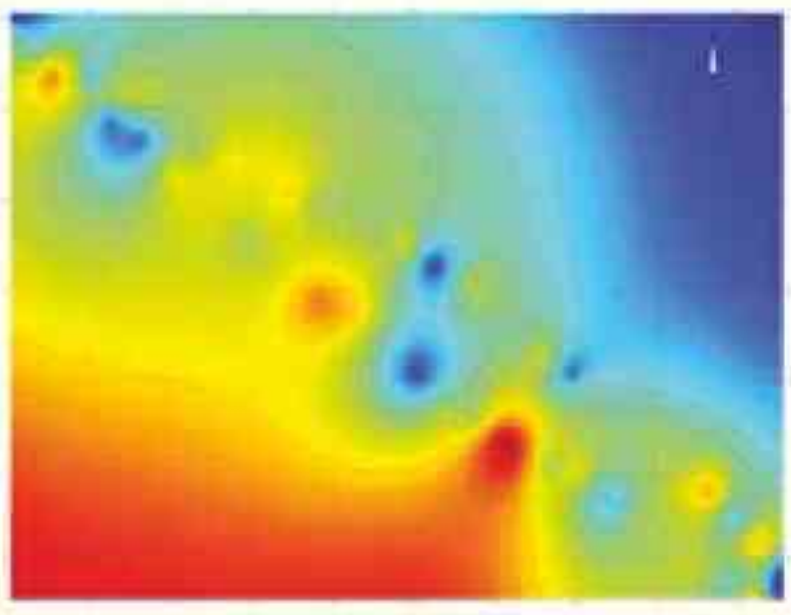
Objectives:

- To conduct a seismic investigation of the well blowout site with broadband (BB) seismograph and Strong Motion Accelerograph (SMA).
- Conduct a series of surveys using ground resistivity meter, proton precession magnetometer (PPM) and Very Low Frequency (VLF) electromagnetic sensors, apart from Interferometric Synthetic aperture Radar (InSAR) investigation to detect any possible ground deformation due to the blowout.

Salient Achievements:

- Under the project, broadband seismic sensors were recorded the data like: Local earthquakes occurring in the NE India and adjoining areas, Regional/teleseismic earthquakes, A number of very local micro-earthquake occurring at Baghjan and

adjoining areas, Continuous vibration coming from the blowout site and Intermittent high frequency disturbances. In the geophysical investigation three types of surveys were conducted for Ground electrical resistivity, Proton precession magnetometer (PPM) and Very low frequency (VLF) electromagnetic systems. The surveys showed significant variations in all the geophysical parameters during various stages of surveys. The strong motion accelerograph (SMA) also recorded several local, regional and very local events during the study period. The maximum ground motion in terms of peak ground acceleration (PGA) recorded was 0.0027g due to a local earthquake occurred on 23.06.2020. The PGA was not significant to cause any damage to the dwellings. Interferometric synthetic-aperture radar (InSAR) data were analyzed to detect any surface deformation at the vicinity of the blowout site. Several sets of acquired InSAR data processed and analyzed. The InSAR data did not show any surface deformation.



CHEMICAL SCIENCES & TECHNOLOGY DIVISION

Chemical Science & Technology Division (CSTD) is a multi-disciplinary division of CSIR-NEIST, Jorhat, which is dedicated for frontline research at the frontiers of modern chemical research with emphasis on effective utilization of the vast resources of the North East India. The division has two groups (i) Applied Organic Chemistry Group (ii) Natural Products Chemistry Group and all these groups have maintained the highest standards of excellence in research.

The Applied Organic Chemistry Group (AOCG), which is under Chemical Science & Technology Division (CSTD) of CSIR-NEIST, Jorhat is devoted for novel basic and application oriented organic chemistry research works. The group is actively involved in the development of new synthetic methods for pharmaceutically important organic scaffolds, drugs/drug intermediates and agrochemicals. This Group is also involved in the synthesis of stable metal nanoparticles on nanoporous biopolymers/cellulose templates and their application in organic synthesis.

The major emphasis of **Natural Product Chemistry Group (NPCG)**, since its inception, has been on chemical investigation of selected traditionally reputed medicinal plants of the northeastern region of India for drugs, pest management agents and nutraceuticals. This Group has investigated a large number of plants and isolated a quite a good number of interesting molecules of different class having novel structures and published ~ 500 research papers in peer reviewed national and international journals. The Group has filed a sizeable number of patents and developed several technologies and transferred to private industries, as well. In the recent past, this Group played a key role in developing two herbal drugs: one for treatment of rheumatoid arthritis and one for fungal infection.

Ongoing projects

I. Mission Mode

Project Title: Development of processes for active pharmaceutical ingredients towards COVID-19: Process for KSM of Lopinavir and Ritonavir

Project No: HCP-0029

Funding Agency: CSIR, New Delhi

PI & Members: Dr Sanjib Gogoi (PI), Dr Subrata Ghosh (Co-PI), Dr A M Das, Dr P Gogoi, Dr G Baishya, Dr P Pahari, Dr R A Maurya, Dr ARoy, Mr G K Rastogi

Objectives:

- Development of scalable processes for the key starting materials of lopinavir and ritonavir.

Salient Achievements:

- Synthesis of some important molecules like Lopinavir and Ritonavir, active pharmaceutical ingredients towards COVID-19 and other some molecules having antiviral, fungicide and pesticidal activity. Completed the synthesis of one intermediate (S)-4-(dibenzylamino)-3-oxo-5-phenylpentanenitrile for the synthesis of KSM. Moreover, we have also using Grignard reaction on this intermediate to synthesize (S,Z)-5-amino-2-(dibenzylamino)-1,6-diphenylhex-4-en-3-one.

II. Inhouse, Grant in aid & Consultancy Projects

Project Title: **Development of efficient processes for important agrochemicals, antivirals, API's and related new chemical entities**

Project No: **OLP-2038**

PI & Members: Dr Sanjib Gogoi (PI), Dr A M Das, Dr P Gogoi, Dr S Ghosh, Dr G Baishya, Dr P Pahari, Dr R A Maurya, Dr A Roy, Dr R Baishya, Mr G K Rastogi, Mr J Bori, Mrs. R Borah

Funding Agency: CSIR, New Delhi

Objectives:

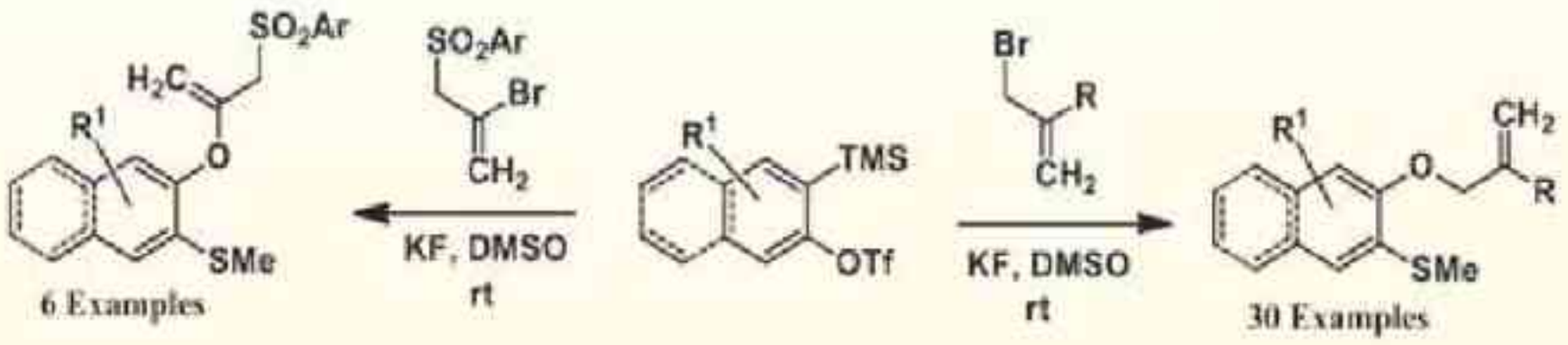
- Development of economically viable processes for commercially important agrochemicals, API's, KSM's and their key-intermediates for import substitution.
- Mapping of chemical diversity and value addition of natural resources from NE.
- Development of non-infringing processes for the synthesis of commercially important antiviral drugs and intermediates.
- Synthesis of new molecular scaffolds related to important antivirals, agrochemicals and API's.

Salient Achievements:

- Phytochemical analysis of ginger oleoresin: Phytochemical analysis of 24 different ginger varieties have been carried out using HPLC-HRMS analysis. Nine compounds namely, Hexahydrocurcumin, Tetrahydrocurcumin, Gingerenone A, 6-Gingerol, 8-Gingerol, 8-Gingerdione, Dehydro-6-gingerdione, 10-Gingerol, and Dehydro-8-gingerdione has been identified as possible marker. These nine compounds were present among all the tested varieties of ginger. In eight different ginger samples, the amounts of markers were relatively quantified using 4-methoxy benzoic acid as standard. Low level of diversity was observed across the studied ginger varieties. The target of this project is comparison of chemical diversity between available different ginger samples.
- Organocatalysis is fast becoming a sustainable strategy in chemical transformations owing to their innate ability of reduced energy consumption. Despite its inception and usage since past two decades, organocatalysis has not gained much importance because of their higher catalytic loading compared to metal catalysts, and lack of

reusability among others. In this regard, solid supported peptide catalysts can play a pivotal role in solving the issues of high loading and reusability. This project would aim to generate resin bound conformationally constrained peptide catalysts for important organic transformations, which will be used to generate API's and other biologically important moieties. There are several advantages of using peptide based catalysts owing to their biocompatibility, enormous scope of derivatitization, formation of conformationally constrained structures by combining synthetic amino acids to name a few.

- Specific objectives of the project would be the: Furthermore, heterogeneous peptide catalysts, in addition to their reusability, can be fine-tuned to mimic bio-catalysts, which can eventually be used for various bio-transformations. It's worth noting that till date there are only a few examples of peptide catalysts having beta or gamma amino acids. This proposal may therefore pave the way for the development of novel reusable peptide catalysts. The future applications of these catalysts, and products formed can be envisaged with the collaboration of various pharmaceutical companies.
- Direct Synthesis of *ortho*-Methylthio Allyl and Vinyl Ethers *via* Three Component Reaction of Aryne, Activated Alkene and DMSO: A synthetic strategy has been developed for the direct synthesis of *ortho*-methylthio allyl and vinyl ethers *via*three-component reaction of *in situ* generated aryne, activated alkene and DMSO. This reaction proceeds *via* several bond cleavages as well as bond formations in a single operation. Mechanism studies reveal that DMSO served as both methylthiolating agent as well as oxygen source. This synthetic method provides a wide range of *ortho*-methylthio substituted arenes in good yields.



R= -COOMe, -COOEt, Me, Br, -CH_2Br; R^1= H, Me, OMe

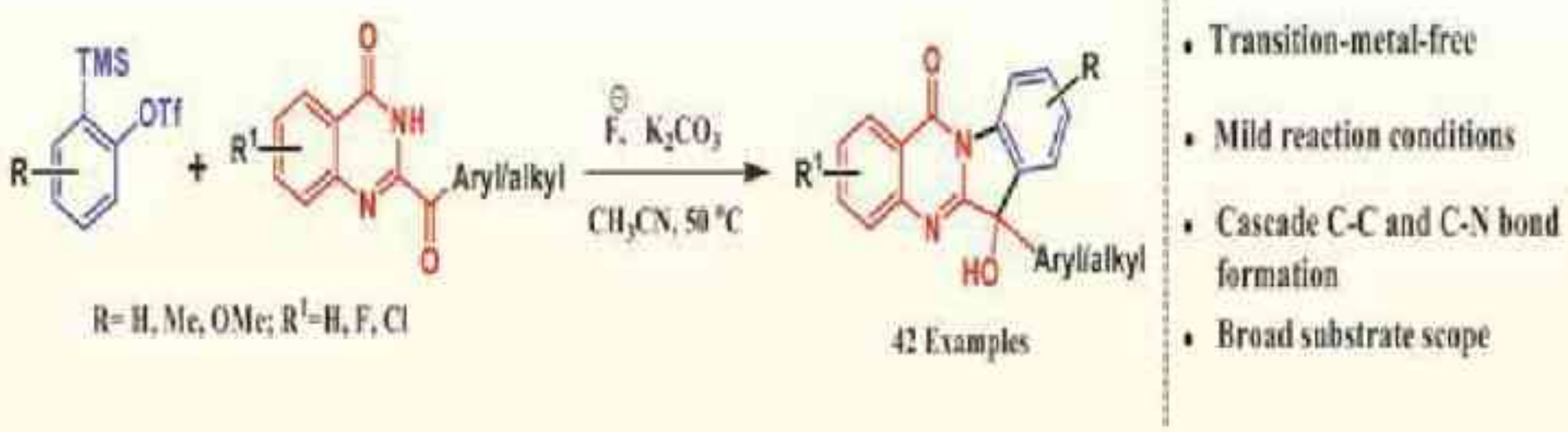
Ar= Ph, *p*-tolyl, *p*-chlorobenzene, *N*-phenylacetamide

- ***Ortho*-functionalization Transition metal-free**
- **Mild reaction conditionsSeveral bond clevages and bond formation**

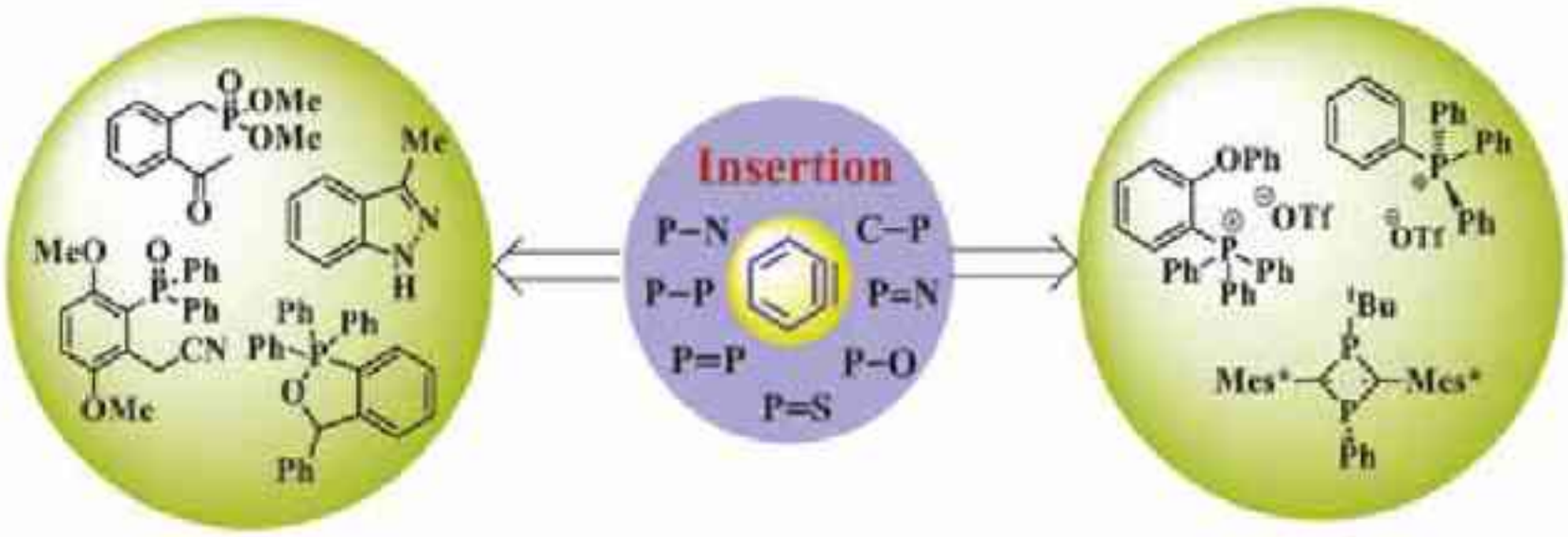
- Indane-Fused Spiropentadiene Chromanones: A Pd-Catalyzed Spiro-Annulation Followed by Cyclization *via* C-H Activation Strategy: Pd-catalyzed spiroannulation of 4-bromocoumarin with alkynes have been illustrated. The reaction highlights an interesting process for cascade formation of two five-membered rings through spiro-annulation followed by cyclization *via* C-H activation. This method offers an attractive

platform for the synthesis of a broad range of indane-fused spiropentadiene chromanones in good yields. Additionally, two of the synthesized compounds have been unambiguously confirmed by single crystal X-ray diffraction analysis.

- Synthesis of 6-substituted indoloquinazolinones from arynes and 2-acyl-4-quinazolinones: Transition-metal free C-N and C-C bond formation strategy: A versatile transition-metal free synthetic strategy has been developed for the direct synthesis of 6-substituted indoloquinazolinones from 2-acyl-4-quinazolinones and aryne precursors under mild conditions. This cascade strategy proceeds *via* successive C-N and C-C bond formations in a single reaction vessel by simple treatment with CsF and K_2CO_3. A diverse range of 6-substituted indoloquinazolinones were synthesized in good yields with excellent functional group tolerance.



- Recent advances in the synthesis of organophosphorus compounds via Kobayashi's aryne precursor: A review: Organophosphorus compounds are important structural motifs that unveil enormous applications, particularly in the field of organic synthesis, agriculture, material science as well as in medicinal chemistry. Additionally, *ortho*-substituted arylphosphorus compounds have played an important role in homogeneous catalysis. Though there are several synthetic pathways for the synthesis of organophosphorus compounds, however this review is particularly focused on aryne based methodologies reported in literature till date.



Project Title: **Natural products/ phyto-pharmaceuticals/herbal formulations/new chemical entities for value addition**

Project No: **OLP-2054**

Funding Agency: CSIR, New Delhi

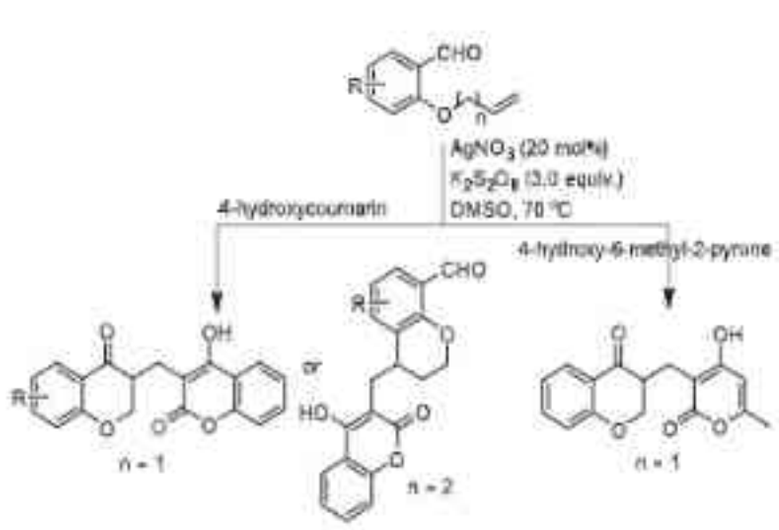
PI & Members: Dr Archana Moni Das (PI), Dr S Ghosh, Dr G Baishya, Dr S Gogoi, Dr P Gogoi, Dr P Pahari, Dr R A Maurya, Dr A Roy, Dr R Baishya, Mr G K Rastogi, Mr J Bori, Mrs. Rumi Borah, Dr R Konwar, Dr C Tamuli, Dr D Banik

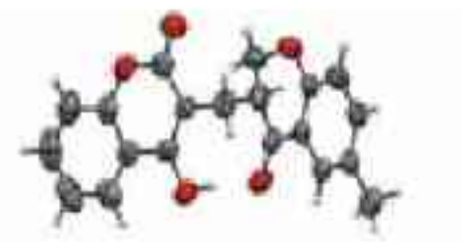
Objectives:

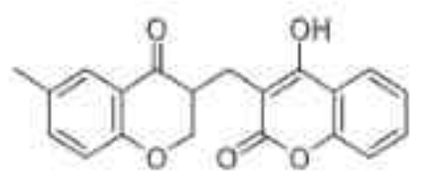
- Bioassay guided extraction and isolation of secondary metabolites from selected medicinal plants against different diseases and chemical investigation of the active extracts for drug like molecules.
- Studies on novel chemistry and their application in the synthesis of natural products and bioactive molecules.
- Development of Natural Products and their analogues for their phyto-pharmaceuticals, chemical profiling, identification of marker compounds and herbal formulations.
- Maintenance of the state-of-the-art equipment and facilities and animal house facility and providing services.

Salient Achievements:

- **Direct synthesis of 4-hydroxycoumarins and 4-hydroxy-6-methyl-2-pyrone containing chroman-4-ones via silver catalyzed radical cascade cyclization reaction:** For the first time, we report a novel silver catalyzed radical cascade cyclization reaction of 2-(allyloxy) arylaldehydes to synthesize two new libraries of chroman-4-ones by using 4-hydroxycoumarins and 4-hydroxy-6-methyl-2-pyrone as radical precursors. $AgNO_3/K_2S_2O_8$ acts as an efficient oxidizing system and smoothly drives the reaction producing the 4-hydroxycoumarins and 4-hydroxy-6-methyl-2-pyrone containing chroman-4-ones in moderate to good yields. The protocol also makes different chemoselective products while using 2-(but-3-en-1-yloxy)benzaldehydes as radical acceptors. We have confirmed the participation of radicals by performing various radical trapping experiments with 2,2,6,6-tetramethylpiperidine-1-oxyl, butylated hydroxytoluene, and diphenyl ethylene (Manuscript communicated).







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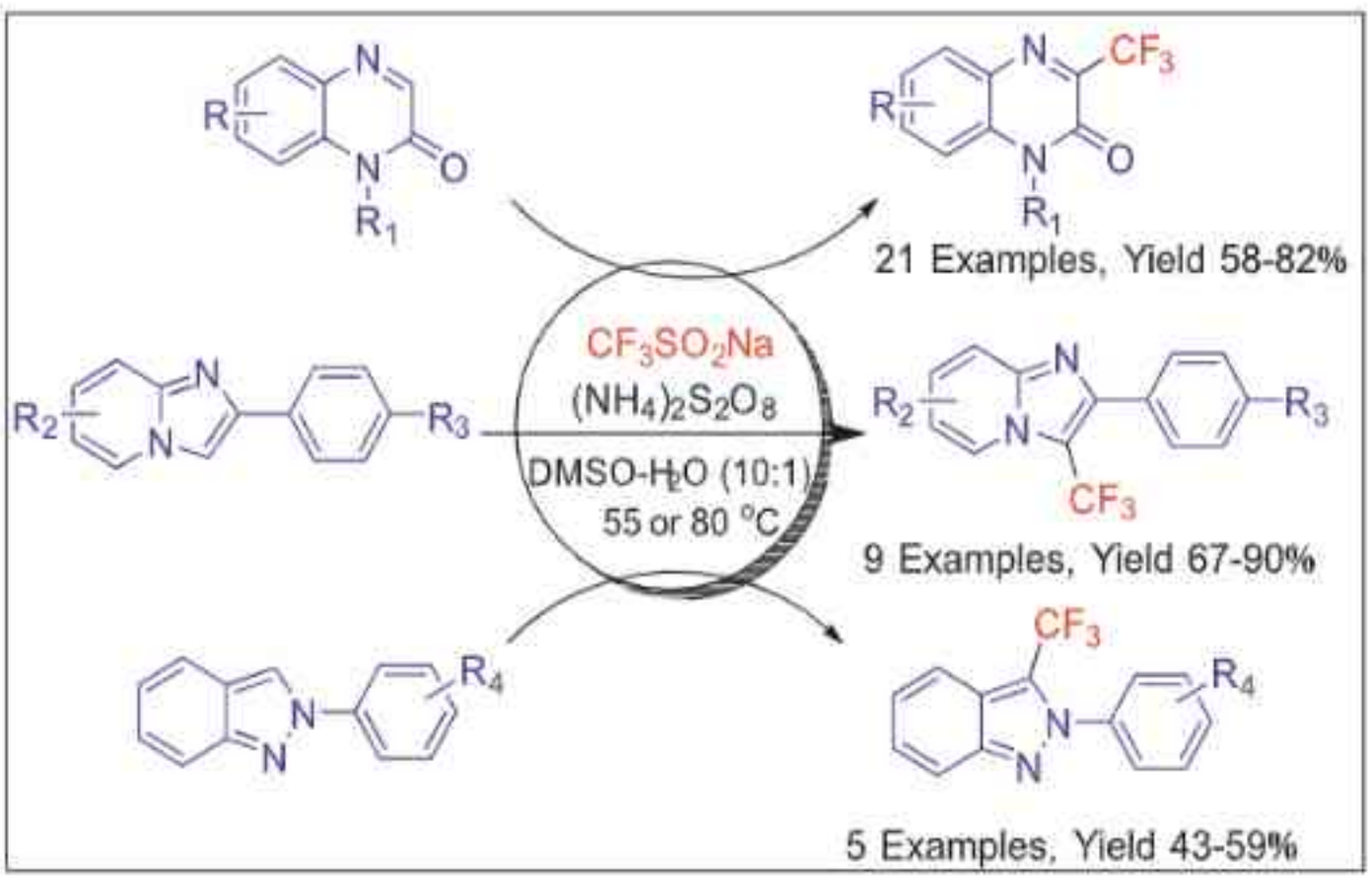
Scheme 1. Radical cascade cyclization reaction for the synthesis of chroman-4-ones and chromans.

- ***Metal-, Photocatalyst-, Light- and Electrochemical-Free C-3 Trifluoromethylation of Quinoxalin-2(1H)-ones, Imidazo[1,2-a]pyridines and 2H-Indazoles:*** An efficient free radical trifluoromethylation protocol for the synthesis of 3-trifluoromethylquinoxalin-2(1H)-ones, 3-trifluoromethylimidazo[1,2-a]pyridines and 3-(trifluoromethyl)-2*H*-indazoles under metal-, photocatalyst-, light- and electrochemical-free conditions has been established. The trifluoromethyl radical generated by the oxidation of sodium triflinate with $(NH_4)_2S_2O_8$ attacks on to the C-3 position of quinoxalin-2(1*H*)-ones, imidazo[1,2-a]pyridines and 2*H*-indazoles; and the excess SO_4^- completes the reaction furnishing their respective 3-trifluoromethyl derivatives. Radical scavenging experiments with (2,2,6,6-tetramethylpiperidin-1-yl)oxyl (TEMPO), butylated hydroxy toluene (BHT), and 1,1-diphenyletnhylene also prove the participation of radical.



Scheme 4. C-3 Trifluoromethylation of quinoxalin-2(1*H*)-ones, imidazo [1,2-a]pyridines and 2*H*-indazoles.

Project Title: **Herbal drug development for antimicrobial/anticancer from North-East based selected plants**

Project No: **GPP-332**

Funding Agency: NEC, Shillong, India

PI & Members: Dr Archana Moni Das (PI), Dr Rinku Baishya (Co-PI)

Objectives:

- Isolation, purification and characterization of active compounds from selected plant extracts.
- Phytochemical analyses of crude as well as pure products.
- In-vitro evaluation of plant extracts for antimicrobial, A549, MDAMB231, HepG2, HeLa and CLS354 activities.

Salient Achievements:

- Different plant species will be collected from the different parts of North East region of India and used for the investigation. Isolation of bioactive phytochemicals from plant materials are carried out using solvents like alcohols (methanol, ethanol), Pet. ether, diethyl ether, and ethyl acetate and mixtures of alcohol water etc. The extracted products have been dried using Rota vapour and lyophilizer. Purification is carried out in dry extracted products using TLC, column chromatography, HPLC etc. and characterized with the help of IR, ^{1}H NMR, ^{13}C NMR, mass spectra, x-ray etc. Using various metals like Ag, Au, Zn, Ni etc. biosynthesis of nanoparticles will be carried out from crude as well as pure products and characterized all by SEM, TEM etc.

Project Title: **Development of novel leads for anti-obesity from North East traditional system through chemistry biology interphase**

Project No: **GPP-350**

Funding Agency: Department of Biotechnology (DBT), Govt. of India

PI & Members: Dr Gakul Baishya (PI)

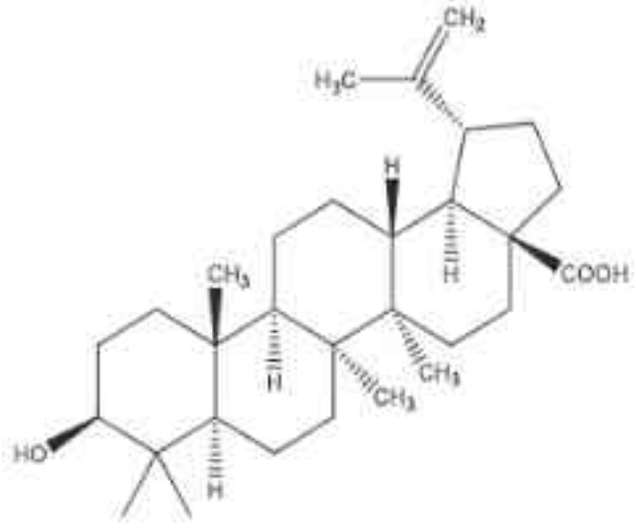
Objectives:

- Bioassay guided extraction and isolation of lead molecules against obesity from traditionally known medicinal plants (*Dillenia indica and Ipomoea aquatica*) from NE region.
- Screening of fraction and molecules against adipogenesis, hepatic steatosis (fat metabolism in liver) and pancreas lipase activity.

Salient Achievements:

- Fractionation of the hydro-ethanol extract and ethanol extract of D*illenia indica* leaf, fruits and bark xtract was done by column chromatography technique. The mixture of compounds isolated by column chromatography from methanol-chloroform fraction of the ethanol extract of *Dillenia indica* (bark parts) was again subjected to column chromatography for purification. After column chromatography purifications (many times), we can able to isolate a one pure compound (700 mg). Then, we started to

determine the structure of the compound (whether it is known or new) by the use of different spectroscopic analysis viz. NMR, mass and IR. The structure of the compound was identified exactly with the help of NMR, mass and IR characterizations. The major compound found from the bark parts of Dillenia indica was confirmed as betulinic acid. The purification is going on in repetition process to isolate more molecules (new and known) present in differnt fraction of the active extracts of *Dillenia indica.*



Betulinic acid

Project Title: **Continuous flow photochemistry: Visible light induced C-H functionalization and C-C/C-X bond formations to access valuable heterocycles and natural products**

Project No: **GPP-351**

Funding Agency: Department of Science & Technology (DST), Govt. of India

PI & Members: Dr Ram Awatar Maurya (PI)

Objectives:

- ❖ To develop novel visible light induced C-H functionalization in flow microreactor.
- ❖ To develop novel C-C/C-X bond formations via photo-generated intermediates in flow microreactor.
- ❖ Photosynthesis of key intermediates of important natural products in flow microreactor on multigram scale.

Salient Achievements:

Developed a visible light driven photochemical approach for the synthesis of medicinally relevant pyrrolocoumarin and a multi-component reaction to access spirooxindoles. These heterocycles are widely used in pharmaceutical industry. Our method is environmentally benign, sustainable and efficient. The reaction can also be performed under natural sun light to yield pyrrolocoumarin in good yields. We have also studied the mechanistic pathways involved in the reaction. While working in these projects, we have made two high impact publications: 1) [*Title of the publication*: Chemo-selective Synthesis of [indoline-3,4'-isoxazolo[5,4-b]pyridine Fused Spirooxindole Derivatives *via* Brønsted Acid Catalysed Three Component Tandem Knoevenagel/Michael Addition Reaction; *Name of the journal*: Results in Chemistry; *Impact factor of the journal*: Not announced yet; *Publication house:*

Elsevier; *Publication Year*: 2020; *Volume*: 2; *Page no.*: 100064] & 2) [*Title of the publication*: Photocatalyst-Free Visible-Light Enabled Synthesis of Substituted Pyrroles from K-Keto Vinyl Azides; *Name of the journal*: *Advanced Synthesis & Catalysis; Impact factor of the journal*: 5.851; *Publication house:* Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim; *Publication Year*: 2020; *Volume*: 362; *Page no.*: 3364 3368].

Project Title: **Oxidative addition and electrophile driven cyclization approach towards azaspirocycles: Synthesis and anticancer activity**

Project No: **GPP-356**

Funding Agency: SERB-Department of Science & Technology (DST), Govt. of India

PI & Members: Dr Pallab Pahari (PI), Dr Mintu Pal (Co-PI)

Objectives:

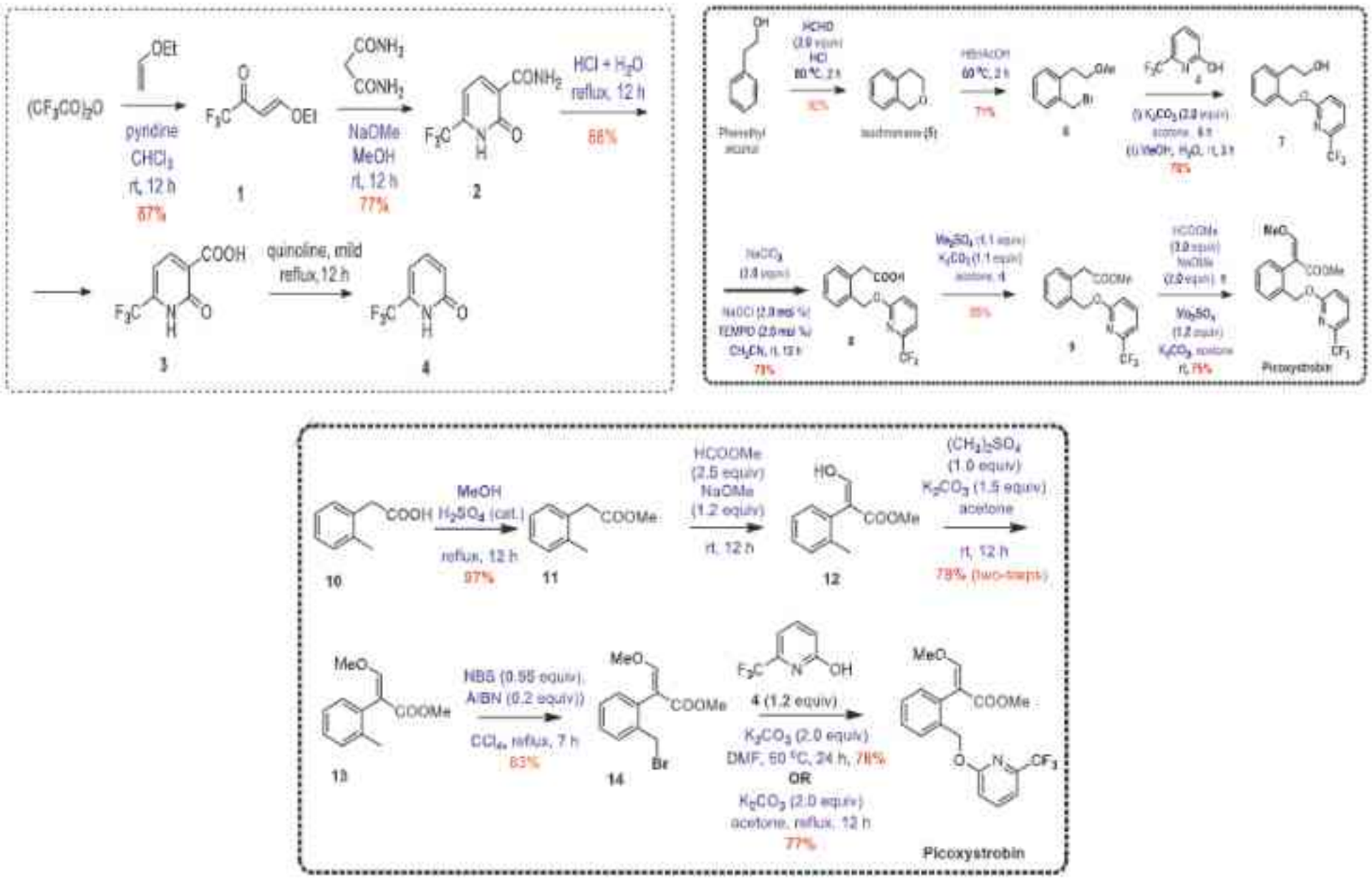
- Synthesis of azaspirocycles via intramolecular oxidative addition cyclization and electrophile driven intramolecular cyclization.
- Synthesis of library of azaspirocycles including skeleton of biologically active azaspirocyclic natural products and spiroindoloalkaloids.
- Study of in vitro cytotoxicity and anticancer activity of the synthesized compounds.

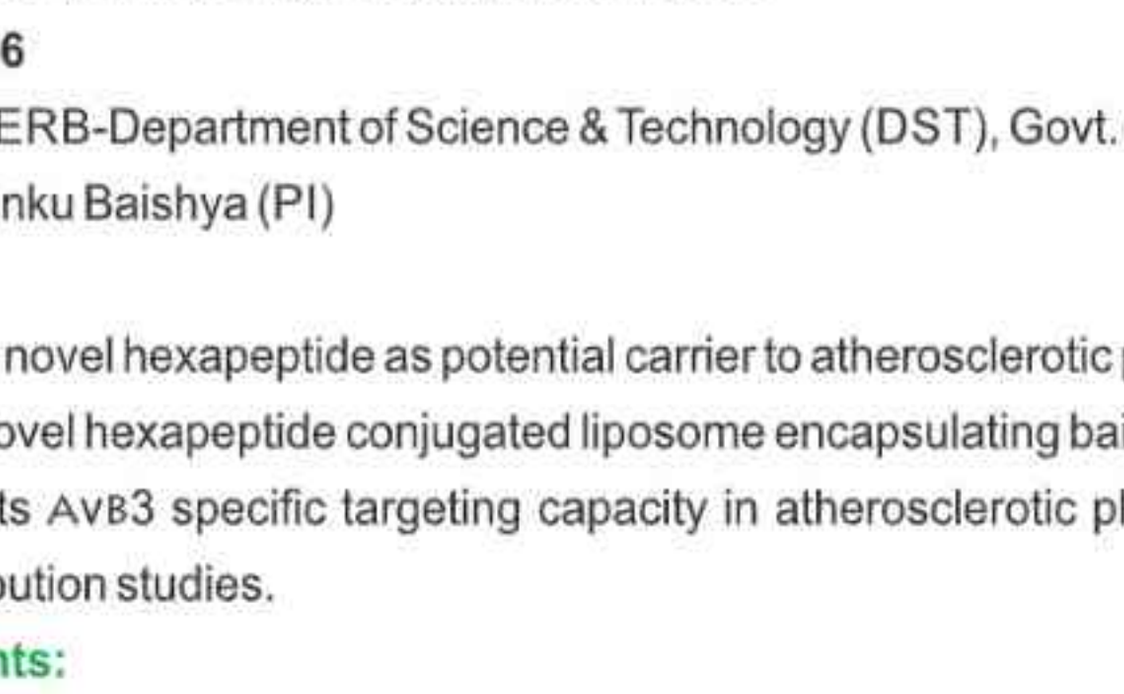
Salient Achievements:

- Synthesis of fluorinated spiro-1.3-thiazines We have developed a electrophilic fluorinating agent mediated intramolecularfluorinative cyclization of N-(2-(cyclohex-1-en-1-yl)ethylbenzthiamide for the production of fluorosubstituted spirothiazines. Thioamide was synthesized by a one pot reaction of benzaldehyde, elemental sulfur and 2-(1-cyclohexenylethylamine) in the presence of a reducing agent. Fluorinated spirocyclization of the thioamide results in the formation of the spirocyclic compounds.The structure of the prepared compound was determined using 1H and 13C NMR spectroscopy.The scope of the reaction was investigated by employing a range of different substituted N-(2-(cyclohex-1-en-1-yl) ethyl) thiobenzamides.
- Development of an efficient synthetic route for picoxystrobin: A CSIR-mission mode project was approved in the month of February, 2019, for the development of an efficient process for the widely used fungicide Picoxystrobin. Picoxystrobin inhibits fungal respiration and has both preventative and curative properties. Picoxystrobin was launched initially for control of yellow, brown and crown rusts, powdery mildew, sooty mold, net and leaf blotch and tan spot on cereal crops, including: wheat, barley and oats in Europe. DuPont has further developed picoxystrobin for use on soybeans in Latin America and in 2010, Picoxystrobin is currently registered in 28 countries. Picoxystrobin is marketed as a single ingredient fungicide and also in several mixtures with other fungicides. Current demand in India is 170 tonn ($ 6.5 million import). The main problem in large scale synthesis of this compound is the availability of the expensive key intermediate 6-(trifluoromethyl)pyridin-2-ol. In last

year, we focused our attention mainly to develop a route for this intermediate and the final fungicide. The key achievements are:

a) A method was developed for the synthesis of expensive key intermediate 6-(trifluoromethyl)pyridin-2-ol.
b) Using this method around 50 g of this important intermediate was synthesized.
c) We developed one non-infringing route for the synthesis of picoxystrobin in 2.0 g scale.
d) We could develop one more method for picoxystrobin using ortho-tolyl phenylacetic acid as the starting material. Using this method, we synthesized 20 g of the fungicide.





Project Title: **Design and evaluation of peptide assisted delivery strategy targeting αvβ3 integrin for potential alleviation of atherosclerosis**

Project No: **GPP-366**

Funding Agency: SERB-Department of Science & Technology (DST), Govt. of India

PI & Members: Dr Rinku Baishya (PI)

Objectives:

- To evaluate a novel hexapeptide as potential carrier to atherosclerotic plaque.
- To design a novel hexapeptide conjugated liposome encapsulating baicalin.
- To evaluate its AVB3 specific targeting capacity in atherosclerotic plaque through *in vivo* biodistribution studies.

Salient Achievements:

- Newly Sanctioned: Work in Progress.

Project Title: **Enantioselective synthesis of spirocycles using metal-catalyzed oxidative C-H activation reactions**

Project No: **GPP-367**

Funding Agency: SERB-Department of Science & Technology (DST), Govt. of India

PI & Members: Dr Sanjib Gogoi (PI)

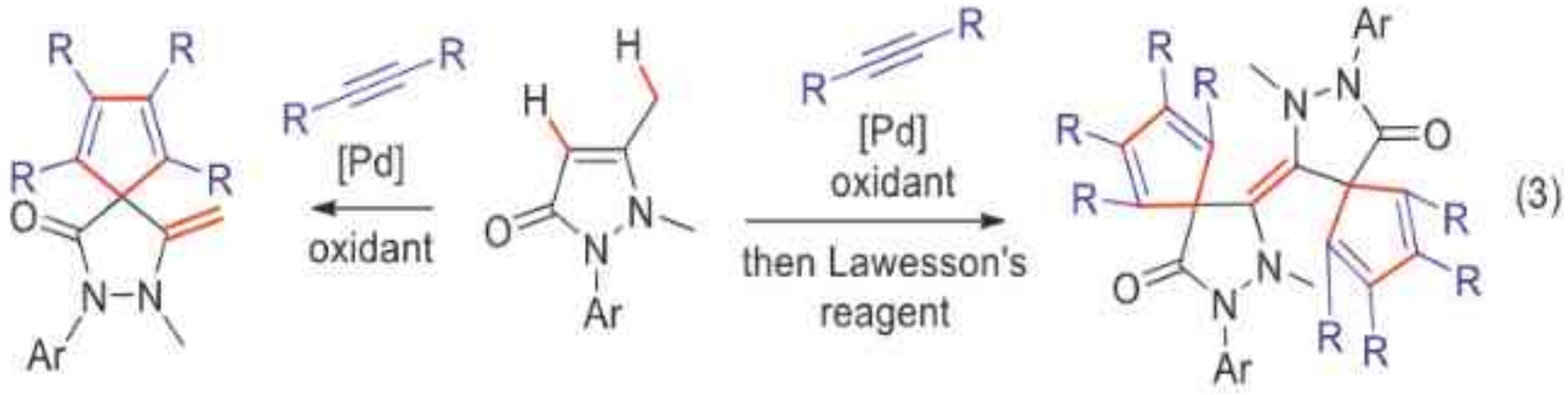
Objectives:

- To develop asymmetric synthesis of spirocyclic compounds using proper combination of metal complex and chiral ligand.

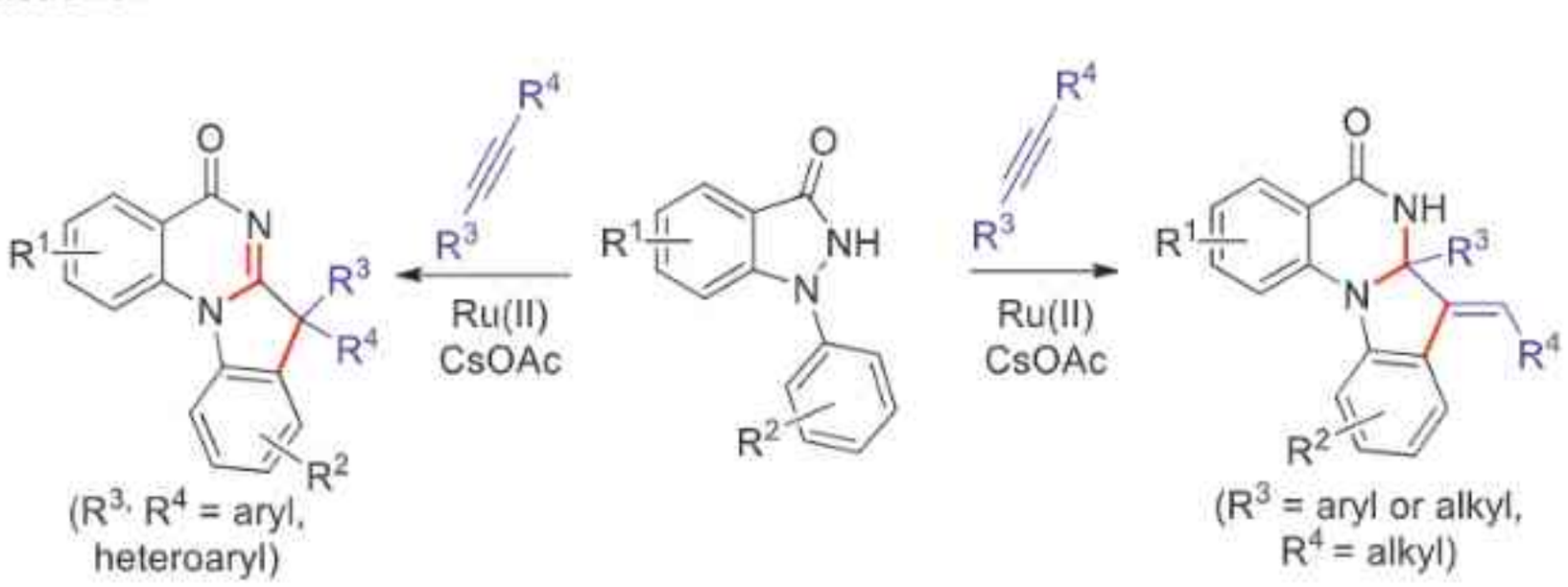
Salient Achievements:

- Developed a new transition-metal-catalyzed alkyne annulation reaction, where annulation proceeds via first activation of one olefinic C(sp^2-H) bond followed by second activation and concurrent rearrangement of one allylic C(sp^3-H) bond. This annulation reaction of antipyrines and disubstituted alkynes provides an efficient method for the synthesis of 4-spiro-5-pyrazolones which are the key structural motif .(140 .24 .,/.3-&1 ".0.40 - 3-/0&-2&!511.-61 0)-2

  mediated dimerization reaction of the resulted spiro-pyrazolones is also developed for the synthesis of fluorescent bis(spiro-pyrazolones).



- Developed a Ru(II)-catalyzed reaction of phenylindazolones with diaryl substituted alkynes and arylalkyl/dialkyl substituted alkynes which have provided an efficient route for the construction of all-carbon quaternary centered indolo[1,2-a]quinazolin-5(7H)-ones and quaternary carbon centered 6a,7-dihydroindolo[1,2-a]quinazolin-5(6H)-ones, respectively. Indolo[1,2-a]quinazolin-5(7H)-ones are formed via C-H activation, annulation and 1,2-aryl shift reactions whereas dihydroindolo[1,2-a]quinazolin-5(6H)-ones are formed via C-H activation, annulation and deprotonation reactions.



Project Title: **On water synthesis of N-Heterocycles as potential AIEgen using Mn catalyzed C–H annulation reactions: Its application for cell imaging**

Project No: **GAP-801**

Funding Agency: SERB-Department of Science & Technology (DST), Govt. of India

PI & Members: Dr Pitamber Patel (PI)

Objectives:

- Development of heterocycle based potential AIEgens via M-Catalyzed C-H annulations.
- Screening and catalytic evaluation of M-catalyst in water.
- Study of emission properties of the synthesized compounds to established its potential as AIEgen.
- Study of biochemical properties of the potential AIEgen and its utility in cell imaging.

Salient Achievements:

- Newly Sanctioned: Work in Progress.

ENGINEERING SCIENCES & TECHNOLOGY DIVISION

Engineering Sciences & Technology Division has three groups namely Applied Civil Engineering Group, Chemical Engineering Group and General Engineering Group and provides engineering inputs and services to different R&D projects of the Institute.

Chemical Engineering group provides a broad spectrum of engineering inputs to the other research and development groups at CSIR-NEIST. The group has expertise in coupled research of Applied and Basic research for generation of knowledge base and knowhow. The group is involved in industry oriented research in the area of Separation and Purification Technology, Reaction Calorimetry, Food & Nutraceuticals and Reaction Engineering & Catalysis. Membrane Technology is one of the priority research area of the group. Design and development of membrane for specific applications, Transport phenomena in solid/liquid membrane based separation, catalytic membrane reactors, facilitated transport in gas and liquid phases through host-guest chemistry are the basic/applied R&D work of the group. Membrane based Technology for separation of Biomolecules from natural feedstock, Racemic Resolution of drugs and pharmaceuticals, Gas separation, Treatment of Industrial waste etc. are the priority research work for Translational research from the group. Engineering analysis of chemical reaction systems i.e. reaction-diffusion phenomena in heterogeneous catalyzed reactions, Design and Scale up, Reaction calorimetry, development of process for food & nutraceuticals etc. are also the current activities of the group.

General Engineering Group has the expertise in the field of Engineering R&D, applied and translational research, technical consultancy, testing and evaluation S&T intervention for rural development, entrepreneurship and skill development activities. The thrust areas of research include Design & simulation, thermal-fluid analysis, advanced manufacturing, materials properties analysis, advanced welding technology etc. The Group also imparted skill development training on different trades like welding, fitting, plumbing, glass blowing, CNC, Weaving, etc. In addition this group provided infrastructural services to all the division by fabrication, repairing, maintenance, glass blowing services, vehicle repair (repair and maintenance), refrigeration and air condition services. General Engineering Group is involved in different types of technology development work; scale up of lab scale technology, optimization at commercial level, preparation of detail project report (DPR) and techno economic feasibility report (TEFR) etc.

Applied Civil Engineering Group is committed to research & development, technical consultancy, testing and evaluation of building and road materials. The main areas of research include geotechnical and transportation engineering and have expertise in geo-technical and transportation engineering. This Group is presently involved in R&D work for stabilization of Brahmaputra river bed materials for use in road construction and modular brick for building structures. The Group also renders technical consultancy services for soil investigation and evaluation of roads, and testing and evaluation services for road & building materials including

soil, cement, concrete, aggregates, brick and other construction materials. The department had contributed towards R&D activities in development of ferro-cement products, low cost housing techniques, light roofing sheets, water filter candles from paddy husk and also in the sector of structural engineering.

Ongoing Projects

I. FTT and FBR Projects

Project Title: **Development of an efficient and cost-effective process for production of Caffeine and Tannin from tea waste**

Project No: **MLP-1012**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Bipul Das (PI), Er Ravi Kumar Lingam (Co-PI), Dr Sanjib Gogoi (Co-PI), Mr Tobiul Hussain Ahmed (Co-PI), Dr Swapnali Hazarika (Co-PI), Dr P Pahari, Dr J Kalita, Er J J Bora, Dr D Kalita

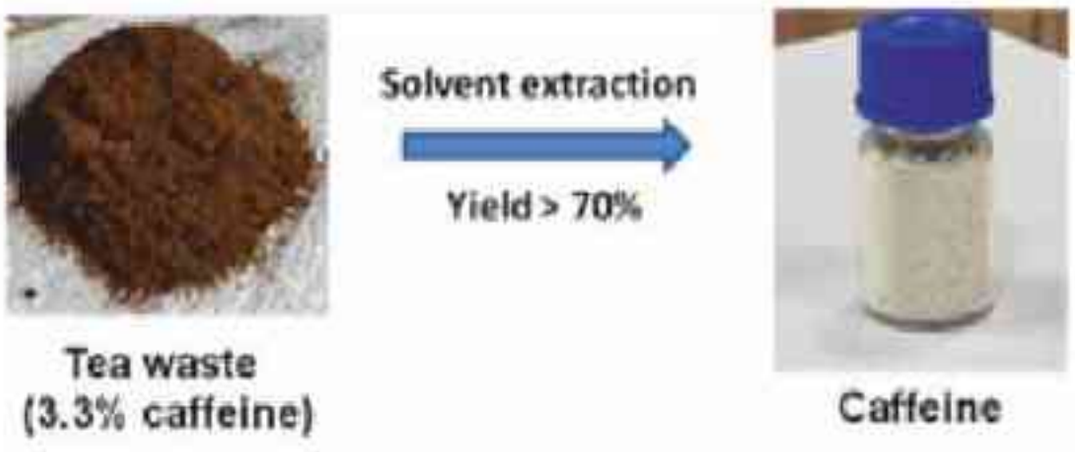
Objectives:

- Characterization of raw material, product and residue.
- To develop a cost-effective process for production of 1 kg per batch caffeine and tannin from tea waste.
- Development of value-added products from the tea waste residue remained after extraction of caffeine and tannin.
- Technology know-how package preparation for 50 kg/day caffeine and tannin production.

Salient Achievements:

- **Extraction of Caffeine from Tea waste**: Caffeine is a drug intermediate for the production of wide range of pharmaceutical formulations. Tea waste is the principal resources for the production of natural caffeine which contains 2 – 3.5% caffeine.

  Because of the huge demand of caffeine in global market, there is still a long way to go for production of natural caffeine using readily available unused tea waste of Assam to bring up the economic growth of this region. The proposed work is to develop a process technology for extraction of caffeine from tea waste of Assam using environmental friendly solvents in economic way. The detail technology know-how package will be made for setting up caffeine production unit to help various entrepreneurs and people of NER.



Project Title: **Development of microbial based process for bio-cement, bio-brick and self-healing concrete using locally available resources**

Project No: **MLP-1014**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Sanjay Deori (PI), Er Dipak Basumatari (Co-PI), Dr Ratul Saikia (Co-PI), Mr N P Borah, Mr R Das

Objectives:

- Development of microbial based bio-cement for use as an alternative eco-friendly construction materials.
- To develop methodology for production of bio-brick and microbial or self healing concrete using bio-cement and locally available raw materials in North East region.
- Study the strength and other engineering characteristics of the developed microbial based construction materials.

Salient Achievements:

- Collection of microbial strain from various bio-resources and natural materials.
- Bio-chemical characterization of collected microbial stains in the laboratory.
- Physico-chemical and morphological characterization of collected natural materials in the laboratory.

Project Title: **Development of processes for edible and industrial dyes from plant sources for enhanced income**

Project No: **MLP-1018**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Swapnali Hazarika (PI), Er J J Bora, Dr P G Ingole, Er R K Lingam, Mr T H Ahmed

Objectives:

- Development of process for extraction and separation protocol of edible and non-edible dyes from plant species.
- Structural identification of dyes and their stability, safety and toxicity studies.
- Application of dyes for food, cosmetics and textile uses.

Salient Achievements:

- The plant samples were collected as its fruit and whole plant depending upon the colour and literature about the dye content of the plants. After proper characterization extracted the dyes using green solvent. For separation of dyes hollow fibre membranes were designed and developed from locally available raw materials composite with commercial polymer. Designed and fabricated the specific membrane module for separation of natural dyes of orange and pink colour. Evaluated the performance of the hollow fiber module for dye separation.

Figure : (a) Hollow fibre membrane module for separation of natural Dyes (b) Red dye after membrane treatment (c) Orange dye after membrane treatment.

II. Skill Development Projects

Project Title: **Skill development training program of CSIR–NEIST, Jorhat**

Project No: **NWP-100**

Funding Agency: CSIR, New Delhi

PI & Members: Er Dipankar Neog (PI), Er Jayanta Jyoti Bora (Co-PI), Er Dhanjit Das (Co-PI)

Objectives:

- To facilitate short term multi-disciplinary skill trainings, enhancing rural economy of the state by creating productive manpower.
- To identify skill deficit sectors within the state by forecasting future demands and introduce new courses.
- Target mainly underprivileged youths of the state as well as promote gender equality in skilling.
- To facilitate national level accreditation to the skill trainees under various programs of NSDC.

Salient Achievements:

- The ongoing basic training are welding, fitting, plumbing, weaving, electrician, autocad drafting and the advancing trainings are on CNC, advance welding, AI-Machine Learning.
- The skilled youths have gradually started to work in their nearby fabricating workshops or set up a small shop of their own, thereby contributing towards their family earning. The Jacquard weaving training has benefitted many rural underprivileged women possessing their weaving skills. Through the weaving training, each trained women weavers are earning Rs 7000.00-15000.00 per month, thus fulfilling the **SDG 'No poverty, Zero hunger'**.
- Targeting national accreditation, the skill trainings are successfully registered under PMVKY 3.0. A total of 12 numbers of QPs (Qualifications Packs) are applied which was already registered by NSDC, Skill India, Ministry of Skill Development, Govt. of India. Our application for PMKVY 3.0 is under review at NSDC, Skill India, Ministry of Skill Development, Govt. of India.
- Our trained weavers are linked with the national level organization WeAct (Women Entrepreneurs Access Connect Transform), which is formed by the software company Accenture, Bangalore under their CSR program. This association of our trained

weavers are done through our associated NGO "SNEHPAD". The trainees to whom we have given the soft skill of jacquard weaving have started the commercial production by taking loans for financial institutes. WeAct and Entrepreneurship Development Institute of India (EDII) helped them to become successful entrepreneur in terms of providing guidance in marketing, publicity, branding etc. On the other hand, a bulk order has been delivered to a Bangalore firm by Milijuli Weavers Group supported by Accenture-EDII, which is formed by our handloom trainees for an amound of Rs. 2,50,000/- (lot-I of 500 pieces). A proper application of the skill training was evident in an exhibition organised by "SNEHPAS" on their handloom products. Also, a heavy sale of handmade mask has been accomplished especially bridal mask. Following are some pictures of the final products:








I. In-house, Grant in aid & Consultancy Projects

Project Title: **Study of hybrid sensible-latent heat storage system for medium temperature application**

Project No: **OLP-2040**

Funding Agency: CSIR, New Delhi

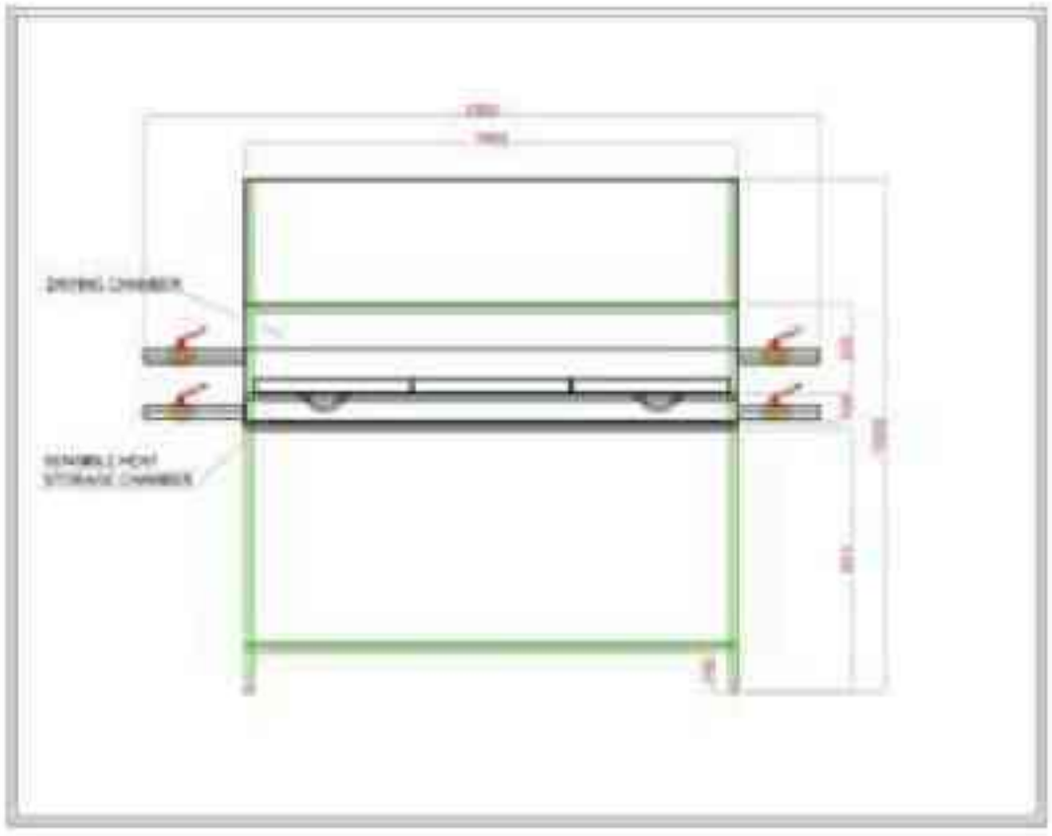
PI & Members: Er Jayanta Jyoti Bora (PI), Er D Neog, Er D Das, Dr J K Doley, Mr A Kalita

Objectives:

- Analysis and physical characterization of phase change and sensible heat storage materials.
- Study and design of heat storage mechanism using computational technique and thermal data acquisition system.

Salient Achievements:

- hermal property analysis of phase change materials is carried out.
- Under the project a solar dryer is designed based on specific heat and bulk density of material to be dried, properties of Phase Changing Materials (PCM) - (a) Melting point, (b) Heat storage capacity, (c) Liquid density and solid density (d) Thermal conductivity.



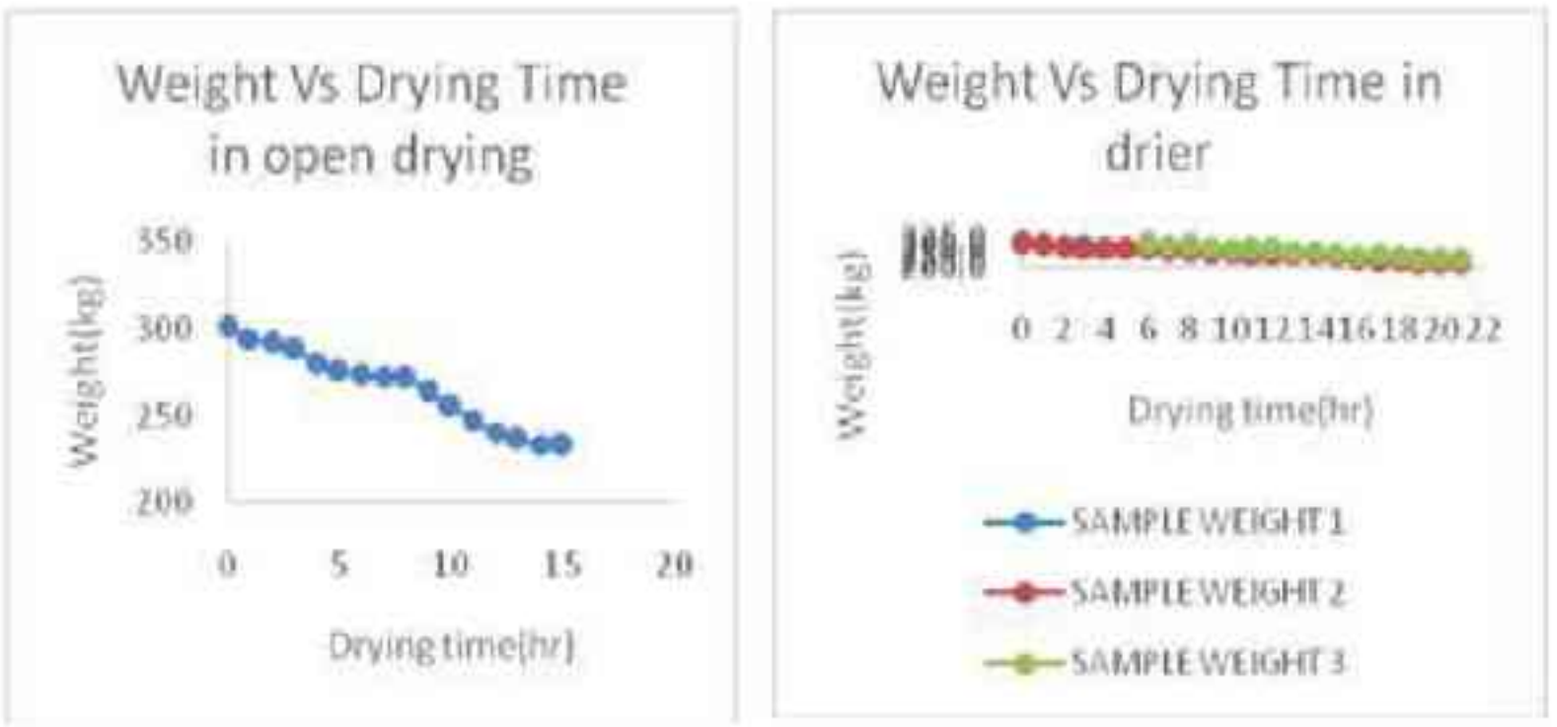


Fig: Weight loss vs drying time for open drying and drying in the drier.

Project Title: **Development of reusable facemask with enhanced antimicrobial efficiency for medical care**

Project No: **OLP-2041**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Swapnali Hazarika (PI), Dr B Das, Dr A Namdeo, Er P Majumder, Er R K Lingam, Dr P G Ingole, Dr J S Verma, Er T H Ahmed

Objectives:

- Design and development of polymeric membrane and nanofiber with effective surface modification by incorporation of nanomaterials

Salient Achievements:

- Under this project, we have designed novel face mask from composite polymeric membranes with suitable pore size, water permeability, air permeability and antimicrobial activity (Patent filed).

Project Title: **Study and development of high performance concrete using Construction & Demolition (C & D) waste materials for construction of bamboo reinforced concrete structures, pervious road pavement and concrete armour for river erosion protection**

Project No: **OLP-2042**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Sanjay Deori (PI), Er Dipak Basumatari (Co-PI), Dr L Raj, Er N P Borah, Er R Das

Objectives:

- Study the Construction & Demolition (C&D) waste materials and Brahmaputra river bed sand for useful application in development of high performance concrete.
- Design and evaluation of high performance concrete using the C & D waste materials for use in Bamboo Reinforced Concrete Structures, Pervious Road Pavement and Concrete Armour for river bank erosion protection.
- Study the performance of models of Bamboo Reinforced Concrete Structures, Pervious Road Pavement and Concrete Armour constructed with C & D waste materials-based High Performance Concrete in field application.

Salient Achievements:

- Collection, segregation and characterization of C & D waste samples.
- Design and development of performance concrete using C & D waste and Brahmaputra river bed sand.
- Testing and evaluation of performance concrete used Pervious Road Pavement and Concrete Armour for river bank erosion protection.

Project Title: **Design and development of a combined gasification and forced draft thermal conversion device**

Project No: **OLP-2050**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Biswajit Gogoi (PI)

Objectives:

- To design, develop and test a combined gasification and forced draft thermal conversion device for domestic and commercial applications.
- To study the characteristics of charcoal obtained with variations in plant species.

Salient Achievements:

- A combined gasification and forced draft thermal conversion device was designed and developed in the workshop. The device is capable of gasifying biomass and the product gas is then passed through a hot fuel bed of charcoal. The device is under test for its performance and fine tuning is undergoing.

Project Title: **Asymmetric modification of two-dimensional nanofluidic channel for chiral separation under TARE program**

Project No: **GAP-775**

Funding Agency: Department of Science & Technology, Govt. of India

PI & Members: Dr Swapnali Hazarika (PI), Dr Pabitra Kalita (PI) Sibsagar College, Jayasagar

Objectives:

- Development of facile and feasible methods for the synthesis of 2D nanosheets and their characterization.
- Functionalization of the nanosheets to introduce chiral agent by (a) Covalent functionalization. (b) Non-covalent functionalization and (c) Grafting with chiral polymers.
- Resolution of racemic mixtures.

Salient Achievements:

- Under this project we have done Asymmetric modification of two-dimensional nanofluidic channel for chiral separation of drug molecules.

Project Title: **Promoting Innovations in individuals, start-ups MSMEs (PRISM)**

Project No: **GAP-2014**

Funding Agency: Department of Science & Technology, Govt. of India

PI & Members: Er Dipankar Neog (PI) , Dr J K Doley, Er J J Bora

Objectives:

- To promote innovation for individual, startup and MSME's by scouting project proposal in prescribed format.
- Counseling with the innovators across the table for the innovative idea thrown by the individual innovators for funding and helping the innovators for preparing the project proposal.
- Reviewing the proposals through the empanelled list of subject experts, providing all necessary supports to the innovators towards implementing their project proposals. These supports include technical guidance for design, mathematical calculations, fabrications of models and prototypes, report preparation, IPR protection etc.
- Continuous monitoring of the project implementation and timely review

- ❖ To take up different activities for overall development of the innovation and entrepreneurship ecosystem.

Salient Achievements:

- ❖ Under the project "Promoting Innovations In Individuals, Start-ups MSMEs (PRISM)",

  four projects are going on under supervision of TOCIC-NEIST, Jorhat. 9 nos of projects are different stages of evaluation under TOCIC-NEIST Jorhat. Three project namely, Micro-light Hydro-turbine, development of digital paper facility and portable muga reeling machine are at different stages of commercialization. Two new projects are sectioned by DSIR for development and demonstration of the prototype.

Project Title: Design and construction of Low Cost & Eco- friendly Rural Housing/ Emergency Shelter/Quarantine Center using Locally Available Materials under STINER Project

Project No: GPP-347

Funding Agency: Ministry of DoNER, GoI, New Delhi

PI & Members: Dr Mantu Bhuyan (PI), Er Jayanta Jyoti Borah (PI), Er Dipak Basumatari (Co-PI), Er Dipankar Neog (Co-PI), Dr Sanjay Deori (Co-PI), Dr S P Saikia, Dr D Kalita, Er T Das, Dr L Raj, Er D Das, Mr A Kalita

Objectives:

- ❖ Use of locally available materials especially bamboo for construction of low- cost emergency cottage like quarantine center in short duration.
- ❖ Possible use of different types of treatment for enhancement of durability of bamboo and other locally available materials.
- ❖ Fabrication of different furniture like bed, tables etc.

Salient Achievements:

- ❖ 3 (Three) units of low cost & eco-friendly Rural Housing/Emergency Shelter/ Quarantine Centre were designed and constructed at CSIR-NEIST Bio Diversity Eco Park using locally available materials specifically bamboo under STINER project which is a technology popularisation, implementation project through training demonstration and incubation.
- ❖ Under this project "**Design and construction of low cost & eco-friendly rural housing / emergency shelter / quarantine centre using locally available materials**" selection of the bamboo species based on strength properties, design of 3 cottages of different types, low cost treatment selection and treatment of bamboo species works carried out and completed construction of 3 prototypes house.

Fig: Bamboo house

Project Title: **Reaction engineering and catalytic studies on bio-oil upgradation**
Project No: **GPP-328**
Funding Agency: SERB-Department of Science & Technology, Govt. of India
PI & Members: Dr Ashutosh Namdeo (PI)
Objectives:

- Bio-oil production and characterization.
- Catalyst synthesis, characterization and screening for bio-oil up-gradation.
- To perform kinetic studies and determine the parameter space (appropriate range of pressure, temperature, catalyst loading, promoter content, etc.) for the products of interest.

Salient Achievements:

- Heterogeneous catalyst has been synthesized using locally available cheap un-utilized materials. Catalysts were thoroughly characterized by BET surface area, XRD, FTIR, SEM, TEM and XPS.
- The performance evaluation for the synthesized catalyst done by applying on glucose to the 5-HMF conversion reaction and 99.81% conversion achieved for glucose, the yield for the conversion of glucose to 5-HMF is 44%.
- The performance evaluation for the synthesized catalyst yields ~36% and ~85% for biomass and plastic pyrolysis respectively. Although for biomass pyrolysis there is no significance enhance in the yield at the operated temperature and ramp rate but GC-MS analysis suggests that Catalyst "SS-65 and SS" efficiently cracking the larger molecules. Further detailed work required in this direction.

Project Title: **Development of nanoparticles incorporated thin film nanocomposite polymer membranes for effective mixture gas separation**
Project No: **GPP-357**
Funding Agency: Department of Science & Technology, Govt. of India
PI & Members: Dr Pravin G Ingole (PI), Dr Swapnali Hazarika (Co-PI)
Objectives:

- Development of new highly H_2-selective and CO_2-selective membranes based on active or passive non-permeable support with embedded "hyperactive" carrier in form of newly synthesized highly CO_2-sorbing nanocomposite membranes prepared using room temperature ionic liquids, Nafion and various nanoparticles.

Salient Achievements:

- The developed thin film nanocomposite membranes show enhanced gas permeance according to loading concentration of C-MWCNT up to 0.04%. The selectivity of C-MWCNT@DT-M4 TFN membrane was also found higher than the already reported results. The same C-MWCNT@DT-M4 TFN membrane shows very interesting results as a gas permeance for H2 93.92 GPU, and for CO_2 23.39 GPU. Interesting selectivities were observed for H_2/CO_2 4.41 and CO_2/CH_4 24.74 at room temperature under 1.01 bar pressure. It is found that our work suggests an encouraging pathway to make advanced control pore sizes and permeation mechanism for the separation of various gases via thin film nanocomposite membranes.

Project Title: **Design characterization and fabrication of a free flow water wheel with high effciency for electricity generation in remote hilly area.**

Project No: **GPP-362**

Funding Agency: Department of Science & Technology, Govt. of India

PI & Members: Dr Jyoti Kumar Doley (PI)

Objectives:

- To give best and optimum welding techniques for aluminium TWB for high speed forming process .
- To studies the different thickness aluminum alloys weld-ability by different welding techniques.
- To studies the different grade aluminum alloys different welding techniques.

Salient Achievements:

- PO for EMF system worth 22 lakhs has been generated besides procurement of Al Sheets. Welding setups for Tungsten Inert Gas and Friction Stir Welding machine have been fabricated. AA 6061 and AA 5052 sheets have been cutted to required 200 mm x 100 mm dimension. TIG welding was done on different grade Aluminium sheets which were unsuccessful.

Project Title: **Design characterization and fabrication of a free flow water wheel with high efficiency for electricity generation in remote hilly area**

Project No: **GPP-363**

Funding Agency: Department of Science & Technology, Govt. of India

PI & Members: Dr Jyoti Kumar Doley (PI)

Objectives:

- To generate electrical energy efficiently from flowing river in remote hilly area.
- Self sufficient of a town/village or community based on a co-operative society for generating electricity.
- To reduce the electricity generation cost.

Salient Achievements:

- Lab scale experimental work is going on with different wheel design and parameters. Four different scale model of water wheel have been fabricated and tested. Grant for next year by DST SERB has been already released.

Project Title: **Development of appropriate product by studying the possible use of coir dust in oil industry with reference to North-East India for absorption of oil spill**

Project No: **CLP-285**

Funding Agency: CCRI, Govt. of India.

PI & Members: Er Jayanta Jyoti Bora (PI), Er Dipankar Neog (Co-PI), Dr R L Goswami, Dr D Kalita, Er D Das

Objectives:

- Study of different properties of coir pith as an absorbent to be used for prevention of oil spillage effect with reference to NE oil industries.
- Design and development of coir pith captor in the shape of membrane/ blanket/ block/ granules to deal with oil spillage.
- Study on possibilities of re-use & disposal of coir pith captor.

Salient Achievements:

- Different types of products like absorbent particles, absorbent board, absorbent mat was developed from Coir pith.
- Project completion report submitted to COIR Board of India.

Project Title: **Structural health monitoring of foundations of towers and chimneys at Silapathar, Assam**

Project No: **CNP-478**

Funding Agency: M/s Teams India Pvt. Ltd.

PI & Members: Dr Leon Raj J (PI), Dr Sanjay Deori (Co-PI), Er Dipak Basumatari (Co-PI), Er N P Borah, Er R Das

Objectives:

- To carry out structural health monitoring by Non-destructive Test (NDT) of Foundations for Chimneys and Towers at Silapathar, Dhemaji, Assam.
- To carry out quality check along with evaluation of compressive strength of foundations of newly constructed structure at site.

Salient Achievements:

- Quality check along with evaluation of compressive strength of foundations of newly constructed structure at site.
- Final Report submitted.

GEO SCIENCES & TECHNOLOGY DIVISION

The Geosciences & Technology Division's core activity has been seismology and seismic hazard assessment. The division is currently implementing a number of research project related to seismic precursor study, seismic microzonation, strong ground motion estimation apart from basic research on seismology. The division is also maintaining a limited broadband seismic network in stand-alone mode along with a strong motion accelerograph network. A few students are registered for PhD program under AcSIR and the division is also a recognized centre for under DST-ASEAN Program for international student exchange.

Ongoing Projects

I. Focused Based Research Projects

Project Title: **Earthquake Hazard Studies in Moderate and Severe Seismic Zones of India (EHIND)**
Project No: **MLP-FBR-0005**
Funding Agency: CSIR, Govt. of India
PI & Members: Dr Bijit Kumar Choudhury (PI), Dr Santanu Baruah (Co-PI), Dr Debasis D Mohanty (Co-PI), Dr Manoj Kumar Phukan (Co-PI), Dr C Rajkonwar, Mr S M Bhattacharyya
Objectives:

- Imaging the lithospheric structure beneath NER of India to study the degree of variation in lateral heterogeneity of the lithosphere by means of Lg tomography, (2) To create a catalogue of moment magnitude (M w) from inversion of Lg spectra,
- To devise empirical ground motion prediction equation (GMPE) based Mw derived from Lg spectra and predict ground motion for the three seismic domains viz. Arunachal Himalaya, Indo-Burman Ranges and the Shillong-Mikir Plateau
- To carry out the numerical modeling of earthquake waves and the identification of physical mechanism based on 1D velocity model. To accomplish this objective, modeling of earthquake events will be carried out through waveform inversion to understand the physics of the earthquake process and to characterize the associated faults and lineaments.
- To investigate deformation and dynamics of lithosphere through detection and interpretation of seismic anisotropy and stress analysis.
- Mantle deformation pattern analysis by splitting measurements to understand the present tectonics of NE Himalaya and Indo-Burmese Range (IBR) and stress-strain pattern calculation to decipher and characterize potential hazards.
- Unified crustal model preparation from converted phases by 'Receiver Function Inversion' techniques to understand the crustal scale dynamics and its implications towards

Salient Achievements:

- Newly Sanctioned: Work in progress.

II. In-house, Grant in aid & Consultancy Projects

Project Title: **Seismotectonics of NE India and adjoining region with emphasis on seismic hazard assessment**

Project No: **OLP-2039**

Funding Agency: CSIR, Govt. of India

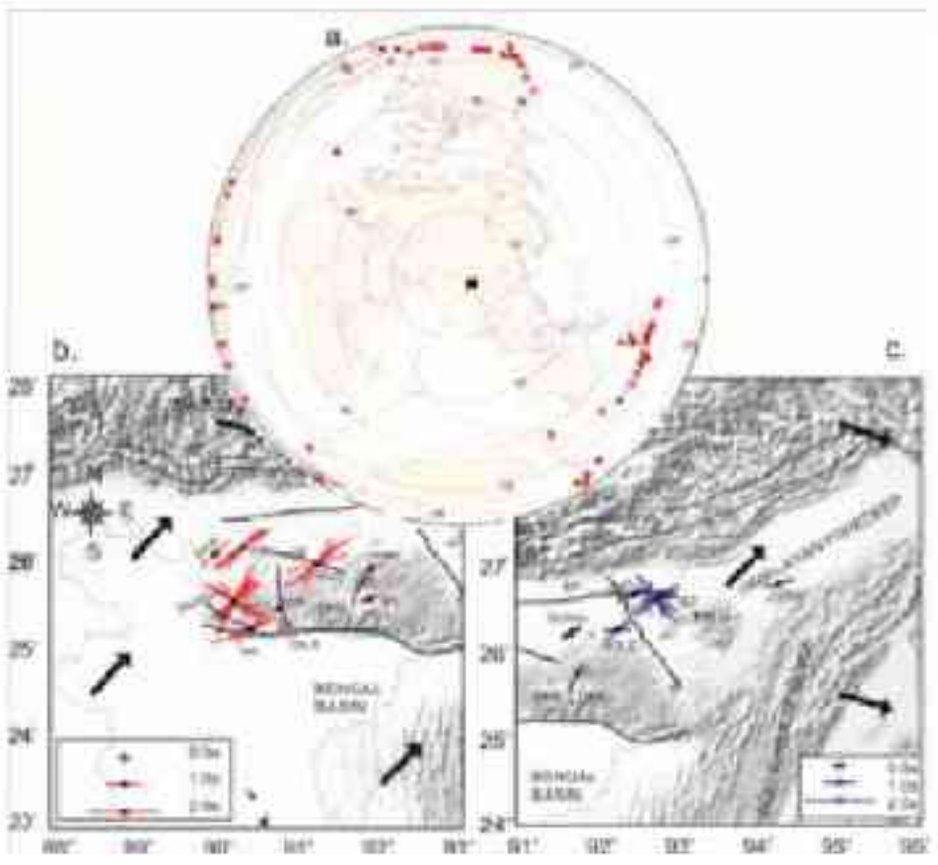
PI & Members: Dr Manoj Kumar Phukan (PI), Dr Sangeeta Sharma (Co-PI), Dr Santanu Baruah (Co-PI), Dr Bijit Kumar Choudhury (Co-PI), Dr Debasis D Mohanty (Co-PI), Dr C Rajkonwar, Mr P K Dutta, Mr S M Bhattacharyya

Objectives:

- Seismic monitoring in the NE India region & earthquake source characterization. VSAT connectivity to 10 seismic stations.
- Geophysical mapping of Kopili fault area
- Characterization of tectonic stress pattern of the lithosphere with emphasis to the understanding of the regional seismic wave propagation
- Earthquake precursory study of active zones through monitoring of seismic and other geophysical parameters.
- Seismic Imaging, deformation & geodynamics of the Wadati-Benioff zone and understanding the oblique subduction characterization of IBW.

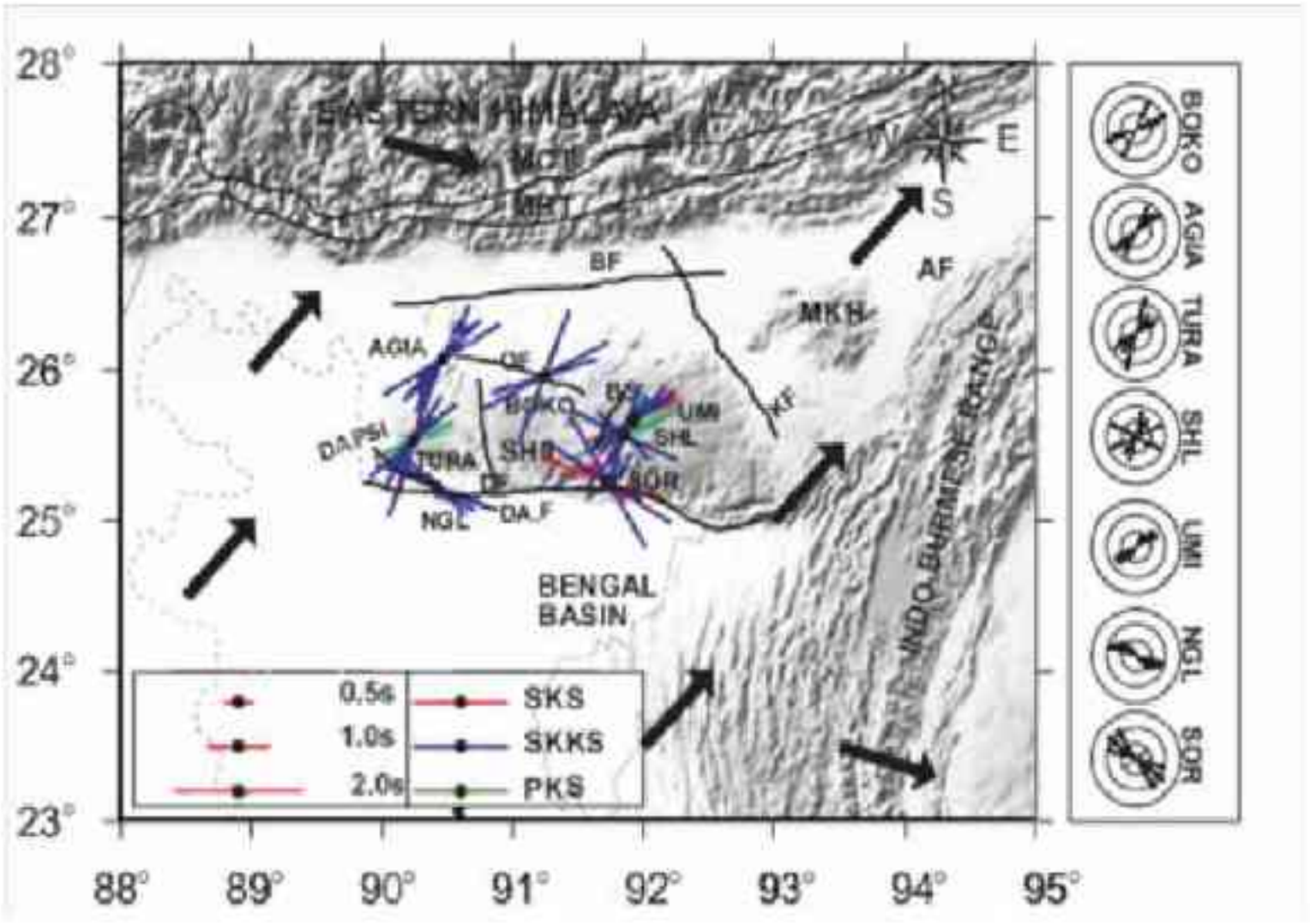
Salient Achievements:

- Lg crustal quality factor determined (Q_{Lg})
- Gross Stress map for IBSZ prepared
- Elevation map for IBSZ prepared
- GPS directivity map of NE India prepared
- Gravity map
- Magnetic map
- Modeling and determination of possible depth and source localisation of seismic anisotropy beneath Shillong plateau and Himalayan foredeep region: an implication towards deformation.



Depiction of the area, splitting parameters and seismic networks used for modeling and depth determination of anisotropic layers.

- Measuring the birefringence of shear wave and mantle deformation patterns beneath Shillong Plateau to decipher role of regional Geological structures suggests a very distict pattern of deformational mechanisms beneath the Shillong plateau mass.



Deformation behavior of lithosphere beneath Shillong Plateau mass.

- **Publications related to the in-house project:**

i. *Chandan Dey, Santanu Baruah, Bijit Kr Choudhury, Timangshu Chetia, Sowrav Saikia, Antara Sharma, and Manoj K Phukan*, 2021, Living with Earthquakes: Educating masses through earthquake awareness: North East (NE) India perspective, ANNALS OF GEOPHYSICS, 64, 3, SE330, 2021; doi:10.4401/ag-8479

ii. *Debasis D Mohanty and Arun Singh;* Birefringence of shear wave and mantle deformation patterns beneath Shillong Plateau: role of regional Geological structures; International Journal of Earth Sciences, IF. 2.80; 2021, Accepted.

iii. *Debasis D Mohanty, Satyapriya Biswal and Manoj Phukan*; Possible depth determination and source localization of seismic anisotropy beneath Shillong plateau and Himalaya foredeep region, Invited Paper, Geological Journal, IF: 2.6, 2021, Accepted.

iv. *Debasis D Mohanty;* Evidence of heterogeneous and unstable anisotropic layers beneath northeast Indian lithosphere from characterization of null splitting measurements; Acta Geophysica et Geodaetica, IF: 2.1, 2021, Accepted.

v. "The 2020 Mw 5.5 Mizoram earthquake and associated swarm activity in the junction of the Surma Basin and Indo-Myanmar Subduction Region"- Natural Hazards, 2020.

vi. "Seismic vulnerability assessment of earthquake-prone mega-city Shillong, India using geophysical mapping and remote sensing"- Georisk: Assessment and Management of Risk for Engineered Systems and Geohazards, 2020.

vii. "An International Virtual Workshop on Global Seismology and Tectonics (IVWGST 2020)"- Seismological Research Letters, 2021.
viii. "Global seismology and tectonics"-Current Science, 2020.

Project Title: **Development of a geochemical map in an around Jorhat, district, Assam**
Project No: **OLP-2053**
Funding Agency: CSIR, Govt. of India
PI & Members: Dr Chinmoy Rajkonwar (PI)
Objectives:

- To develop a geochemical map of Jorhat and adjacent areas.

Salient Achievements:

- A survey of pertinent literatures has been undertaken in the first few months during the beginning of the research work. For this purpose different articles, research papers and books related to the study area and the research topic are collected. The location map of the study area has been prepared with the help of the Survey of India Topo Sheet no. 83 J/1, 83 J/2, 83 J/5, 83 J/6 and 83 I/8. Extensive field surveys has been done and worked out the general geology of the study area with help of previous works. Surface soils or "topsoils" are collected from 0-10 cm depth. "Deep" or "Profile" soils are generally collected from >35 cm for the purpose of establishing a relationship with parent material. The physical properties and occurrences of soil samples collected from various locations within the proposed study area has been documented and plotted on the map with the help of Golden Surfer software.

Project Title: **Estimation of ground motion parameters in Shillong Mikir Hills plateau from acceleration time history of earthquake events originated in NE India**
Project No: **GAP-300**
Funding Agency: Ministry of East Science, Govt. of India
PI & Members: Dr Sangeeta Sharma (PI), Dr Saurabh Baruah (Co-PI)
Objectives:

- A systematic mapping of S-wave birefringence from earthquakes.
- To study the polarization obtained from source mechanism of earthquakes and to correlate the observed polarization with the polarization obtained from source mechanism.
- To make an effort to image 3D seismic structures by local earthquake tomography.

Salient Achievements:

- New strong motion stations installed at Guwahati, Diphu and Golaghat.
- Multi-channel analysis of surface wave (MASW) surveys conducted at different cities of NE India, viz. Jorhat, Golaghat and Nagaon.
- Estimated and updated Qp and Qs values for Tezpur, Guwahati, Shillong and Tura stations.
- Estimation response spectrum of different stations from acceleration time histories.
- Processing & analysis of MASW data.

Project Title: **Setting up of multiparametric geophysical observatory in Mikir Hills, North Eastern India for earthquake precursory research.**

Project No: **GPP-294**

Funding Agency: Ministry of Earth Sciences, New Delhi

PI & Members: Dr Saurabh Baruah (PI), Dr Sangeeta Sharma (Co-PI), Dr Santanu Baruah (Co-PI)

Objectives:

- To establish multi-parametric geophysical observatory in Mikir Hills Plateau, Assam.
- To create high quality geophysical database for earthquake precursory studies.
- To develop physical models of earthquake processes/sources and evaluating the potential of multi-parametric precursors in practical earthquake prediction programs.
- Numerical modeling of Total Electron Content and its temporal perturbations in Ionosphere as a possible indicator of earthquake.

Salient Achievements:

- Keeping in mind the objectives of the project "Setting up of Multi parametric geophysical observatory for monitoring of Earthquake precursor in Mikir Hills Plateau, Assam", we have tried to examine the precursory changes prior to some of the felt earthquakes of North East India in terms of changes in terms of variation in available Geophysical parameters (eg. Radon, MT, Fluxgate, Resistivity, ULF, Coulomb stress and TEC) subjected to availability of databases. Some interesting results have been documented under this study. The studies done so far are:
  - Recent seismicity of NER India
  - Investigations on variation of magnetic field from ULF magnetometer, Apparent resistivity of earth, radon emanation, Magneto Tellurics signals Fluxgate signals, Total Magnetic Field and Ionospheric TEC with seismicity in Tezpur (Eastern Himalaya) region
  - Estimation of Recurrence time period
- **New Observations:**
  - Zone for probable earthquake occurrence identified along Kopili fault zone.
  - Variation of apparent resistivity and radon emanation prior to earthquake.
  - In layer 6.5m depth abrupt raise in resistivity by 38.21 Ohm.m two days prior to an earthquake event.
  - Both the MT and fluxgate magnetometers show an anomalous signature is observed within 6 hours preceding the two earthquake events.
  - Ground to ionospheric anomalies was observed in Radon gas emanation, Total Magnetic Field Intensity and inonospheric Total Electron Content derieved from GPS.
  - Seismo ground to inospheric anopmalies were found to be in validation to Lithosphere Atmosphere Ionosphere Coupling (*LAIC*) model.
  - Thus from some of the reported anomalies some fraction are authentic in the sense that these are physically related to the earthquake preparation and generation processes of the impending ones.

❖ **Publication related to the project:**

- "Weibull distribution analysis of precursory time due apparent resistivity anomaly prior to earthquakes in the vicinity of multi-parametric geophysical observatory, Tezpur, India"- Geomatics, Natural Hazards and Risk, 2020.
- "Appraisal of contemporaneous application of polarization ratio and fractal analysis for studying possible seismo-electromagnetic emissions during an intense phase of seismicity in and around Assam Valley and the Eastern Himalayas, India"- Physics of the Earth and Planetary Interiors, 2021.

Project Title: **Seismic microzonatin of greater Dimapur, Nagaland**

Project No: GPP-326

Funding Agency: Dept. of Revenue & Disaster Management, Govt of Nagaland

PI & Members: Dr Manoj Kumar Phukan (PI), Dr Santanu Baruah (Co-PI), Mr S M Bhattacharyya

Objectives:

- Preparation of seismotectonic map.
- Acquisition of seismic ambient noise data of entire Dimapur city at a grid interval of 1.0-1.5km.
- Processing, analysis and interpretation of ambient noise data.
- Estimation of H/V amplification ratio with fundamental frequencies and preparation of site amplification map.
- Comparison of seismic site amplification data with geological and geotechnical information for site characterization / classification.
- Estimation of strong ground motion parameters.

Salient Achievements:

- Completed all field activities: acquired microtremor data from 138 sites and GPR profiles from 54 sites.
- Prepared site amplification map, predominant frequency map and seismic vulnerability index map.
- Processed geological & borewell data, comparison of seismic ambient noise data
- Processed strong motion accelerograph data

Project Title: **Active geodynamics, evolution, structure and deformation analysis of Indo-Burman wedge**

Project No: GPP-352

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Debasis D Mohanty (PI)

Objectives:

- Understanding the present crustal and mantle deformation patterns by seismic anisotropy parameters and predicting the actual relative tectonic movements of Indian and Burmese plates, examining the present status of tectonics.
- Identifying and estimating the most hazardous regions in IBW on basis of Geodynamic and deformation studies.

Salient Achievements:

- The very first results of deformation patterns from IBW region make us eligible to understand the present state of tectonics and surface deformation patterns.
- Crustal anisotropy deciphers the state of stress in the IBW region and potentially identifies the Seismic potential zones. In the northern part of the study area, alignment of the SHmax is nearly Parallel to the strike of the thrust and strike-slip faults where as in the southern part of the region, which is highly deformed by the fold belts, infers abrupt orientation of the SHmax, which is rotated from NE-SW direction to the E-W direction, perpendicular to the fold belts.
- Core refracted phases (SKS, SKKS and PKS) are used to decipher the mantle anisotropic effects which suggest a N-S deformation at the southern part transforming towards a N-S/NNE-SSW at the northern part of the IBW region, clearly emphasizes the oblique subduction pattern.

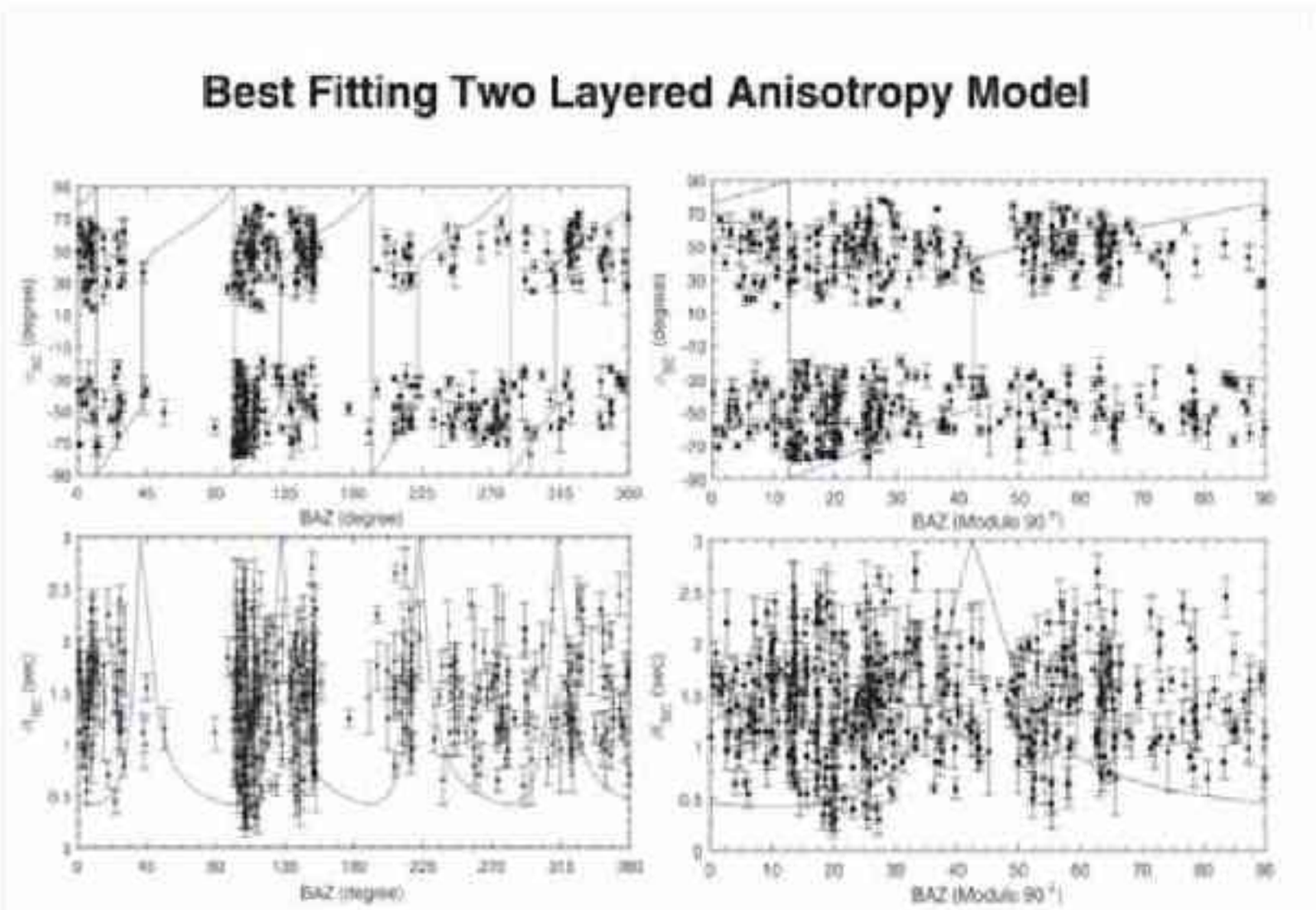


Fig: The above figure depicts the best fitting two layer model developed for IBR region.

- **Publications from the project:**
  - *Poulommi Mondal and Debasis D Mohanty*; Recent deformation patterns beneath Northeast Indian lithosphere inferred from the SKKS splitting analysis; Studia Geophysica et Geodaetica, https://doi.org/10.1007/s11200-020-1121-y
  - *Poulommi Mondal, Debasis D Mohanty, Satyapriya Biswal and Rekha Yadav;* Implication of mantle dynamics beneath North-East India through the perspective of SKKS splitting analysis, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-14437, https://doi.org/10.5194/egusphere-egu21-14437, 2021.

Project Title: **Effect of Change in coulomb stress on Guttenberg-Richter law for the seismicity of North East India Region**

Project No: **GPP-368**

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Santanu Baruah (PI)

Objectives:

- Coulomb-stress theory is used to evaluate how one earthquake trigger another. While Gutenberg-Richter law is a landmark theory of theoretical seismology as well as hallmark for seismic hazard assessment. It is assumed in several earthquake rupture models that the distribution of earthquake magnitudes is not a ected by the change in the Coulomb stress after a main event. However, it is found in many cases that the distribution of magnitudes is actually sensitive to the change in Coulomb-stress (e.g., seismicity after 1992 Landers earthquake, Mw 7.3).This value added information would be an important component for the calculation of hazard potential of a region due to earthquakes. In this project, I would like to investigate the possibility of changes in seismicity due to changes in Coulomb stress after occurrence of large earthquakes in North East India.

Salient Achievements:

- The change in Coulomb stress for all of these four felt earthquakes are, however, found to be ranging from 0-0.01 bar only. It has been demonstrated that changes in Coulomb stress ranging between 0.01 to 1 bar can influence the occurrence of future earthquakes (Rajput et al., 2005; Weatherley, 2006). Our observations on the Coulomb stress change is, however, on the lower limit. This seems surprising that stress drops of a large to moderate earthquake are commonly much larger, several bars to several hundred bars. Hence such a small change in static stress might be too small to affect any crustal fault. It should be, however, noted that cannot produce an earthquake, it can only trigger an earthquake. In this situation, the fault is assumed to be sufficiently close to its failure and only a small stress perturbation is sufficient to produce or enhance the instability. Thus, we conclude that our observations of the tectonic stress system not only explains the transverse tectonics of the Kopili fault, the Coulomb stress change observations also demonstrate fairly well the spatio-temporal occurrence of the recent felt earthquakes. These results further suggest occurrence of an impending felt/large earthquake to the southeast of the 2013 earthquake in this fault zone. Therefore Coulomb stress change must be considered in seismic hazard assessment, particularly the calculation of recurrence times or probabilities. A close monitoring of the Kopili fault seismic activity and monitoring of earthquake precursor if any, are the need of the time to mitigate seismic hazards in the Assam valley.
- **Publication related to the project:** "*Correlation between crustal anisotropy and seismogenic stress field beneath Shillong–Mikir Plateau and its vicinity in North East India*"- Geomatics, Natural Hazards and Risk, 2021.

Project Title: **Estimation of site specific response spectrum for the proposed road connectivity between Gohpur (NH-52) to Numaligarh (NH-37)**

Project No: **CNP-477**

Funding Agency: **NHIDCL and Louis Berger, Gurgaon, New Delhi**

PI & Members: Dr Santanu Baruah (PI), Dr Manoj K Phukan (Co-PI), Dr B K Choudhury, Mr. S M Bhattacharyya

Objectives:

- To carry out Seismic Refraction tests along the Longitudinal and transverse directions to depict the strata along the proposed road connectivity between NH 37 and NH52. The results to be validated and interpreted by doing the test near to the existing borehole locations along with P-wave velocities.
- To carry out MASW test (for shear wave velocity) along the Longitudinal and transverse directions to depict the strata along the proposed road connectivity between NH 37 and NH52. The results to be validated and interpreted by doing the test near to the existing borehole locations along with shear-wave velocities.
- To determine the dynamic modulus and shear modulus for soil strata along the proposed road connectivity between NH 37 and NH52.
- To determine the Strong Ground motion parameters eg PGA for MCE and DBE.
- Time history evaluation.

Salient Achievements:

- Geo-Science and Techology Division to take part in nation building process by availing the sub-consultancy project from Louis Berger to conduct geophysical investigation and estimation of site specific response spectrum of the proposed connectivity site for tunnel construction underneath the Brahmaputra river. This is the first of its kind endeavor attempted by the division. NE India being seismically considered as one the most active regions of the country, it is imperative to assess the site-specific characteristic and geophysical parameters prior to construction of such a mega engineering structure. The field investigation was carried out for about three months in several phases and constrained by several operational and logistical challenges as a number of sites were accessed via ferry. To complete the Geophysical and seismic survey for the proposed tunnel below Brahmaputra, a period of 3 month is meager. However, the team members with hard work and acumen, managed to complete the investigations at the proposed sites. Being NE India seismically very active, it was suggested to have more comprehensive and detailed seismic and geophysical study with considerable time period for the said construction.

Project Title: **Paleoseismic studies along the Himalayan front**

Funding Agency **Dalhousie University, Canada**

PI & Members: Dr Santanu Baruah (PI)

Objectives:

- To investigate ancient earthquakes along the foot of the Himalaya. Besides academic interest there is a potential for great societal benefits because the area is prone for destructive earthquakes, however we still know too little to predict the future earthquakes with any precision.

Salient Achievements:

- The 1714 Bhutan earthquake was one of the largest in the Himalaya in the last millennium. Nevertheless, until few years ago, Bhutan Himalaya were regarded as a seismic gap with a large potential for slip. We show that the surface rupture caused by this earthquake was at least 175 km long, with slip exceeding 11 m at our study site. The age of the surface rupture was constrained by combination of radiocarbon and traditional optically stimulated luminescence dating of affected river sediments. Computations using empirical scaling relationships yielded plausible magnitude of Mw 8.1 ± 0.4, and placed the epicentre of the 1714 Bhutan earthquake on the flat segment of the Main Himalayan Thrust (MHT), the basal décollement of the Himalayan orogen. Calculations of Coulomb stress transfer indicate that large earthquakes along the proximal part of the MHT would cause surface rupture. In contrast, distal earthquakes would not immediately trigger surface rupture although they would increase the stresses in the proximal part facilitating future surface-rupturing earthquakes. Distal, blind earthquakes would also transfer stress into the foreland basin facilitating southward propagation of the MHT in form of a blind basal décollement. In conclusion, studies of surface rupturing events alone, likely underestimate the seismic slip along the Himalayan megathrust.
- **Publication related to the project:**
  "Closing the Seismic Gap: Paleoseismological findings at a new Himalayan Main Frontal Thrust trench increase the extent of the 1714 Bhutan Earthquake"- Frontiers in Earth Science, 2021.

MATERIALS SCIENCES & TECHNOLOGY DIVISION

Materials Science and Technology Division (MSTD) comprises of four Groups Advanced Materials (AM) Group, Analytical Chemistry (AC) Group, Polymer & Petroleum (PP) Group and Coal & Energy (CE) Group. The department has some unique features in the whole CSIR system e.g. Cellulose Pulp and Paper (CPP) is only laboratory in whole CSIR carrying R&D work on pulp and paper. Similarly, Polymer, Petroleum and Coal & Energy Groups is involved in various activities, which cater the need of minerals and energy sector viz. coal, biomass, petroleum, polymers especially about the different aspects of the high organic sulfur coal of NE region. The Analytical Chemistry (AC) Group mainly supports the various sophisticated and high end analytical services to different R&D projects of the laboratory, testing and analytical requirements of the various private and public organizations of the NE region in particular and country in general. The Advanced Materials (AM) Group is mainly involved in development of various high end nano materials and devices pertaining to environmental sensors, catalysts, catalytic devises and separation barrier for improvement of air and water quality, beneficiation, quality assessment and valorization of different mineral resources of NE region.

Ongoing Projects

I. Focused Based Research (FBR) Projects

Project Title: **Plasmonic nanoparticle decorated 2D nanosheets for detection of the fluoride and arsenic in drinking water: Fabrication of a paper based analytical device**

Project No: **MLP-1009**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Manash Ranjan Das (PI), Er Dipankar Neog (Co-PI), Dr Hemant S. Dutta (Co-PI)

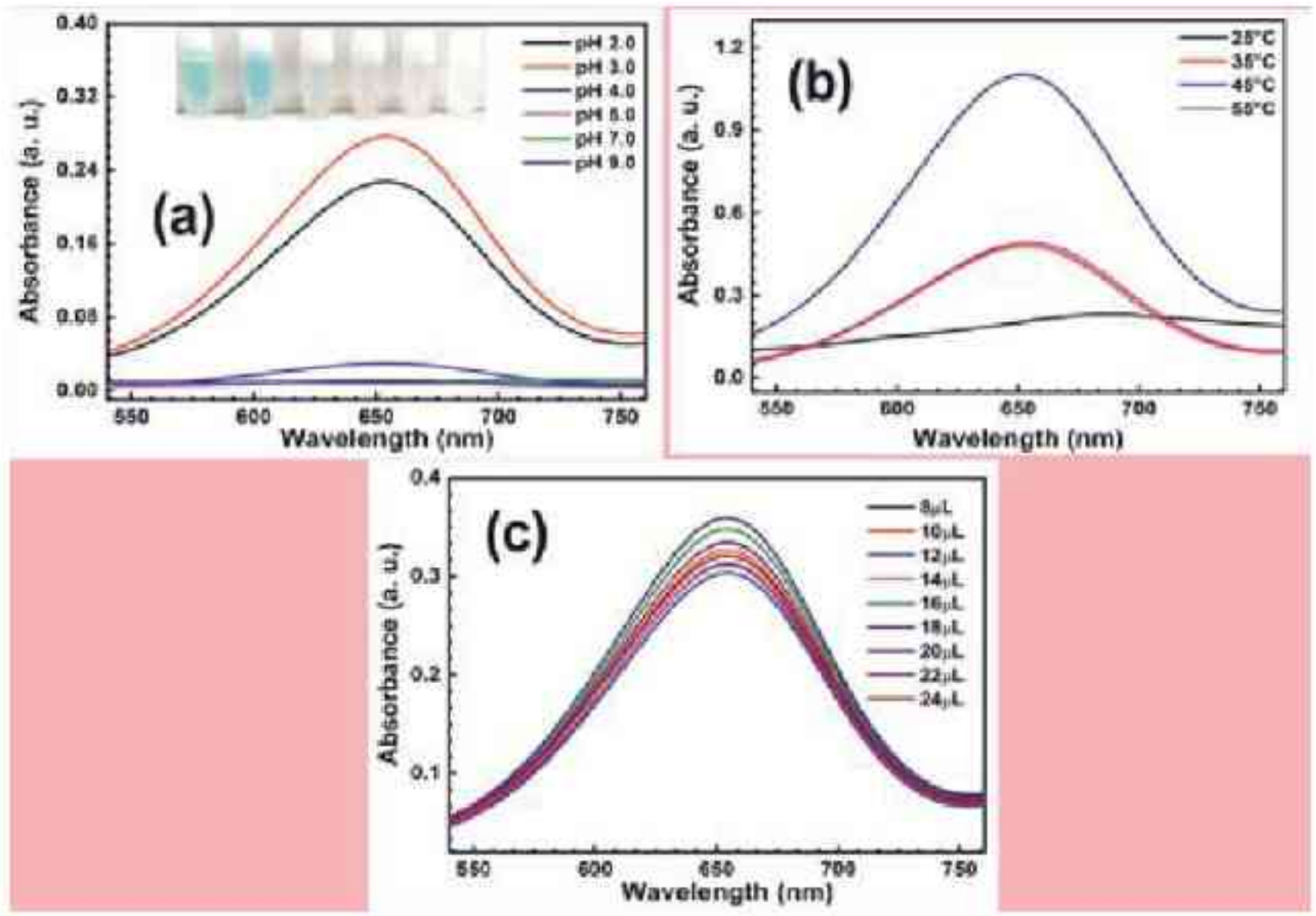
Objectives:

- Synthesis and characterization of the plasmonic nanoparticles and their bimetallic counterparts on the exfoliated 2D nanosheets.
- The intrinsic peroxidase enzyme like catalytic behaviour of the plasmonic nanoparticle-2D nanocomposite materials through the oxidation of chromogenic substrate 3,3′,5,5′-tetramethylbenzidine(TMB), 2,2′-bis(3-ethylbenzothiazoline-6-sulfonic acid)(ABTS) and O-phenylenediamine (OPD) will be investigated.
- Finally, paper based analytical device(μPAD) will be fabricated for the visual and naked eye detection of the water contaminates like fluoride and arsenic using plasmonic monometallic/bimetallic nanoparticle decorated 2D nanosheets materials. Different existing fabrication techniques of (μPAD) will be used and some innovative techniques specific to the present application will also be used.

Salient Achievements:

- Four different type of the quantum dots (GQDs, g-CNQDs, h-BNQDs, MoS_2 QDs and WS_2 QDs) were synthesized. PL spectra were obtained after excitation of GQDs, g-

CNQDs, h-BNQDs, MoS_2QDs and WS_2QDs at different wavelengths starting from 300 nm to 410 nm to determine the wavelength of maximum emission (λ_{max}). The peroxidase mimetic activity of the synthesized quantum dotes was demonstrated using peroxidase substrate TMB molecule in presence of the H_2O_2.



I. In-house, Grant in aid & Consultancy Projects

Project Title: **Analytical instrumentation facility and their process development**
Project No: **OLP-2030**
Funding Agency: CSIR, New Delhi
PI & Members: Dr Prakash Jyoti Saikia (PI), Dr Manash Ranjan Das (Co-PI), Dr H S Dutta
Objectives:

- Development of co(polymeric) stabilizers in the preparation biocompatible polyester particles
- Development of affordable analytical platforms for determining specific toxins in edibles and herbal formulations

Salient Achievements

- Synthesized poly(octadecyl methacrylate) (POMA) *via* reverse atom transfer radical polymerization technique and the obtained polymers of different molecular weights were assessed as stabilizer for the preparation of polycaprolactone (PCL) particles. Stable and smooth PCL microparticles are formed in the size range of 1-70 μm at different molecular weights of the stabilizer POMA. During the process, morphology and stability of the PCL particles dependent on the concentration of stabilizer
- Fabrication of paper based analytical devices has been carried out using wax-based and laser-based fabrication techniques. Novel colorimetric approach have been

explored for detection of Arsenic (III) using agglomeration of surface modified gold nanoparticles. Efforts have been made to characterize nanozymes for their optical sensing performance using related characterization facilities and to develop their colorimetric sensing capabilities.

Project Title: **Design & development of polymeric nano-composite materials and resource quality assessment along with value addition of low-quality coal/natural carbonaceous materials**

Project No: **OLP-2031**

Funding Agency: CSIR, New Delhi

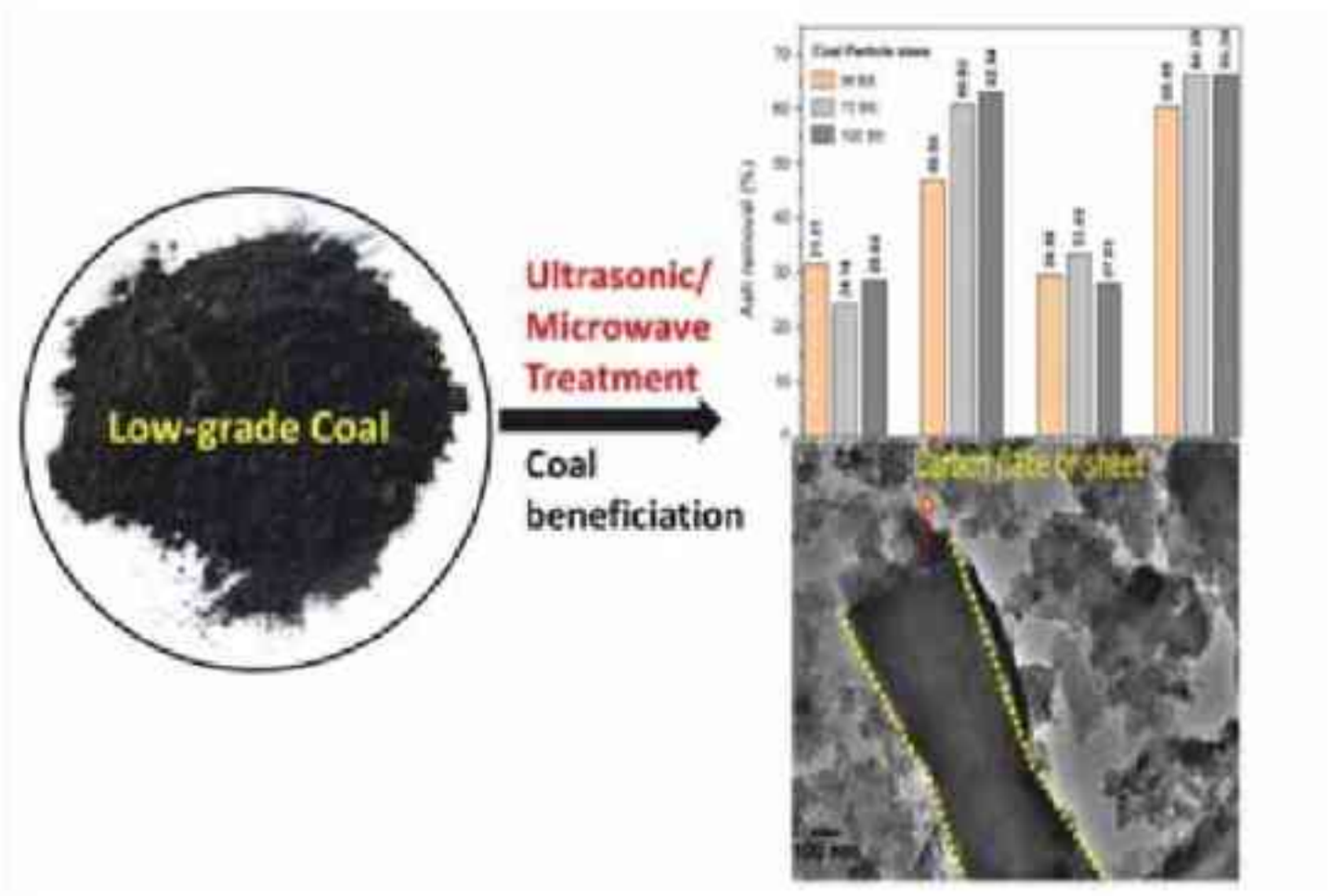
PI & Members: Dr Jayaramudu Jarugala (PI), Dr Binoy Kumar Saikia (Co-PI), Dr U N Gupta, Dr P Saikia, Dr Ajit Singh, Dr T Das, Mr R Borah, Mr L Phukan

Objectives:

- Quality assessment, environmental assessment, and economic production of high-value carbon products from NER coal resources and other carbonaceous materials.
- Design and preparation of Nano Materials (NMs) based on coinage metal, base metal, clay, graphite, cellulose, carbon based materials, etc. and its modification for specific applications.
- Design and development of polymer/rubber nano-composite (P/RNC) with the inclusion of NMs as reinforcement required for its end application.

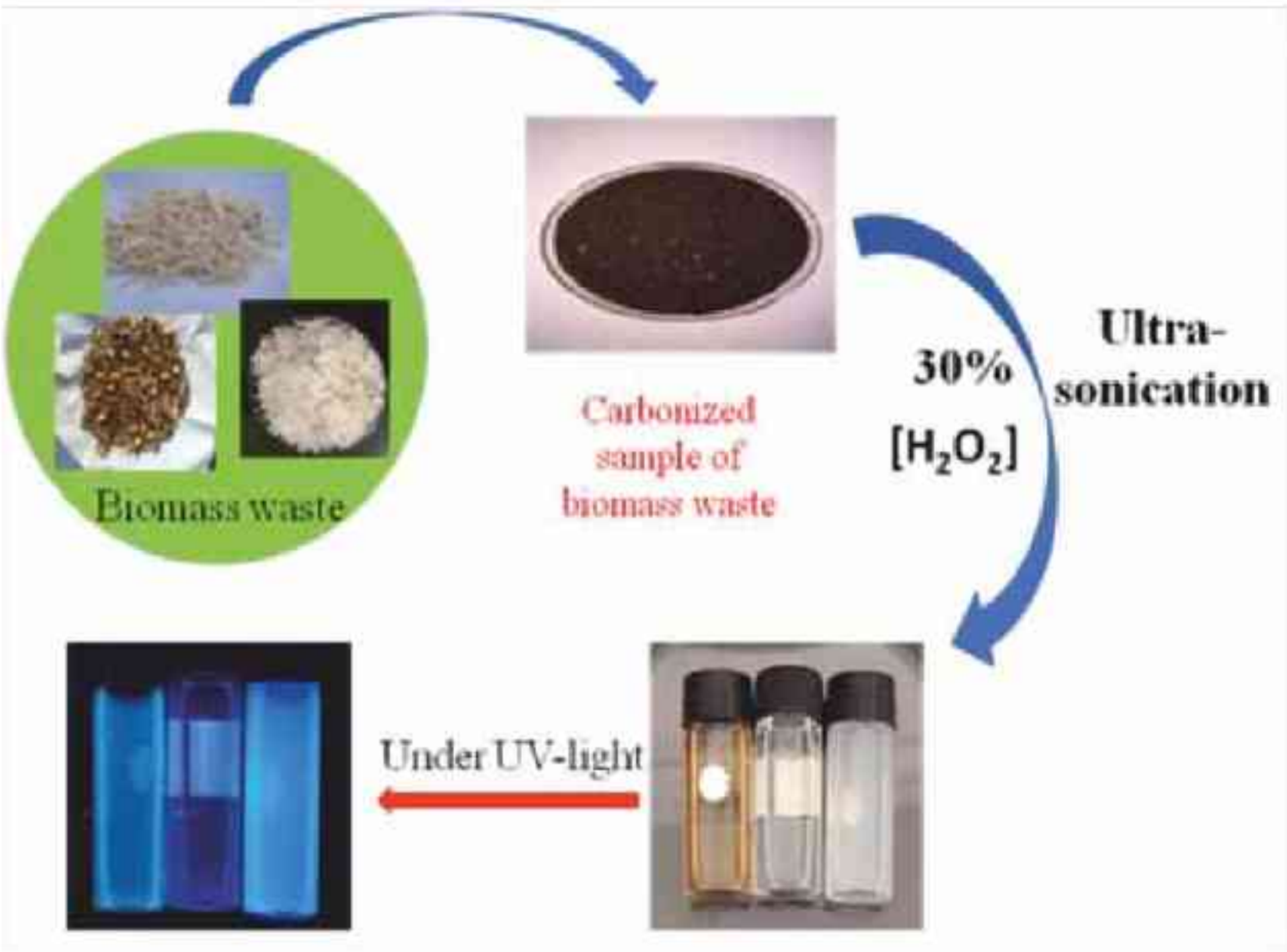
Salient Achievements:

- **Oxidative chemical beneficiation of low-quality coals under low-energy ultrasonic and microwave irradiation: An environmental-friendly approach:**
  Ultrasound and microwave energy was utilized in removal of mineral matters from coal powder. Thermal properties of cleaner coals is found to be improved. Advanced level analytical characterizations of raw and cleaner coals were performed and the process was observed to be feasible and suitable for scale-up.



(Journal of Environmental Chemical Engineering, Volume 9, Issue 2, April 2021, 104830)

- **Blue-emitting fluorescent carbon quantum dots from waste biomass sources and their application in fluoride ion detection in water:** Carbon quantum dots (CQDs) are the most feasible allotropes of carbon-based nanomaterials which have unique characteristics of photoluminescence, bio-compatibility, and high stability. A green and eco-friendly approach was propagated in the production of carbon quantum dots from biomass waste like sugarcane bagasse, garlic peels, and taro peels by ultrasonic-assisted wet-chemical-oxidation method. Biomass waste is considered to be a major pollutant to living beings when they get contaminated with land and water. The fabricated CQDs were characterized by High Resolution Transmission Electron Microscopy (HR-TEM), Fourier Transform Infrared (FT-IR) spectroscopy, X-ray Diffraction (XRD), and X-ray Photoelectron spectroscopy (XPS), The synthesized CQDs showed the characteristic photo-physical properties as confirmed from the UV-visible and fluorescence (FL) spectroscopy analysis. The synthesized CQDs are highly water soluble, possess strongly blue fluorescence under UV light with a quantum yield around 4-27 %. In addition, the resultant CQDs-Eu^{3+} nanoprobe were promisingly used for fluoride sensing in water.



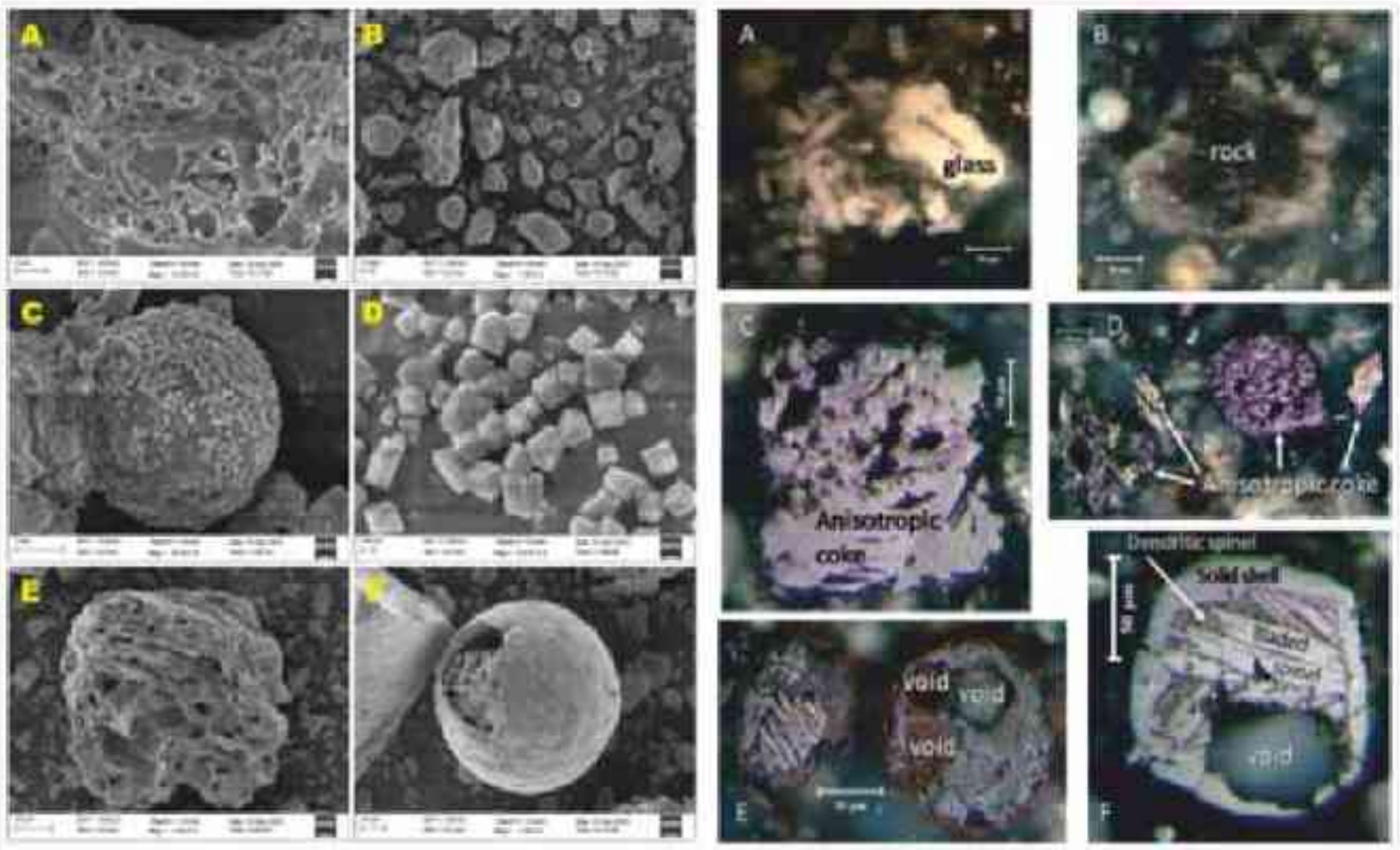
(Boruah et al., Journal of Photochemistry & Photobiology, B: Biology 209 (2020) 111940)

- **Geochemistry and mineralogy of coal mine overburden (waste): A study towards their environmental implications:**
  Coalmine overburden (waste) from Northeast (NE) Indian coalfield are studied along with their advanced analytical characterization towards their improvement for gainful utilization. Concentration of hazardous and REEs in overburden (waste) are determined and studied. NE coalmine overburden samples contain considerable amounts of REYs for further exploration.

(Islam and Saikia, 2021. Chemosphere, Volume 274, 129736)

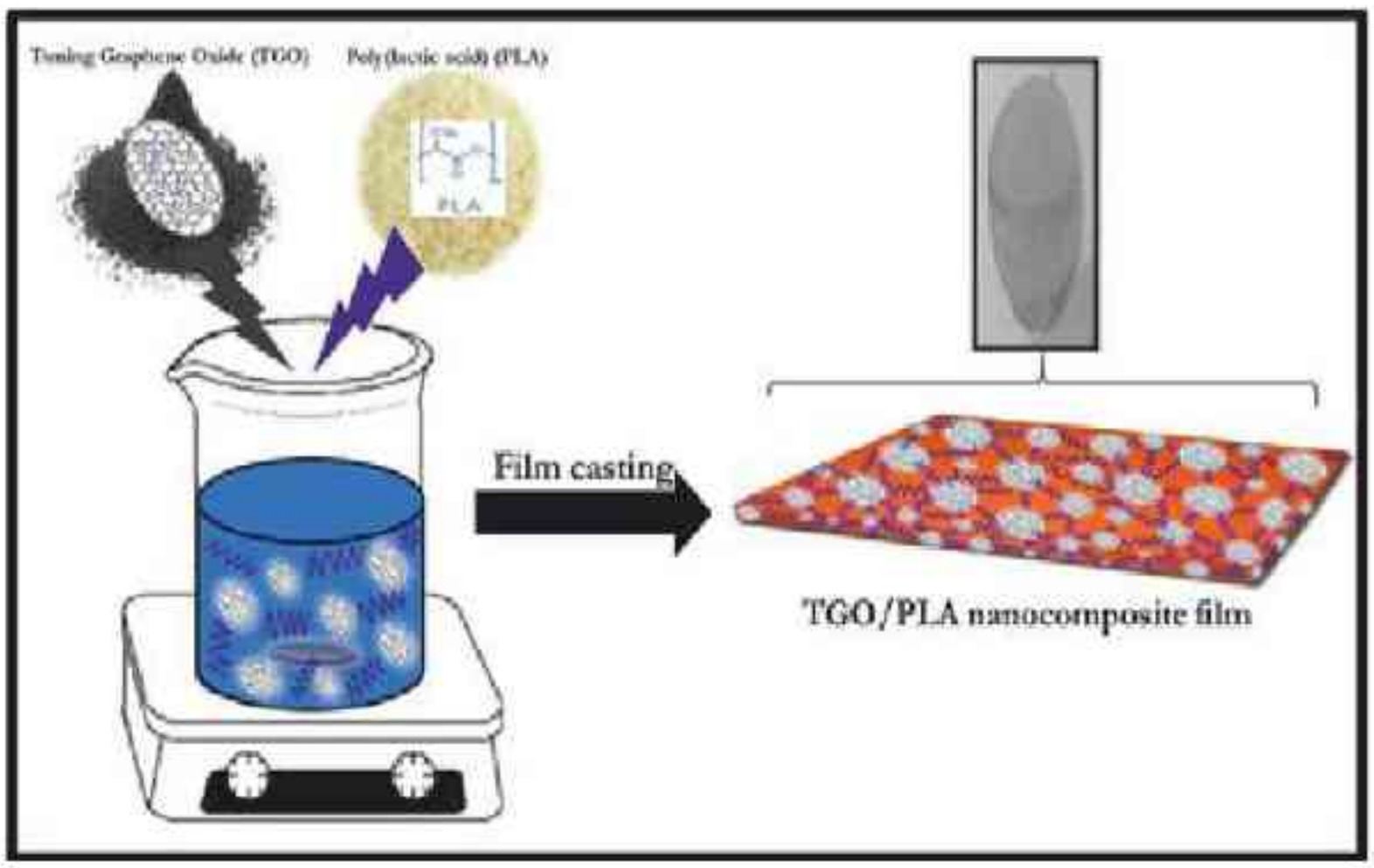
- **Geochemistry and petrology of coal and coal fly ash from a thermal power plant in India:**

Few of the Indian power coal and fly ash are examined geochemically and petrologically. Advance electron beam techniques are applied for nano-scale studies of the samples. Concentration of trace and REEs in the samples are determined and studied. There is possibility for environmental implications from these coal fly ashes.



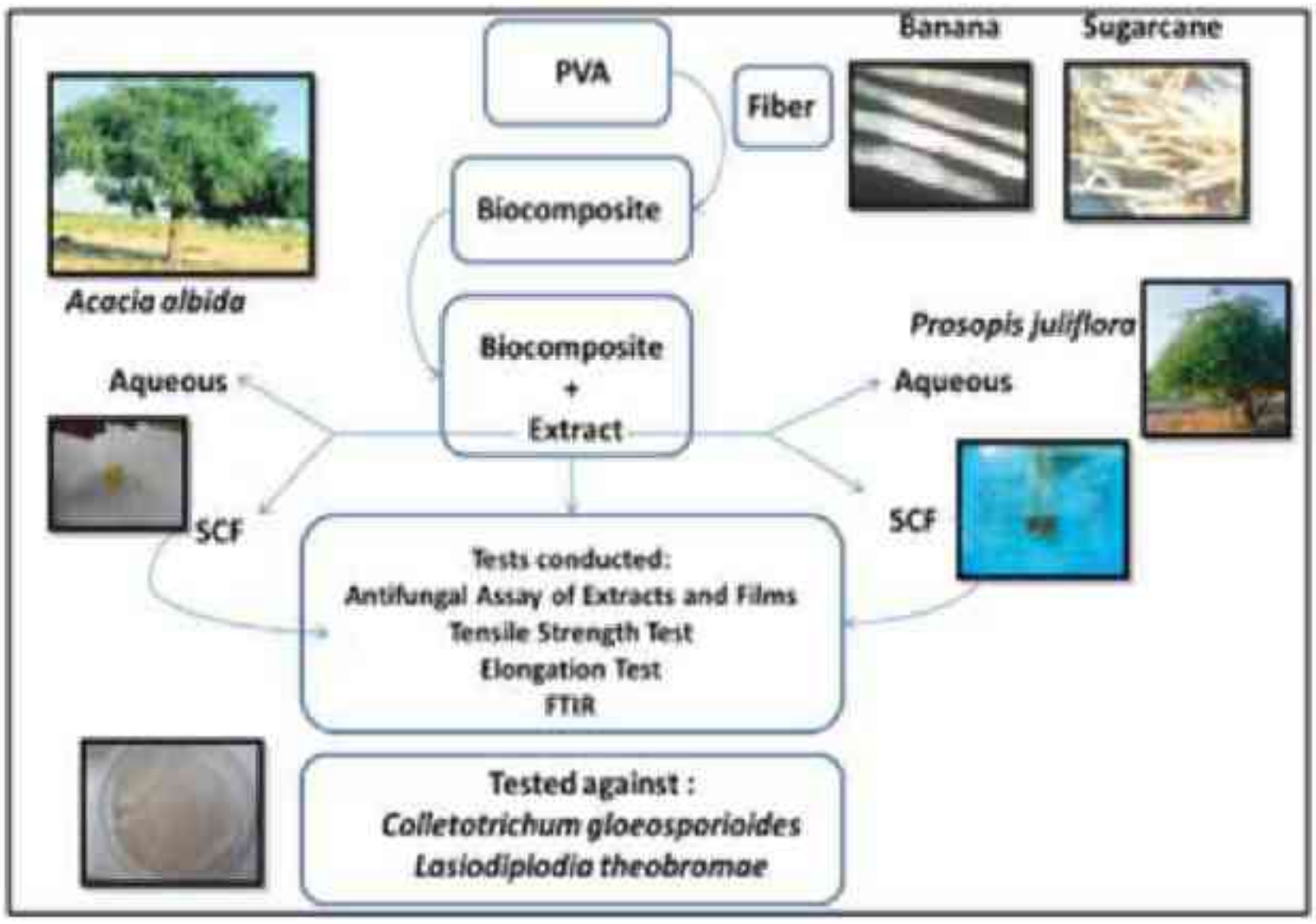
(Saikia et al., 2021. Fuel 291, 120122)

- **Structure and physical properties of poly (lactic acid) (PLA)/ graphitic oxide (GO) nanocomposite films:** The biodegradable polylactic acid (PLA) has been used for a wide range of applications such as food packaging, household engineering, drug delivery and tissue engineering because of increasingly serious environmental pollution and declining petroleum resources. However, graphene oxide (GO) with tuning was investigated in terms of its use as a filler to improve the inherent properties of bio-polylactide (PLA) films. The bio-composites of PLA with different loadings of Tuned Graphene oxide (GO) were prepared by solution casting method. The tensile tests show that the prepared PLA/GO nanocomposite films have significant improvements tensile strength compared with the unreinforced PLA film. Morphological analysis using SEM showed that the GO nanofillers were well dispersed at low GO loading and GO agglomeration was found at higher GO loadings.Therefore, these novel PLA nanocomposite films are promising candidates for biodegradable packaging applications.



- **Development of antifungal biocomposite film against postharvest pathogens Colletotrichum gloeosporioides and Lasiodiplodia theobromae.** (*Materials Today: Proceedings, 38, 1113-1120, 2021*)

  Colletotrichum gloeosporioides and Lasiodiplodia theobromae are the two main causative agents for the postharvest losses in mango, through anthracnose and stem-end rot disease, respectively. Reduction of these losses using antifungal agents was attempted by developing biocomposite films based on polyvinyl alcohol reinforced with cellulosic fibres incorporated with antifungal extracts. Thereafter, individual films were incorporated with aqueous (3 mg/ml) and supercritical fluid (SCF) [1000 µL] extracts of Prosopis juliflora and Acacia albida which gave the maximum inhibition in the antifungal assay of the extract against the selected pathogens. The developed films were tested for antifungal activity, tensile strength, and elongation. The films retain their antifungal activity after incorporation and also maintained significant tensile strength and elongation for a biocomposite packaging film.



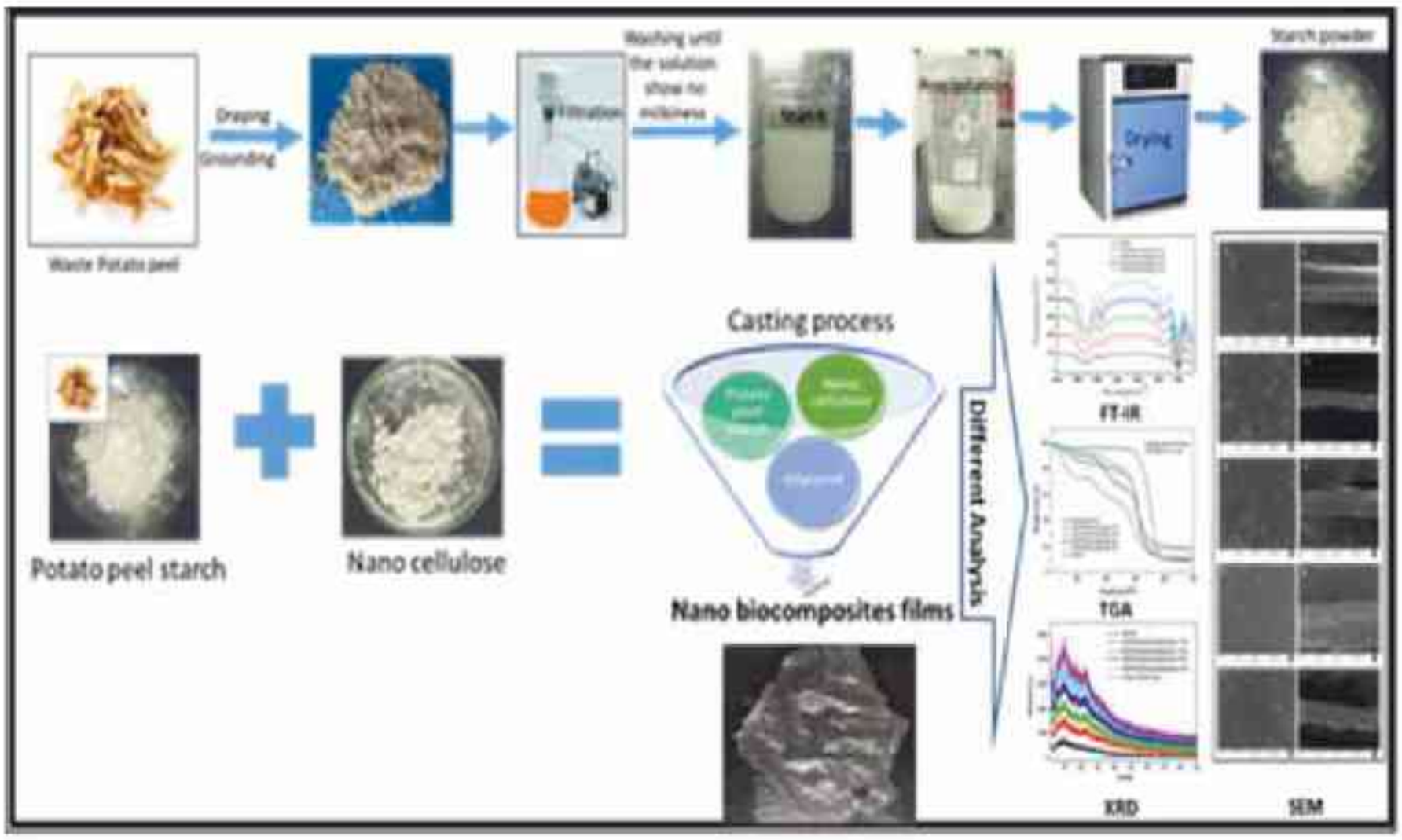
- **Development of cellulose nanocrystals bio-composite film for food packaging application**

  Environment friendly packaging materials prepared based on poly-vinyl alcohol reinforced with cellulose nanocrystals (CNC) and titanium dioxide (TiO_2) by casting method. The bio-composite films containing cellulose nanocrystals (CNC) obtained from avocado peels by acid hydrolysis and varying concentrations of TiO 2 such as (0, 0.25, 0.50, 0.75 and 1% w/w). The structure, transparency, thermal stability, tensile strength and elongation at break of the bio-composite films were analyzed. Images of the obtained films observed under the scanning electron microscope, revealed uniform distribution of nanoparticles. The X-Ray diffraction results disclosed that increased TiO_2 concentration led to the increased crystalline structure of the bio-composite films. The Fourier transform infrared spectra revealed hydrogen bonding and interactions between Ti and O. The addition of CNC into the PVA/TiO_2 blend films enhanced the thermal and other mechanical characteristics. The bio-nanocomposite film with 1% TiO_2 was found to be ideal based on morphology, tensile strength, elongation and even exhibited better results against Colletotrichum gloeosporioides compared to other concentrations.

- **Preparation of waste potato peel starch (WPS)/nano-cellulose reinforced bio composite films**

  The use of plastics is struggled worldwide. Therefore, finding substitutes to plastic packaging products is an urgent issue. This project work was dedicated considering environmental friendly approach towards using food and agree waste viz. potato peel waste starch as matrix and nano-cellulose_used as fillers to produce eco-friendly biopolymer nanocomposite films by solvent casting method. The eco-friendly polymer nanocomposite films were characterized for their surface morphology, FT-IT, XRD and

thermal properties. The surface morphology study and thermal properties of the developed green polymer nanocomposite films are promising and these films can be used for food packing industry.



Project Title: **Materials, minerals and processes for sustainable development**

Project No: **OLP-2037**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Rajib Lochan Goswamee (PI), Dr Manash Ranjan Das (PI), Dr L Saikia, Dr B Saha, Ms D Rajbongshi, Mr P Kalita, Mr P J Bora

Objectives:

- Development of Advanced Materials based Process for S&T Needs of rural areas North East Region pertaining to water and silk industry.

Salient Achievements:

- The raw materials required for the deflouridation of water are collected and physico-chemical analysis is in progress.
- Biocompitable AuNPs has been synthesized by following green biosynthesis route. Approximately 11 nm spherical shaped AuNP has been synthesized by reducing $HAuCl_4$ using Ocimum sanctum leaf extract at 50 °C within 3 h.

Project Title: **Nanoparticles supported self assembled conducting polymer monolayer based platform for rapid detection of monosodium glutamate in food products**

Project No: **GPP-318**

Funding Agency: Department of Biotechnology (DBT), Govt. of India

PI & Members: Dr Hemanta Sankar Dutta (PI)

Objectives:

- To develop self-assembled conducting polymer monolayer based electrode platform.
- To detect monosodium glutamate efficiently in food products.

Salient Achievements

- Demonstration of electrochemical detection of monosodium glutamate using Langmuir-Blodgett nanohybrid films of GO and AuNPs with a linear range of detection from 1 mM to 0.1 µM with a R^2 value of 0.99 using an immunosensing approach.
- The immunosensor is validated for monosodium glutamate detection in real food samples like vegetable soups, tomato soups, and instant noodle products.

Project Title: **NCAP-WGIII: Carbonaceous aerosol emissions, source apportionment and climate effects**

Project No: **GPP-325**

Funding Agency: Ministry of Environment, Forests and Climate Change, New Delhi

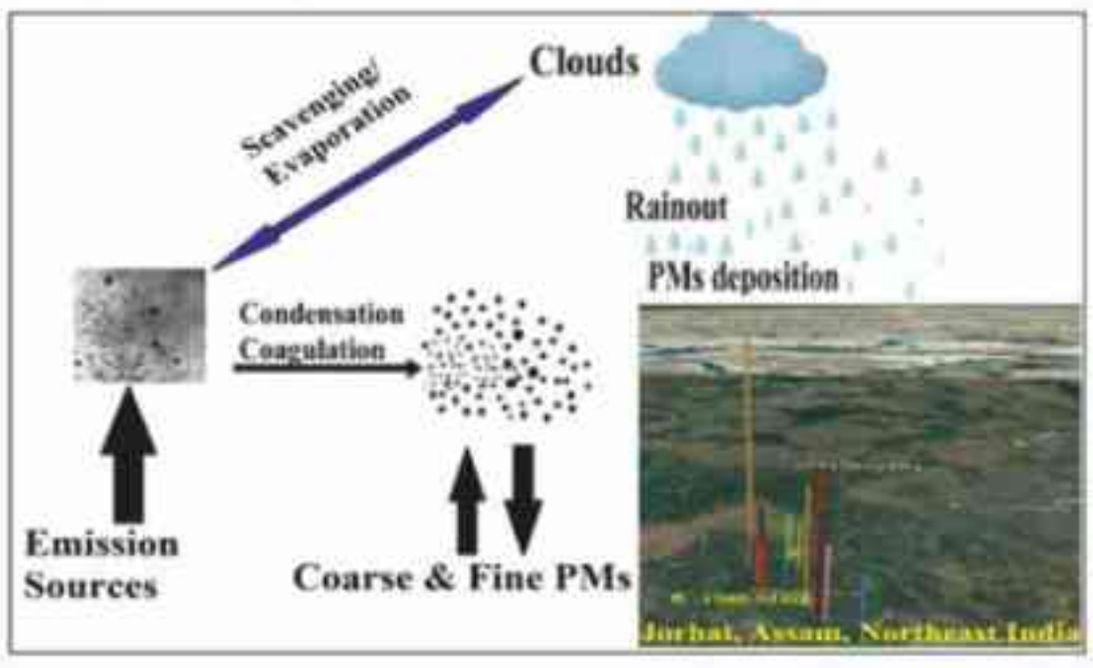
PI & Members: Dr Binoy Kumar Saikia (PI), Dr Prasenjit Saikia (Co-PI), Mr Tonkeswar Das (Investigator)

Objectives:

- Identification of a regionally representative location for particle sampling for BC source apportionment.
- Particle sampling for a two year period, including QA/QC protocol development and implementation. Filters are to be passed on to the associate institution for full chemical analysis and source apportionment modelling.
- Analysis of seasonal variations in source contributions to PM2.5 as related to meteorology and emissions. Data generation for final receptor modeling results for North-Eastern India site. Detailed activity timeline charts and budget are given in the following section.

Salient Achievements:

- A five Channel Speciation Air Sampling System (SASS) was used to collect $PM_{2.5}$ particles every alternate day for 24 hours duration onto multiple filter substrates. Meteorology data for wind speed, wind direction, ambient temperature, relative humidity, barometric pressure, and rain was collected at per-minute resolution from Automatic Weather Station (AWS) in a single Unit.
- Treatment and sub-sampling of the filters for dispatch to IITK for further chemical analysis.
- Chemical analysis of soil around the NEIST campus and the atmospheric aerosol for environmental quality study.



(Islam and Saikia, 2020. Chemosphere 259, 127453)

Project Title: **Approach towards tailoring the interfacial structure and property of lignin for flexible bio-polymer film application**

Project No: **GPP-330**

Funding Agency: SERB-Department of Science and Technology (DST), Govt. of India

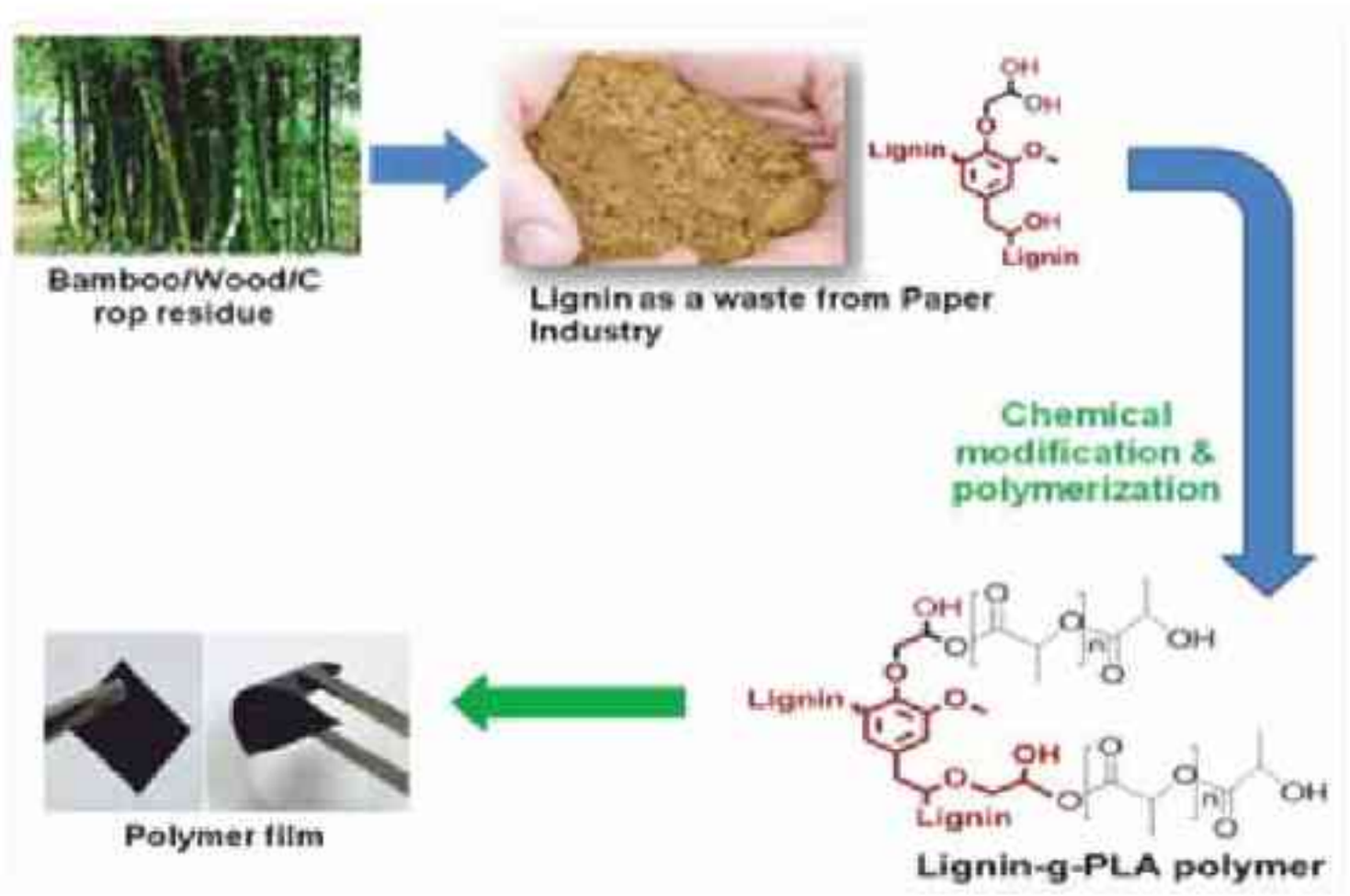
PI & Members: Dr Ajit Singh (PI)

Objectives:

- Development of lignin-Polylactic acid copolymer film from lignin.

Salient Achievements:

- In the project work, development of biodegradable polymer film from paper industry waste lignin was the main objective. Therefore, lignin was isolated from black liquor obtained from the paper industry. Isolalated lignin was firstly chemically modified with epichlorohydrin to enhance it's reactivity and later polylactic acid (PLA) was grafted in it to synthesize lignin-PLA copolymer. The copolymer was characterized and confirmed with various spectroscopic techniques such as FT-IR, XRD, TGA, DSC, GPC etc. Hydraulic hot press technique was used to prepare flexible polymer film from the developed lignin-PLA copolymer. Further, properties enhancement and biological properties evaluation of the above polymer film is in continuation.



Schematic diagram of the polymer film development from lignin

Project Title: **Red-Ox active ferrocene functionalized N-heterocyclic carbene-molybdenum complex for catalytic nitrogen triple bond reduction**

Project No: **GPP-333**

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Biswajit Saha (PI)

Objectives:

- Syntheses of ferrocene functionalized NHC ligands.
- Preparation of [Fe-Mo] catalysts.
- Ammonia synthesis from dinitrogen by [Fe-Mo] catalysts at ambient condition.

Salient Achievements:

- New ferrocene functionalized N-heterocyclic carebene ligands have been synthesized and characterized by NMR, IR, HRMS and CV. One molybdenum complex is prepared and used for nitrogen fixation. Another iridium complex is synthesized and structure is established by single crystal x-ray. This iridium complex is presently utilized for the oxygen and hydrogen production from water at ambient conditions.

Project Title: **Development of low cost biodegradable plastics from Indian agricultural-food processing starch wastes for food packaging and other value added applications**

Project No: **GPP-337**

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Jayaramudu Jarugala (PI), Dr U N Gupta, Mr R C Bohra, Mr L Phukan

Objectives:

- The main objective of this project is to replace/substitute existing petroleum derived plastic films with eco-friendly, biodegradable plastic films produced from renewable resource based polymers and agro-food processing starch waste materials.
- It is proposed to reduce the cost of biodegradable plastics (poly propylene carbonate) using a low cost agro-food processing waste of potato and banana peel starch waste.
- In addition to that the two fold nanofillers such as cellulose nanocrystals and silica nanoparticles shall be obtained from a single feed stock of an abundantly available rice husk agriculture waste.
- These nanofillers shall be utilized to improve mechanical thermal, barrier properties of PPC/starch blends. Also the grape fruit seed extract also used to impart the antimicrobial, antioxidant and UV absorbance properties of PPC/starch blends.
- The biodegradable plastic films will be melt processed and the effect of starch, grape fruit extract, cellulose nanocrystals and silica nanoparticles on perfomence of the films shall be investigated.
- The physico-mechanical and thermo-mechanical performance of the developed films will be evaluated using ASTM standards. Biodegradation of films will be carried out according ASTMD 6348. Finally optimized of new formulations were used to test food packaging, agricultural mulching films applications.

Salient Achievements:

- Eco-friendly biocomposite films were fabricated by reinforcing silica particles. The biocomposite films were prepared by solution casting method. The prepared films were characterized for SEM analysis. The effects of silica particles (1 wt %, 2 wt %, 3 wt % and 4 wt % with respect to starch) on the morphology of the starch/silica particles bio-composite films were examined by SEM technique. Morphological & photo group studies indicated uniform dispersion of the low-concentration (2%) silica particles in the starch matrix (**Fig.1 & Fig.2**). The biocomposite films will be extensively studied using various characterization techniques viz. mechanical, thermal, barrier properties, FTIR etc. The outcomes of this project work provide understandings into the development of eco-friendly bio composite films for packaging applications.

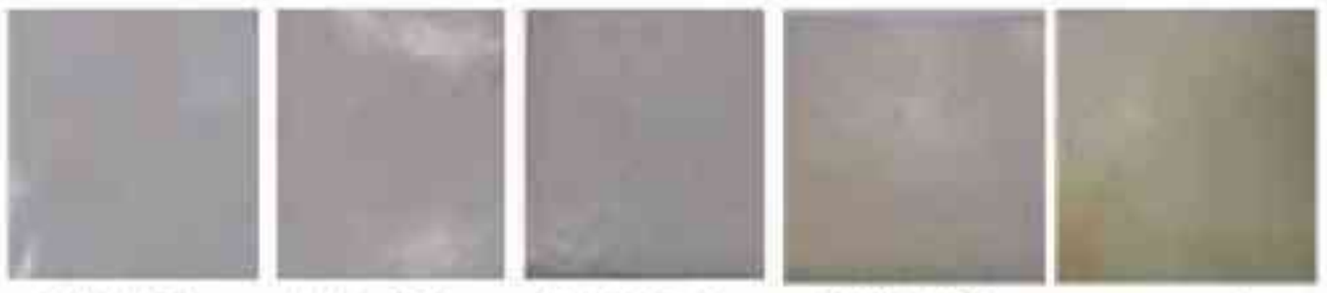


Figure 1. Bio-composite films with different SiO_2 loading (0-4%).

Figure 2. SEM images of starch-silica bio-composite film.

Project Title: **Application of biosynthesized metal nanoparticles for quality enhancement of Muga silk fiber**

Project No: **GPP-338**

Funding Agency: Department of Biotechnology (DBT), Govt. of India

PI & Members: Dr Lakshi Saikia (PI)

Objectives:

- Green synthesis of metallic Nanoparticles using locally sourced plant/fruit extracts.
- Study of the effect of synthesized nanoparticles of Au, Ag & Cu on quality of Muga silk fiber.
- Evaluation of Toxicity of the metallic nanoparticles by screening in mammalian cell lines.
- Quality assessment of nanoparticle treated Muga Silk fibers.
- Evaluation biodegradability of extracted silk following treatment with metallic nanoparticles.

Salient Achievements:

- Biosynthesis of some of the metal nanoparticles (Au, Cu etc.) has been carried out using plant extract. Initial characterization of the synthesized nanomaterials confirms the formation of the corresponding metal nanoparticles. Similar line of work is being carried out on eri silk worm and the results are very much encouraging. The smoothness and strength of the yarn is increased significantly. Based on those results since muga silk fiber has diversified application and different physical as well as other properties we have performed preliminary investigation.

Project Title: **Development of hybrid battery power module with indigenously developed super-capacitor and Li-ion cell.**

Project No: **GPP-348**

Funding Agency: Ministry of Electronics and Information Technology (MeitY), Government of India, New Delhi

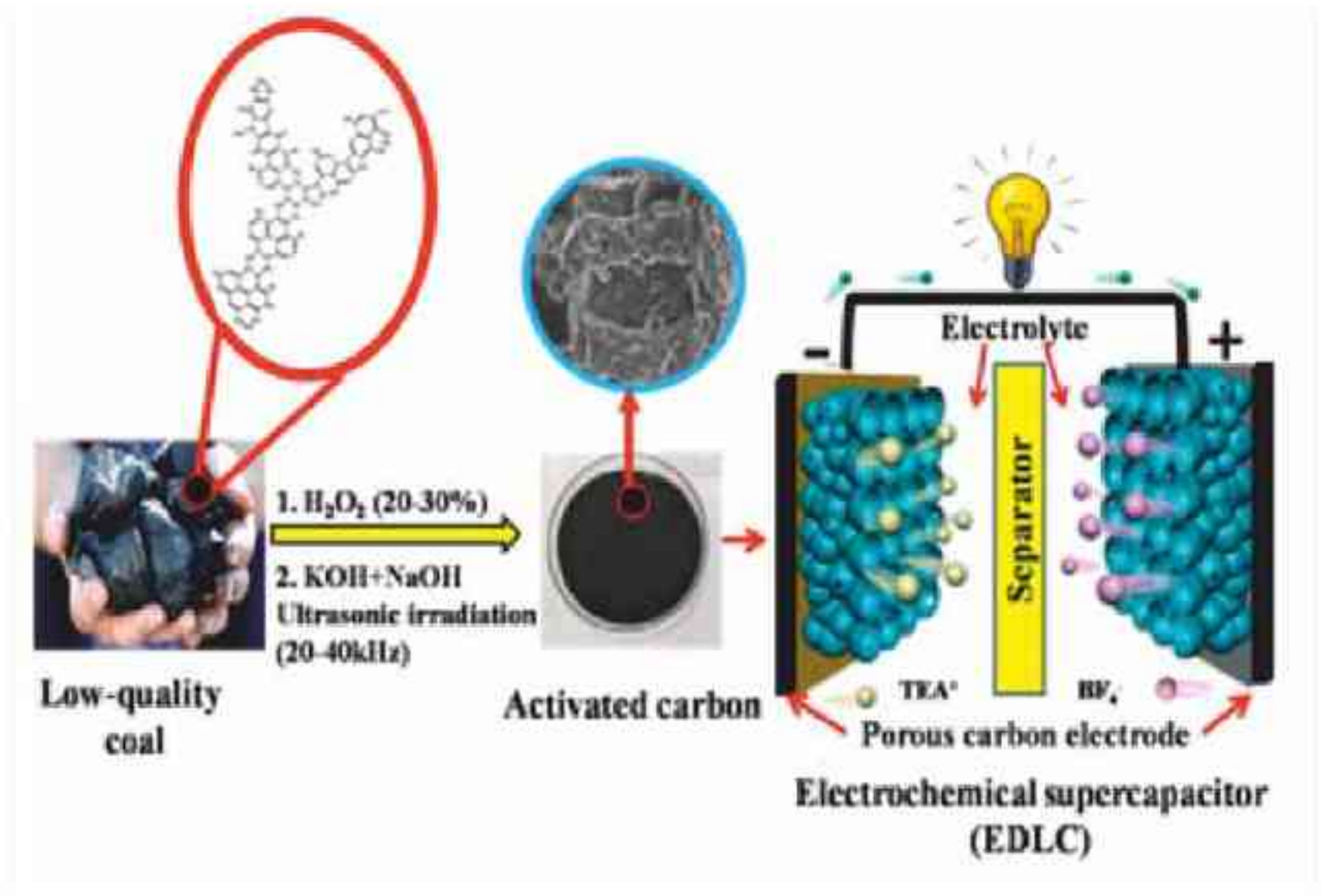
PI & Members: Dr Binoy K. Saikia (PI), Dr Dhrubajyoti Bhattacharjya, Dr P Saikia, Dr T Das

Objectives:

- Development of hybrid battery power module with indigenously developed super-capacitor and Li-ion cell.

Salient Achievements:

- An ultrasonic-assisted activation process for low-quality coals is developed.
- Chemical and surface properties of the coal-derived activated carbon are evaluated.
- Electrochemical properties of these coal-derived activated carbon are evaluated.



(Bora et al., 2021. Journal of Environmental Chemical Engineering 9, 104986)

Project Title: **A comprehensive approach in understanding in acid mine drainage problems of Makum coalfield and its management**

Project No: **GPP-364**

Funding Agency: Ministry of Earth Sciences, New Delhi

PI & Members: Dr Binoy K. Saikia (PI), Dr Manoj Kumar Phukan (Co-PI), Dr P Saikia, Dr T Das

Objectives:

- Geochemical and kinetic studies of Acid Mine Drainage (AMD) problem in Makum coalfield (Margherita), Assam.
- Development of a site-specific prototype for management of AMD from Makum coalfield.

Salient Achievements:

- Proximate and ultimate analysis of coal, OB and sediment samples.
- Petrographic analysis of the coal and OB samples from Makum coalfield.
- Determination of sulfur and forms of sulphur in coal and OB samples.
- Principal Component Analysis (PCA) of the chemical and geochemical parameters to evaluate their mutual correlations.

Figure: Coal sampling around AMD affected areas of North Eastern Coalfields, Margherita (A: view of Tirap colliery OCM); B: 20 feet coal seam; C: Sampling of dump coal; D: AMD affected area) during winter (early March-2021)

Project Title: Pilot scale demonstration and popularisation of some sustainable technology for the supply of safe water in fluoride and arsenic affected areas

Project No: GPP-372

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Rajib Lochan Goswamee (PI), Dr Manash Ranjan Das (Co-PI), Dr Lakshi Saikia (Co-PI)

Objectives:

- Installation of minimum four demonstration plants each suitable for a community unit of approx. 50 adult persons for fluoride and arsenic removal from bore well water.
- Intermediate toxic sludge immobilization at the plant site by lime-silica reactions for safe transportation to central sludge repository
- Immobilization of intermediately stabilized sludge through mortarisation in centralized repository to obtain commercial products
- Feasibility assessment and capacity building of the community for institutional sustainability of the technology on field conditions and expanding exposure of the technology through demonstration to multiple stakeholders and user groups of two fluoride and arsenic affected areas.

Salient Achievements:

- The project execution has started recently. The raw materials required for the column preparation to decontaminate the water are being collected and initial physic-chemical analysis is in progress. Investigations on process parameters are initiated.

Project Title: **Development of advanced hybrid supercapacitor operating with high energy density and wide operating temperature range**

Project No: **GAP-796**

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Dhrubajyoti Bhattacharjya (Ramanujan Fellowship)

Objectives:

- Fabrication of energy storage device from Northeast region bio-resources.

Salient Achievements:

- Newly sanction: Work in progress.

BRANCH LABORATORY IMPHAL & BRANCH LABORATORY ITANAGAR

The CSIR-NEIST Branch Laboratory Imphal was established in the year 1973 with the aim to undergo research and development related to oil yielding plants. After renaming the RRL to NEIST, the Substation has been upgraded to the status of Branch Laboratory, Imphal in the year 2012 with many more activities and research areas such as Biodiversity, Bioprospection, Biochemistry, Designing and development of products based on ethnic designs and materials, Seismic observatory, Weather monitoring station, etc. The Branch Laboratory will be focusing more on motivation and transfer of technology of CSIR to society through NGOs, Organizations and Entrepreneurs.

The CSIR-NEIST Branch Laboratory Itanagar was established in the year 1981 and started functioning from the year 1983. The objectives of the branch Laboratory is to promote advances to medicinal, aromatic, economic plants, metabolic engineering and microbial research for the benefit of the society of Arunachal Pradesh in particular and to the country in general. The branches will be implementing the objectives, research, educational and societal activities that foster a multi-disciplinary interchange idea, S&T consciousness to the students, entrepreneurs, NGO, SHG etc. The activities of the branch laboratory Itanagar will contribute to the basic science, translational research for application of health care and environment, agriculture and sustainable development and livelihood income generation for the people of Arunachal Pradesh.

Ongoing Projects

I. Focused Based Research Projects

Project Title: **Deciphering the mechanism(s) of host-endophytes coevolution, enhanced secondary metabolite production and crop productivity**
Project No: **MLP-0048**
Funding Agency: CSIR-Focused Basic Research (CSIR-FBR)
PI & Members: Dr Natarajan Velmurugan
Objectives:

- The main purpose of this project was to isolate, screen and select potential endophytic candidates from the endangered medicinal plants specific to Arunachal Pradesh, with emphasis on plant growth promoting activities and functional metabolites production.
- We are characterizing and determining metabolic pathways and elite genes in selective endophytes responsible for plant growth promoting activities and functional metabolites production.

Salient Achievements:

- ❖ Successfully isolated endophytes from the interior parts of rhizomes of selective medicinal plants. The isolated endophytes were characterized at phenotype level with emphasis on their role in plant growth promotion and functional metabolites production.

II. In-house, Grant in aid & Consultancy Projects

Project Title: **Augmentation of bioresources for environmental care and socio-economic development**

Project No: **OLP-2043**

Funding Agency: CSIR, New Delhi

PI & Members: Dr H B Singh (PI), Dr P Yuvaraj, Ms N Abem Devi, Mr Somananda Thokchom

Objectives:

- ❖ Survey, germplasm collection, identification & documentation of economically & environmentally significant plants.
- ❖ Chemical profiling of selected species.
- ❖ Formulation of some usable products from bioresources.

Salient Achievements:

- ❖ A survey was conducted for collection of ethnobotanical data on immune boosting herbs practiced by Meitei community of Manipur. A total of 55 plants belong to 35 families and 39 genera are collected. (It will be communicated to a research journal for publication).
- ❖ Planted 15 sapling of Agar (*Acquillaria malaccensis*), 7 sapling of soap nut (*Sapindus mukorossi*), 5 saplings of lipstick plant (*Bixa orellana)*, 6 *Terminalia citrina*, 6 *Litsea cubeba*, 3 *Stixis suaveolens*, and 3 *Hiptis bengalensis* in the Experimental farm of BLIM on the occasion of Gandhi Jayenti.
- ❖ Two types of green tea are formulated and nutritional and other parameter profiling of 2 types of green tea in undergoing.

Project Title: **Extension activities in Arunachal Pradesh: Utilization of medicinal, aromatic and economic plant (MAP) for socio-economic benefit in rural sector of Arunachal Pradesh**

Project No: **OLP-2044**

Funding Agency: CSIR, New Delhi

PI & Members: Dr Chandan Tamuly (PI), Dr N Velmurugan, Dr B C Baruah, Mr J Bora, Mrs M Hazarika

Objectives:

- ❖ Exploration and chemical investigation of selective medicinal, aromatic and economic plant of Arunachal Pradesh emphasis on bioactive constituents of *Zanthoxylum armatum* and other specific medicinal plants.
- ❖ Evaluation of nutraceuticals, antioxidant, anti-diabetic properties, mineral content and other therapeutic value of selective medicinal/edible plant species.

- To generate employment opportunities for socio economic uplift in the rural sector through utilization of low cost rural technologies like cultivation of mushroom, production of vermicompost etc.
- Preparation and propagation of improved vermicomposting using bamboo leaves waste, microbial consortia, *Trichoderma, E. fetida, A. differengens*and *E. euginae.*
- Analysis of chemical and elemental composition of improved vermicompost variety.

Salient Achievements:

- A total of 5 pure cultures were successfully processed and germ plasms were established.
- For characterization of mushroom species, genomic DNA was isolated from fruiting bodies of 5 mushroom samples, MR001, MR002, MR003, MR004 and MR005. The LSUD region was amplified and sequenced. The obtained nucleotide sequences were trimmed and analyzed. The final contigs of the each samples were used for identification purpose. All the strains were identified as *Pleurotus* sp. The accession numbers were obtained for the same.
- Further, the phylogenetic affiliation of the pure cultures were determined. Isolates MR002, MR003, MR004, MR005 were shown very close similarity while strain MR001 was relatively distinct from other 4 strains. The MR005, MR002, MR003 and MR004 were found to be identical to *Pleurotus cornucopiae* while MR001 was found to be identical to *Pleurotus ostreatus*. The phylogenetic affiliation of pure cultures is as follows:
- Taxol from Taxus: Taxol is a botanical source of anticancer drugs. Our objective is to optimized the process of extraction and quantification of taxol content of Arunachal Pradesh
- Samples were collected from four locations of Arunachal Pradesh- Limeking, Tawang, Bomdila and Ziro
- The bioactive chemical- Paclitaxel; Cephalomannine; 10-Deacetyl baccatin-III and Baccatin III (taxoids) were identified and quantified which have significant medicinal importance.
- Paclitaxel found highest in cold methanol extraction. The performance is better in hot methanol extraction

Project Title: Nutritional enrichment of agricultural wastes with essential fatty acids producing Thraustochytrids as improved feed for aquaculture

Project No: GAP-369

Funding Agency: Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Natarajan Velmurugan (PI)

Objectives:

- The main purpose of this project related to characterizing the agricultural waste materials available in Arunachal Pradesh and enriching those agricultural waste materials with essential fatty acids producing Thraustochytrids cells.
- Characterizing the selective agricultural waste materials available in Arunachal

Pradesh and optimizing the fermentation conditions for the growth of essential fatty acids producing Thraustochytrids in agricultural waste materials which to be used as direct feed for aquaculture farms in Arunachal Pradesh.

Salient Achievements:

- Analyzed the proximate composition of selective agricultural waste materials of Arunachal Pradesh. We are growing selective strains of essential fatty acids producin Thraustochytrids in agricultural wastes.

Project Title: **Expanding endophytes of *Paris polyphylla* as a model to study co-evolution relationships with emphasis on functional metabolites production**

Project No: **GPP-323**

Funding Agency: SERB -Department of Science and Technology (DST), Govt. of India

PI & Members: Dr Natarajan Velmurugan (PI), Dr B C Baruah

Objectives:

- Collection and identification of *Paris polyphylla* from high-altitude mountain forests of Arunachal Pradesh.
- Isolation and characterization of endophytes from *P. polyphylla*.
- Screening of endophytes for the production of saponins and other bioactive compounds along with phytochemical investigation of *P. polyphylla*.
- Transcriptomics analysis – Understanding the molecular mechanisms of co-evolution relationships with emphasis on functional metabolites production.
- Effect of selective endophytes on bioactive compounds production in *P. polyphylla*.

Salient Achievements:

- Documented the presence of endangered medicinal plant *P. polyphylla* in high altitude forest/mountain ranges of Bomdila region of Arunachal Pradesh. Major bioactive compound steroidal saponins was successfully isolated and characterized. Metabolic pathways responsible for bioactive compounds synthesis and transportation were determined. We have isolated 193 bacterial and 2 fungal endophytes from the rhizomes of *P. polyphylla*.

Project Title: **Anthropogenic impacts and their management options in different ecosystems of the Indian Himalayan region**

Project No: **GPP-327**

Funding Agency: GB Pant National Institute of Himalayan Environment & Sustainable Development, Ministry of Environment Forest & Climate Change, Govt. of India

PI & Members: Dr H B Singh (PI)

Objectives:

- To monitor snow melt and/or headwater contribution in total river water flow, their seasonal behavior and quality due to climate change.
- To assess the impacts due to erratic seasonal behavior of river/stream water flow on

overall land use pattern, the developmental projects such as HEPs and riverine aquatic biodiversity.

- ❖ To enhance capacity building of the stakeholders including women in terms of increasing their resilience and adaptive capacity due to climate change for their sustainable livelihood options.
- ❖ To suggest mitigating measures and management options due to anthropogenic impacts.
- ❖ To provide policy guidelines for strengthening existing polices.

Salient Achievements:

- ❖ Survey of 15 villages completed to know the people perception about climate change, Head water contribution, people perception on climate change questionnaire survey.
- ❖ Baseline database about demographic status, livelihood options, climate change scenario, etc. in each study site was generated.
- ❖ 2 Consultative workshops/ seminars to minimize climate change impacts and conservation were organized.
- ❖ Capacity building programme and income generation program for 14 Days (2020) Capacity building and income generation program was conducted including 60 women out of 80 participants as source for livelihood options through Lemon grass cultivation, Essential oil distillation, banana fibre extraction and vermicomposting training.

Project Title: **Diastereoselective synthesis of Lamellarin alkaloid natural product fused spirooxindoles and its analogues. A series of evaluation of its biological activities against Mycobacterium tuberculosis and other bacterias**

Project No: **GPP-334**

Funding Agency: SERB -Department of Science and Technology (DST), Govt. of India

PI & Members: Dr P Yuvaraj (PI)

Objectives:

- ❖ Synthesis of focused natural products based libraries.
- ❖ Screening for a diverse range of biological activities.
- ❖ Structure-activity relationship studies (SAR).
- ❖ Iterative improvement of leads.
- ❖ In-depth studies of lead compounds.
- ❖ Commercialization of lead compounds.

Salient Achievements:

Diastereoselective synthesis of Lamellarin alkaloid natural product fused spirooxindoles and its analogues. A series of evaluation of its biological activities against Mycobacterium tuberculosis and other bacteria.

- ❖ Synthesized more than 100 compounds of focused natural products-based libraries.
- ❖ Screening for a diverse range of Mycobacterium tuberculosis and other Bacteria for all the compounds.
- ❖ Structure-activity relationship studies (SAR) for the all-synthesised compounds done.

- ❖ Iterative improvement of leads.
- ❖ This investigation will give us preliminary information to determine the anti-microbial activity of newly synthesized materials.

Project Title: **Chemical investigation and therapeutic evaluation for linking marker compound(s) with anti-diabetic potential of young shoots of *Wendlandia glabrata* D.C. and fruits of *Phoebe cooperiana*, used by indigenous ST people of Arunachal Pradesh**

Project No: **GPP-340**

Funding Agency: Department of Biotechnology (DBT), Govt. of India

PI & Members: Dr Chandan Tamuly (PI), Dr J Bora

Objectives:

- ❖ To deliver effective phytopharmaceuticals and/or potentially novel lead molecule(s).
- ❖ Identification, characterization and validation of active constituents to define molecular signatures of active extract and or fraction components that correlate with the degree of biological activity.

Salient Achievements:

- ❖ Significant results were found in the young shoot of *Wendlandia glabrata* D.C. in water extract and usable part with anti-diabetic properties followed by Methanol fraction. Samples of *Wendlandia glabrata* have been sent to IASST, Guwahati in order to carry out the further *in-vivo* evaluations.
- ❖ Published two nos. of paper under the project.

Project Title: **Chemical profiling, quantification of bioactive constituents of ethno-medicinal plant of Arunachal Pradesh**

Project No: **GPP-342**

Funding Agency: National Medicinal Plants Board, Govt. of India, New Delhi

PI & Members: Dr Chandan Tamuly (PI), Dr B C Baruah, Ms M Hazarika

Objectives:

- ❖ Chemical profiling, quantification of constituent with seasonal variation of the selected plant.
- ❖ Formulation of spice products from the selected plant which is widely use by the people of Arunachal Pradesh.
- ❖ Awareness programme regarding promotion, sustainable utilization of the spice plant for mass cultivation to conservation of biodiversity and socio-economic development of the tribal people.

Salient Achievements:

- ❖ Three nos of compounds was identified in the leaf of the plant which shows significant anti-diabetic activities.
- ❖ The bark of the plant also shows a significant anti-diabetic activities. Identified five nos of compounds from the bark of the plant. All compounds were identified and confirmed by HPLC and HRMS analysis.

- In GC-MS analysis was carried out in Petroleum ether extract (bark part) of the plant. Total five nos of chemical constituents were identified
- **Awareness programme**: 3 nos of awareness programme on "Conservation, cultivation, sustainable utilization of medicinal plant i.e. *Zanthoxylum armatum* C.DC of Arunachal Pradesh" at different villages of Papum Pare, Upper Siang, East Siang
- dist. have been organized.

Project Title: Empowerment of ST people of Arunachal Pradesh through income generation exploring under-utilized food item 'Tashe'

Project No: GPP-345

Funding Agency: SEED Division, Department of Science and Technology (DST), New Delhi

PI & Members: Dr Chandan Tamuly (PI)

Objectives:

- To explore and utilization of edible food 'Tashe' which is very popular among ST people of Arunachal Pradesh.
- To organize training awareness programme for conservation, sustainable utilization, cultivation of 'Tashi' for socio economic benefit of local people of Kurung Kumey district.
- To evaluate the sustainability, market value and established different food items from 'Tashe'.

Salient Achievements:

- Organised awareness programme for preparation of value added products. 20 nos. Total nsos of participants 22 nos.
- Initiated the process for development the mechanized method for extraction of Tashe. The prototype-I & II has completed.
- The production and selling the value added product is going on. It is carried out by the Lifeline Multi-purposes Co-operative Society, Koloriang.
- The nutritional analysis was done for the value added products. It covered protein, carbohydrate, minerals (Na, K, Ca, Fe, Mg, P, Cu etc).
- Establishment of market linkage with local entrepreneurs.

Project Title: Synthesis of analogues of natural products having anticancer potential and investigation on their chemico-therapeutic potential to mitigate lung cancer

Project No: DBT-RA

Funding Agency: Department of Biotechnology, New Delhi, Govt. of India

PI & Members: Dr P Yuvaraj (PI), Dr K N Devi

Objectives:

- To synthesise the other derivatives of Apigenin and its purification. Also, to synthesise new compounds from Chrysin, thymoquinone, resveratrol. Purification and structure elucidation of derivatives synthesized.

- To study their anticancerous effects using cell line study. And also to check their co-relation with pro-inflammatory cytokines.

Salient Achievements:

- Literature survey on phytoactive compounds; Apigenin, thymoquinone, Chrysin, resveratrol. Completed writing a review paper on Apigenin, its derivatives and anticancer activities.
- Derivatives of Apigenin synthesis was done following Mannich reaction reported by Lin et al., 2012 with slight modification.
- Nitric oxide reducing assay of thymoquinone and resveratrol.

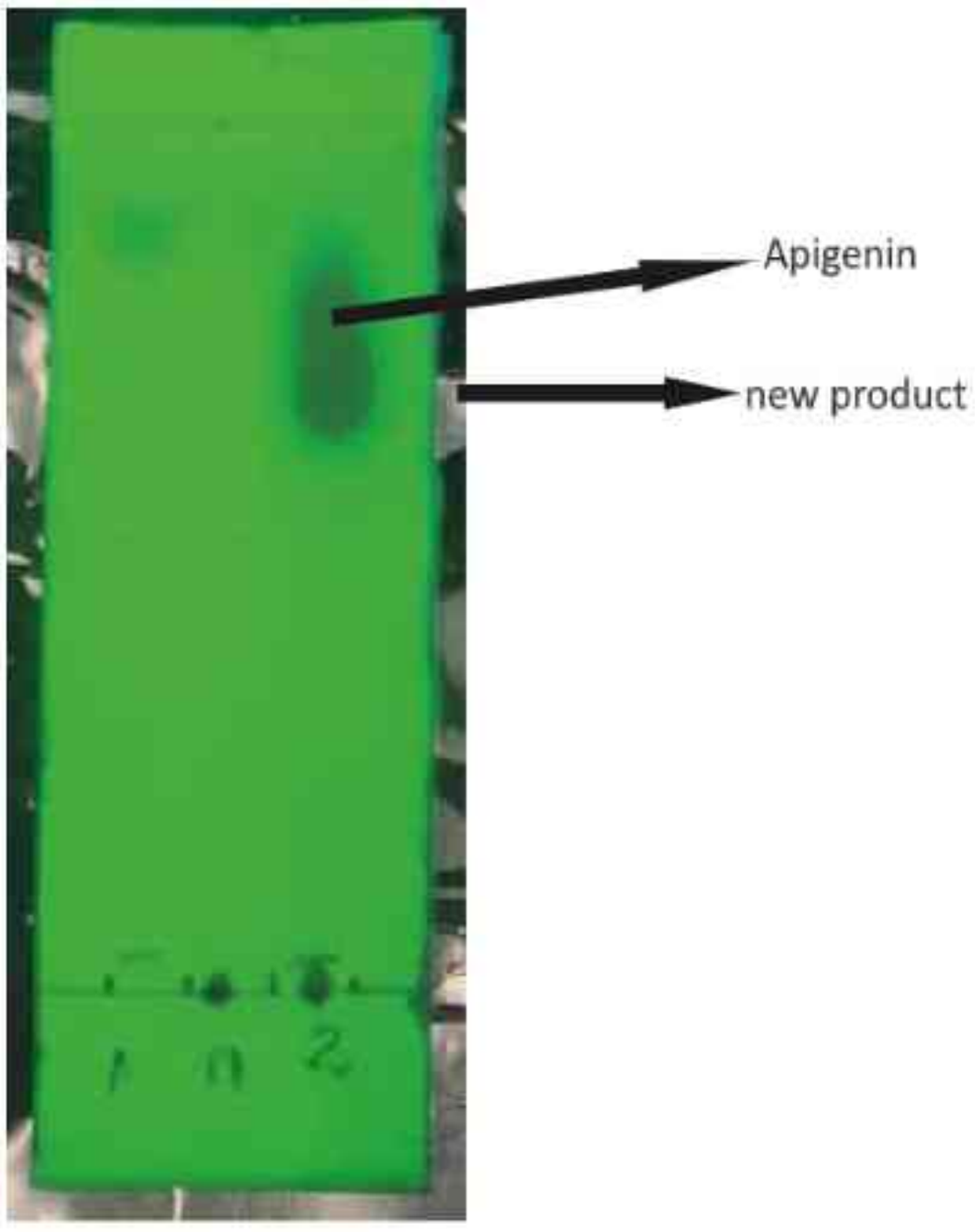


Fig.: TLC of Apigenin and its new product in solvent system methanol: ethylacetate:2:8 observed under UV (254 nm)

R&D MANAGEMENT

RESEARCH PLANNING & BUSINESS DEVELOPMENT DIVISION

Earlier, Management Sciences consisted of three major divisions namely, Human Resource Development Division, Information & Business Development Division and Planning & Project Monitoring Division. Each division had individual core activities to support the R&D fraternity of the Institute as well as to support the Director and Administration. Later, the three divisions were merged to form a new division named, Research Planning & Business Development Division (RPBD) with an aim to bring synergism in overall activities and objectives of the division. The divisional activities are being streamlined to ensure better performance with optimum use of resources.

RPBD will continue to work in areas focused at developing business of the Institute, human resources, planning & allocation of resources and evaluation of outcomes of R&D projects. The division will continue to serve as a window to the outside world and maintain liaison with public, industrial houses, government & private agencies, entrepreneurs, etc.

In addition to that the Knowledge Resource Centre (KRC) and Information Communication technology division also provide significant and regular support to the Director and administration.

Information and Business Development Activities

RPBD division continued to serve as the front office of the Institute to the outside world and coordinated the overall business development activities. The division discharged the dual responsibility of maintaining liaison activities with industrial houses, entrepreneurs, govt. departments, private and public sector institutes etc., on the one side and disseminating the Institute's services, expertise and capabilities for economic and societal benefits of clients, customers and users on the other side. The division also made efforts to consolidate the gains of Institute's R&D in order to meet the needs and requirements of the entrepreneurs/ users/clients who seek assistance from the Institute from time to time.

Exhibitions/workshop organised:

The division disseminated information regarding institutional technologies by its products display & posters, banners etc on different exhibitions and invitation by the entrepreneurs on various occasions. The group also organized workshops/seminar etc.

Publications:

During the period the division brought out the following regular and need based publications on different occasions.

Annual Report 2019-20 - Annual report of the institute was brought out and released on the CSIR-NEIST Foundation Day celebration on 18 March, 2020 .

CSIR-NEIST Publications at a glance

Filing Patent Application:

The division is responsible for processing of the Institute's patent application for filing in India and abroad in coordination with Innovation Protection Unit (IPU), CSIR, New Delhi. During the year 2020-21, 10 Patents were granted in abroad and 4 Patent applications were filed in India and 1 Patent application filed in abroad.

Technology Transfer:

The division is also responsible for licensing of the technologies developed by the institute. It is responsible for drafting of technology/knowhow transfer agreement and acts as bridge between the clients and the technology teams responsible for demonstrating the knowhow package. Two (2) nos. of technologies were transferred to 2 Parties/Entrepreneurs during the year.

Testing & Analysis:

The division is also responsible for processing of samples received by the Institute for testing and analysis. On completion of the analysis, the reports are issued by the division to the respective parties.

MoU/Agreement:

The division processed and executed the MoU/Agreements with various organization/universities on different occasions as given below:

Sl.No	MoU/ Agreement	Party	Purpose/Technology	Date of signing
1	MoU	Assam Downtown University, Guwahati Assam	Academic and Research Collaboration	16/06/2020
2	MoU	Darrang College, Guwahati Assam	Academic and Research Collaboration	21/10/2020
3	MoU	Numaligarh Refinery Ltd, Golaghat, Assam	Research Collaboration pertinent to microbial remediation, soil chemistry, hydrocarbons	21/10/2020
4	MoU	Rain Forest Research Institute, Jorhat Assam	Research Collaboration pertinent to R&D projects of common interest	26/10/2020
5	MoU	M/s Bosing Banggo Farmers Producers Cooperative Society Ltd, Arunachal Pradesh	Research Collaboration pertinent to Aromatic, Medicinal, Floriculture and other important plants	28/10/2020
6	MoU	M/s Indica Nutraceuticals LLP, New Delhi	Research Collaboration pertinent to Medicinal & Aromatic including Cannabis/Hemp	30/10/2020
7	MoU	Pachhunga University, College, Mizoram	Academic and Research Collaboration	27-11-2020
8	MoU	Manipur State medicinal Plant Board, Manipur	Research Collaboration in the areas such as food processing, agriculture, healthcare, drugs, water & Water resources, etc	14/12/2020
9	MoU	Nagaland Science and Technology Council, Kohima (NASTEC), Nagaland	Research Collaboration	14/12/2020
10	MoU	EMPOWER MSME Trust, Hyderabad	Research Collaboration	17-12-2020
11	MoU	BCPL, Dibrugarh	Research Collaboration to create a common umbrella between petrochemicals industry and CSIR Organization	18/12/2020
12	MoU	TUSTI, Guwahati	Research Collaboration	22-12-2020

13	MoU	Central Pollution control Board, Govt of India	Research Collaboration for implementing the project titled "Assessment of Air, Water and soil quality in baghjan oil blowout site and its vicinity, Tinsukia, Assam	13-01-2020
14	MoU (Integrity pact)	Central Pollution control Board, Govt of India	MoU (Integrity pact)	25-01-2020
15	MoU	Department of chemicals and petrochemicals, Ministry of chemicals and fertilizers, Government of India	Research Collaboration for implementing the project titled "Polymers, their composites and polymeric membranes for sustainable development of petroleum industries"	19-01-2020
16	MoU	Numaligarh Refinery Ltd, Golaghat, Assam	Research Collaboration for implementing the project titled "Removal of sour/stripped water, its value addition and recycling of water and allied activities"	24/02/2020
17	MoU	Mushroom Development Foundation, Lamb Road, Ambari, Guwahati-781001, Assam	To promote cooperation in scientific research and dissemination of technologies related to health and nutrition at the same time creating livelihood and entrepreneurship opportunities	25/02/2020
18	MoU	Indigenous Agricultural Farmers Producers Company, Dipsur, Guwahati, Assam	For the implementation of the "CSIR-Aroma Mission" in 100 hectares of land in the state of Assam.	11/03/2021
19	Technology Transfer Agreement	M/s Rising Sun Enterprise Indore, Madhya Pradesh	For transfer of Technology on "Citronella , Jor Lab C-5	15.12.2020
20	Technology Transfer Agreement	M/s Rising Sun Enterprise Indore, Madhya Pradesh	For transfer of Technology on "Lemongrass, Jor Lab L-8	15.12.2020
21	Technology Transfer Agreement	M/s Vigor Healthcare Services Private Limited Hyderabad, Telangana,	For transfer of Technology on "Citronella , Jor Lab C-5	05.10.2020

Human Resource Development Activities

Under HR activities, the division organizes workshops / lecture seminars, etc. The division imparts training and motivates students of the NE region in particular and the country in general. The division also undertakes extensive recordkeeping of the employee and researchers, competency development through need based training, strive for collaborative projects, etc.

It is needless to mention that this year, the outbreak of COVID-19 pandemic in early 2020 created unprecedented challenges to human health, economy and social well being of the people in entire world. Due to COVID-19 pandemic situation, several activities such as students' visit, seminars, lectures, Jigyasa programmeme, etc. could not be held in physical form.

Research Workers / Project Fellow:

The division encourages young talent for joining in the fellowships under various national and international schemes of CSIR and other funding bodies to carry out basic research in frontier areas of science from the country and from abroad. Presently, a few of them are working in various capacity under such schemes viz., Women Scientist Scheme (WSS) of DST, Senior Research Fellow and Junior Research Fellow of CSIR, UGC and other funding bodies, DST Inspire faculty, CSIR-TWAS Fellow, DST Ramanujan fellow and NPDF. The group also arranges to engage a few lecturers / teachers of nearby colleges and other Institutes as Guest Workers for their research work leading to PhD. The number of such research workers under various capacity during the periods are enlisted viz., 29 SRF, 40 JRF, 01 Women Scientist Scheme (WSS), 01 CSIR-TWAS Fellow, 01 DST Inspire Faculty, 01 DST Ramanujan fellow, 03 DST-NPDF, 02 DBT-RA, 02 CSIR-RA, 01 DST-AIRTF and 01 TARE Fellow. Based on review of their progress of research work a few of them were registered to pursue Ph D degree from Dibrugarh University, Gauhati University, Assam University and our own Academy of Scientific and Innovative Research (AcSIR).

Database Management:

The division maintains different databases on manpower of the institute viz., research workers, manpower, apprentice trainees, etc. The group provides information of Group IV scientist to RAB, to CSIR, visits of scientist abroad to ISTAD, CSIR.

Infrastructure Management:

The division manages different activities of the Boys' hostels of the institute.

Project/dissertation to students:

The division arranges facilities for multi-theme and multi-level training programmeme viz.,

summer training, industrial training, practical training, dissertation, etc. for the selected students from different universities, colleges and institutes of the country up to a maximum period of six months. During this period 165 Student Trainee (summer & winter season) completed their training in different division.

Apprenticeship Training Programmeme:

The division provides training programmeme for Graduate degree holders (Chemical & Mechanical), Laboratory Assistant (Chemical Plant) and ITI trade certificate holders in different trades like Fitter, Welder, Plumber, Draughtsman (Mechanical), Electrician and COPA.

Planning and Project Monitoring Activities

Planning and monitoring activities involves R&D management in terms of planning and allocation of resources and monitoring the outcomes of R&D projects. The division serve as the main centre for appropriate dissemination of information regarding Fast Track Translational projects (MLP), Mission Mode Projects (HCP), Focused Basic Research Projects, Facility Creation Projects, CSIR-integrated Skill Development Program (NWP) and In-house projects (OLPs) like Covid related Projects and CSIR- virtual Lab as well as the other externally funded projects like (GAP, CNP, CLP and SSP) to the management and as well as the concerned scientists. The division provides proper logistic support to the management in respect of successful implementation and completion of the projects which reflects in the growth of the institute. The division also prepares the annual performance target of the projects and the laboratory as a whole by focusing the R&D thrust areas which are in accordance with the CSIR vision and National mission. The division also acts as a link between CSIR HQ and the Institute with respect to formulation of Planned Projects & their execution & regular monitoring and reporting of progress. The division is also entrusted with preparation of various documents such as Man-month distribution of projects, Task Assignment of Staff, Manpower Profile, etc. The division updates the information of various projects and reports regularly for management support and other purposes. Processing of purchase indents and maintenance of Lab Notebooks are other activities under Planning and Project Monitoring (PPM).

Planning and Project Monitoring (PPM) also invloves following the activities:

External Cash Flow (ECF): The Institute undertakes projects funded by various external agencies. The details of funds received from these agencies were regularly recorded and monitored. Monthly statements of department wise ECF positions of the institute were prepared highlighting receipts from Govt Departments, Public and Private Organizations. Total ECF generated during 2020-21 was **1132.35** lakhs which comprised receipts from Government Departments/Ministries, Public Sector Industries and Private Sector organizations to the extent of **83.40%, 9.99% and 6.62%** respectively. ECF of the institute from different projects and services are shown below:

EXTERNAL CASH FLOW (ECF) FOR THE YEAR 2020 - 2021

(Including GST) (Rs in lakh)

Sl No	Category	Govt	Indian Industry	*CPSE	**SPSE	Foreign Company	Foreign Agency	Others	Total 01/04/2020 To 31/03/2021
1	Collaborative	0.036	0.000	38.130	0.000	0.000	0.000	0.000	38.166
2	R&D Consultancy	7.055	26.970	60.617	0.000	0.000	0.000	0.000	94.642
3	Grant-in-aid	924.197	0.000	0.000	0.000	0.000	0.000	0.000	924.197
4	Premia	0.000	1.680	0.000	0.000	0.000	0.000	0.000	1.680
5	Sponsored R&D	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6	Technical Service	13.049	46.273	7.854	6.490	0.000	0.000	0.000	73.666
	Total:	944.337	74.923	106.601	6.490	0.000	0.000	0.000	1132.351

* CPSE : Central Public Sector Enterprise
**SPSE : State Public Sector Enterprise

The Division wise External Cash Flow (ECF) are as follows:

Division	ECF(in Lakh)
Chemical Science and Technology	**116.32**
Geo-Science Science and Technology	**133.43**
Biological Science and Technology	**107.74**
Materials Science and Technology	**521.24**
Engineering Science and Technology	**146.76**
Advanced Computation and Data Sciences	**44.22**
Extension Centres (Branch Laboratory Itanagar & Branch Laboratory Imphal)	**46.88**
Research Planning and Business Development	**15.77**
Total	**1132.35**

Expenditure Monitoring: The expenditure of all the projects were monitored as per the budget allocation and uploaded the details of receipt & expenditure in PPM portal so that the fund position of a given project is readily accessible by concerned Principal Investigator (PI) and management for effective management. The division facilitates in preparing Utilization Certificate and Statement of Expenditure of the externally funded projects.

Goods & Services Tax (GST): The division monthly compiles the report for payment of Good and Service Tax (GST) to Govt of India, accrued from the various Scientific and Technical Services such as water testing, metal testing, soil testing, SEM/FESEM reports etc rendered by the Institute. Total Service Tax realized during the year 2020-21 is Rs. **33.87** Lakhs.

Project Status: Status of Project Contracted and Completed during 2020-21 are as follows:

Sl No.	Sources	Project Contracted		Project Completed	
	Project	Contract Value(Rs. in Lakh)	No. of Projects	Contract Value (Rs. in Lakh)	No. of Projects
1.	Grants-in-Aid	996.4	8	1372.89	9
2.	Collaborative	126.56	1	0	0
3.	Consultancy	132.04	4	138.42	4
Total		**1255.00**	**13**	**1511.31**	**13**

Audit Queries: The division responds to various audit queries (CSIR HQ & CAG) and Parliament queries in relation to all type of projects.

Contribution to Lab Reserve Fund: The division is taking initiative to transfer the overhead and Non-Refundable Balance amount from ongoing as well as closed Externally Funded Projects to LRF in the every financial year.

Research Utilization Data: Research Utilization Data deals with the revenue generated from the projects and other activities funded by external funding agencies undertaken by the institute. Yearly and Quarterly reports were furnished to CSIR Headquarters regularly.

PPM Portal: The division hosted and maintained a portal for display of all the project related reports on-line. The website is linked to the NEIST Intranet and at present displays reports on Projects-(Completed, on-going, in proposal stage), Research Utilization Data, External Cash Flow, Expenditure details of all ongoing funded and network projects, Goods and Service Tax, Employee List, Central Plan Scheme Monitoring System etc.. For analysis of outcome of funded projects, the on-line form has been designed and the Principal Investigator fills it on completion of their projects. The reports available on-line have proved to be efficient technical support for the management and scientists.

Human Resource Portal: The division also hosted and maintained a portal to keep track of the manpower position in order to facilitate the top management to formulate the policy on human resource.

ERP System: CSIR-NEIST adopted the Enterprise Resource Planning (ERP) system and running it successfully. The division is mainly involved in updating project related data and mapping of NEIST staff with the roles of the staff, in CSIR Enterprise Transformation Portal.

Monthly/ Quarterly Performance Report: Monthly/ Quarterly Performance Report of NEIST contains information about the performance of the Institute on various parameters like papers, patents, development of technology, awards & appreciations received by scientists & staff members. Reports are regularly sent to CSIR HQ. These reports are also helping the management in reviewing its own performance as a monitoring tool.

Miscellaneous activities:

a. Regular monitoring of different projects through divisional review meetings, all scientists meeting, review of Mission Mode and FTT projects, Young Scientists meet and various VCs related to FTT projects, mission mode projects, etc.
b. Compiled the Task Assignment of staff members for the year 2020-21 and also prepared the list of Mentors for Scientists (Pay Band-3), Reporting and Review officers for Technical personnel of your division/Section has been prepared for the year 2020-21.
c. Prepared and uploaded various documents in the C-DIS Portal.

Knowledge Resource Centre

The Knowledge Resource Centre (KRC) continued to provide library and information services to R&D divisions, Research Fellows, outside students and individuals like from universities of NE region and R&D institutes. During the period, the KRC added 218 numbers of R&D books, 157 numbers of Hindi books to its stock and subscribed 8 numbers of print Journals. Apart from these subscribed Scifinder, ACS Journals, iThenticate and ASTM DL through NKRC and other 5 numbers of online journals individually subscribed from Elsevier. KRC also subscribed the BIS packs for standard to supplement the testing facilities of the institute. The KRC enhanced the repository of Annual reports from various R&D and academic institutions.

The KRC continues to maintain a database on publications and presentation of papers by scientists and researchers of the institute and on the basis of which various reports with Bibliometric analysis of laboratory's publications were carried out as and when required by the management for analysis and external submission. KRC also started providing the Online Public Access Catalogue (OPAC) with the help of ICT members which can be access through intranet.

संस्थान में राजभाषा गतिविधियां
RAJBHASHA HINDI ACTIVITIES IN THE INSTITUTE

हिन्दी दिवस समारोह का आयोजन

कोविद-19 महामारी संक्रमण काल के प्रोटोकॉल का पालन करते हुए सीएसआईआर-उत्तर-पूर्व विज्ञान तथा प्रौद्योगिकी संस्थान, जोरहाट ने राजभाषा हिंदी को कार्यालयीन कार्य में उत्तरोत्तर वृद्धि करने के लिए संस्थान में विभिन्न ऑनलाइन प्रतियोगिताओं के साथ 7-14 सितंबर के दौरान राजभाषा हिंदी सप्ताह का आयोजन किया एवं 14 सितंबर को ऑनलाइन आभासी प्रतिभागिता के साथ कोरोना प्रोटोकॉल का अनुसरण करते हुए पुरस्कार वितरण समारोह का आयोजन किया ।

हिन्दी सप्ताह का शुभारंभ 7 सितम्बर 2020 को किया गया । राजभाषा सप्ताह के दौरान प्रतिदिन हिन्दी में कार्य करने के प्रति लगाव बढ़ाने के लिए कई प्रकार के प्रतियोगिताओं का आयोजन किया गया । नव-नियुक्त वैज्ञानिकों एवं चिकित्सा अधिकारी के लिए विशेष रूप से ऑनलाइन हिन्दी कार्यशालाएँ आयोजित की गयी, जिसमें हिन्दी अधिकारी ने केंद्र सरकार के राजभाषा नियमों का विवरण प्रस्तुत करते हुए उन्हें अनुपालन के उत्तरदायित्व से अवगत कराया । साथ ही सरलता से बिना हिन्दी की-बोर्ड के हिन्दी में फोनेटिक रूप में टाइप करने के बारे में बताया । गूगल के माध्यम से वॉयस अनुवाद एवं वॉयस टाइप करने के तकनीक से परिचय कराया । कोविद-19 महामारी के ज्वलंत समस्या को ध्यान में रखते हुए इसी विषय पर हिन्दी में लेख लेखन प्रतियोगिता आयोजित कराया गया । गूगल के सहायता ऑनलाइन हिन्दी विचज किया गया जिसमें काफी संख्या में स्टाफ सदस्यों ने भाग लिया । भुत लेखन प्रतियोगिता के अंतर्गत वॉयस फाइल मेल किया गया जिसे सुनकर प्रतिभागियों ने लिखा । सप्ताह का समापन 14 सितम्बर 2020 को हिन्दी दिवस समारोह के रूप में किया गया । कोरोना प्रोटोकॉल का अनुसरण करते हुए निर्धारित समय के अनुरूप इस कार्यक्रम का शुभारंभ हिन्दी अधिकारी एवं सचिव, नगर राजभाषा कार्यान्वयन समिति श्री अजय कुमार ने भारत सरकार के गृह मंत्री के हिन्दी दिवस संदेश पढ़कर किया । समारोह में केवल प्रतियोगिता के विजेता को ही प्रत्यक्ष रूप से आमंत्रित किया गया जबकि अन्य सभी स्टाफ सदस्यों को ऑनलाइन जोड़ा गया । सादगी के साथ पुरस्कार वितरण करते हुए ई-प्रमाणपत्र जारी किया गया । हमारे विभाग सीएसआईआर के महानिदेशक डॉ शेखर सी मंडे के संदेश को भी इस अवसर पर सुनाया गया । संस्थान के मुख्य वैज्ञानिक एवं राजभाषा कार्यान्वयन समिति के अध्यक्ष डॉ सौरभ बरुआ ने अपना विचार व्यक्त करते हुए हिन्दी के प्रयोग को बढ़ाने का अपील किया । इस अवसर पर संस्थान के प्रशासनिक अधिकारी श्री जे एल सोंगसई, भंडार एवं क्रय अधिकारी श्री नीलांबुज प्रसाद एवं वित्त एवं लेखा अधिकारी श्री रमाशंकर शर्मा ने भी हिन्दी के विकास हेतु प्रयोग पर बल दिया । कार्यक्रम के अंत में पुरस्कार वितरण समारोह का संचालन श्री कुमार ने किया एवं धन्यवाद ज्ञापित किया।

महामारी संक्रमण के प्रोटोकाल अनुसरण के कारण केवल प्रभागों के प्रधान एवं हिन्दी सप्ताह के दौरान आयोजित प्रतियोगिता के विजेताओं के बीच हिन्दी दिवस आयोजन कार्यक्रम की झलक

संस्थान में राजभाषा हिंदी सप्ताह का आयोजन

कोविद-19 महामारी संक्रमण काल के प्रोटोकॉल का पालन करते हुए हिन्दी सप्ताह के दौरान अधिकारियों/कर्मचारियों के प्रोत्साहन हेतु प्रत्येक कार्यदिवस में निम्नलिखित ऑनलाइन प्रतियोगिताएं एवं कार्यशालाएँ आदि आयोजित की गयी ताकि उनमें एक प्रेरणा और उत्साह की उत्पत्ति हो सके :

7.8/9/2020 : प्रथम सत्र में हिन्दी सप्ताह का शुभारंभ कार्यक्रम आयोजित हुआ जिसमें संस्थान के सभी स्टाफ सदस्य, विशेष रूप से नव-नियुक्त वैज्ञानिक एवं चिकित्सक ने ऑनलाइन भाग लिया । प्रथम दिवस के प्रथम सत्र में "राजभाषा नीति एवं कार्यालय में प्रयोग" एवं द्वितीय सत्र में "कार्यसाधक हिन्दी ज्ञान एवं परीक्षा" विषय पर श्री अजय कुमार, हिन्दी अधिकारी ने अपनी प्रस्तुति दी । द्वितीय दिवस के प्रथम सत्र में "कंप्यूटर पर हिंदी यूनिकोड एवं गूगल हिंदी का प्रयोग" एवं द्वितीय सत्र में अभ्यास कराया गया ।

9/9/2020 : "कोविद-19 महामारी" विषय पर ऑनलाइन हिन्दी लेख लेखन प्रतियोगिता आयोजित किया गया ।

10/9/2020 : हिन्दी भाषा से संबन्धित ज्ञान को केन्द्रित करते हुए हिन्दी विज (प्रश्नोत्तरी) प्रतियोगिता आयोजित की गयी । रुचिपूर्ण एवं ज्ञानवर्धक कार्यक्रम होने के कारण इसमें काफी प्रतिभागियों ने भाग लिया । भारतीय स्टेट बैंक के प्रबन्धक (राजभाषा), श्री अजय कुमार सिन्हा ने 'कौन बनेगा करोड़पति' के तर्ज पर विज का संचालन किया । प्रतिभागियों ने खूब आनंद उठाया ।

11/9/2020 : हिन्दी श्रुतलेखन प्रतियोगिता आयोजित किया गया । अतिथि निर्णायक एवं संचालक की भूमिका श्री अमरदीप कुलश्रेष्ठ, मुख्य प्रबंधक (राजभाषा) यूको बैंक, आंचलिक कार्यालय, जोरहाट ने निभाया । काफी प्रतभागियों ने भाग लिया ।

संस्थान में हिंदी कार्यशालाओं का नियमित आयोजन

राजभाषा नियम एवं सीएसआईआर मुख्यालय के दिशानिर्देश में संस्थानन के वैज्ञानिकों, तकनीकी अधिकारियों, तकनीशियनों, प्रशासन के अधिकारियों एवं कर्मचारियों के लिए तिमाही हिंदी कार्यशाला का आयोजन किया जाता है । प्रभावी कार्यान्वयन की दृष्टि से समय-समय पर कार्य एवं पद की एकरूपता को ध्यान में रखकर समूह बनाकर कार्यशाला में प्रशिक्षण दिया जाता है । वर्ष के दौरान नियमित रूप से अर्थात बार बार दो दिवसीय कार्यशालाओं का आयोजन किया गया । कार्यशालाओं में मुख्य विषय राजभाषा हिंदी का महत्वर, कार्यालय में कार्यान्वीयन एवं कंप्यूमटर पर यूनिकोड हिंदी अनुकूलता एवं गूगल हिंदी का प्रयोग आदि प्रमुखता से सिखाया गया एवं कंप्यूटर पर सरलता से हिन्दी में कार्य करने की विधि वर्किंग टेबल पर अभ्यास के रूप में कराया गया ।

व्याख्यान/संगोष्ठी में सहभागिता, अन्य संस्थाओं/कार्यालयों के हिन्दी कार्यशाला में विशेषज्ञ

श्री अजय कुमार, हिन्दी अधिकारी एवं सचिव, नगर राजभाषा कार्यान्वयन समिति, जोरहाट को निम्नलिखित केंद्र सरकार के कार्यालयों में राजभाषा हिन्दी के विशेषज्ञ/संकाय सदस्य/ मुख्य अतिथि के रूप में उल्लेखित तिथि को आमंत्रित किया गया एवं उन्होने तदनुसार प्रस्तुति दी ।

केंद्रीय मुगा एरी अनुसंधान एवं प्रशिक्षण संस्थान, केंद्रीय रेशम बोर्ड, वस्त्र मंत्रालय भारत सरकार: 29 जून 2020 एवं दुबारा 23 मार्च 2021 को आयोजित हिन्दी कार्यशाला के मुख्य अतिथि एवं व्याख्याता के रूप में राजभाषा कार्यान्वयन पर व्याख्यान हेतु आमंत्रित किया गया ।

भारत सरकार, गृह मंत्रालय, राजभाषा विभाग, क्षेत्रीय कार्यालय, गुवाहाटी: राजभाषा विभाग, क्षेत्रीय कार्यालय, गुवाहाटी ने 9 जून 2020 को पूर्वोत्तर स्थित सभी नगर राजभाषा कार्यान्वयन समिति के सचिवों के लिए एक वेबिनार का आयोजन किया गया जिसमे "ऑनलाइन कार्य की पद्धतियां" विषय पर आमंत्रित व्याख्यान प्रस्तुत किया ।

केंद्रीय विद्यालय, वायु सेना स्थल, जोरहाट (शिक्षा मंत्रालय, भारत सरकार): सतर्कता सप्ताह के दौरान 17 अक्तूबर 2020 को विद्यालय ने अपने फैकल्टि के प्रतिभागिता के बीच "भ्रष्टाचार मुक्त समाज का निर्माण : एक दु:स्वप्न" विषय पर आयोजित वाद-विवाद प्रतियोगिता के निर्णायक पेनल के लिए आमंत्रित किया जिसे सफलतापूर्वक निभाया ।

भारतीय विमानपत्तन प्राधिकरण, जोरहाट हवाई अड्डा, जोरहाट: 20 जनवरी 2021 को आयोजित हिन्दी कार्यशाला के मुख्य अतिथि एवं व्याख्याता के रूप में राजभाषा कार्यान्वयन पर व्याख्यान हेतु आमंत्रित किया गया ।

केंद्रीय विद्यालय, आरआरएल, जोरहाट (शिक्षा मंत्रालय, भारत सरकार): वर्ष 2020-21 के लिए विद्यालय प्रबंधन समिति के सदस्य के रूप में नामित किया । 16 सितंबर 2020 एवं 19 जनवरी 2021 को प्रबंधन समिति की बैठक में महत्त्वपूर्ण चर्चा एवं संस्थागत निर्णय के लिए आमंत्रित किया गया । संविदा शिक्षक की नियुक्ति के साक्षात्कार समिति के सदस्य के रूप में 6 फरवरी 2021 को आमंत्रित किया गया ।

ऑयल एवं नेचुरल गैस कारपोरेशन लि., असम एवं असम अराकान बेसिन, जोरहाट: 29 सितंबर 2020 को ओएनजीसी, जोरहाट 'राजभाषा अधिनियम के अनुपालन' विषय पर कार्यशाला का आयोजन किया गया । दुबारा 15 मार्च 2021 को ऑनलाइन हिन्दी कार्यशाला में "कार्यालयीन हिन्दी के स्वरूप एवं पत्राचार के विभिन्न प्रारूप" विषय पर व्याख्यान हेतु आमंत्रित किया गया । इस कार्यशाला में विषय विशेषज्ञ एवं विशिष्ट अतिथि के रूप में के रूप में आमंत्रित किया गया, तदनुसार प्रस्तुति दिया ।

हिंदी शिक्षण योजना द्वारा हिंदी भाषा प्रशिक्षण पाठ्यक्रम केंद्र का संचालन

हिंदीतर भाषी अधिकारियों/कर्मचारियों के लिए निर्धारित स्तर के हिंदी भाषा पाठ्यक्रम प्रबोध/प्रवीण/प्राज्ञ परीक्षा पास करना अनिवार्य होता है । संस्थान में उक्त पाठ्यक्रम के प्रशिक्षण के लिए वर्ष 1997 में भारत सरकार, गृह मंत्रालय, राजभाषा विभाग, हिंदी शिक्षण योजना द्वारा संस्थान प्रबंधन के अधीन अंशकालिक हिंदी भाषा प्रशिक्षण केंद्र स्थापित किया । विभाग द्वारा यह केंद्र स्थानीय सभी केंद्र सरकार के कार्यालयों के प्रशिक्षण हेतु भी संचालित किया गया । तदनुसार यह केंद्र सरकार के कार्यालय, स्वायत्तशासी संस्थानों, राष्ट्रीयकृत बैंकों द्वारा नामित अधिकारियों/कर्मचारियों को वर्ष में दो सत्र के अंतर्गत नियमित/प्राइवेट तौर पर प्रशिक्षण हेतु नामांकित करते हैं । प्रशिक्षण के साथ-साथ उप-निदेशक (परीक्षा), नई दिल्ली के नियंत्रण में उक्त पाठ्यक्रमों के परीक्षा को भी संस्थान द्वारा संचालित किया जाता है । वर्ष के दौरान कोविद महामारी के संक्रमण के कारण दो के स्थान पर केवल एक सत्र संचालित एवं परीक्षा आयोजित हुआ :

जनवरी 2020 सत्र : मई 2020 को आयोजित होने वाली परीक्षा कोविद महामारी के कारण रद्द कर दिया गया ।

जुलाई 2020 सत्र : हमारे संस्थान के नव-नियुक्त वैज्ञानिकों अलावा अन्य कार्यालय यथा केन्द्रीय मुगा एवं एरी अनुसंधान संस्थान, जोरहाट, पावर ग्रिड कार्पोरेशन ऑफ इंडिया ओएनजीसी लिमिटेड, जोरहाट, केंद्रीय विद्यालय, आर आर एल जोरहाट एवं केनरा बैंक, जोरहाट से प्रशिक्षण हेतु नियमित/प्राईवेट नामित किए गए तथा नवम्बर 2020 को आयोजित परीक्षा में जनवरी-जुलाई दोनों सत्र के परीक्षार्थियों ने भी भाग लिया । कुल प्रशिक्षित आकड़े दर्शाए गए हैं ।

	परीक्षा फॉर्म भरे	परीक्षा में बैठे	परीक्षा में उत्तीर्ण	पुरस्कृत परीक्षार्थी
प्रबोध	14	11	11	10
प्रवीण	19	16	16	12
प्राज्ञ	10	08	08	06

निस्ट, जोरहाट में गठित राजभाषा कार्यान्वयन समिति (राकास) की बैठकें

प्रावधान के अनुसार संस्थान में प्रभावी राजभाषा कार्यान्वयन के लिए राजभाषा कार्यान्वयन समिति गठित है । नियमानुसार प्रत्येक तीन माह में बैठक आयोजित की जाती है एवं कार्यान्वयन की मोनिटरिंग भी की जाती है । इस वित्तीय वर्ष में उल्लेखित तिथि 07/04/2020, 27/08/2020, 11/11/2020 एवं 18/02/2021 को बैठक आयोजित की गई एवं महत्वपूर्ण निर्णय लिए गए ।

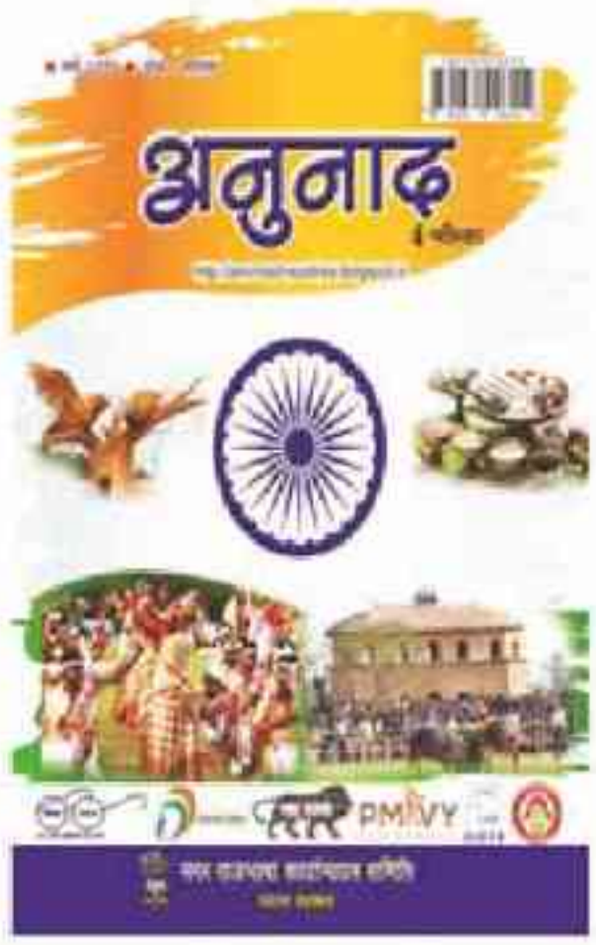
नगर राजभाषा कार्यान्वयन समिति (नराकास), जोरहाट की बैठकें

नगर राजभाषा कार्यान्वयन समिति (नराकास), जोरहाट भारत सरकार, गृह मंत्रालय, राजभाषा विभाग, नई दिल्ली द्वारा बड़े बड़े शहरों में अवस्थित केंद्र सरकार के कार्यालयों में राजभाषा हिंदी के प्रयोग को सुनिश्चित करने के उद्देश्य नगर राजभाषा कार्यान्वयन समिति की स्थापना की जाती है । बड़े एवं सदाम कार्यालय के प्रधान को अध्यक्ष नामित किया जाता है । स्थानीय सभी केंद्रीय कार्यालय इसके सदस्य होते हैं एवं प्रत्येक वर्ष इसकी बैठक आयोजित की जाती है ।

वर्ष 2009 में भारत सरकार ने नगर राजभाषा कार्यान्वयन समिति, जोरहाट का कार्यभार निदेशक, निस्ट, जोरहाट को सौंपा तथा सचिवीय कार्य हेतु श्री अजय कुमार, हिन्दी अधिकारी, निस्ट, जोरहाट को नामित किया । स्थानीय केंद्रीय कार्यालय, बैन्य संगठन, वायु सेना, राष्ट्रीयकृत बैंक, स्वायत्तसेवी संस्थान, प्रतिष्ठान, परिषद समिति के सदस्य हैं जो नियमित आयोजित बैठक में राजभाषा हिंदी पर चर्चा के लिए भाग लेते हैं ।

समिति की 37वीं बैठक : समिति की 37वीं बैठक ऑनलाइन मंगलवार 30 मार्च 2021 को संपन्न हो गया । बैठक की अध्यक्षता डॉ सौरभ बरुआ, मुख्य वैज्ञानिक, निस्ट, जोरहाट ने किया । भारत सरकार, राजभाषा विभाग, गुवाहाटी कार्यालय के प्रधान श्री बदरी यादव एवं जोरहाट अवस्थित लगभग सभी केंद्रीय कार्यालयों के प्रधान/प्रतिनिधि बैठक में ऑनलाइन उपस्थित हुए एवं राजभाषा हिन्दी के कार्यालयों में प्रचालन पर चर्चा किया ।

37वीं बैठक का आयोजन



अनुनाद" ई--पत्रिका के सातवें अंक के प्रिंट एवं डिजिटल वर्जन का लोकार्पण

कोविद-19 वैश्विक महामारी के प्रभाव के कारण सम्पूर्ण बैठक ऑनलाइन 3-00 बजे आरंभ किया गया । कार्यक्रम का संचालन समिति के सचिव श्री अजय कुमार ने किया। उपस्थित कार्यालयों के प्रधान एवं प्रतिनिधियों ने अपना परिचय दिया । तत्पश्चात समिति के अध्य क्ष ने उपस्थित कार्यालय प्रधान एवं प्रतिनिधियों का हार्दिक स्वोगत किया एवं समिति के लक्ष्य को दोहराया । इस दौरान सभी कार्यालयों ने अपने-अपने प्रयास, प्रोत्साहन गतिविधियां एवं आने वाली समस्याओं को समिति के सामने रखा । प्रावधान के अनुसार सभी कार्यालय को प्रत्येक तिमाही में राजभाषा हिन्दी के प्रगामी प्रयोग का स्पिोर्ट निर्धारित प्रपत्र में भरकर राजभाषा विभाग, भारत सरकार को भेजने दायित्व है । विदित हो कि राजभाषा विभाग प्रत्येक वर्ष सभी कार्यालयों को राजभाषा हिन्दी अनुपालन के लिए वार्षिक कार्यक्रम में दिशा निर्देश के अंतर्गत एक लक्ष्य तय करती है. तदनुसार वार्षिक कार्यक्रम 2021-22 पर चर्चा के साथ अनुपालन का सुझाव दिया गया । सभी केंद्रीय कार्यालयों में कर्मचारियों का हिन्दी ज्ञान एवं प्रशिक्षण, हिन्दी टाइप/आशु/कम्प्युटर कार्य, हिन्दी टाइप/कम्प्युटर की स्थिति, धारा 3(3) के अंतर्गत जारी किए गए कागजात की स्थिति, हिन्दी में प्राप्त पत्रों की स्थिति,पत्रावार की स्थिति, हिन्दी कार्यशालाओं के आयोजन की स्थिति, हिन्दी पदों की स्थिति, कार्यालयों के प्रयोग में आनेवाली सामग्री द्द फॉर्म, मोहरें, नामपट्टों की स्थिति पर विचार विमर्श हुआ । कार्यालयों ने अनुपालन की अपनी वचनबद्धता को दोहराया ।

राजभाषा विभाग द्वारा निर्धारित मानदंडों के अनुरूप नाराकास के सदस्य कार्यालयों में वर्ष के दौरान उत्कृष्ट राजभाषा कार्यान्वयन कार्य के प्रावधान के तहद चार कार्यालय को चयनित किया गया । केंद्रीय मूगा, एरी अनुसंधान एवं प्रशिक्षण संस्थान, जोरहाट; भारतीय वायु बोर्ड, क्षेत्रीय कार्यालय, जोरहाट; भारतीय स्टेट बैंक, व्यावसायिक कार्यालय, जोरहाट एवं यूको बैंक क्षेत्रीय कार्यालय, जोरहाट को पुरस्कार से सम्मानित किया गया । कार्यक्रम ऑनलाइन होने के कारण पुरस्कार के रूप में प्रशंसा पत्र एवं शील्ड बाद में प्रदान किया जाएगा । केंद्रीय मूगा, एरी अनुसंधान एवं प्रशिक्षण संस्थान की निदेशिका डॉ जलजा, स्टेट बैंक की ओर से उप-प्रबन्धक श्रीमति अजंता हजारिका एवं यूको बैंक के प्रबंधक श्री अमरदीप कुलश्रेष्ठ ने पुरस्कार ग्रहण किया । साथ ही कार्यक्रम में नगर राजभाषा कार्यान्वयन समिति, जोरहाट द्वारा प्रकाशित पत्रिका "अनुनाद" ई-पत्रिका के सातवाँ अंक के प्रिंट वर्जन का ऑनलाइन लोकार्पण किया गया ।

बैठक में ओएनजीसी, जोरहाट के ईडी एवं बेसिन प्रबन्धक श्री पुनीत सूरी, भारतीय विमानपत्तन प्राधिकरण जोरहाट हवाई अड्डा के श्री मुकुल कुमार, भारतीय जीवन बीमा निगम, आयकर आयुक्त कार्यालय, वर्षा वन अनुसंधान संस्थान के निदेशक, राष्ट्रीय मृदा सर्वेक्षण एवं भूमि उपयोग नियोजन ब्यूरो के वैज्ञानिक, केंद्रीय विद्यालय, जवाहर नवोदय विद्यालय, पंजाब नेशनल बैंक, केंद्रीय विद्यालय ओएनजीसी, डाक विभाग, वायु बोर्ड, यूनाइटेड इन्शुरेंस कंपनी, के प्रतिनिधियों ने भाग लिया एवं अपने कार्यालय के हिन्दी प्रगति को प्रस्तुत किया ।

अंत में भारतीय स्टेट बैंक के राजभाषा अधिकारी श्री अजय कुमार सिन्हा ने अपने वक्तव्यन के साथ धन्यवाद ज्ञापित किया ।

रेशम कीट बीज उत्पादन केंद्र के प्रधान डॉ रानुमा दास एवं पावर ग्रिड कार्पोरेशन ऑफ इंडिया लि. के महाप्रबंधक श्री एस के गोगोई ने पुरस्कार ग्रहण करते हुए

बैठक में भारतीय विमानपत्तन प्राधिकरण जोरहाट हवाई अड्डा के निदेशक श्री कृष्ण कुमार, भारतीय स्टेट बैंक, प्रशासनिक कार्यालय, जोरहाट के मुख्य प्रबन्धक श्री सुनील कुमार सिन्हा एवं राजभाषा अधिकारी श्री अजय कुमार सिन्हा, यूको बैंक, अंचल कार्यालय, जोरहाट के वरिष्ठ प्रबन्धक राजभाषा श्री अमरदीप कुलश्रेष्ठ, सेंट्रल बैंक के राजभाषा अधिकारी श्री रेवती कुमार, अहम्यल इंडिया लि के मुख्य अभियंता श्री निलिम ज्योति बुरगोहाइन अल्ल इंडिया रेडियो के एचओओ श्री विश्वजीत दास, केंद्रीय रिजर्व पुलिस बल, महानिरीक्षक कार्यालय, जोरहाट के सहायक-कमांडेंट श्री गौतम खाखलारी, केंद्रीय अद्योगिक सुरक्षा बल के सहायक कमाडेंट श्री एन एस बसुमतारी, भारतीय जीवन बीमा निगम के प्रशासनिक अधिकारी श्री प्रशांत शर्मा, आकार आयुक्त कार्यालय के अधिकारी श्री रातू बोरा, वर्षा वन अनुसंधान संस्थान के वैज्ञानिक डॉ मनीष कुमार, राष्ट्रीय मृदा सर्वेक्षण एवं भूमि उपयोग नियोजन ब्यूरो के वैज्ञानिक, रबर बोर्ड के विकास अधिकारी श्री जॉर्ज मथेयू एम, केंद्रीय विद्यालय, आरआरएल के प्राचार्य श्रीमति इन्दिरा बुरगोहाइन, एनएसएसओ कार्यालय के सांख्यकी अधिकारी श्री सुशील हजारिका के अलावा केंद्रीय मुगा एरी अनुसंधान एवं प्रशिक्षण संस्थान, जवाहर नवोदय विद्यालय, ओएनजीसी, बीएसएनएल, शाखा प्रबन्धक कॉर्पोरेशन बैंक, विजया बैंक, बैंक ऑफ बरोदा, पंजाब नेशनल बैंक, आंध्रा बैंक, 10 विंग वायु सेना, केंद्रीय विद्यालय ओएनजीसी, डाक विभाग, चाय बोर्ड, यूनाईटेड इन्शुरेंस कंपनी, के प्रतिनिधियों ने भाग लिया एवं अपने कार्यालय के हिन्दी प्रगति को प्रस्तुत किया ।

अंत में भारतीय स्टेट बैंक के राजभाषा अधिकारी श्री अजय कुमार सिन्हा ने अपने वक्तव्य के साथ धन्यवाद ज्ञापित किया ।

CSIR-SUMMER RESEARCH TRAINING PROGRAMME 2020

In view of the unprecedented COVID-19 lockdown, DG-CSIR desired to initiate a programme which was directed to provide online summer research training to bachelors, masters and teachers. On behalf of CSIR, CSIR-NEIST initiated the programme under the leadership of Dr G Narahari Sastry, Director, CSIR-NEIST which was launched by Dr Shekhar C. Mande, Director General, CSIR on 16th June 2020.

CSIR-Summer Research Training programme was a training programme that aimed to provide research-based training to undergraduate and postgraduate students and faculties of various disciplines viz. B.Sc, M.Sc., B.Tech./B.E., MCA, M. Tech., M. Pharm. having excellent academic record from various universities and colleges affiliated to UGC/AICTE/ State/Central/Private universities. Over 16,000 UG/PG students and teachers from various institutes/colleges across India were registered under the two months Summer Research Training Programme (SRTP 2020). In the unprecedented pandemic situation of COVID 19, SRTP 2020 created a unique opportunity to ignite the young minds of every cow corner of the country to inculcate the scientific research. The programme was coordinated nation wise and conducted by the faculties and mentors from 38 CSIR laboratories and guest mentors from different universities, institutes across the length and breadth of the country. A website (http://neist.res.in/srtp2020/) was developed on the programme where aspiring students were applied through and number of views for this website is found to be about 1 million. The programme was provided a platform for closer interaction between the mentors and students to carry out research-based project in the above subject areas.

Among the 16000 applicants, about 8000 candidates were selected by CSIR-NEIST and rests were distributed to the other CSIR laboratories across the country according to the applicant's lab preferences given in their applications. Different14 interdisciplinary projects were formulated and all the students selected for CSIR-NEIST, Jorhat are allocated to these projects. Four hundred (400) mentors from outside the CSIR joined hands to guide the summer research fellows. One of the major attractions of SRTP-2020 was 'Eminent Scientist Lectures', where renown scientists, professors, science policy makers were invited to deliver a lecture and followed by a 'Question and Answer' session. These lectures were all of different flavors and topics varying from core scientific talks like, corona virus protein structure and drug discovery, chemical biology of artificial enzymes, or life lessons of different personalities, and varying topics such as: expeditions to Antarctica, power of imaginations and knowledge in the WhatsApp and Facebook era, Integration of research in science education, Importance of encouraging and establishing MSME units, Raising issues of gender inequality in STEM carrier among others. All these lectures were live telecasted in MS Teams, Facebook live and in YouTube. The archives of lectures were made in YouTube which can be accessed anytime. Involvement of the participants was eye catching. Many experts were demonstrated experiments, high end instruments for characterization of materials or products in their respective projects.

The online training provided on experimental basis virtually in different focused research areas which covered specialized lectures, online practical sessions and demonstrations of high end equipment, instruments and experimental procedure uploaded in CSIR-SRTP YouTube channel. On the occasion of SRTP programme, 77 nos. of videos were made on the learning techniques of different experimental techniques and demonstration on equipments throughout their working principle and released in CSIR-SRTP YouTube channel. These videos received large number of viewers and supporters with a large number of valuable and encouraging comments.

A special session on COVID-19 by "COVID WARRIORS" on the detection techniques, immunoassay for COVID-19, COVID-19 & AI based approaches, vaccine basics and role of micronutrients to boost the immunity was held. Another special session was held wherein the institute's Ph D students and project fellows presented short videos on the 17 SDGs of UN to create awareness on these 17 goals and voice their concerns in urging the research fraternity of India, to align their research objectives with the SDGs, which is very much attuned to UN's objective to address and alleviate some key and critical issues currently plaguing the globe. Director, CSIR-NEIST had taken the lead to design the programme in such a manner that it acts as a platform for the young scholar to discuss their take in addressing these challenges through S&T interventions. In addition to these, elocution competition, quiz competition, Essay competition and a number of other events were conducted, which amalgamate various branches of science and clearly strike a point that we have gone beyond different branches of science which is divided into physics, chemistry, biology and engineering etc.

CSIR-Summer Research Training Programme also got helping hands from the Royal Society of chemistry (RSC), and DBT Welcome Trust, under which Prof. Dominic Tindesley former president RSC, President elect Prof. Gill Reids delivered very exciting talks. Amongst the speakers, there were the acting CEO and Executive Editor of RSC who spoke about "a career in leadership' and "how to publish: do's and don'ts while writing a research article" which were particularly helpful for the graduate students and young researchers.

EMINENT SCIENTISTS

CSIR-SRTP Programme Timeline

Inaugurated by the honorable Director General of CSIR and Secretary, DSIR, Dr. Shekhar C Mande on 16th June, 2020

Orientation of the programme was held on 17th & 18th June, 2020

42 eminent scientists lectures started from 17th June, 2020

More than 16000 applicants with 8000 allocations in CSIR-NEIST

Coordinated by CSIR-NEIST and mentored by faculties from 38 CSIR laboratories

14 interdisciplinary projects formulated by CSIR-NEIST

77 sophisticated instrument demonstration videos in CSIR-SRTP YouTube channel
(www.youtube.com/channel/UCT6mR4LjRj9rIaYyoHuDjfA/featured)

Special session on the 17 sustainable development goals on 29th June, 2020

Session on "COVID Warriors" on 2nd July, 2020

Special session on the socio-economic, health and agriculture survey conducted by AcSIR students of CSIR-NEIST on 7th July, 2020

Drug Discovery Hackathon from 13th July to 11th September, 2020

Webinar on Chemistry and Biology of Natural Products on 24th and 25th July, 2020

Panel discussion on: Indian Science in post COVID period: Challenges and opportunities on 20th August, 2020

One day workshop on "Artificial Intelligence in Drug Discovery" on 1st September, 2020

Online quiz with 786 participants on 25th September, 2020

Special Q & A session with Padma Vibhushan N R Narayana Murthy on 4th September, 2020

CSIR-SRTP 2020 in NEWS

CSIR-NEIST INITIATIVES TO COMBAT COVID-19 PANDEMIC

In early 2020 the world faced one of the biggest heath crises due to the outbreak of COVID-19 pandemic causing unprecedented challenges to social, health and economic well being. COVID-19 pandemic (caused by Sars-Cov-2 virus) changed the way of living and impacted every sector & industry. In India and North East region, various initiatives were aggressively implemented by the government to contain the spread of COVID-19 infection. CSIR-NEIST under the aegis of CSIR rose to the occasion to tackle the pandemic situation by implementing various action plans. Under the leadership of its Director, Dr G Narahari Sastry, CSIR-NEIST adopted various preventive measures and steps right from the beginning for COVID-19 management.

With high demand of hand sanitizers and its unavailability in commercial stores throughout the region due to the pandemic, CSIR-NEIST along with its branch lab at Imphal, Manipur took up the responsibility on war footing to prepare and distribute hand sanitizers to various sections of the society. The institute prepared hand sanitizer with alcohol content of ~80% along with other additives as recommended by the World Health Organization (WHO). About 400 liters of hand sanitizer was prepared during March-April 2020 by CSIR-NEIST and distributed throughout its campus and various establishments in the district like Jorhat Air Force Station, SBI Bank-RRL Branch, Kendriya Vidyalaya, Office of Superintendent of Police, District Sessions Court, Post Office, Jorhat Airport and Railway Station etc. In Imphal (Manipur), CSIR-NEIST branch lab prepared 200 liters of hand sanitizer and distributed to the officials of NABARD bank, hospitals, Manipur University, district municipality, etc.

Clock-wise from top left: Distribution of hand sanitizer in Jorhat Airport, Jorhat Railway Station, Jorhat Air Force Station and Office of Superintendent of Police by CSIR-NEIST during March-April, 2020.

Initiative by CSIR-NEIST Branch Lab, Manipur

CSIR-NEIST Branch Laboratory, Imphal has prepared more than 300 litres of hand sanitizer and distributed to officials of NABARD bank, Manipur University, district municipality, media personnel, and other officials working in fighting COVID such as doctors, professors from Jawaharlal Nehru Institute of Medical Sciences, Imphal. To further increase its mass production, the branch lab has joined hands with a local firm based in Imphal on 12 April 2020. Alcohol-based Herbal Hand Sanitizer formulated by CSIR-NEIST Branch Lab Imphal, Manipur was officially launched by Dr RK Ranjan, Member of Parliament, Manipur in the presence of other officials like Pro-Vice Chancellor and Registrar of Manipur University; doctors and professors from Jawaharlal Nehru Institute of Medical Sciences, Imphal and many more officials from state and central govt. departments on 10 April 2020 at the Conference Hall of the Branch Lab, Imphal. A total of about 13 litres of the hand sanitizer has been produced so far and provided to the officials working in fighting COVID-19 and media personal. As desired by Dr Sastry, the formulation know-how of the Hand Sanitizer has been shared with Marjing Industries, Imphal with no technology cost and they are now in production of the Hand Sanitizer.

Alcohol based hand sanitizer developed by CSIR-NEIST Branch Lab, Imphal (Left). Handing over of Alcohol-based Herbal Hand Sanitizer by Dr H B Singh, Incharge CSIR-NEIST Branch Lab, Imphal to Shri N Biren Singh, Hon'ble Chief Minister of Manipur (Right).

Handing over of Alcohol-based Herbal Hand Sanitizer by Dr H B Singh, Incharge CSIR-NEIST Branch Lab, Imphal to to SP Central Jail, Sajiwa, Imphal (left) and Dr R K Ranjan Singh, Member of Parliament, Manipur.

Development of other COVID-19 related products

Besides hand sanitizers, CSIR-NEIST also developed various other products such as face masks, hand wash, liquid disinfectant, sanitized paper towel and anti-septic soap in large quantities to further aid in self-defense measures to prevent the spread of COVID-19. These materials are being produced indigenously and distributed among the employees, local community and different essential service related establishments in Jorhat.

Liquid Hand Wash formulation has anti-bactericidal properties against different skin and enteric microbes. The formulation is gentle and safe for the skin and causes no toxicity or skin allergy. The institute has so far distributed the hand wash to its various divisions and sections for staff use.

CSIR-NEIST
Liquid Hand Wash

The liquid disinfectant formulation is prepared based on Dettol, alcohol, water and aromatic oil. This disinfectant is recommended to use for spraying in walls and disinfecting commonly used objects such as door handles, phone receivers, computer mouse, etc., various nook and corners of the room as well as in mopping floors.

Liquid Disinfectant

CSIR-NEIST prepared paper based towel treated with broad spectrum herbal anti-microbial formulation which can be used for sanitizing hands, face and any surface including mobile, computer key board etc.

Sanitized Paper Towel

An anti-septic soap with broad-spectrum herbal anti-microbial formulation has been developed by CSIR-NEIST which is useful for personal care and hygiene. The product has been prepared by the scientists' team led by Dr Mantu Bhuyan, Principal Scientist.

Herbal Anti-Septic Soap

On request of Jorhat District Administration General Engineering Group of ESTD designed and fabricated SWAB Collection cabin with foot operated twin FLAP, double chamber waste material bin and supplied the prototype to them for their use and fabrication.

Detachable Swab Sample Collection Cabin with Foot Operated Twin Flap, Double Chamber Waste Material Bin.

CSIR NEIST developed Foot pedal Operated Hand Sanitizer, Soap Dispenser & Tap Opener, foot sanitizing Pad are installed in Covid testing lab and different location of the laboratory.

Foot pedal Operated Hand Sanitizer, Soap Dispenser & Tap Opener developed by General Engineering Group of CSIR-NEIST

Foot Sanitizing Pad

Bamboo based bed are fabricated for emergency hospital use purpose developed by General Engineering Group of CSIR-NEIST.

Bamboo Based Hospital Bed

Awareness regarding COVID-19

CSIR-NEIST had undertaken various initiatives to tackle the biggest health crisis due to the outbreak of COVID-19 pandemic causing unprecedented challenges to social, health and economic well being. Dr G Narahari Sastry, Director visited different divisions of the laboratory to spread awareness about the rules to be followed for the prevention of novel coronavirus. He also visited Research Scholars hostels along with Medical Officers for spreading awareness and thermal screening of all the students and caretakers was done at the hostels.

Dr G Narahari Sastry, Director, CSIR-NEIST interacting with students and staff about COVID-19 preventive measures.

COVID-19 testing laboratory inaugurated in CSIR-NEIST

Dr Himanta Biswa Sarma inaugurating the COVID-19 testing laboratory at CSIR-NEIST in the presence of Dr G Narahari Sastry, CSIR-NEIST and Ministers, Shri Atul Bora & Shri Pijush Hazarika; MPs Kamakhya Prasad Tasa & Tapan Kumar Gogoi besides CSIR-NEIST staff

A new COVID-19 testing laboratory was established on 30 May 2020 in CSIR- NEIST. Dr Himanta Biswa Sarma, Then Minister of Health and Family Welfare, Finance, Education (Higher, Secondary and Elementary), Transformation and Development, PWD, Govt. of Assam, inaugurated the laboratory. The Director of CSIR-NEIST, Dr G Narahari Sastry,

described this momentous event as an important milestone in the annals of CSIR-NEIST history as apart from ICMR and medical institutions, CSIR-NEIST is the first R&D institute in Assam to carry COVID-19 testing. He ascribed the establishment of the COVID-19 testing laboratory here as need of the hour.

Appreciating the fact that NEIST is the first Research and Development institute in Assam to open up a testing facility, Dr Himanta Biswa Sarma congratulated the scientists and staff of the institute for making it happened. A team of 10 scientists of the institute are actively involved in isolation of RNA from the virus besides 40 other staff members are acting as a support system. The institute's Biotechnology Division played a pivotal role in carrying out RT-PCR based COVID-19 testing. Besides, the Govt. of Assam and the district administration of Jorhat had actively cooperated in facilitating the efforts put in by the institute. A microbiologist from the Department of Health and Family Welfare, Govt. of Assam was engaged with the institute's COVID-19 testing laboratory to certify the testing.

During the day, Sarma also took stock of the kind of scientific programmes, research, technologies and products of the institute. He was quite happy to learn about the technologies that were patented and commercialized by NEIST. Some of the noteworthy achievements that have been commercially translated include the herbal anti-arthritis ointment, anti-fungal ointment, new varieties of aromatic plants. "Establishment of the COVID-19 testing laboratory here is the demand of the hour, as it is the most effective and globally successful approach to test, trace, isolate the virus before it gets dispersed to community transmission level. Assam is at the threshold point of crossing over to stage 3 which is the community level transmission stage", said Dr Sastry. He further added that the only way to mitigate and contain the situation is to carry forward with extensive testing, and the ray of hope is the will of lakhs of people to fight the pandemic. At the same time, the challenge is that the capacity to do so lies in the hands of only a few people. Thus, the paramount task of the scientific community is to carry out as many tests as possible to keep a tab on the virus and to develop effective drugs and vaccines for a sure shot cure.

During 2020-21, the lab had successfully tested more than 20,000 samples received through state government and district administration.

COVID-19 Web Portal launched by CSIR-NEIST

CSIR-NEIST in its endeavour towards societal responsibilities launched its own web portal to create awareness on COVID-19 and to keep the masses updated on the new developments on the pandemic situation. The portal was formally launched on 6 May 2020 by Dr G Narahari Sastry, Director which can be accessed as www.neist.res. in/covid

19. The basic focus of the web-portal is to disseminate knowledge and create awareness on COVID-19 pandemic in the society at large.

The portal has been classified into various sections viz. a home page, dedicated on the background and history on the origin of novel coronavirus; therapeutics; CSIR activities; epidemiology, pandemics; MPDS COVID-19; resources; myths and truths and a blogging page. The portal caters to highlight upon the research activities being undertaken by the various CSIR laboratories in the wake of COVID-19 pandemic such as molecular digital surveillance, development of rapid and cheap diagnostic kit, new therapies development and drug repurposing, development of personal protective equipment kit (PPE) and supply chain etc. especially to apprise common people, the research fraternity and the industry as a whole. It may be mentioned that the sections on popular myths and facts on COVID-19 and blogging platform are added features which can be used to voice ones thoughts, opinions and concerns on the issue. In totality the portal is a window to the global happenings revolving around the novel coronavirus pandemic. It may be mentioned that CSIR-NEIST has been playing a pivotal role in its societal mission under the dynamic leadership of Dr G. Narahari Sastry, Director of the laboratory.

CSIR-NEIST initiated COVID-19 Lecture Series

With an objective to increase awareness about COVID-19 and its impact in the world across different sectors, CSIR-NEIST initiated online COVID-19 Lecture series in April 2020. Under the lectures series, various scientists and students of CSIR-NEIST discussed on a wide range of issues and aspects of the pandemic and its implications in industry, education, society, environment and so on.

Under the lecture series, 22 lectures were delivered on following topics:

Sl.No	Title of the Lecture	Date	Delivered by
1	COVID-19: Statistics and Analysis	20 April 2020	Dr Leon Raj, Scientist
2	The Coronavirus: A Geopolitical Earthquake	21 April 2020	Dr Santanu Baruah, Senior Scientist
3	Impact of COVID-19 on scientific community and an approach from nanotechnology point of view	22 April 2020	Dr Lakshi Saikia, Principal Scientist
4	COVID-19 and repurposing of FDA approved drug candidates	23 April 2020	Dr Gakul Baishya, Senior Scientist
5	Taking leads from ancient Indian traditional knowledge: potential prophylactic measures against COVID-19	24 April 2020	Dr Dipanwita Banik, Senior Scientist

6	Scope of using Bamboo based structures in temporary shelters, hospitals etc. during different disaster situations	27 April 2020	Dr Dipankar Neog, Principal Scientist
7	COVID-19 and role of medicinal plants	28 April 2020	Dr Chandan Tamuly, Principal Scientist
8	COVID-19: The positive side	29 April 2020	Er Vaskar Rajkhowa, Senior Technical Officer (3)
9	COVID-19: Blessing in disguise?	30 April 2020	Dr Bijit Kr Choudhury, Scientist
10	COVID-19: Pathogenesis, immune response and role of anti-oxidants	01 May 2020	Dr Rinku Baishya, Scientist
11	Strategy of employment generation in rural areas of Assam under post COVID-19 condition	04 May 2020	Dr Mantu Bhuyan, Principal Scientist
12	A scientific outlook of post COVID-19 and preparation for battle	05 May 2020	Dr Subrata Ghosh, Senior Scientist
13	COVID-19: Its impact on unemployment rate, oil, gas and chemical organizations	06 May 2020	Dr Manashi Sarmah, National Post Doctoral Fellow
14	Structural basis for the development of pre and post infection therapies for COVID-19	08 May 2020	Dr Arup Roy, Scientist
15	Earth response to COVID-19	12 May 2020	Dr Debasis Mohanty, Scientist
16	Impact of COVID-19 lockdown on agriculture and allied sectors	13 May 2020	Dr Dipul Kalita, Principal Scientist
17	COVID-19 outbreak and its impact in construction sectors	14 May 2020	Er Dipak Basumatari, Principal Scientist
18	Aromatic herbs for the management of COVID-19 pandemic & post covid socio-economic upliftment: Individual to community	19 May 2020	Dr Saikat Haldar, Scientist
19	Novel coronavirus pandemic: Its perspective and scientific intervention	20 May 2020	Dr Archanamoni Das, Principal Scientist
20	An overview of COVID-19 drug development	21 May 2020	Dr Ram Awatar Maurya, Scientist
21	Coronavirus pandemic: Retrospection towards clean energy harvesting in India	26 May 2020	Dr Prasenjit Saikia, Senior Scientist
22	Recombinant antibodies for COVID-19: Engineering and production	28 May 2020	Dr N Velmurugan, Scientist

CSIR-NEIST Scholars Donate Fund and Ladies Club offers Non-perishable Food Items

The Research Scholars working in CSIR-NEIST have contributed an amount of Rs 54,201 to the Prime Minister's Citizen Assistance and Relief in Emergency Situations Fund. The collected amount from all the students was transferred through State Bank of India online payment portal. The worldwide COVID-19 pandemic situation and the continuous lockdown for a month in the country is wreaking havoc on the day to day life of people who are daily wagers, drivers, tailors, laundry man, etc. To support these poor people during the crisis the NEIST Ladies Club has made an effort to distribute some non-perishable food items like pea, Masoor dhal, chana dhal, Chickpea, Mustard oil, Jaggery, Atta, flattened rice, Soap, etc. to the families of neighbouring villages who are regular visitors to NEIST Colony as domestic helpers, maids, drivers, etc. It has been possible due to the contribution received from the families of NEIST Colony. The members of the NEIST Ladies Club also offered sincere gratitude to Dr G Narahari Sastry, Director, CSIR-NEIST Jorhat for his support in all aspects.

Distribution some of non-perishable food items to domestic helpers, maids, drivers, etc. by members of the Ladies Club of CSIR–NEIST.

INAUGURATION AND S&T FACILITIES INSTALLED

350 kWp On grid Solar Power Plant inaugurated at CSIR-NEIST

With an aim to become more self-reliant on energy by reducing energy imports and in the pursuit of producing clean energy, CSIR-NEIST has installed a 350 kWp On grid Solar Power Plant at its campus today. The Solar Plant was inaugurated by Smt. Roshni Aparanji Korati, Deputy Commissioner, Jorhat in presence of Dr G Narahari Sastry, Director, CSIR-NEIST and members of the staff. The programme was held following COVID SOPs.

Smt. Korati in her speech informed that this is the first of its kind Solar Plant with such capacity in Jorhat and has been connected on grid of APDCL. She also added that CSIR-NEIST is an important institute in the district which has proactively contributed to the district administration in the fight against COVID-19 pandemic by setting up a RT-PCR COVID Testing Laboratory. Dr G Narhari Sastry, Director, CSIR-NEIST informed that the institute is trying to be hundred per cent eco-friendly and has taken many initiatives to enhance the biodiversity, water conservation, waste management etc. The present initiative will provide nearly 50 per cent of its power requirement in the campus. The programme was also attended by Ms. Monsumi Saikia, Sub-Divisional Engineer, APDCL. Mr Makhan Bora, In-charge, Electrical Section of CSIR-NEIST offered vote of thanks at the concluding point of the event.

It may be mentioned that the institute is already using 100kWp Off Grid Solar Power since 2011 and with the additional installation of 350 kWp Solar Power Plant has further increased its capacity which will not only cater to the needs of the

Inauguration of 350 kWp On Grid Solar Plant by
Ms.Roshni Aparanji Korati, IAS Deputy Commissioner,
Jorhat in presence of Dr G Narahari Sastry, Director, CSIR-NEIST

Unveiling of the bust of legendary freedom fighter and statesman from Jorhat Jananayak Late Debeswar Sarmah

Unveiling of the bust of legendary freedom fighter and statesman from Jorhat Jananayak Late Debeswar Sarmah in the courtyard of the Institute on 18 March 2021 by Dr Madhu Dixit, Chairperson, Research Council CSIR-NEIST, Jorhat. Jananayak Late Debeswar Sarmah was instrumental in establishing CSIR-NEIST in Jorhat. The occasion was graced by the presence of his grandson Mr Subroto Sarmah as the Guest of Honour. campus but will also export the excess energy generated by the Solar Plant to the grid.

Inaugurated of the 'NEIST Biodiversity Eco Park'

Dr. G Narahari Sastry, Director, CSIR-NEIST, Jorhat inaugurated the 'NEIST Biodiversity Eco Park' on 14 November 2020. Several initiatives have been taken to conserve the biodiversity in the CSIR-NEIST Campus such as planting 2000 trees including fruit trees in the campus, to conserve different orchids, bamboo species, citrus species, herbs, ornamental plants beside conservation of rare, threatened and endangered species of medicinal plants and also conservation of honey bee in the campus.

Inauguration of Centre for Petroleum Research

Petroleum being one of the critical areas of the region for research, innovation, economy and industrial development, a Centre for Petroleum Research was established at CSIR-NEIST. The Centre was inaugurated by Shri R.K.Soni, Dept. of Chemicals and Petro-chemicals (DCPC), Govt. of India and Shri Nitin Sakarwal DCPC in presence of Dr G Narahari Sastry, Director, CSIR-NEIST on 11 January, 2021

Inauguration of STINER Technology Facility Centre Hub (STINER-TFC)

Science & Technological Intervention for North East India (STINER) is an ambitious, innovative and challenging project conceived and designed by the Ministry of Development of North Eastern Region (MDoNER), Govt. of India for the people of this region, a Centre for Petroleum Research was established at CSIR-NEIST. CSIR-NEIST being the only CSIR Institute in the entire NE region has taken the responsibility to implement this flagship project for the potential use of CSIR technologies and technologies developed by various other organizations and institutes for socio-economic development of the region. With this vision, STINER main centre, designated as STINER-TFC Hub (STINER Technology Facility Centre Hub) was established at CSIR-NEIST, Jorhat. The Centre was inaugurated by Shri K. Moses Chalai, IAS, Secretary,NEC in presence of Dr G Narahari Sastry, Director, CSIR-NEIST on 19 March 2021.

Hydraulic Compression moulding machine

For making polymer composites

Gas Chromatography– Triple Quadrapole Mass Spectrometry

The Triple Quadrapole GC-MS-MS system provides analytical capabilities for applications such as environmental, chemical, petrochemical, food, forensic, pharmaceutical, and material testing and allow users to achieve sensitive, robust, and reliable GC/MS analysis.

Total Organic Carbon and Nitrogen Analyzer

Sample analyzer with integrated 100-position auto sampler for determination of Nitrogen (N), Protein, Total Carbon (TC), Total Elemental Carbon (TEC), Total Inorganic Carbon (TIC) and Total Organic Carbon (TOC) all in one unit.

Dietary Fibre Extraction System

This instrument is useful to analyze Soluble, Insoluble and total dietary fibre.

Refrigerated centrifuge

This instrument is useful for sample preparation for food analysis

Multimode Elisa Reader & Plate Washer

Mycotoxins in food samples can be analyzed using this instrument.

Automatic Protein Estimation System

Estimation of Nitrogen and Protein content in varieties of food products can be analyzed using this instrument

Automatic Fat Extraction System

Crude fat and total fat content in food products can be analyzed using this instrument

Supercritical CO_2 Extraction Closed Loop System

Using Supercritical fluid extractor we can extract or separate desired compounds from a mixture of chemical compounds, without altering the nature of the compound.

Automatic Color measurement system

Color content in food samples for specific product like tea, Jam & Jelly, Oil, Honey, spice, tablets, bakery products etc. can be analyzed using this instrument.

Optical Polarization Microscope with Heating Stage

For tiles, ceramic materials, polymers and biopolymer composite materials.

Hand Made Paper Unit

For making handmade paper sheet from different natural fibres such as jute, cotton, banana, bamboo pulp and any other office paper waste

Gas chromatography-triple quadrupole mass spectrometry (GC-MS/MS)

GC-MS/MS is a hyphenated analytical technique for the qualitative and quantitative analysis of complex mixture of analytes. It constitutes of a gas chromatograph coupled to a triple quadrupole mass spectrometer. It is well known for its high sensitivity (femtogram) and resolution for the analysis of simple to very complex mixture of volatiles and semi-volatiles. The scope for the library based structural prediction is an added advantage to this technique. It will be largely useful for the analysis of volatiles in flavours, fragrances, food, organic pollutants in environmental samples, forensic, petrochemicals and pharmaceuticals.

High performance thin layer chromatography (HPTLC)

High-Performance Thin-Layer Chromatography (HPTLC) is a technologically advanced form of TLC that provides much higher resolution, sensitivity, repeatability and accuracy of quantification for the target analyte(s). It is a robust, simple, rapid and less expensive analytical tool which has made its use advantageous over other liquid chromatography (LC) techniques. It will be useful for the profiling, qualitative/quantitative analysis and quality control of natural extracts and synthetic mixtures

Hollander Beater

For making pulp from
lingo-cellulosic materials

Lamination Machine for Handmade paper

For lamination of Handmade Paper

Single Die Hydraulic Paper Plate Making Machine

For making disposable paper plate.

Fully Automated Paper Cup Making Machine

For making disposable cup, glass

WORKSHOP/WEBINAR/SEMINAR/CONFERRENCE ORGANIZED

Drug Discovery Hackathon 2020

Drug Discovery Hackathon 2020 (DDH 2020) is a brainchild of our Honourable Prime Minister, Shri Narendra Modi and the first of its kind national initiative to support drug discovery processes. DDH 2020 is jointly taken up by AICTE, CSIR and supported by Office Office of Principal Scientific Advisor, MHRD Innovation Cell, Govt. of India, NIC and MyGov. The partners of the hackathon are Pharmacy Council of India, CDAC, myGov, Schrodinger, ChemAxon, Biovia, Cresset Dassault Systems, BioSolveIT and Optibrium. Dr G Narahari Sastry, Director, CSIR-NEIST was appointed as the chairman to conduct the training programme of DDH 2020 and CSIR-NEIST as the coordinating lab by the honourable Principal Scientific Advisor to the Govt. of India, Prof. K Vijay Raghavan and Director-General, CSIR, Dr Shekhar C Mande.

DDH2020 vision and mission are to establish an 'Open innovation Model' for in silico drug discovery against Covid-19 virus and will cover the various processes in drug discovery, including but not limited to, in silico screening of molecules, lead optimization and identification of drug-able non-toxic targets. The targets/tools/lead molecules identified through the process of DDH2020 will be further taken forward for synthesis followed by subsequent steps in routine drug discovery programme.

Further, it has been decided to give training to the participants. Dr G Narahari Sastry from CSIR-NEIST has taken the responsibility to provide training to DDH participants for two months from 13 July to 11 September, 2020. After several rounds of discussion, it was decided to create three verticals under DDH.

On 13 July 2020, the first inaugural lecture in Vertical 1 was delivered by Dr Shekhar C Mande, DG-CSIR. Inaugural lecture of Vertical 2 was delivered by Dr G Narahari Sastry. The first Vertical 3 lecture was delivered by Dr Girinath G Pillai, Director, Zastra Innovations. Dr Nagamani and Dr Hridoy Jyoti Mahanta from Advanced Computation and Data Science Division, CSIR-NEIST coordinated Vertical 1 and Vertical 2 of the training programme. Vertical 3 was coordinated by Dr Girinath G Pillai, Director, Zastra Innovations. Dr Himkshi Sarma Mr Lijo John and Dr Papri Banerjee were moderator for the training programme.

Vertical 1 focuses on theory and compoutational mthods, Vertical 2 focuses on algorithm and method development and Vertical 3 focuses on practical and hands-on different open source and commercial software. Within these two months, 84 lectures and 24 hands-on sessions were successfully conducted under the leadership of Dr G Narahari Sastry, Director, CSIR-NEIST.

National webinar on "Chemistry & Biology of Natural Products"

A two-day webinar on "Chemistry & Biology of Natural Products" was organized by CSIR-NEIST during July 24-25, 2020 under the mentorship of Dr G Narahari Sastry, Director, CSIR-NEIST. Dr Archana Moni Das, Head, CSTD, given the introduction of the webinar and Dr G Narahari Sastry, Director, CSIR-NEIST given the welcome address. Padma Bhushan, Dr A V Rama Rao graced the occasion by releasing online five videos on YouTube prepared by CSIR-NEIST. He also delivered a keynote address on "Role of Natural Products and Health Care". In his lecture he emphasized the modernization of Ayurveda and underscored the importance of Ayurveda in natural product chemistry and biology practices as the future lies in Ayurveda for health care. It is worth mentioning that Dr. Rama Rao was the first scientist from India to have established the concept of chiral synthesis and technology. His contribution in the areas of HIV/AIDS by initiating work on Azidothymidine (AZT), the first curative agent for AIDS is indeed a milestone in Indian drug research.

Dr J S Yadav (Former Director CSIR-IICT) was another keynote speaker. In his talk, Dr Yadav mentioned the importance of the syntheses of natural product compounds following artificial synthesis routes. Dr Sanjay Kumar (Director, CSIR-IHBT) described how biodiversity, agrotechnology, chemical technology, and food & neutraceuticals are important to correlate to strengthen the agro-economy of our country. Prof. Tapas Kundu (Director, CSIR-CDRI) has enlightened the audience about DNA-methylation, Histone modification, mRNAs, or non-coding RNA. Dr M J Bordoloi (Chief Scientist, CSIR-NEIST) has described the structure determination of various stereochemically complicated natural product compounds. Closing the webinar by vote of thanks given by Dr Sanjib Gogoi, Pr Scientist, CSIR-NEIST.

From the top left: Dr Mahdu Dikshit, Dr A V Rama Rao, Dr G N Sastry
From the bottom left: Dr J S Yadav, Dr Sanjay Kumar, Prof. T K Kundu, Dr M J Bordoloi

CSIR-NEIST organized One day Workshop on Artificial Intelligence in Drug Discovery

CSIR-NEIST conducted one-day workshop on "Artificial Intelligence in Drug Discovery" on 1 September, 2020 as a part of two programmes of high importance in online platform i.e Summer Research Training Programme 2020 (SRTP-2020) and Drug Discovery Hackathon 2020 (DDH 2020) conducted by CSIR-NEIST under the leadership of Dr G Narahari Sastry, Director, CSIR-NEIST.

The workshop was the blend of SRTP 2020 and DDH 2020 which primarily focused on the work carried out in the Advanced Computation and Data Science Division, CSIR-NEIST headed by Dr Sastry. The theme of the workshop is the application of Artificial Intelligence in the field of Biology, Chemistry and Drug Discovery and approximately 4000 participants participated through different online platforms. Dr Sastry extended warm welcome to all the participants and dedicated the workshop in the memory of our country's late former President, Shri Pranab Mukherjee. Dr Sastry delivered a Keynote Lecture wherein he discussed the concepts of experiment, theory modelling and data science as well as their roles in drug discovery and drug development. He highlighted the difference between learning, understanding, intelligence and insight. In addition, he deliberated about subjecting these concepts to quantification. He emphasized the role of Artificial Intelligence in drug discovery and the role of fourth paradigm in science & technology in general and drug discovery in particular. He also elaborately explained the roles of drug discovery processes and the importance of developing indigenous open-source drug discovery software. He further explained how drug discovery has been transformed from our traditional approach to modern drug discovery with the help of Artificial Intelligence and Machine Learning.

An overview of Molecular Property Diagnostic Suite (MPDS) indigenous open-source Drug Discovery software was presented by Dr S Nagamani, Scientist, CSIR-NEIST. He discussed the genesis and applications of MPDS and machine learning script indigenously developed by the research group of Dr G Narahari Sastry.

Mr Debabrata Das, Senior Scientist, CSIR-NEIST and Mr Khirod Buragohain, Senior Scientist, CSIR-NEIST elaborately explained how SRTP 2020 was technically handled and how it was hosted "Live" on SRTP Youtube channel. They also gave an overview of computer vision, IoT and OpenCV applications with examples. Dr Himakshi Sarma, Post Doctoral Fellow talked about Big Data and its applications with examples. Dr Himakshi described handling of data with advanced big data analytics. Dr Hridoy Jyoti Mahanta, Scientist, CSIR-NEIST focused on hands-on sessions on Jupyter Notebook and explained as well as supervised learning models for classification of small molecules. Mr Lijo John, Research Scholar focused on hands-on on MPDS with specific attention towards the compound library. The programme concluded with "Questions and Answer" session with the participants.

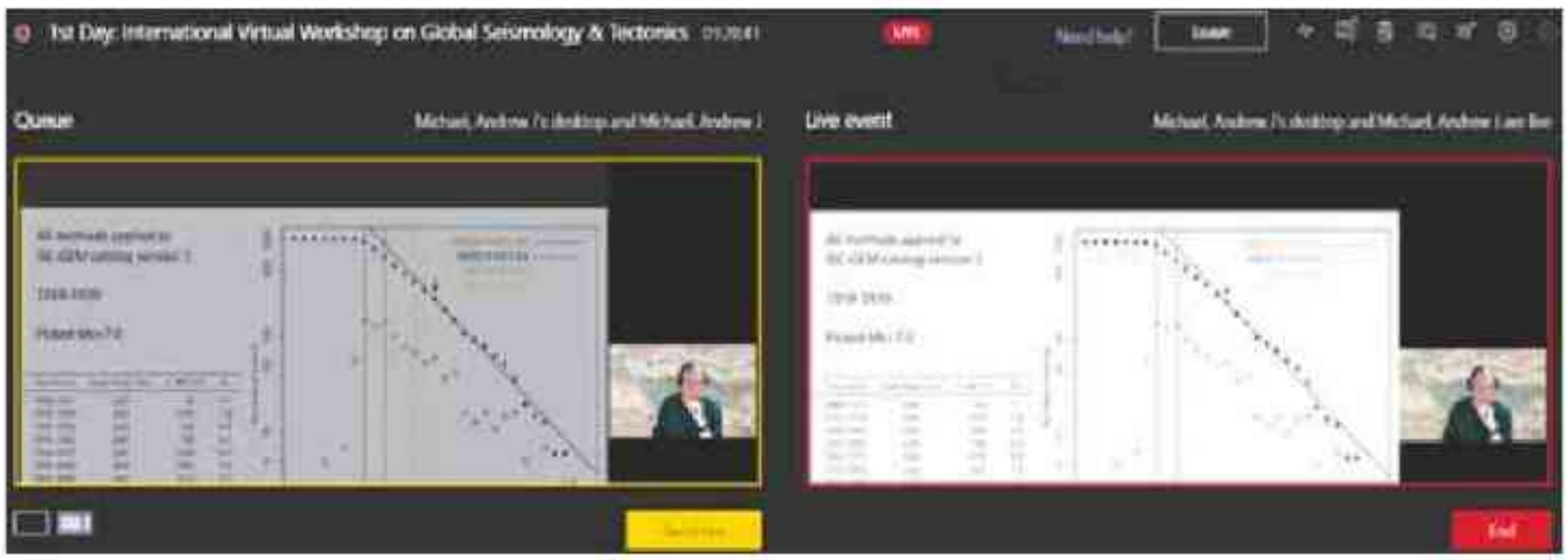
Webinar under CSIR-AROMA Mission

A Webinar was organized with an attempt to connect to 500 villagers/ farmers involved in Aroma Mission during the period of pandemic on 2 June 2020. About 320 farmers involved in CSIR Aroma Mission from entire North East participated.

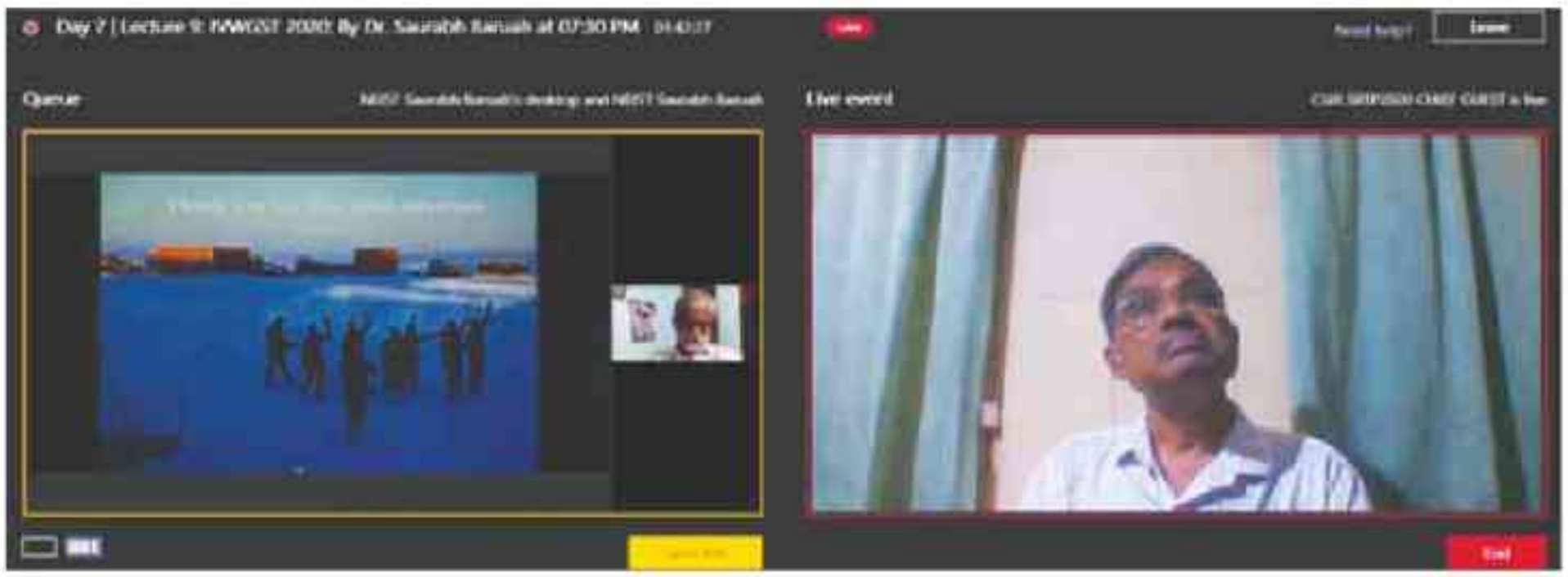
Webinar organized on 2 June 2020.

International Virtual Workshop on Global Seismology & Tectonics (IVWGST-2020) CSIR-Industry Meet

An international virtual workshop on global seismology and tectonics (IVWGST-2020) was organized by the Geoscience and Technology Division of CSIR - North East Institute of Science and Technology, Jorhat, India during 14-25 September 2020. This workshop predominantly catered to undergraduate, postgraduate and Ph.D. students, scientists and academicians from across the globe. The primary motive of IVWGST-2020 was to inspire the participating students, perturbed by the unprecedented situation brought about by the CoVID-19 pandemic, with quality lecture sessions, so as to lift their spirits. The virtual workshop served as a conduit for the students and researchers to directly interact with several pioneers and prominent geoscience researchers from around the world. Lectures, via Microsoft Teams, were given by 15 eminent speakers from diverse geoscience forums and institutions and were attended by more than 1000 participants, mostly students and researchers, from 30 different countries.



Snapshot 1: During day 1 of IVWGST-2020 where Dr. Andrew J Michael, USGS delivered his first talk. (Date: 14 September 2020)



Snapshot 2: During day 7 of IVWGST-2020 where Dr. Saurabh Baruah, CSIR-NEIST delivered his talk. On the right panel, Prof. J R Kayal, GSI, India, as the Chairperson, taking questions from the online participants. (Date: 20 September, 2020)

Snapshot 3: During the e-valedictory function on day 12 of IVWGST-2020 where Dr. G. Narahari Sastry, the Director, CSIR-NEIST, India (left panel) and Prof. Ramesh Singh, Chapman University, USA (right panel) took part as the Chief Guest and Guest of Honour of the function, respectively. (Date: 25 September 2020)

CSIR-Industry Meet

CSIR-NEIST organized CSIR-Industry Meet on "**Recent Trends in Petroleum Research**" **RTPR-2020** on 11 December 2020 at Dr J N Baruah Auditorium, CSIR-NEIST. The conference was organized both in online and offline mode. The industry meet consisted of 11 lectures from top officials of oil and petrochemical industries, NESAC & IIRS and CSIR institutes.

Dr G N Sastry, Director, CSIR-NEIST sitting on the dais along with dignitaries from NESAC, IIRS and CSIR institutes.

National Seminar on "Dying of tree bean (Yongchak) in Manipur: remedies & steps towards conservation

CSIR-NEIST Branch Lab, Imphal co-sponsored and organized 1-day National Seminar on "Dying of tree bean (Yongchak) in Manipur: remedies & steps towards conservation", in collaboration with Manipur University, ICAR, Manipur Govt., Apunba Imagi Machasing, Imphal on 16 Jaunary 2021. Dr Lorho S. Pfoze, Member of Parliament (Outer) Manipur and Prof Amar Yumnan, Vice Chancellor, Manipur University graced the occasion as Guest of Honour & President of the inaugural program respectively. Dr Najma Heptulla, Governor of Manipur, attended the programme as Chief Guest through online mode.

Dr Najma Heptulla, Hon'ble Governor of Manipur attending the program through online mode along with the other dignitaries on the dais.

Workshop-cum-meeting on ISO/IEC 17025: 2017

CSIR-NEIST, Jorhat organized a Workshop-cum-meeting on ISO/IEC 17025: 2017 on 08 February 2021. The workshop was attended by Scietists and Research Scholars of the institute. Dr K N Udpa, Lead Assessor, NABL was the Research Person for the workshop.

Participant of the workshop on ISO/IEC 17025: 2017 at CSIR-NEIST along with Director, CSIR-NEIST and Dr K N Udpa, Resoruce Person.

Entrepreneur meet cum Training programme

CSIR-North East Institute of Science & Technology Jorhat organized one day "**Entrepreneur meet cum Training programme on Cultivation of Medicinal and Processing of Aromatic Plants**" at CSIR-NEIST Branch Itanagar Naharlagun under the CSIR-Aroma Mission Programme. About 60 nos of participant from different SHG/NGO, school students etc attended the day long programme. Dr G Narahari Sastry, Director, CSIR-NEIST, graced the occassion as Chief Guest. The Chief Guest interacted with School students of Govt. Secondary School, G-Sector, Naharlagun and distributed books, share his knowledge and motivate to the students towards scientific temperament for development of the nation. The programme was co-ordinatted by Dr Chandan Tamuly, Sc In Charge and all staff of the Branch Lab.

Dr G N Sastry, Director, CSIR-NEIST at the Entrepreneur meet with CSIR-NEIST officials, farmers and entrepreneurs.

Student and Scientist interaction programme.

Farmer's meet organised at CSIR-NEIST Branch Itanagar

Under CSIR-800 programme CSIR-NEIST, Branch Lab, Itanagar organised a farmers meet during January 2021 at its premises. The meeting was coordinated byDr. G.Narahari Shatry, Director, CSIR-NEIST. Farmers from Papumpare district of Arunachal Pradesh attended the day long farmers meet.

Dr G Narahari Sastry, Director, CSIR-NEIST along with the farmers in the day long farmer's meet organised at CSIR-NEIST Branch Itanagar during January 2021.

EVENTS ORGANISED

CSIR-NEIST celebrated its 61st Foundation Day

Left: Dignitaries, Guests and staff of CSIR-NEIST in the unveiling ceremony of the bust of Jananayak Late Debeswar Sarmah (photo in right)

CSIR-NEIST celebrated its 61st Foundation Day today in a befitting manner on 18 March, 2021 with a day-long programme. The only CSIR institute in the entire North East region, CSIR-NEIST has been serving the North East India in particular and the country in general for the last 60 years through Science & Technology (S&T) interventions for the greater benefit of the common masses. Speaking on this great occasion, Dr G Narahari Sastry, Director CSIR-NEIST underscored the success stories scripted by this institute over the years through translational research and societal goals. The main event of the day was the unveiling of the bust of Jananayak Late Debeswar Sarmah in the courtyard of institute and rich tributes were paid to this legendary freedom fighter and statesman from Jorhat, who was also instrumental in establishing CSIR-NEIST (the erstwhile Regional Research Laboratory) in Jorhat. The occasion was graced by the presence of his grandson Mr Subroto Sarmah as the Guest of Honour. Mr Sarmah addressed the august gathering and said that he and his family are indeed very thankful to Dr Sastry and the CSIR-NEIST fraternity for bestowing so much of honour to his grandfather and acknowledging his contribution in establishing the erstwhile RRL in Jorhat. He warmly reciprocated the affection and honour showered upon him and to his family by the institute, which he deeply treasured. He also proposed that the family of Jananayak Late Debeswar Sarmah will be delighted to contribute in every possible way in celebrating the CSIR-NEIST Foundation Day every year from now onwards. In this connection, Dr Sastry accepted the proposal to name the Foundation Day Lecture as Jananayak Late Debeswar Sarmah Memorial Foundation Day Lecture and also mentioned that Dr Madhu Dikshit, the Chief Guest of the function will be the first person to do so.

The added attraction was a special programme held at Dr J N Baruah Auditorium following COVID-19 protocols wherein the Foundation Day Lecture was delivered by Dr Madhu Dikshit, Former Director of CSIR-CDRI, Lucknow, THSTI National Chair & Chairperson, Research Council, CSIR-NEIST. She spoke on "Honesty, Integrity and Ethics in Science". She emphasized the fact that science is the quest for truth, and highlighted the importance of scientific temperament, honesty, integrity, ethics, trust and a need for a check on scientific

misconduct is very much vital to produce quality and high science. She further added that misconduct may be intentional or unintentional, but the fact of the matter is to accept such happenings and rectify in the right time. It is cardinal to introspect and discuss openly about such misconduct and the serious cases need to be brought to book and criminalised.

Dr G Narahari Sastry said that we are here today because of Late Jananayak Debeswar Sarmah who is considered as hero of Assam-a frontline freedom fighter. Jananayak late Sarmah took the lead and established CSIR-NEIST Jorhat, formerly Regional Research Laboratory in 1961, he said. Dr Sastry mentioned that in the recent times the institute has added many feathers in the glorious saga of R&D accomplished. Mention may be made about some challenging tasks successfully undertaken and accomplished by the institute viz. R&D product like anti arthritis herbal ointment which has become popular throughout the country; establishment of the COVID-19 testing laboratory in the institute campus last year; Summer Research Training Programme (SRTP) 2020 which was organised PAN India wise; Drug Discovery Hackathon (DDH) 2020, which was an online platform to take open source drug discovery to a higher pedestal in the crusade against the COVID-19 pandemic; the seismic investigation of the Oil India Ltd. gas blow out site at Baghjan in the Tinsukia District of Assam; the geophysical investigation of the proposed first under water tunnel of India across river Brahmaputra connecting Gohpur in the north bank to Numaligarh in the south bank of the river in Assam; setting up of about 15 Multi-locational experimental research fields in the North East Region (5 farms in Assam, 4 in Arunachal Pradesh, 1 each in Manipur, Nagaland, Meghalaya, Mizoram, Sikkim and Tripura) to fulfil the vision of the Honourable Prime Minister of India, Shri Narendra Modi, in doubling the farmers' income in the next few years, apart from a number of industrial research oriented MoUs signed with downstream oil & gas industries to address certain issues faced by the petrochemical industries in Assam, are a few from a host of other such achievements to reckon with. Dr Sastry opined that the history and the growth of CSIR-NEIST have been intricately linked to the growth and progress of our nation. He further added "We are proud of our legacy, the culture of scientific excellence that infiltrates every corner of this laboratory through successive generation of men and women who have worked here painstakingly for the benefit of the society at large".

In tune with this occasion, Dr Jatin Kalita, Principal Scientist of the institute quoted a few lines from the experiences and the emotions penned down by Jananayak Late Debeswar Sarmah in his effort to establish the erstwhile RRL in Jorhat.

Earlier, Dr Sastry felicitated Dr Madhu Dikshit, Chief Guest of the function, Mr Subroto Sarmah, the Guest of Honour and other family members of Jananayak Late Debeswar Sarmah along with a team of progressive farmers and entrepreneurs who are being trained by CSIR-NEIST under its agrotechnology missions.

The occasion was also apt to recognise 13 child scientists selected from different districts of Assam, and it may be mentioned that they will be mentored by CSIR-NEIST throughout until they secure a footing.

The CSIR-NEIST Annual Report for the year 2019-20 and the report on SRTP 2020 were formally released by the Dr Sastry and the invited dignitaries. This was followed by the Vote of Thanks proposed by Dr Kalyani Medhi, Senior Scientist of the institute.

The day-long programme culminated with a cultural extravaganza which was the harbinger to the year-long Diamond Jubilee celebration to be continued by the institute until the next Foundation Day in the year 2022.

Left: Release of Annual Report 2019-20 by the dignitaries, Dr G Narahari Sastry, Director CSIR-NEIST, Dr Madhu Dikshit, Chief Guest and Mr Subroto Sarmah Guest of Honour (from left). Right: CSIR song presented by CSIR-NEIST staff and students.

Cultural Programme held on the occasion.

Meeting with Medicinal Plants Board, Government of Arunachal Pradesh

CSIR-NEIST, Branch Laboratory, Itanagar organized a meeting with the Chairman, State Medicinal Plants Board, Government of Arunachal Pradesh in on 21 Jnauary 2021 and discussed about the joint research activities related to medicinal plants of Arunachal Pradesh.

Meeting with Chairman State Medicinal Plant Board, A.P. and other entrepreneur and Farmers.

Meeting with Department of Chemicals and Petrochemicals

CSIR-NEIST organized a meeting with the "Team of Experts", Department of Chemicals and Petrochemicals, Ministry of Chemicals & Fertilizers, New Delhi, 11 January, 2021.

Meeting in progress.

Meeting with Numaligarh Refinery Limited

CSIR-NEIST, Jorhat organized a meeting with Numaligarh Refinery Limited on 11 January 2021 and discussed about the project on waste management of the industry.

Meeting in progress.

Meeting with Brahmaputra Cracker and Polymer Limited, Dibrugarh

CSIR-NEIST, Jorhat organized a meeting with Brahmaputra Cracker and Polymer Limited, Dibrugarh on 29 January 2021 and discussed about the possible collaboration with the industry.

Dr G Narahari Sastry, Director, CSIR NEIST felicitating officials of BCPL, Dibrugarh.

Participation in Exhibition

CSIR NEIST Branch Laboratory Imphal jointly with Marjing Industries, Imphal has participated in an exhibition of the Central Agricultural University Agri Fair 2020-21, organized by Central Agricultural University (CAU), Imphal during 8-10 March 2021.

During Exhibition

SOCIETAL ACTIVITIES/OTHER TRAINING PROGRAMMES

Hands on Training on Coal Testing Training

Coal & Energy Group (MSTD) group of CSIR-NEIST, Jorhat organized a "Hands on training on coal testing" during 15-19 February 2021 for the Chemists/Geologists of Directorate of Geology & Mining, Nagaland.

Participants in "hands on training on coal testing" organized by Coal & Energy Group.

CSIR Technology Window Launched

CSIR Technology Window launched at the Institute of Natural Resources, Mawpat, Shillong on 25 February 2021 to facilitate support services to the farmers that are engaged in the cultivation and production of MAPs.

Launching of CSIR Technology Window.

Establishment of "Multilocational Trail & Regional Research Experimental Farm" of CSIR-NEIST, Jorhat in different states of North East

Multilocational Trail & Regional Research Experimental Farm" of CSIR-NEIST, Jorhat established at Rajapara, Kamrup, Assam on 15 September 2020; at Pasighat, Arunachal Pradesh on 28 October 2020; at Yaongyimsen, Nagaland on 26 November 2020; at Bokakhat, Golaghat on 19 February 2021 and at Roing, Arunachal Pradesh on 27 February 2021.

Activities under Mushroom Cultivation

Training on commercial cultivation of mushroom for Deptt of Horticulture, Govt. of Arunachal Pradesh

As per request of Smt. A.R. Ering, MDO (Mushroom development officer), Deptt of Horticulture, Govt. of Arunachal Pradesh, CSIR-NEIST Branch Lab, Itanagar organised a day long training programme on preparation and conservation of mushroom cultures at its premises on 19 November 2020. A total of eight members (Project Asstt) headed by Smt. Ering, MDO of Mushroom Development Centre (MDC) Itanagar participated in the training programme. The group were trained on preparation of different methods of mushroom cultures and its long term conservation technique.

Glimpses of training on preparation of mushroom culture/spawn and cultivation technology of mushroom for the participants from "Mushroom Development Centre (MDC), Department of Horticulture, Govt of Arunachal Pradesh at NEIST Branch Itanagar on 19 November 2020.

Training on commercial cultivation of mushroom for local ST women

Under skilled development programme, CSIR NEIST Branch Laboratory, Itanagar organised a day long training programme on commercial cultivation of mushroom at CSIR-NEIST Branch premise during March 2021. A total of 25 participants of local ST women Headed by Mrs Karia Baggang, Chairman, "State Medicinal Plants Board" Govt of Arunachal Pradesh participated in the training programme.

Glimpses of training programme.

Activities under Vermicomposting

Inspite of lockdown due to COVID-19 pandamic situation, societal programme on vermicompost was also continued during the reporting period. Technical guidance provided through online mode and several farmers benefitted through vermicompost training programme. Under technical guidance of Branch Lab, Itanagar five farmers installed 5 commercial vermicompost production units at Papumpare district.

Under technical guidance of NEIST Branch Itanagar Vermicompost production unit at Demsite, Naharlagun, Papumpare district.

Under the technical guidance of CSIR-NEIST Branch Lab, Itanagar Smt Tar Yami established a commercial vermicompost unit at Nirjuli during the reporting period. About more than 10

beneficiaries have started commercial production of vermicompost at different rural localities in Arunachal Pradesh. Some of them started earning livelihood of Rs 6,000/ per month by harvesting and selling of vermicompost from their vermicompost production units.

Technical guidance on establishment of commercial vermicompost production unit given to local ST youth at NEIST Branch Itanagar during February, 2021.

Installation of commercial vermicompost production units in different localities in Papumpare district, Arunachal Pradesh.

Awareness programme on "preparation of Cake, Cookies, Biscuits from Tashe".

One day awareness programme was organised by CSIR-NEIST Branch Lab, Itanagar on "Preparation of Cake, Cookies, and biscuits from Tashe –an economic plant of Arunachal Pradesh. Accordingly, a few beneficiaries participated in the programme.

Training on Preparation of cake and Cookies from "Tashe"-an under-utilized food plant of Arunachal Pradesh.

BEAUTIFUL CSIR-NEIST: Through the Lens

FLORA AND FAUNA AT NEIST CAMPUS












DIFFERENT ORCHID VARIETIES FROM NEIST ORCHIDARIUM

AWARDS/RECOGNITIONS

The Biotech Research Society India awarded the Biotech Research Society India Annual Award to Dr G N Sastry Director, CSIR NEIST. Royal Society of Chemistry awarded the Fellow of Royal Society of Chemistry to Dr G N Sastry Director, CSIR NEIST.

Young Associate Fellow

The Maharashtra Academy of Sciences awarded Dr. Pravin G. Ingole, Scientist, ESTD Division the "Young Associate Fellow" for outstanding research contributions on 28 November 2020.

Young Researcher Award-2020

The Institute of Scholar, Bangaluru awarded Dr Tonkeswar Das, Technical Officer the "Young Researcher Award-2020" for his co-authored paper published in ACS Sustainable Chemistry and Engineering.

Oral Presentation Award

Ms Lisamoni Kalita, Senior Research Fellow (SRF), has been awarded first prize for her oral presentation in the India International Science Festival (IISF) - Young Scientists' Conference 2020 on the theme "Frontiers Areas of Research-Chemical Science".

Oral Presentation Award

Dr Prachurjya Dutta, Senior Project Associate (SPA), has been awarded third prize for his oral presentation in the India International Science Festival (IISF) - Young Scientists' Conference 2020 on the theme "Science and Technology in Rural Planning".

RECOGNITIONS

- BLIM, Imphal (Dr HB Singh, Senior Principal Scientist) received "Certificate of Appreciation" by Dr R K Ranjan Singh, Member of Parliament, Manipur for development of Alcohol-based Herbal hand sanitizer, production and distribution to COVID-19 worriers free of cost on Jul 31, 2020.
- Dr Chandan Tamuly, Principal Scientist & Scientist-in-charge, Branch Lab, Itanagar has been recommended as a subject expert for RAC (Research Advisory Committee) for Ph.D scholars, Dept of Biotech and Bioengineering, NIT, Arunachal Pradesh.
- Dr Chandan Tamuly, Principal Scientist & Scientist-in-charge, Branch Lab, Itanagar has been nominated as Director of Board of Directors of Arunachal Pradesh Mineral Development Corporation Ltd (A GoAP-PSU) Itanagar.
- Dr Chandan Tamuly, Principal Scientist & Scientist-in-charge, Branch Lab, Itanagar has been nominated as a Member of Scientific Advisory Committee, Krishi Vigyan Kendra (KVK), Papum Pare, Govt of Arunachal Pradesh.
- Dr Chandan Tamuly, Principal Scientist & Scientist-in-charge, Branch Lab, Itanagar has been nominated as an Executive Member of State Medicinal Plant Board, Govt. of Arunachal Pradesh.
- Dr Chandan Tamuly, Principal Scientist & Scientist-in-charge, Branch Lab, Itanagar has been nominated as an Executive member, State Geology and Mining Dept, Govt. of Arunachal Pradesh.
- Dr Leon Raj J, Scientist has been nominated as member of Board of Studies for Civil Department, St. Xavier's Catholic College of Engineering, Nagercoil, Tamil Nadu
- Dr Leon Raj J, Scientist has been nominated as member of Board of Studies r for Civil Department, Kaziranga University, Jorhat, Assam
- Mr Chandan Dey, CSIR-SRF was a member of one of the the six teams selected from India by the Atal Innovation Mission, NITI AAYOG, Govt of India to participate and present solution at the Next Generation Water Action 2021 organized by Denmark Technical University, Denmark. Mr Dey is pursuing PhD work under the guidance of Dr Santanu Baruah, Senior Scientist of GSTD.
- Dr Santanu Baruah, Senior Scientist has been nominated as Guest Editor for The Journal of Physics & Chemistry of the Earth (Elsevier Publication); IF 2.7.
- Dr Santanu Baruah, Senior Scientist has been nominated as Editorial Board Members of Geometrics, Natural Hazards & Risk (Taylor & Francis) IF 3.5.
- Debasis D Mohanty, Scientist has been selected as Main convener for the IG session in the prestigious Virtual Asia Oceanic Geosciences Society (AOGS), 2021.

TRAINING ATTENDED

Sl. No	Title of Programme	Organizers details & duration / date	Name & Designation of the staff member
1	Advancement In Tunnel Technology	The Institution of Engineers (India) 06 October 2020	Dr Santanu Baruah Senior Scientist, GSTD
2	Online course on Research Ethics Committee	St John's Medical College & Research Institute, Bangalore 1 – 30 Nov 2020	Dr Rinku Baishya, Scientist, CSTD
3	Food processing	CSIR-CFTRI, Mysuru and APEDA, Govt. of India 5 days: 4-8 Jan, 2021	Dr HB Singh, Senior Principal Scientist, BLIM, Imphal
4	Processing of Bamboo Shoots	Apunba Imagi Machasing, Imphal, funded by NEC, Govt. of India 2 days: 18-19 Jan, 2021	Dr HB Singh, Senior Principal Scientist, BLIM, Imphal
5	Training Program on ISO/IEC 17025:2017	Coal and Energy group, MSTD, CSIR-NEIST, 08 February, 2021	Dr Ashutosh Namdeo, Scientist, ESTD
6	Training Program on ISO/IEC 17025:2017	Coal and Energy group, MSTD, CSIR-NEIST, 08 February, 2021	Dr Biswajit Gogoi, Scientist, ESTD
7	Training Program on ISO/IEC 17025:2017	Coal and Energy group, MSTD, CSIR-NEIST, 08 February, 2021	Dr Leon Raj J, Scientist, ESTD

SKILL DEVELOPMENT TRAINING IMPARTED

Sl. No	Title of training	No of beneficiaries/ participants and their affiliation	Salient features	Organized by and date	Funding Agency
Activities under Cultivation of Mushroom					
1.	Training on cultivation of mushroom technology	45 Nos '96)1!,:,1452,38 (4/,8; &).)61)-93	Handsome training on mushroom cultivation	Organised by CSIR-NEIST Branch Itanagar at NEIST Branch on 16.04.2020	Inhouse project (OLP-2044)
2.	Training on cultivation of mushroom technology	30 Nos (/)3-("6495 East Siang district, AP	Handsome training on mushroom cultivation	Organised by CSIR-NEIST Branch Itanagar At NEIST Branch on 11.09.2020	Inhouse project (OLP
3.	Training on cultivation of mushroom technology	20 Nos)092)5)("6495&).)61)-93	Handsome training on mushroom cultivation	Organised by CSIR-NEIST Branch Itanagar At NEIST Branch on 11.09.2020	Inhouse project (OLP
4.	Training on cultivation of mushroom technology	10 Nos Unemployed Educated youth of Itanagar locality	Handsome training on mushroom cultivation	Organised by CSIR-NEIST Branch Itanagar At NEIST Branch on 04.11.2020	Inhouse project (OLP
5.	Training on cultivation of mushroom technology	16 nos 10 from Majuli and 6 from Pulibar, Jorhat	Handsome training on mushroom cultivation	Organised by CSIR-NEIST on 12.11.2020	Under STINER Project
6.	Training on cultivation of mushroom technology	25 Nos !4 Iphine PG 378/898,!,.6)93	Training on preparation of mushroom spawn and mushroom cultivation	Organised by CSIR-NEIST Branch Itanagar at NEIST Branch campus on 18.11.2020	Inhouse project (OLP
7.	Training on cultivation of mushroom technology	10 Nos 97.6442 !,:,1452,38 ,386, Deptt. Of Horticulture, Govt of AP	Handsome training on mushroom cultivation/ culture and spawn preparation	Organised by CSIR-NEIST Branch Itanagar at NEIST Branch campus on 19.11.2020	Inhouse project (OLP
8.	Training on cultivation of mushroom technology	25 Nos Unemployed Youth of Naharlagun locality	Handsome training on mushroom cultivation	Organised by CSIR-NEIST Branch Itanagar at NEIST Branch campus on 19.03.2021	Inhouse project (OLP

Activities under Cultivation and Processing of Medicinal and Aromatic Plants					
1.	Cultivation and Processing of Aromatic Plants	More 200 beneficiaries from different parts of North East India	One day and Three day Training programme	Organised by CSIR-NEIST	CSIR-AROMA Mission
Other Training Programmes					
1	CSIR-Summer Research Training Program 2020 (online)	16000 Students	Online summer research training	CSIR-NEIST	CSIR-NEIST
2	International Virtual Workshop on Global Seismology & Tectonics (IVWGST-2020):	More than 1000 Students	The virtual Lectures, via Microsoft Teams, were given by 15 eminent speakers from diverse geoscience forums and institutions and were attended by more than 1000 participants, mostly students and researchers, from 30 different countries.	Geoscience & Technology Division; 14-25 September, 2021	CSIR-NEIST
3	Hands on training on coal testing	Chemists/Geologists of Directorate of Geology & Mining, Nagaland.	Hands on training on coal testing	Coal & Energy Group (MSTD) 15-19 February, 2021	CSIR-NEIST
4	Online Biosafety Training "Laboratory Biosafety and Biosecurity"	**38 Nos** (Scientist/Technical Officer/Ph. D. Scholar/Project Fellow of CSIR-NEIST, Jorhat)	Biosafety Guidelines **(Resource Person:**Dr.Sumita Acharjee, Department of Agricultural Biotechnology,Assam Agricultural University, Jorhat, Assam)	15/12/2020 Institutional Bio-Safety Committee (IBSC), CSIR-NEIST, Jorhat	CSIR-NEIST

PROJECTS UNDERTAKEN (EXTERNALLY FUNDED)

Sl No.	PI & Title	Project code with Funding Agency	Contract Value (Rs in Lakhs)
1	Dr Swapnali Hazarika Removal of Phenol from Sour/stripped water, It's Value addition and Recycling of Water	CLP0289 Numaligarh Refinery Limited	126.56
2	Dr Manoj Kumar Phukan Geophysical Study at the Baghjan well Blowout Site	CNP0475 Oil India Ltd	89.24
3	Er Vaskar Rajkhowa Upgradation of Water Filtration Plant of CMER&TI Residential Campus, Cinnamara, Jorhat	CNP0476 Central Silk Board, Lahdoigarh Jorhat Assam	14.72
4	Dr Santanu Baruah Estimation of Site Specific Response Spectrum for the Proposed Road Connectivity between Gohpur (NH52) to Numaligarh (NH-37)	CNP0477 LOUIS BERGER, Gurgaon, India	29.25
5	Dr J Leon Raj Structural health monitoring of foundations of towers and chimneys, Silapathar, Assam	CNP0478 M/S Teamsindia Towerlines Pvt Ltd, Silapathar, Dhemaji	6.49
6	Dr Natarajan Velmurugan Nutritional enrichment of agricultural wastes with essential fatty acids producing Thraustochytrids as improved feed for aquaculture	GPP0369 DST, Min of Science & Technology	42.73
7	Dr Mohan Lal Extension and cultivation of aromatic and high value endangered medicinal plants through farmer participatory model for livelihood generation in Arunachal Pradesh	GPP0370 Govt of Arunachal Pradesh, Department of Horticulture, Itanagar	100.00
8	Dr Madhulekha Gogoi Design and development of lanthanide-MOF using2-D graphene like sheets as ligand for simultaneous photocatalysis and sensing application	GPP0371 DST, Min of Science & Technology	27.38

9	Dr Rajib Lochan Goswamee Pilot Scale Demonstration and Popularisation of Some Sustainable Technology for the Supply of Safe Water in Fluoride and Arsenic Affected Areas	GPP0372 DST, Min of Science & Technology	107.05
10	Dr G Narahari Sastry Polymers, their composites and polymeric membranes for sustainable development of Petroleum industries	GPP0373 Ministry of Chemicals and Fertilizers	499.00
11	Dr Chandan Tamuly Empowerment of Apatani tribe of Arunachal Pradesh through value addition of ethnic food items	GPP0374 DST, Min of Science & Technology	64.09
12	Dr Lakshi Saikia Assessment of air, water and soil quality in Baghjan oil blow out site and its vicinity, Tinsukia, Assam	GPP0375 Central Pollution Control Board (CPCB), New Delhi	81.40
13	Mr Dhanjit Das Design and development of 500 kg capacity solar-biomass hybrid distillation unit with the mobile type distillation vassal and its field demonstration for entrepreneurship development	GPP0376 DBT, Min of Science & Technology	74.74

PROJECTS ONGOING (EXTERNALLY FUNDED)

Sl No.	P.I Name & Project Title	Project code with Funding Agency	Project Cost (in lakhs)
1	Dr Swapnali Hazarika Removal of Phenol from Sour/stripped water, It's Value addition and Recycling of Water	CLP0289 Numaligarh Refinery Limited	126.56
2	Dr J Leon Raj Analysis and Design of Police Station using 3D Sandwich panels at Vishakhapatnam, Andhra Pradesh	CNP0474 Beardsell Limited	7.55
3	Dr Manoj Kumar Phukan Geophysical Study at the Baghjan well Blowout Site	CNP0475 Oil India Ltd	89.24
4	Er Vaskar Rajkhowa Upgradation of Water Filtration Plant of CMER&TI Residential Campus, Cinnamara, Jorhat	CNP0476 Central Silk Board, Lahdoigarh Jorhat Assam	14.72
5	Dr Santanu Baruah Estimation of Site Specific Response Spectrum for the Proposed Road Connectivity between Gohpur (NH52) to Numaligarh (NH-37)	CNP0477 LOUIS BERGER, Gurgaon, India	29.25
6	Dr J Leon Raj Structural health monitoring of foundations of towers and chimneys, Silapathar, Assam	CNP0478 M/S Teamsindia Towerlines Pvt Ltd, Silapathar, Dhemaji	6.49
7	Mr Dipankar Neog Technopreneur Promotion Programe (TePP) Outreach Centre (TUC)- (11 FYP). Promoting innovations in individuals, startups and MSMES (PRISM)- (12-FYP)	GAP0214 Min. of Science & Technology, DSIR, New Delhi	26.24
8	Mr Dipankar Neog Council of Science and Technology for Rural India Centre at NEIST, Jorhat (CSTRI Centre - NEIST)	GAP0232 DST, New Delhi, Min of Science & Technology	40.02
9	Dr Saurabh Baruah Setting up of the Multiparametric Geophysical Observatory for monitoring of Earthquake precursor in Mikir Hills Plateau, Assam	GPP0294 Min. of Earth Sciences, New Delhi	405.24

10	Dr Mohan Lal Characterization and chemical composition of high yielding varieties of Amada Haldi(Curcuma zedoaria Rose) and Kali Haldi(Curcuma Caesia Roxb): Endangered High Value Medicinal Plants	GPP0312 National Medicinal Plants Board (NMPB), Ministry of AYUSH, New Delhi	29.77
11	Dr Manash Ranjan Das Reduced Graphene Oxide Nanosheets Decorated with Metallic/Bimetallic Nanoparticles: A Multifunctional Materials for Photothermal Therapy of Cancer Cells	GPP0316 Biotech Consortium India Limited, New Delhi	50.27
12	Mr Hemanta Shankar Dutta Nanoparticles Supported Self Assembled Conducting Polymer Monolayer based Platform for Rapid Detection of Monosodium Glutamate in Food Products	GPP0318 Biotech Consortium India Limited, New Delhi	54.40
13	Dr Pranjal Gogoi Development of Novel NIR Absorbing Sensitizers and their Nano-Conjugates for the Multimodal Cancer Imaging and Therapy	GPP0319 Biotech Consortium India Limited, New Delhi	61.08
14	Dr N Velmurugan Expanding endophytes of paris polyphylla as a model to study co-evolution relationships with emphasis on functional metabolites production	GPP0323 SERB (DST), Min of Science & Technology	43.79
15	Dr Binoy Kumar Saikia National Carbonaceous Aerosols Programme(NCAP) Working Group-III project	GPP0325 Min of Environment, Forest & Climate Change, New Delhi	106.08
16	Dr Manoj Kumar Phukan Seismic Microzonation of Greater Dimapur	GPP0326 Directorate of Geology & Mining, Govt. of Nagaland, Dimapur	19.50
17	Dr H B Singh Anthropogenic impacts and their management options in different ecosystems of the Indian Himalayan Region	GPP0327 G B Pant National Institute of Himalayan Environment and Sustainable Development	32.90
18	Dr Ashutosh Namdeo Catalytic and reaction engineerig studies on bio-oil upgradation	GPP0328 SERB (DST), Min of Science & Technology	40.35

19	Dr Anil Kumar Singh Delineating the regulation of multi drug resistant efflux pumps over expressed in clinical mycobacteria	GPP0329 SERB (DST), Min of Science & Technology	44.60
20	Dr Ajit Singh Approach towards tailoring the interfacial structure and property of lignin for flexible bio-polymer film application	GPP0330 SERB (DST), Min of Science & Technology	28.08
21	Dr Prasenjit Manna A novel therapeutic against metabolic syndrome via activation of coagulation unrelated Vitamin K dependent proteins	GPP0331 SERB (DST), Min of Science & Technology	31.64
22	Dr Biswajit Saha Red-Ox active Ferrocene Functionalized N-Heterocyclic Carbene-Molybdenum Complex for Catalytic Nitrogen Triple Bond Reduction	GPP0333 SERB (DST), Min of Science & Technology	35.55
23	Dr P Yuvraj Diastereoselective synthesis of Lamellarin alkaloid natural product fused spirooxindoles and its analogues. A series of evaluation of its biological activities against Mycobacterium tuberculosis	GPP0334 SERB (DST), Min of Science & Technology	32.76
24	Dr Mantu Bhuyan STINER- Technology Facility Centre (STINER-TFC) at SASRD Nagaland University, Medziphema Campus, Medziphema, Nagaland	GPP0335 Min of Development of NE Region (MDoNER)	1000.00
25	Dr H P Dekabaruah Regional Mapping of Carbon Stock, Sequestration and Sink Potential of Reserve Forest Ecosystem of Assam for improvement of Ecosystem Health and Services	GPP0336 G B Pant Institute of Himalayan Environment and Sustainable Development, Almora, Uttarakhand	99.17
26	Dr Jayaramudu Jarugala Development of low cost biodegradable plastics from Indian agricultural-food processing starch wastes for food packaging and other value added applications	GPP0337 SERB(DST), Min of Science & Technology)	26.00
27	Dr Lakshi Saikia Application of Biosynthesized Metal nanoparticles for Quality Enhancement of Muga Silk Fiber	GPP0338 DBT, Min of Science & Technology	34.80

28	Dr Mohan Lal Establishment of Gene Bank and Distinctness Uniformity and stability (DUS), characterization of Lemon Grass (Cymbopogan flexuosus L.) germplasm.	GPP0339 Protection of Plant Varieties & Farmers Rights Authority, Ministry of Agri & Farmers Welfare	18.00
29	Dr Chandan Tamuly Chemical investigation and therapeutic evaluation for linking marker compound(s) with anti-diabetic potential of young shoots of Wendlandia glabrata D.C and fruits of Phoebe Cooperiana, used by indige	GPP0340 DBT, Min of Science & Technology	42.06
30	Dr Jatin Kalita Establishment of Rural Women Technology Park in CSIR-NEIST, Jorhat, Assam	GPP0341 DST, Min of Science & Technology	61.41
31	Dr Chandan Tamuly Chemical profiling, quantification of bio-active constituents of ethno-medicinal plant of Arunachal Pradesh.	GPP0342 National Medicinal Plants Board (NMPB), Ministry of AYUSH, New Delhi	20.96
32	Dr Mohan Lal Varietal development for high fruit yield and high solasodine content of Solanum Khasianum, A high value medicinal plant of NE India.	GPP0343 National Medicinal Plants Board (NMPB), Ministry of AYUSH, New Delhi	49.87
33	Er Jayanta Jyoti Bora Setting up of rural appropriate technology demonstration centre at Arunachal Pradesh	GPP0344 Arunachal Pradesh State Council for Science and Technology	35.10
34	Dr Chandan Tamuly Empowerment of ST people of Arunachal Pradesh through income generation exploring under-utilized food item Tashe.	GPP0345 DST, Min of Science & Technology	30.63
35	Dr M J Bordoloi Bio-prospecting of some indigenous medicinal plants of NE region of India with special reference to Anti-inflammatory properties	GPP0346 DBT, Min of Science & Technology	25.63
36	Dr Mantu Bhuyan STINER-Common Facility Centre at CSIR-NEIST, Jorhat, Assam	GPP0347 Min of Development of NE Region (MDoNER)	4000.00
37	Dr Binoy Kr Saikia Development of hybrid battery power module with indigenously developed supercapacitor and Li-ion cell.	GPP0348 Ministry of Elecronics & Information Technology, New Delhi	247.70

38	Dr Dipanwita Banik Investigation of oleo chemicals of under-utilized wild nutmegs native to NE India and value addition thereof.	GPP0349 DBT, New Delhi, DBT, Min of Science & Technology	35.61
39	Dr Gakul Baishya Development of novel leads for anti-obesity from North East traditional system through chemistry biology interphase	GPP0350 DBT, New Delhi, DBT, Min of Science & Technology	41.16
40	Dr Ram Awatar Maurya Continuous Flow Photochemistry: Visible Light Induced C-H Fictionalisation and C-C/C-X Bond Formation to Access Valuable Heterocycles and Natural Products	GPP0351 SERB (DST), Min of Science & Technology	27.79
41	Dr Debasis Mohanty Active Geodynamics, Evolution, Structure and Deformation analysis of Indo-Burman Wedge	GPP0352 SERB (DST), Min of Science & Technology	13.40
42	Dr Sangeeta Sharma Estimation of Ground motion parameters and development of a new attenuation relation from the earthquakes originated in and around North East India	GPP0354 Min. of Earth Sciences New Delhi	37.57
43	Dr Mohan Lal Development of disease resistant superior variety of bhut Jolokia (Capsicum chinense Jacq.)through backcross breeding	GPP0355 G B Pant National Institute of Himalayan Environment and Sustainable Development	13.58
44	Dr Pallab Pahari Oxidative addition and electrophile driven cyclization approach towards azaspirocycles: synthesis and anticancer activity	GPP0356 SERB (DST), Min of Science & Technology	39.78
45	Dr Pravin G Ingole Development of nanoparticles incorporated thin film nanocomposite polymer membranes for effective mixture gas separation	GPP0357 (DST), Min of Science & Technology	30.14
46	Dr Ratul Saikia Molecular Investigation into the Lignocellulolytic System of a few Wild Silkmoth in North-East India	GPP0359 DBT, Min of Science & Technology	28.07
47	Dr Supriya Saha Designing Advanced Functional Materials for Better Performing Photovoltaic Devices Through In-Silico Study	GPP0360 DST, Min of Science & Technology	13.50

48	Dr Supriya Saha Advanced Hybrid Nanomaterials and their Photocatalytic Efficiency towards Solar Fuel Generation through CO2 Reduction:A Quantum Chemical exploration	GPP0361 DST, Min of Science & Technology	22.87
49	Dr Jyoti K. Doley Study on High Speed Formability of Welded Blanks of Aluminium Joined by Different Welding Methods	GPP0362 DST, Min of Science & Technology	52.59
50	Dr Jyoti K. Doley Design characterization and fabrication of a free flow water wheel with high efficiency for electricity generation in remote hilly area	GPP0363 DST, Min of Science & Technology	29.95
51	Dr Binoy K. Saikia A comprehensive Approach in Understanding in Acid Mine Drainage Problems of Makum Coalfield and its management	GPP0364 Min. of Earth Sciences New Delhi	45.64
52	Dr Mohan Lal Identification and Development of High Yielding Varieties of Kaempferia galanga: A High Value Endangered Medicinal Plant	GPP0365 National Medicinal Plants Board (NMPB), Ministry of AYUSH, New Delhi	33.93
53	Dr Rinku Baishya Design and evaluation of peptide assisted !"&,")-) "-)"'K, 2 '")'() potential alleviation of atherosclerosis	GPP0366 DST, Min of Science & Technology	17.38
54	Dr Sanjib Gogoi Enantioselective Synthesis of Spirocycles Using Metal-Catalyzed Oxidative C-H Activation Reactions	GPP0367 DST, Min of Science & Technology	34.74
55	Dr Santanu Baruah Effect of Change in Coulomb Stress Gutenberg-Richter law for the seismicity of North East India Region	GPP0368 DST, Min of Science & Technology	6.60
56	Dr Natarajan Velmurugan Nutritional enrichment of agricultural wastes with essential fatty acids producing Thraustochytrids as improved feed for aquaculture	GPP0369 DST, Min of Science & Technology	42.73
57	Dr Mohan Lal Extension and cultivation of aromatic and high value endangered medicinal plants through farmer participatory model for livelihood generation in Arunachal Pradesh	GPP0370 Govt of Arunachal Pradesh, Department of Horticulture, Itanagar	100.00

58	Dr Madhulekha Gogoi Design and development of lanthanide-MOF using2-D graphene like sheets as ligand for simultaneous photocatalysis and sensing application	GPP0371 DST, Min of Science & Technology	27.38
59	Dr Rajib Lochan Goswamee Pilot Scale Demonstration and Popularisation of Some Sustainable Technology for the Supply of Safe Water in Fluoride and Arsenic Affected Areas	GPP0372 DST, Min of Science & Technology	107.05
60	Dr G Narahari Sastry Polymers, their composites and polymeric membranes for sustainable development of Petroleum industries	GPP0373 Ministry of Chemicals and Fertilizers	499.00
61	Dr Chandan Tamuly Empowerment of Apatani tribe of Arunachal Pradesh through value addition of ethnic food items	GPP0374 DST, Min of Science & Technology	64.09
62	Dr Lakshi Saikia Assessment of air, water and soil quality in Baghjan oil blow out site and its vicinity, Tinsukia, Assam	GPP0375 Central Pollution Control Board (CPCB), New Delhi	81.40
63	Mr Dhanjit Das Design and development of 500 kg capacity solar-biomass hybrid distillation unit with the mobile type distillation vassal and its field demonstration for entrepreneurship development	GPP0376 DBT, Min of Science & Technology	74.74

PROJECTS COMPLETED (EXTERNALLY FUNDED)

Sl No.	P.I Name & Project Title	Project code with Funding Agency	Project Cost (in lakhs)
1	Dr J Leon Raj Design work for secant piling works at KSEBL, Munnar	CNP0472 Bumi-Zillion JV, 101 Sagar Tower, Disrict Centre, Janakpuri, New Delhi	5.19
2	Dr Manoj Kumar Phukan Geophysical Study at the Baghjan well Blowout Site	CNP0475 Oil India Ltd	89.24
3	Er Vaskar Rajkhowa Upgradation of Water Filtration Plant of CMER&TI Residential Campus, Cinnamara, Jorhat	CNP0476 Central Silk Board, Lahdoigarh Jorhat Assam	14.72
4	Dr Santanu Baruah Estimation of Site Specific Response Spectrum for the Proposed Road Connectivity between Gohpur (NH52) to Numaligarh (NH-37)	CNP0477 Louis Berger, Gurgaon, India	29.25
5	Mr Hemanta Shankar Dutta Nanoparticles Supported Self Assembled Conducting Polymer Monolayer based Platform for Rapid Detection of Monosodium Glutamate in Food Products	GPP0318 Biotech Consortium India Limited, New Delhi	54.40
6	Dr Pranjal Gogoi Development of Novel NIR Absorbing Sensitizers and their Nano-Conjugates for the Multimodal Cancer Imaging and Therapy	GPP0319 Biotech Consortium India Limited, New Delhi	61.08
7	Dr N Velmurugan Expanding endophytes of paris polyphylla as a model to study co-evolution relationships with emphasis on functional metabolites production	GPP0323 SERB (DST), Min of Science & Technology	43.79
8	Dr Manoj Kumar Phukan Seismic Microzonation of Greater Dimapur	GPP0326 Directorate of Geology & Mining, Govt. of Nagaland, Dimapur	19.50

9	Dr H B Singh Anthropogenic impacts and their management options in different ecosystems of the Indian Himalayan Region	GPP0327 G B Pant National Institute of Himalayan Environment and Sustainable Development	32.90
10	Dr Ashutosh Namdeo Catalytic and reaction engineerig studies on bio-oil upgradation	GPP0328 SERB (DST), Min of Science & Technology	40.35
11	Dr Anil Kumar Singh Delineating the regulation of multi drug resistant efflux pumps over expressed in clinical mycobacteria	GPP0329 SERB (DST), Min of Science & Technology	44.60
12	Dr Mantu Bhuyan STINER- Technology Facility Centre (STINER-TFC) at SASRD Nagaland University, Medziphema Campus, Medziphema, Nagaland	GPP0335 Min of Development of NE Region (MDoNER)	1000.00
13	Dr Jayaramudu Jarugala Development of low cost biodegradable plastics from Indian agricultural-food processing starch wastes for food packaging and other value added applications	GPP0337 SERB(DST), Min of Science & Technology)	26.00

TECHNOLOGIES RELEASED TO THE INDUSTRY

S.No	Know-How	Party
1	Improved Variety of Citronella (Jor Lab C-5)	M/s Rising Sun Enterprise, Hare krishna Vihar Extension, Behind Best Price, Bypass Nipaniya, Indore M/s Vigor Healthcare Services Private Limited Hyderabad, Ranga Reddy, Telangana
3	Improved Variety of Patchouli Jor Lab P-1	M/S Rising Sun Enterprise, Hare krishna Vihar Extension, Behind Best Price, Bypass Nipaniya, Indore

MoU AGREEMENTS SIGNED

S.No	Party	Purpose
1	Assam Downtown University, Guwahati Assam	Academic and Research Collaboration
2	Darrang College, Guwahati Assam	Academic and Research Collaboration
3	Numaligarh Refinery Ltd, Golaghat, Assam	Research Collaboration pertinent to microbial remediation, soil chemistry, hydrocarbons.
4	Rain Forest Research Institute, Jorhat Assam	Research Collaboration pertinent to R&D projects of common interest
5	M/s Bosing Banggo Farmers Producers Cooperative Society Ltd, Arunachal Pradesh	Research Collaboration pertinent to Aromatic, Medicinal, Floriculture and other important plants
6	M/s Indica Nutraceuticals LLP, New Delhi	Research Collaboration pertinent to Medicinal & Aromatic including Cannabis/Hemp
7	IIT, Guwahati	Academic and Research Collaboration
8	Pachhunga University, College, Mizoram	Academic and Research Collaboration
9	Manipur State medicinal Plant Board, Manipur	Research Collaboration in the areas such as food processing, agriculture, healthcare, drugs, water & Water resources, etc
10	Nagaland Science and Technology Council, Kohima (NASTEC), Nagaland	Research Collaboration
11	EMPOWER MSME Trust, Hyderabad	Research Collaboration
12	BCPL, Dibrugarh	Research Collaboration to create a common umbrella between petrochemicals industry and CSIR Organization
13	TUSTI, Guwahati	Research Collaboration
14	Central Pollution control Board, Govt of India	Research Collaboration for implementing the project titled "Assessment of Air, Water and soil quality in baghjan oil blowout site and its vicinity, Tinsukia, Assam
15	Central Pollution control Board, Govt of India	MoU (Integrity pact)
16	Department of chemicals and petrochemicals, Ministry of chemicals and fertilizers, Government of India	Research Collaboration for implementing the project titled "Polymers, their composites and polymeric membranes for sustainable development of petroleum industries"
17	Numaligarh Refinery Ltd, Golaghat, Assam	Research Collaboration for implementing the project titled "Removal of sour/stripped water, its value addition and recycling of water and allied activities"
18	Mushroom Development Foundation, Lamb Road, Ambari, Guwahati-781001, Assam	To promote cooperation in scientific research and dissemination of technologies related to health and nutrition at the same time creating livelihood and entreprenuearship opportunities
19	Indigenous Agricultural Farmers Producers Company, Dipsur, Guwahati, Assam	For the implementation of the "CSIR-Aroma Mission" in 100 hectares of land in the state of Assam.

CSIR-NEIST signed MoU with Assam Downtown University, Guwahati

Dr G Narahari Sastry, Director, CSIR-NEIST exchanging the signed MoU with members of Assam Downtown University, Guwahati on 16 June 2020 for academic and research collaboration.

CSIR-NEIST signed MoU with Numaligar Refinery Ltd, Assam

Dr G Narahari Sastry, Director, CSIR-NEIST exchanging the signed MoU with members of Numaligar Refinery Ltd, Golaghat on on 21 October 2020.

CSIR-NEIST signed MoU with Rain Forest Research Institute, Jorhat

Dr G Narahari Sastry, Director, CSIR-NEIST exchanging the signed MoU with RSC Jayaraj. Director at Rain Forest Research Institute, Jorhat on 26 October 2020.

CSIR-NEIST signed MoU with EMPOWER MSME Trust, Hyderabad

Dr G Narahari Sastry, Director, CSIR-NEIST exchanging the signed MoU with the members of EMPOWER MSME Trust on 17 December 2020 for research collaboration.

CSIR-NEIST signed MoU with Brahmaputra Cracker and Polymer Limited (BCPL), ibrugarh

Dr G Narahari Sastry, Director, CSIR-NEIST exchanging the signed MoU with Shri Reep Hazarika, Managing Director at Brahmaputra Cracker and Polymer Limited, Dibrugarh on 18 December 2020.

CSIR-NEIST signed MoU with TUSTI, Guwahati

Dr G Narahari Sastry, Director, CSIR-NEIST exchanging the signed MoU with members of TUSTI Guwahati on 22 December 2020 for research collaboration.

CSIR-NEIST signed MoU with Numaligar Refinery Ltd, Assam

Dr G Narahari Sastry, Director, CSIR-NEIST exchanging the signed MoU with members of Numaligar Refinery Ltd, Golaghat on 12 March 2021 for implementation of the project entitled "Removal of Phenol from Sour/stripped water, It's Value addition and Recycling of Water".

PATENTS

GRANTED IN FOREIGN COUNTRIES

1.	TITLE	A PROCESS FOR THE PREPARATION OF BLUE-FLUORESCENCE EMITTING CARBON DOTS (CDTS) FROM SUB-BITUMINOUS TERTIARY HIGH SULFUR INDIAN COALS
	PATENT NO	10655061
	INVENTORS	BINOY KUMAR SAIKIA, TONKESWAR DAS, SONALI ROY, BARDWI NARZARY, HARI PRASANNA DEKA BORUAH, MANOBJYOTI BORDOLOI, JIUMONI LAHKAR, DIPANKAR NEOG, DANABOYINA RAMAIAH
	DATE OF GRANT	19/ MAY/2020
2.	TITLE	A NOVEL PROCESS FOR EXTRACTION AND SEPARATION OF OXYRESVERATROL FROM ARTOCARPUS LAKOOCHA ROXB
	PATENT No	3204346
	INVENTORS	SWAPNALI HAZARIKA, DILIP KONWAR, HIROKJYOTI BORAH, SOMIRON BORTHAKUR, PRANAB BARKAKATI, MODON MOHAN BORA, RAM NATH DAS
	DATE OF GRANT	02/ SEP/2020
3.	TITLE	A NOVEL PROCESS FOR EXTRACTION AND SEPARATION OF OXYRESVERATROL FROM ARTOCARPUS LAKOOCHA ROXB
	PATENT No	3204346
	INVENTORS	SWAPNALI HAZARIKA, DILIP KONWAR, HIROKJYOTI BORAH, SOMIRON BORTHAKUR, PRANAB BARKAKATI, MODON MOHAN BORA, RAM NATH DAS
	DATE OF GRANT	02/ SEP/2020
4.	TITLE	A NOVEL PROCESS FOR EXTRACTION AND SEPARATION OF OXYRESVERATROL FROM ARTOCARPUS LAKOOCHA ROXB
	PATENT No3	204346
	INVENTORS	SWAPNALI HAZARIKA, DILIP KONWAR, HIROKJYOTI BORAH, SOMIRON BORTHAKUR, PRANAB BARKAKATI, MODON MOHAN BORA, RAM NATH DAS
	DATE OF GRANT	02/ SEP/2020

GRANTED INDIA

1.	TITLE	A PROCESS FOR THE PREPARATION OF BIO-BASED LUBRICANTS FROM CHEMOENZYMATICALLY SYNTHESIZED EPOXIDES OF VEGETABLE OIL
	PATENT No	344266
	INVENTORS	BORA ISHANJYOTI, LASKAR NARAYAN CHANDRA, DUTTA DIPANKA, BOHRA RAMESH CHAND, TAMULY RITURANI, GAUTAM ARVIND, BARUAH SHASHI DHAR
	DATE OF GRANT	17/AUG/2020

2.	TITLE	STEROID-CHITOSAN KETIMINE NANOPARTICLES FOR ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY
	PATENT No	349513
	INVENTORS	ARCHANA MONI DAS, ABDUL AZIZ ALI, PRITISH KUMAR CHOWDHURY, MANASH PROTIM HAZARIKA, ARCHANA YADAV, PURNAJYOTI DEKA BHUYAN
	DATE OF GRANT	19/ OCT/2020
3.	TITLE	A DEVICE FOR CASTING OF CELLULOSIC PULP MATERIAL IN HOLLOW CYLINDRICAL FORM
	PATENT No	352429
	INVENTORS	BORA JAYANTA JYOTI, KALITA DIPUL, GOSWAMI TRIDIP, KALITA SUBODH CHANDRA, SENGUPTA PINAKI, RAO PARUCHURI GANGADHAR
	DATE OF GRANT	27/NOV/2020
4.	TITLE	A NOVEL CLASS OF DIOSGENIN ACETATE-ISOXAZOLE, PROCESS FOR PREPARATION THEREOF AND THEIR ANTIFUNGAL ACTIVITY
	PATENT No	354346
	INVENTORS	ARCHANA MONI DAS, MANASH PROTIM HAZARIKA, PURNAJYOTI DEKA BHUYAN
	DATE OF GRANT	23/DEC/2020
5.	TITLE	A METHOD FOR THE PREPARATION OF SILICA MG-AL LDH CORE SHELL DERIVED MIXED METAL OXIDE NANO-SHEET BASED COMPOSITE CATALYST FOR DECOMPOSITION OF N2O IN SYNTHETIC AUTOMOBILE EXHAUST CONDITION
	PATENT No	359880
	INVENTORS	RAJIB LOCHAN GOSWAMEE, PINKY SAIKIA, ANGANA BORAH, NGUADI BLAISE ALLOU
	DATE OF GRANT	01/ MAR/2021
6.	TITLE	A PROCESS FOR THE SYNTHESIS OF MEMBRANE USEFUL FOR CARBON DIOXIDE SEPARATION
	PATENT No361456	
	INVENTORS	SWAPNALI HAZARIKA, PANCHALI BHARALI, HIROK JYOTI BORAH, INDUMONI DAS, SOMIRON BORTHAKUR, MODON MOHAN BORA, DILIP KONWAR
	DATE OF GRANT	16/MAR/2021

FILLED IN FOREIGN COUNTRIES

1.	TITLEF	ABRICATION OF BLUE-FLUORESCENT AND NON-TOXIC NANODIAMONDS (NDS) FRO ATMOSPHERIC\PARTICULATE MATTERS
	APPLICATION NO	17/204467
	INVENTORS	BINOY K SAIKIA, NAZRUL ISLAM, TONKESWAR DAS, JATIN KALITA
	FILLING DATE	17/Mar/2021

FILLED IN INDIA

1.	TITLE	A NOVEL TRANSITION METAL BASED HETEROGENEOUS CATALYST FOR THE PRODUCTION OF PLASTICIZER DIOCTYLTEREPHTHALATE (DOPT)FROM WASTE BOTTLE MADE OF POLYTHYLENE TEREPHTHALATE (PET)
	APPLICATION No	202011035841
	INVENTORS	GAURAV RASTOGI, UPENDRA NATH GUPTA, PALLAB PAHARI, MANOBJYOTI BORDOLOI, JAYARAMUDU JARUGALA
	FILLING DATE	20/AUG/2020
2.	TITLE	A PROCESS FOR PRODUCTION OF ACTIVATED CARBON FROM SUBBITUMINOUS TERTIARY HIGH SULFUR INDIAN COALS BY ULTRASONIC-ASSISTED CHEMICAL ACTIVATION
	APPLICATION No	202011046539
	INVENTORS	BINOY KUMAR SAIKIA, TONKESWAR DAS, PRASENJIT SAIKIA, DIPANKAR NEOG, MOUSUMI BORA, SANTHI MARIA BENOY
	FILLING DATE (PROVISIONAL)	23/OCT/2020
3.	TITLE	FABRICATION OF BLUE-FLUORESCENT AND NON-TOXIC NANODIAMONDS (NDS) FROM ATMOSPHERIC PARTICULATE MATTERS
	APPLICATION No	202011051976
	INVENTORS	BINOY K SAIKIA, NAZRUL ISLAM, TONKESWAR DAS, JATIN KALITA
	FILLING DATE	27/NOV/2020
4.	TITLE	THE SYNTHESIS AND APPLICATION OF 2, 6 - DIIODO-AZA-BODIPY-BIOTIN CONJUGATES DPR2A AND DPR2B AS THERANOSTIC AGENTS
	APPLICATION No	202111015510
	INVENTORS	PRANJAL GOGOI, DANABOYINA RAMAIAH, SHIVAKUMARI ASHA NAIR, JOSHY JOSEPH, DHIRAJ DUTTA, RAJSHREE NAIR
	FILLING DATE	31/MAR/2021

PAPERS PUBLISHED

National And International

1. Radio Waveguide–Double Ratchet Rotors Work in Unison on a Surface to Convert Heat into Power by Anup Singhania, Indrani Ghosh, Pathik Sahoo, Daisuke Fujita, Subrata Ghosh, Anirban Bandyopadhyay, Nano Letters, 20(9), P 6891–6898 (12.279)
2. IndiGenomes: a comprehensive resource of genetic variants from over 1000 Indian genomes by Chiranjita Goswami, Biraj Jyoti Borah, Manash Jyoti Kalita, Himadri Saikia, Kohei Tada, Shingo Tanaka, Pankaj Bharali, Journal Of Colloid And Interface Science, P 446-456 (7.489)
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10. Cyclodextrine-Gluteraldehyde cross-linked nanofiltration membrane for recovery of resveratrol from plant extract by Hirak J Borah, Monti Gogoi, Diganta B Das, Swapnali Hazarika, Journal of environmental chemical engineering (5.909)
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13. Oxidative dehydrogenation of propane on the oxygen adsorbed edges of boron nitride nanoribbons by Biplab Rajbanshi, Supriya Saha, Charles Fricke, Salai Cheettu Ammala, Andreas Heyden, Catalysis Science & Technology, P 5181–5195 (5.726)
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15. Utilization of renewable and sustainable basic heterogeneous catalyst from Heteropanax fragrans (Kesseru) for effective synthesis of biodiesel from Jatropha curcas oil et al. by Sanjay Basumatary, Biswajit Nath, Bipul Das, Fuel, 286(1), P 119357(5.578).
16. A brief review on supercapacitor energy storage devices and utilization of natural carbon resources as their electrode materials, Binoy K Saikia, Santhi Maria Benoy, Mousumi Bora, Joyshi Tamuly, Mayank Pandey, Dhurbajyoti Bhattacharya, Fuel, P 118796 (5.128)
17. Atmospheric particulate matter and potentially hazardous compounds around residential/road side soil in an urban area by Nazrul Islam, Binoy K. Saikia, Chemosphere, P 127453 (5.108)
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19. Indane-Fused Spiropentadiene Chromanones: A Pd-Catalyzed Spiroannulation Followed by Cyclization via C-H Activation Strategy, Abhilash Sharma, Hemanta Hazarika, Manashi Sarmah, Babulal Das, Pranjal Gogoi, Journal of Organic Chemistry, P 11382–11395 (4.745)
20. CoS_2 Nanoparticles Supported on rGO, g-C_3N_4, BCN, MoS_2, and WS2 Two-Dimensional Nanosheets with Excellent Electrocatalytic Performance for Overall Water Splitting: Electrochemical Studies and DFT Calculations by Priyakshree Borthakur, Purna K.Boruah, Das Manash R., Mohamed M. Ibrahim, Tariq Altalhi, Hamdy S.El-Sheshtawy, Sabine Szunerits, Rabah Boukherroub, Mohammed A Amin, ACS Applied Energy Materials, P 1269-1285 (4.473)
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22. Biocompatible functionalized AuPd bimetallic nanoparticles decorated on reduced graphene oxide sheets for photothermal therapy of targeted cancer cells by Punamshree Das, Sushma V. Mudigunda, Gitashree Darabdhara, Purna K. Boruah, Sachin Ghar, Aravind K. Rengan, Manash R. Das, Journal of Photochemistry and Photobiology, B: Biology, P 112028 (4.383)
23. O Quinone Methides and o Quinone Sulfides via Arynes: Synthesis of Ortho-Disubstituted Arenes and Heterocycles by Abhilash Sharma, Hemanta Hazarika, Pranjal Gogoi, Journal of Organic Chemistry, P 1-13 (4.335)
24. Ultrasonic-assisted chemical synthesis of activated carbon from low-quality subbituminous coal and its preliminary evaluation towards supercapacitor applications by Mousumi Bora, Santhi Maria Benoy, Joyshil Tamuly, Binoy K.Saikia, Journal of Environmental Chemical Engineering, 9(1), P 104986 (4.3)

25. Fluorescent graphitic carbon nitride and graphene oxide quantum dots as efficient nanozymes: Colorimetric detection of fluoride ion in water by graphitic carbon nitride quantum dots by Mamta Devi, Punamshree Das, Purna K.Boruah, Manash J.Deka, Rituparna Duarah, Abinash Gogoi, Dipankar Neog, Hemant S. Dutta, Manash R. Das, Journal of Environmental Chemical Engineering, P 104803 (4.3)
26. A new perspective of functionalized MWCNT incorporated thin film nanocomposite hollow fiber membranes for the separation of various gases by Ook Choia, Sachin Karkibc, Radheshyam R. Paward, Swapnali Hazarika, Pravin G.Ingole, Journal Of Environmental Chemical Engineering (4.3)
27. Facile synthesis of CuS nanoparticles on two-dimensional nanosheets as efficient artificial nanozyme for detection of Ibuprofen in water by Priyakshree Borthakur, Purna K.Boruah, Manash R. Das, Journal Of Environmental Chemical Engineering (4.3)
28. Oxidative chemical beneficiation of low-quality coals under low-energy ultrasonic and microwave irradiation: An environmental-friendly approach by Monikankana Saikia, Tonkeswar Das, James C. Hower, Luis F. O.Silva, Xing Fan, Binoy K. Saikia, Journal of Environmental Chemical Engineering (4.3)
29. Hydrodistillation based multifaceted value addition to Kaempferia galanga L. leaves, an agricultural residue by Bhaskar Protim Mahanta, Neelav Sarma, Phirose Kemprai, Twahira Begum, Lakshi Saikia, Mohan Lal, Saikat Haldar, Industrial Crops and Products, P 112642 (4.244)
30. Symbiotic Associations: Key Factors That Determine Physiology and Lipid Accumulation in Oleaginous Microorganisms by Deepi Deka, Shashanka Sonowal, Channakeshavaiah Chikkaputtaiah, Natarajan Velmurugan, Frontiers in Microbiology (4.236)
31. Blue-emitting fluorescent carbon quantum dots from waste biomass sources and their application in fluoride ion detection in water by Anusuya Boruah, Monikankana Saikia, Tonkeswar Das, Rajib Lochan Goswamee, Binoy K.Saikia, Journal of Photochemistry and Photobiology, B: Biology, P 111940, (4.067)
32. DNA barcodes for delineating Clerodendrum species of North East India by Barbi Gogoi, S. B Wann, S. P Saikia, Scientific Reports, 10(1), P-13490 (4.011)
33. Molecular Verification of the UK National Collection of Cultivated Liriope and Ophiopogon Plants. by Eva Masiero, Dipanwita Banik, Jon Abson, Paul Greene, Adrian Slater, Tiziana Sgamma, Plants (Basel), (3.935)
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Conference paper

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PERSONNEL

Dr G N Sastry
Director, CSIR-NEIST

Scientists

S.No.	Name	Designation
1	Dr Saurabh Barua	Chief Scientist
2	Dr R L Goswamee	Senior Principal Scientist
3	Er J J Bora	Senior Principal Scientist
4	Dr S B Wann	Senior Principal Scientist
5	Dr H B Singh	Senior Principal Scientist
6	Dr Ratul Saikia	Senior Principal Scientist
7	Dr Sanjay Deori	Senior Principal Scientist
8	Dr Rituraj Konwar	Principal Scientist
9	Dr S P Saikia	Principal Scientist
10	Dr (Mrs) Swapnali Hazarika	Principal Scientist
11	Er Dipankar Neog	Principal Scientist
12	Dr Montu Bhuyan	Principal Scientist
13	Dr Chandan Tamuly	Principal Scientist
14	Dr Archana Moni Das	Principal Scientist
15	Dr Jayaramudu Jarugala	Principal Scientist
16	Dr Dipul Kalita	Principal Scientist
17	Dr Jatin Kalita	Principal Scientist
18	Er Tapas Das	Principal Scientist
19	Er Dipak Basumatary	Principal Scientist
20	Dr Prosenjit Manna	Principal Scientist
21	Dr Ravindra Kumar Rawal	Principal Scientist
22	Mr Khirod Buragohain	Senior Scientist
23	Dr Manash Ranjan Das	Senior Scientist
24	Dr Lakshi Saikia	Senior Scientist
25	Ms I Ilika Zhimo	Senior Scientist
26	Dr Sanjib Gogoi	Senior Scientist
27	Dr Prakash Jyoti Saikia	Senior Scientist
28	Dr Channakeshavaiah Chikkaputtaiah	Senior Scientist
29	Dr Subrata Ghosh	Senior Scientist
30	Dr Binoy Kumar Saikia	Senior Scientist
31	Dr Gakul Baishya	Senior Scientist
32	Dr Pranjal Gogoi	Senior Scientist
33	Dr Jiban Jyoti Mahanta	Senior Scientist
34	Dr Manoj Kumar Phukan	Senior Scientist
35	Dr (Mrs) Kalyani Medhi	Senior Scientist
36	Dr (Mrs) Dipanwita Banik	Senior Scientist
37	Mr Rajib Deka	Senior Scientist

38	Mr Debabrata Das	Senior Scientist
39	Mr Partha Paul	Senior Scientist
40	Dr Pallab Pahari	Senior Scientist
41	Dr Himangsu Kousik Bora	Senior Scientist
42	Dr Prasenjit Saikia	Senior Scientist
43	Dr (Mrs) Sangeeta Sharma	Senior Scientist
44	Dr Anil Kumar Singh	Senior Scientist
45	Dr Mohan Lal	Senior Scientist
46	Dr Bipul Das	Senior Scientist
47	Dr Santanu Baruah	Senior Scientist
48	Dr Bijit Kumar Chowdhury	Senior Scientist
49	Dr Upendra Nath Gupta	Scientist
50	Dr Ram Awatar Maurya	Scientist
51	Dr P Yuvraj	Scientist
52	Dr Natarajan Velmurugan	Scientist
53	Dr Ashutosh Namdeo	Scientist
54	Dr Ajit Singh	Scientist
55	Dr Biswajit Saha	Scientist
56	Er Dhanjit Das	Scientist
57	Mr Partha Majumder	Scientist
58	Dr Arup Roy	Scientist
59	Er Ravi Kumar Lingam	Scientist
60	Dr J Leon Raj	Scientist
61	Dr Hemant Shankar Dutta	Scientist
62	Dr Debasis Mohanty	Scientist
63	Dr Rinku Baishya	Scientist
64	Dr Pravin Ganeshrao Ingole	Scientist
65	Dr Supriya Saha	Scientist
66	Dr Jyoti Kumar Doley	Scientist
67	Dr Saikat Haldar	Scientist
68	Mr Jitendra Singh Verma	Scientist
69	Dr Selvaraman Nagamani	Scientist
70	Dr Tridip Phukan	Scientist
71	Dr Chinmoy Rajkonwar	Scientist
72	Dr Pankaj Bharali	Scientist
73	Dr Hridoy Jyoti Mahanta	Scientist
74	Dr Biswajit Gogoi	Scientist
75	Dr Romi Wahengbam	Scientist
76	Dr Sachin Rameshrao Geed	Scientist
77	Dr Ashutosh Thakur	Scientist
78	Dr Jayashree Chiring Phukan	Scientist
79	Dr Sandeep Kumar Dey	Scientist
80	Dr Atul Ashok More	Scientist

Technical Group III

S.No.	Name	Designation
1	Dr T Bora	Principal Technical Officer
2	Dr Budhen Chandra Baruah	Principal Technical Officer
3	Shri Vaskar Rajkhowa	Senior Technical Officer
4	Ms Purnajyoti Deka Bhuyan	Senior Technical Officer
5	Dr (Ms) Kalpataru Dutta Mudoi	Senior Technical Officer
6	Ms Archana Yadav	Senior Technical Officer
7	Shri Pradip Dutta	Senior Technical Officer
8	Shri Makhan Borah	Senior Technical Officer
9	Ms Jonali Saikia	Senior Technical Officer
10	Shri Manoj Kumar Das	Senior Technical Officer
11	Shri Madhurjya Saikia	Senior Technical Officer
12	Ms Jyoti Lakshmi Hati Boruah	Senior Technical Officer
13	Dr Antara Sharma	Senior Technical Officer
14	Shri Sanjay Kumar Chanda	Senior Technical Officer
15	Ms Palakshi Bordoloi	Technical Officer
16	Dr Dipanka Dutta	Technical Officer
17	Shri Himangsu Lekhak	Technical Officer
18	Shri Rajib Das	Technical Officer
19	Shri Tobiul Hussain Ahmed	Technical Officer
20	Ms N Aben Devi	Technical Officer
21	Shri Nibir Pran Bora	Technical Officer
22	Ms Ankana Phukan	Technical Officer
23	Shri Ashok Kalita	Technical Officer
24	Shri Somananda Thokchom	Technical Officer
25	Shri Amar Jyoti Gogoi	Technical Officer
26	Dr Tonkeswar Das	Technical Officer
27	Ms Moushimi Hazarika	Technical Officer
28	Shri Dhiman Bhattacharyya	Technical Officer
29	Shri Sausthov Maunash Bhattacharyya	Technical Officer
30	Shri Ramesh Chand Bohra	Technical Officer
31	Shri Mukesh Agarwal	Technical Assistant
32	Ms Anamika Bora	Technical Assistant
33	Shri Rishi Raj Phukan	Technical Assistant
34	Ms Kongkana Gogoi	Technical Assistant
35	Shri Gaurav Kumar Rastogi	Technical Assistant
36	Ms Dipa Rajbongshi	Technical Assistant
37	Shri Jugal Bori	Technical Assistant
38	Dr Jiumoni Lahkar	Technical Assistant

Technical Group II

S.No.	Name	Designation
1	Ms Minu Prova Pegu	Senior Technician
2	Shri Prodip Hazarika	Senior Technician
3	Shri Prasad Hazarika	Senior Technician
4	Shri Sondhar Neog	Senior Technician
5	Shri Dhaneswar Bora	Senior Technician
6	Shri Suchen Das	Senior Technician
7	Shri H C Dutta	Senior Technician
8	Shri Chiranjeet Bora	Senior Technician
9	Ms Rinki Kalwar	Technician
10	Shri Madhab Ch Borah	Technician
11	Shri Lalit Chutia	Technician
12	Shri Jogot Bora	Technician
13	Shri Dibyajyoti Ozah	Technician
14	Shri Jintu Bora	Technician
15	Shri Manash Jyoti Bora	Technician
16	Shri Alok Bora	Technician
17	Shri Pranjal Handique	Technician
18	Shri Poran Jyoti Kalita	Technician
19	Shri Priyam Jyoti Bora	Technician
20	Shri Manash Hazarika	Technician
21	Shri Lachit Phukan	Technician
22	Ms Puspa Kumari Das	Technician
23	Shri Chandan Boruah	Technician
24	Ms Rumi Borah	Technician
25	Shri Jaganath Saikia	Technician
26	Ms Archana Changmai	Technician
27	Shri Jayanta Madhab Boruah	Technician
28	Ms Cingsianniang Buasing	Technician
29	Shri Pobon Chandra Saikia	Technician
30	Shri Chandan Saikia	Technician

Technical Group I

S.No.	Name	Designation
1	Shri Bipul Saikia	Lab Assistant
2	Shri Pabon Kr Bora	Lab Assistant
3	Shri Mathura Saud	Lab Assistant
4	Shri Robin Baruah	Lab Assistant
5	Shri Debojit Sarmah	Lab Attendent

6	Shri Boloram Gayab	Lab Attendent
7	Shri Atul Borah	Lab Attendent
8	Shri Ananta Kumar Borua	Lab Attendent
9	Shri Prodip Hazarika	Lab Attendent
10	Shri Rameswar Das	Lab Attendent
11	Shri Ranjan Borah	Lab Attendent
12	Shri Ananda Saikia	Lab Attendent
13	Shri Arup Kr Neog	Lab Attendent
14	Shri Dimbeswar Dutta	Lab Attendent
15	Shri Rajen Ch Dutta	Lab Attendent
16	Shri Rohit Ch Borah	Lab Attendent
17	Shri Arun Ch Bora	Lab Attendent
18	Shri Mantu Sharma	Lab Attendent
19	Shri Bipin Ch Dutta	Lab Attendent
20	Shri Loknath Boruah	Lab Attendent
21	Shri Laba Bora	Lab Attendent
22	Shri Atul Gayan	Lab Attendent
23	Shri Ram Bahadur Thapa	Lab Attendent
24	Shri Prasanta Nath	Lab Attendent
25	Ms Raju Gogoi	Lab Attendent
26	Shri Rajit Gogoi	Lab Attendent

Administration Staff

S.No.	Name	Designation
1	Shri J L Khongsai	Administrative Officer
2	Shri Jyotimoy Bhuyan	Administrative Officer
3	Shri Rama Shankar Sharma	CoFA
4	Shri Neelambuj Shanker Prasad	Store & Purchase Officer
5	Shri B Mahrili Osanah	Section Officer (F&A)
6	Ms Rita Devi Patgiri	Assistant Section Officer (G)
7	Shri Rahul Saikia	Assistant Section Officer (G)
8	Shri K B Rabha	Assistant Section Officer (G)
9	Shri Ajit Ch Chutia	Assistant Section Officer (S&P)
10	Shri Probin Kr Phukan	Assistant Section Officer (F&A)
11	Shri Ajay Kumar	Hindi Officer
12	Ms Radhika Chetry	Receptionist
13	Shri Raju Kumar	Junior Stenographer
14	Shri Hiren Brahma	Junior Stenographer
15	Shri Ratul Saikia	Senior Secretariat Assistant (G)
16	Shri Debojit Kr Sarmah	Senior Secretariat Assistant (G)
17	Shri Bijoy Sharma	Senior Secretariat Assistant (G)
18	Ms Minakhi Das	Senior Secretariat Assistant (G)

19	Shri Pritom Bordoloi	Senior Secretariat Assistant (G)
20	Ms Rinku Bora	Senior Secretariat Assistant (F&A)
21	Shri Pranjal Sharma	Senior Secretariat Assistant (F&A)
22	Shri Uday Kant Trivedi	Senior Secretariat Assistant (F&A)
23	Shri Pranjal Pratim Gogoi	Senior Secretariat Assistant (S&P)
24	Shri Hemant Sonowal	Staff Car Driver
25	Shri Rupeswar Chetia	Staff Car Driver
26	Shri Poresh Borah	Staff Car Driver
27	Shri S B Singh	Staff Car Driver
28	Shri Prodip Bordoloi	Staff Car Driver
29	Shri Bipul Saikia	Canteen Saikia
30	Shri Rajen Borchetia	Group C (MTS)
31	Shri Naba Kr Dutta	Group C (MTS)
32	Shri Dilip Saikia	Group C (MTS)
33	Shri Krishna Prasad Sharma	Group C (MTS)
34	Ms Anjali Hatiboruah	Group C (MTS)
35	Shri Tame Rajan	Group C (MTS)
36	Shri Krishna Kanta Bora	Group C (MTS)
37	Shri Prodip Ch Saikia	Group C (MTS)
38	Shri Prodip Kr Das	Group C (MTS)
39	Shri Lila Gondhia	Group C (MTS)
40	Shri Bipul Ch Boruah	Group C (MTS)
41	Shri Rajat Saikia	Group C (MTS)
42	Shri Lenti Ao	Group C (MTS)
44	Shri Kh. Ibochou Singh	Group C (MTS)
45	Shri Suresh Rana	Group C (MTS)
46	Ms Kobita Saikia	Group C (MTS)
47	Shri Kamal Bahadur Pun	Group C (MTS)
48	Smt M Anamika Chanu	Group C (MTS)
49	Shri Goutom Koch	Group C (MTS)

RETIRED STAFF

Sl.No.	Name	Designation	Date of Retirement
1.	Shri Horendra Prasad Rai	Lab. Assistant-2	30.04.2020
2.	Shri Nogen Chandra Bora	Lab. Assistant-2	30.04.2020
3.	Shri Bipul Neog	Group-C(MTS)	30.06.2020
4.	Dr. Manob Jyoti Bordoloi	Chief Scientist	31.07.2020
5.	Dr H P Deka Baruah	Sr Principal Scientist	31.08.2020
6.	Shri Puneswar Kalita	Lab Attendant-2	31.08.2020
7.	Shri Kushal Chandra Lekhok	PTO	31.08.2020
8.	Shri Khirud Phukan	ASO	31.08.2020
9.	Dr. Modon Mohan Bora	PTO	30.09.2020
10.	(Late) Shri Chandra Borah	Lab Attendant-2	11.10.2020
11.	(Late) Shri Giridhari Balmiki	Group-C (MTS)	11.11.2020
12.	Shri Lakheswar Das	P.S	30.11.2020
13.	Shri Poresh Kalita	STO-1	31.12.2020
14	Shri Dilip Dutta	Lab Attendant-2	31.12.2020
15.	Shri Rakhal Nayak (VR)	Lab Attendant-2	31.12.2020
16.	Shri Jayanta Bora	STO-3	31.01.2021
17.	Shri Sushil Gayan	Group-C (MTS)	28.02.2021
18.	Shri Biren Borthakur (VR)	Lab. Attendant-2	01.02.2021
19.	Shri Ranjit Kumar Baruah	Lab Assistant	28.02.2021
20.	Shri Purna Kanta Hazarika	Lab. Attendant-2	28.02.2021
21.	Shri Punyo Yaro	Group-C (MTS)	31.03.2021
22.	(Late) Shri Romen Ch Saikia	Group-C (MTS)	31.03.2021