Annual Report 2018-19

Institute of Advanced Study in Science and Technology (IASST)

An Autonomous Institute under Department of Science and Technology Govt. of India

"Ask the right questions, and nature will open the doors to her secrets."

C. V. Raman

"When learning is purposeful, creativity blossoms. When creativity blossoms, thinking emanates. When thinking emanates, knowledge is fully lit. When knowledge is lit, economy flourishes."

APJ Abdul Kalam

ANNUAL REPORT

2018-19

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Foreword

Greetings from the Institute of Advanced Study in Science and Technology (IASST), Guwahati! The year 2018-19 was very significant as it marked the completion of the first decade on 9th March 2019 as a national autonomous R&D institute under DST, Ministry of Science and Technology, Govt. of India. The 9th March was celebrated as the "Open Day", where achievements of the institute were exhibited and more than 3000 visitors including those from institute's neighborhood were hosted. Laboratory and other infrastructures including sophisticated equipment of IASST were opened to visitors and interaction between scientific fraternity and visitors was very satisfying.

There were four major objectives of IASST set in the beginning: 1. Building a centre of excellence in R&D with state-of-the-art equipment and infrastructure facilities, 2. Supplementation of core budget for research by generating fund through extramural grants, 3. Development of human resources to cater to need of scientific manpower of NE region and the country, and 4. Societal intervention of science and technology. We feel that the growth trajectory of the first decade with these objectives was reflective of the strides in right direction. The infrastructure of the institute expanded substantially. Within its 20-acre area campus, the building and road network rose to 150444 and 64560 m^2 in 2018-19 from 60966 and 19368 m^2, respectively in 2009-10. Sophisticated equipment acquired over the years have been prepared to shift to the vibration-free central instrumentation facility building (CIFB), which is getting completed soon. Other major facilities such as "Incubation Centre" and "Quality Control and Quality Assurance (QCQA) Laboratory under Phytochemical Mission" for NE India will also be located in CIFB. Across CIFB, a GLP complaint Animal House Facility (AHF) was nearing completion. This is the first GLP- complaint AHF in NE India and will cater to the need of the researchers of the region. All laboratories of Academic and Administration Building (AAB) were made modular over the years and the administrative block and the knowledge resource centre inside AAB had been face lifted and now wear modern look. Construction of an academic staff apartment complex was taken up during the year and 19 scientists will move in the next year. Through fast pace of earth filling, road making, plantation and water body creation inside, the Bioresource Conservation Hub (BCH) received the final touch to open for visitors. The BCH in its 7 acre area houses valuable wood tree species, health beneficial indigenous minor fruit plant species, host plant species of silkworm, medicinal herbs, a fragrant flower avenue for walk, indigenous fishes in aquatic bodies, a small tea plantation and a collection of unique plant species. A transmission electron microscope was installed in the ground floor of CIFB during the year and a Zebra fish facility was also created for using zebra fish as a model system for research on probiotics potentially beneficial for human health. That IASST is emerging as a centre of excellence in R & D is evident from these developments of the first decade.

The R&D activity portion of this AR 2018-19 provides details of basic research achievements, publications and patents during the year. The impact factor of publication per paper per scientist during the year was 2.2 and at per with those of last few years. A number of research presentations of IASST research scholars were awarded in best oral/poster category in different national conferences. The year 2018-2019 also saw a significant activity in translational aspect of research steered mainly by the IASST's Social Venture and Entrepreneurship Consortia (ISVEC). ISVEC brought out two issues of Newsletter, organized workshops/seminars to sensitize the scientists/ research scholars and help them extract product/process aspects of their research findings with potential for incubation and business. Initial years' efforts of ISVEC has resulted in a grant of Rs. 300 lakhs from

M/S BIRAC, New Delhi under "BIONEST" scheme. Incubation facility of "BIONEST" will be extended to prospective start-ups both in-house scientists/research scholars and those from outside. The institute also received a grant of ~Rs. 2.0 crores to set up a QCQA under phytopharmaceutical mission for NE India. Another grant from the DST during the year enabled techno-commercial feasibility study for coating on copper alloys using the patented "plasma technology" of IASST. It is expected that these facilities will facilitate business on biotechnology and herbal plant products in NE India and also serve as a means of revenue generation for the institute. Towards the fulfillment of the 2nd objective, the faculty of the institute put efforts consistently. During the first 10 years, institute generated 30.0 crores extramural grant (EMG) (16.3%) against core grant of Rs. 185 crores and last 3 years the extramural grant share was 24.4 % of total budget (core grant + EMG) from different funding agencies including DBT, DST, DAE and CSIR. During the year, the institute has also received two contracts for consultancy service, one from ONGC and the other from World Bank project on sericulture. With the initiative of translational research, technology incubation and consultancy services, the accreditation of quality standards has been a necessity. All preparations for the audit requirement in connection with ISO certification have been completed during the year for award of the ISO certificate to IASST. Standard Operating Procedures (SOP) for institute's ethics committee, internet access policy, AADHAAR enabled Biometric Attendance System AEBAS), software based equipment management portal and server infrastructure upgradation using virtualization have been accomplished during the year.

Capacity building for science education in terms of attracting more students towards science pursuit and generating scientific manpower for present and future need has been a major objective of IASST. Hundreds of school students have been given exposure to IASST laboratory infrastructure under regular students visit programme round the year and also during National Science Day or Open Day events organized inside the campus. IASST also initiated a laboratory experience-based science education programme during 2018-19 for ST community students from schools of Bodoland Territorial Council area. Ten research scholars received Ph.D. and seven of them acquired postdoctoral positions in India and abroad. Altogether, 110 research scholars, 18 PDFs and 5 national programme fellows were on roll during the year. A major achievement of the year was recruitment in the vacant positions, which took several rounds of advertisements and interactions over last 2/3 years. We could not ascertain whether the reason of poor response to our initial advertisement was dearth of candidates for specific subject domain positions or low visibility of this relatively new institute to attract brilliant candidates. We are now tempted to connect the large response to our recent advertisement during 2018-19 to ~4 lakhs visitors to IASST website during the last 2/3 years. Scientists/ PDFs who were serving in reputed institute of India and abroad have been recruited during the year.

Intervention of science and technology for societal development is another mandate of IASST under which two ST community villages have been adopted in Rani Development Block, Assam and the number of the beneficiaries increased to 146 compared to the previous years 105 and an improvement in their livelihood have been visible. The institute also celebrated the national events such as Independence Day, *Hindi Pakhwada*, *Rastriya Ekta Diwas*, Vigilance Week, National Entrepreneurship Day, International Yoga Day, Republic Day and Institute events such as Foundation Day, *Diwali*, Open Day and Teachers' Day. The institute staff also took part in the Village Day on 26th December, 2018 organized by its adopted village in Rani Development Block. These celebrations have been refreshing breaks for the faculty, students and other staff amidst their hectic lab and office activities. We have presented these activities and achievements to the esteemed readers as indicators of how the institute is moving forward in its academic, research, technology and outreach pursuit and the quality standards are being worked on. Whatever the institute has achieved during its first decade under DST and also the financial year 2018-19, have been possible due to the dedicated and hard work of each and every one of IASST family as a team, the guidance and mentorship of members of GC and SAC, physical infrastructure supporting expert team and also suggestion, advice and criticisms of many. I put on record our deep sense of appreciation and heartfelt gratitude to each one of them. Last but not the least, it needs a special mention that the members of faculty, administration and finance sent their portions of annual report in very organized manner for which it was possible to complete the annual report of this year in a record short time. I place with pleasure to the readers the details of different activities in IASST during 2018-19.

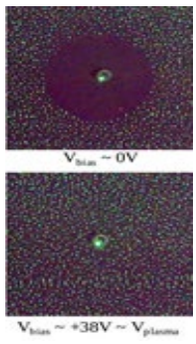
Jai Hind

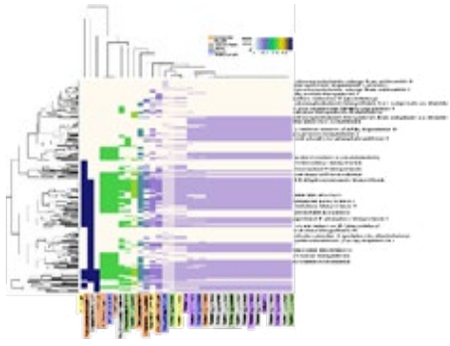
N. C. Talukdar

HIGHLIGHTS: 2018-19

Basic Research

An alternative method for plasma potential measurement in a dusty plasma has been proposed. The diameter of a dust void created around a small cylindrical/spherical metal object is reduced to zero when an external bias voltage equivalent to the plasma potential is applied to the object. [Phys. Plasmas, 25 (2018) 053705] (More details on page no. 20)

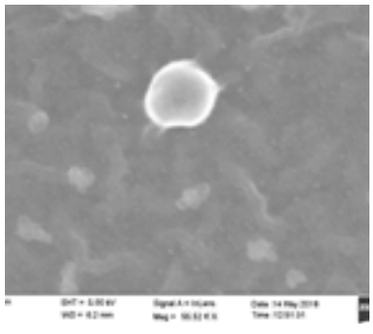


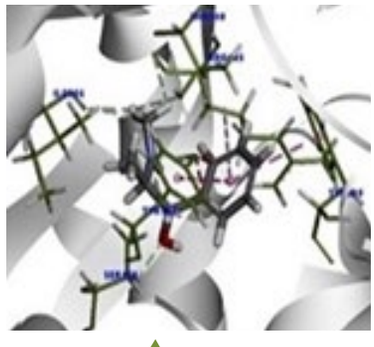


On alignment of 16S RNA gene sequence of 40 bacterial isolate obtained from seed interior of 7 genotypes in PAPRICA, interesting link observed between the bacterial metabolic pathways and the agroecosystem where the rice genotypes cultivated. [BMC Genomics: under revision] (More details on page no. 61)

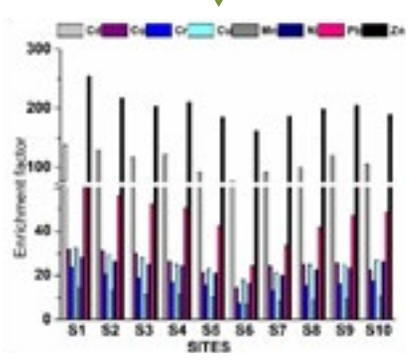
A new fluorescent conjugate of cholesterol and amino acid is synthesized and used as a tag molecule to prepare fluorescent filter paper strips for the efficient detection of Picric acid (PA) and dinitrosalicylic acid in vapor phase. [Mat. Res. Bull., 115 (2019) 211] (More details on page no. 32)

Bio-mimicking hybrid vesicles systems are ideal candidates for drug/gene delivery and nano-reactor applications. Here, we report the fabrication of hybrid oleic acid-graphene quantum dot vesicles that were successfully used as an efficient drug delivery system (DDS). The hybrid vesicles systems show efficient drug loading and higher release. (More details on page no. 36)

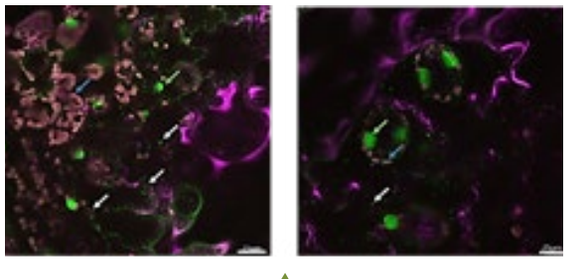




Deepor Beel, a Ramsar declared tropical freshwater wetland of the Northeastern region of India, which is close to Guwahati municipal garbage dumping site has higher contamination of heavy metals. Pollution indices confirmed heavy metal enrichment by anthropogenic inputs. [Env. Pollution, 250 (2019) 969]. (More details on page no. 72)



Wild type and mutated human gluconeogenic enzyme, Phosphoenolpyruvate carboxykinase (PEPCK) was cloned and expressed in pET28a plasmid. Among 500 medicinal plant origin compounds screened by in-sillico studies, 4 compounds were found to be competitive inhibitors for the GTP (nucleotide) binding site of PEPCK. (More details on page no. 102)



Endophytic bacteria are integral component of tobacco plant and were not eliminated completely by treatment of its root suspension culture (RSC) and RSC regenarated roots and shoots with antibiotics. (More details on page no. 63)

Translational research

- **Environment** friendly plasma based technology in collaboration with BARC, Mumbai for protective coating on copper alloys. (Page no.157)
- **Technique** to produce antioxidant beverage resembling red win. (Page no. 157)
- **Herbal** formulation *Premna herbacea* for clinical trial of type 2 diabetics. Authenticated ayurveda literature listed *Premna herbacea* as potential herbal drug. (Page no. 157)
- **Liquid** antifungal product for foliar application in tea fungal diseases. (Page no. 158)

Scientific manpower generation and training

- Ph.D. awarded : 10
- Summer internship training
  - Competitive : 27
  - Regular : 20
- M.Sc./B.Sc. dissertation : 20

Academic, research and technology/start-up promotion activities

- An extramural grant under 'Bionest' of M/S BIRAC, New Delhi for technology incubation and commercialization for in-house and outside incubates.
- Extramural grant for setting up QC/QA laboratory to promote product development and business under phytopharmaceutical mission.
- Building up of Academia-Industry collaboration with (a) Emami Ltd., Kolkata; CSIR-IIIM, Jammu (b) Kryzmal Super Foods Private Limited, Assam and (c) M/S Green Harvest (India) Bio-Tech Pvt. Ltd, Assam.

Scientific manpower placement

- Postdoctoral placement at IASST from other institutes : 05
- Postdoctoral placement from IASST at other institutes
  - International institutions : 02
  - National institutions : 03
- Project fellow from IASST selected for PhD positions at
  - International institutions : 01
  - National institutions : 01

New Recruits

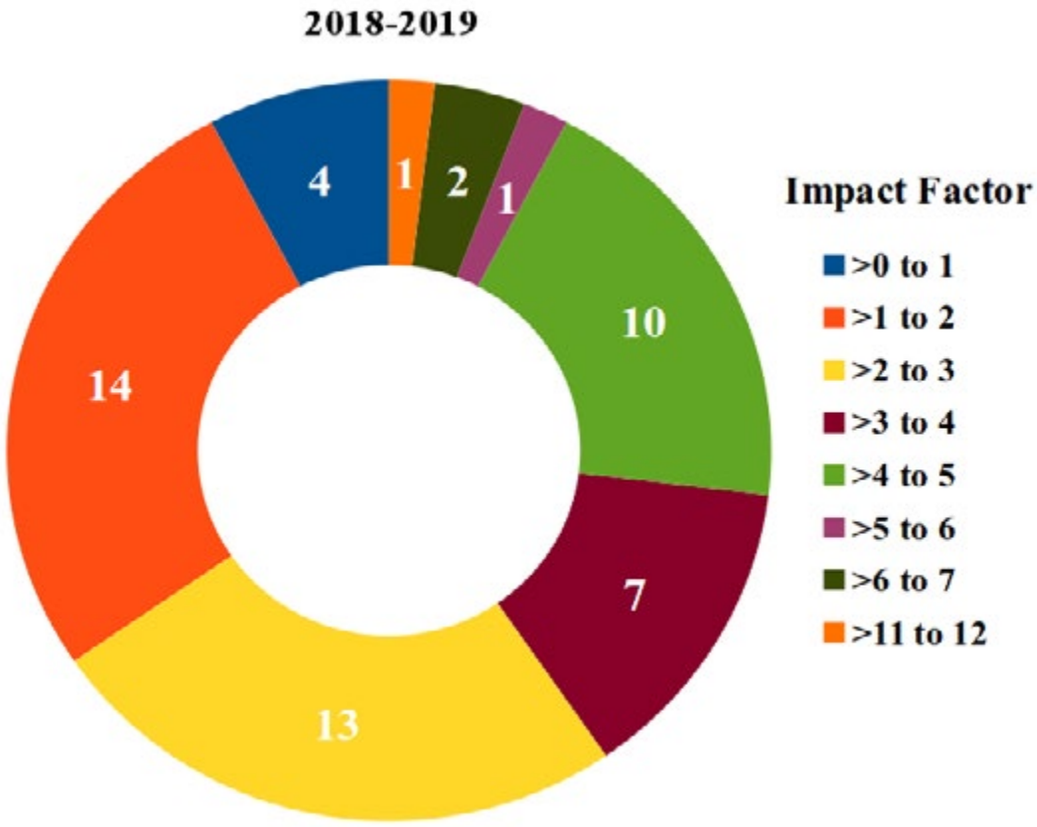
IASST started recruitment process to fill up eight vacant faculty positions. The process involved nationwide advertisement, two level screening and final interviews that comprised of presentation and personal interactions. In both the screening and interview stages, committees were formed with eminent scientists of respective fields from different parts of the country.

Infrastructure

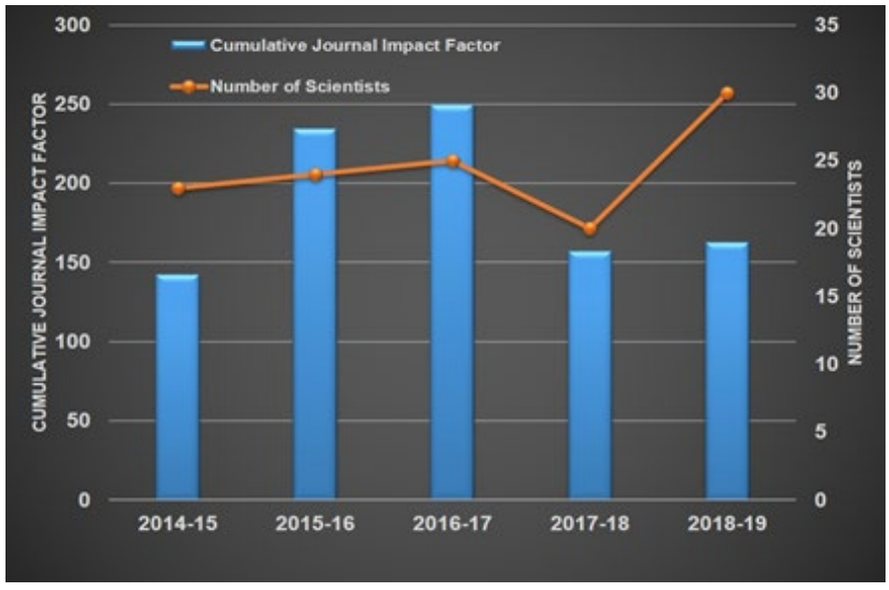
- Promotional works of Information technology, e-governance and e-finance
  - Installation of (a) rack severs with virtualization and (b) next generation firewall
  - Strengthening the surveillance system and LAN extension
  - Setting up of virtual classroom
  - Re-designing and modification of the stock module in the e-finance package
  - Development of online requisition portal for CIF facility
- Civil infrastructure
  - Admin and Library blocks interchanged and modernized
  - Mini sports complex put on use
  - Completion of 70% of academic residential complex
  - Completion of 95% of Central Instrumentation Facility (CIF) building
  - Completion of 95% of Animal house
  - 100% completion of SC/ST training facility building.

RESEARCH OUTPUT AT A GLANCE

Distribution of peer reviewed publications over various impact factor ranges



Impact factor trend over last five years

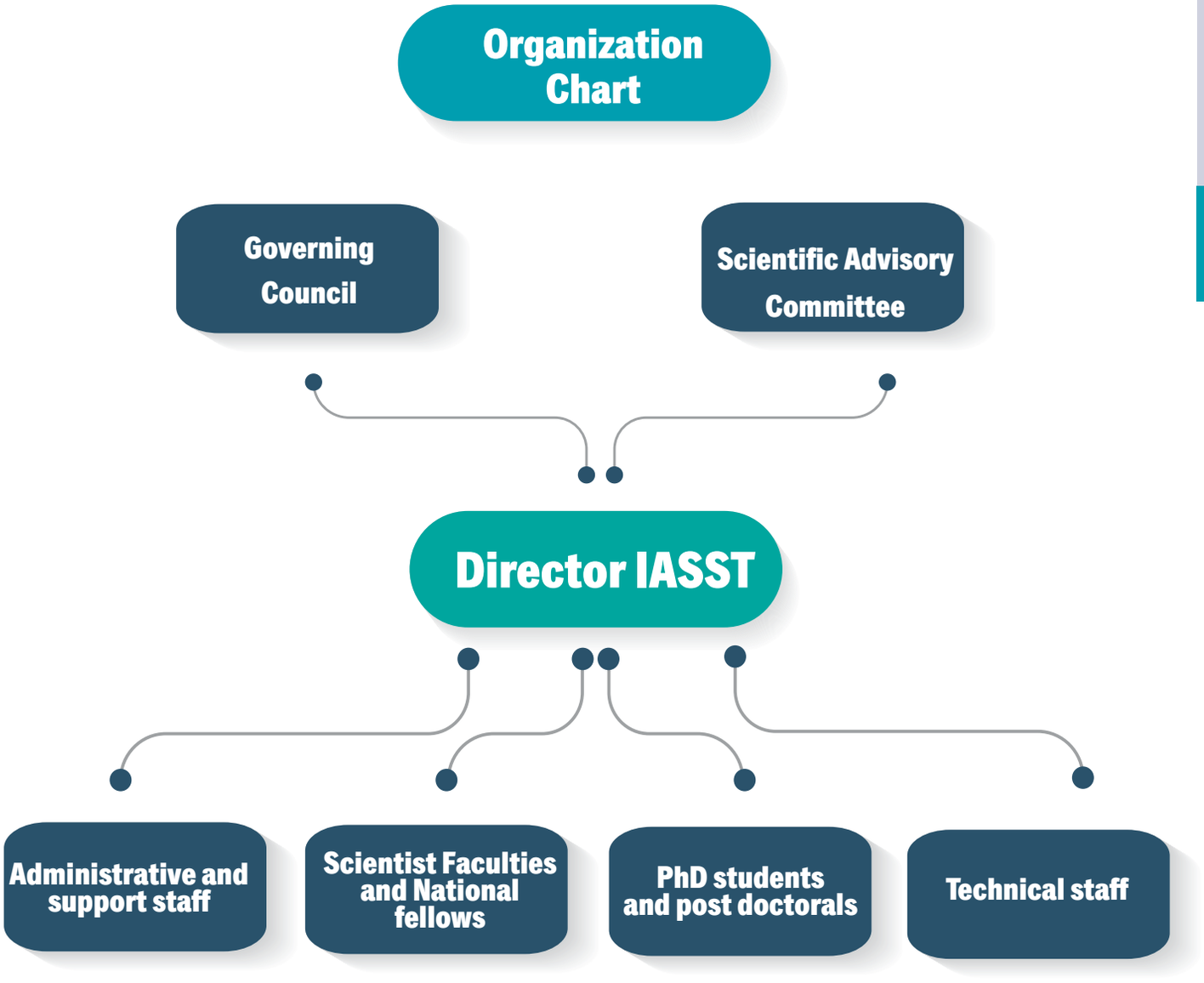


Total Indian patents (granted+filed): 01+06

Total peer reviewed journal publications: 58

Total journal impact factor: 162.87

IASST ORGANIZATION AND MANAGEMENT



IASST organization and management chart

ADMINISTRATIVE AND ACADEMIC MANAGEMENT

Governing Council (GC) of IASST

Reconstituted GC (2019)

Chairperson

Prof. Abhay Karandikar
Director, IIT Kanpur

Members

Dr. Mohan C. Kalita
Sr. Professor, Dept. of Biotechnology
Gauhati University

Prof. Kamal L. Panigrahi
IIT Kharagpur

Vice Chancellor, Gauhati University
(Dr. Mridul Hazarika)

Prof. Ashutosh Sharma
Secretary, DST, Govt. of India

Mr. B. Anand, IAS
Additional Secretary and Financial Advisor
DST, Govt. of India, New Delhi

Prof. Uday Bandyopadhyay
Director, Bose Institute, Kolkata

Mr. Hemen Das
Secretary, Science and Technology Department
Govt. of Assam, Guwahati.

Member-Secretary:

Dr. N. C. Talukdar
Director, IASST, Guwahati

Previous GC (Upto Sept, 2018)

Chairperson

Prof. Ashutosh Sharma
Secretary, Department of Science & Technology
Government of India, New Delhi

Members

Prof. Sibaji Raha
Director, Bose Institute,
Kolkata

Prof. A. N. Rai
Biochemistry Department
North-Eastern Hill University (NEHU),
Shillong

Vice Chancellor, Gauhati University
(Dr. Mridul Hazarika)

Prof. Rabindranath Pal
Saha Institute of Nuclear Physics (SINP)
Kolkata

Mr. B. Anand, IAS
Additional Secretary and
Financial Advisor
DST, New Delhi

Mr. Binod Seshan, IAS
Secretary
Science and Technology
Department, Govt. of Assam
Guwahati

Member -Secretary:

Dr. N. C. Talukdar
Director
IASST, Guwahati

Scientific Advisory Council (SAC) of IASST

Chairperson

Prof. P. Balaram
Former Director
IISC Bangalore

Members

Prof. Dinakar S. Patil
Former Prof. & Head, Dept. of Metallurgical Engg.
& Material Sciences, IIT Mumbai

Prof. Sibaji Raha
Former Director
Bose Institute, Kolkata

Prof. Gautam Dey
Chief Scientist & Head
Nanostructured Materials Division
CSIR-Central Glass & Ceramic
Research Institute, Kolkata

Prof. Pranab Goswami
Head, Centre of Energy
IIT Guwahati

Prof. U. C. Gupta
Head, Dept. of Mathematics
IIT Kharagpur

Prof. Arun Chattopadhyay
Chemistry Department
IIT, Guwahati

Dr. Niranjan Chakraborty
Director
National Institute of Plant Genome Research
New Delhi

Dr. Kanury Venkata Subba Rao
Former Head DDRC, Translational Health Science and Technology Institute, Faridabad

Prof. Appa Rao Podile
Vice Chancellor, University of Hyderabad, Hyderabad

Dr. N. C. Talukdar
Director,
IASST, Guwahati

Prof. H. Bailung
Head, Physical Sciences Division
IASST

Finance Committee (FC) of IASST

Chairperson
Dr. N. C. Talukdar

Director, IASST,
Guwahati

Members
Mr. B. Anand, IAS
Joint Secretary and Financial Advisor
DST, New Delh

Dr. B. K. Shukla
Scientist G and Head AI Division
DST, New Delhi

Prof. B. C. Tripathy
Tripura University, Agartala

Mr. Uttam Ch. Das
Registrar
IIT Guwahati

Member-Secretary:
Mr. Pradyut Borkataki
FAO, IASST, Guwahati

Building Works Committee (BWC) of IASST

Chairperson

Dr. N. C. Talukdar
Director, IASST
Guwahati

Members
Prof. Sudeep Talukdar
Department of Civil engineering
IIT Guwahati

Chief Engineer
CPWD, Shillong or his nominee

Prof. Heremba Bailung
Head, PSD, IASST
Guwahati

Member Secretary:
Dr. Diganta Goswami
Registrar, IASST, Guwahati

OTHER OFFICIALS OF IASST

Chief Vigilance Officer, DST, Govt. of India	: **Dr. Akhilesh Gupta** Adviser and head, SPLICE and climate change Programme, DST, New Delhi
Vigilance Officer, IASST	: **Dr. Neelotpal Sen Sarma** Assoc. Professor, PSD, IASST
Appellate Authority (RTI), IASST	: **Dr. N.C. Talukdar** Director, IASST
Central Public Information Officer (CPIO), IASST	: **Dr. Diganta Goswami** Registrar, IASST
Chairperson, Women Cell, IASST	: **Dr. (Mrs.) Munima B. Sahariah** Assoc. Professor, CCNS, IASST
Nodal Officer, Public Grievance, IASST	: **Dr. (Mrs.) Sumita Kumari Sharma** Woman Scientist

INSTITUTIONAL MANPOWER

Dr. N. C. Talukdar	Director

Basic and Applied Plasma Physics

Dr. Heremba Bailung	Professor II & Head
Dr. Joyanti Chutia	Emeritus Scientist
Dr. Sumita Kumari Sharma	DST Women Scientist
Dr. Nirab Chandra Adhikary	Technical Officer –B
Pallabi Pathak	CSIR-SRF
Tonuj Deka	SRF
Binita Borgohain	SRF
Yoshiko Bailung	SRF (DST-INSPIRE)
Rakesh Rushel Khanikar	JRF (DST-INSPIRE)
Ibnul Farid	JRF (DST-INSPIRE)
Bidyut Chutia	JRF (DST-INSPIRE
Palash J. Baruah	JRF (DST INSPIRE)
Kuldip Kalita	Project Scientist
Abhijit Baruah	Project Scientist
Krishna Kanta Swargiary	Technician
Bipul Kumar Das	Multi-Tasking Staff

Mathematical and Computational Sciences

Dr. Gautam Choudhury	Assoc. Prof-II and i/c CCNS
Dr. (Mrs.) Lipi B. Mahanta	Assoc. Prof-I
Niranjan Bhagobaty	Technical Officer-B
Tabassum Yesmin Rahman	DST Women Scientist
Ajay Kr. Saw	JRF
Priyanka Kalita	JRF
Snigdha Mahanta	JRF
Karishma Sharavan	JRF
Daisy Das	JRF
Silpisikha Goswami	JRF
Kangkana Bora	SRF (DST-INSPIRE)
Anjana Begum	JRF UGC-MANF
Elima Hussain	JRF
Balabhadra Pathak	Multi-Tasking Staff

Advanced Material Sciences

Dr. Neelotpal Sen Sarma	Assoc. Prof-II
Dr. Devasish Chowdhury	Assoc. Prof.-II
Dr. Arup Ratan Pal	Assoc. Prof-II
Dr. Sarathi Kundu,	Assoc. Prof.-I
Dr. Munima B. Saharia	Assoc. Prof.-I
Dr. Sagar Sharma	DST INSPIRE Faculty
Dr. Biswajit Choudhury	DST INSPIRE Faculty
Dr. Robinson Jose	DBT-RA
Dr. Abdul Barik	NPDF
Manash jyoti Deka	SRF
Achyut Konwar	SRF
Ashim Chandra Bhowal	SRF
Parijat Borgohain	SRF
Ujjal Saikia	SRF
Sristi Mazumdar	SRF
Hrishikesh Talukdar	CSIR SRF
Deepshikha Gogoi	SRF
Bandita Kalita	SRF
Jayanta Sharma Boruah	SRF
Suman Sarkar	NET JRF
Bablu Basumatary	JRF
Shantanu Podder	JRF

Samarin Upadhaya	JRF
Subhankar Pandit	JRF (DST-INSPIRE)
Sweety Biswasi	JRF (DST-INSPIRE)
Gautomi Gogoi	SRF
Ankita Deb	JRF
Jahnabi Gogoi	JRF
Purbajyoti Bhagowati	JRF (DST-INSPIRE)
Samiran Upadhyay	SRF
Payal Saha	JRF
Raktim Jyoti Sarmah	JRF
Tishamoni Kashyap	Research Asstt.
Jyotisman Bora	JRF
Kabyashree Phukan	CSIR JRF
Bijay Kumar Sah	CSIR SRF
Babul Ch. Deka	Multi-Tasking Staff

Biodiversity and Ecosystem Research

Dr. N. C. Talukdar	Director
Dr. Suresh Deka	Professor-II & i/c RMES, LSD
Dr. (Mrs.) Arundhuti Devi	Assoc. Prof-I
Dr. Debajit Thakur	Assoc. Prof-I
Dr. M.R. Khan	Assoc. Prof-I
Dr.Soumyadeep Nandi.	Ramalingaswami Fellow
Dr. Nandana Bhardwaj	DBT Bio Care Women Scientist
Dr. W. Romi	DST INSPIRE Faculty
Sri Anupam Bhattacharya	Research Associate
Dr. Rupamoni Thakur	NPDF
Dr. Sailendra Gayari	NPDF
Dr. Seydur Rahman	NPDF
Dr. Rinku Moni Kalita	NPDF
Dr. Parijat Saikia	NPDF
Dr. Bhaskar Das	NPDF
Dr. Archana Nath	NPDF
Dr. Kaushik Bhattacharya	NPDF
Dr. Anowar Hussain	RA
Dr. Kamal Das	RA
Dr. Atanu Adak	RA
Dr. Partha P. Dutta	RA
Dr. Ananya Barman	DBT-RA
Dr. Kaustavmani Patowary	DBT-RA
Madhusmita Dehingia	RA
Anupam Bhattacharya	RA
Rictika Das	DST Women Scientist
Rajkumari Mazumdar	Project Technical Assistant
Monikankana Kalita	SRF
Barsha Deka	SRF
Ranjita Das	JRF (RGNF-UGC)
Garima Raj	JRF
Manashi Das	SRF
Jilmil Baruah	JRF
Mohd Shadab	JRF
Sujata Deka	JRF
Nilam Sarma	JRF
Anurupa Goswami	JRF (DST-INSPIRE)
Atlanta Borah	JRF
Yogesh Babasaheb Chaudhari	CSIR-SRF
Rupshikha Potowary	CSIR-SRF
Priyanka Sarkar	JRF
Suravi Kalita	CSIR-SRF
Bhuwan Bhaskar	JRF
Rabiya Sultana	JRF (UGC MANF)
Suparna Sen	SRF
Khanindra Sharma	JRF
Tulsi Kumari Joishy	SRF (DST-INSPIRE)
Chingakham Juliya Devi	CSIR-UGC-JRF
Chandana Malakar	DBT-JRF
Dibyayan Deb	JRF
Santanu Das	JRF
Shabiha Nudrat Hazarika	JRF
Monalisa Kalita	JRF
Tamali Sinha	CSIR-JRF
Juri Saikia	JRF (RGNF)
Madhurankhi Goswami	JRF
Arun Kumar	DBT-JRF
Satabdi Saha	JRF
Bithorai Basumatary	JRF
Dibyajyoti Koiri	JRF
Jinu Medhi	UGC JRF
Bidyarani Devi	CSIR JRF
Manomohan Huzuri,	Technical Assistant
Madan Chandra Kalita	Multi-Tasking Staff
Srikanta Baishya	Multi-Tasking Staff

Traditional Knowledge Based Drug development and Delivery

Dr. N. C. Talukdar	Director
Dr. (Mrs.) Rajlakshmi Devi	Assoc. Prof.-II& i/c BCSS
Dr. Jagat Borah	Assoc. Prof-II
Dr. Mrinal Kr. Das	Asstt. Prof. II
Dr. Rosy Mondal	DST INSPIRE Faculty
Dr. Joshodeep Baruah	Scientist-E (Project)

Dr. Shyamashree Dasgupta	Scientist-D (Project)
Juri Pathak	Technical Officer-A
Julie Bordoloi	Technical Assistant-II
Subrata Goswami	Technical Assistant.
Momita Das	JRF(RGNF-UGC)
R Elancheran	SRF
Raghuram Kandimalla	RA Scientist "C"
Partha P. Dutta	RA
Dr. Suman Kumar Samanta	Scientist-C
Himadri Kalita	SRF
Ankita Hazarika	SRF
Sima Kumari	SRF
Krishna Nayani Dutta	SRF
Sagar Ramrao Barge	SRF
Simang Champramary	Project Assistant
Prasanta Kr. Deb	JRF
Paramita Choudhury	JRF
Simanta Bharadwaj	Technical Assistant
Puspanjali Khound	JRF
Swarnali Bhattacharjee	JRF
Bhaswati Kashyap	JRF
Barsha Deka	SRF
Shilpi Saikia	JRF
Jonali Brahma	JRF
Dr. Asim Kr. Dutta	NPDF
Arup Jyoti Deka	Account Assistant
Bikash Jyoti Das	Animal Keeper
Abinash Nath	Animal Keeper
Gwhwm Basumatary	Animal Keeper
Tarun Talukdar	Multi-Tasking Staff
Bolin Das	Multi-Tasking Staff
Sabin Kalita	Multi-Tasking Staff
Haren Medhi	Multi-Tasking Staff

Administration and Accounts

Dr. Diganta Goswami	Registrar
Pradyut Borkataki	Finance & Accounts Officer
Rajesh Sharma	PRO
Prabodh Kr. Deka	Section Officer (Admin.)
Suresh Ch. Sarma	Section Officer (Acctts.)
Rabin Ch. Kalita	Superintendent
Ramen Mahanta,	Superintendent
Saraswati Bora,	Superintendent
Dwijendra Deka,	Superintendent
Lelin Gogoi	PS to Director
Munindra Singh	Technical Assistant
Diganta Das	Assistant
Gora Gupta	Assistant
Prabhat Ch. Barma	Assistant
Phatik Baishya	Driver
Nimai Hazam	Driver
Lakshmi Kanta Soud	Multi-Tasking Staff
Madhabi Das	Multi-Tasking Staff
Nripen Ch. Goswami	Multi-Tasking Staff
Satish Ch. Das	Multi-Tasking Staff
Niren Sarma	Multi-Tasking Staff
Ratul Baishya	Multi-Tasking Staff
Binoy Kr. Choudhury	Multi-Tasking Staff
Pradip Das	Multi-Tasking Staff
Madhu Ram Kalita	Multi-Tasking Staff
Munna Basfor	Sweeper

Temporarily engaged persons

Jayanta Borthakur	Network & System Administrator
Ajay Kr. Chakraborty	Programme Executive
Nabajyoti Choudhury	Programme Manager
Nayan Talukdar	Technical Officer (Instrumentation)
Dr. Anil Kumar	Technical Coordinator
Debajit Deka	Jr. Network Administrator
Pinky Taye	Assistant
Hemanta Sharma	Assistant
Ksh. Sharmina Devi	Receptionist
Sanjubi Sharma	Project Assistant
Nirmali Devi	Hindi Assistant
Milan Jyoti Das	Technical Assistant
Mehjabin Ali	Project Assistant
Lachman Thapa	Driver
Pranab Talukdar	Driver
Bimal Das	Driver
Sanjib Kr. Das	Driver
Prakash Kr. Kachari	Field Supervisor
Madan Kr. Das	Cook
Manindra Deka	Cook cum Hostel Care Taker

Engineering and Estate Management

Montu Deka	Assistant Engineer

Temporarily engaged persons

Hiranya Kr. Das	Estate Management Consultant
Gautam Kr. Medhi	IEME
Gadadhar Deka	Project Engineer
Pranjit Sarma Baruah	Assistant Field Manager
Rupen Pegu	Fishery Management Assistant
Md. Mahammad	JE (Civil)
Pabitra Deuri	JE (Electrical)
Shankar Daimari	Work Supervisor
Muktaram Kumar	Work Supervisor
Kumud Patgiri	Electrician
Hiren kalita	Resident Electrician
Uddipta Deka	Resident Electrician
Dharani Basumatari	Resident Electrician
Dijoraj Roy Choudhury	Plumber
Anima Baishya	Cleaner
Dinesh Deka	Gardener
Ajay Baishya	Mali

Knowledge Resource Centre

Dr. Tarini Dev Goswami	Assistant Librarian
Kumud Baishya	Assistant
Sarala Deka	Multi-Tasking Staff

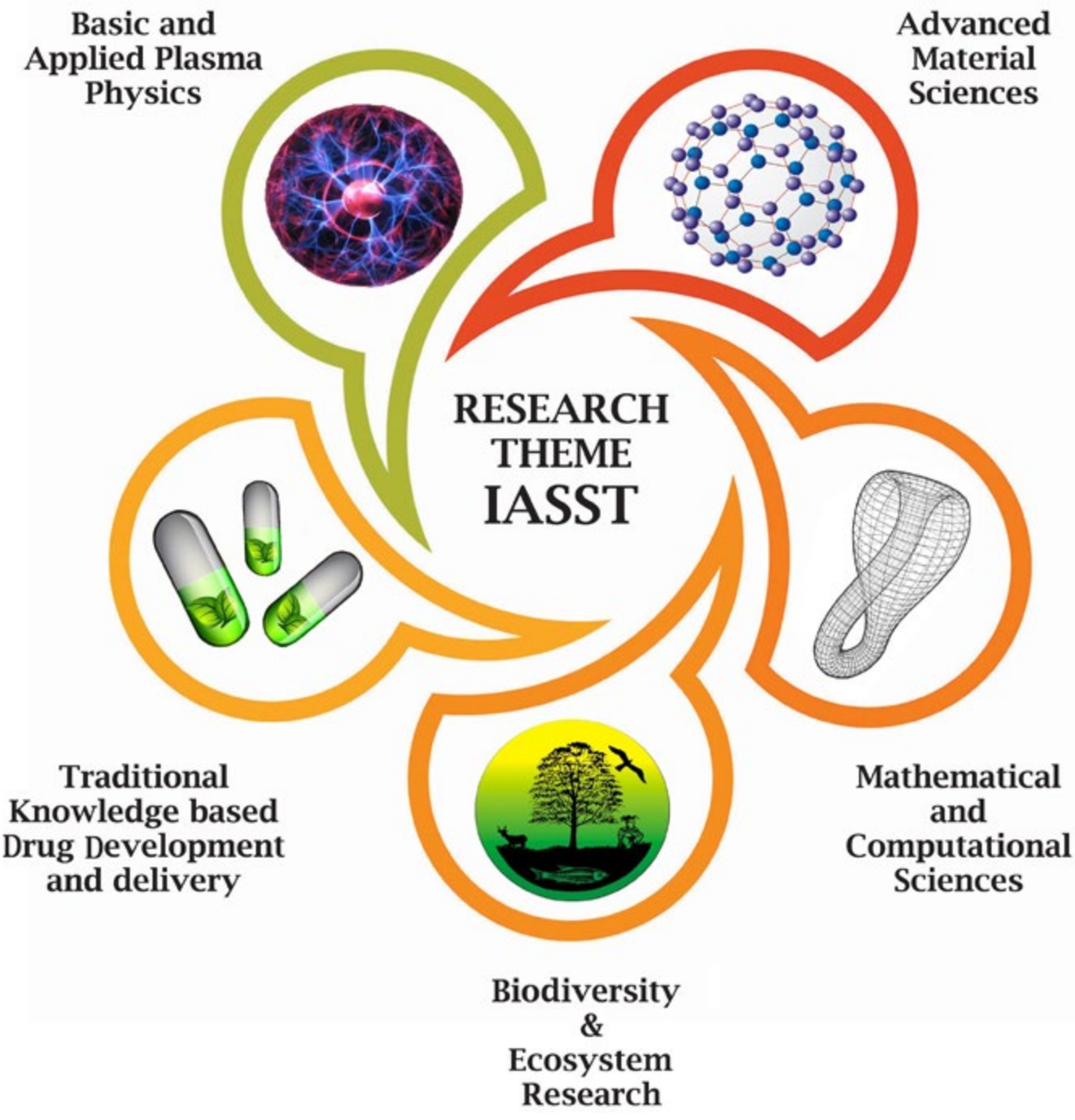
Temporarily engaged persons

Subhrajit Sengupta	Professional Assistant

IASST Consultants

Prof. Dharmeswar Das	Chief Consultant Former Director &VC (A), ICAR-IVRI, Izatnagar Dean, Faculty of Vety. Science, AAU
Prof. B.N. Goswami,	FNA, FASc, FNASc, FTWAS Consultant (Flood forecasting Project) Former Director, IITM, Pune, SERB Distinguished Fellow Cotton University
Prof. O. K. Medhi	Consultant (Tea waste Project) Renowned Organic Chemist and former Vice Chancellor, Gauhati University
Dr. D. K. Hore	Consultant (Landscaping) Former Regional Director, NBPGR, Shillong
Prof. Nalin Kr. Mohan	Consultant (Tribal area dev. program) Former Director of Extension education and Chief Scientist, AAU
Dr. Aswini Bezbaruah	Consultant Medical Officer Senior Consultant-Internal Medicine Excelcare Hospital, Guwahati
Pradip Kr. Chakraborty	Consultant (Audit) Former Sr. Audit Officer, AG office, Guwahati
Mr. B. Bose	Consultant (Admin and Engineering) Retired Sr. manager NII, New Delhi

RESEARCH ACTIVITIES



BASIC AND APPLIED PLASMA PHYSICS

The thrust areas of basic research in BAPP section are waves and instabilities in multicomponent plasma and in dusty plasma. In multicomponent plasma the recently discovered Peregrine soliton, the so called prototype of the rogue wave in the ocean has been continued to investigate and its other semi localized forms. In dusty plasma, nonlinear wave phenomena associated with low frequency dust acoustic waves and nonlinear structures associated with dusty plasma flow have been intensly investigated. Very low density plasma with near ionoshpheric plasma condition has been experimentally realised with negative ions to study the spacecraft or satellite interaction. In applied plasma section, the development of fuel cell electrode assembly with incorporation of nanostructured catalyst using plasma process has been continued. Atmospheric pressure plasma system has been developed to deposit composite polymer films with selective properties on metal surfaces. We also have developed liquid plasma discharge reactor and utilize it for synthesis of nanomaterial in water without using any highly toxic reducing agent. The liquid plasma reactor has potential application in synthesis of nanomaterial with tuneable optical and structural properties.

First row (L to R) : Nirab Ch. Adhikary, Technical Officer-B; Heremba Bailung, Professor & Head of Physical Sciences Division; Joyanti Chutia, Professor & Emeritus Scientist; Subir Biswas, Assistant Professor II.

Second row (L to R) : Bidyut Chutia,JRF; Tonuj Deka, SRF; Binita Borgohain, SRF; Yoshiko Bailung, SRF; Pallabi Pathak, SRF; Rakesh Ruchel Khanikar, JRF; Palash Jyoti Baruah, JRF; Abhijit Boruah, Project Scientist; Ibnul Farid, JRF; Hanan A. Hoque, Market Analyst; Bipul Kr. Das, MTS; Krishnakanta Swargiary, Technician.

Heremba Bailung

Professor

Dr. Heremba Bailung received PhD from Gauhati University in 1996 and carried out Postdoctoral research at Institute for Space and Astronautical Research, Japan under BOYSCAST fellowship program of DST, GoI. He joined IASST in 1996 and currently Head of Physical Sciences Division. Experimental plasma physics is his core research domain and has worked continuously on waves and instability in multicomponent plasma and dusty plasma. He also pursues Plasma application research in material synthesis for enhanced photocatalytic activity and fuel cell.

Joyanti Chutia

Emeritus Scientist

Prof. Joyanti Chutia obtained her PhD and postdoctoral research experience from Dibrugarh University. She was a Visiting Scientist at PRL, Ahmedabad, India during 1983-85. She has been the longest service scientist of IASST who rose to the highest rank of Director in 2005 and served IASST until 2012 in this capacity. An accomplished plasma physicist, her core interest includes non-linear dynamics in plasmas and plasma processing for diverse applications. She setup plasma research lab of IASST and steered the institution in its difficult phases. Currently she is an Emeritus Scientist in IASST.

Sumita K. Sharma

DST Women Scientist

Dr. Sumita K. Sharma obtained her PhD in Plasma Physics from Gauhati University in 2011. She was a DST-INSPIRE Faculty from 2012 to 2017 and currently continuing research as a DST-Woman Scientist in the Basic and Applied Plasma Physics program. Her area of research mainly includes waves, instabilities and related phenomena in different laboratory plasma environment such as multicomponent plasma, dusty plasma and nanodusty plasma.

Research Summary

A. Basic Plasma Research

A.1. Investigations on Peregrine solitons

The interaction of resonant ions with ion acoustic Peregrine soliton is investigated in a multicomponent plasma with negative ions. The experiment is performed in a double plasma device. In order to observe the interaction, the ion temperature is enhanced by applying a rf signal (in the range of ion plasma frequency) to the separation grid, so that ion thermal velocity becomes close to the wave phase velocity.

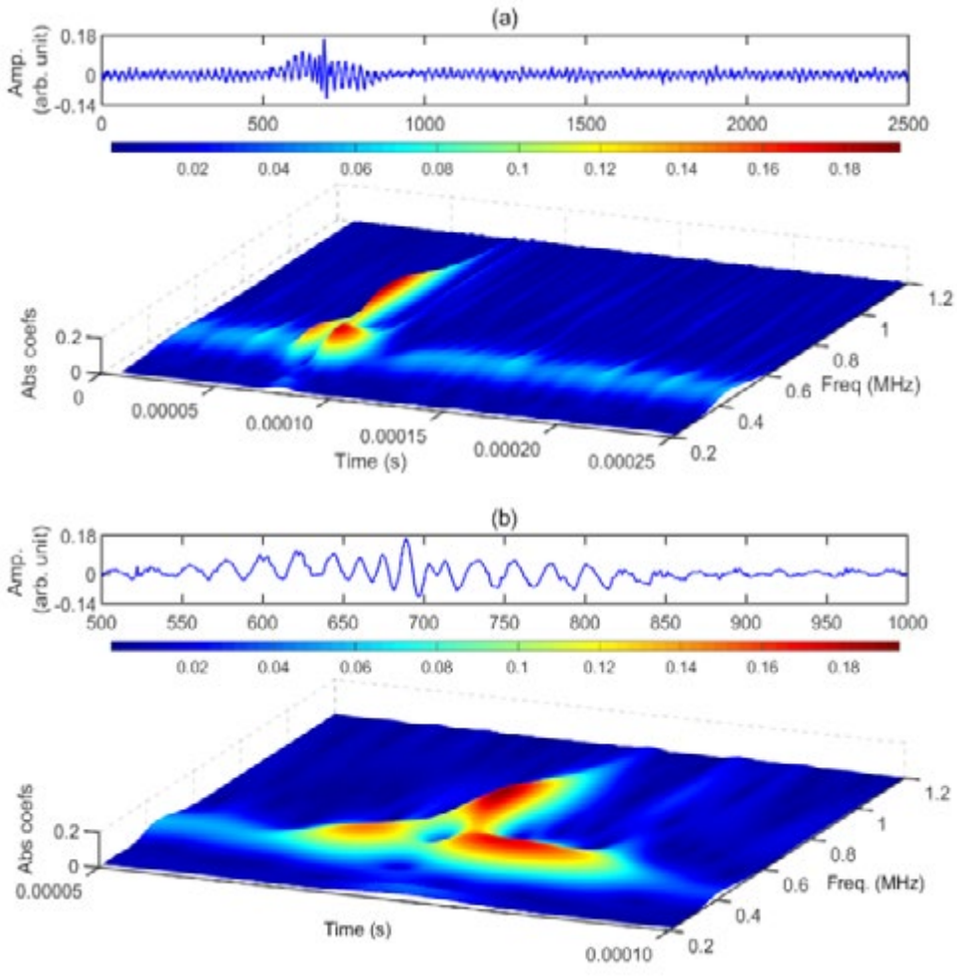


Fig. 1.1. Typical CWT scalogram of fundamental Peregrine soliton without application of V_{HF}. The probe position is at 9 cm. (a) time series (top) and CWT scalogram for data length 0 – 250 μs (bottom).

These resonant ions made the ion acoustic wave suffer heavy Landau damping. The spatial damping rate of the ion acoustic wave is measured from the interferometer phase plot. The results show a good increment in damping rate when amplitude of the rf signal is increased. The experimentally measured damping rate shows good agreement with the theory obtained from fluid model of plasma. The ion acoustic Peregrine solitons are excited by applying a slowly amplitude modulated wave packet to the anode of the source plasma. The Peregrine soliton is localized in both space and time and its amplitude is ~ 3 times that of the background carrier wave. The main physical mechanism behind the generation of Peregrine soliton is the modulational instability, a physical process where phase and amplitude modulation grow as result of delicate balance between nonlinearity and group velocity dispersion. We observe modifications on the evolution characteristics of Peregrine soliton while interacting with resonant ions. The soliton peak disappears leaving behind an envelope only when damping rate is higher. At high amplitude of rf signal, the damping rate increases due to increase in thermal velocity of ions and thereby increasing the number of resonant ions close to the phase velocity of wave. Once dissipative effect becomes stronger, the delicate balance between nonlinearity and group velocity dispersion get affected and the soliton disappears. The theoretical model considering the resonant wave particle interaction effect will be considered as a future subject.

A.2. Sheath characteristics in low temperature low density electronegative plasma

Electronegative plasmas have found their place in many applications such as plasma processing, fusion research, simulation of D-layer of the lower ionosphere, etc. Negative ion rich multicomponent plasma is produced at IASST in a novel plasma device for sheath studies with very low electron density n_e~10^5-10^6 $cm^{-3}$and temperature T_e~ 0.2-0.4 eV.

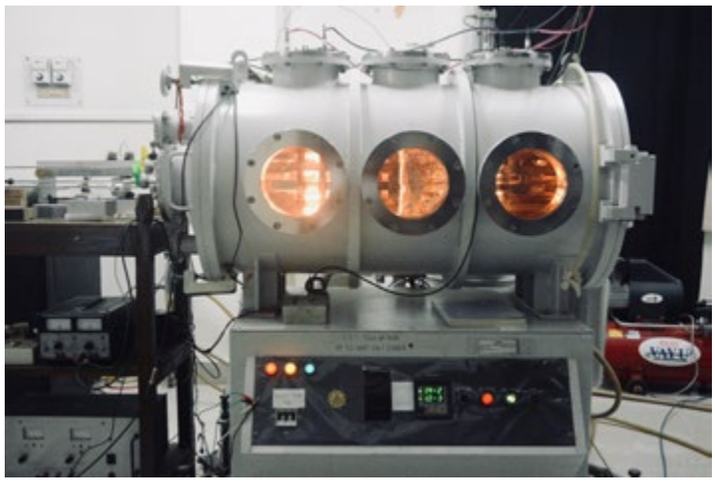


Fig. 1.2. Photograph of Large volume Double Plasma Device

A photograph of the device is shown in Fig. 1.2. Negative ions are introduced by injecting SF_6 gas in Ar plasma. Electron attachment process favours the formation of SF_6- ions in the diffused section because electron temperature is very low, T_e~0.25 eV. Langmuir probe is used to measure the plasma parameters and the negative ion concentration in the device. An emissive probe is used to measure the plasma potential using the inflection point method in the limit of zero emission. Potential profiles are measured for different negative ion concentrations and at plate bias ±10 V. When negative ions are absent, r=0 , both the sheath profiles (for positive and negative plate bias) show symmetric structures with nearly same sheath thickness. With little higher SF_6^- concentration r=0.5, we observe sharp reduction in sheath thickness and remains nearly constant until r=0.9. This observation signifies sharp fall of sheath thickness near a critical negative ion concentration. The experimental sheath structure is found to approximately match with the profiles obtained from Poisson's equation and Debye sheath model. The ion (-10 V) and electron/negative ion (+10 V) sheath profiles are found to be of equal dimension for a particular negative ion concentration. The formation of sheath is believed to be independent of the mass of the charged particles constituting the plasma with Ar^+, SF_6^{--}, and electrons. These results support our earlier experimental findings of Phys. Plasmas, **24**, 113512 (2017). Recent numerical simulations performed by researchers of IOWA university USA, depicted the electron sheath to be as thick as ion sheath. Our experiments support their simulation results.

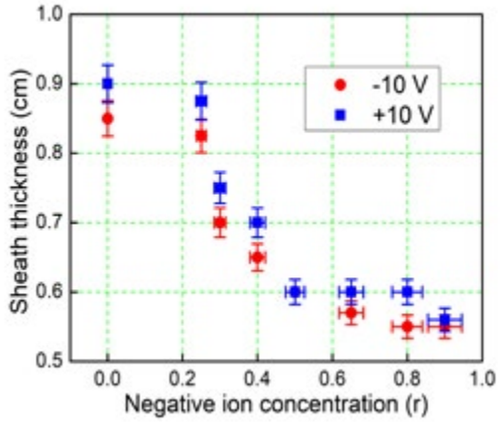


Fig.1.3. Sheath thickness vs negative ion concentration for V_{plate}=-10V and V_{plate}=+10V.

In Fig. 1.3, the measured sheath thickness as a function of negative ion concentration for a constant plate bias voltage ±10 V is shown. This symmetry between the positive ion and electron/negative ion sheath thickness is due to the ideal plasma condition (with electrons following a sharp Maxwellian distribution) in the experimental region which is free from primary ionizing electrons. Present experimental plasma parameters n_e~10^5-$10^6$$cm^{-3}$, ($n_-$~$10^4$-$10^5$$cm^{-3}$), T_e~ 0.2-0.4 eV, T_i~0.01-0.1 eV and T_-~ 0.01-0.1 eV are somewhat higher than the typical D–layer ionospheric plasma. However, plasma density may rise in D–layer up to at the time of solar proton event. Since the electron and negative ion density are controllable, the present device can be a potential test bed to study the lower ionosphere.

A.3. Experimental study on dusty plasma flow past an obstacle

A dusty (or complex) plasma is composed of electrons, ions and a neutral background with additional micron to nanometer sized charged components in it. Dusts, when exposed to the plasma environment, immediately become charged by collecting electrons and ions. Laboratory study of such charged dust particles in plasma, has introduced a great variety of new phenomena associated with waves and instabilities and has also provided a number of interesting dynamical structures such as voids, vortices, Mach cones etc.

Many different mechanisms can cause vortices (i.e. dust rotation) due to fine variation in the experimental conditions. In the past couple of decades, there have been a few reports on the dusty plasma flow interaction with dust voids. Void is actually a dust free region inside a dust cloud that is frequently encountered in dusty plasma experiments

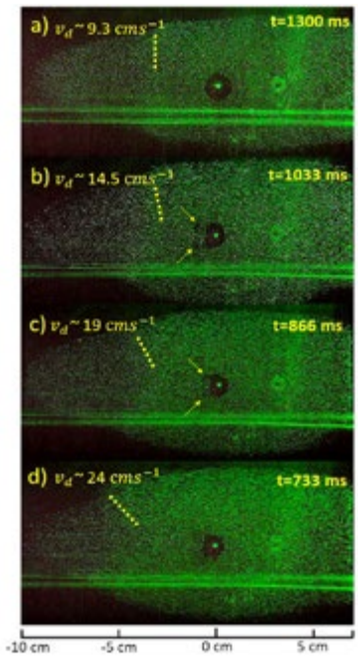


Fig. 1.4. Typical snapshots showing structures formed behind the void with different ~ (a) 9.3 cms^{-1} (b) 14.5 cms^{-1} (c) 19 cms^{-1} and (d) 24 cms^{-1}.

performed under microgravity conditions as well as in ground based laboratory conditions. An experiment on dusty plasma flow past an obstacle is projected in a strongly coupled dusty plasma (at Dusty Plasma Laboratory) by inserting a cylindrical pin (0.1 mm diameter) in an RF (~ 13.56 MHz) discharge argon plasma. The cylindrical pin produces a void in a stationary dusty plasma fluid which acts as the obstacle to a dusty plasma flow. A novel experimental setup has been designed which allows a variable range of dusty plasma flow velocity ~ (7 – 30) cms^{-1}. In such a variable range of velocity (Mach number, M ~ 1 – 4 and Reynolds number, Re ~ 90 – 400), it is possible to observe the transition from laminar to turbulent flow. In the unsteady laminar range, a pair of vortex (commonly known as Föppl vortices in hydrodynamics) is formed behind the dust void. Examples of pattern formation behind the dust void for different flow velocities are shown in Fig. 1.4. The top image represents a flow with velocity ~9.3 cms^{-1}. For lower flow velocity ~ 7 – 10 cms^{-1} (Re ~ 90 – 130) specific pattern is not formed. Vortex pair formation in the wake behind the void is observed when flow velocity is 14.5 - 19 cms^{-1}.

A pair of counter rotating and symmetric vortex is formed with two clear eyes. For higher flow velocities the dust dynamics behind the void is rather complex and flow may be considered close to turbulent (Re > 250). This indicates that the void in our experiment behaves as non-rigid compressible type obstacle. Our experimental study as a whole, opens up a comprehension of flow past an obstacle in a strongly coupled dusty plasma fluid and the results may be of interest in the interpretation of structures observed in space plasma.

A.4. Generation of dust density wave in nano dusty plasma and its suppression

The medium of normal electron-ion plasma containing nanometer size dust particles is commonly known as nanodusty plasma. Nano dusty plasma is observed in many astrophysical environment such as cometary tails as well as in laboratory condition such as fusion reactor and semiconductor processing devices. The presence of nano dust not only modifies the usual dusty plasma processes involving micron dust such as dust charging, wave generation etc. but also shifts the parameter domain of the collective dust dynamics.

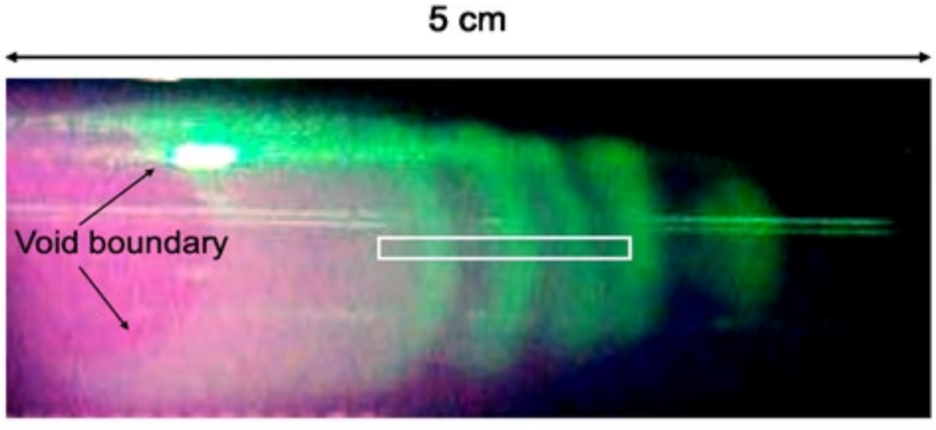


Fig. 1.5. Snapshot of the observed self-excited DDW. The rf power is kept at 15 W and chamber pressure at 0.015 mbar. The void boundary is shown by the arrows. The region of interest is shown by the rectangle.

Experiment is performed in a cylindrical glass chamber of length 15 cm and inner diameter 2.8 cm mounted horizontally. Argon plasma is produced in the chamber by applying rf discharge (13.56 MHz, 10 – 15 W) at a working pressure of 0.01 – 0.015 mbar. Carbon particle of average radius 50 nm initially placed inside the chamber are lifted up into the plasma due to the ion bombardment. A dust cloud, with a void at the centre, is observed in the plasma by laser light illumination. The ion density and the plasma potential profile along the axis of the chamber is measured by a Langmuir probe. The electric field is measured from the gradient of the potential. The dust void is formed by the balance of electric field force and the ion drag force. The ions streaming from the void centre takes place at a drift velocity greater than the ion thermal speed. This ion streaming generates a self-excited dust density wave (DDW) propagating from the void boundary. The collective dynamics are recorded by a high-speed digital video camera at a high frame rate ~ 240 - 420 frames per second (fps). Image frames are then extracted from the recorded videos and then analyzed by an image analysing

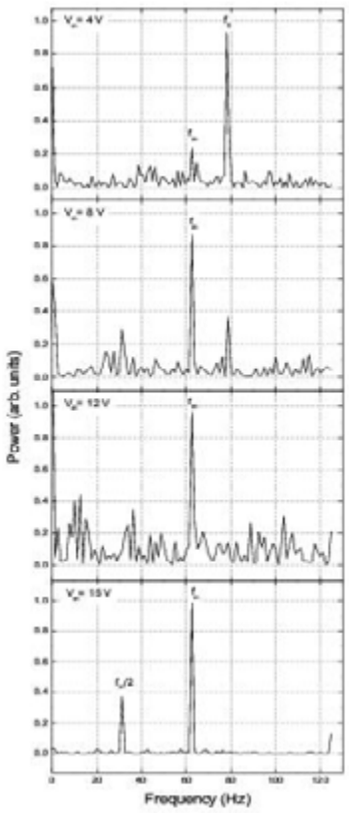


Fig. 1.6. Typical FFT signal of the modulated DDW at modulating frequency ~ 62 Hz and a varying modulation amplitude of 4 V, 8 V, 12 V and 15 V with the natural frequency f_0 ~ 78 Hz.

software. The time series data is obtained from the intensity fluctuation at a fixed position and from this FFT spectrum is obtained. Fig.1.5. shows a typical image of the spontaneous DDW observed in our experimental chamber. The natural frequency of the DDW is measured to be f_0 ~ 78 Hz. The measured wavelength and the phase speed are 0.27 cm and 21 cms^{-1}.

The suppression of the spontaneous DDW is observed by modulating the ion streaming. Sinusoidal signals of varying amplitude 1-15 V and frequency ranging from 50-100 Hz, is applied to a circular exciter of diameter 10 mm inserted into the chamber from one end. The signal is applied through an amplifier from a function generator. This modulates the ion streaming which modulates the background dust density resulting the suppression of the spontaneous wave. A typical set of FFT signals is shown in Fig. 1.6 for an external signal of constant frequency and varying amplitude. Initially at low amplitude there is no interaction between applied and the spontaneous signal. As amplitude increases, coupling between the signals takes place. The amplitude of the spontaneous signal gradually decreases while that of the applied signal increases. At higher amplitude complete suppression of the spontaneous signal occurs and period doubling bifurcation becomes prominent.

A.5. *In situ* production of nanodusty plasma

Low temperature laboratory plasma plays a significant role in producing nanoparticles, metal oxides and nano-composites using different types of reactive gases. In most of the laboratory discharges, nanodusty plasma (i.e. plasma containing nanometer size particles) is produced either by introducing particles externally or by growing them inside the plasma. Plasmas containing nanoparticles are widely used and proposed in plasma technological applications for production of nanomaterial, metal oxides and surface deposition. They also provide the scope to study interstellar environments in laboratory.

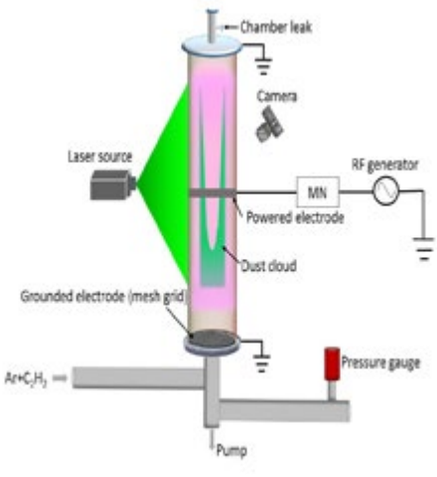


Fig. 1.7. Schematic of the experimental set up. MN – Matching network.

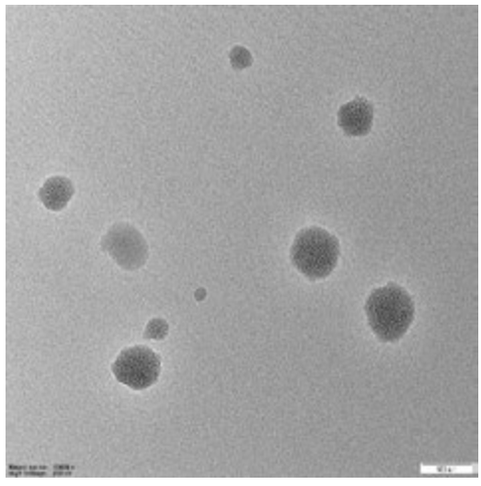


Fig. 1.8. TEM image of dust particles collected after 15 min of C_2H_2 flow into the discharge.

A new experimental set up is designed & installed at IASST to produce nanoparticles via an *in situ* plasma-physicochemical process. The schematic of the setup is shown in Fig. 1.7. The chamber is a vertically mounted cylindrical quartz tube of length 50 cm and diameter 6 cm. The chamber is first evacuated using a rotary pump and then Argon (Ar) gas is injected to achieve the working pressure of ~ 0.1 mbar. Plasma is produced by applying rf power (2 – 20) W at 13.56 MHz. to a circular thin aluminum strip. Discharge characteristics such as rf voltage and current are measured in Ar plasma using a 1000X voltage probe (Tektronix P6015A) and a current probe (Tektronix TCP A300) respectively for rf powers (2 – 20) W. The phase difference, ϕ between instantaneous voltage and current signal is measured and ranges from 84^0 – 102^0 with voltage signal lagging behind the current. It has been verified that

the product of rms value of voltage, current and cosine of the corresponding phase difference (i.e., $V_{d(pp)} I_{d(pp)} \cos\phi$) is nearly equal to the applied rf power. The Ar plasma is then characterized by measuring the plasma density and electron temperature with the help of an rf compensated cylindrical Langmuir probe. The values of ion density are found to be 2.68×10^{15}-2.7×10^{16} m^{-3} and the electron temperature is found to be 3.7 – 6.7 eV. After characterizing the plasma, C_2H_2 gas is injected into the Ar plasma through an mass flow controllers at flow rate of ~ 2 sccm. Nearly 5 – 10 min after C_2H_2 gas injection, cloud of fine particles start to appear inside the chamber. Gradually the cloud extends vertically up to 15 – 20 cm (nearly 15 min after C_2H_2 injection). The particles are collected after specific time and characterized using SEM and TEM. A typical TEM image of the as grown particles is shown in Fig. 1.8. The particles are spherical in shape and their size distribution varies from 20 – 160 nm with an average size of 80 nm. From OML theory, the average charge on each dust particle is found to be (31 – 247) electron charge

B. Applied Plasma Research

B.1. Development of an atmospheric pressure plasma jet for fabrication of super-hydrophobic surface

In recent years non-thermal atmospheric pressure plasma jet (APPJ) devices attracted significant attention due to their great potential for a variety of material processing and biomedical applications. In this type of non-thermal plasmas, the highly reactive chemical and charged species, metastable atoms and UV photons are generated by the high energetic electrons. These highly reactive species play the dominant role in surface modifications and helps the chemical reactions to occur at a lower temperature than the conventional methods

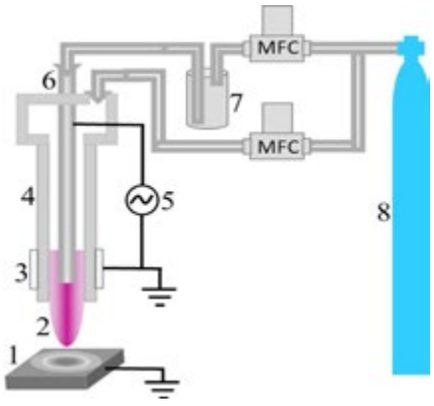


Fig. 1.9. Schematic diagram of the experimental setup. 1=Substrate, 2=Plasma plume, 3=Ground electrode, 4=Quartz tube, 5=High voltage power supply, 6=Hollow live electrode, 7=Bubbler, 8=Ar gas cylinder, MFC= Mass flow controller.

At IASST we developed atmospheric pressure plasma jet device (Fig 1.9) with application potential in different fields. The plasma is produced between a live electrode placed inside a quartz tube through one end and an outer grounded ring electrode wrapped around the tube on the other end. A high voltage sinusoidal power supply (frequency ~ 20-50 KHz, voltage ~ 0-20 KV) is used to power the device. The plasma forming gas (He/Ar/O2) and precursor monomer vapour are mixed to reach the discharge zone. Hexamethyldisiloxane (HMDSO) is used as the precursor monomer. A plasma plume (length 1 cm, diameter 1 mm) blows out into open air with the flow of the gas and is directed towards a substrate and a hydrophobic film of Silicon compounds is deposited on the substrate.

The XRD spectrum of the deposited film shows the amorphous nature of the coating. The FTIR spectroscopy confirms incorporation of Silicon containing compounds to the film. The surface morphology of the film is analysed by SEM and AFM as shown in Fig. 1.10. The surface morphology after plasma treatment indicates that a hydrophobic coating is deposited into the substrate with a rougher surface. The increase in roughness can be verified by the Atomic Force Microscopy (AFM). Roughness of the order of 1μm is confirmed by analysis. The EDS mapping dot analysis shows the atomic concentrations of Si, O and C to be 18.44%, 45.66% and 35.91% respectively. It proves that silicon is introduced into the polymeric coated surface and a film of $SiC_xH_yO_z$ is deposited. Fig. 1.11. shows the photographs of water contact angle on the substrate before and after plasma treatment. After plasma treatment time of 3 min, the hydrophobicity increases and a water contact angle of 152°-155° is achieved. This is attributed to an increase in surface roughness and introduction of non-polar silicon containing groups to the surface.

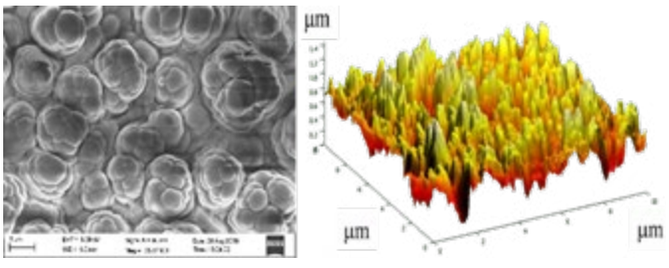


Fig. 1.10. SEM (left) and AFM (right) images of the film

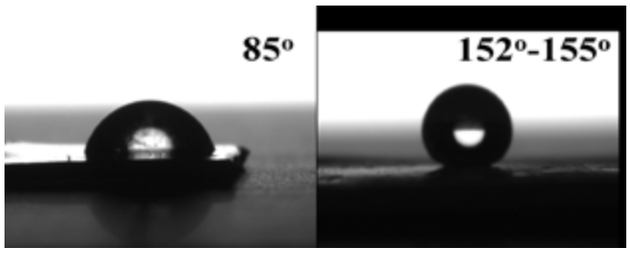


Fig. 1.11. Photographs of water droplets on untreated and plasma coated stainless steel substrate showing water contact angle.

B.2. In-liquid plasma discharge for the synthesis of oxygen vacancy induced narrow bandgap tungsten oxide (WO_{3-x}) nanoparticles

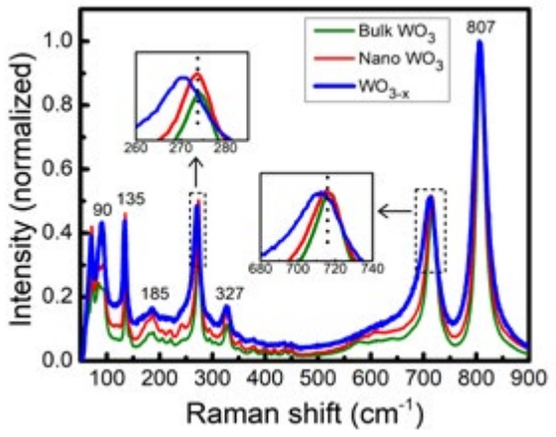


Fig.1.12. Raman spectra of the samples.

Plasma generation inside liquid is rapidly growing in the field of nanoparticle (NP) synthesis. For the generation of plasma we have applied a negative potential of ~ 1 KV DC between two vertically pointed tungsten electrodes in de-ionized water. Evaporation of atomic tungsten from the electrodes after plasma generation and its oxidation by reactive radicals leads to the NP synthesis. Raman spectrum (Fig.1.12) provides the compositional difference of the three samples (synthesized WO_{3-x}, Commercial bulk and nano WO_3). It has been observed that for the synthesized NPs W – O – W and W^{6+} – O band appears at 270 and 711 cm^{-1} rather than 274 and 716 cm^{-1} respectively for Commercial bulk & nano WO_3. These shift suggest the formation of WO_{3-x} structure by the creation of oxygen vacancies. TEM image (Fig.1.13a) shows formation of irregular shaped nanoparticles. Polycrystalline nature of the nanoparticles has been observed from the selected area electron diffraction (SEAD) pattern of randomly sitting nanoparticles (Fig.3b). Presence of discontinuities (Fig.1.13(c-d)) indicate lack of oxygen atoms in the stoichiometric WO_3.

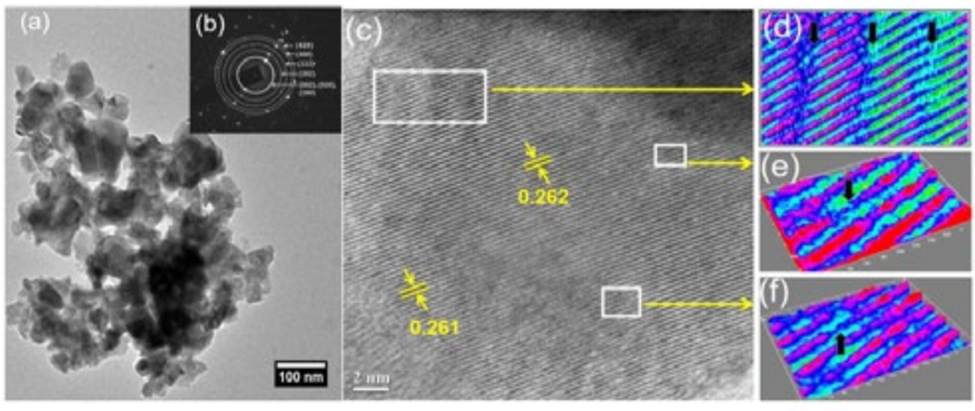


Fig.1.13. (a) TEM image, (b) SEAD pattern, (c-d) discontinuity in the crystal planes of WO3-x NPs

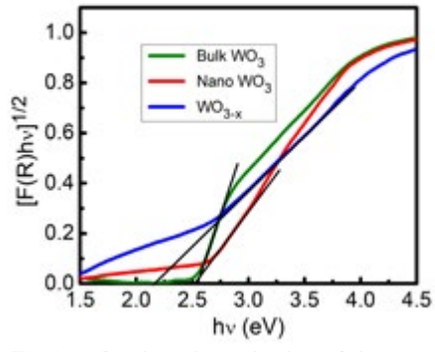


Fig.1.14. Bandgap determination of the samples.

Formation of oxygen vacancies and surface defects may be attributed to the bombardment of energetic electrons on the surface of as-formed nanoparticles. The bandgap of the bulk WO_3, nano WO_3 and WO_{3-x} nanoparticles are found to be around 2.54, 2.51 and 2.16 eV respectively (Fig.1.14). Narrow bandgap clearly indicates the creation of defect sates within the fundamental bandgap of WO_{3-x} NPs. Narrow bandgap WO_{3-x} NPs can be effectively use as a photo-catalyst.

B.3. Development of plasma modified bio-membrane for Fuel cell:

Fuel cell is the most promising renewable source of energy in the near future. The fuel cell research have seen a remarkable growth in the recent years as scientists have successfully developed fuel cell assemblies for electricity generation through efficient proton conduction. However, the key components of fuel cell, electrode and membrane are still very costly as it uses high percentage of Pt and Nafion respectively. This issue can be tackled by reducing the amount of Pt on the electrodes and using low cost membranes. At IASST we are working on natural bio-membrane (extracted from betel nut leaf) containing electronegative groups as a potential electrolyte through sulfonated polypropylene deposition and low loaded Pt/Ag electrode catalysts prepared by using plasma co-sputtering method. Performances of a virgin and the plasma modified bio membrane in PEMFC as an electrolyte are tested using single fuel cell station. Plasma polymerization of propylene and Triflouromethane sulfonic acid (TMSA) mixture is carried out in rf plasma. Plasma parameters and hence plasma grafting are controlled by varying the discharge conditions. After polymerization, the presence of propylene and sulfonic acid groups is confirmed from the FTIR spectra of deposition over silicon wafer. Fig. 1.15 depicts FTIR spectra of the treated plasma polymerized bio-membranes at different time.

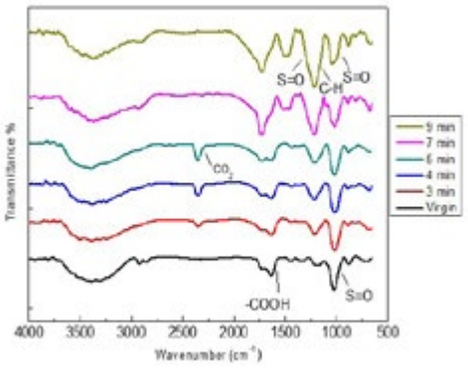


Fig. 1.15. FTIR spectra

Proton conductivity of the prepared membranes increases with deposition time which is higher than the virgin membrane. The average roughness (37 – 340 nm) of the bio-membrane decreases as the deposition time decrease as found from the AFM analyses. These nano structures are responsible for the overall conductivity of the membrane. The contact angle of the membrane increases with the increase in deposition time as polypropylene content increases. The maximum power density is found to be 242 mW/cm^2 by using the bio-membrane polymerized for 11 min deposition time which is almost six-fold increase than the virgin bio-membrane.

B.4. Development of low loaded Pt based binary catalyst electrode for Proton Exchange Membrane (PEM) fuel cell

We use co – sputtering technique in a magnetron discharge plasma to develop Pt based alloy catalyst for fuel cell electrode assembly. Two targets Pt (Platinum) and Ag (Silver) are simultaneously sputtered on carbon paper. This catalyst deposited carbon paper is used as GDL (Gas Diffusion Layer) for fabrication of Membrane Electrode Assembly (MEA). Discharge parameters such as power, deposition time, base pressure and target substance distance are optimized to obtain desired characteristics of the catalyst.

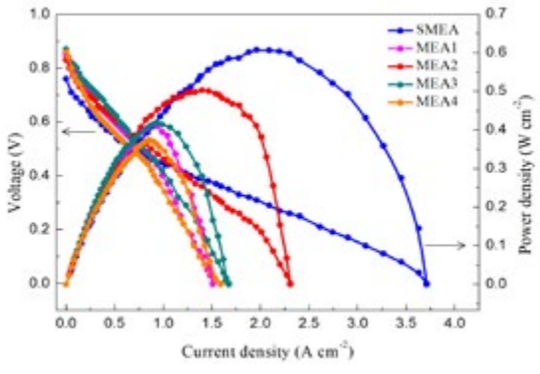


Fig.1.16. Polarization curve for plasma polymerized bio-membrane for different deposition time.

AFM analysis of the prepared samples reveals the formation of conical nanopillar structures. The density and height of the pillars are found to increase with increase in loading up to a certain value. These nanopillars offer more Effective Surface Area (ESA) for the electrochemical reaction to take place than compared to a normal smooth thin film. The catalytic activities of the fabricated samples are studied with the help of cyclic voltammetry.

The cell performance of the prepared MEAs is measured in a single fuel cell test station in terms of polarization curves and is shown in Fig. 1.16. The maximum power density is recorded to be 412.56, 503.19, 419.69 and 374.16 mW cm^{-2} for three different samples respectively. The Pt_Ag mass-specific power density of the co-sputtered electrode is found to be 8 times higher than the standard electrodes. The loading of the best prepared MEA is 10 times lower than the standard electrode's loading and the cell performance achieved is comparable to that of standard cells. Thus it can be concluded that binary Pt_Ag catalyst loading can be significantly reduced by plasma magnetron co-sputtering method.

C. Development of SURYA-TERELLA device for student's outreach programme

The Aurorae are spectacular phenomena in polar regions of the Earth atmosphere. It offers an entrancing, dramatic, magical display that fascinates all who see it. Since the beginning of time, people have tried to understand what causes the aurorae, resulting in a myriad of myths and legends. But it was only a hundred year ago, when Norwegian physicist Kristian Birkeland led a daring expedition to the top of an arctic mountain, scientists realised that the aurorae are created by charged particles from the Sun travelling along the Earth's magnetic field lines and exciting our atmosphere. Back in his laboratory in Oslo, Birkeland proved his hypothesis to the world with a famous experiment where he created auroral light around magnetic spheres inside a small vacuum chamber. Recently, a modernized version of the Terrella (a little Earth) has been designed. This Planeterrella experiment is very flexible, allowing the visualization of many phenomena occurring in our space environment. Although the Planeterrella was originally designed to be small to be demonstrated locally by a scientist, it has proved to be a very successful public outreach experiment in the western world. Some of the well-known plasma laboratories having Planeterrella set up are: University Paris Diderot, France, University of Iowa, University of California, Los Angeles, and University of Leicester, UK.

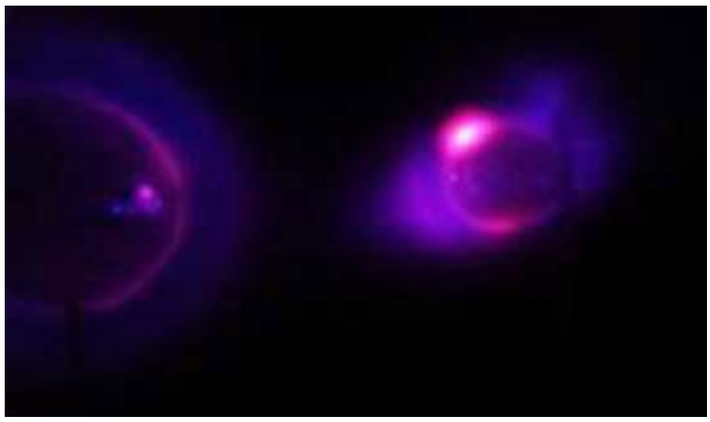


Fig. 1.17. Photograph of aurora formation on the polar region of the Earth (right). The Sun is seen on the left.

At IASST, Guwahati, we have developed the device to demonstrate the Sun – Earth interaction in the laboratory. The device has special capability to demonstrate some characteristic event on the solar surface and the magnetosphere of the Earth. We therefore named it as Surya-terella. To the best of our knowledge this device is the first of its kind in the country. The miniature Earth-Sun system placed inside a glass vacuum chamber (60 cm in diameter and 50 cm in height) is capable of viewing aurora (Fig. 1.17), demonstrate a plasma ring or swarms of ions in the magnetosphere that circle the planet's equatorial plane. The most fascinating demonstration of this experiment is the Bow shock phenomena of the Earth's magnetosphere due to reflection of solar wind (Fig. 1.18).

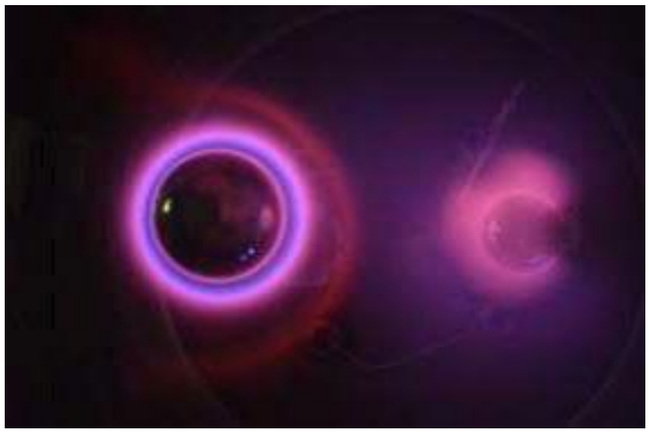


Fig. 1.18. Photograph of the plasma ring and Bow shock formation around the Earth (left). The Sun is seen on the right.

Fig. 1.19. Student visitors enjoying Surya –terella demo as a part of outreach program. More than 1500 students have enjoyed live demoat IASST this year

Subir Biswas

Assistant Professor-II

Dr. Subir Biswas did his PhD from Saha Institute of Nuclear Physics (Calcutta University), Kolkata. He did Post-doctoral research at Weizmann Institute of Science, Israel (period: November 2014 to January, 2019) and Saha Institute of Nuclear Physics, Kolkata (period: May 2013 to October 2014). Dr. Biswas joined IASST as Assistant Professor-II in Physical Science Division on February, 2018. His field of specialization is on experimental plasma physics (e.g., waves-instabilities in plasma, spectroscopic diagnostics of plasma).

Research Summary

In the core region of Tokamak, high density pulse power plasma or in the collisional plasma where material probe cannot be used due to high heat flux or high collisionalities, optical emission spectroscopy can be employed for plasma diagnostics. I am involved in determining the plasma density and electron temperature from the Stark broadening of the line and intensity ratio of lines of the atmospheric pressure plasma used for material processing. I have a collaboration of Weizmann Institute of Science, Israel for spectroscopic determination of electric and magnetic field and the plasma parameter of a self-focusing electron beam diode. I also started a collaboration for determining the magnetic field from Zeeman spectroscopy of ADITYA-U tokamak group of Institute for Plasma Research (IPR), Gandhinagar. I am also now reviewing on the zonal flow and turbulences experiments in laboratories, an important area research both in fusion and astrophysical plasma, so that facilities of such experiments would be build here in IASST.

N. C. Adhikary

Technical Officer - B

Dr. Nirab C. Adhikary obtained PhD from Gauhati University in Plasma Physics in 2010 and did Post-Doctoral Research at Yokohama National University, Japan during 2010-2011. He has published 39 papers in the area of Plasma Physics, Nano Technology, Electronics & Fuel Cell Technology.

Research Summary

In a work the propagation characteristics of ion-acoustic solitary waves in an unmagnetized thermal electron-ion plasma is studied under the influence of relativistic positron beam. Using the reductive perturbation technique, the KdV equation is derived which governs the evolution of weakly nonlinear ion-acoustic solitons in relativistic beam driven plasmas. The effects of the plasma parameters, namely the ion to electron temperature ratio, the beam to electron temperature ratio and the relativistic parameter due to the flow of positron beam on the profiles of the ion-acoustic solitons are studied. It is found that the propagation characteristics of ion-acoustic solitons are significantly modified by these plasma parameters as well as by the relativistic factor V_b (shown in Fig.1)

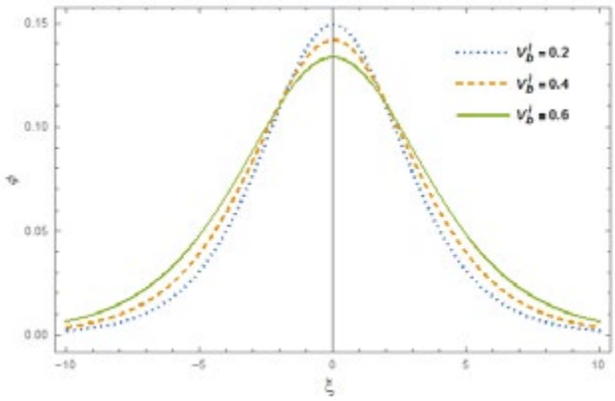


Fig. 1. Soliton solution is plotted w.r.t the spatial variable x with the relativistic effect V_b'.

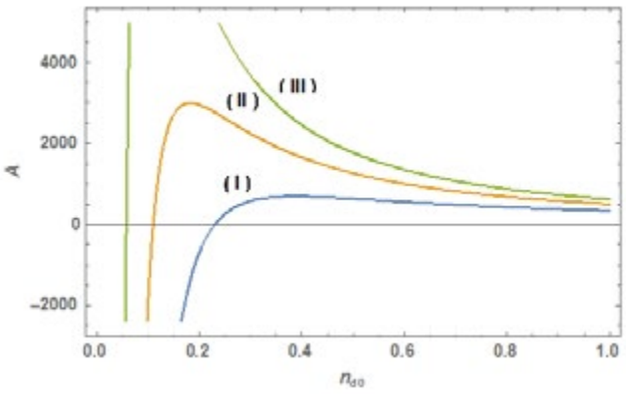


Fig. 2. Variation of nonlinear coefficient A with dust density n_{d0} for shock waves relevant in the radial spokes of Saturn's ring region.

In another work nonlinear wave phenomena in a multicomponent plasma with Maxwellian electrons and ions including the effects of dust charge fluctuations in plasma acoustic modes is studied here. Different aspects of nonlinear dynamics have been studied through the Korteweg-deVries (K-dV) equation (solitons) and Burgers equation (shocks) derived by reductive perturbation technique.

Here, a special method, known as (G'/G) method, has been used for solution. It predicts successfully the different coherent features of various nonlinear waves and finally their importance has been recognized in space plasmas. Evolutions have been shown with the input of appropriate typical plasma parameters to support our observations in space plasmas and the variation of nonlinear coefficient A with dust density is shown in Fig.2.

Research Output

Extramural projects

Completed projects in 2018

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Achievement
Development of Plasma modified bio-membrane and low loaded catalyst for fuel cell by plasma process.	Funding Agency: DST-SERB Total fund: Rs. 36,31,940.00 Duration: 3 Years 2 months PI/Coordinator: Joyanti Chutia Co-Investigator: Arup R. Pal	1. It is for the first time that a natural bio-membrane (from Areca Catechu leaf) has been used as proton conducting membrane in a fuel cell as the membrane contains electronegative carboxylic and sulfonic acid group. The proton conductivity, Ion exchange capacity and fuel cell performance of the virgin bio-membrane is enhanced by grafting it with sulfonated polypropylene by plasma process. 2. Plasma co-sputtered Pt-Ag binary catalyst electrodes have been developed for PEMFC to reduce Pt loading. High electrochemical activity of the co-sputtered catalysts has been observed. Prepared low loaded Pt/Ag electrodes have 8 times higher mass specific power density than standard MEA.

Ongoing projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
Study of dynamical behavior of nanodusty plasma produced in a reactive gas discharge	Funding Agency: Dept. of Science and Technology (DST) Total fund: Rs. 31,00,000.00 Duration: 3 years PI/Coordinator: Sumita K. Sharma, DST Women Scientist	1. Study of dust formation using reactive gas in plasma under different inert gas environments and optimization of discharge parameters for controlled growth. 2. Parameterization of nanodusty plasma containing plasma grown particles in reactive gas discharge. 3. Study of low frequency wave dynamics, structure formation processes and instabilities involving plasma grown dust particles.

Publications

In cited journals

Author's name	Title	Journal name	Volume & Issue no./page no.	Month/Year of publication
Yoshiko Bailung, Tonuj Deka, Abhijit Boruah, Sumita K. Sharma, Arun R. Pal, Joyanti Chutia and Heremba Bailung	Characteristics of dust voids in a strongly coupled laboratory dusty plasma	*Physics of Plasmas*	25/053705	May/2018
R Sarma, A P Misra, N C Adhikary	Nonlinear ion-acoustic solitary waves in an electron-positron-ion plasma with relativistic positron beam	*Chinese Physics B*	*27(10)/ 105207*	2018
S Thakur, SM Borah, N C Adhikary	A DFT study of structural, electronic and optical properties of heteroatom doped monolayer graphene	*Optik*	*168(2)/ 228*	2018
R Sarma, GC Das, R Das, N C Adhikary	On the nonlinear solitary and shock waves in Maxwellian multicomponent space plasma	*Physics of Plasmas*	*25 (7)/ 073704*	2018
M Goswami, N C Adhikary, S Bhattacharjee	Effect of annealing temperatures on the structural and optical properties of zinc oxide nanoparticles prepared by chemical precipitation method	*Optik*	*158/1006*	2018

Presentation in Conferences/seminars

Invited talks

Faculty	Title	Programme Name	Date & Venue
Heremba Bailung	Experimental observation of cylindrical dust acoustic soliton in a strongly coupled dusty plasma	2nd Asia-Pacific Conference on Plasma Physics (AAPPS-DPP 2018)	12th – 17th November, 2018, Kanazawa, Japan
Heremba Bailung	Some new experimental aspects of ion acoustic and dust acoustic waves	33rd National Symposium on Plasma Science and Technology (PLASMA - 2018)	4th – 7th December, 2018, Dept. of Physics and Astrophysics, University of Delhi
Sumita K. Sharma	Dust dynamics observed in an in-situ grown nanodusty plasma	National Conference: Trends in Modern Physics 2019	22nd – 23rd February, 2019, Physics Department, Assam Don Bosco University, Guwahati
Heremba Bailung	Experimental aspects of ion acoustic and dust acoustic waves	Recent Trends in Basic Plasma Research	8th March, 2019, Centre for Plasma Physics-IPR, Guwahati

Contributory

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Binita Borgohain and Heremba Bailung	Sheath Characteristics in a magnetically filtered low density and low temperature plasma	19th International Congress on Plasma Physics (ICPP-2018)	Poster	4th – 8th June, 2018, Vancouver, Canada
Abhijit Boruah, Bhabesh Kr. Nath, Joyanti Chutia and Arup R. Pal	Development of plasma modified bio-membrane for Proton Exchange Membrane Fuel Cell (PEMFC)	International Conference on Renewable & Alternate Energy (ICRAE- 2018)	Poster	4th – 6th December, 2018, Assam Science and Technology University (ASTU), Guwahati
Ibnul Farid, Abhijit Boruah, Joyanti Chutia and Heremba Bailung	Low loaded Pt_Ag binary catalysts anode electrode for PEM fuel cell by plasma co-sputtering method	International Conference on Renewable & Alternate Energy (ICRAE- 2018)	Poster	4th – 6th December, 2018, Assam Science and Technology University (ASTU), Guwahati
Bidyut Chutia, Tonuj Deka, Yoshiko Bailung, Sumita K. Sharma and Heremba Bailung	Characterization of in situ grown dust particles in a capacitively coupled rf discharge	33rd National Symposium on Plasma Science and Technology (PLASMA - 2018)	Poster	4th – 7th December, 2018, Dept. of Physics and Astrophysics, University of Delhi, Delhi
Tonuj Deka, Sumita K. Sharma and Heremba Bailung	Observation of spontaneous rotation of dust cloud in an unmagnetized dusty plasma containing carbon nanopowder	33rd National Symposium on Plasma Science and Technology (PLASMA - 2018)	Poster	4th – 7th December, 2018, Dept. of Physics and Astrophysics, University of Delhi, Delhi

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Yoshiko Bailung, Tonuj Deka, Bidyut Chutia, Sumita K. Sharma, Joyanti Chutia and Heremba Bailung	Dependence of dust voids on probe potential and dust density	33rd National Symposium on Plasma Science and Technology (PLASMA - 2018)	Poster	4th – 7th December, 2018, Dept. of Physics and Astrophysics, University of Delhi, Delhi
Palash Jyoti Boruah, Rakesh R. Khanikar and Heremba Bailung	In-liquid plasma discharge for synthesis of Copper Oxide (CuO) nanospindles	33rd National Symposium on Plasma Science and Technology (PLASMA - 2018)	Poster	4th – 7th December, 2018, Dept. of Physics and Astrophysics, University of Delhi, Delhi
Rakesh R. Khanikar, Palash J. Boruah and Heremba Bailung	Formation of super-hydrophobic surface with hexamethyldisiloxane (HMDSO) coating by cold atmospheric pressure plasma polymerization	33rd National Symposium on Plasma Science and Technology (PLASMA - 2018)	Poster	4th – 7th December, 2018, Dept. of Physics and Astrophysics, University of Delhi, Delhi
Tonuj Deka, Bidyut Chutia, Yoshiko Bailung and Heremba Bailung	FFT spectral analysis technique as a diagnostic tool for dusty plasma with nanometer size dust particles	Recent Trends in Basic Plasma Research	Poster	8th March, 2019, Centre for Plasma Physics-IPR, Guwahati
Yoshiko Bailung, Joyanti Chutia and Heremba Bailung	Experimental study of dusty plasma flow past a dust void	Recent Trends in Basic Plasma Research	Poster	8th March, 2019, Centre for Plasma Physics-IPR, Guwahati

Conferences/Workshops/Meetings attended

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Palash Jyoti Boruah	5th ASEAN School on Plasma and Nuclear Fusion (ASPNF2019) and SOKENDAI Winter School	January 21-25, 2019 Mahidol University, Bangkok, Thailand
Ibnul Farid	5th ASEAN School on Plasma and Nuclear Fusion (ASPNF2019) and SOKENDAI Winter School	January 21-25, 2019 Mahidol University, Bangkok, Thailand

Awards/Recognitions/Achievements

Name	Particulars
Prof. H. Bailung	Nominated as Member of the Programme Advisory Committee of DST-SERB (High Energy Physics, Plasma Physics..)
Yoshiko Bailung	Awarded DST-INSPIRE SRF by Department of Science and Technology (DST) on 2nd June, 2018
Tonuj Deka	Awarded CSIR – SRF Fellowship 2019 by Council for Scientific and Industrial Research (CSIR)
Yoshiko Bailung	Received Best Poster prize for the poster presentation entitled "*Experimental study of dusty plasma flow past a dust void.*", at the Recent Trends in Basic Plasma Research held at Centre of Plasma Physics-IPR at Guwahati on 8th March, 2019.

ADVANCED MATERIAL SCIENCES

The research activity of Advanced Materials Science group of IASST includes areas like sensor developement, synthesis and simulation of materials having applications in energy and environment sectors, soft materials and their properties and designing of materials for biomedical applications. One major focus of this group is to develop sustainable and environment friendly carbon and non-carbon based hybrid nanomaterials through comprehensive bottom up strategy for applications in bio-medical field, drug delivery, catalysis, sensors, optoelectronic devices etc. Significant effort is going on in the field of soft matter physics with emphasis on thin films of fatty acids, lipids, proteins, polymers, nanomaterials, etc. A group effort has also been initiated to understand plasmonic activities in nanostructures for photocatalytic and photovoltaic applications using experimental as well as theoretical approaches. The Advanced Materials Science group is in active collaboration with the Life Science Group of IASST in developing materials for biological application.

First row (L to R) : Anamika Kalita, DST INSPIRE Faculty; Biswajit Choudhury, DST INSPIRE Faculty; Neelotpal Sen Sarma, Assoc. Prof-II; Devasish Chowdhury, Assoc. Prof-II; Munima B. Sahariah, Assoc. Prof.-I; Sarathi Kundu, Assoc. Prof.-I; Arup Ratan Pal, Assoc. Prof-II.

Second row (L to R) : Sanu Sarkar, JRF; Ujjal Saikia, SRF; Babul Ch. Deka, MTS; Gautomi Gogoi, SRF; Bandita Kalita, SRF; Sweety Biswasi, JRF; Ankita Deb, JRF; Trishamoni Kashyap, Research Asstt.; Sristi Mazumdar, SRF; Payal Saha, JRF; Deepshikha Gogoi, SRF; Jahnabi Gogoi, JRF; Shantanu Podder, JRF; Suman Sarkar, JRF; Sanjib Sau, JRF; Bablu Basumatary, JRF; Purbajyoti Bhagowati, JRF.

Third row (L to R) : Sazzadur Rahman, JRF; Samarin Upadhaya, JRF; Subhankar Pandit, JRF; Hrishikesh Talukdar, SRF; Jyotisman Bora, JRF; Raktim Jyoti Sarmah, JRF.

Neelotpal Sen Sarma

Associate Professor-II

Dr. Neelotpal Sen Sarma completed his Ph.D from Dibrugarh University in 2001. He joined IASST in the year 2002 and developed the Polymer Section of Material Sciences Division which was merged in Advanced Material Science Program (AMSP) of PSD. Solid State Ionics, Liquid Crystalline Polymers, Hydro and polymer gels, Bio and chemosensors and synthesis of high value polymers are his research interest. He has so far published 68 papers and supervised nine Ph.D. research scholars. Two of his filed five Indian patents already granted.

Research Summary

The research focus of Advanced Materials Science group of IASST is on the development of sensors, energy and environment, various aspects of soft materials and designing materials for biomedical application. Here is a brief account of the research activity during last one year.

Cholesterol-aminoacid conjugates treated filter paper-based photoluminescence indicator for nitroaromatic chemicals

Selective detection of explosive materials is essential to the current world scenario from the perspective of health, safety, and environment. Here, we have developed and characterized a couple of bio-based conjugated systems, viz. cholesterol-tryptophan and cholesterol-cysteine for the detection of nitroaromatic explosive chemicals. The presence of tryptophan moiety introduces fluorescence property to the non-fluorescence cholesterol backbone, and hence it was used as a tag molecule to prepare photoluminescent filter papers which serve as indicators for picric acid and dinitrosalicylic acid. These paper strips undergo instant quenching in the presence of the experimental analytes under the UV irradiation, which could be visualized through the naked eye. The amount of quenching is found to be proportional to the concentration of the analytes. The limit of detection for picric acid and dinitrosalicylic acid was estimated to be about 33 nM and 48.7 nM respectively, and the mechanism of this quenching is mainly due to fluorescence resonance energy transfer between the fluorophore and the quencher. Also, the vapor of picric acid completely diminishes the photoluminescence of the filter papers.

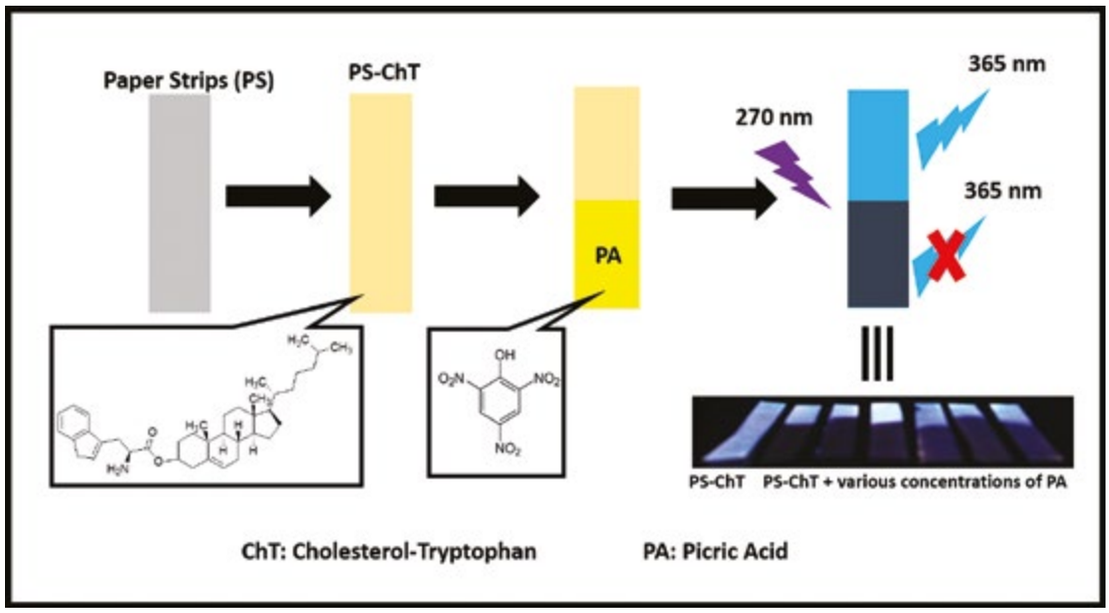


Fig. 1. Photographs of fluorescent filter paper strips of ChT treated with different concentration of PA. These photographs were taken with a digital camera placed inside of the UV-cabinet without the flash.

Development of Bright Fluorescent Poly(1-vinyl-2-pyrrolidone-co-acrylonitrile) and Its Polysalts with HCl and HNO_3: Materials for Solid State Electrical Applications

Herein, we have reported the synthesis, characterization, and ionic conductivity analysis of fluorescent poly(1-vinyl-2-pyrrolidoneco- acrylonitrile) and its salts with HCl and HNO_3 in solid state. The synthesized polymers and their polysalts were characterized using different analytical and spectroscopic techniques. The AC conductivities were measured in varying frequency and temperature in solid state. Ionic conductivities of the salts of the copolymer with hydrochloric acid and nitric acid were found to be 2.145×10^{-5} and 2.349×10^{-5} S cm $^{-1}$, respectively, which are nearly 1000 times more than that of poly(1-vinyl-2-pyrrolidone-co-acrylonitrile). The activation energies for the copolymer and the polyelectrolytes were found to be 0.454, 0.6288, and 0.659 eV, respectively. The transport number of the copolymers was found to be 0.0278, and that of the polysalts was found to be 0.7596 and 0.7424, respectively. The copolymer showed distinct fluorescent when irradiated with UV light and can be used as acid vapor sensor in solid state.

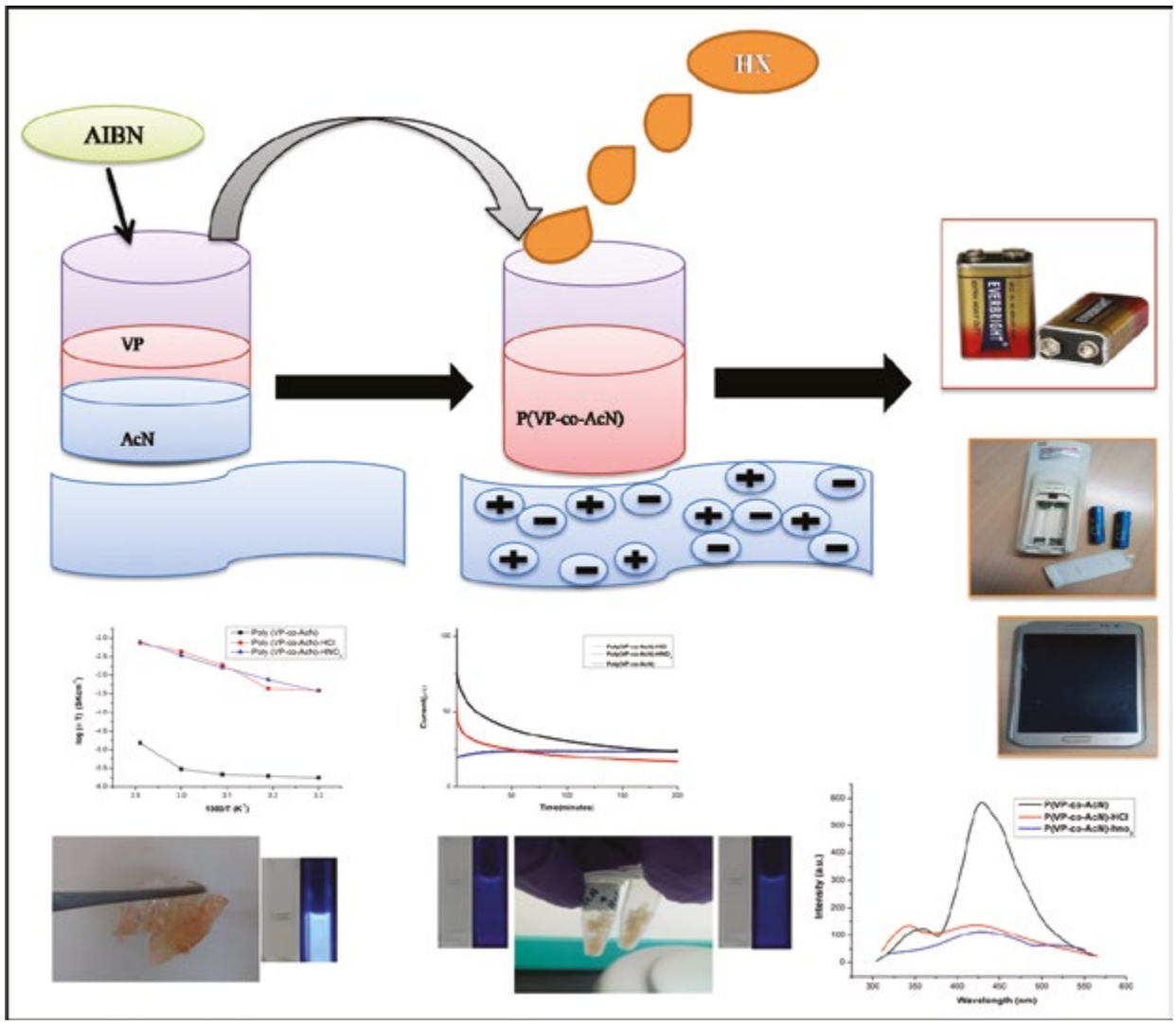


Fig. 2. Synthesis of the Bright Fluorescent Poly(1-vinyl-2-pyrrolidone-co-acrylonitrile) and Its Polysalts: its applications and sensing of acid vapour by the polymer.

Devasish Chowdhury

Associate Professor-II

Dr. Devasish Chowdhury received Ph.D from Indian Institute of Technology, Guwahati in 2004. He was a post-doctoral fellow at Weizmann Institute of Science, Israel from 2004 to 2007 and later a SERB Fast Track scientist at IIT Guwahati. He was also Visiting Scientist at University of Illinois, Urbana-Champagne, USA during 2009-10. His Material Nanochemistry Laboratory under AMSP works on development of comprehensive bottom-up strategy to fabricate hybrid nanomaterials for diverse applications in sensors, bio-medical, energy, environment and catalysis. He has more than 62 publications and 4 Indian patents to his credit.

Research Summary

Material Nanochemistry laboratory is fully devoted to the development of hybrid nanomaterials with useful properties. The objective of the laboratory is to develop comprehensive bottom-up synthetic strategy to fabricate variety of hybrid biomaterials, carbon based nanomaterials, polymer nanocomposites for diverse applications.

With this objective in mind last one year we developed an electrochemical sensing platform for detection of Bisphenol A. We devised methods of tuning the electrical properties of graphene and functionalized graphene sheets. Efforts were also made to prepare p-type and n-type nanocomposite from graphene oxide.

Sensors

(1) Functionalized Graphene Oxide as an Electrochemical Sensing Platform for Detection of Bisphenol A

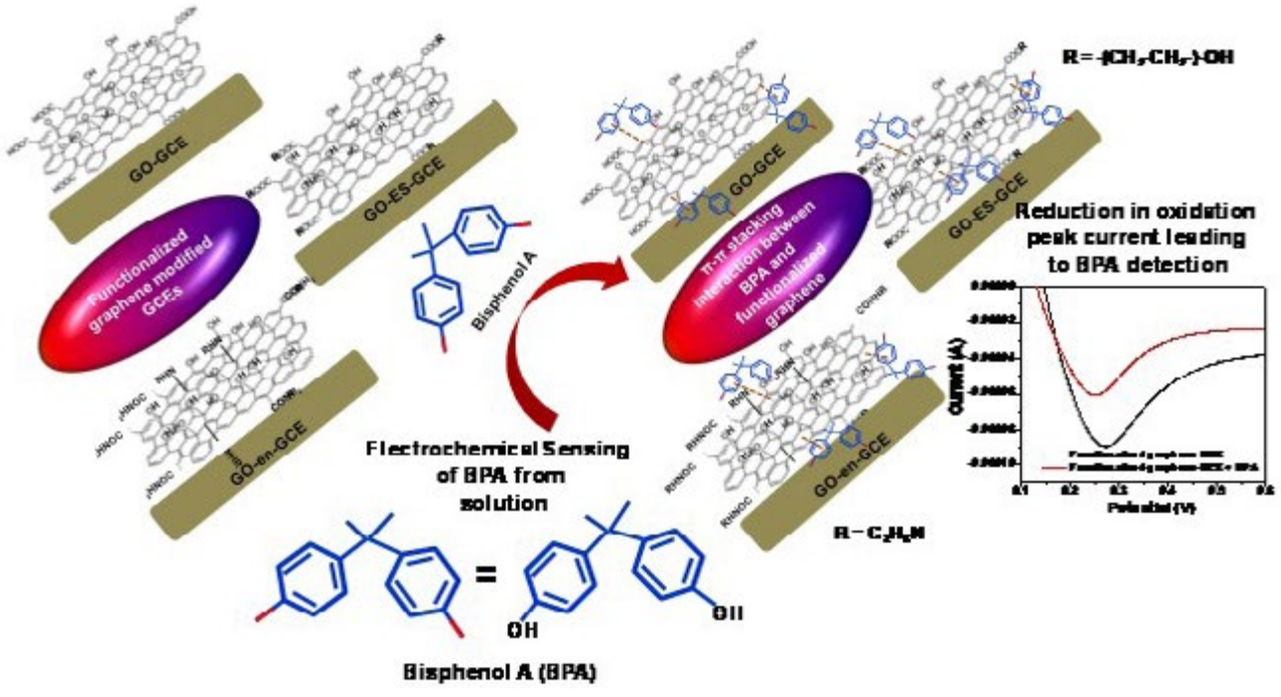


Fig. 1. Schematic representation of the electrochemical sensing of BPA in solution as a result of π-π stacking of BPA molecules on the functionalized graphene modified GCEs.

This work demonstrates the electrochemical detection of the endocrine disruptor Bisphenol A in solution by three different types of functionalized graphene samples viz. graphene oxide (GO), ester functionalized graphene oxide (GO-ES) and amine functionalized graphene oxide (GO-en) modified glassy carbon electrode (GCE) using a very simple drop casting method without the use of any toxic organic compounds or polymeric binders via cyclic voltammetry. The system developed showed detection of BPA via a reduction in the oxidation peak current value associated with a significant shift in the peak potential value. The electrochemical sensing materials developed showed good sensitivity compared to already reported systems and furthermore high selectivity in presence of other structurally similar kinds of molecules in solution without the use of any toxic organic chemicals thereby demonstrating the practical applicability of the material and the technique developed. The practical viability of the material developed is also demonstrated via testing with a real plastic sample.

Tunning of Electronic properties of materials

(2) Surface Charge Induced Tuning of Electrical Properties of CVD Assisted Graphene and Functionalized Graphene Sheets

We demonstrate a new approach to tune the electrical properties of graphene and functionalized graphene. Graphene was synthesized using thermal chemical vapour deposition (TCVD) method on copper foil using precursor gas acetylene and co-catalyst H_2 gas. TCVD assisted graphene was successfully transferred onto a silicon wafer. Transferred graphene sheet was then functionalized to prepare graphene oxide (GO) and reduced graphene oxide (rGO). Different surface charge carbon nanoparticles, e.g. carbon nanoparticle with net positive charge and carbon nanoparticle with net negative charge were then immobilized on transferred graphene and functionalized graphene sheets. The idea is shown in the fig 2. The functionalized graphene and charge mobilized functionalized graphene were characterized by UV-visible spectroscopy, Fourier transformed infrared spectroscopy, scanning electron microscopy, and Raman spectroscopy. After immobilization of carbon nanomaterials, the a.c. electrical conductivity was found to increase the surface charge, electron density, and mobility. It was observed that negative surface charge immobilized graphene and functionalized graphene show higher conductivity. Thus, the electrical property of graphene and functionalized graphene can be tuned by surface modification with different surface charge carbon nanomaterials.

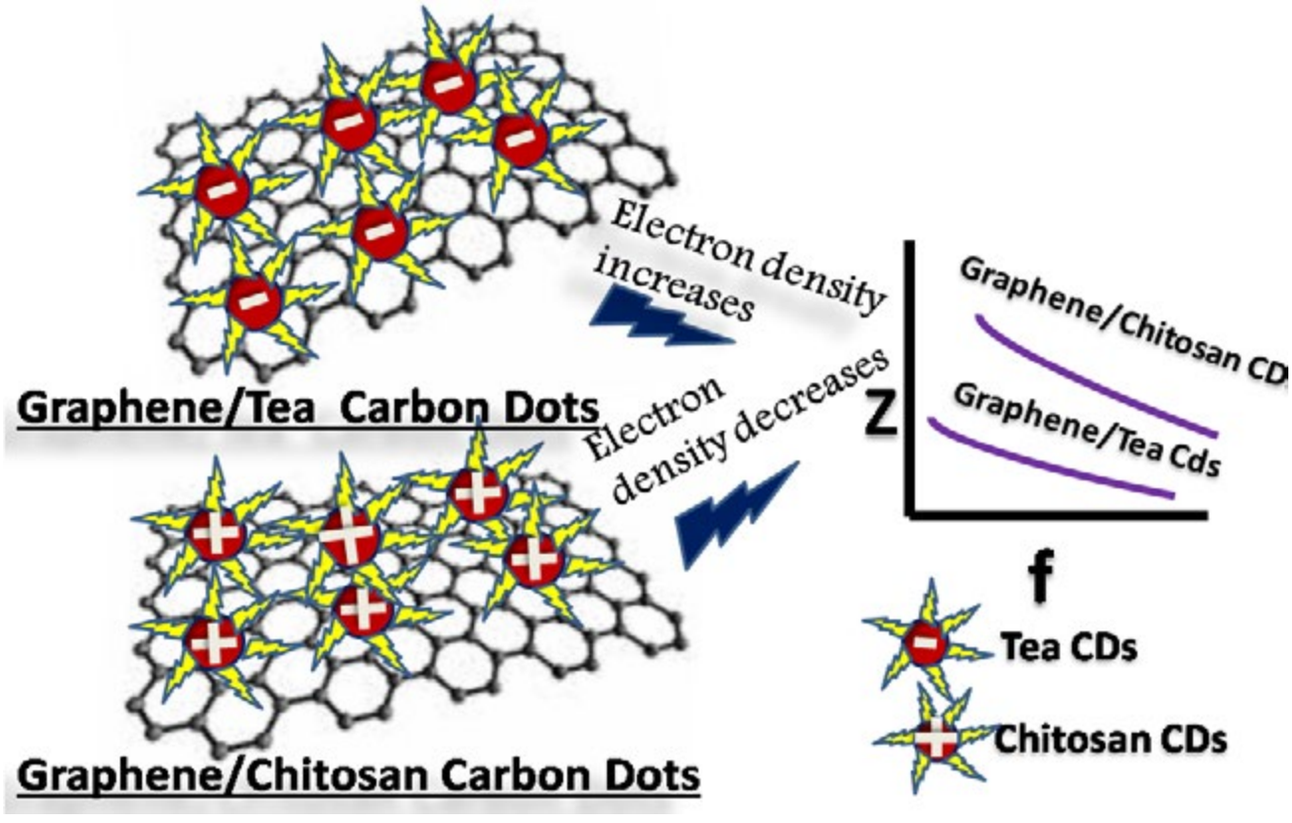


Fig. 2. Schematic representation of the probable mechanism for the difference in conductivity of tea and chitosan-carbon dots immobilized graphene system.

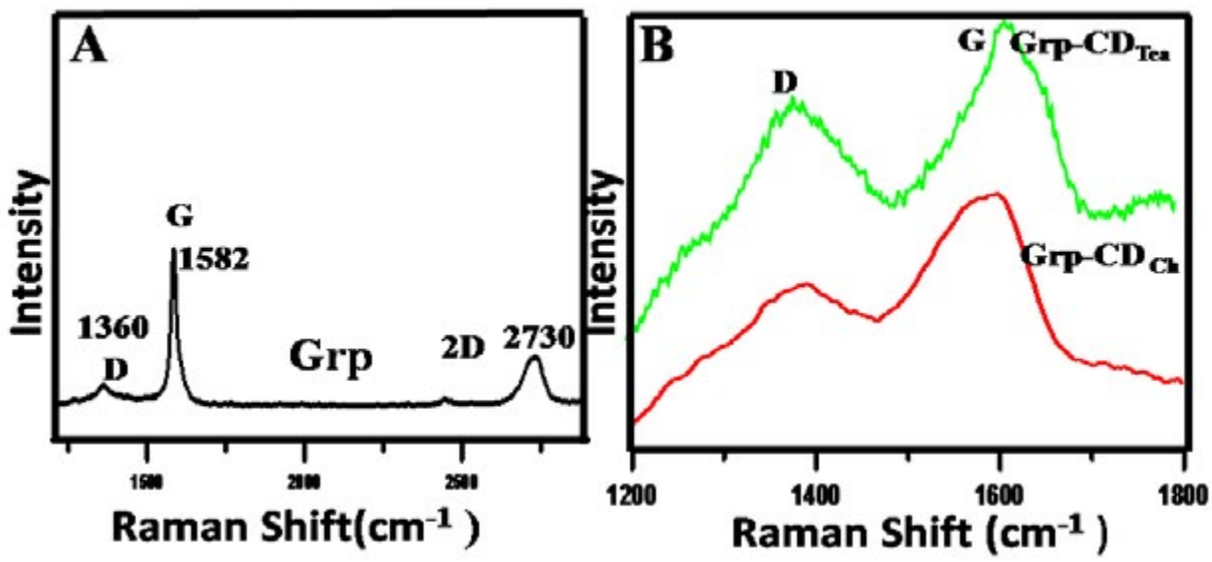


Fig. 3. Stacked Raman spectra of (A) Grp (transfer) and (B) comparision of D and G peaks of Grp-CD_{Ch} and Grp-CD_{Tea} on a silicon wafer substrate.

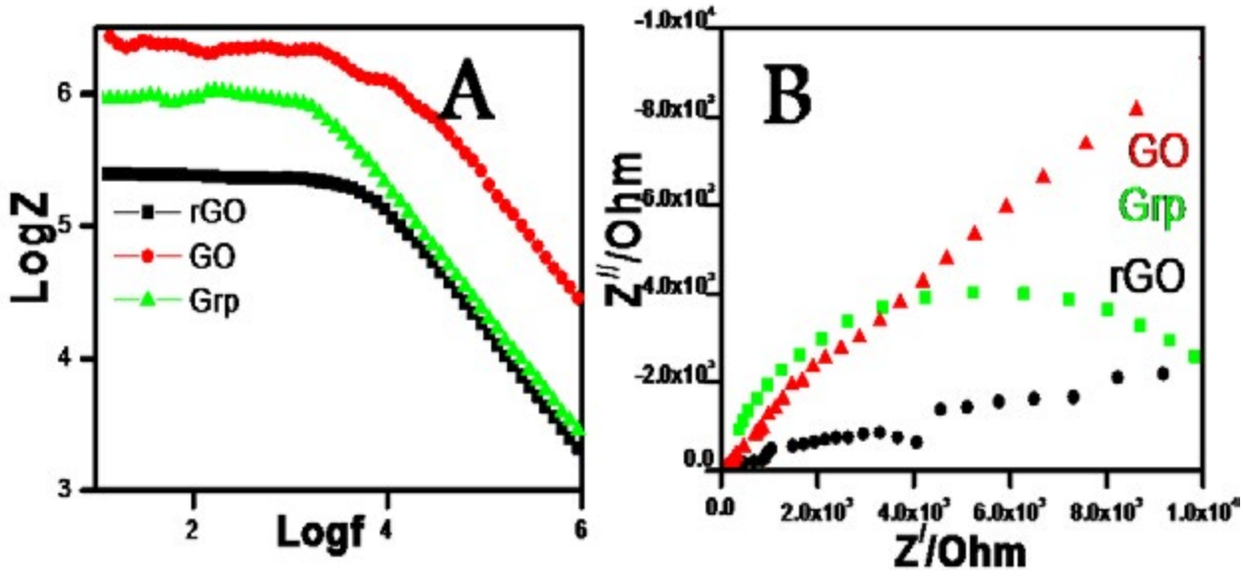
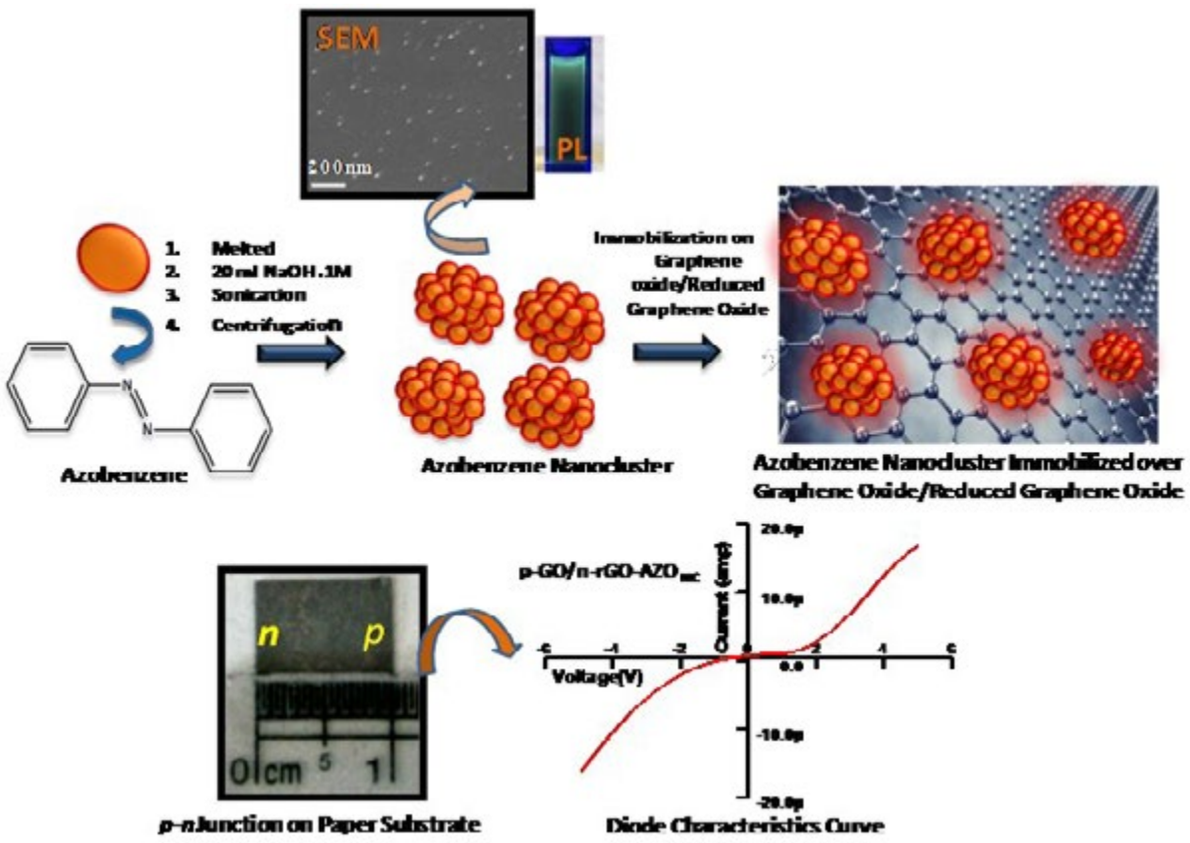


Fig. 4. logZ vs log*f* plot of (A) Grp, Grp-$CD_{Ch,}$and Grp-$CD_{Tea,}$(B) GO, GO-$CD_{Ch}$and GO-$CD_{Tea,}$(C) rGO,rGO-CD_{Ch} and rGO-$CD_{Tea.}$

(3) *p*-Type and n-Type Azobenzene Nanocluster Immobilized Graphene Oxide Nanocomposite

We have successfully synthesized azobenzene nanocluster from azobenzene molecules through a bottom-up approach. The synthesized azobenzene nanocluster shows beautiful green fluorescence and well dispersed in aqueous medium. Interestingly, the photoswitchable property of azobenzene molecules is also retained in the azobenzene nanocluster. Furthermore, we have synthesized successfully two types of functionalized graphene composites with the azobenzene nanocluster, one is with reduced graphene oxide (rGO) through π- π stacking, and other is direct immobilization on graphene oxide (GO). The electrical properties of rGO- azobenzene nanocluster reveal n-type behavior and GO p-type. Eventually, when rGO- azobenzene nanocluster and GO is coated on 1cm x 1cm filter paper substrate to form a junction it shows the characteristic curve of the diode successfully showing the use of the material in electronic devices.



Arup Ratan Pal

Associate Professor-II

Dr. Arup Ratan Pal earned Ph.D in Physics in the year 2006 from the Gauhati University, Guwahati for his research carried out in IASST labs. He did postdoctoral research work on plasma processing during 2007-2008 at the University of Maryland, USA with BOYSCAST fellowship awarded by the DST, Govt. of India. Currently he is working on plasma based synthesis of materials for optoelectronic devices.

Research Summary

Sub-bandgap photodetection using plasmonic nanostructures

Plasmon induced charge separation is strongly emerging as a potential method to complement the conventional photo responsive devices. There is strong possibility that it may also compete with the conventional photo devices in terms of overall performance including significantly enhanced operational life time. Here, fabrication of a self-powered photodetector sensitive towards infrared range has been realized by plasmonic-functionalization where plasmonic materials as well as the semiconductor is prepared by plasma based processes. Au nanoparticles (NPs) prepared by magnetron sputtering are taken as model plasmonic absorbers and a blend of Rubrene and plasma polymerized aniline (PPA) is taken as the facilitator for charge injection and transport in the device architecture. The photodetector structure is composed of PPA-Rubrene/Au photoactive film sandwiched between Indium Tin Oxide (ITO) and Aluminium (Al). From the material property analysis, this study reveals that the plasmon absorption band of Au can be extended up to the near IR region of the electromagnetic spectrum due to the particle size and distribution dependent property of Localized Surface Plasmon Resonance (LSPR) tuned by varying the plasma deposition conditions. Use of such optimized Au NPs in the device geometry leads to enhanced IR sensitivity.

Significantly improved photovoltaic property of the device with an open circuit voltage (V_{OC}) of 1.08 V is obtained with the addition of Au NPs in the device. As shown in Figure 1, it has been experimentally demonstrated that very efficient plasmon generated charge transfer between Au NPs and PPA-Rubrene system takes place leading to significant enhancement of infrared responsivity at the plasmon absorption band of Au with a peak at 850 nm (1.46 eV), whereas the semiconductor used in this device is having a wide bandgap of 3.50 eV. Thus, this study demonstrates how plasma based processes can be utilized to prepare plasmonic nano-materials and also to realize plasmon induced charge separation for devices responsive to infrared region of the electromagnetic spectrum with sub-bandgap detection capability.

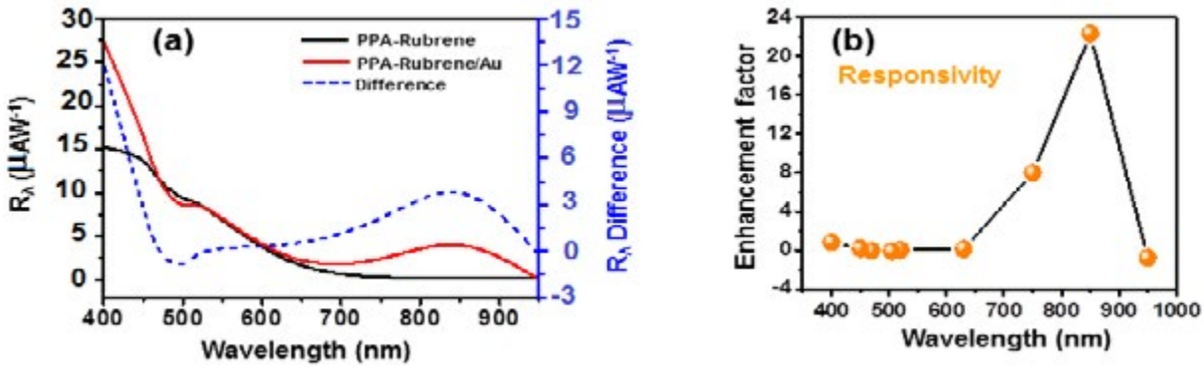


Fig. 1. (a) Responsivity (R_λ) of PPA-Rubrene and PPA-Rubrene/Au devices at zero bias along with the difference as a function of wavelength. (b) Responsivity (R_λ) enhancement factor of PPA-Rubrene/Au device at zero bias as a function of wavelength.

Sarathi Kundu

Associate Professor-I

Dr. Sarathi Kundu received Ph.D. from Jadavpur University for his Ph.D. research carried out in Saha Institute of Nuclear Physics, Kolkata. He did his Post-Doctoral research in University of Paris Sud, France and was a visiting Scientist in KEK, Japan. He specialises on soft matter physics with emphasis on thin films of fatty acids, lipids, proteins, polymers, nanomaterials and explore structures and properties of Soft and Nano materials using scattering, spectroscopic and microscopic methods.

Research Summary

Soft Materials

Soft materials show fascinating structural and physical properties. Such materials also have a wide range of technological applications. Different structures, interactions and properties are identified from such systems from their bulk and thin film conformations.

Conductivity of poly(3,4-ethylenedioxythiophene):poly(styrenesulfonate) (PEDOT:PSS) thin films is highly modified in the presence of cationic polyelectrolyte poly(diallyldimethylammonium chloride) (PDADMAC). In-plane electrical conductivity of the thin films of PEDOT:PSS and PDADMAC complex (designated as PED*PDA) are measured for one to five layers, i.e., $(PED*PDA)_1$ to $(PED*PDA)_5$ films prepared by spin-coating method and compared with the pristine PEDOT:PSS films. In addition, PDADMAC and PEDOT:PSS is spin coated on each other to form a bilayer unit (designated as PDA/PED) and one to five layers of such PDA/PED unit, i.e., $(PDA/PED)_1$ to $(PDA/PED)_5$ films are formed by alternate deposition and the conductivity is compared with the complex films. In-plane conductivity of PED*PDA is drastically higher than the pristine PEDOT:PSS and is nearly independent of the layer number, i.e., thickness of the film. However, for PDA/PED films, behavior of conductivity is different in comparison

with that of the complex films as the conductivity is found to increase for $(PDA/PED)_1$ to $(PDA/PED)_2$ and then decreases from $(PDA/PED)_3$ to $(PDA/PED)_5$ respectively. With the increase of the applying voltage, the linear nature of I-V curves remain unchanged. The structure, morphology and mechanism of conductivity enhancement are investigated through various characterization techniques. The strong electrostatic attachment between anionic PSS part of PEDOT:PSS and cationic PDADMAC is responsible for the drastic enhancement of conductivity as the percolation pathway enhances.

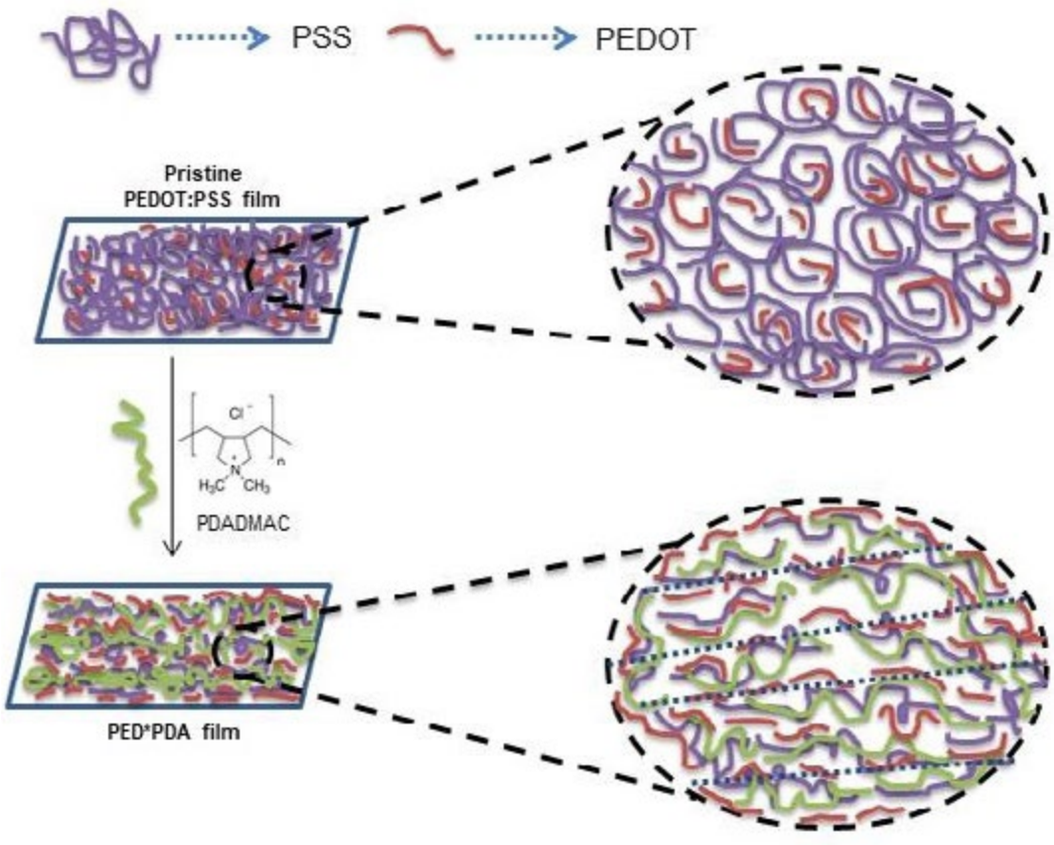


Fig. 1. Schematic illustration of the mechanism of conductivity enhancement of PEDOT:PSS in the presence of PDADMAC. The electrostatic attraction between positively charged PDADMAC and anionic PSS of PEDOT:PSS helps to form the conducting percolation path through PEDOT-PEDOT chain shown by the purple dotted lines which favors the increment of charge mobility.

Small angle neutron scattering study reveals that below the isoelectric point of the globular protein lysozyme and in the presence of different divalent (Mg^{2+}, Ca^{2+} and Ba^{2+}) and monovalent (Na^{+}) ions, the long-range repulsive and the short-range attractive interactions decreases and increases respectively with the increase of salt concentration. In addition with these short- and long-range interactions, fractal aggregates also form even in pure lysozyme solution by a very small amount (≈0.5%). Protein-protein interactions are mostly dominated by the fractal structure factor only for Na^{+} and Mg^{2+} ions at higher salt concentrations as more aggregates are formed.

Lysozyme protein-induced luminescent gold and copper nanoclusters (AuNCs and CuNCs) are prepared and their sensing capability is studied in the presence of different valent ions (Na^{+}, Ca^{2+}, Hg^{2+}, Pb^{2+}, Fe^{3+} and La^{3+} ions) in aqueous solutions of up to 100 μM salt concentration. Both types of nanocluster show good stability in aqueous conditions and, among all the chosen valent ions, it is found that maximum fluorescence quenching is observed in the presence of Hg^{2+} and Pb^{2+} ions for AuNCs and CuNCs, respectively. From steady-state fluorescence study and by using Stern–Volmer plots, the Stern–Volmer constant and other important thermodynamical parameters, i.e. changes in enthalphy, entropy and Gibbs free energy, are calculated. We propose a two step interaction process between the nanoclusters and the dissolved ions: first the interaction occurs between the protein-coated nanocluster surface and the ions, followed by the interaction of the metallic nanocluster core with the ions. Although thermodynamic investigation implies that both types of interaction are electrostatic in nature, selective fluorescence quenching of AuNCs and CuNCs in the presence of Hg^{2+} and Pb^{2+} ions occurs due to noncovalent metallophilic interactions between the cluster core and the dissolved ions.

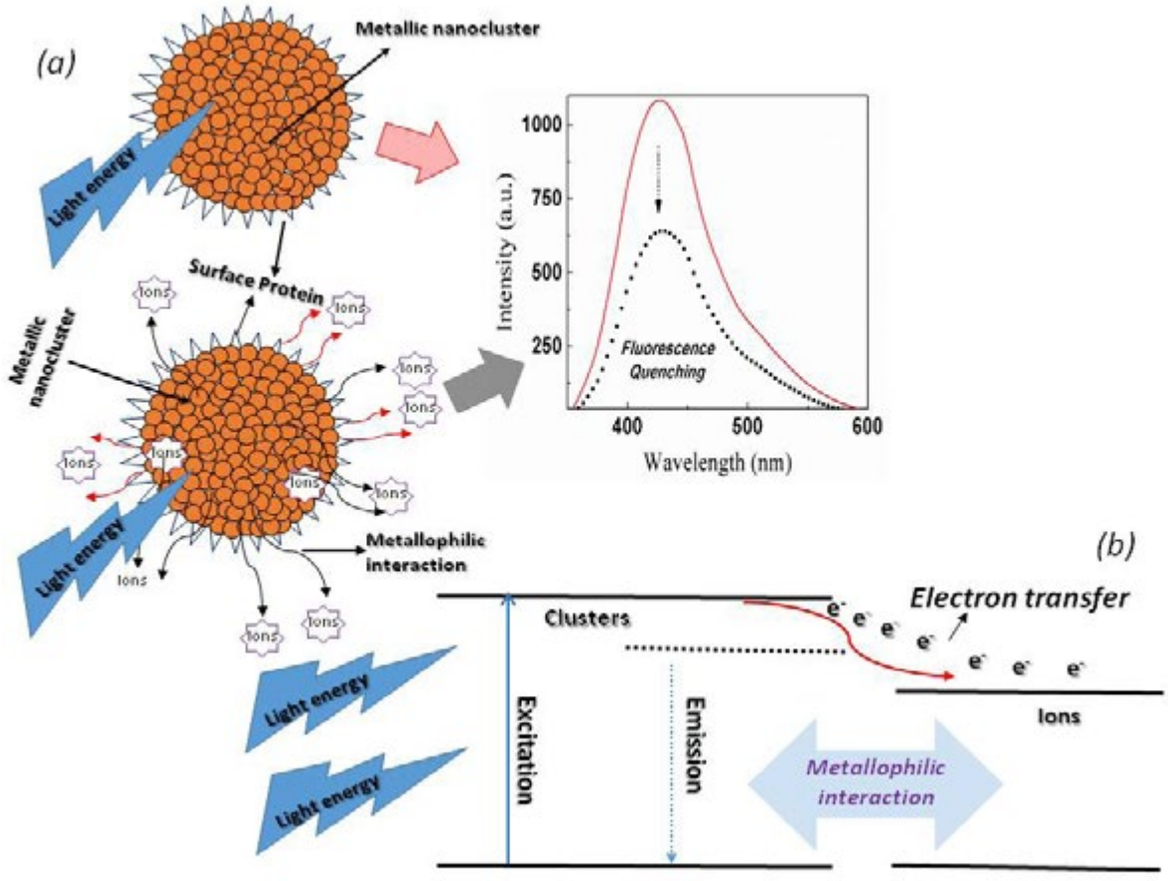


Fig. 2. A proposed schematic representation of (a) protein-ion, nanocluster-ion interaction and the corresponding fluorescence quenching, and (b) electron transfer mechanism from the electron rich nanoclusters core to the ion.

Structure, morphology and electrical behaviors of poly(3,4- ethylenedioxythiophene):poly(4-styrenesulfonate) or PEDOT:PSS thin films are investigated in the presence of protein-mediated green chemically synthesized positively charged gold and silver nanoparticles. The pure and PEDOT:PSS nanocomposite thin films are prepared by spin coating method. The presence of both nanoparticle and polymer is confirmed from X-ray diffraction, whereas composite formation is confirmed from Raman and FTIR spectroscopy. Atomic force microscopy (AFM) images show the surface morphologies of both pure and composite films, whereas average film thicknesses are obtained from AFM and X-ray reflectivity analysis. The presence of electrostatic interaction between the positively charged metallic nanoparticles and negatively charged PSS chains leads to the electrostatic shielding between cationic PEDOT and anionic PSS, which favors better charge transfer through PEDOT–PEDOT conducting paths. The increase in electrical conductivity is visualized from the current–voltage (*I–V*) curves, which show that the conductivity is relatively higher in the presence of silver than gold nanoparticles in the composite thin films. The conductivity of nanocomposite films is approximately five to six times enhanced in comparison with the pristine PEDOT:PSS thin films.

Fluorescence behavior of globular protein like BSA is studied under the re-entrant condensation in the presence of trivalent salts like YCl_3 and $LaCl_3$. BSA shows a re-entrant behaviour in solution where a specific turbid phase is formed between the two critical concentrations of the trivalent salts. Optical behaviors of proteins are explored by UV–Vis, photoluminescence and time resolved photoluminescence (TRPL) spectroscopy, whereas hydrodynamic size is obtained from the dynamic light scattering (DLS) technique. BSA shows maximum emission intensity at ≈ 338 nm for an excitation at 278 nm, however, the value of the peak intensity of emission gradually increases with the increase in salt concentration and becomes maximum at the turbid phase but for higher salt concentration as the re-dissolution takes place, the emission intensity again decreases. TRPL study suggests that the decay time of BSA under re-entrant condensation is correlated with the salt concentration, whereas DLS study shows that the hydrodynamic size gradually increases up to a certain salt concentration where turbid phase is formed and then again decreases for higher salt concentrations. The variation of emission intensity of BSA nearly follows the modification of diffusion coefficient or hydrodynamic size and the phase transition behaviors.

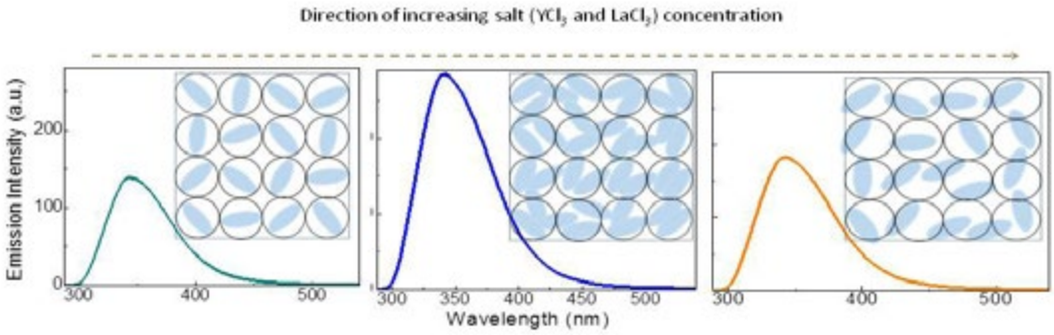
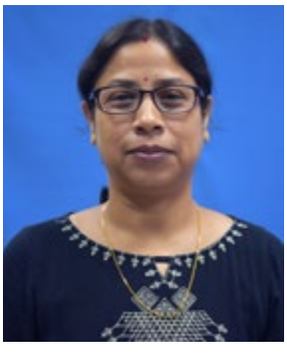


Fig. 3. Modification in optical emission under re-entrant condensation with increasing salt (YCl_3 and $LaCl_3$) concentration.

We have reported an efficient antibacterial hybrid fabricated through surface functionalization of lysozyme capped gold nanoclusters (AuNC-L) with β-lactam antibiotic ampicillin (AuNC-L-Amp). The prepared hybrid not only reverted the MRSA resistance towards ampicillin but also demonstrated enhanced antibacterial activity against non-resistant bacterial strains. Most importantly, upon awakening through cis-2-decenoic acid (cis-DA) exposure, the MRSA persister got inhibited by the AuNC-L-Amp treatment. Intraperitoneal administration of this hybrid eliminates the systemic MRSA infection in a murine animal model. Topical application of this nano conjugate eradicated MRSA infection from difficult to treat diabetic wound of rat and accelerated the healing process. Due to inherent bio-safe nature of gold, AUNC-L alone or in the construct (AuNC-L-Amp) demonstrated excellent biocompatibility and did not indicate any deleterious effects in *in vivo* settings. We postulate that AuNC-L-Amp overcomes the elevated levels of β-lactamase at the site of MRSA antibiotic interaction with subsequent multivalent binding to the bacterial surface and enhanced permeation. Coordinated action of AuNC-L-Amp components precludes MRSA to attain resistance against the hybrid. We proposed that the inhibitory effect of AuNC-L-Amp against MRSA and its persister form is due to increased Amp concentration at the site of action, multivalent presentation and enhanced permeation of Amp through lysozyme-mediated cell wall lysis.



Munima B. Sahariah

Associate Professor-I

Dr. Munima B. Sahariah recieved her Ph.D. from Indian Institute of Technology, Guwahati (2006) and carried out post-doctoral research funded by DST Fast Track scheme (2007-10). During her Ph.D, she also undertook training in Michigan Tech University, Michigan, USA under the exchange visitor scheme for five months. Her research field is Computational Materials Science. First principles calculations of Heusler alloys, metal-metal interface and cluster of metal nitrides are the present interests.

Research Summary

Non-equilibrium phases of Cu-Nb multilayered system

Materials with condescending properties will be one of the defining challenges for the globe in the 21st century. Development of advanced materials having superior attributes is an important aspect towards implementation of next generation technologies, where, the conventional materials may face performance failure as they are generally designed and developed for a specific environment. Strain induced pseudomorphic growth of transformed phase of a material on the substrate of a different material where the transformed phase adopt the crystalline phase of the substrate is an interesting process. Such phase transformation may attribute to new aspects of electronic structure, mechanical properties or dynamical behaviour of the same elements. Motivated by such facts, we have examined the Cu-Nb multilayered system (a viable structural material for extreme thermomechanical and radiation environment in

it's original fcc-bcc crystalline phase) with bcc-bcc and fcc-fcc interface. Although the bulk phase of bcc Cu and fcc Nb are unstable, our results suggest that the free standing slab of bcc Cu (110) is mechanically stable. We have shown that these unstable bulk can also be stabilized by applying suitable amount of pressure. For the composite system, based on elastic stiffness constants calculation, we have shown that Cu_{bcc}(110)- Nb_{bcc}(110) multilayered nanocomposite system with both coherent and noncoherent interface (figure 1) are mechanically stable. Such finding with further thorough and systematic investigation may open various interesting applications of these materials.

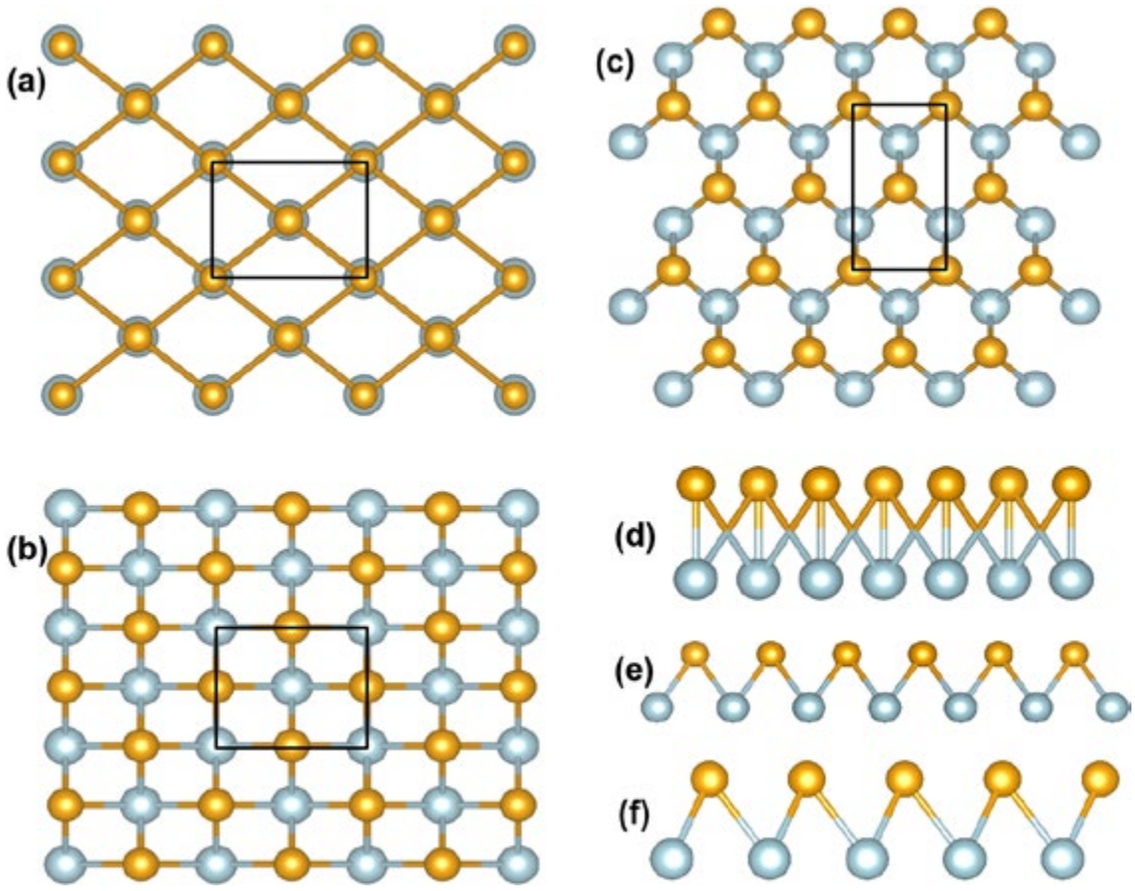


Fig. 1. The top view of the optimized (a) Cu_{bcc}(110)- Nb_{bcc}(110) coherent (b) noncoherent and (c) Cu_{fcc}(111)- Nb_{fcc}(111) noncoherent interfaces of the multilayer nonocomposite systems. The side view of (a), (b) and (c) is shown in (d), (e) and (f) respectively.

Plasmonics in Titanium nitride and non-collinear magnetism in heusler alloys

Two Ph.D. projects have been started, one on electronic properties of alternative plasmonic material and another on non-collinear magnetism in *Mn* based Heusler alloys. *TiN* system is a promising alternative plasmonic material as compared to conventional noble metals. Structure of *TiN* nanoclusters are being constructed using molecular dynamics simulations. Classical molecular dynamics has been attempted first using both Lennard Jones (LJ) and Embedded Atom method (EAM) potentials. However none of these potentials were found to be suitable for small clusters. The method has now therefore been shifted to *ab initio* molecular dynamics. As for the non-collinear magnetism study in *Mn*-based Heusler alloys, the structure of the targetted system has been worked out along with some base studies on how to do calculations for non-collinear magnetic structures. The earlier works in the group were all on collinear magnetism.

Biswajit Choudhury

DST INSPIRE Faculty

Dr. Biswajit Choudhury received Ph.D. from Tezpur University in 2014. He is a DST INSPIRE Faculty in AMSP of IASST. He worked as a postdoctoral researcher at Tezpur University and Indian Institute of Technology Guwahati during 2014 - 2016. His research focus is on the development of semiconductor and plasmonic-based hybrid nanomaterials for optoelectronics, energy and environmental applications. He has authored more than 30 papers.

Research Summary

Surface plasmon resonance (SPR) is a phenomenon exhibited by metal nanoparticles on interaction with light. This phenomenon helps in accumulating large numbers of photons on a nanoscale separation between nanoparticles. As compared to the incident light intensity, the intensity on the surface and interface between nanoparticles enhances 10^{10} fold. SPR can be useful in driving photochemical reactions covering the entire solar spectrum.

Plasmonic Photocatalysis

Graphitic carbon nitride (CN) decorated with gold (Au) and silver (Ag) nanoparticles show wavelength-selective photocatalytic response. Depending on the excitation wavelengths chosen for a particular study, gold and silver nanoparticles can act either as a co-catalyst or a plasmonic photocatalyst. The measurements were performed under UV, UV-Visible, and green laser (532 nm). Ag and Au nanoparticles act as co-catalyst under UV light. Under UV excitation, metal nanoparticles store the electrons transferred from CN. The electrons on the metal nanoparticles and holes on CN participate in the photocatalytic reactions. There is synchronous excitation of both excitonic and plasmonic under UV-visible light leading to both forward as well as the back transfer of electrons. The process reduces the adequate numbers of carriers for participation in photocatalysis. The SPR mediated enhanced photocatalysis is seen under green laser illumination. Because of the matching frequency between SPR and green laser, there is a generation of sufficient numbers of plasmonic hot electrons. These hot electrons acquire adequate energy above the Fermi surface of Au and Ag to be driven to the semiconductors. Photoresponse study is conducted under 405 nm, 470 nm, 530 nm, and white light photoexcitation. The study reveals that the plasmonic hot electrons mediate the enhanced photocatalysis. The results are recorded under white light as well as under 405 nm, 470 nm, and 530 nm, respectively. Steady-state and time-resolved photoluminescence study provide evidences for the efficient charge transfer process in the plasmonic hybrids.

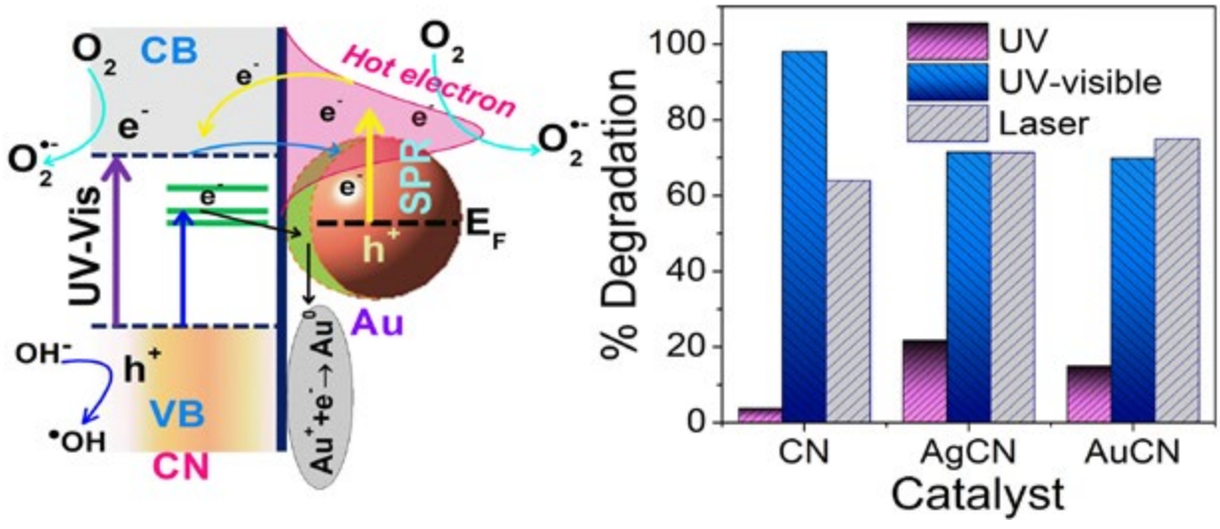


Fig. 1. (a) Schematic showing surface plasmon mediated photocatalytic response under UV-visible light. (b) A comparative results on photocatalysis for various catalysts under UV, UV-visible and Green laser illumination.

Dr. Anamika Kalita

DST INSPIRE Faculty

Dr. Anamika Kalita obtained her PhD degree from Indian Institute of Technology, Guwahati in 2018. She had a brief stint as a UGC Dr. D. S. Kothari postdoctoral fellow at Department of Chemical Sciences, Tezpur University before joining IASST as DST INSPIRE Faculty in October, 2018. Currently, she works on design of Metal Organic Frameworks (MOFs) with functional versatility, Fabrication of MOF/Polymer composites & membranes, application of MOFs & derived materials in sensors, energy and environment.

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Research Summary

Organic Linkers: A Systematic Investigation of functionality

Metal Organic Frameworks (MOFs) have been considered as the most beautiful structures with wide range of applications including environmental remediation. Our research area mainly focused on development of organic linkers of naphthalene diimide via simple condensation reaction with different pendent moieties such as isoniazid, pyridine, isophthalic acid, salicylic acid etc. The functional groups present on most of the pendent moieties are –OH, -COOH, -NH_2 etc. that have the potential to bind directly with the metal sides to form porus MOFs. Furthermore via introducing secondary linkers also, we can easily tune the porous character of MOFs as well as their adsorption behaviors towards various guest analytes. In preliminary stage, we have synthesized few organic linkers with naphthalene diimide as core and various salicylic acids as pendent chain, their electronic properties have been investigated to apply them in devices as electroactive MOFs in diverse field. Among electronic properties, impedence, IV measurements for the as synthesized organic linkers have been carried out successfully.

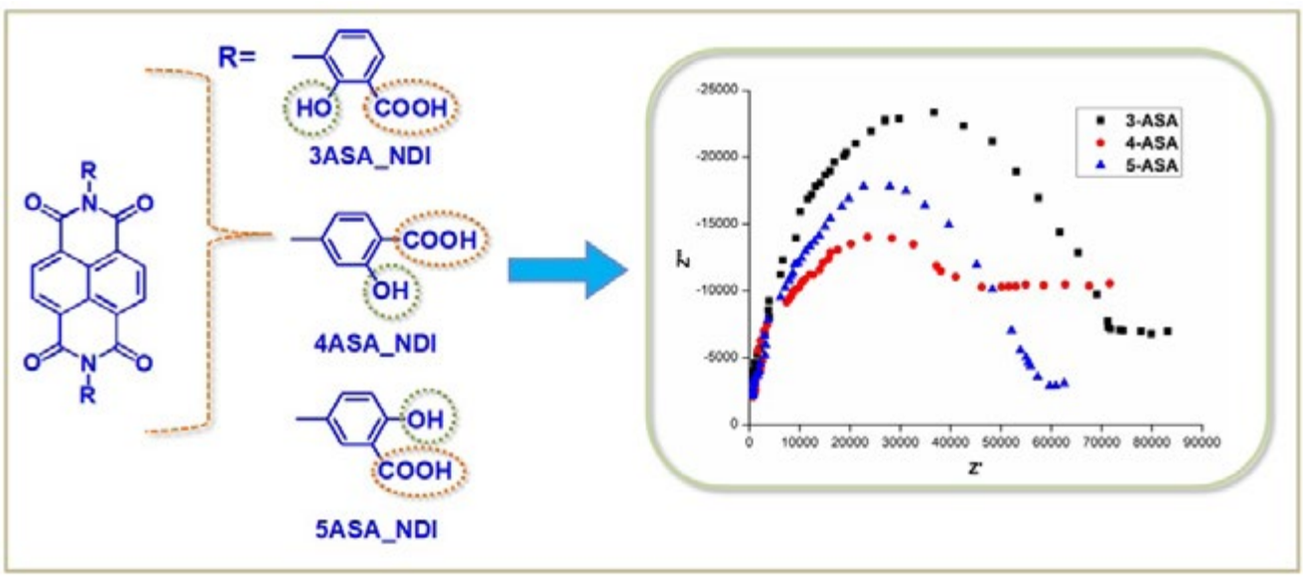


Fig 1. Schematic showing organic linkers with functional group for binding and their electronic property.

Research Output

Extramural projects

Ongoing projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
Development of Nanoparticle or Microparticle Adjuvanted Subunit Oral vaccine against Poultry Salmonellosis	DBT, New Delhi, Twinning Program ; Rs. 18.43 lakhs; 2016-2019; Dr. Devasish Chowdhury	The present study has been undertaken with the hypothesis that the subunit vaccine formulation comprising whole outer-membrane protein (obtained from capsular type A and D of Pasteurella multocida) that are adjuvanted with either calcium phosphate nanoparticle or aluminum hydroxide nanoparticles or poly-lactide co-glycolide microparticles would confer protective immune in pigs against swine pasteurellosis. . In the present proposal it is hypothesized that calcium phosphate nanoparticle or aluminum hydroxide nanoparticle adjuvanted outer membrane protein vaccine would give strong antibody response and would replace the conventional alum adjuvanted vaccine.
Plasma Based Synthesis of Materials for Plasmonic Infrared Photodetector	Funding Agency: SERB, Government of India Total fund: INR 83.20 Lakh Duration: March 19, 2018 to March 18, 2021 PI/Coordinator: Dr. Arup Ratan Pal, IASST Co-Investigator: Prof. H. Bailung, IASST	1. Preparation of infrared (IR) transparent electrode by growing carbon nanostructures by atmospheric pressure glow discharge plasma enhanced chemical vapour deposition process. 2. Synthesis of IR absorbing nanostructures by magnetron sputtering and tuning the plasmon absorption band of the nanostructures up to 3000 nm by tailoring the properties of the material with optimization of synthesis conditions. 3. Development of plasmonic IR detector by using the above mentioned IR transparent electrode and IR absorbing nanostructures, and study of the device performance including spectral responsivity, detectivity, time response and stability, and study of device photo-physics.
Feasibility study of commercial scale coating on copper alloys, using radio frequency plasma technology	Funding Agency: DSIR, Government of India Total fund: INR 20.00 Lakh Duration: January 01, 2019 to December 31, 2019 PI/Coordinator: Dr. N. C. Talukdar, Director, IASST	1. To study the techno-commercial status of surface protection of bell metal and brass in the main production centers of India 2. To find the proper mechanism for transferring the surface coating technology, developed by IASST
DST INSPIRE Faculty Award "Hybrid nanomaterials of semiconductor metal oxides-carbon nanomaterials deposited with noble metal nanoparticles for energy and environmental applications".	DST; Rs. 35 Lakhs; 30.03.2016 to 30.03.2021 Dr. Biswajit Choudhury	The project aims to understand the photocatalytic activity of semiconductor metal oxides (TiO_2, ZnO, CeO_2, etc) and carbon nanomaterials (graphene, C_3N_4) in pristine as well as in its hybrid forms deposited with Au, Ag etc., under the illumination of visible light. Plasmonic effect tunability with size, shape variation will also be considered.
DST INSPIRE Faculty Award "A Facile Strategy Towards Naphthelene Diimide based Metal Organic Frameworks-Polymer Composite Membrane as Traps for Selective Capture of CO_2".	DST; Rs. 35 Lakhs; 01.10.2018 to 01.10.2023 Dr. Anamika Kalita	The project aims to develop metal organic frameworks (MOFs) with naphthalene diimide as core linker and various pendent groups such as salicylic acid, pyridine, isoniazid having -OH, -COOH, $-NH_2$ etc. are considered for tuning porous nature as well as adsorption behavior towards guest analytes. Adsorption of environmental pollutants via fabrication of as-synthesized MOF and polymer composite derived membranes will also be investigated.

Publications

In cited journals

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month/Year of publication
Bandita Kalita, Bedanta Gogoi, and Neelotpal Sen Sarma	Cholesterol-aminoacid conjugates treated filter paper-based photoluminescence indicator for nitroaromatic chemicals	Materials Research Bulletin	115, 211-218	March/ 2019
Samiran Upadhyaya, Rajumani Sarma, Abdul Barik, and Neelotpal Sen Sarma	Development of Bright Fluorescent Poly(1-vinyl-2-pyrrolidone-co-acrylonitrile) and Its Polysalts with HCl and HNO3: Materials for Solid State Electrical Applications	Advances in Polymer Technology	Article ID 1470196, 12 pages	February/ 2019
Gautomi Gogoi, Smruti R. Sahoo, Basanta Kumar Rajbongshi, Sridhar Sahu, Neelotpal Sen Sarma, Sagar Sharma	New types of organic semiconductors based on diketopyrrolopyrroles and 2,1,3-benzochalcogenadiazoles: a computational study	Journal of Molecular Modeling	25:42	January/ 2019
Achyut Konwar, Devasish Chowdhury and Abhijit Dan	Chitosan Based In-Situ and Ex-Situ Magnetic Iron Oxide Nanoparticles for Rapid Endotoxin Removal from Protein Solutions	Mater. Chem. Front.	2019, 3(4), 716-725	March 2019
Manash Jyoti Deka, Subham Kumar Sahoo and Devasish Chowdhury,	p-Type and n-type azobenzene nanocluster immobilized graphene oxide nanocomposite	Journal of Photochemistry & Photobiology A: Chemistry,	2019, 272, 131-139.	January 2019
Manash Jyoti Deka, Devasish Chowdhury,	Surface charge induced tuning of electrical properties of CVD assisted graphene and functionalized graphene sheets	Journal of Materials Science & Technology	2019, 35, 151–158	January 2019
Kailash Barman, Devasish Chowdhury and Pranjal K. Baruah,	Nanoemulsion of ginger Rhizome (Zingiber officinale) extract as a preservative for sweet lemon squash: An alternative to reduce the use of benzoic acid.	Int. J. Adv. Res.	2018, 6(5), 1116-1126.	May 2018
Upama Baruah and Devasish Chowdhury,	Functionalized graphene oxide as an electrochemical sensing platform for detection of Bisphenol A	Advanced Materials Letters	2018, 9(7), 516-525.	July 2018
U. Saikia, M. B. Sahariah, César González and R. Pandey	Vacancy assisted He-interstitial clustering and their elemental interaction at fcc-bcc semicoherent metallic interface	Scientific Reports	8:3844	March 2018
Deepshikha Gogoi, Amreen A Hussain and Arup R Pal	Plasma Based Synthesis of Nanomaterials for Development of Plasmon Enhanced Infrared Responsive Optoelectronic Device	Plasma Chemistry and Plasma Processing	254/ 5760	November/ 2019
Bikash Sharma, R Kar, Arup R Pal, R K Shilpa, R O Dusane, D S Patil, S R Suryawanshi, M A More and S Sinha	Investigations on the transformation of vertically aligned CNTs to intramolecular junctions by atmospheric pressure PECVD	Materials Today Communications	16/ 178	June/2018
A. C. Bhowal , H. Talukdar , S. Kundu	Preparation, characterization and electrical behaviours of PEDOT:PSS-Au/Ag nanocomposite thin films: an ecofriendly approach	Polymer Bulletin	https://doi.org/10.1007/s00289-018-2652-z /page no. 1-19	December/2018
A. C. Bhowal, S. Pandit, S. Kundu	Fluorescence emission and interaction mechanism of protein-coated gold and copper nanoclusters as ion sensors in different ionic environments	Journal of Physics D: Applied Physics	52/015302	October/2018
S. Kalita, R. Kandimalla, A. C. Bhowal, J. Kotoky, S. Kundu	Functionalization of β-lactam antibiotic on lysozyme capped gold nanoclusters retrogress MRSA and its persisters following awakening	Scientific Reports	8/5778	April/2018

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month/Year of publication
S. Pandit, S. Kundu	Optical responses of BSA protein under re-entrant condensation in presence of trivalent ions	Journal of Molecular Liquids	276/954-960	December/2018
S. Pandit, S. Kundu, S. Abbas, V. K. Aswal, J. Kohlbrecher	Structures and interactions among lysozyme proteins below the isoelectric point in presence of divalent ions	Chemical Physics Letters	711/8-14	September/2018
H. Talukdar, A. C. Bhowal, S. Kundu	Percolation dependent conducting behavior of poly (3,4-ethylenedioxythiophene): Poly (styrenesulfonate) in the presence of cationicpolyelectrolyte	Physica E: Low-dimensional Systems and Nanostructures	107/30-37	November/2018
A. C. Bhowal, S. Kundu	Studies on surface morphology and electrical conductivity of PEDOT:PSS thin films in presence of gold nanoparticles	AIP conference Proceedings	1942/ 080025-1-080025-4	April/2018
H. Talukdar, S. Kundu	Thin film of polyelectrolyte complex nanoparticles for protein sensing	AIP conference Proceedings	1942/ 080030-1-080030-4	April/2018
S. Pandit, S. Kundu	Optical and structural behaviors of crosslinked polyvinyl alcohol thin films	AIP conference Proceedings	1942/ 080029-1-080029-4	April/2018
S. Sarkar, S. Kundu	Polymer thin film as coating layer to prevent corrosion of metal/metal oxide film	AIP conference Proceedings	1942/ 080070-1-080070-4	April/2018
B. Choudhury, K.K. Paul, D. Sanyal, A. Hazarika, P.K. Giri	Evolution of nitrogen related defects in graphitic carbon nitride nanosheets probed by position annihilation and photoluminescence spectroscopy	J. Phys. Chem. C	122 (16) 9209-9219	April/ 2018

Conference proceedings

Author (s)	Title	Conference name	Volume & Issue no./ page no.	Month/Year of publication
Abdul Barik, Samiran Upadhyaya, Ijaz Ullah Muzaddadi, and Neelotpal Sen Sarma	A Novel Urea Sensor using CuO/ZnO fabricated diode	2018 IEEE SENSORS, New Delhi	PP. 1-4, doi: 10.1109/ ICSENS.2018.8589863	Date Added to IEEE Xplore: 27 December 2018

Patents

Inventor(s)	Title	File no. for enrollment	Provisional/final patent grant no.	Issue no. of patent office
Sarma Neelotpal Sen, Dass Narendra Nath, Chutia Joyanti and Hoque Samiul.	Development of Thermistor device from the Liquid Crystalline Polymers	Application No. 1503/DEL/2011	Indian Patent No. 296096 granted on 25-04-2018	1503/DEL/2011 dt.25/05/2011
H. Talukdar and S. Kundu	Polyelectrolyte Complex Nanoparticles as Efficient Material for Protein Sensing	Application No. 201831017555	-	-

Presentation in Conferences/seminars

Invited talks

Faculty	Title	Programme Name	Date & Venue
Dr. Neelotpal Sen Sarma	Nanoparticles and its effect on polymers	Amazing NANO-2019, National Workshop on Nanotechnology	25th February to 2nd March 2019 at Assam Don Bosco University, Guwahati
Dr. Devasish Chowdhury	Carbon nanomaterials in Bio-medical Applications	6th World Congress of Nanomedical Sciences	7-9th January 2019 at Vigyan Vihar, New Delhi
Dr. Devasish Chowdhury	Tea carbon dots-reduced Graphene Oxide: An efficient conducting coating material for fabrication of an E- textile	International Conference on Advances in Polymer Science & Technology	November 1-3, 2018, Kathmandu, Nepal

Faculty	Title	Programme Name	Date & Venue
Dr. Devasish Chowdhury	Carbon Nanomaterials in bio-medical applications	National Conference on Translational Drug Discovery: Current trends and Future Interventions (TDDCTFI-2018)	10th -11th November 2018 organized by Assam Down town University, Guwahati in association with society of Biological Chemists, North East chapter, Jorhat and Tea improvement Consortium (TIC), Tocklai, Assam
Dr. Munima B Sahariah	A DFT study on fcc-bcc layered nanocomposite system: stability and elemental interaction of defects	International Conference on 'Advances in nanomaterials and Devices for Energy and Environment'	27-29 January, 2019 IIITM, Gwalior
Dr. S. Kundu	Structures, interactions and related properties of polymer and polymer nanocomposites	Global Conference on Polymer and Composite Materials (PCM 2018)	April 10-13, 2018 at Kitakyushu, Japan.

Contributory

Author(s)	Title	Conference name	Oral/ poster	Date & Venue
Abdul Barik, Samiran Upadhyaya, Ijaj Ullah Muzaddadi and Neelotpal Sen Sarma	A novel urea sensor using Cuo/ZnO fabricated diode	IEEE Sensors International Conference, 2018	Poster	28th to 31st October 2018 held at Hotel Aerocity Pullman, New Delhi
Jayanta Sarmah Boruah and Devasish Chowdhury	Nano-hybrid of fatty acid vesicles for drug delivery	3rdInternational Conference On Recent advances In Material Chemistry (ICRAMC-2019)	Oral	13-15th Feb, 2019, SRM Institute of science and technology, Chennai
Ankita Deb, Rasna Saikia and Devasish Chowdhury	Fabrication of Nano-Bio-conjugate film using *Aloe vera*	TEQIP-III Sponsored National Conference "Recent Advances in Applied Sciences (RAAS'2019)"	Poster	17th-18th May, Gauhati University
Jahnabi Gogoi, Abhipsa Dev Choudhury, Devasish Chowdhury	Synthesis of a graphene oxide clay nanocomposite as an efficient photocatalyst for the degradation of cationic dye in water	National Conference on Recent Advances in Applied Sciences (RAAS'2019)	Poster	17th-18th May, 2019 Gauhati University
Bablu Basumatary and Arup R. Pal	Catalyst-free Synthesis of Graphene Oxide as a Transparent Electrode for Light Detecting Devices	International Conference on Fiber Optics and Photonics – PHOTONICS-2018	Poster	December 12-15, 2018 Indian Institute of Technology (IIT), Delhi
Deepshikha Gogoi and Arup R. Pal	Surface Plasmon Enhanced Organic Infrared Photodetector	International Conference on Fiber Optics and Photonics – PHOTONICS-2018	Poster	December 12-15, 2018 Indian Institute of Technology (IIT), Delhi
Santanu Podder and Arup R. Pal	Synthesis of Plasmonic Titanium Nitride for Optoelectronic Device Application	International Conference on Fiber Optics and Photonics – PHOTONICS-2018	Poster	December 12-15, 2018 Indian Institute of Technology (IIT), Delhi
Deepshikha Gogoi and Arup R. Pal	Role of Nanoparticle properties on Charge Generation and Transfer in Hot Carrier Photovoltaic Devices	Interdisciplinary Climate Research Centre and National Institute of Science, Technology and Development Studies (ICRC-NISTADS), Northeast India Energy Conclave	Poster	June 6-7, 2018 Cotton University, Guwahati
Santanu Podder and Arup R. Pal	Plasmon-induced hot carrier injection at titanium nitride/ copper oxide interface for light harvesting applications	Interdisciplinary Climate Research Centre and National Institute of Science, Technology and Development Studies (ICRC-NISTADS), Northeast India Energy Conclave	Poster	June 6-7, 2018 Cotton University, Guwahati
Sweety Biswasi and Arup R. Pal	Hot carrier generation in Plasmonic Photodetector based on Polyaniline-Rubrene binary material decorated with Gold nanoparticles	Interdisciplinary Climate Research Centre and National Institute of Science, Technology and Development Studies (ICRC-NISTADS), Northeast India Energy Conclave	Poster	June 6-7, 2018 Cotton University, Guwahati
Arup R. Pal and Santanu Podder	Plasmonic Titanium Nitride based Hot carrier Infrared responsive Devices	First Indian Materials Conclave and Materials Research Society of India-Annual General body Meeting (MRSI-AGM-2019)	Oral	February 12-15, 2019 Indian Institute of Science (IISC), Bangalore

Author(s)	Title	Conference name	Oral/ poster	Date & Venue
H. Talukdar, S. Sarkar, S. Kundu	Electrical Investigation on Thin Films of Poly(3,4-Ethyl enedioxythiophene):Poly(Styr enesulfonate) in Presence of Cationic Polyelectrolyte	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	Poster	December 18-22, 2018 Guru Jambheshwar University, Hisar, Haryana, India
B. K. Sah, S. Kundu	Surface pH induced hysteresis behavior of lipid (DMPA)-protein (BSA) complex monolayer	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	Poster	December 18-22, 2018 Guru Jambheshwar University, Hisar, Haryana, India
A. C. Bhowal, S. Pandit, S. Kundu	Lysozyme Induced Luminescence Gold Nanoclusters as Hg^{2+} Sensor	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	Poster	December 18-22, 2018 Guru Jambheshwar University, Hisar, Haryana, India
S. Pandit, S. Kundu	Optical Activity of Polyelectrolyte (PSS) – Protein (Lysozyme) Complexes	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	Poster	December 18-22, 2018 Guru Jambheshwar University, Hisar, Haryana, India
R. J. Sarmah, B. K. Sah, S. Kundu	Monolayer Behavior of Human Serum Albumin (HSA) at Air-Water Interface	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	Poster	December 18-22, 2018 Guru Jambheshwar University, Hisar, Haryana, India
S. Sarkar, S. Kundu	Structure, morphology and electrical behaviors of polymer (polystyrene)-metal (copper) composite thin films	Prof. Dinesh Varshney memorial National Conference on Physics and Chemistry of Materials (NCPCM)	Poster	December 27-28, 2018 Govt. Holkar Science College, Indore

Conferences/Workshops/Meetings attended

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Jayanta Sarmah Boruah	98th DAE BRNS-IANCAS National workshop on Radiochemistry and application of radioisotopes	1-6th October, 2018, USTM Guwahati
Jayanta Sarmah Boruah, Ankita Deb and Jahnabi Gogoi	Science Academies' Lecture Workshop on Emerging Trends in Chemical Sciences	8-10th Nov, 2018, Gauhati University
Dr. Robinson Jose	NCMR-NCCS Workshop	January 14th -18th 2019 at National Centre for microbial resource
Purbajyoti Bhagowati and Payal saha	Modelling and Simulations of Materials for Energy and Environment	12-14 December, 2018 JNCASR, Bangalore
Deepshikha Gogoi, Santanu Podder and Bablu Basumatary	International Conference on Fiber Optics and Photonics –PHOTONICS-2018	December 12-15, 2018 Indian Institute of Technology (IIT), Delhi
Deepshikha Gogoi, Santanu Podder and Sweety Biswasi	Interdisciplinary Climate Research Centre and National Institute of Science, Technology and Development Studies (ICRC-NISTADS), Northeast India Energy Conclave	June 6-7, 2018 Cotton University, Guwahati
Dr. Arup R. Pal	First Indian Materials Conclave and Materials Research Society of India- Annual General body Meeting (MRSI-AGM-2019)	February 12-15, 2019 Indian Institute of Science (IISC), Bangalore
Dr. S. Kundu	Global Conference on Polymer and Composite Materials (PCM 2018)	April 10-13, 2018 at Kitakyushu, Japan.
A. C. Bhowal	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	December 18-22, 2018 at Guru Jambheshwar University, Hisar, Haryana, India
H. Talukdar	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	December 18-22, 2018 at Guru Jambheshwar University, Hisar, Haryana, India
S. Pandit	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	December 18-22, 2018 at Guru Jambheshwar University, Hisar, Haryana, India
B. K. Sah	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	December 18-22, 2018 at Guru Jambheshwar University, Hisar, Haryana, India
R. J. Sarmah	63rd DAE Solid State Physics Symposium (DAE-SSPS 2018)	December 18-22, 2018 at Guru Jambheshwar University, Hisar, Haryana, India
S. Sarkar	Prof. Dinesh Varshney memorial National Conference on Physics and Chemistry of Materials (NCPCM)	December 27-28, 2018 at Govt. Holkar Science College, Indore

Other activities

Ph.D. thesis examined/ viva conducted

Faculty	Author	Thesis Title	University/Institution
Dr. Munima B. Sahariah	Rahul Bhattacharjee	Theoretical investigation of structural, electronic and optical properties of some binary compound and their alkaline-earth element doped ternary alloys employing Density Functional Theory (DFT) based FP-LAPW methodology	Tripura University
Dr. Neelotpal Sen Sarma	Allow Ng uadi Blaise	Layered double hydroxides based hybrid nanocomposites for the extended release of important biologically active molecules.	CSIR-NEIST, Jorhat

Awards/Recognitions/Achievements

Name	Particulars
Dr. Devasish Chowdhury	Nominated as a member in Facility Management Committee (FMC) for sophisticated Analytical Instrument Facility (SAIF) at Gauhati University, attended its 32 FMC meeting on November 20, 2018 at Gauhati University.
Mr. Jayanta Sarmah Boruah	Awarded the best Oral presentation Award in 3rd International Conference on Recent Advances in Material Chemistry(ICRAMC-2019) organized by department of Chemistry, SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu during 13-15 February 2019
Ms. Ankita Deb	Awarded best poster award at National Conference On "Recent Advances in Applied Sciences" RAAS' 2019 Organized By: Department of Applied Sciences, Gauhati University, Assam, India, May 17-18, 2019.
Mr. Santanu Podder	Received second prize for poster presentation entitled "Plasmon-induced hot carrier injection at titanium nitride/copper oxide interface for light harvesting applications", at the Interdisciplinary Climate Research Centre and National Institute of Science, Technology and Development Studies (ICRC-NISTADS), Northeast India Energy Conclave, Cotton University, Guwahati, held during June 6-7, 2018
Ms. Sweety Biswasi	Received third prize for poster presentation entitled "Hot carrier generation in Plasmonic Photodetector based on Polyaniline-Rubrene binary material decorated with Gold nanoparticles", at the Interdisciplinary Climate Research Centre and National Institute of Science, Technology and Development Studies (ICRC-NISTADS), Northeast India Energy Conclave, Cotton University, Guwahati, held during June 6-7, 2018
Dr. Sarathi Kundu	Awarded financial support from SERB, DST (File number: ITS/2018/000200) for attending the Global Conference on Polymer and Composite Materials (PCM 2018) as an invited speaker which was held during April 10-13, 2018 in Japan.
Mr. Hrishikesh Talukdar	Awarded CSIR-SRF fellowship (Grant No: 09/835 (0020) 2018-EMR-I) during this period of time.

MATHEMATICAL AND COMPUTATIONAL SCIENCES

Members of Mathematical and Computational Sciences group focuses their research work on three different areas namely Stochastic Processes, Fluid Dynamics and Pattern recognition and Computer vision. The Stochastic Process subgroup are working on some vacation models with reliable and unreliable service systems. developing some recursive solution to compute the exact probability distribution of different performance measure. The research subgroup of Fluid Dynamics studies heat and mass transfer flow of Newtonian as well as non-Newtonian fluid with both analytical and numerical approaches. The research subgroup of Pattern recognition and Computer vision are dealing with the use of artificial intelligence in the field of medical images, ballistics and bio biometrics.

First row (L to R) : Lipi B. Mahanta, Assoc. Prof-I; Gautam Choudhury, Assoc. Prof-II & i/c CCNS Division; Niranjan Bhagobaty, Technical Officer-B.

Second row (L to R) : Snigdha Mahanta, JRF; Daisy Das, SRF; Elima Hussain, JRF; Anjana Begum, JRF.

Gautam Choudhury

Associate Professor II

Dr. Gautam Choudhury received Ph.D from Gauhati University in Statistics in 1998. His research interest is Stochastic Processes with special reference to Queueing Theory and works on different branches of queues such as vacation models, retrial models and control of queues. He has been editorial board member and guest editor of number of reputed journals including "Applied Mathematical Modelling" (Elsevier Journal) and "Quality Technology and Quantitative Management" (Taylor Francisl).

Research Summary

Stochastic Process:

Queueing theory is a branch of Applied Stochastic Process with growing application in the field of Industrial Engineering, Digital Communication Systems and Tale Communication Systems etc. And as such is a very important area of present day research.

Reliable Queueing System:

We have developed a modified vacation policy model for a single server queueing system which is motivated from studying production to order system, where production to order system follows modified vacation policy captures closedown task, two types of optional job with different length, dormant time, and start-up time. By using the probabilistic approach method namely, Embedded Markov Chain and Markov Regenerative Process we have estimated different performance measures with considering parameters so that production facility provides maximum production to the arriving orders. We have shown the numerical analysis for the model which helps the production manager to obtain optimal value for the production to order system. We have also found out cost optimization for the model so that the production manager without any doubt can use this model for their production to order system and get maximum benefit with minimum cost.

Unreliable Queueing System:

An unreliable queueing system is characterised by failure of the service station where the server stops providing service and waits for a repair to start, usually referred to as server's delay time.

An unreliable queue providing two types of general heterogeneous service with optional re-service has been inspected. The server in this model provides two types of general heterogeneous service to an arriving unit (customer) who has an option to repeat the same type of service again (once); if it is not satisfied by the service provided by the service channel. While providing services, the server may break down at any moment and as soon as breakdown occurs the server is sent for repair. Immediately after the server is fixed (i.e., repaired), the server starts its remaining service in both the type of services or repeated service. The server remain sidle until the queue size builds up to a pre-assigned threshold level N (build-up period). As soon as the queue size becomes $N(\geq 1)$ the server undertakes a gear up time called Setup time (SET) in order to setup the system into operative mode (set up period), on completion of which service starts (busy period).

For all these type of models we have studied various stochastic processes such as queue length process, waiting time process, busy period processes and backlog processes. Moreover, for unreliable queueing models we have carried out the reliability aspects. Further, we have investigated cost optimization problem of these models.

Lipi B. Mahanta

Associate Professor I

Dr. Lipi B. Mahanta received Ph.D. in Statistics from Gauhati University in 2004. She joined IASST in 1990 and worked in the erstwhile Computer Science Department in a teaching position upto 2009. Her field of specialization is Computer Vision and Pattern Recognition, Distribution and Theory and Operations Research.

Research Summary

Pattern Recognition & Computer Vision:

Computer vision can be succinctly described as finding and telling features from images to help discriminate objects and/or classes of objects. Statistical methods of automated decision making and modeling have been invented (and reinvented) in numerous fields for more than a century. Important problems in this arena include pattern classification, regression, control, system identification, and prediction. In recent years, these ideas have come to be recognized as examples of a unified concept known as Machine Learning (ML), which is concerned with 1) the development of algorithms that quantify relationships within existing data and 2) the use of these identified patterns to make predictions based on new data. Machine learning and pattern recognition essentially deal with the problem of automatically finding a decision, for example, separating apples from pears. In traditional literature, this process is outlined using the pattern recognition system (Figure A).

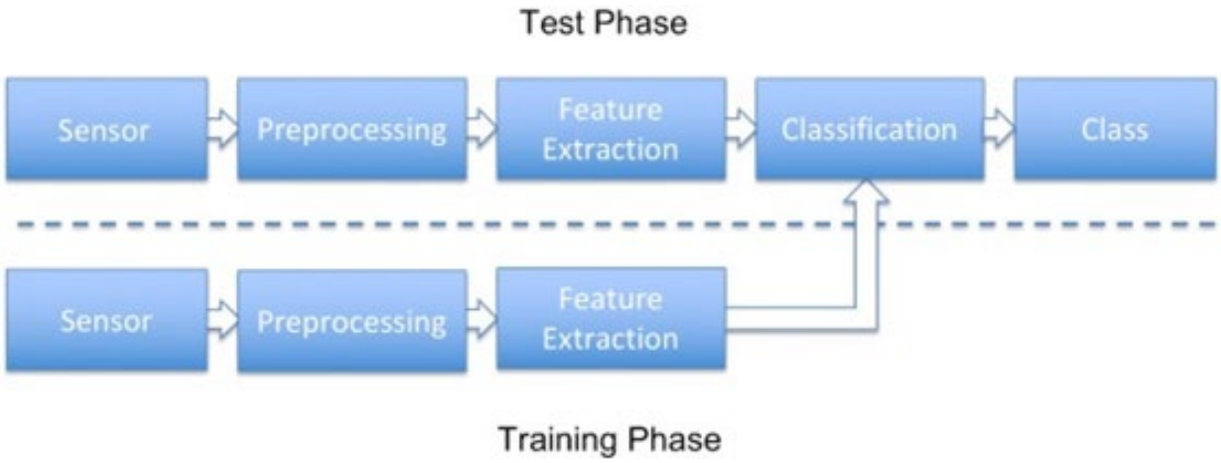


Fig. A. Schematic of the traditional pattern recognition pipeline used for automatic decision making. Sensor data is preprocessed and "hand crafted features are extracted in training and test phase, During training a classifier is trained that is later used in the test phase to decide the class automatically

During a training phase, the so-called *training data set* is *preprocessed* and meaningful *features* are extracted. Preprocessing is understood to remain in the original space of the data and comprise of operations such as noise reduction and image rectification. Feature extraction is facing the task to determine an algorithm that would be able to extract a distinctive and complete feature representation, for example, color or length of the semi-axes of a surrounding ellipse for our apples and pears example. This task is truly difficult to generalize, and it is necessary to design such features anew essentially for every new application.

Deep Learning (DL) is a subset of Machine Learning and over the recent years, Deep Learning has had a tremendous impact on various fields in science. It has lead to significant improvements in speech recognition and image recognition. Obviously this technology is also highly relevant for medical imaging.

In the deep learning literature, this process is often also referred to as "hand-crafting" features. Based on the feature vector $x \in Rn$, the *classifier* has to predict the correct *class y*, which is typically estimated by a function $\hat{y}=\hat{f}(x)$ that directly results in the classification result $\hat{y}$. The classifier's parameter vector θ is determined during the training phase and later evaluated on an independent *test data set*.

The work in CCNS by the group involved in Computer Vision research involves both strategies of Machine Learning and Deep Learning in various domains: Medical diagnostics, Ballistics and Biometrics. A group is also working on researches in Biostatistics and Operations Research, both in context of Medical diagnosis and management of patients. Some of the research outcomes are depicted pictorially below:

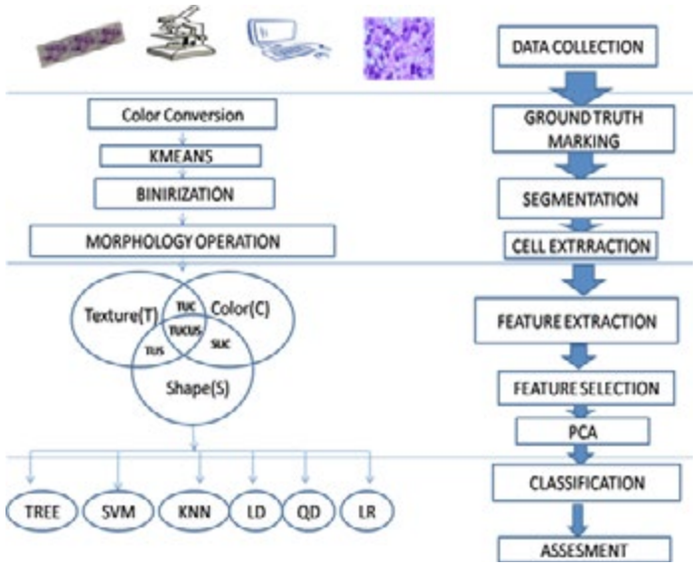


Fig. B. Model of the work

MEDULLOBLASTOMA: Diagnosis and Prognosis of brain tumour in children is always a critical case. Medulloblastoma is that subtype of brain tumour which occurs most frequently amongst children. Post-operation, the classification of its subtype is most vital for further clinical management. In this paper a novel approach of pathological subtype classification using biological interpretable and computer-aided textural features is forwarded. The classifier for accurate features prediction is built purely on the feature set obtained by segmentation of the ground truth cells from the original histological tissue images, marked by an experienced pathologist. The work is divided into five stages (Figure B): marking of ground truth, segmentation of ground truth images, feature extraction, feature reduction and finally classification. Kmeans colour segmentation is used to segment out the ground truth cells from histological images (Figure C). For feature extraction we used morphological, colour and textural features of the cells followed by feature reduction using Principal Component Analysis. Finally both binary and multiclass classification is done using Support Vector Method (SVM). The classification was compared using six different classifiers and performance was evaluated employing five-fold cross-validation technique. The accuracy achieved for binary and multiclass classification before applying PCA were 95.4% and 62.1% and after applying PCA were 100% and 84.9% respectively (Table A, Figure D and E). The run-time analysis are also shown. Results reveal that this technique of cell level classification can be successfully adopted as architectural view can be confusing. Moreover it conforms substantially to the pathologist's point of view regarding morphological and colour features, with the addition of computer assisted texture feature.

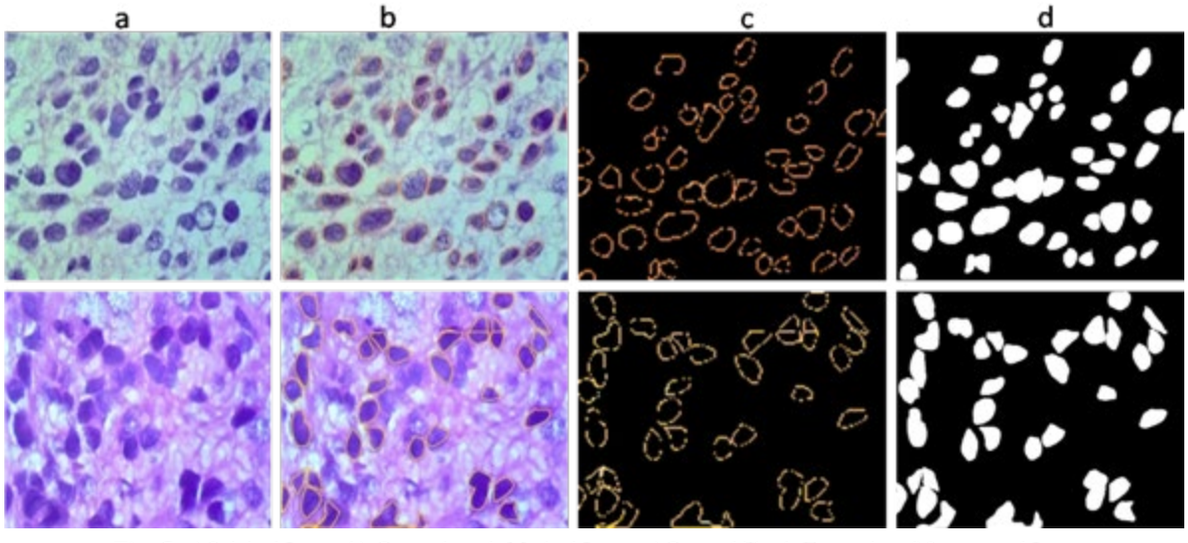


Fig. C. a)Original Image b) Ground truth Marked Image c)Ground Truth Extraction d)Segmented Image

Table A: Average accuracy for classifiers

Classifiers	Average Accuracy	
	Binary Classification	Multiclass classification
Tree	**96.5**	**61.5%**
Linear Discriminant	87.7	55.70%
Quadratic Discriminant	71.5	59.30%
Logistic Regression	77.8	---
SVM	**95.4**	**62.1%**
KNN	83.3	55.50%

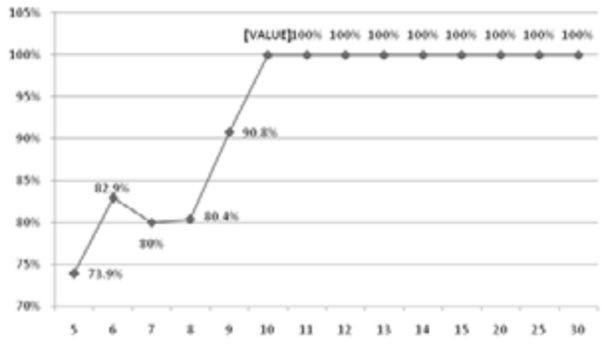


Fig. D. Number of principal component vs.Accuracy (Binary)

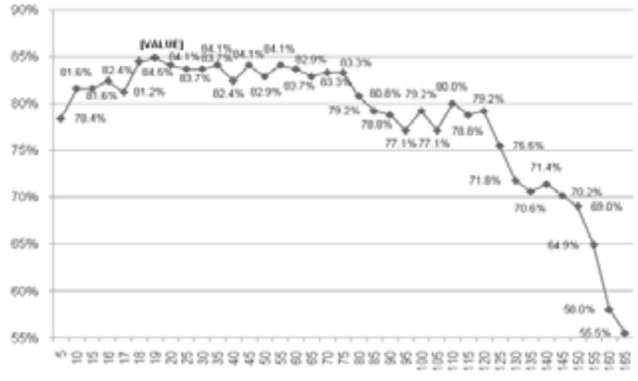


Fig. E. Number of principal component vs. Accuracy (Multiclass)

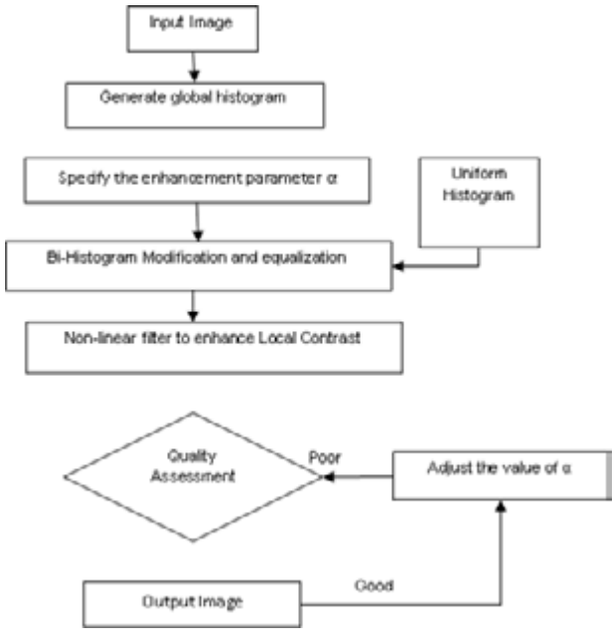


Fig. F. Flowchart of proposed BHM-ANF

BREAST: Breast Cancer can be cured if diagnosed early. Digital mammography is one of the most effective imaging modality for early detection of breast cancer. However mammogram images often come with low contrast, noises and artifacts making diagnosis difficult. The purpose of this research work is to preprocess mammogram images to improve the results of a Computer Aided Diagnosis system. This study presents three preprocessing methods (Figure F) - a breast border segmentation method, a contrast enhancement method and a pectoral muscle removal method. The proposed breast border extraction method employs a threshold based segmentation technique along with a combination of morphological operations. The contrast enhancement method presented here is divided into two phages. In phase I, a bi-level histogram modification technique is applied to enhance the image globally and in phase II a non-linear filter based on local mean and local standard deviation of each pixel is applied to the histogram modified image. The pectoral muscle removal method discussed here is implemented by applying a region growing algorithm. The proposed techniques are tested on Mini MIAS dataset. The breast border extraction method is applied to 322 images of Mini MIAS dataset and achieved 98.7% segmentation accuracy. The contrast enhancement method is evaluated based on quantitative measures like Measure of Enhancement, Absolute Mean Brightness Error, Combined Enhancement Measure and Discrete Entropy. The contrast enhancement is applied to 14 images with different types of masses. The quantitative measures show that the proposed contrast enhancement method provides an optimum level of contrast enhancement while compared to other enhancement methods by preserving the local details. Removal of pectoral muscle from MLO mammogram images reduces the search region while identifying abnormalities like masses and calcification. The preprocessing steps proposed here show promising results in terms of both qualitative and quantitative analysis (Figure G).

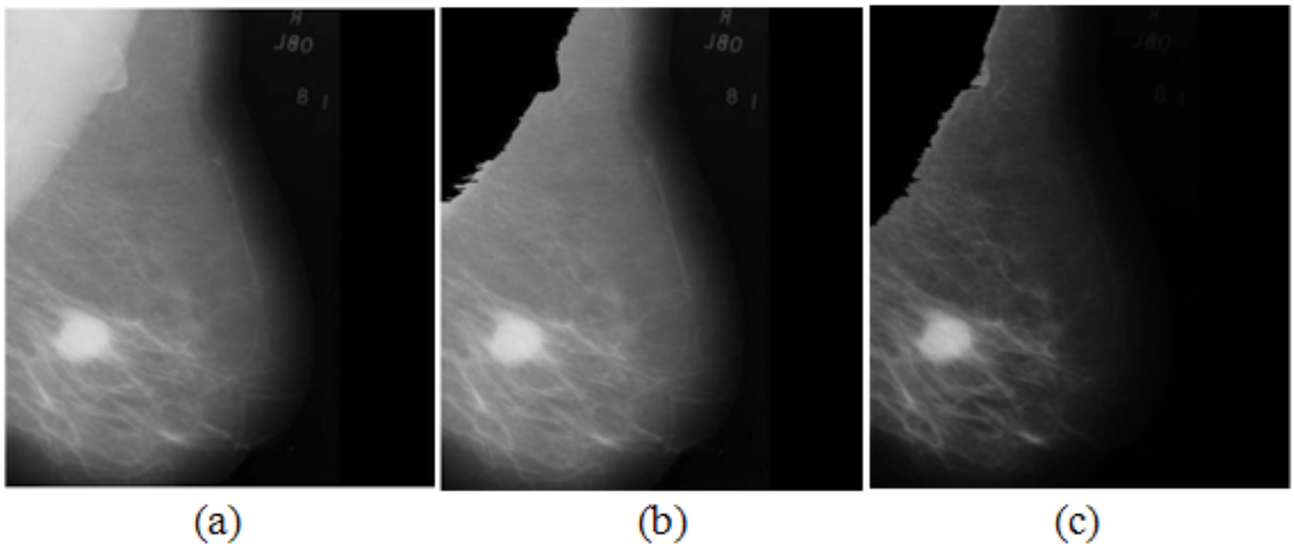


Fig. G. (a) original image mdb28, result of phase II of pectoral muscle removed image when applied to (b) original image (c) enhanced image using BHM-ANF

Table 1: Comparison of Breast Border Extraction Techniques

Author(s)	Methods applied and performance measure achieved	Number of Images	Detection Accuracy
M´endez et. al [13]	Intensity Gradient Based	322	89%
Mario et. al [15]	Region Growing	40	100%
Raba et. al[18]	Histogram based threshold, Gaussian Filter	320	98%
Ferrari et. al[7]	Active Contour	84	0.96 completeness and correctness
Proposed	Morphology	322	98.75

Research Output

Extramural projects

Ongoing projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
ON THE DEVELOPMENT OF AN AUTOMATED IMAGE ANALYSIS SYSTEM FOR DETECTION OF CERVICAL PRE-CANCEROUS AND CANCER LESIONS USING LIQUID CYTOLOGY BASED PAP SMEAR IMAGES. BT/PR12127/MED/32/358/2014	DBT, Govt. of India; Rs. 50.93 lakhs; 2016-2019; Dr. Lipi B. Mahanta	1. To design & develop a Decision Support Software for detection of cervical pre-cancerous & cancerous lesions. 2. To assess the impact of some risk factors (socio-economic, environmental, lifestyle, medical history, diet, anthropometry and hematology) of the patients. 3. To evaluate human papillomavirus (HPV) DNA testing as an alternative screening method.

Publications

In cited journals

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month/Year of publication
Priyanka Kalita, Gautam Choudhury and S. Dharmaraja.	Analysis of single server queue with Modified Vacation Policy	Methodology and Computing in Applied Probability	doi.10.1007/s11009-019-09713-9	2019
Anupam Gautam, Gautam Choudhury and S. Dharmaraja	Performance analysis of DRX mechanism using batch arrival vacation queueing system with N-policy in LTE-A networks	Anals of Telecomunication	doi.org/10.1007/s12243-018-0659-y	2018
Chandi Ram Kalita and Gautam Choudhury	A note on reliability analysis of an N - policy unreliable / queue with optional repeated service	RAIRO- Operations Research	52, *713 -724.*	2018
Chandi Ram Kalita and Gautam Choudhury	The N-policy for an unreliable / queue with optional repeated service and delayed repair	Communications in Statistics-Theory and Methods	doi.org/10.1080/03610926.2018.1481976	2018
Daisy Das, Lipi B. Mahanta*, Shabnam Ahmed, Basanta Kr. Baishya, Inamul Haque	Study of contribution of Biological Interpretable and computer-aided features towards the classification of Childhood Medulloblastoma Cells.	Journal of Medical Systems	42:151	July 2018
Manasi Hazarika, Lipi B Mahanta*	A new breast border extraction and contrast enhancement technique of Digital Mammogram Images for improved detection of breast cancer	Asian Pacific Journal of Cancer Prevention	19 (8), 2141-2148	August 2018,
N Rajbongshi, D C Nath, L B Mahanta*	Estimating Risk of Breast cancer at different ages: Application of Survival Techniques	Asian Pacific Journal of Cancer Prevention	19 (11), 3033-3038	November 2018
Alpana Deka and L.B. Mahanta*	Forecasting: A review and its application to handwritten signatures	International Journal of Applied Engineering Research	Vol13, No. 21, 15192-15195	2018
Alpana Deka and L.B. Mahanta*	Applications of image preprocessing techniques in handwritten signatures	Journal of Emerging Technologies and Innovative Research	Volume 5, Issue 11, 400-405	November 2018
Alpana Deka and L.B. Mahanta*	Real time verification of Offline handwritten signatures using K-means clustering	International Journal of Advanced Scientific Research and Management Technology and Advanced Engineering (IJASRM),	Volume 3 Issue 11, 418-423	November 2018
Manasi Jyoti Das, Lipi B Mahanta*	Lung segmentation from CT images: Impact of different window settings on the accuracy of segmentation	Journal of Emerging Technologies and Innovative Research	Volume 5 | Issue 12 | 189-195	December-2018
Manasi Hazarika*, Dr. Lipi B. Mahanta	A Hierarchical Spatial Fuzzy C Means Algorithm for Mammographic Mass Segmentation	International Journal of Computer Sciences and Engineering	Vol 7, Issue 1, 84-88	January 2019
Alpana Deka and Lipi B. Mahanta*	Applications of time-series analysis: A case study on the development of a predictive model for handwritten signature.	Songklanakarin Journal of Science and Technology (SJST)	41 (1), 136-143	Jan. – Feb. 2019
Soma Dhar, Lipi B. Mahanta* and Kishore K. Das	Formulation of the simple Markovian model using fractional calculus approach and its application to analysis of queue behavior of severe patients	Statistics in Transition new series,	Vol. 20, No. 1, pp. 117–129	March 2019
Lipi B. Mahanta*, Kangkana Bora, Rahul Kumar, Shauvik Purkayastha, R. Suresh	A Pilot Study on Image Processing Methods for Segmentation of Striations in Fired Bullets	International Journal of Computer Sciences and Engineering	Vol. 7, Issue-3, 449-455,	March 2019
Soma Dhar, Lipi B. Mahanta* and Kishore K. Das	Estimation of the waiting time of patients in a hospital with simple Markovian model using Order Statistics	Hacettepe Journal of Mathematics and Statistics	Volume 48 (1), 274 - 289	June 2019

Conference proceedings

Author (s)	Title	Conference name	Volume & Issue no./page no.	Month/Year of publication
Amartya Ranjan Saikia, Dr. Lipi B. Mahanta, Kangkana Bora and Dr. Anup K. Das,	Inceptionism and Residualism in Classification of Breast Fine Needle Aspiration Cytology Cell Samples	Intel® Student Ambassador AI Poster Presentations,	AVAILABLE ONLINE https://software.intel.com/en-us/ai-academy/poster-presentations	2018

Conferences/Workshops/Meetings attended

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Anjana Begum	Two Day National Seminar on STATISTICS FOR PEOPLE, SOCIETY AND ECONOMY	February 22-23, 2019, Department of Statistics, Gauhati University, Guwahati.
Daisy Das	-do-	-do-
Elima Hussian	-do-	-do-

Chaired Sessions in Conferences/seminar

Faculty	No. of sessions chaired	Programme Name	Date & Venue
Gautam Choudhury	Two	Two Day National Seminar on STATISTICS FOR PEOPLE, SOCIETY AND ECONOMY	February 22-23, 2019, Department of Statistics, Gauhati University, Guwahati
Lipe B Mahanta	-do-	-do-	-do-

BIODIVERSITY AND ECOSYSTEM RESEARCH

The programme includes a wide array of research opportunities in the domain of sericulture/seribiotechnology inclusive of diversity of silkworm moth, effect of anthropogenic activity in ecosystem and environment on health of microorganism and higher organism within it and restoration of disturbed/polluted ecosystem. Other areas of research under BDER are understanding the range of diversity of bacteria in the interior of different plant parts including shoots, roots and seeds and their role in different crop development stages. Role of genetics, diet and geography on human gut microbiome and their association in human health and well being are also area of interest in this programme.

First row (L to R) : M. R. Khan, Assoc. Prof-I; Suresh Deka, Professor-II & i/c RMES, LSD; N. C. Talukdar, Director, IASST; Debajit Thakur, Assoc. Prof-I; W. Romi, DST-INSPIRE Faculty.

Second row (L to R) : Srikanta Baishya, MTS; Bhaskar Das, NPDF; Parijat Saikia, NPDF; Kaushik Bhattacharya, NPDF; Kaustavmani Patowary, DBT-RA; Manashi Das, JRF; Mehjabin Ali, Project Asst.; Madhurankhi Goswami, JRF; Tamali Sinha, JRF; Rabiya Sultana, JRF; Chingakham Juliya Devi, JRF; Shabiha Nudrat Hazarika, JRF; Atlanta Borah, JRF; Arjun Karke, Project Asst.; Dibyayan Deb, JRF; Khanindra Sharma, JRF; Santanu Das, JRF; Arun Kumar, JRF.

Third row (L to R) : Ranjita Das, JRF; Nilam Sarma, JRF; Chandana Malakar, JRF**;** Tulsi Kumari Joishy, SRF; Jinu Medhi, JRF; Mayanglambam B. Devi, JRF; Anowar Hussain, RA; Bhuwan Bhaskar, JRF; Archana Nath, NPDF.

Narayan C. Talukdar

Director, IASST & Head, Life Sciences

Dr. N. C. Talukdar obtained Ph. D. in plant-microbe interaction from the University of Saskatchewan in 1993 as a Canadian Commonwealth Scholar. He was a visiting FAO Fellow in University of Jerusalem during 2000-2001 and a visiting scientist in University of Warwick, UK in 2006. Microbial biodiversity, plant microbe interaction and endophytic bacterial succession in plant interior are his core research interest. Last one decade, he has also been actively involved in infrastructure building and research for promotion of Traditional Knowledge based drug discovery, besides providing leadership towards building two national laboratories in NE India.

Research Summary

Microbial diversity and interactions in ecosystems:

Endophytic microorganisms occur in plant parts including seeds, roots, shoots and flowers but how these organisms in seed/propagating material persist and spread to growing parts and whether there is any underlying phenomenon regulating their transmission between plant interior and exterior in growth substrate are not known well. This research is generating data on culture-dependent and culture-independent approach based endophytic bacterial diversity in cereal (rice), legume (green gram), oilseed (mustard) and two Solanaceous (tobacco and tomato) crops. Our research approach includes (1) diversity analysis of Endophytic Bacteria in surface sterilized seed (SSS) interior by microscopy (SEM, TEM and laser confocal) and culture dependent and metagenome sequencing, (2) broad spectrum antibiotic induced changes in diversity profile in root explant derived callus, suspension culture and regenerated plants at different time intervals and (3) interaction of introduced bacteria with naturally occurring plant interior bacteria in hydroponic system.

Culture dependent and metagenome sequence based endophytic bacteria in surface sterilized seeds of five different crops:

Endophytic bacterial (EB) species obtained on culture plate from seeds of 5 different crops showed an interesting pattern. Each crop species harbours different types of bacteria. Bacteria of *Bacillus* sp. were found to be dominant in mustard, tomato and tobacco; whereas rice and green gram seeds contained two distinct set of dominant culturable EB species (Table1). Similarly, metagenomic approach (NGS) based result showed that rice, green gram, mustard and tobacco seeds are inhabited predominantly by bacteria belonging to phyla Proteobacteria, Actinobacteria and Firmicutes with high dominance of Proteobacteria (Table1). In terms of diversity of dominant genera, each crop seeds differ conspicuously with *Achromobacter* (17%), *Serratia* (82%), *Agrobacterium* (54.23%), *Pantoea* (24.1%) and *Bacillus* (16.1%) being most dominant in rice, green gram, mustard, tobacco and tomato, respectively. It would be interesting to understand how such diversity of EB in crop seeds translates into functional significance in vegetative and reproductive stages of these seed derived plants.

Next generation sequence based diversity of endophytic bacteria in SSS interior of 7 rice genotypes from 3 agroecosystems of NE India

Next generation sequencing of seed interior bacterial microbiome of 7 rice genotypes i.e., *Kekua bao, Maguri bao, Kalajoha*, *Ranjit*, *Fazai, Taiklwangh* and *Idaw* revealed that OTU richness was significantly higher in *Idaw* (1985) than in the other six genotypes as tested by student's t-test ($P \leq 0.05$). It was followed by *Taiklwangh* (1701), *Kekua bao* (1597), *Kalajoha* (1509), *Maguri bao* (1427), *Ranjit* (949) and *Fazai* (896). The alpha diversity measures showed seed interior of upland and lowland rice genotypes to possess more bacterial diversity than that of midland genotypes. When the genotypes peculiar to each agroecosystem pooled, upland and deepwater genotype seed showed more diversity than midland genotypes. Irrespective of genotypes, the abundance in terms of coverage in the bacterial population was highest in phyla *Proteobacteria, Actinobacteria, Bacteroides* and *Firmicutes*. The three alpha diversity measures also showed that seeds of different hills of a single genotype of an ecosystem were less diverse than seeds grain in different genotypes and agroecosystems.

Table1: Endophytic bacterial diversity in 5 different crops revealed by 16S rDNA and next generation sequencing.

Plant species	Culturable endophytic bacterial species detected and their abundance	Dominant bacteria of metagenomic sequence at phylum and genus level with % abundance	
		Phylum level (%)	Genus level (%)
Rice (*Oryza sativa*)	(40) * *Pantoea agglomerans* (60%), *Xanthomonas sacchari* (12%), Others (28%)	Proteobacteria (85.3) Actinobacteria (5.98) Firmicutes (5.18) Bacteroides (2.39) Others (1.14)	*Achromobacter* (17.02), *Erwinia* (12.9), *Xanthomonas* (10.7), *Pseudomonas* (9.06), *Agrobacterium* (6.9), *Ochrobactrum* (6.8), *Stenotrophomonas* (0.78), Others (35.5)
Green Gram (*Vigna radiata*)	(30) * *Microbacterium testaceum* (10%), *Staphylococcus epidermis* (6.6%), Others (83.4%)	Proteobacteria (90.8) Firmicutes (8.42) Actinobacteria (0.28) Others (0.5)	*Serratia* (82), *Lysinibacillus* (5.81), *Agrobacterium* (5.18), *Bacillus* (2.38), Others (4.6)
Mustard (*Brassica campestris*)	(8) * *Bacillus endophyticus* (50%) *Bacillus filamentosus* (37.5%), Others (12.5%)	Proteobacteria (38) Firmicutes (24) Actinobacteria (15) Others (23)	*Agrobacterium* (36.47), *Methylobacterium* (13), *Acinetobacter* (13), *Bacillus* (1.96), Others (35.57)
Tobacco (*Nicotiana tabacum*)	(1) * *Bacillus pumilus* (100%)	Proteobacteria (36.7) Firmicutes (8.1) Actinobacteria (9.1) Others (46.1)	*Pantoea* (24.1), *Stenotrophomonas* (20.9), *Pseudomonas* (11.3), *Sphingobacterium* (10.3), Others (33.4)
Tomato (Solanum lycopersicum)	(2) * *Bacillus amyloliquefaciens*(50%) *Bacillus subtilis* (50%)	Firmicutes (31.1) Proteobacteria (23.6) Bacteroidetes (10.5) Others (34.8)	*Bacillus* (16.1), *Pantoea* 6.3), *Terrimonas*(5.2), *Propionibacterium*(4) Others(68.4)

* No of culturable species detected.

Linkage between rice seed endophytic bacterial species and database assigned metabolic pathways of the rice seed interior EB species of six rice genotypes of three agroecosystems of NE India:

Forty randomly selected endophytic bacterial (EB) isolates of seed interior of rice genotypes were identified based on alignment against NCBI database. The 40 sequences were found to be representative of 3 phyla, 11 genera, and 16 different species (Fig 1). The culturable EB population of midland agroecosystem is more diverse phylogenetically than upland and deep water agroecosystem. The 16S rRNA gene sequences were individually aligned in PAPRICA (Pathway Prediction by Phylogenetic Placement) pipeline to predict the metabolic pathways and putative roles of the prokaryotic endophytes. Query sequences provided to PAPRICA were searched for sequence similarity in DNA databases using Infernal. Their metabolic pathways and functions were assigned from BioCyc and MetaCyc databases using pathway tools through phylogenetic placement of the query sequences on a reference tree by pplacer. Whether the predicted pathways are correct was further checked by scanning through the available genome sequences of the isolates. Euclidean distance was computed and hierarchical clustering was performed to the output of PAPRICA analysis using pdist and hclust functions, respectively in R A total of 436 metabolic pathways were assigned based on database search for the 40 EB of the seeds (Fig. 2). There were a large number of assigned central pathways of which several pathways are for growth and development of host plant. These pathways were found to vary in their abundance (number of times a pathway was present in an agroecosystem) depending upon agroecosystem. For example, (R)-acetoin biosynthesis I& II, responsible for the synthesis of plant beneficial volatile organic compound (VOC), acetoin was found to be present in most of the EB isolated from landraces of upland agroecosystem. Similarly, pathways for siderophore production such as 2,3-dihydroxybenzoate biosynthesis and siroheme biosynthesis were also found more prominent in isolates of upland agroecosystem followed by midland agroecosystem. These two pathways had very low confidence score (0.714) in the deep-water agroecosystem. In contrast, three pathways for 4-aminobutanoate (GABA) degradation were found to be present in all the isolates of the deep-water agroecosystem. Interestingly, adenosylcobalamin (vitamin B12) biosynthesis pathways were assigned to isolates of the midland genotype *Kalajoha* and upland genotypes *Idaw* and *Taiklwangh*. Selenate reduction pathway was assigned with a higher confidence score (4.22) to the EB of midland agroecosystem followed by those in upland and deep-water (Fig. 2).

Fig. 1. Phylogenetic relationship among the culturable endophytic bacteria was inferred by constructing maximum likelihood tree with 1000 bootstraps. The branch length represents 0.20 nucleotide substitutions per site, it was calculated by Tamura-Nei method using the 16S rDNA sequences. Tree was created with MEGA7 software. Percent similarity of the sequences obtained by aligning against NCBI 16S rDNA nr database is also represented. Families to which these bacterial species belong are shown.

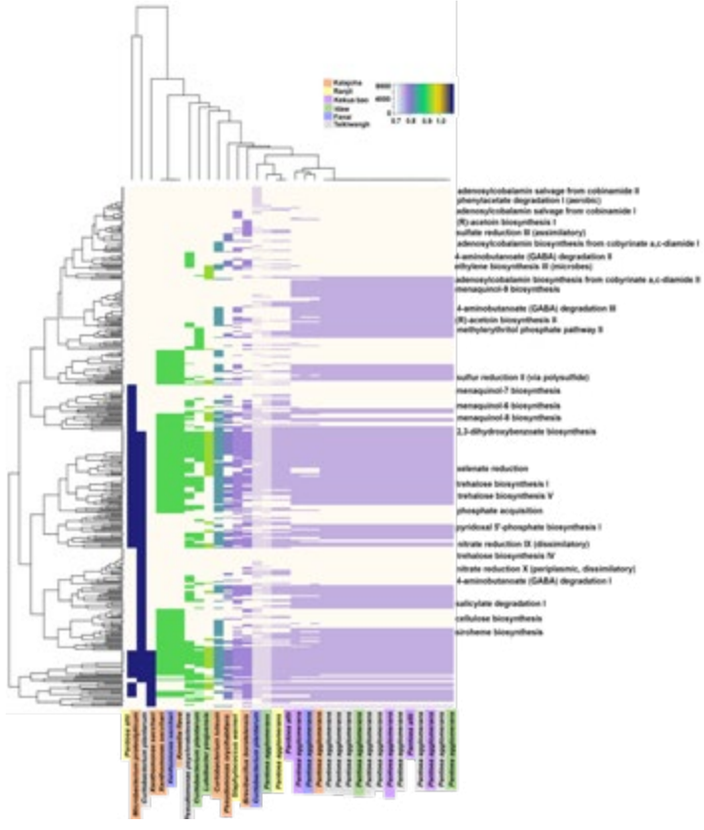


Fig. 2. Rice plants are benefitted by different metabolic pathways of the seed EB. PAPRICA (pathway prediction by phylogenetic placement) analysis assigned 436 metabolic pathways to 34 EB isolated from seeds of the six rice genotypes. A few potentially beneficial pathways are shown in the figure. Heatmap displays presence of these metabolic pathways in the EB. Euclidean distance was calculated using "dist" function and hierarchical clustering was done using "hclust" method from heatmap.2 function of gplots package in R. A value of two was added to the data for normalization and converted to log scale. The color key shows a gradual increase in confidence score of the metabolic pathways in log scale.

Endophytic bacterial composition in tobacco plant generated from suspension culture treated with broad-spectrum antibiotic.

In an attempt to produce tobacco plants with reduced endophytic bacterial (EB) load, plants were generated from antibiotic-treated suspension culture. Initially, callus was produced from tobacco *var.*Podali roots using MS media containing 2mg/l NAA and 0.5mg/l BAP phytohormones. From callus, suspension culture were generated in MS media containing 2mg/l 2, 4-D and 0.5mg/l BAP. The suspension was then treated separately with 2 doses of a single antibiotic rifampicin, streptomycin, chloramphenicol, ampicillin, penicillin (conc. 100µg/ml) at an interval of 24 hours between the two doses. Also cocktail of rifampicin – streptomycin (100µg/ml) and rifampicin – ampicillin (100µg/ml) were used. After 48-hours of constant shaking (at 25°C, 100rpm) suspension was washed and transferred in MS media containing 6 mg/l BAP for shoot regeneration. After 45-50 days, it was observed that antibiotic-treated cells started to regenerate shoot. These plants derived from antibiotic-treated suspension were again divided into 4 groups and injected separately with 1, 2, 3 and 4 doses of cocktail of rifampicin-streptomycin antibiotic for further elimination of endophytic bacteria from the plants. The endophytic bacterial composition was determined by culture-dependent and independent methods in surface-sterilized seed (SSS), callus, suspension, and regenerated plant parts.

Culturable endophytic bacteria were not detected uniformly in all seeds, callus and suspension tested. None of the surface sterilized seeds (SSS) showed culturable bacteria when seed crushed suspension was plated in culture media. In another experiment, SSS crushed in sterile distilled water inoculated individually in nutrient broth (NB) for enrichment of EB, but surprisingly none of the 150 seeds showed colony on plating in NA after 5 days of incubation in orbital shaker. However, on similar enrichment in NB, 16 percent of 90 SSS derived callus showed CFU of EB ($1.5x10^2$ – $0.73x10^7$ CFU/callus). The plant cell suspension also did not show growth of any culturable bacteria. NGS of bacterial metagenome from both seed and callus showed interesting data on EB. A comparison of four dominant phyla in SSS seed and callus showed that of 60-78% EB was comprised of Proteobacteria in 5 replicate samples and in similar number of callus Proteobacteria comprised only 3-7.5% of EB. Similarly, callus samples comprised of 79-83% Firmicutes against of 3-4% in case of SSS (Fig 3). Endophytic bacterial load could be reduced by antibiotic treatment of root derived suspension culture and subsequent antibiotic injection of plants developed from the suspension culture (Fig 4). The population of most abundant of EB family *Rhizobeaceae* was reduced drastically by antibiotic treatment and EB belonging to the *Family X, Neisseriaceae*, *Rhodocyclaceae* were completely eliminated by 3 doses of antibiotic treatment. Over all it was not possible to evaluate entire load of EB of tobacco interior of seed, callus, cell suspension and regenerated plants.

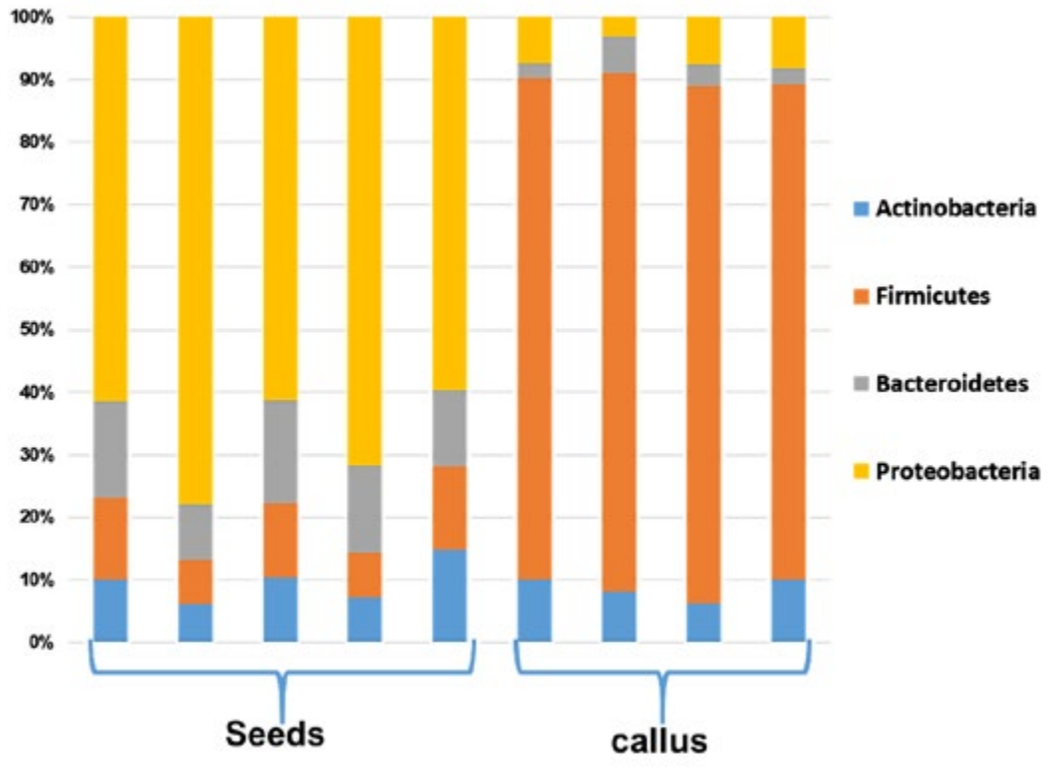


Fig. 3. Relative abundance of bacterial endophyte at major phyla level. *Proteobacteria* are most abundant phyla in all five replicate of seeds and *Firmicutes* is most abundant phyla in all four replicate of callus.

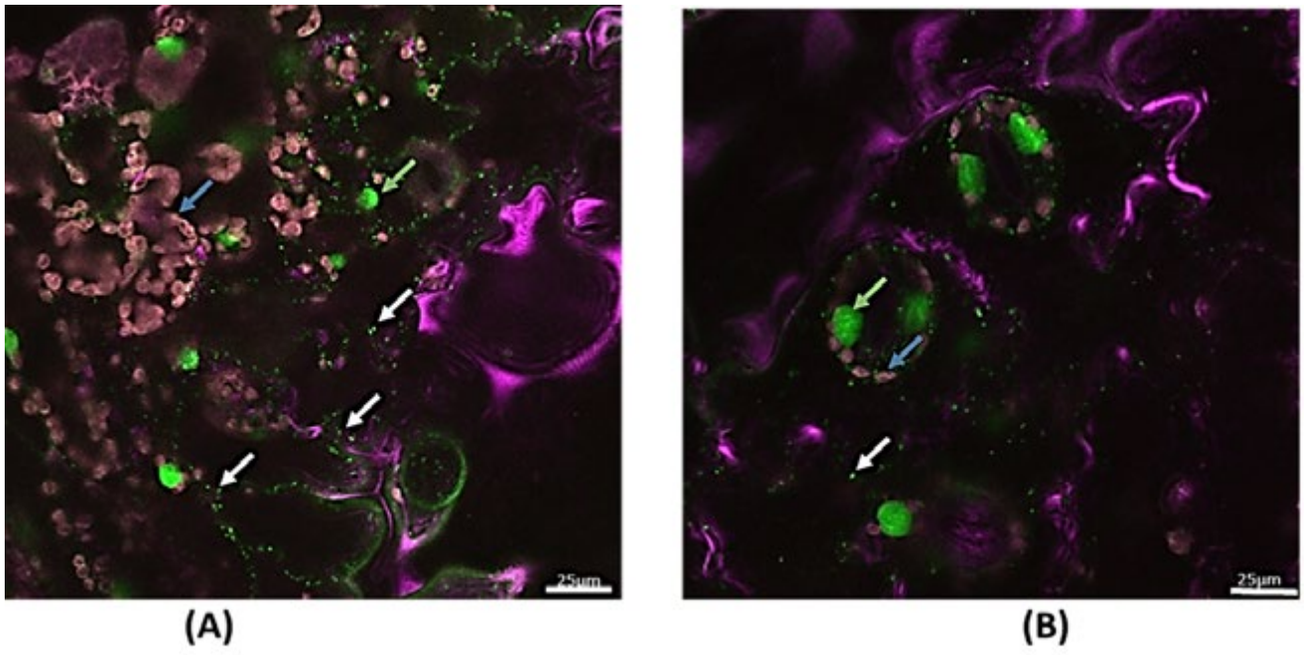


Fig. 4. Laser Confocal microscopic image of bacteria in (A) Control and (B) antibiotic-treated plants- plant sample stained with Syto9 which binds to the nucleic acid of the cell. In image (A) and (B) both EB and nucleus are stained with Syto9 and gives green color. Size of the nucleus is in the range of 10-13 µm and bacteria is 0.8-1µm. Bacteria are shown with white arrow and nucleus with green. Mitochondria also have nucleic acid but does not get stained with syto9. Auto-fluorescence of mitochondria of Magenta color is shown with green arrow. Compared to image (A) control bacterial load reduced in (B) antibiotic-treated plants but not completely eliminated.

Comparative assessment of carbon sequestration potential and livelihood sustainability of different indigenous land-use systems in Lower Assam, North East India" (SERB- N- PDF) - Dr. Rinku Moni Kalita:

This study assessed the carbon sequestration potential and livelihood sustainability of different indigenous land-use systems in the Lower Assam, Brahmaputra Valley (Kamrup, Goalpara and Bongaigaon districts). The study showed prevalence of forest, monoculture plantations and agroforestry systems as major land use systems in the area of interest. Twenty (20) different land use types were sampled from the systems which include 10 different types of Traditional agroforestry systems (*pineapple, areca, cocoa, orange, broom, sandal dominated mixed agroforestry systems, Paan Jhum , Som based agroforestry, jhumlands and traditional homegardens*) ; 4 monoculture orchard systems (*lemon, banana, papaya, ziziphus*); 2 Fallowlands (jhum and abandoned forest), *Shorea robusta* forest conserved by communities, Natural *Shorea robusta* and *Tectona grandis* dominated forests and *Imperata* based managed forest. Structure and composition of vegetation in different systems were studied. Dendrometric measurements of different vegetation compartments have been performed adopting standard methodologies. A total of 86 tree species belonging to 76 genera under 36 families were recorded across different study sites. Shrub and Herb communities were represented by 17 and 37 species. *Leguminosae* was the dominant family having 11 species followed by *Arecaceae, Moraceae, Rutaceae* (6 species each), *Euphorbiaceae* and *Meliaceae* (5 species each), *Anacardiaceae* and *Malvaceae* (4 species each) respectively. Apart from this Eight (8) different types of bamboo species and six (6) different types of banana species were recorded in different land use systems. Across different sites monoculture plantations exhibited maximum tree density (1120.00 ± 503.60 stem ha^{-1}) followed by natural forest (1063.33 ± 434.78 stem ha^{-1}) and managed agroforestry systems(611.60 ± 111.01 stem ha^{-1}). Natural forests lets in higher tree basal area cover (39.42 ± 2.26 m^2ha^{-1}) compared to managed agroforestry systems (27.39 ± 5.95 m^2ha^{-1}) and monoculture plantations (13.87 ±7.27 m^2ha^{-1}) respectively. Natural forests bear the maximum biomass carbon stock potential with mean stock value of 208.55 ± 32.60 Mg ha-1 following managed agroforestry systems and monoculture plantations (Fig 1). Basal area cover and biomass carbon stock exhibited significant correlation ($r^2 = 0.987$; $p < 0.05$) across different land use systems (Fig 2). Biomass data and soil parameters including carbon stock and sequestration of different land use systems will provide index of sustainability and recommendation for management intervention for livelihood sustainability.

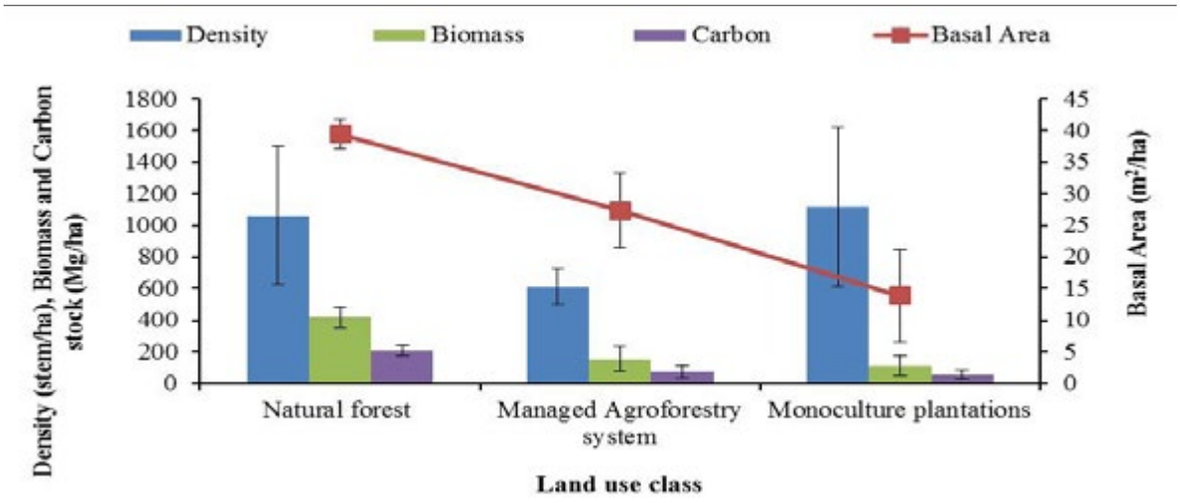


Fig. 1. Biomass and carbon stock in different land use classes in lower Assam

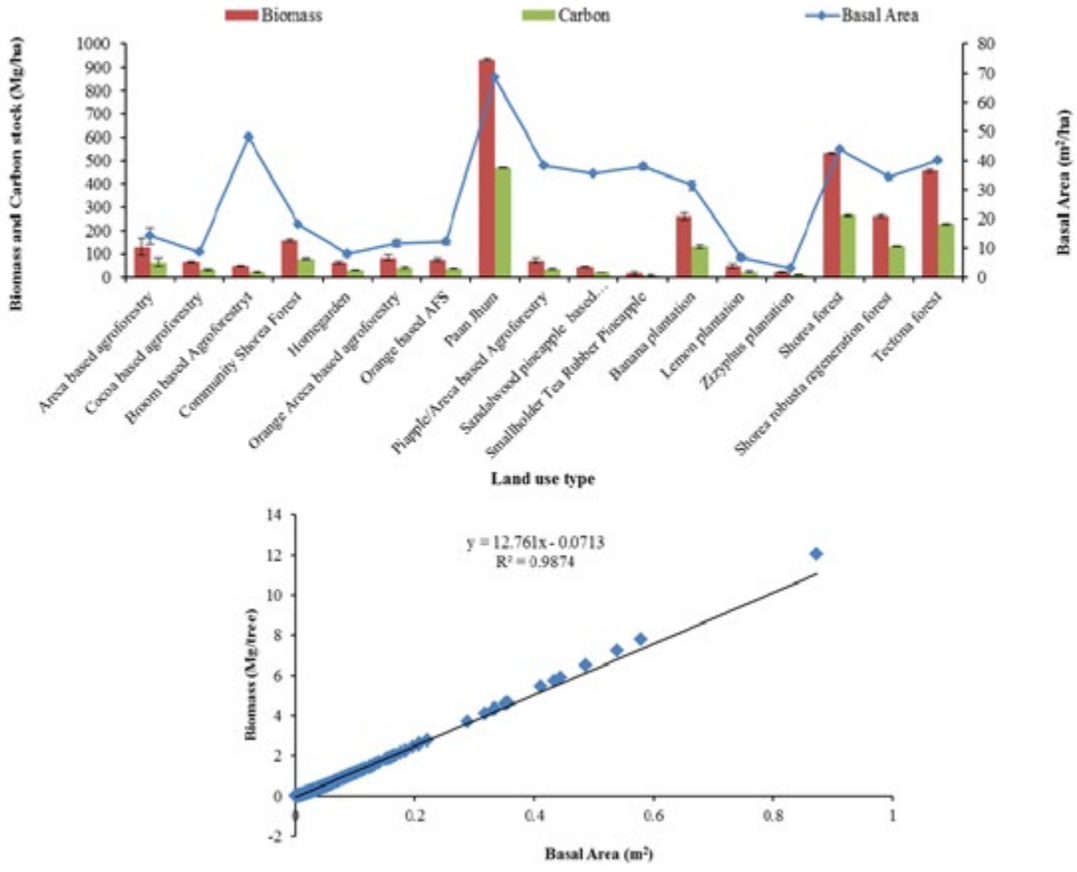


Fig. 2. Biomass carbon stock and tree basal area – carbon relationship in different land use classes in lower Assam

Effect of scented rice seed derived endophytic bacteria (EB) on growth of Kola Joha rice and EB population in root, shoot and rhizosphere:

Inocula of EB species *i.e. Micrococcus luteus* and *Staphylococcus epidermidis* enhanced height and biomass of 25 days old plants in comparison to uninoculated control plants and the cumulative loss of water by transpiration. The 50 ml capacity centrifuge tube was used for growing plants were covered with cap with a small hole in the centre which allowed the rice plants to come out (Fig. 5). This system allowed virtual stoppage of evaporation loss of water from soil and difference in weight of a set in two consecutive measurements was treated as transpirational water loss. The tubes with plant of more height and biomass also required more sterile distilled water to attain constant weight of the

set daily. The population of EB in shoot interior (4.98 ± 0.4 log cfu gm^{-1}) of inoculated plants was higher than that of uninoculated control plants (4.79 ± 0.4 log cfu gm^{-1}). However, the EB population in root was higher in uninoculated plants (4.94 ± 0.5 log cfu gm^{-1}) than inoculated plants (4.66 ± 0.7 log cfu gm^{-1}). The EB were also detected in the rhizosphere of the sterilized sets suggesting leakage of bacteria from the interior of seeds or roots. Thus the growth enhancement is attributed to the beneficial effect of inoculation with the EB.

Effect of *M. luteus* bio-fertilizer on four varieties of scented Joha rice of Assam:

Bio-fertilizer was prepared in solid form by mixing *M. luteus* culture with sterile compost. The bio-fertilizer contained 2.4 X 10^7 cfu of *M. luteus* per g of compost and the sterilized compost carrier which was mixed with sterilized broth having no bacteria. Moisture content both in bio-fertilizer and sterilized compost was maintained at 70%. The roots of thirty days old seedlings of four varieties of scented rice were separately coated with bio-fertilizer @ 6 Kg/ha seedlings in the form of a slurry derived by mixing bio-fertilizer with equal quantity of sterilized compost and a known quantity of rice field sticky soil. Uninoculated control plot seedlings were treated with only sterilized compost @ 12 Kg/ha seedlings along with sticky mud. The roots of the seedlings were dipped in the respective slurry overnight to develop a coat of bio-fertilizer or carrier. By 10^{th} day after transplanting, the growth difference in rice plants of uninoculated and inoculated has been noticed (Fig. 6).

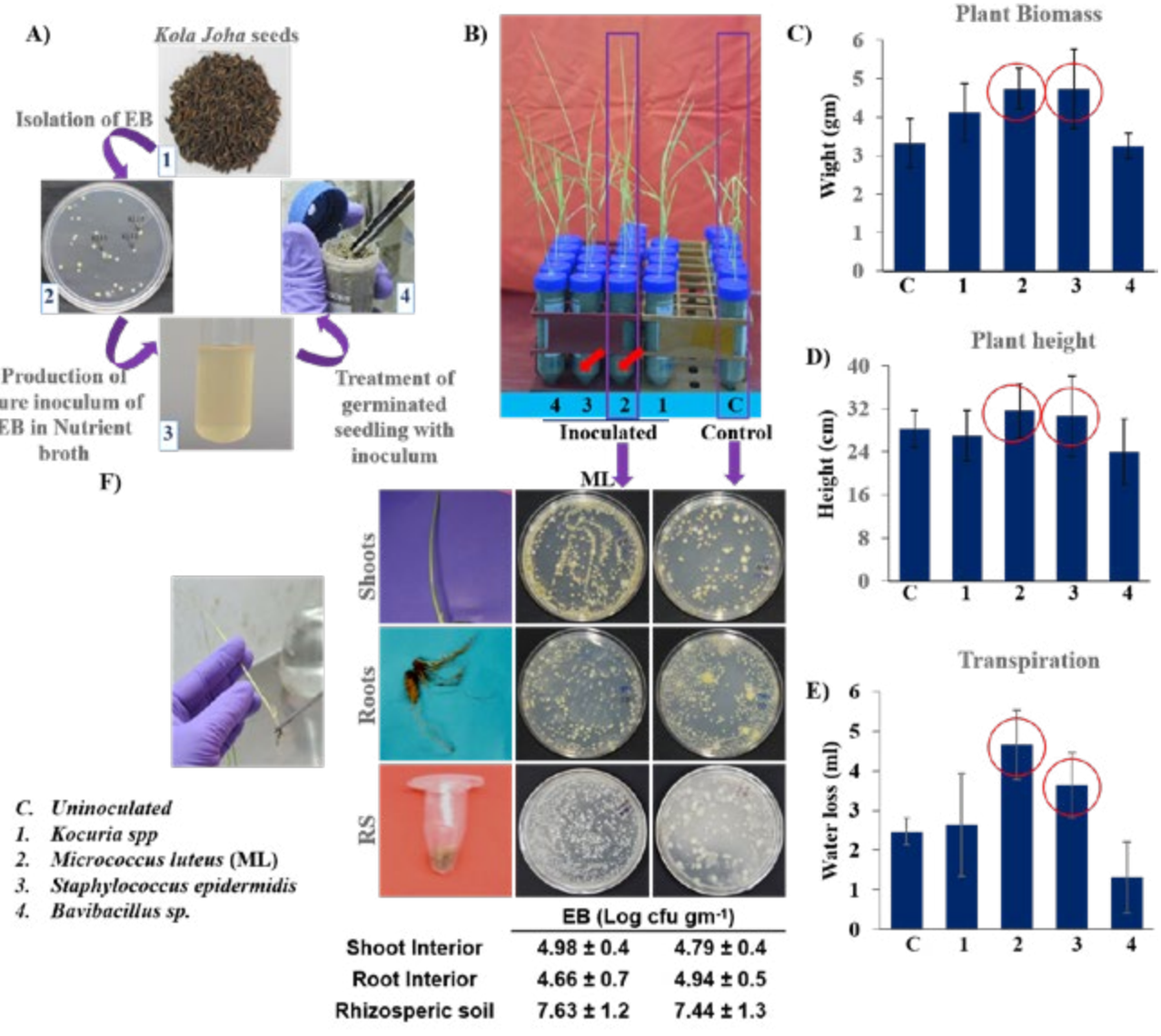


Fig. 5. Testing of seed origin endophytic bacterial (EB) inocula on plant growth and colonization pattern in *Kola Joha* rice (KJR) grown in 50 ml centrifuge tubes using sterile soil. (A) Schematic representation of the (A1) method of isolation of KJR seed originated EB (A2), production of inoculum (A2) and treatment of the 5 days old seedlings (A4). Please note the changes in biomass (C), plant height (D) and transpirational water loss of the 25 days old plants. Inoculation of seedlings with EB isolates increased bacterial population in shoot interior and rhizosphere of the KJR plants is shown in Fig F.

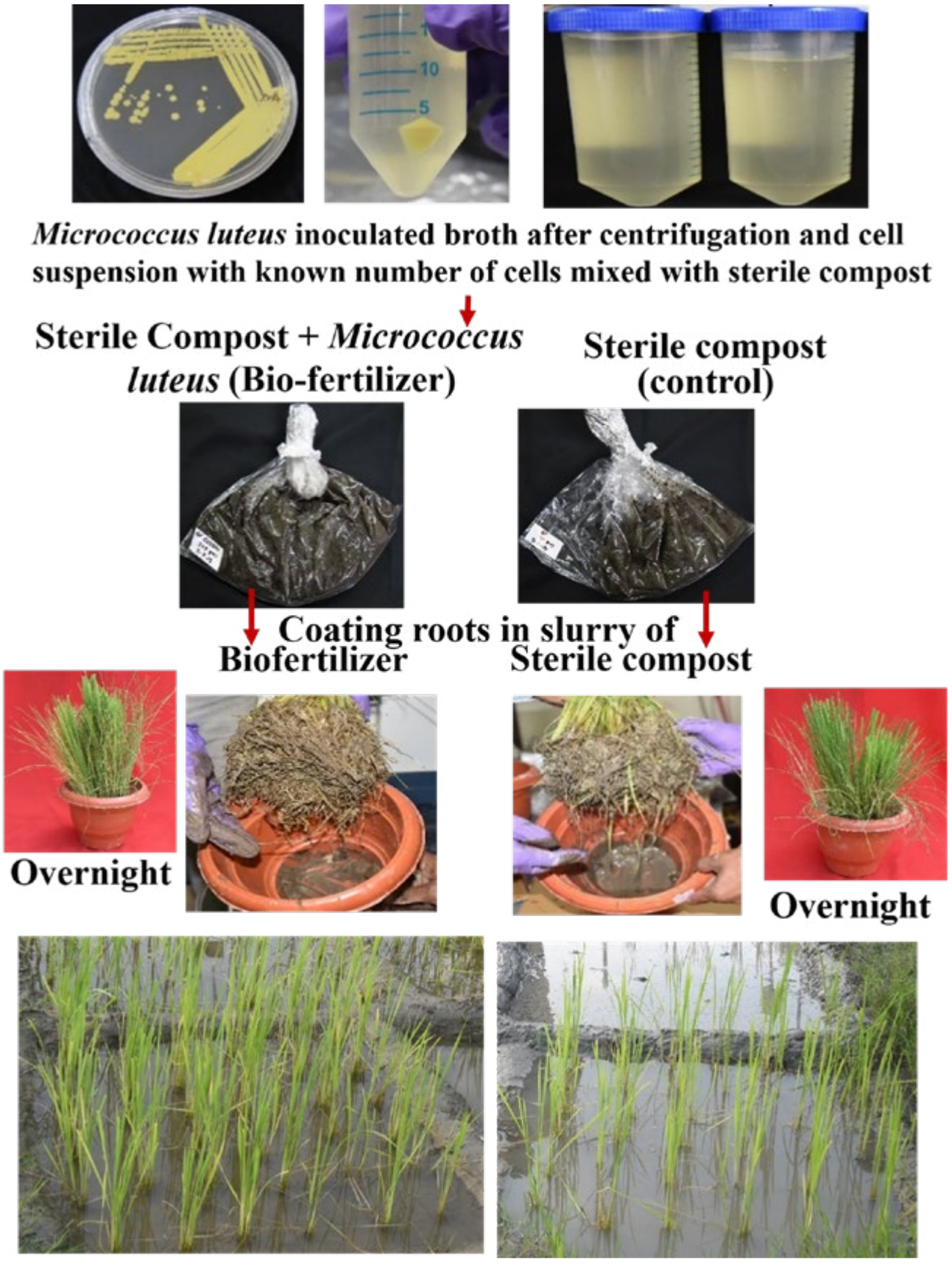


Fig. 6. Preparation of *M. luteus* broth culture (Top panel), mixing with carrier as solid biofertilizer (second panel from top), coating of roots with biofertilizer (left) and sterile compost slurry (right) [third panel from top] and growth of biofertilizer treated and control *kolajoha* rice on 10th day after transplanting in field (botton panel).

Climate resilient marker-assisted generation of prospective germplasm for wide adaptability of Muga silkworm and quality and quantity enhancement of silk production – (DBT-RA) - Dr. Kamal Das:

The Muga culture is known to be originated in the Brahmaputra Valley of Assam, India. A polyphagous insect (*Antheraea assamensis* Helfer) produces Muga silk and is feeds on *Persea bombycina* (Som) & *Litsea monopetala* (Soalu), as primary hosts and there are secondary and tertiary hosts as well (Neog et al., 2005; Tikader and Rajan, 2012). In general, som (a heterozygous plant) is the preferred food plant as the worms reared on it showed uniform growth and higher silk ratio, producing good quality silk thread at the commercial level (Tikader and Rajan, 2012). Breeding practices for leaf production need to be improved as a yield gap of more than 8MT of leaves/ha/year could be seen in the recent past (Tikader et al., 2011a). But due to lack of knowledge on the genetic makeup of this plant species, enhanced leaf production could not be achieved (Thangavelu et al., 2005). Therefore the present research has been carried out with these objectives: 1) Study the genetic diversity of germplasm collected from different geographical locations of Assam, Meghalaya, Mizoram, Nagaland and West Bengal by using lab characterized co-dominant SSR markers as well as with universal ISSR dominant markers. 2) Crossing between the individuals containing the highest genetic diversity and 3) Raising population that can withstand the alarming climatic fluctuations that might provide a constant supply of food for *Antheraea assamensis*. So far different universal ISSR primers were standardized (Fig 7) on DNA samples isolated from leaves of various Som plants maintained in Bio-conservation hub (BCH)-2 of IASST campus. Pure germlines (a total of 38) of Som plants collected from different geographical locations and maintained by Central Muga Eri Research Training Institute, Jorhat are also being analyzed using ISSR marker to unfold the genetic correlation among these ecotypes.

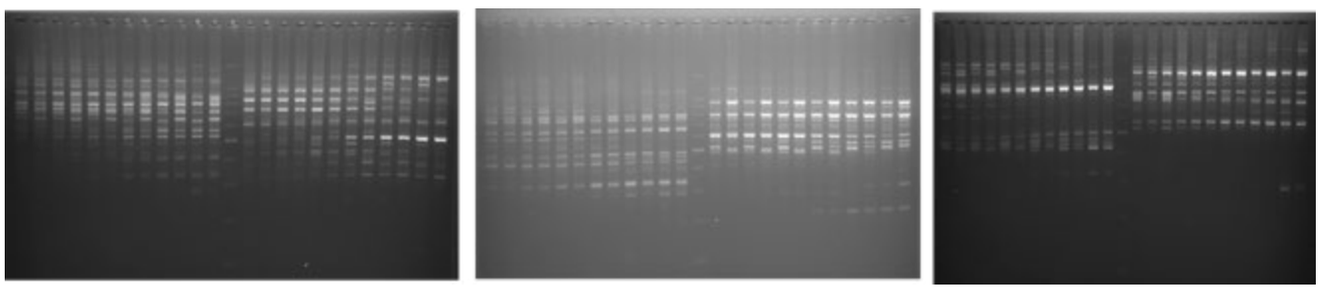


Fig. 7. Standardization of different ISSR markers and subsequently testing of diversity among various Som samples collected from BCH-2 of IASST campus.

Wetlands of Assam, India: a look into the current scenario and future prospects for their sustainable development using the novel approach of constructed wetlands" (DST-NPDF)- Dr. Parijat Saikia:

Experimental microcosm study-constructed wetland (CW)

A laboratory scale CW experiment was conducted to assess the nutrient removal efficiency of three different indigenous macrophytes namely, *Acorus calamus, Vetiveria zizanioides,* and *Hygroryza aristata* (Fig 8). At varying retention time sewage treatment potential of CW was evaluated. After three months of monitoring of fully established CWs, we measured significant removal of COD, NO_3^--N, PO_4^{-3}-P and BOD5 by treatment with *Vetiveria zizanioides* ($P > 0.05$) over the control (un planted). In the present case, organic matter in the form of higher root biomass can be the cause of relative increment of alkaline buffering capacity in treatment planted with *Vetiveria zizanioides* followed by treatments with *Acorus calamus* and *Hygroryza aristata*. Results indicated, CW proved an effective method of treating wastewater and may be combined with decentralized wastewater.

Fig. 8. Experimental microcosm study for determination of effluent removal with various wetland macrophytes

Suresh Deka

Professor

Dr. Suresh Deka received Ph.D. in Microbial Ecology from Guwahati University in 1991 and overseas Associateship of DBT for carrying research on Biosurfactant of microbial origin in the University of Ulster, UK. His research focus is on hydrocarbon degradation, bioremediation of hydrocarbon pollution in soli and microbial biosurfactant in plant diseases management. He served IASST 28 long years and superannuated in 2018. Presently, he is working as an Honorary Professor in the institute.

Research Summary

Rhamnolipid producing bacterial strain for treatment of oil field formation water and application of rhamnolipid against human pathogen Staphylococcus aureus

A cost-effective and rapid method for treatment of formation water of oil industry for safe disposal and reuse

In this method, rhamnolipid biosurfactant producing bacterial strain *Pseudomonas aeruginosa* RS29 isolated from hydrocarbon contaminated soil was used for treatment of formation water generated during oil exploration. This formation water cannot be discharged in the environment due to presence of hydrocarbons and other toxic substances.

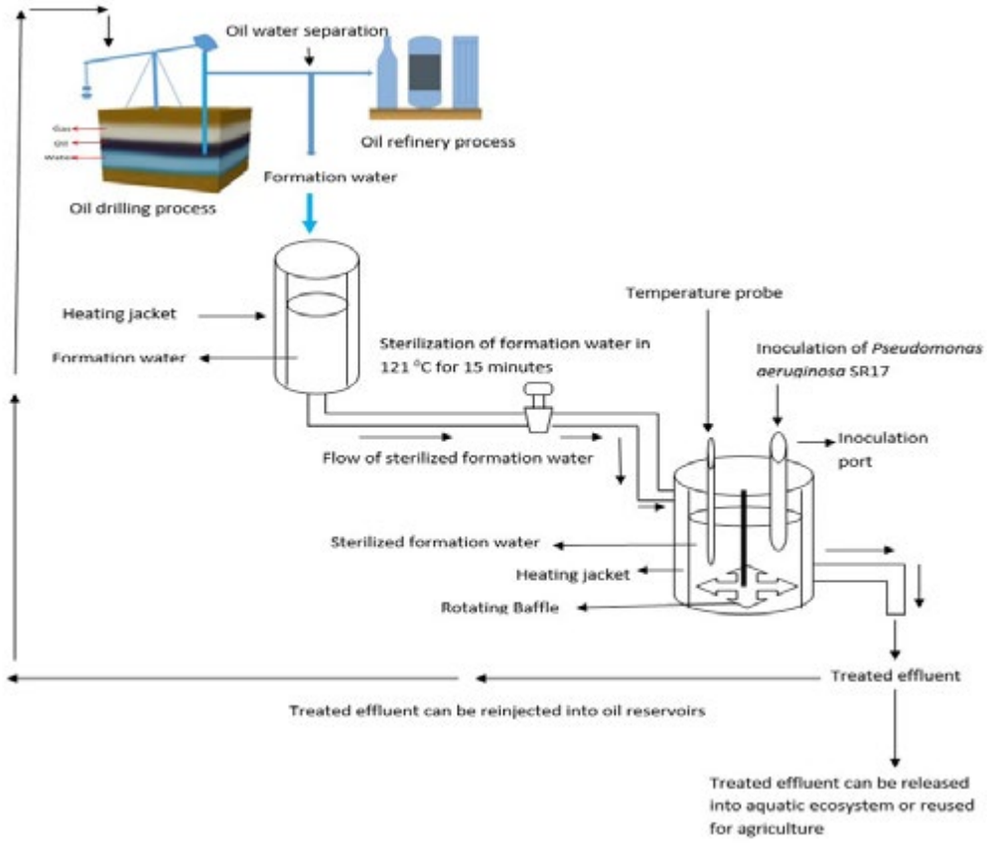


Fig. 1. Schematic diagram representing the formation water treatment process. (1: Formation water generated during oil production. 2: Formation water sterilization vessel. 3: Inoculation vessel with rotating baffle for mixing; 4: Innoculation port; 5: Temperature probe; 6: Stop cock to control flow of sterilized formation water to inoculation vessel).

The bacterial strain RS 29 was able to utilize the hydrocarbons and other metals present in the formation within 24 hours of time (fig. 1a & b). The present process for remediation of oil field formation water is advantageous since it requires no nutrient supplementation and bioremediation is completed in a short incubation time of 48 hours, overcoming the major bottlenecks associated with conventional biological treatment. The treated discharge water (conforming to the regulatory standard for on-shore disposal) encompasses a Sodium Adsorption Ratio (SAR) value of <1 is suitable for direct application for irrigational purposes. Thus, the present process could serve as an environmentally sustainable technology for rapid and cost-effective remediation of oil field formation water conforming it to regulatory standards for safe disposal and reuse as oil well injection water or for agriculture. The method is applied for granting Indian patent (application no. 201831020835 filed on 04.06.2018). (Diagrammatically represented in Fig. 1).

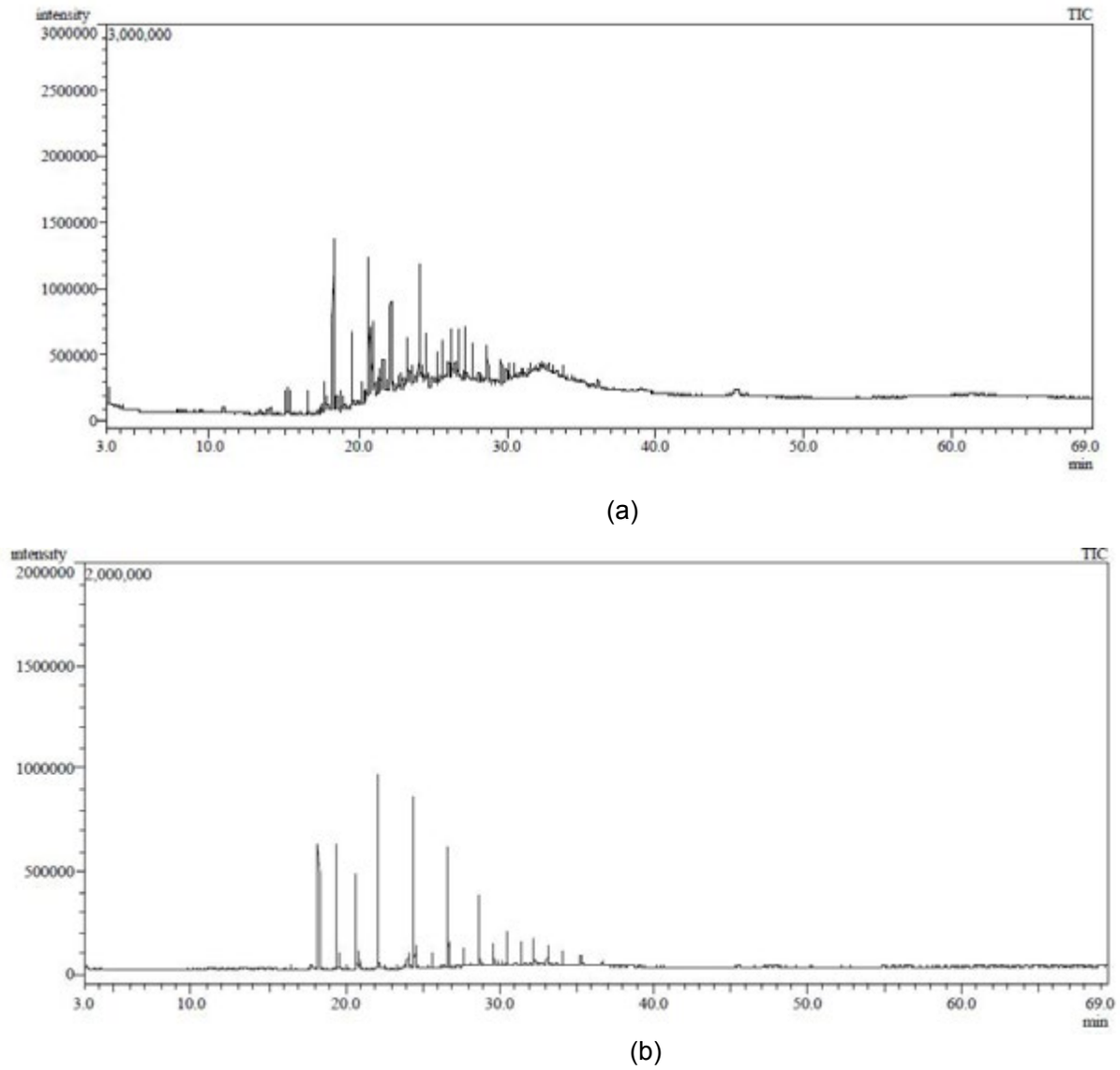


Fig. 2. a) Gas chromatography-mass spectrometer (GC-MS) chromatograph of abiotic control formation water incubated for 48 hours. **b)** GC-MS chromatograph of formation water treated with *Pseudomonas aeruginosa* RS29 for 48 hours.

Anti-bacterial efficacy of rhamnolipid biosurfactant obtained from *Pseudomonas aeruginosa* JS29 against human pathogen *Staphylococcus aureus* MTCC 96

The antibacterial activity of rhamnolipid biosurfactant produced by *Pseudomonas aeruginosa* strain JS29, SR17 and SS14 against the most prevalent human pathogen *Staphylococcus aureus* MTCC 96 was investigated. Result revealed that rhamnolipid produced by the bacterial strain JS29 cause maximum inhibition against the human pathogen *Staphylococcus aureus* MTCC 96 (Fig. 3).

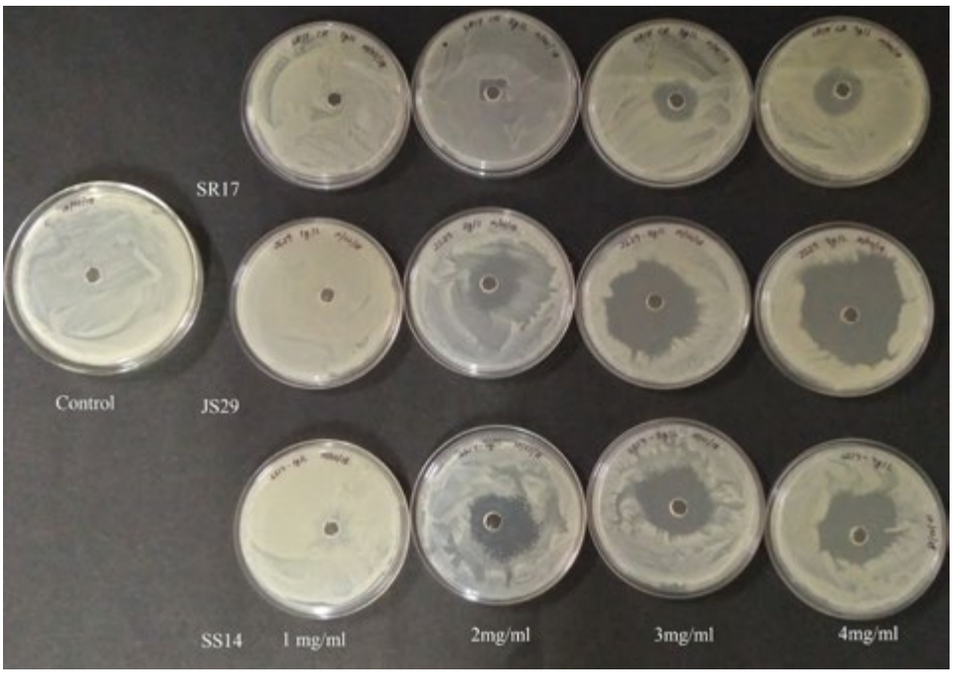


Fig. 3. Well diffused method showing the zone of inhibition produced by varying concentration (1mg ml^{-1} – 4 mg ml^{-1}) of rhamnolipid of SR17, JS29 and SS14. The zone of inhibition were measured in terms of milimeters (mm)

Rhamnolipid extract of JS29 exhibited prominent activity causing inhibition of biofilm as well as disruption of preformed biofilm. These results indicate that compared to the commercially available clindamycin hydrochloride (a standard drug against *Staphylococcus aureus*) the biofilm disrupting efficiency of column purified rhamnolipid extract of JS29 at same concentration was much higher. So, rhamnolipid biosurfactant produced by the bacterial strain *Pseudomonas aeruginosa* JS29 has potential for use as an alternative of Clindamycin hydrochloride drug for treatment of human pathogen *Staphylococcus aureus,* however, animal model trial will be necessary for establishment of the result.

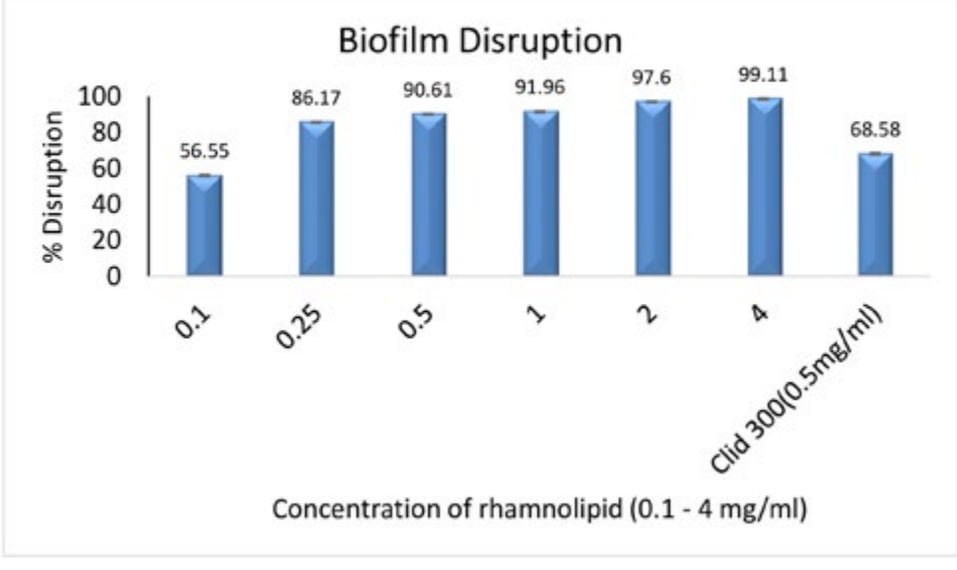
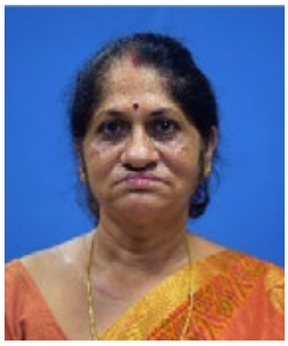


Fig. 4. Percent biofilm disruption activity of varying concentrations of column-purified rhamnolipid extracted from *P. aeruginosa* JS29 against *Staphylococcus aureus*. Clindamycin (Clid 300) was used at concentration of 0.5mg ml^{-1}. Vertical bars are the standard errors of mean, calculated based on data of two independent experiments in triplicates.



Arundhuti Devi

Associate Professor I

Dr. Arundhuti Devi received her Ph. D. Degree in Environmental Chemistry from Gauhati University. Her area of research includes assessment of health of ecosystem components including soil, water and air and remediation of degraded ecosystems specially those under anthropogenic influences including hydrocarbon polluted fields.

Research Summary

Sediment characterisation of a Deepor Beel- a tropical freshwater wetland of Indo-Burmese province

A study was conducted on Deepor Beel to determine the pollution status and carbon stock in sediment of the wetland. Ten sites were selected for sediment sampling for the year 2016 and 2017 (pre-monsoon, monsoon, and post-monsoon).

Results revealed that the sediments of the study area is acidic (pH 4.1) and texture is sandy clay loam. Organic carbon (OC), total nitrogen (TN) and available nitrogen (AN) of sediment were higher in the monsoon period. The mean stock of the sediment carbon pool of the Deepor Beel was estimated to be 2.5 ± 0.7 kg m^{-2}. This work is the first report of estimation of carbon stock in the sediment of wetland of north-eastern region of India. Metal estimation revealed that mean concentration Cr (40.59±11.6 mg Kg^{-1}), Cu (31.02±9.3 mg Kg^{-1}), and Ni (41.74±12.4 mg Kg^{-1}) were higher than the US EPA standards for these metals.

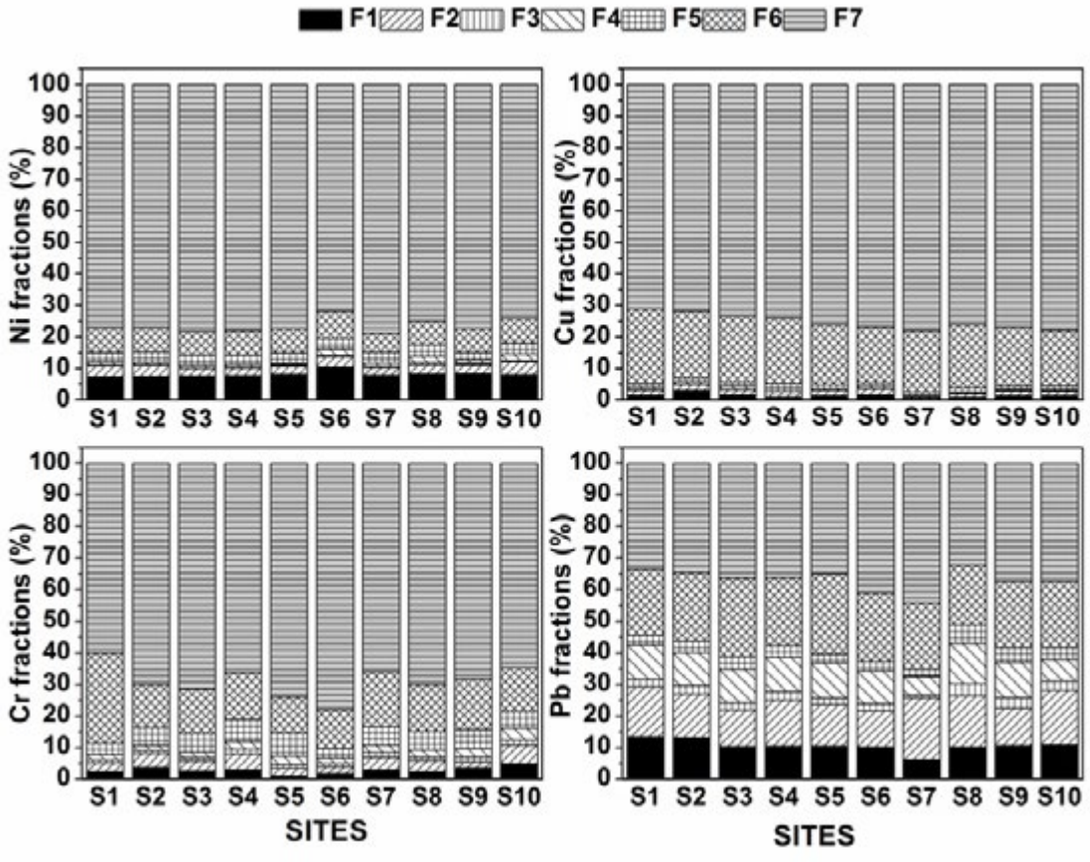


Fig. 1. Spatial distribution of different fraction percentage of Ni, Cr, Cu and Pb.

Metal fractionation study revealed that mean percentage of residual fraction was found to be highest for the metals (Ni, Cr, Cu, and Pb) which indicate that a dominant portion of these metals are unavailable for biological uptake. Fig. 1 shows the spatial distribution of different metal fractions such as exchangeable (F1), carbonate-bound (F2), Mn oxide-bound (F3), amorphous Fe oxide-bound (F4), crystalline Fe oxide-bound (F5), organic and sulphide mineral-bound fraction (F6), and residual minerals (F7) for the each metal. But the sum of non-residual fraction percentage (63.2%) of Pb was found to be higher than the residual fraction, which suggests that mobility of Pb in the sediment and its availability to the aquatic organisms is higher in comparison to other metals of this study.

Sediment quality guidelines study revealed that Zn content ~490 mg kg^{-1} exceeding its effect range medium (ERM) limit (270 mg kg^{-1}) indicates frequent adverse effects on sediment fauna. Further, sediment indices namely enrichment factor (EF), potential ecological risk index (RI) and risk assessment code (RAC) were calculated to deal with overall synergistic effects of metals. All the sites showed significant enrichment of metals due to anthropogenic inputs as EF values >5 (Fig. 2a). Zn and Cd with EF values > 50 correspond to extremely severe enrichment of these two metals at all the sites. Potential ecological risk index (RI) revealed that Cd can pose moderate to considerable potential ecological risk (Fig. 2b). Again the RAC values of Pb (approximately 25.0% for most of the sites) indicate that Pb with high labile fraction pose a medium risk to ecology (Fig. 2c).

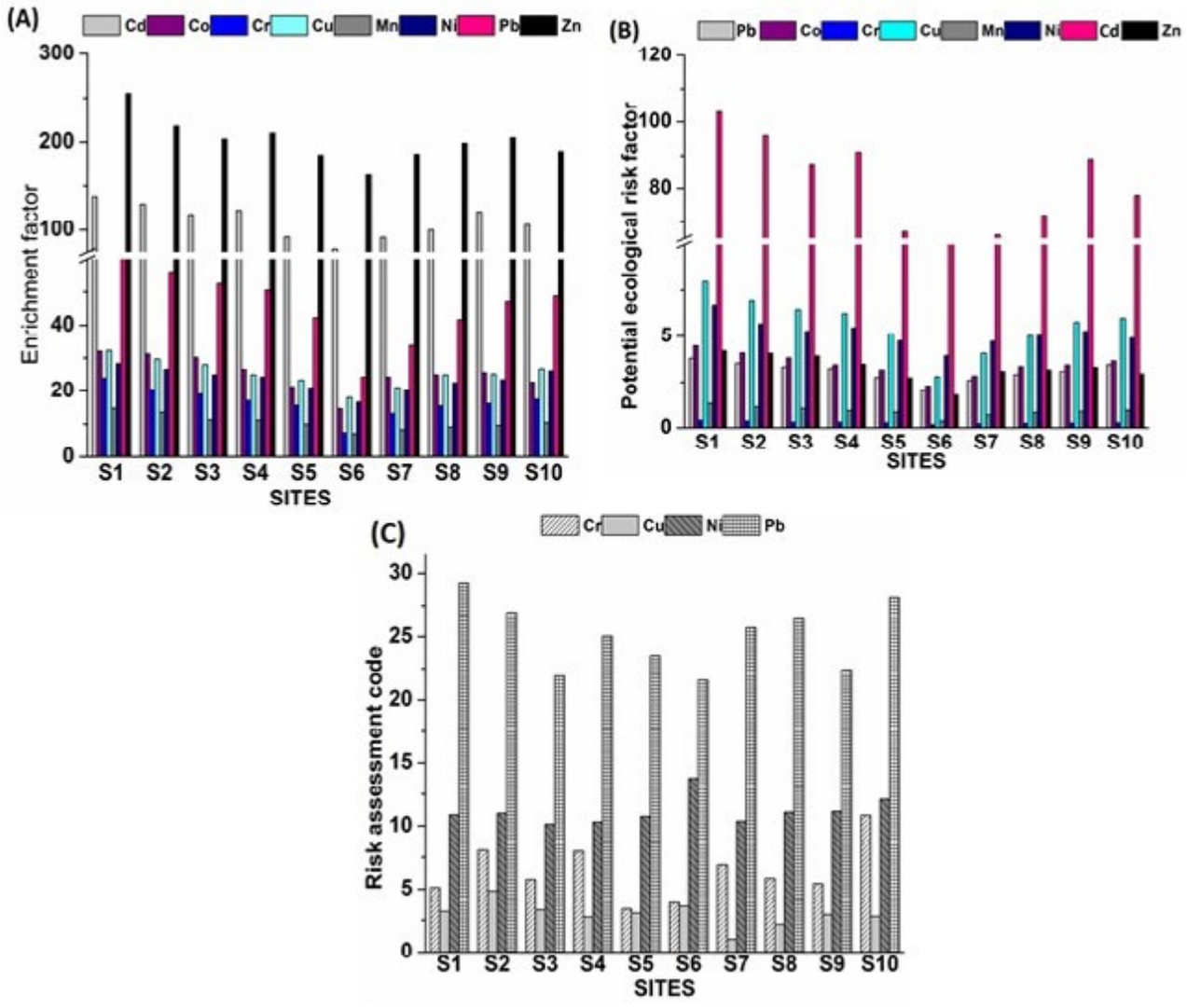


Fig. 2. Sediment quality indices (a) Enrichment factor, (b) Potential ecological risk index, and (c) Risk assessment code

The Pearson's correlation matrix revealed a significant positive correlation between the OM, OC, TN, AN, and AP (available phosphate) which suggests that a significant portion of TN, AN, and AP are organically derived. Principal Component Analysis (PCA) (Fig. 3) revealed that first component (PC I) with strong positive loadings of ions and the metals indicates the significant amount of input from anthropogenic sources e.g. the discharge of city sewage or run-off from agricultural fields. PC II with significantly positive loadings of OM, OC, TN, AN, and AP implies the influence of flora and fauna present in the wetland ecosystem. The pH was found to be associated with PC III which indicates the influence of lithogenic/geogenic.

This study has generated interesting data on wetland sediment characteristics namely carbon stock, metal fractionation and pollution status of a Ramsar declared tropical freshwater wetland of the North-eastern region of India. The present study established that Deepor Beel is a potential carbon sink in the Indo-Burmese province.

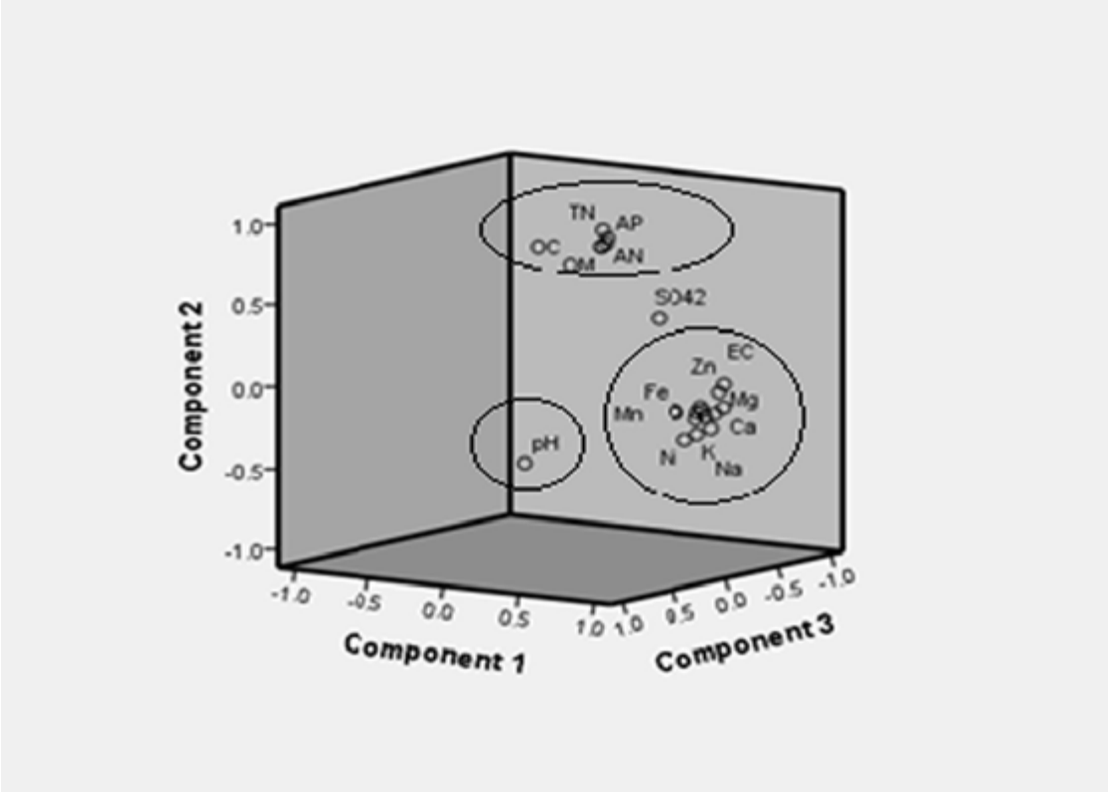


Fig. 3. Component plot (PCA) of sediment parameters

Sequential treatment of paper mill effluent with modified Fenton oxidation and bioflocculation

Pollutants emerging from the effluents of paper mill eventually disturbs the environment, thus, demanding the development of a tactful technology/method for management of effluent. In this work, a cost-effective and environmentally benign technique is proposed to remediate contaminants present in the effluent of paper mill in a sequential steps using Advanced oxidation processes (AOP) including Fenton reaction (FO) ($Fe(II)/H_2O_2$), Modified Fenton Oxidation (MFO) ($Fe(II)/Zn(II)/H_2O_2$) and Biological flocculation process.

In Fenton oxidation, the chain reaction propagates via the steps shown in equations (1-4).

$$Fe^{2+} + H_2O_2 \rightarrow Fe^{3+} + OH^{\cdot} + OH^{-} \quad (1)$$

$$OH^{\cdot} + Fe^{2+} \rightarrow OH^{-} + Fe^{3+} \quad (2)$$

$$Fe^{3+} + H_2O_2 \rightarrow Fe^{2+} + HO_2^{\cdot} + H^{+} \quad (3)$$

$$H_2O_2 + OH^{\cdot} \rightarrow H_2O + HO_2^{\cdot} \quad (4)$$

The physical appearance of the untreated and treated samples are shown in the fig 4. This will give a visual idea about the efficacy of the treatment strategy.

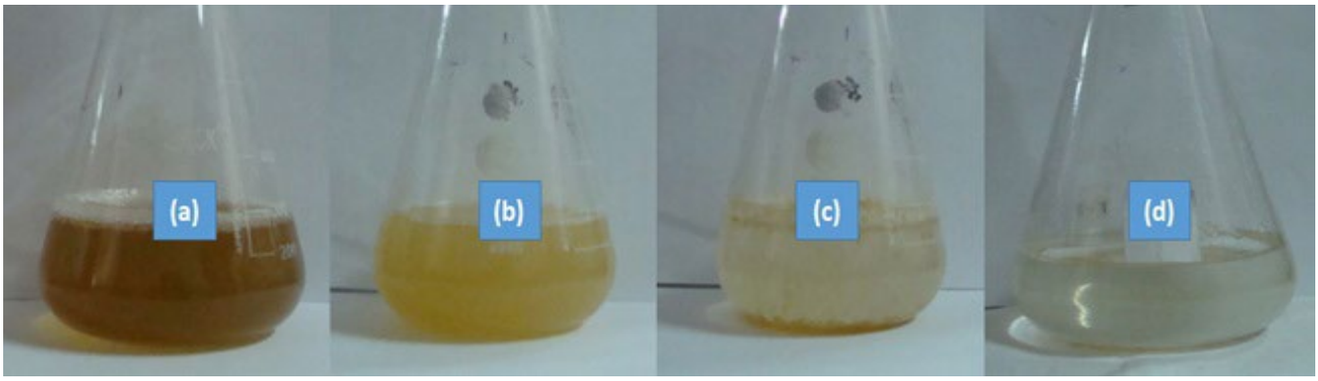


Fig. 4. (a) Untreated sample, (b) Treated with MFO, (c) Treated with combined MFO and BF and (d) Treated sample after centrifuge. Experiments were carried out at room temperature (298 K) and normal pH of the sample (7.9 ± 0.5).

GC-MS analysis revealed the presence of eleven hydrocarbons in the untreated effluent of paper mill (Fig.5 (a)). It was observed that bioflocculation (BF) could reduce the pollutant load by only ~33.3 % (Fig.5 (b)) while Fenton oxidation (FO) treatment resulted in drastic reduction in the total hydrocarbon content up to ~75.6 % (Fig. 5(c)) On the other hand, modified Fenton oxidation (MFO) resulted in a surge in the degradation of the compounds up to ~97.3%, and only one compound was left in the reaction mixture (Fig.5(e)). Again, the combined FO and BF treatment chromatogram shows the removal of organic contaminants as ~89.5% in terms of total peak area (Fig 5(d)) and combined MFO and BF recorded the degradation of pollutants upto ~97.3% (Fig.5(f)).

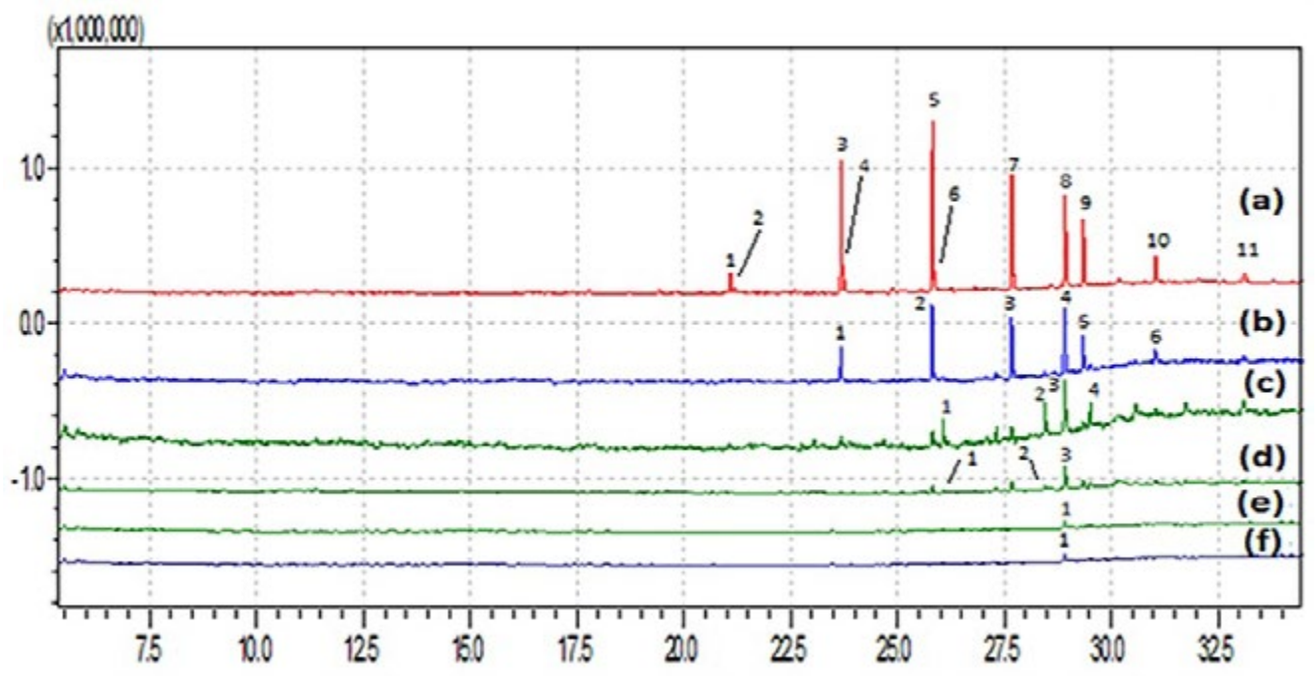


Fig. 5. Comparative GCMS Chromatograms of (a) Untreated effluent, (b) Treated with BF, (c) Treated with FO, (d) Treated with FO and BF, (e) Treated with MFO and (f) Treated with MFO and BF.

Biological flocculation was utilised for the removal of various toxic heavy metals present in the paper mill effluent. Since the MFO method was found to be the most effective technique for the removal of organic pollutants (Fig. 5(e)), therefore, a combination of bioflocculation (for metal removal) with MFO was also studied. The study revealed that the removal percentage of metals followed a decreasing order of Fe (91.6%) > Mn (82.6%) > Zn (81.6%) > Cd (71.4%) >Pb (70%) > Ni (68.6%) > Co (66.7%) > Cu (50.8%) (Fig. 6).

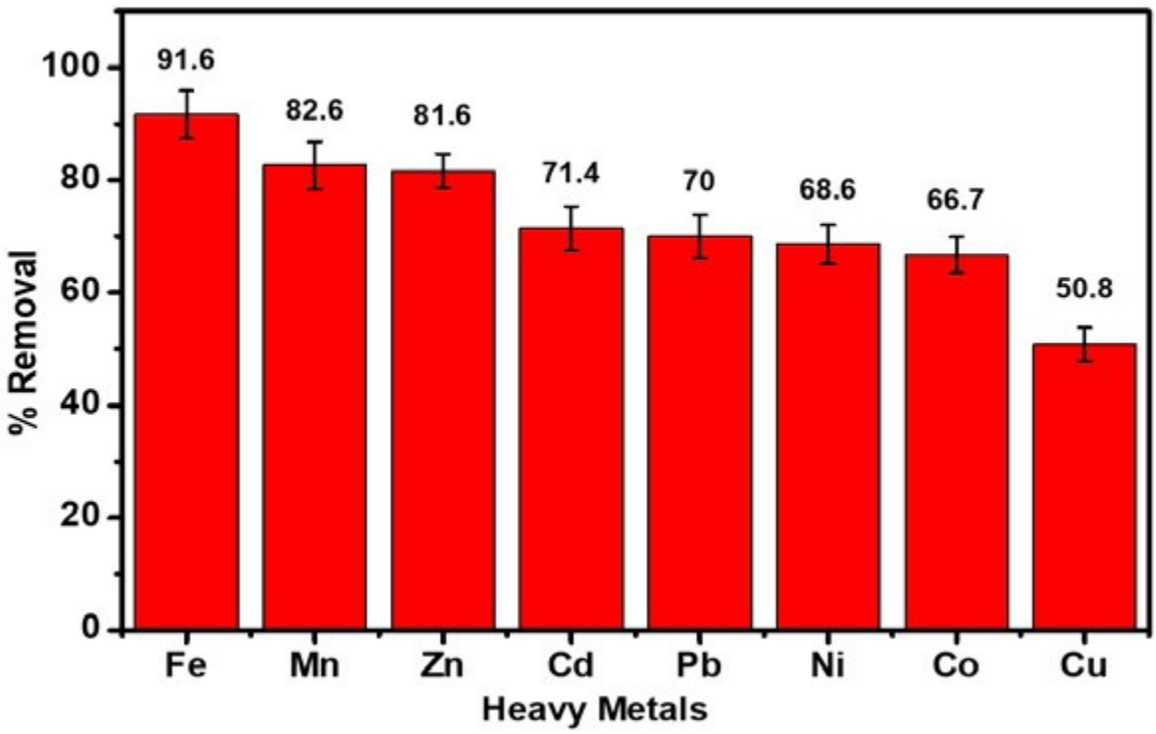


Fig. 6. Percentage removal efficiency of different heavy metals by bioflocculation method under room temperature and normal pH (7.9 ± 0.5) of the effluent

Lignin and phenolic are major pollutants present in paper mill effluent. The removal of lignin, phenolic content and colour were monitored separately after the completion of both MFO and combined MFO and BF (MFBF) treatment (fig 7) and 56 %, 62%, 55% reduction of lignin, phenolic compound and colour was observed after the completion of MFO. Combined MFO and BF (MFBF) treatment enhanced removal rate of lignin (84%), phenolic content (97%) and also transparency (96%) of the suspension.

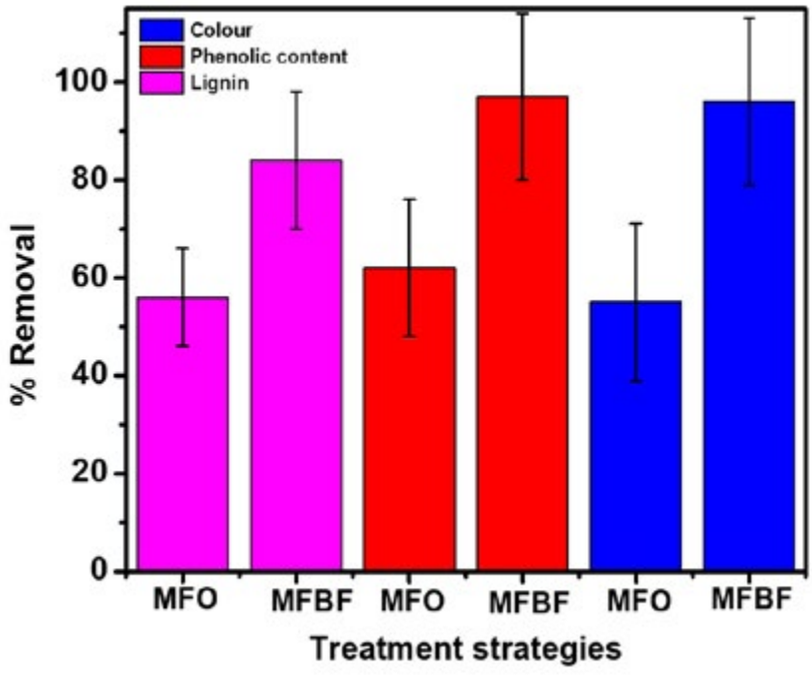


Fig. 7. % Removal of lignin and phenolic content and enhancement (%) of transparency of the paper mill effluent after 1 hour and 30 minutes of treatment with MFO and MFBF.

It has been observed that, in both FO and MFO reaction, the degradation of pollutants was not completed due to the formation of intermediate compounds which interferes during the reaction. However, MFO shows better efficiency towards the removal of chemical oxygen demand (COD) as compared to FO (Fig. 8) due to the presence of more reactive radicals whose formation was accelerated by the presence of $ZnSO_4$.

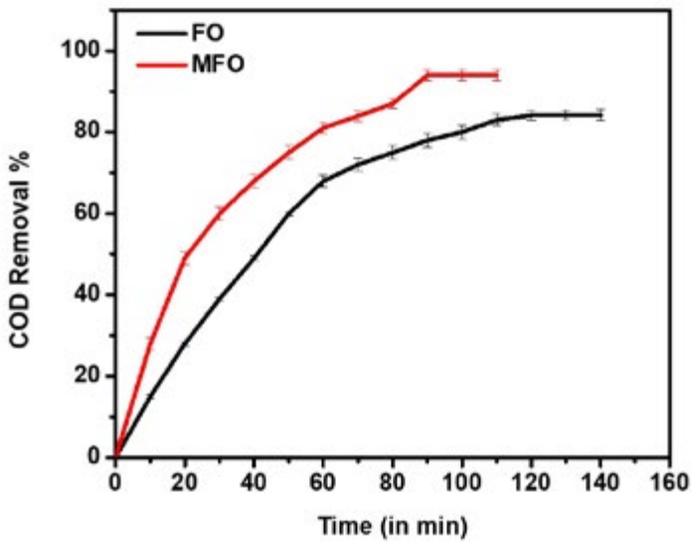


Fig. 8. Chemical oxygen demand (COD) removal (%) in the paper mill effluents at different time interval due to Fenton and Modified Fenton oxidation reaction against different time interval at optimized concentration of Fe (II) = 10.044 mg/L, Zn (II) = 9.095 mg/L. and H_2O_2 = 0.391 mg/L and pH= 7.9 ± 0.5.

Mojibur R. Khan

Associate Professor I

Dr. Mojibur R. Khan received PhD and post doctoral training on plant-microbe interaction studies in University College Dublin (UCD, Ireland) (2003-2011). He joined IASST as Ramalingaswami fellow and assistant professor-II in 2011. His current research is focused on understanding the nature of human microbiome and its links with well being of the human body and how this knowledge can be translated for microbiome based therapeutics.

Research Summary

Traditional dietary habits and human microbiome

Rice beer and microbiome

Traditionally prepared rice beer is widely consumed by different ethnic groups of the North-East of India. There has been a research interest in understanding the ingredients and attributes in such drinks and their implications on human health. This research is exploring (1) rice beer fermentation process of various ethnic groups in the North-East of India in which various types of herbs are used and also (2) their implications on human health. Recent data on two major ethnic groups of Assam, *Ahom* and *Bodo* indicated that rice beer consumption caused reduction of short chain fatty acid (SCFA) producing bacteria *Faecalibacterium* and *Roseburia* in their gut microbiota (Fig. 1A). The SCFA butyric acid, a vital component of a healthy gut was also reduced with rice beer consumption (Fig. 1B).

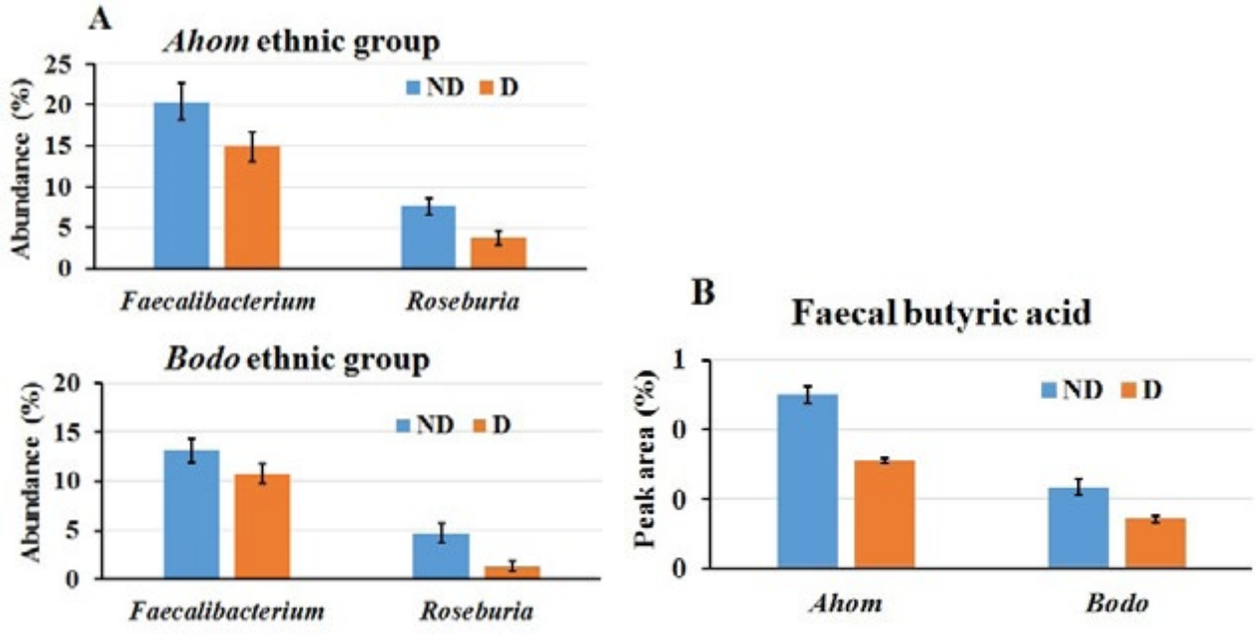


Fig. 1. Effect of rice beer in the *Ahom* and *Bodo* ethnic groups. Bar plots depict decrease in abundance of (A) bacterial genera *Faecalibacterium* and *Roseburia* and (B) butyric acid in the fecal samples of the drinkers (D) compared to non-drinkers (ND).

As traditionally prepared rice beer is rich in microbes and oligosaccharides, it may influence the gut-brain axis. Therefore, an animal experiment was conducted to understand its effect on brain functions. After 28 days of treatment, behavioural tests were performed on elevated plus (EP) and Y mazes following standard procedures to evaluate anxiety and spatial learning and memory (spontaneous alternation), respectively. In the EP maze test, the time spent (out of 300 seconds) in its open and close arms were recorded. The rice beer treated group spent longer duration in the open arms than the controls indicating its effect on reduction of anxiety (Fig. 2A). The rice beer treated group had also higher spatial learning and memory than the controls (Fig. 2B). The solid fraction of rice beer had similar effects indicating probable role of the microbes in this gut-brain axis.

Dairy products

Preparation of curd from milk vary worldwide due to which its taste, texture and impact on human health also differ. In Assam, curd prepared from raw milk (RMC) is preferred over curd prepared from boiled milk (BMC), a tradition believed to have originated from the Mongoloid customs. We have tried to understand the differences in microbial composition of the two types of curds and their effect on human gut microbiota. Our study indicates a more complex bacterial profile of RMC and also the consumers of RMC had different gut bacterial profile than the BMC consumers (Fig. 3A). The bacteria *Bifidobacterium* and *Klebsiella* were in higher abundance in the gut of RMC consumers (Fig. 3B).

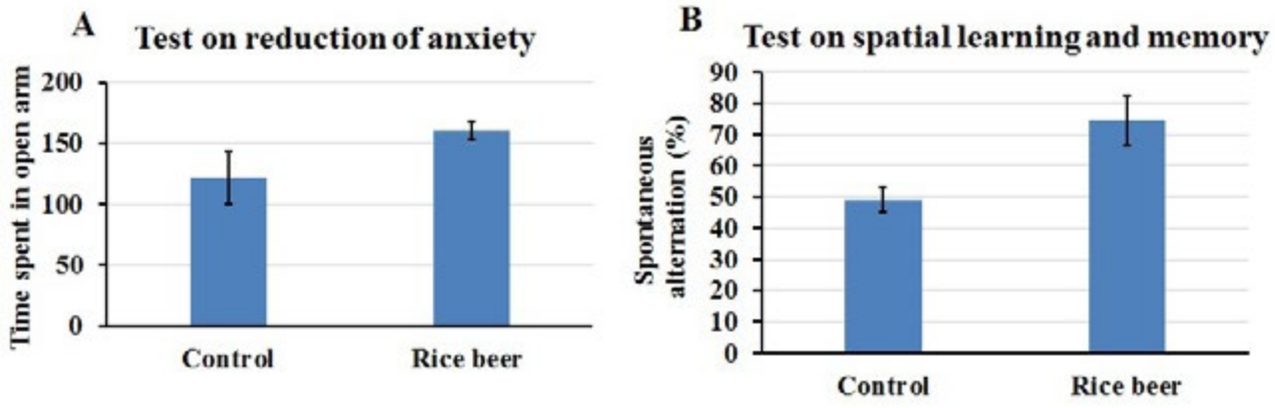


Fig. 2. Effect of rice beer on brain functions of mouse. **(A)** Time spent (seconds) in the open arm of the EP maze. (**B)** Spontaneous alternation (%) in Y maze.

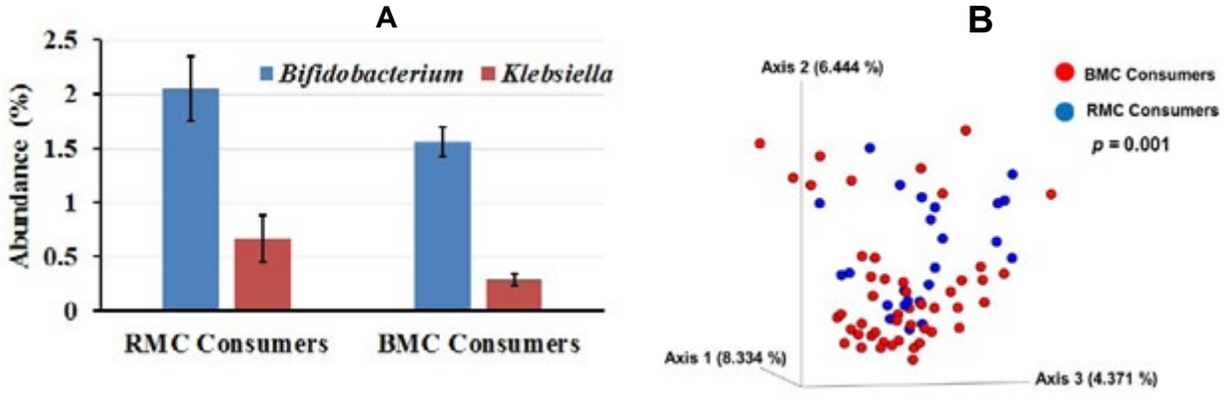


Fig. 3. Effect of dairy products on gut microbiota. **(A)** A PCoA plot based on the gut microbiota of RMC and BMC consumers. (**B**) Abundance of bacterial genera in gut microbiota of RMC and BMC consumers.

Debajit Thakur

Associate Professor I

Dr. Debajit Thakur received Ph.D. degree from Dibrugarh University, Assam in 2004 on biotransformation of antibiotics and postdoctoral research at IMTECH, Chandigarh. He served Tocklai Tea Research Institute, Jorhat from 2007 and joined IASST, Guwahati in 2011. His research interest includes microbial biodiversity of pristine ecosystem and tea ecosystem and extraction of microbial agents for bioformulation/s in organic cultivation of commercial crop *tea (Camellia sinensis)*. Exploration of extracellular antimicrobial metabolites for bioactive principle agent MRSA, MDR strains, infectious diseases and dermatophytes is his another research area of interest.

Research Summary

Antimicrobial potentiality of actinobacteria isolated from two microbiologically unexplored forest ecosystems of Northeast India

Actinobacteria are often known to be great producers of antibiotics. The rapid increase in the global burden of antibiotic-resistance with the concurrent decline in the discovery of new antimicrobial molecules necessitates the search for novel and effective antimicrobial metabolites from unexplored ecological niches. The present study investigated the antimicrobial producing actinobacterial strains of two microbiologically unexplored forest ecosystems, viz. Nameri National Park (NNP) and Panidehing Wildlife Sanctuary (PWS), located in the Eastern Himalayan Biodiversity hotspot region.

A total of 172 putative isolates of actinobacteria were isolated, of which 24 isolates showed strong antimicrobial bioactivity (fig 1). Evaluation of the ethyl acetate extracts of culture supernatants against test microbial strains revealed that isolates PWS22, PWS41, PWS12, PWS52, PWS11, NNPR15, NNPR38, and NNPR69 were the potent producers of antimicrobial metabolites. The antimicrobial isolates dominantly belonged to *Streptomyces*, followed by *Nocardia* and *Streptosporangium*. Some of these isolates could be putative novel taxa. Analysis of the antimicrobial biosynthetic genes (type II polyketide synthase and nonribosomal peptide synthetase genes) showed that the antimicrobial metabolites were associated with pigment production and belonged to known families of bioactive secondary metabolites. Characterization of the antimicrobial metabolites of *Streptomyces* sp. PWS52, which showed lowest taxonomic identity among the studied potent antimicrobial metabolite producers, and their interaction with the test strains using GC-MS, UHPLC-MS, and scanning electron microscopy revealed that the potential bioactivity of PWS52 was due to the production of active antifungal and antibacterial metabolites like 2,5-bis(1,1-dimethylethyl) phenol, benzeneacetic acid and nalidixic acid. Our findings suggest that the unexplored soil habitats of NNP and PWS forest ecosystems of Northeast India harbor previously undescribed actinobacteria with the capability to produce diverse antimicrobial metabolites that may be explored to overcome the rapidly rising global concern about antibiotic-resistance.

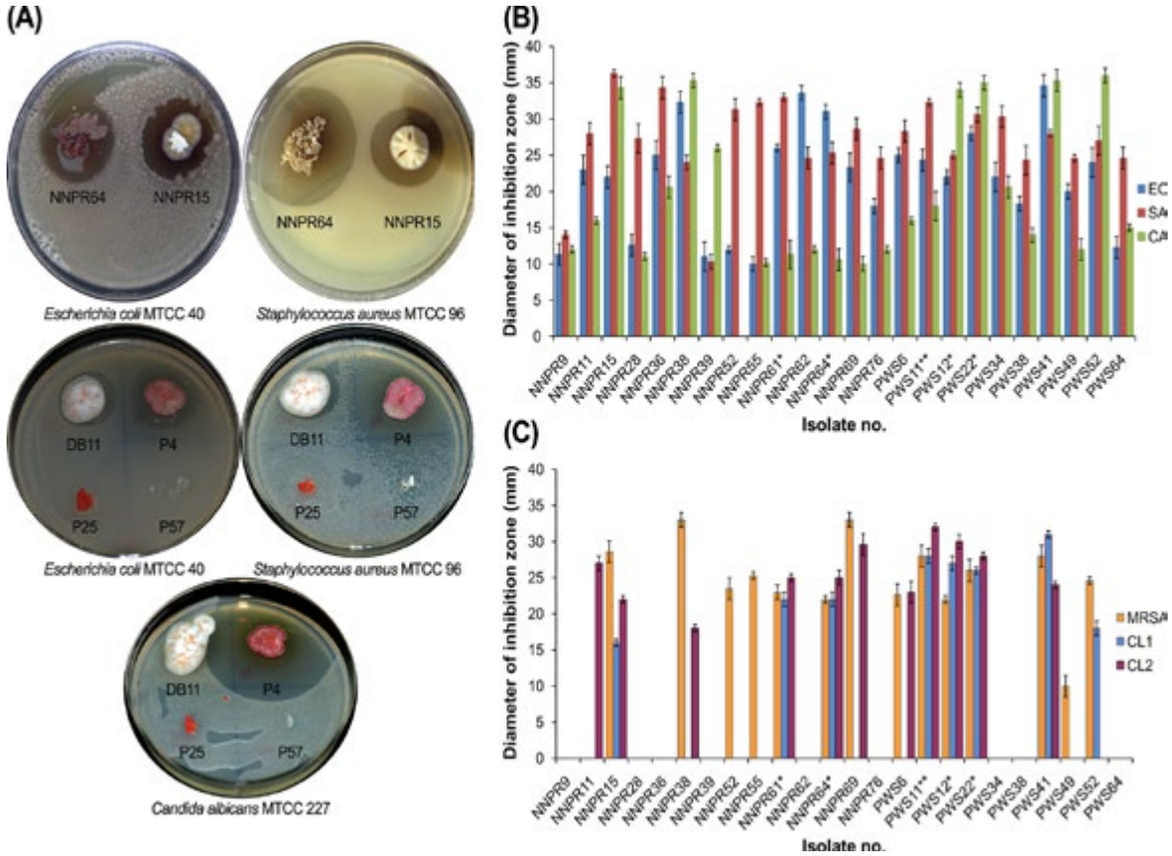


Fig. 1. **a** Screening of antimicrobial activity of actinobacteria; **b** the antimicrobial activities of the selected 24 actinobacterial isolates against MTCC test pathogens and **c** antimicrobial activity against MRSA and antibiotic-resistant clinical isolates. **a** The figure shows representative antimicrobial metabolites producing actinobacterial isolates. b, c Antimicrobial activities were determined by disc diffusion assay. The graph represents the activity of ethyl acetate extract of cell-free culture supernatant. The diameter of inhibition zone was determined after loading pathogen-seeded MHA plates with ethyl acetate extract impregnated (10 µg) filter paper discs followed by 24 h incubation at 37°C for bacteria and 28°C for *C. albicans*. Each bar represents arithmetic mean of three independent replicates and the error bar indicates the standard error of the mean. In x-axis, single asterisk (*) after the isolate number represents the detected presence of PKSII antimicrobial biosynthetic gene, while double asterisks (**) indicates the detected presence of both PKSII and NRPS antimicrobial biosynthetic genes. EC: *Escherichia coli* MTCC 40, SA: *Staphylococcus aureus* MTCC 96, CA: *Candida albicans* MTCC 227, MRSA: Methicillin-resistant *Staphylococcus aureus* ATCC 43300, CL1: Clinical isolate *Staphylococcus saprophyticus* CL1, Clinical isolate *Bacillus pumillus* CL2.

Development of *Streptomyces* sp. TT3 as a potential biocontrol agent against Tea fungal pathogens

Streptomyces sp. TT3 is an actinobacterium isolated from the rhizosphere soil of the tea plant collected from Tocklai Tea Germplasm Preservation plot, Tocklai Tea Research Station, Jorhat (26°36'29.41"N 94°25'42.59"E), Assam, India. *Streptomyces* sp. TT3 is produced extracellular biologically active metabolite/s which showed *in-vitro* antifungal activity against wide range of tea foliar fungal pathogens. Based on phenotypic and molecular characteristics, the strain was identified as *Streptomyces* sp. (Gene bank accession KT892738) which shares 99.4% sequence similarity with *Streptomyces lydicus* NBRC13058 (Gene bank acc. NR_112352). Fig 2 shows the morphology of the strain TT3 under the Screening Electron Microscope. The secondary metabolites of this strain have strong antifungal property which can efficiently act against diverse group of fungal diseases.

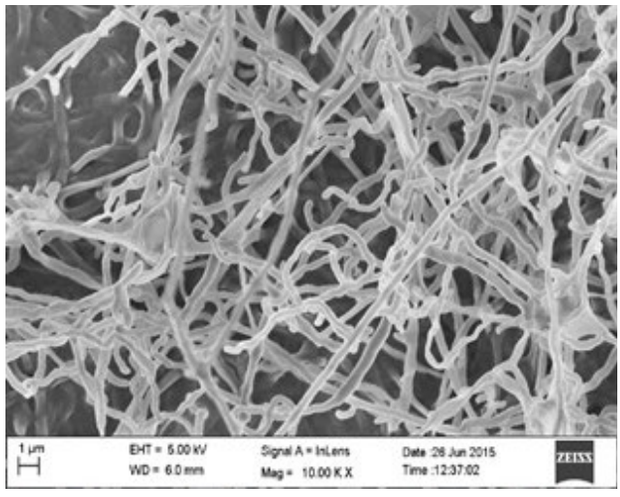


Fig. 2. *Streptomyces* sp. TT3 under the Screening Electron Microscope

Soumyadeep Nandi

Ramalingaswami Fellow

Dr. Soumyadeep Nandi did his Ph.D. from the Jawaharlal Nehru University, New Delhi and carried out postdoctoral research in Ottawa University for three years and later moved to Umea University. Dr. Nandi has been working in IASST as Ramalingaswami Fellowship holder faculty science 2015. His area of research is Computational Biology.

Research Summary

Our group focuses on the development and implementation of computational algorithms to analyze the enormous amount of biological data produced in recent days. Examples of such data are, Genomic and Proteomic sequences, Next Generation Sequencing data, viz, ChIP-seq, ChIP-chip, transcriptome, etc. Generation of such large scale data brings in the challenge to manage and analyze. Therefore, studies directed towards the development or improvement of efficient computational methods to manage and investigate these data has become highly essential. Such frameworks are essential for conducting studies to address different fundamental biological phenomena.

Correlation study of epigenetic factors controlling gene expression:

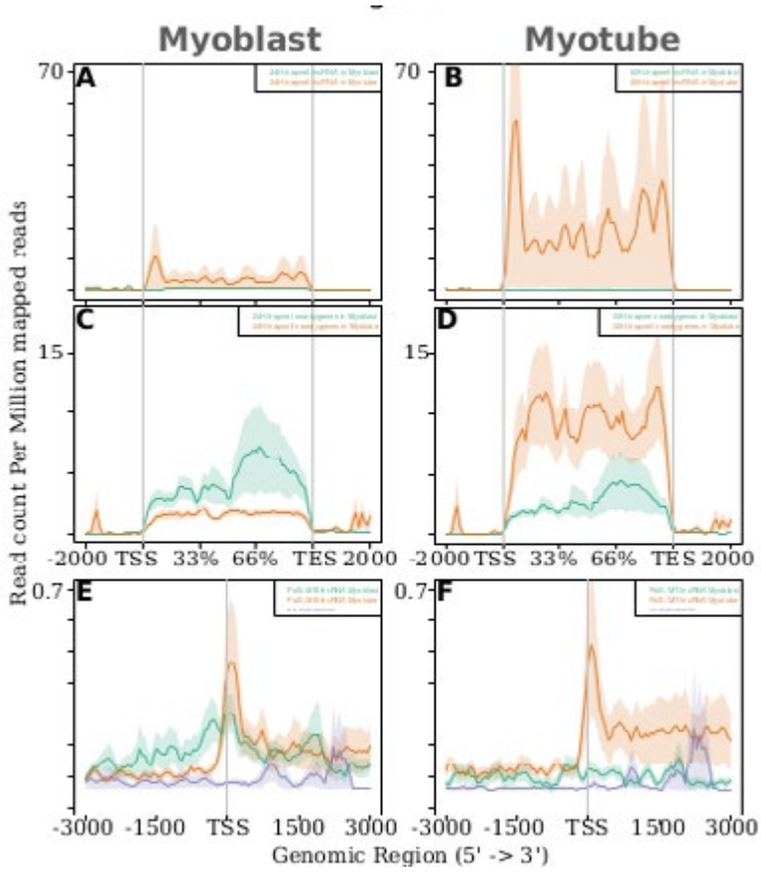
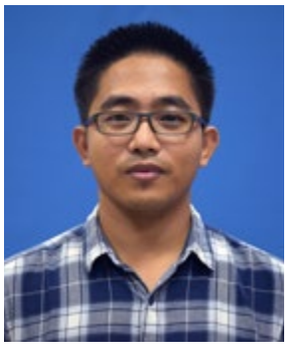


Fig. 1. Expresson of IncRNA (Figure A and B), Expresson of nearby genes (Figure C and D), Distribution of PolII (Asp. et al.) along the identified IncRNAs from Trapnell et al. data (Figure E and F).

Recent transcriptomic studies of mammalian genomes have revealed the presence of a substantial population of non-coding RNA (ncRNA) molecules in the transcripts expressed in cells. More than 90% of our genome encodes for ncRNAs. Presence of such a large collection of ncRNA indicates the regulatory potential of these molecules. Based on the size of ncRNAs, they can be roughly grouped into two classes, short and long ncRNA. Short ncRNA, which is less than 200bp in length includes microRNA or piwi-interacting RNAs, and the long ncRNA is longer than 200 nucleotides and are transcribed mostly by RNA polymerase II. Like messenger RNAs, lncRNAs contain 5'7-methylguanosine cap and 3' poly(A) tail but lack coding potential. This new class of gene is recently identified in various tissues. The function of the micro RNAs is well studied, whereas, the mode of action of the lncRNAs in gene regulation is not well understood. Studies are yet to be conducted for functional annotation of these lncRNAs. ENCODE project (GENCODE v26) has annotated thousands of lncRNA in various cells. Studies are required, for functional annotation of these lncRNAs. The evidence of the involvement of lncRNA in embryonic or adult skeletal myogenesis and muscle diseases is increasing from recent studies. Therefore, in my group study the process of myogenesis as a study case to identify the lncRNA from the large transcriptome data in mouse and human and annotated the functional role played by lncRNAs in the skeletal myogenesis. Utilizing the existing data we determine the differentially expressed lncRNAs in myoblasts and myotubes and confirmed the expression with epigenetic marks, such as histone modifications. We observe a very high correlation between the lncRNA expression and the deposition of epigenetic marks.

Development of Alignment-free method for phylogenetic analysis:

Apart from this, our group is also interested in designing and developing computational applications for efficient sequence analysis of the massive data available in numerous repositories. Recently, with the advent of advanced technology scientist are overwhelmed with the colossal amount of information from genomics. This emergence of vast data has confronted scientist with the challenge of sequence analysis. Most often biologist tries to infer evolutionary relationship among the sequences. The traditional alignment-based method for such studies has certain limitations. A number of studies have proposed a non-alignment based method as an alternative approach. We developed an alignment-free algorithm for faster sequence analysis. The novelty of our approach is the inclusion of fuzzy integral algorithm with a Markov chain. The method estimates the parameter of a Markov chain by considering the frequencies of occurrence of all possible nucleotide pairs from each DNA-sequence, which is further utilized to calculate similarity among all pairwise combinations of DNA-sequences.



Wahengbam Romi

DST INSPIRE Faculty

Dr. Wahengbam Romi completed his Ph.D. in Molecular Microbial Ecology in 2015 from IBSD, DBT, Imphal and Gauhati University. He served as Scientist-B in the Microbial Repository Centre IBSD and as postdoctoral Research Associate in IASST during 2013-16, and currently working as DST-INSPIRE Faculty in IASST. His research interest is microbial ecology (assembly, structure, function and interaction) of traditional food fermentation and human gut and vaginal microbial ecosystems.

Research Summary

Human microbiome as a therapeutic target for improving women health

Understanding the reproductive tract microbiota is a key to various gynecological health problems in women. In the current study on women experiencing premature nature menopause (PNM) to define the role of vaginal microbiota in the onset and pathogenesis of PNM, we isolated 259 aerobic and 85 anaerobic vaginal bacteria using six culture media. Menopausal women had less bacterial abundance and diversity (81 isolates) as compared to the healthy group (263 isolates). Molecular phylotype grouping by 16S rDNA-ARDRA using *Hae*III, *Hinf*I, and *Hha*I restriction enzymes revealed that most of these isolates belonged to the *Lactobacillus* genera and were grouped into ten distinct ARDRA phylotypes (Fig. 1). Taxonomic identification of these phylotypes by 16S rDNA sequencing is in progress. The most severe and frequently reported symptoms that PNM women experienced were somato-vegetative symptoms [hot flashes (83.3%, 95.8%), joint and muscle discomfort (70.8%, 87.5%)] and psychological symptoms [exhaustion (70.8%, 91.7%), anxiety (66.7%, 91.7%), irritability (66.7%, 83.3%), depression (62.5%, 83.3%)] (Fig. 2). In order to minimize bias during microbiota profiling by amplicon-based next-generation sequencing, we also attempted to optimize amplicon primers in addition to extracting metagenomic DNA with high recovery, microbial content, and diversity. An *in silico* analysis of 28 sets of commonly used universal bacterial primers targeting 16S rDNA hypervariable regions (V3, V3-V4, V4, and V4-V5), performed using SILVA reference, non-redundant database (SILVA SSU 132), revealed that all the tested primer pairs were domain-specific only towards bacteria or both bacteria and archaea, except a V4-V5 primer pair (PP6) that showed very high eukaryota-specificity (91.6%) (Fig. 3). The coverage of bacteria and archaea by the most widely used V3-V4 primer set (PP1) (B: 92.4%, A: 66.5%) was significantly lower than the primers targeting V4 (PP4) (B: 92.8, A: 94.4%) and V3 (PP27) (B: 94.6%, A: 84.9%) regions. A new primer pair targeting V3 region was designed that increased the coverage of bacteria and archaea by 2.48% and 84.3%, respectively, from the existing one.

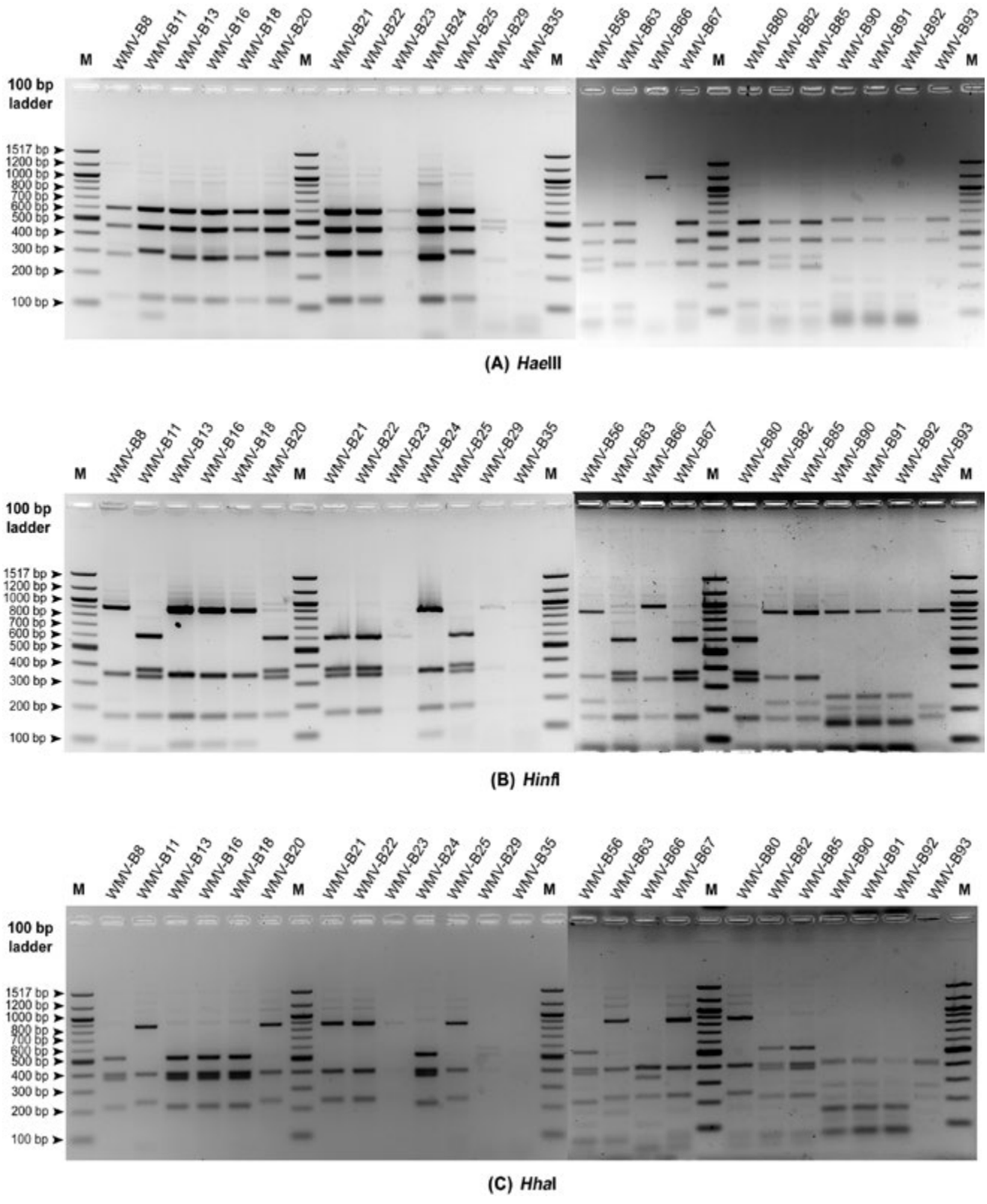


Fig. 1. ARDRA fingerprints of 16S rDNA amplicons of some of the representative vaginal isolates after digestion with three restriction enzymes, indicating the diversity within vaginal microbiota.

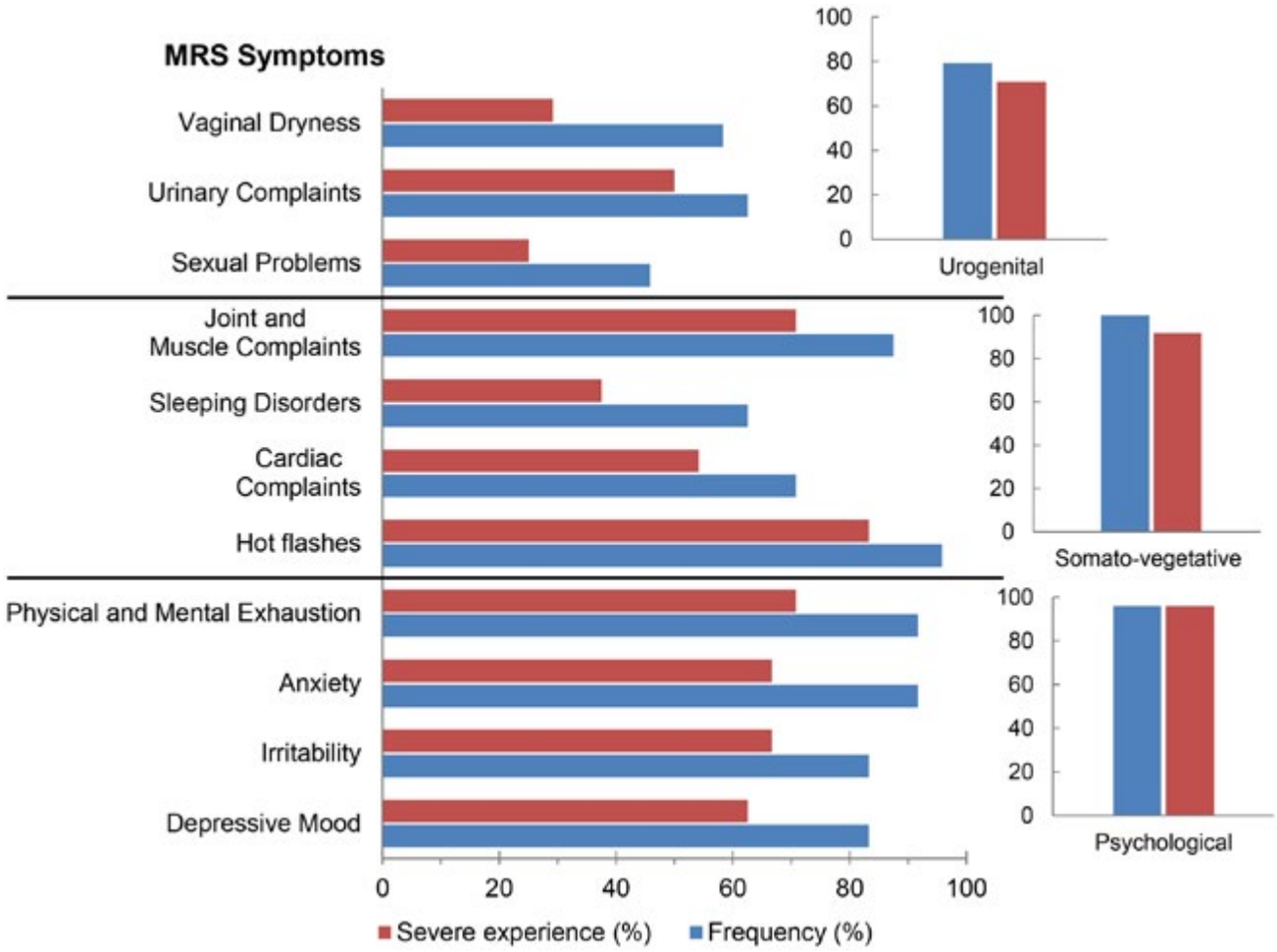


Fig. 2. The severity and frequency of psychological, somato-vegetative and urogenital symptoms experienced by the PNM subjects as scored under the HRQoL Menopause Rating Scale (MRS).

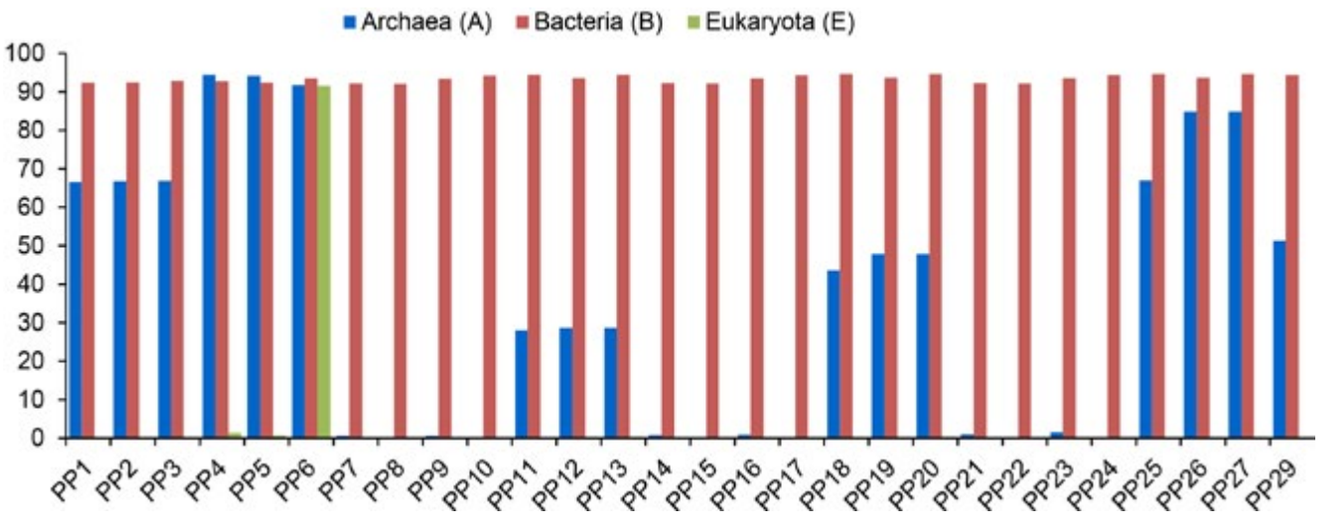


Fig. 3. Different coverages and specificities of various pairs of commonly used universal bacterial primers targeting 16S rDNA hypervariable regions (V3, V3-V4, V4 and V4-V5) indicate the inherent primer-bias in amplicon-based profiling of host-associated microbiota.

Research Output

Extramural projects

Ongoing projects

Title of the project	Funding Agency; Total fund; Duration; PI/ Coordinator	Goal
DBT's Scented Rice Program for the NE- "Microbial roles in yield management of scented rice of North East India.	Funding Agency: DBT, Govt. of India Total fund: As a group- Rs 121.22 lakhs (IASST component of Rs.36.84 lakh Duration: 2016 to 2019 PI: Dr. N. C. Talukdar	Endophytic bacterial diversity in four varieties of scented black rice seeds of Manipur *i.e. Amubi*, *CCPUR*, *Poireiton* and *Sempak* varied from 5.55 to 6.69 Log CFU/g seeds indicates higher level of endophytic bacterial population as compared to those of scented rice varieties of Assam. Characterization on the basis of 16S rDNA sequences showed existence of 02, 02, 01 and 03 different types of bacterial population in seeds of *Amubi*, *CCPUR*, *Poireiton* and *Sempak*, respectively. The inoculation of endophytic bacteria isolate *i.e. Micrococcus luteus* of *Kola Joha* seeds, increased the height of rice plant and transpirational water loss as compared to those of un-inoculated plants suggesting their potentials use as bio-fertilizer for scented rice of North Eastern region of India. Further, investigation on interaction of *Micrococcus luteus* with/without seed surface bacteria (SSB) and soil bacteria (SB) demonstrated that *Micrococcus luteus* could increase the plant biomass in presence of SSB and SB alone but not in combination. This increase in plant biomass was mainly due to increase in shoot biomass. Determination of bacterial population in rhizospheric soil, root and interior indicated that *Micrococcus luteus* probably help in colonisation of more bacteria in root from the soil.
Integrating herbal medicine of NER with contemporary approaches in develop therapeutic strategies for metabolic syndrome.	Funding Agency: DBT, Govt. of India Total fund: As a group- Rs 2455.793 lakhs (IASST component of Rs. 1043.28 lakhs Duration: 2017 to 2019 PI: Dr. N. C. Talukdar	1. Authentication and fingerprinting analysis in TLC, HPTLC and HPLC has been completed for *P. herbacea, Lysimachia candida, Allium hookeri* and *Antidesma acidum*. 2. Two potent molecules having anti-diabetic efficacy have been isolated from an enriched fraction that was prepared from *Premna herbacea* ethanolic extract. 3. This enriched standardized fraction is currently under clinical trial. 4. Two Indian patents and one international patents have been published. The main objective of the project was to test effectiveness of extract of nine herbs of NE India based on their common use by traditional healers against type-II Diabetes and integrate the bioactive princiles/extracts with contemporary approach in search of therapeutic strategies to deal with metabolic syndrome. Experimental approach included (1) Herbal extract normal diet and (High Fat- High Fructose diet) HFHF fed animal experiment is with Sprague Dawley rats in preventive and therapeutic mode (2) Cell based assays (Skeletal muscle cells, adipose tissue) on effect of herbal extracts on glucose uptake, insulin insensitivity reversal and lipid accumulation (3) Fractionation and characterisation of bioactive compounds using GC-MS-MS, LC-MS-MS and H^+ & C^{13}- NMR (Pl see the details achievements in the Traditional Knowledge based Drug Discovery program)
Development of an integrated multi-omics analysis platform, and its application to elucidate the differential process of silk colouration in the Muga silkworm *Antheria assamensis* Heifer.	Funding Agency: DBT, Govt. of India Total fund: As a group- 1054.7992 lakhs (IASST component of Rs. 63.28 lakhs) Duration: 12/09/2018 to 05/09/2021 PI: Dr. N. C. Talukdar	The rearing of the silkworms was initiated at 3 different location of North-east (Lumami, Nagaland; Sibsagar, Assam; IASST campus, Boragaon). However, because of the severe storm and heavy rain, it wiped away 2nd instar of larvae from Som and Mejankori host plantation at Sibsagar. The *Antheria assamensis* larvae reached 4th instar in both Som and Mejankori plantation at Lumami Campus of Nagaland University but all larvae died due to infestation by Flacherie disease. So far, pipeline for analyzing RNA-sequencing data has been built and a reference database and ESTs from Wild Silkbase database have been downloaded.

Title of the project	Funding Agency; Total fund; Duration; PI/ Coordinator	Goal
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" under DBT's Twinning Programme for NER.	Funding Agency: DBT, Govt. of India Total fund: As a group- 85.95 lakhs (IASST + NEIST component of Rs. 63.2 lakhs) Duration: 2018 to 2021PI: Dr. N. C. Talukdar	The objective of the project is to isolate and evaluate the efficacy, toxicity of bioactive compounds from young shoots of *Wendlandia glabrata* and fruits of *Phoebe cooperiana* selected on the basis of their extensive use in the different human sub-populations of the NER specially by the tribes of Arunachal Pradesh and the experimental data to be generated using a diet-induced diabetic rat model. Important prospect of the project is targeting adipose tissue in the treatment of T2DM. The other objective is determination of tissue-specific activity profile of each of the active constituent or combinations thereof. The experimental results will be useful in identification of the target tissue(s) on which a given molecule acts to either prevent perturbations or restore metabolic homeostasis.
Setting up a Quality Control (QC) and Quality Assurance (QA) Laboratory Facility for the Phytopharmaceutical Mission for North East India.	Funding Agency: DBT, Govt. of India Total fund: Rs. 190.58860 lakhs Duration: 2018 to 2021 PI: Dr. N. C. Talukdar	The North East Region of India is a genetic treasure house of plant, animal and microbial resources. The plant biodiversity of the region includes not only tropical and sub-tropical biota but those of temperate and alpine regions due to its altitudinal gradient. The region has enormous resources in form of medicinal and aromatic plants. Many important aromatic, medicinal and economic plants are traded from NE states without proper regulatory guidelines and quality evaluation. Many a times buyers refuse to pay proper value due to quality issues and therefore there has been hindrance in business with this potential resource. Keeping in view the above facts, DBT, Govt. of India has decided to setting up a QC-QA laboratory in the NE states for the benefits of the farmers / plant growers / industries. From amongst several project proposals, IASST was selected for setting up this highly equipped state-of-the art national facility. The goal and objective of this project is to create QA-QC facility for herbals as per regulatory guidelines of The National Accreditation Board for Testing and Calibration Laboratories (NABL), Food Safety and Standards Authority of India (FSSAI) and Ministry of AYUSH. The major components are (i) identification and documentation of the medicinal plants of NE states, (ii) Chemical analysis: determination of heavy metals, pesticide residues, radioactive contamination etc. (iii) determination of microbial contaminants and aflatoxins and (iv) identification of chemical marker compounds.
Application of Glycolipid Biosurfactant for General Welfare of Economically Important Crops with special reference to Management of Phytopathogenic Fungi	DBT, Govt. of India Rs. 25.93 Lakhs 2017-2020 PI- Prof. Suresh Deka	This research will help to develop a biopesticide from Glycolipid Biosurfactant (particularly Rhamnolipid) against plant pathogenic fungi of *Capsicum chinense* (Bhut jolokia) and *Zea mays* (Maize). The main fungal diseases of *Capsicum chinense* are die-back disease caused by *Colletotricum gleosporoides*, stem rot and wilt caused by *Sclerotinia sclerotiorum* and leaf spot caused by *Corynespora cassicola* Similarly, the main fungal diseases of *Zea mays* are maydis blight (*Bipolaris maydis*), charcoal rot (*Macrophomina phaseolina*) and banded leaf & sheath blight (*Rhizoctonia solani sasakii*). The rhamnolipid biosurfactant produced by certain bacterial strains will be tested against these plant pathogenic fungi to develop formulations of biopesticide to control the diseases.
PM10 and PM2.5 Related Health Effects in North-East India: Source Identification and Cohort Analysis	DST,Govt. of India. Rs.1840200/- 2019-2022 PI- Dr. Arundhuti Devi	This study has been focused on determination of the levels of fine particulate matter and trace metals in the particulates in several areas of Assam in North Eastern India and source apportionment with respect to industrial, vehicular, and refinery area. Chemical analysis and modelling have been proposed to be combined into yielding meaningful and interesting results in the field of air pollution study in this area.
DBT's-Unit of excellence project, "Effect of traditional dietary habits on human gut microbes: dairy products of Nepali population and traditional rice beer of tribes of Assam on gut bacterial profile"	DBT; Rs 133.14 Lakhs; 01.04.2016 to 31.09.2019 i.e. 3.5 years; Dr. Mojibur R. Khan	This study will reveal the effect of dairy products and rice beer on gut bacterial profile and health of individuals. The probable outcomes will be a) Components of dairy products and rice beer influencing the gut bacterial profile, b) Gut bacteria responsive to the components of dairy products and rice beer, c) the microbial metabolites that are formed in response to altered gut bacterial profile and d) probable effect of the microbial metabolites on health.
DBT's- Advanced Level Institutional Biotech hub, "Establishment of Institutional Level Biotech Hubs (IBT Hubs) for North Eastern states of India."	DBT; Rs 46.26 Lakhs; 14.11.2011 to 14.11.2019, i.e. 8 years; Dr. Mojibur R. Khan	Advanced Level Institutional Biotech hub at IASST is providing laboratory facility for the research scholars of IASST and the neighboring institutes. Training and workshops are arranged under Biotech hub for UG, PG and PhD scholars.

Title of the project	Funding Agency; Total fund; Duration; PI/ Coordinator	Goal
Exploration and conservation of microbial resources prevalent in protected forest ecosystems and tea rhizosphere soil of Assam.	DBT, Govt. of India; Rs 27.10 lakhs; 2017-2020; Dr. Debajit Thakur	Aim of this research is to explore Tea rhizobacteria from commercialtea estates and actinobacteria prevalent in protected forest ecosystems of Assam and preservation for plant growth promotion, plant and human disease control. Antimicrobial metabolites producing microorganisms (especially Actinobacteria) will be preserved and a database will be created. The database would help for future development of clinically/ pharmaceutically important drug molecule/s.
Bioinformatics infrastructure facility for Biology teaching through Bioinformatics.	DBT, Govt. of India; Rs 27.10 lakhs; 2017-2020; Dr. Debajit Thakur	The Department of Biotechnology (DBT), Government of India, funded to establish the Bioinformatics Infrastructure Facility at Institute of Advanced study in science and Technology in the year of 2011-2012. The Bioinformatics Centre provides services in the field of bioinformatics sequence analysis, metagenomic study, transcriptomic data analysis, molecular dynamics simulation and docking to researchers working in that field. Presently, the softwares, journals available in the centre are extensively used by researchers, scientists of IASST. Centre is regularly organizing seminars, workshops and training programmes from time to time to spread latest knowledge on Bioinformatics among the students, teachers, scientists of the entire north east as a whole.
Human microbiome as a therapeutic target for improving women health: Role of vaginal and gut microbiota in the onset and pathogenesis of premature natural menopause	DST, Govt. of India; Rs. 35 lakhs; 2016-2021; PI: Dr. W. Romi	This study hypothesizes that temporal and spatial variation in the microbiome of reproductive-age (30 – 40 years) women correlate with the onset and pathogenesis of premature natural menopause (PNM). We are adopting multiomics approach combined with reverse microbial culturomics to elucidate the role of gut and vaginal microbiome and microbial-derived metabolites in the onset and pathogenesis of PNM in Indian women, assess their variation between individuals of different ethnicity, socio-economic strata, diet and nutritional status, and devise a model for prediction of PNM.

Publications

In cited journals

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month/ Year of publication
Ajay Kumar Saw, Garima Raj, Manashi Das, Narayan Chandra Talukdar, Binod Chandra Tripathy & Soumyadeep Nandi.	Alignment-free method for DNA sequence clustering using Fuzzy integral similarity.	Scientific Reports.	9:3753. 1-18.	March, 2019
Sanasam Shantibala Devi , Nongthombam Grihalakshmi Devi , Mohan Chandra Kalita and Narayan Chandra Talukdar	Isolation and selection of cellulose-degrading microorganisms for utilization along with earthworms in efficient conversion of municipality waste mix to compost.	Current Science	114:6, 1261-1274.	March, 2018
Kishore K. Dey, Narayan C. Talukdar, Fenella M. W. Nongkhlaw and Dwipendra Thakuria	Isolation, characterization and practical significance of cellulose degrading bacteria from the gut wall of two ecologically distinct earthworms.	Current Science	114:7, 1474-1484.	April/ 2018
Narayan C. Talukdar	More about microorganism in soil and around hidden half of plants as a driver of agro-ecosystem health	Journal of Indian Society of Science	Vol.65	August/ 2018
Robinson C. Jose, Louis Bengyellad, Pratap J. Handiqueb, and Narayan C. Talukdar	Cellular and proteomic events associated with the localized formation of smut-gall during Zizania latifolia–Ustilago esculenta interaction.	Microbial Pathogenesis	126: 79-84	October, 2018
Hazarika P., D. Dutta and N.C. Talukdar	Microbial technology for revegetation in overburden dumps of coal mined area of Assam, India- A review.	International Research Journal of Environmental Sciences	7(12), 56-62	December, 2018

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month/ Year of publication
K. Patowary et al.	Recycling of Bakery Waste as an Alternative Carbon Source for Rhamnolipid Biosurfactant Production	Journal of Surfactants and Detergents	22 / 373–384	March/ 2019
S. Sen et al.	Efficacy of a rhamnolipid biosurfactant to inhibit Trichophyton rubrum in vitro and in a mice model of dermatophytosis	Experimental Dermatology	28/601-608	March/2019
M. Goswami and S. Deka	Biosurfactant production by a rhizosphere bacteria Bacillus altitudinis MS16 and its promising emulsification and antifungal activity	Colloids and Surfaces: B Biointerfaces	178/285-296	March/2019
Suravi Kalita, Hari Prasad Sarma and Arundhuti Devi	Sediment characterisation and spatial distribution of heavy metals in the sediment of a tropical freshwater wetland of Indo-Burmese province	Environmental Pollution	250,969-080	2019
Chandrawali Kalita, Mausumi Ganguly and Arundhuti Devi	Biosynthesis of Silver Nanoparticles by using Edible Bamboo Shoots with high Antioxidant Properties	Research Journal of life Sciences, Bioinformatics, Pharmaceutical and Chemical Sciences	4(5), 652-666	2018
Khanindra Sharma, Mihirjyoti Pathak, Suravi kalita,Krishna G. Bhattacharyya, Neelotpal S. Sarma, Arundhuti Devi	Sequential treatment of paper mill effluent with modified Fenton Oxidation and bioflocculation	Environment, Development and Sustainability	doi.org/10.1007/ s10668-019-00431-3	2019
Dehingia, M., Adak, A., Khan, M. R.	Ethnicity-Influenced Microbiota: A Future Healthcare Perspective	Trends in microbiology	27(3), 191-193	March/2019
Adak, A., Khan, M. R.	An insight into gut microbiota and its functionalities	Cellular and Molecular Life Sciences	76(3), 473-493	February/2019
Ranjita Das, Wahengbam Romi, Rictika Das, Hridip Kumar Sharma and Debajit Thakur	Antimicrobial potentiality of actinobacteria isolated from two microbiologically unexplored forest ecosystems of Northeast India.	BMC Microbiology	18:71. doi. org/10.1186/ s12866-018-1215-7	July, 2018
Jafrin Farha Hussain and Sabitry Bordoloi	Adaptive Modifications in Four Fish Species of the Genus *Garra* (Teleostei; Cyprinidae) in Basistha River, Assam, India.	Microscopy and Microanalysis	24 (3); 310-317	June 2018
Annemarie OHLER, Mohini Mohan BORAH, Mrinal Kumar DAS, Chatoan TESIA & Sabitry BORDOLOI	A study on amphibian fauna of Arunachal Pradesh	Alytes	36 (1–4): 276–288	June 2018

Book chapters

Author (s)	Other details
Jafrin Farha Hussain and Sabitry Bordoloi	"A Study on the Heavy Metal Concentration in Waste Dumping Sites in Titabar, Jorhat, Assam, India." in Waste Management and Resource Efficiency, Springer, 2018 Publisher: Springer Nature Singapore Pte. Ltd., 2019. ISBN 978-981-10-7289-5; ISBN 978-981-10-7290-1 (e-Book) (pp 423-430)

Patents

Inventor(s)	Title	File no. for enrollment	Provisional/final patent grant no.	Issue no. of patent office
Suresh Deka and Bhaskar Das	A Cost-Effective Rapid Method for Treatment of Formation Water of Oil Industry	Application no. 201831020835	Provisional	-
Arundhuti Devi, Khanindra Sharma and Neelotpal Sen Sarma	Synthesis of ZnO Nanoparticles and its application for the Treatment of wastewater contaminated by hydrocarbons	Application no. 201931005321	Provisional	-

Contribution to World Database

Author (s)	Title	Database	Accession no.
S. Das, D. Deb, A. Adak, M. R. Khan	Understanding the microbes of traditional rice beer and their functionalities	NCBI	MK106072-MK106088 & MK106344-MK106351
T. K. Joishy, M. R. Khan	Bacterial diversity and metabolite profiles of curd prepared by natural fermentation of raw milk and back sloping of boiled milk	NCBI	MG722721-MG722728, MG722748,49, MG7225749, MG824960-63, MG824966-73
R. Thakur, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Effect of *chulai* on gut microbiota composition'	MG-RAST	74 metagenomes (private)
T. K. Joishy, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Effect of dairy based diet on human gut bacteria'	MG-RAST	62 metagenomes (private)
S. Das, D. Deb, A. Adak, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Effect of traditional dietary habits'	MG-RAST	142 metagenomes (private)
S. Das, D. Deb, A. Adak, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Microbial diversity of rice beer'	MG-RAST	9 metagenomes (private)
S. Das, D. Deb, A. Adak, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Dietary effects of Majuli satra on gut microbes'	MG-RAST	24 metagenomes (private)
D. Deb, S. Das, A. Adak, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Dietary effects of *Jou bishi* on gut microbes of *Bodo* tribe'	MG-RAST	67 metagenomes (private)
D. Deb, S. Das, A. Adak, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Dietary effects of *Xaaj* on gut microbes of Ahom tribe'	MG-RAST	67 metagenomes (private)
P. Sarkar, M. R. Khan	NGS data of 16S rDNA amplicons of fecal metagenomes of the study on 'Restoration Study'	MG-RAST	16 metagenomes (private)
R.Mazumdar and D.Thakur	Exploration of Actinobacteria from Selected Forest Ecosystems of Assam for the production of antimicrobial metabolites	MH718314,MH922849-MH922864, MN069557 and MK981152	2018, 2019
J. Saikia and D.Thakur	Phylogenetic and functional characterization of endophytic bacterial community prevalent in different species of Orchids and their role in growth promotion and disease suppression.	MK140993 MK140994 MK140995 MK140996 and MH493677	2018
R Das and D Thakur	Exploration and functional characterization of pesticide/herbicide tolerant tea rhizobacteria for growth promotion and suppression of fungal diseases	MK088274 to MK088305, MK461975	2018, 2019

Presentation in Conferences/seminars

Invited talks

Faculty	Title	Programme Name	Date & Venue
N.C. Talukdar	Lead lecture- "Bacteria in rhizosphere and root interior- new insight and implication."	4th National conference on PGPR for sustainability of Agriculture and Environment	11-12 May, 2018 at Mizoram University, Aizwal, Mizoram

Faculty	Title	Programme Name	Date & Venue
N.C. Talukdar	Resource Person lecture- "Insight into microbial role in growth, productivity and community structure of plant."	Refresher course workshop on "Life Science (Botany, Biotechnology & Zoology)"	12th July, 2018 at Department of Botany, Gauhati University.
N.C. Talukdar	Keynote speaker- "Recent trend in Drug discovery from Herbal Medicine"	National Seminar on "REDIMAP-2018"	17th August, 2018. ADP College, Nagaon, Assam
N.C. Talukdar	Lead speaker- "A glimpse on medicinal plants and their health benefits practised and conserved by *maiba-maibi* across Manipur and their scientific validation with special reference to Diabetes.	National Conference on ethno-medicine and traditional health practices in North East Region of India	25th August, 2018, Organised by NIPER-Guwahati, NGI-Mirza Campus in association with Society of Ethnopharmacology, India, Saktigarh, Jadavpur, Kolkata
N C Talukdar	Invited lecture "Microbial Bioresources of North East India and their potential application in agriculture, industry and health	India-UK Newton Bhaba Fund Researchers link workshop – Scopes and challenges for the development of novel anti-microbial agents from Ayurvedic medicinal plants to combat the problem of antimicrobial resistence.	4-7 Sept, 2018 organized at Department of Pharmaceutical technology, Jadavpur University, Kolkata
N.C. Talukdar	Keynote lecture of inaugural function "Bioresources for sustaining life and Livelihoods in North-East India"	National Conference on "Bioresources for sustaining life and Livelihoods in North-East India"	4th Oct, 2018 organised by Dept. of Zoology, Nagaon College in association with Institutional Advanced level Biotech Hub & Zoological Society of Assam
N. C. Talukdar	Chief guest lecture in the inaugural function of the one day symposium	Symposium on "Potent of Edible insects in North East India"	Sponsored by DBT-CTEP, GOI at Advanced Level Institutional Hub, Department of Biotechnology, Guwahati University on 30th March, 2019.
	Keynote address on the theme of the conference	International conference. On the theme "Technological Innovation for Integration of Food, nutrition and Health: A focus on North-Eastern India (TiFH-2019)"	Organized by Dept. of Food Engineering and Technology at Council Hall, Tezpur University, 14th Feb, 2019.

Contributory

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Manashi Das and Dr. N.C.Talukdar	*Jhum* cycle's crop plants shapes the bacteria flora in its rhizosphere under stress condition.	5th National Asian PGPR Conference on Eco-friendly Bio-innovations for Integrated Crop Management Soil Health and Environment.	Poster	23-25th February 2019. Acharya Nagarjuna University, Guntur, Andhra Pradesh (India)
Mohd shadab and Narayan Chandra Talukdar	Endophyte Bacterial Diversity in Tobacco Seeds, plants and regenerated plants from plant cell suspension culture.	5th National Asian PGPR Conference for Sustainable and Organic Agriculture	Poster	23-25th February 2019. Acharya Nagarjuna University, Guntur, Andhra Pradesh (India)
Hussain A, Karki A K, Shadab M, Deka S, Baruah J and Talukda N C	Determination of endophytic bacterial diversity, their succession in growing stages and screening for growth promotion in scented rice of North Eastern region of India	5th National Asian PGPR Conference for Sustainable and Organic Agriculture	Oral	23-25th February 2019. Acharya Nagarjuna University, Guntur, Andhra Pradesh (India)
Barsha Deka, Sagar R Barge, Bhaswati Kashyap, Simanta Bharadwaj, Partha Pratim Dutta, Joshodeep Boruwa, Raghuram Kandimalla and Narayan Chandra Talukdar	Traditional knowledge based investigation on effect of two herbs under *Allium* genus used in treatment of metabolic syndrome.	4th International Research on Translational Research: Recent Developments and Innovation in Human Health and Agricultural Research.	Poster	11th-13th October, 2018. Bogmallo Beach Resort Goa.

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Sagar R Barge, Bhaswati Kashyap, Simanta Bharadwaj, Barsha Deka, Partha Pratim Dutta, Joshodeep Boruwa, Raghuram Kandimalla, Narayan C.Talukdar	Anti-Obesity And Anti-Hyperglycemic Potential Of A Dietary Leafy Vegetable Used By Traditional Healers Of Manipur	4th International Conference on Translational Research: Recent Developments and Innovation in Human Health and Agricultural Research	Poster	11th-13th October, 2018. Bogmallo Beach Resort Goa.
S. Sen, A. Bora, and S. Deka	Rhamnolipid biosurfactant can control cutaneous dermatophytosis caused by *Trichophyton rubrum*	12th Annual Convention of ABAP and International conference on Biodiversity, Environment, and Human Health: Innovations and Emerging Trends (BEHIET-2018)	Oral	12th – 14th November, 2018 Mizoram University, Aizwal, Mizoram, India
S. Sen, S.N. Borah, A. Bora, and S. Deka	Efficacy of a rhamnolipid biosurfactant against dermatophytosis caused by *Trichophyton mentagrophytes*	International Conference on Bio-Innovation for Environmental and Health Sustainable Developments (BEHSD-2018)	Poster	27th and 28th November, 2018 CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow
Bhaskar Das, Suresh Deka	An environmentally sustainable and eco-friendly process for remediation of petroleum hydrocarbons in oil field formation water	International Conference on Bio-Innovation for Environmental and Health Sustainable Developments (BEHSD-2018)	Oral	27th and 28th November, 2018 CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow
Bhaskar Das, Suresh Deka	Phycoremediation: A new dimension to organic pollutant remediation	4th International Conference on "Recent Advancements in Chemical, Environmental and Energy Engineering (RACEEE 2019)"	Oral	14th and 15th February 2019, SSN College of Engineering, Tamil Nadu
D. Deb, S. Das, A. Adak, M. R. Khan	Effect of rice beer on gut bacterial diversity	International conference on microbiome research	Poster	19th-22nd November, 2018 at National Centre for Cell Science, Pune
S. Das, D. Deb, A. Adak, M. R. Khan	Biochemical properties, microbial diversity and functional analysis of rice beer varieties	International conference on microbiome research	Poster	19th-22nd November, 2018 at National Centre for Cell Science, Pune
M. Dehingia, M. R. Khan	Distribution of gut bacterial oligotypes across the ethnic groups of India	International Human Microbiome Consortium meeting	Poster	26th -28th June, 2018 at Killarney, Ireland
T. K. Joishy, M. R. Khan	Microbial diversity in dairy products consumed in the north-east of India	26th International ICFMH Conference–Food Micro 2018	Poster	3rd-6th September, 2018 at Berlin, Germany
S. Das	Understanding the microbes of traditional rice beer and their functionalities	National conference cum workshop on Host-Microbe Interactions	Oral	1st -2nd February, 2019 at IASST, Guwahati
D. Deb	Effect of rice beer consumption in gut bacterial profile and health in ethnic communities of Assam	National conference cum workshop on Host-Microbe Interactions	Oral	1st -2nd February, 2019 at IASST, Guwahati
T. K. Joishy	Consumption of dairy products and its effect on gut microbes	National conference cum workshop on Host-Microbe Interactions	Oral	1st -2nd February, 2019 at IASST, Guwahati
B. Bhaskar	Rice beer fractions ameliorate depression and improve learning memory in mice	National conference cum workshop on Host-Microbe Interactions	Oral	1st -2nd February, 2019 at IASST, Guwahati

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Aliul Islam and Debajit Thakur	Microbes based bio-formulations for sustainable yield, diseases and pests control in Tea (*Camellia sinensis*).	35th Tocklai Conference - SustainabiliTea : Challenges & the Way Forward.	Oral	22-23 February, 2019. Tocklai Research Institute, Jorhat, Assam
Manish Kumar, CSIR SRF (poster presentation) Dr. Rosy Mondal (mentor)	Clinical utilization of circulating cell-free DNA in identification of early somatic mutations in head and neck squamous cell carcinoma: A pilot study from Northeast India. (Best Poster Presentation Award).	44th Annual Conference ISHG-2019: Genomics for Health and Precision Medicine,	Poster	30th January to 1st February 2019 Organized by National Institute of Biomedical Genomics and University of Kalyani, Kalyani, West Bengal
Manish Kumar, CSIR SRF (poster presentation) Dr. Rosy Mondal (mentor)	Identification of circulating cell-free mitochondrial DNA D-loop mutation in head and neck squamous cell carcinoma: A study from Northeast India.	Bio-Innovation for Environmental and Health Sustainable Developments (BEHSD- 2018), CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, India in association with the Biotech Research Society (BRSI), India.	Poster	27-28th Nov 2018 Lucknow
Romi, W., Ahmed, G., Jeyaram, K.	Genetic diversity and population structure of Lactobacillus plantarum – The predominant core microbiota of traditional spontaneously fermented bamboo shoot	26th International ICFMH Conference: FoodMicro 2018-Biodiversity of Foodborne Microbes	Poster	3rd to 6th September 2018, Freie Universität Berlin, Germany

Conferences/Workshops/Meetings attended

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Suravi Kalita	International Conference on Recent Innovations in Biosustainability and Environment Research-2019)	Annamalai University, Tamil Nadu 20th to 22nd February, 2019.
M. R. Khan	International conference on 'Climate Change, Biodiversity and Sustainable Agriculture	13th-16th December, 2018 at Assam Agricultural University
D. Deb	International conference on microbiome research	19th-22nd November, 2018 at National Centre for Cell Science, Pune
S. Das	International conference on microbiome research	19th-22nd November, 2018 at National Centre for Cell Science, Pune
M. Dehingia	International Human Microbiome Consortium meeting	26th -28th June, 2018 at Killarney, Ireland
T. K. Joishy	26th International ICFMH Conference–Food Micro 2018	3rd-6th September, 2018 at Berlin, Germany
A. Kumar	New Trends in Multi Modal Molecular Imaging Applications for Animal Studies in Drug Discovery	20th-21st November, 2018 at NIPER, Guwahati
Debajit Thakur	Assam Botanical Congress (ABC-01) and International Conference on Plant Science.	4-6 February, 2019. Department of Botany, Gauhati University, Guwahati
Debajit Thakur	35th Tocklai Conference - SustainabiliTea : Challenges & the Way Forward.	22-23 February, 2019. Tocklai Research Institute, Jorhat, Assam
Dr. Rosy Mondal (Invited Speaker)	NATIONAL CONFERENCE ON GREEN, SUSTAINABLE AND EVOLVING SCIENCES (GSES-2019) & 64TH ANNUAL TECHNICAL SESSION OF ASSAM SCIENCE SOCIETY	JUNE 28–29, 2019 Cotton University, Guwahati, Assam
Dr. Rosy Mondal (Valedictory popular talk)	Basics of DNA Sequencing and its Applications	10-04-2019 to 14-04-2019 University of Kalyani, West Bengal

Lectures delivered at other institutes

Faculty	Topic	Date & Venue
N.C.Talukdar	A lecture on IPR on the occasion of "World Intellectual Prosperity Day"	26th April, 2018 in Conference Hall of New Academic Building, Gauhati University.
M. R. Khan	Popular talk on 'gut microbiome'	18th August 2018 in the Biotechnology department at Gauhati University
M. R. Khan	Understanding our gut feeling	14th May 2018 at Asian Institute of management and technology (AIMT), Guwahati

Other activities

Visits to national/international institutes/laboratories

Faculty/Research scholar	National/international institutes/laboratories	Date
Mr. A. Kumar	Dr. Deepak Sharma's laboratory at CSIR-Institute of Microbial Technology, Chandigarh to learn about testing of probiotics against Parkinson's disease.	4th -13th July, 2018
Ms J. Medhi	Prof. S. C. Lakhotia's laboratory, Department of Zoology, BHU to learn *Drosophila* cultural techniques.	6th -11th January, 2019

Awards/Recognitions/Achievements

Name	Particulars
Suresh Deka	Chaired a technical session in the National Conference on Microbiome Research: Understanding the diversity to improve plant, animal, human and environmental health, held at Uka Tarsadia University, Bardoli, Surat, during 7-9 March,2019
Suravi Kalita	International Conference on Recent Innovations in Biosustainability and Environment Research-2019 organised by Annamalai University, Tamil Nadu from 20th to 22nd February, 2019. (Awarded Young Scientist Award for oral presentation)
M. R. Khan	Served as chief guest and judge in annual science festival at Green Meadows School at Panjabari, Guwahati on 10th November, 2018.
M. R. Khan	Served as expert in 'Talent Search Contest (TSC) on Innovative Research Ideas Leading to Entrepreneurial Venture in Biotechnology and Allied Areas' at Biotech Park, IITG in 2018.
M. R. Khan	Member of Institutional biosafety committee of Cotton University.
M. R. Khan	Served as expert member in the selection of candidates for the posts of technical assistant for the Assam warehouse corporation.
M. R. Khan	Served as external examiner for the viva exam of M.Sc. (Botany-microbiology) course of Gauhati University.
Dr. Wahengbam Romi	International Travel Support Grant 2018 from SERB, DST, Govt. of India

TRADITIONAL KNOWLEDGE BASED DRUG DEVELOPMENT

Traditional knowledge-based drug discovery (TKDD) research at IASST mainly focuses on validating the claims of locals with scientific evidence. The whole Northeast region (NER) of India is full of biodiversity of flora and fauna. Most of the people here still rely on traditional medicine for their day to day care. Scientific exploration of potential traditional medicine is an urgent need of the hour to meet up the demand of the global herbal market. In this context, an approach has been made for in-depth research in this field with experimental biology, biochemical evaluation, natural and synthetic chemistry, pharmacology, molecular biology etc, so as to reach the goal of therapeutic and nutraceutical product for prevention and cure of metabolic syndrome. For this purpose, we have selected some indigenous medicinal plants of NER having authentic therapeutic potential, further bioactivity guided fractionation is being carried out for targeting the bioactive molecules for development of phytopharmaceuticals from natural resources.

First row (L to R) : Suman Kumar Samanta, Scientist-C; Jagat C. Borah, Associate Professor II; N. C. Talukdar, Director, IASST; Rajlakshmi Devi, Associate. Prof.-II& i/c BCSS; Rosy Mondal, DST INSPIRE Faculty.

Second row (L to R) : Abinash Nath, Animal Keeper; Tarun Talukdar, MTS; Partha Pratim Sarma, JRF; Swarnali Bhattacharjee, JRF; Paramita Choudhury, JRF; Jonali Brahma, JRF; Nonibala Gurumayum, JRF; Puspanjali Khound, JRF; Julie Bordoloi, Technical Assistant-II.

Third row (L to R) : Bhaswati Kashyap, JRF; Simanta Bharadwaj, Technical Asstt.; Saydur Rahman, NPDF; Sagar Ramrao Barge, SRF; Kasturi Dutta, JRF; Gwhwm Basumatary, Animal Keeper; Sabin Kalita, MTS.

Rajlakshmi Devi

Associate Professor II

Dr. Rajlakshmi Devi received her Ph D from Gauhati University in 1999 and carried out her post doctoral study at All India Institute of Medical Sciences (AIIMS), New Delhi and University of Southern Queensland (USQ), Australia. Currently, she is carrying out research on traditional knowledge based drug discovery and development. Recently, she was awarded International Fellowship for visiting Gifu University, Japan as Indian Biomedical Scientists 2018-19 under ICMR, New Delhi.

Suman K. Samanta

Scientist-C

Dr. Samanta completed his PhD from CSIR-Indian Institute of Chemical Biology (IICB), Kolkata in Biochemistry in 2013. He was Associate in Cancer Biology department at CSIR-IICB and later did his post-doctoral research (2014-2016) in School of Medicine at University of Pittsburgh, USA. He validated a phyto pharmaceutical against different subtype of breast cancer in in vivo model. Currently he is working as Scientist-C in contract mode.

Research Summary

The traditional use of folklore herbal plants in the treatment of diseases like diabetes, cardiovascular complications, and other metabolic syndrome has been claimed by the local healers, and our Traditional knowledge-based drug discovery (TKDD) research mainly focuses on validating these claims with scientific evidence. The past research in this institute has already provided scientific validation for some traditional claims about the therapeutic effect of some herbs and formulations against diabetes and other metabolic syndromes. For future in-depth research in this field, we aim to integrate the traditional knowledge with experimental biology, biochemical evaluation, natural and synthetic chemistry, pharmacology, molecular biology so as to reach the goal of therapeutic and nutraceutical product for prevention and cure of metabolic syndromes.

A. Comparative study of antioxidant potential of Garcinia pedunculata Roxb. in different drying conditions.

The present study was designed to assess and compare the nutritional and antioxidant potential of *Garcinia pedunculata* under different drying conditions, viz shade dried, sun dried and oven dried. Their extracts were prepared in five different solvents viz, methanolic, hydromethanolic, ethanolic, hydroethanolic and water. The fresh samples were screened for nutitional parameters and after concentrating the extracts, they were screened using antioxidant and phytochemical assays. In this study, it was revealed that the total carbohydrate concentration remained nearly same in shade dried and oven dried sample, but was found to be a bit low in sundried sample while a major decrease in protein concentration was found in oven dried and sun dried sample as compared to shade dried sample.

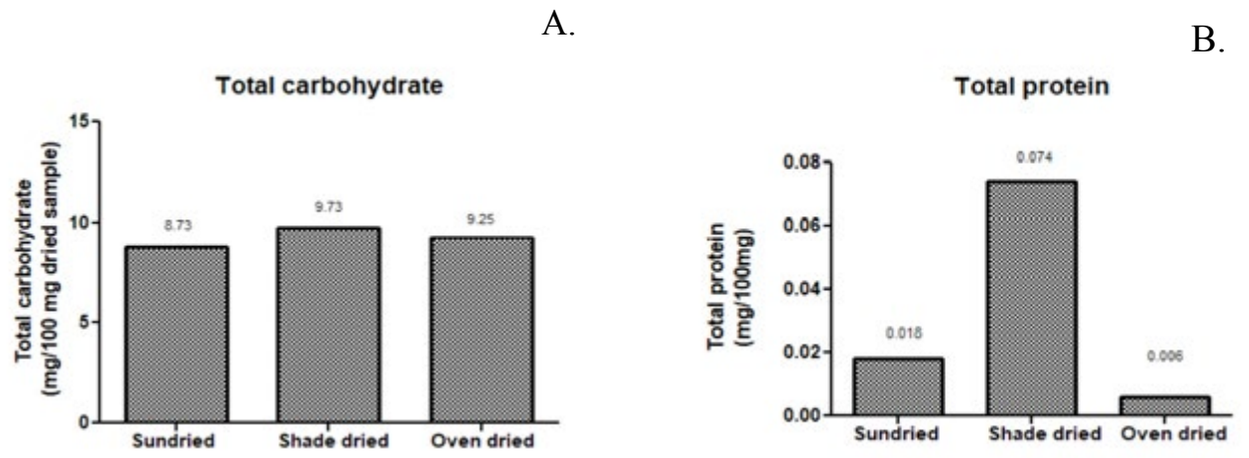


Fig. 1. Graphs depicting comparison of Total carbohydrate (A.) and Total protein content (B) of sun dried, shade dried and oven dried GP. Data represented as n=3 with SEM.

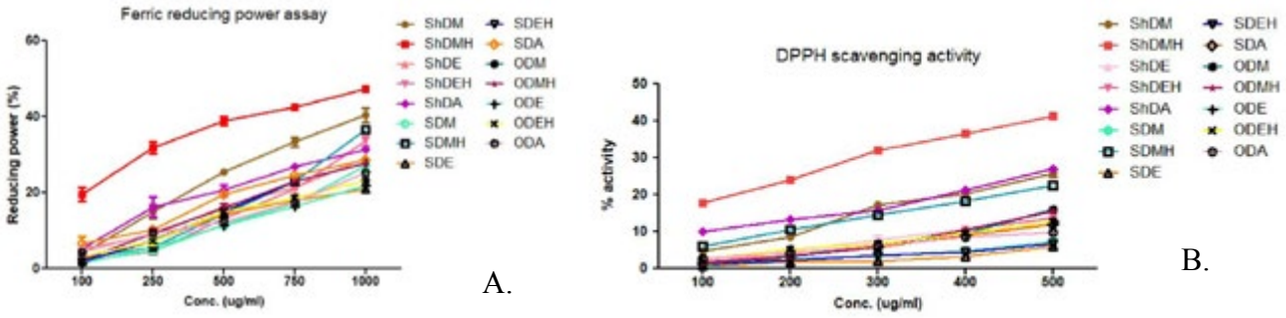


Fig. 2. (A) Graph depicting DPPH scavenging activity of shade dried, sun dried and oven dried GP. Data represented as n=3 with SEM. (ShD- Shade dried, SD- Sun dried, OD- Oven dried, M= Methanolic, Mh= Hydromethanolic, E= Etanolic, EH= Hydroethanolic, A= Aqueous. (B) Graph depicting FRAP reducing power of shade dried, sun dried and oven dried GP. Data represented as n=3 with SEM. (ShD- Shade dried, SD- Sun dried, OD- Oven dried, M= Methanolic, Mh= Hydromethanolic, E= Etanolic, EH= Hydroethanolic, A= Aqueous).

In 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay, the shade dried hydromethanolic extract showed maximum scavenging activety as compared to the shade dried extract with other solvents as well as the oven dried or sun-dried samples. In ABTS (2,2-Azinobis-(3-ethylbenzathiazoline-6-sulfonate) radical scavenging assay, also followed the same pattern as DPPH. In Ferric reducing antioxidant power (FRAP) assay also, the shade dried hydromethanolic extract showed maximum antioxidant power when compared with sun dried and oven dried samples.

Thus, from the present study it can be concluded that the drying procedure does have a significant impact on the nutritional and antioxidant properties of GP. The shade dried sample has the highest nutritional content conserved and also has higher antioxidant properties than that of the sun dried and oven dried samples. This may have happened as because in scorching heat of oven or under sun's UV rays some of the compounds might have degraded in the samples which did not happen in the shade dried ones. Shade drying preserves most of the constituents thereby rendering the shade dried GP higher nutritional and better antioxidant capacity.

B. Chemical profiling of Joha and Black rice of NER for nutritional, nutraceutical parameters and aromatic compounds.

Scented (joha) and black rice indigenous to North-east region (NER) of India are the two among 40,000 varieties of species Oryza sativa, prevalent for its great aroma, medicinal property and/or equally noteworthy taste. Biochemical and target based LCMS analysis was performed to identify and quantify the different phytonutrients from the selected rice grains from those two varieties. HPTLC analysis was performed to draw the fingerprinting of different molecules and their variance in the selected rice grain. Biochemical assay revealed that the selected black rice (Amubi) content ~1.8 fold higher of total phenolic and ~2.3 fold higher of total flavonoid than the scented rice grain (Kon joha). The total starch content was also analysed and it is significantly higher in black rice compare to scented rice grain. The health beneficial ratio of ω-6/ω-3 essential unsaturated fatty acid is notably better in selected scented rice grain

than black rice grain. The targeted LC-MS/MS analysis confirms the presence of oryzanol and ferulic acid in both the samples. The scented rice further confirms the presence of 4-hydroxy benzoic acid, apigenin, tricin, avenasterol, coumarin, coumaric acid, phenyl alanine, caffeic acid, α- tocophenol, etc. On the other hand, the black rice separately confirms the presence of protocatechuic acid and dehydroxy myricetin in the hydro-methanolic extract. Further the quantitative analysis showed that the lipids LPI 16:0, LPE 14:0, LPC 18:2, LPE 18:2, PE, along with oryzanol, hydroxy docosanoic acid are at least 3-fold higher in scented rice varietal; whereas, in amubi the content of petunidin galactoside, LMMPE18:2, PC14:0 is higher than the scented rice grain. The HPTLC analyses provide the difference in metabolite and their variation on those selected rice seeds. Altogether different phytonutrients including phenol, polyphenol, and flavonoid have been identified in selected rice varietals with reported antioxidant, antihyperlipedemic, anticancer, and antidiabetic activities.

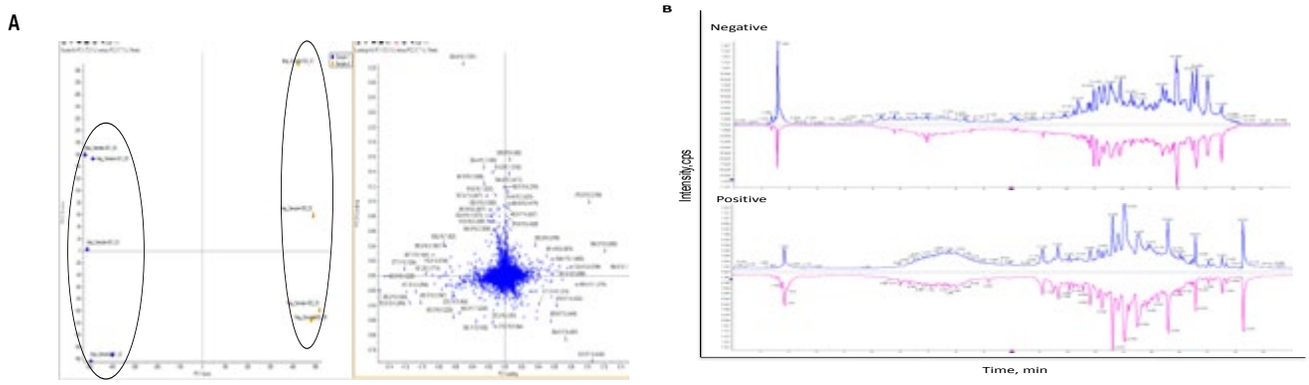


Fig. 4. Mass Spectrometry Comparison of two samples: (A) Principal Component analysis (PCA) plot showing grouping of the two different rice verities viz. sample 1 as Kon joha and sample 2 as Amubi. (B) Mirror total ion chromatogram (TIC) in negative and positive polarity comparing the two samples.

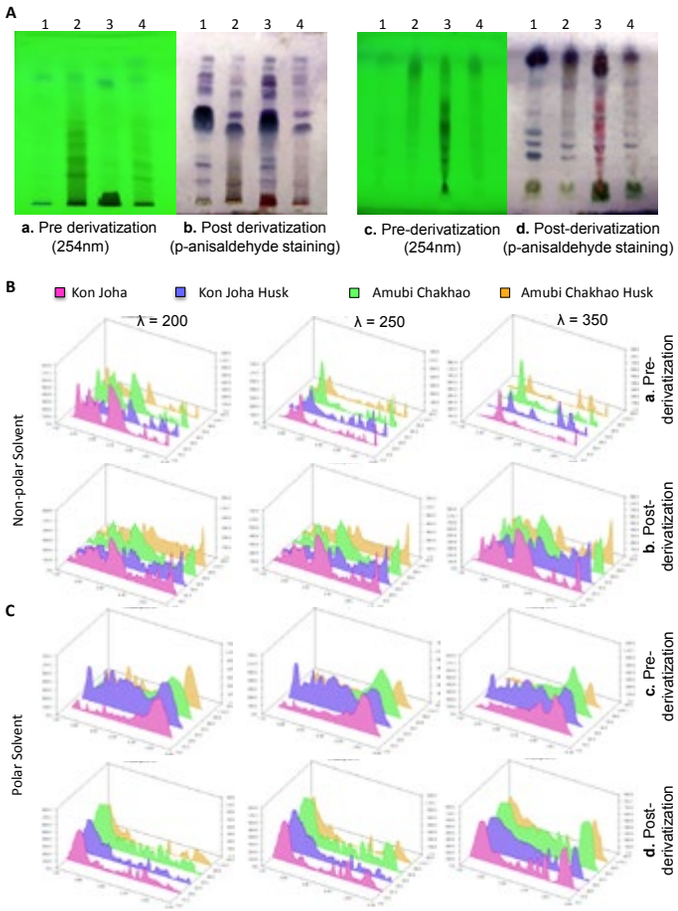


Fig. 5. HPTLC fingerprinting: (A) Thin layer chromatography analysis in (a, b) non-polar [chloroform: methanol (95:5) + 0.1% FA] and (c, d) polar [butanol: acetic acid: water (4:1:5)] showing the distribution of different metabolites in (1) kon joha, (2) kon joha husk, (3) chakhao amubi and (4) chakhao amubi husk. HPTLC fingerprinting profiling of (1) kon joha, (2) kon joha husk, (3) chakhao amubi and (4) chakhao amubi husk are showing in different wave length after developing in (B) non-polar [chloroform : methanol (95:5) + 0.1% FA] and (C) polar [butanol: acetic acid: water (4:1:5)] solvent system. "a and c" represents the pre derivatization whereas "b and d" represents the post derivatization (p-anisaldehyde staining) profiling in throughout the figure.

C. Characterization of high value phytochemicals of anti diabetic and immunomodulatory properties in north eastern banana varieties

Present study focuses on chemical profiling and identification of bioactive compounds present in *Musa balbisiana* root exudates (MBRE) and/or pulp for treatment of metabolic syndrome. Chemical analysis of *Musa balbisiana* (Root and Pulp) reveals that there is mixture of several polar and non-polar compounds present in the sample. For this study, sample was collected from the Medicinal plant garden of Institute of Advanced Study in Science and Technology (IASST), Guwahati. Healthy roots were cut and washed properly and a glass vial was fixed over night to collect the juice. Next morning sample were collected and filtered properly using Whatman Filter Papers (125 mm). Pulp was also washed properly and peeled off for extraction.

HPLC fingerprinting of root exudates

Chromatograms were observed at three different wave length and different picks were observed, which indicates the presence of several polar and non-polar compounds in *Musa balbisiana* root exudates sample.

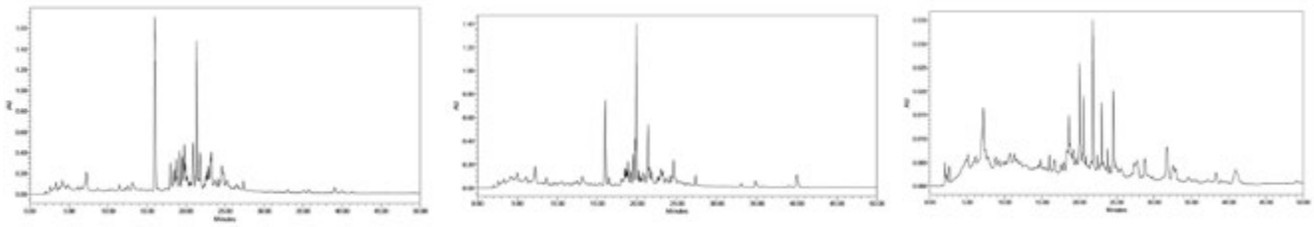


Fig. 6. : HPLC Chromatogram at 254, 275 and 366 nm respectively

Further identification and characterization are going on to establish MBRE as a potent anti-diabetic and cardioprotective agent for treatment of metabolic syndrome.

HPLC Chromatogram of MB EtoAc fraction

HPLC analysis followed by LCMS analysis confirmed the presence of Sinapic acid and Ferulic acid in the EtOAc fraction of MB pulp. Further we have quantified those two compounds by newly developed HPLC method.

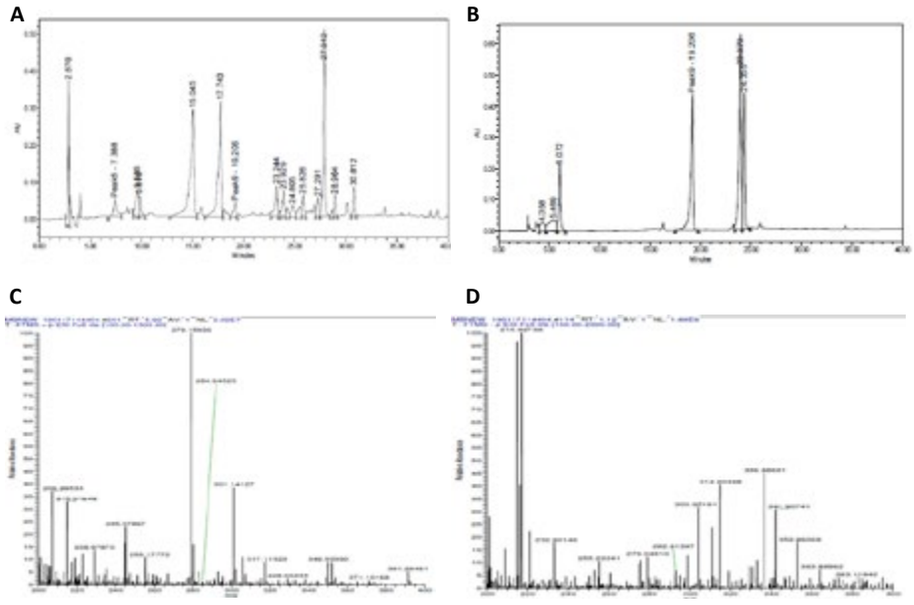


Fig 7. (A) HPLC Chromatogram of MB EtoAc fraction (B) Chromatogram of Standard compounds (Gallic Acid, Catechin, Sinapic acid, Ferulic acid) (C) LCMS spectrum of MB Extract in Positive ESI (D) LCMS spectrum of MB Extract in Negative ESI.

Further the characterization of other bioactive phytochemical(s) present in the EtOAc fraction of MB pulp is being analysed to develop a phytopharmaceutical composition for the treatment of diabetes.

Narayan C. Talukdar

Director & Head of the Department

Jagat C. Borah

Associate Professor II

Dr. Jagat C Borah, completed his Ph.D. research in CSIR-NEIST Jorhat and received Ph.D. from Dibrugarh University in 2006. He received his post-doctoral research training in chemical biology at Mount Sinai School of Medicine, New York City, USA. He works on Natural Medicinal Chemistry, Diabetes and related metabolic syndrome. His main focus is on translational aspect leading to development of phytopharmaceutical drug and/or lead molecules and/or IND from ethno-medicinal plants. He has more than 22 publications and 03 patents to his credit.

Mrinal Kumar das

Assistant Professor-II

Dr. Mrinal Kumar das did his Ph.D. from University of Delhi in 2011. He did his postdoctoral work in ICGEB, New Delhi from 2013 to 2017. Following this, he joined Leicester University, UK as a Newton fellow. His current research interest is to understand the immuno-metabolism in Tuberculosis (TB).

Aparajita Ghosh

Scientist-C

Dr. Aparajita Ghosh received her PhD. from Indian Institute of Chemical Biology, Kolkata. She has more than ten years of experience in Drug Delivery & Nanotechnology, Cell Biology, Cancer Biology and Tissue Engineering. She worked as Project Associate (DBT Centre of Excellence) at NII, New Delhi; DBT-Research Associate at Bose Institute, Kolkata and SERB-NPDF at IIT, Guwahati. She has been working in Contractual Scienctist "C" positon in IASST since January, 2019

Raghuram Kandimalla

Scientist-C

Dr. Raghuram Kandimalla carried out his research in IASST and received Ph.D. in Pharmaceutical Sciences (Pharmacology) from Department of Engineering in Pharmacy, Gauhati University in 2018. Currently he is a postdoctoral researcher at *James Graham Brown Cancer Center*, University of Louisville, Kentucky, United States. His Research interest is cancer prevention and cancer drug delivery. His current work is on delivery of Phyto drugs and siRNA's to cancer cells for effective cancer therapy.

Research Summary

Concerted efforts are being made by the group for development of herbal drug as per current requirement of regulatory guidelines. After generation of intensive pre-clinical data on *Premna herbacea*, a medicinal plant used by the tribal populations of Assam and reported in the Indian Systems of Medicine. Phase-I clinical trial is in progress to assess efficacy and safety in pre-diabetic and diabetic patients in collaboration with Govt, Ayurvedic College, Guwahati, Assam. It is aimed to develop a herbal anti-diabetic drug under AYUSH mode which may further be developed as phytopharmaceutical drug.

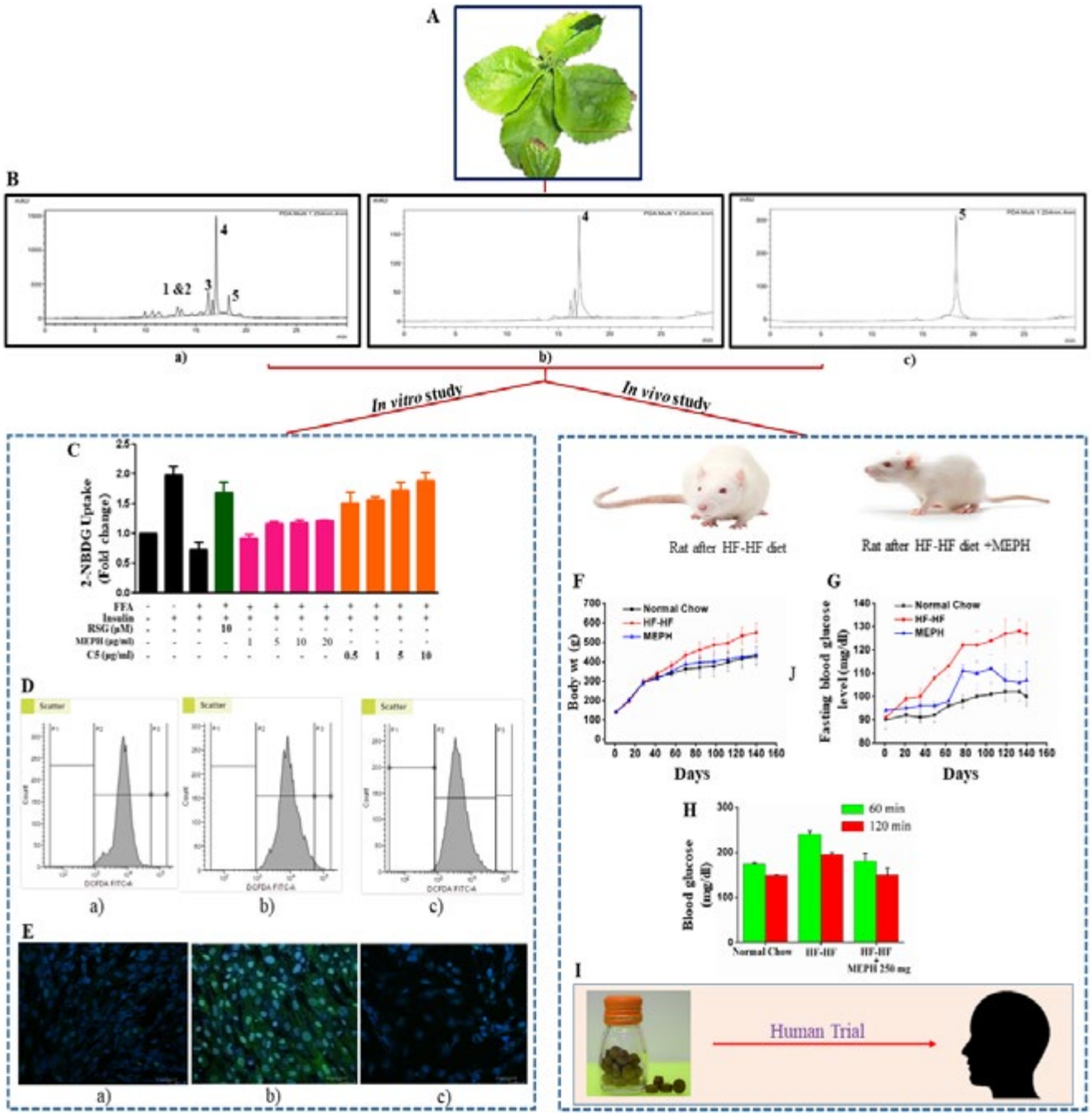


Fig: *In vitro* and *in vivo* study of methanolic extract of *P. herbacea* (MEPH) and its isolated compound (C5). **A**: *P. herbacea* plant; **B**. HPLC chromatogram obtained for (a) MEPH, (b) & (c) isolated marker compounds from sub-fraction of n-butanol with Diaon HP-20; **C**: Glucose uptake activity of MEPH and C5 in Palmitate (FFA) induced peripheral insulin resistance in L6 myotubes; **D** & **E**: Flow cytometry and confocal microscopy image depicting effect of C5 against FFA induced ROS generation in peripheral insulin resistance and pMAPK protein expression in L6 myotubes after 6 hr treatment, (a) cells without FFA (b) cells with FFA (c) cells with FFA+C5; **F** & **G**: Body weight and fasting blood glucose of SD rats fed with normal diet, high fat-high fructose diet (HF-HF) and HF-HF + MEPH during 140 days; **H**: Effect of MEPH on Intraperitoneal Glucose Tolerance Test (IPGTT) in 60 and 120 min; **I**: *P. herbacea* tablets and its ongoing human trial.

Type 2 diabetes mellitus (T2DM) is a complex metabolic disorder characterised by hyperglycaemia stirring from insufficiency in insulin secretion, action, or both. The disease is a multifactorial one, caused by ageing of population and increase in obesity and resultant in insulin resistance and increased glucagon secretion. Body cells with insulin resistance are not able to uptake glucose from bloodstreams and utilize in peripheral target tissues, skeletal muscles, liver, and adipose tissues. Based on large volume of research results, accumulation of free fatty acids (FFA) in the tissues is believed to be responsible for a great deal of impaired insulin-induced glucose uptake and disposal. Furthermore, prolonged exposure to elevated FFA results in activation of inflammatory factors and its pathway. This in turn accelerate β-oxidation of FFA, causing excessive electron flux in the mitochondrial respiratory chain, and generates more reactive oxidant species (ROS). Plant based products had become extremely popular worldwide because of their effectiveness with little or no side effects as compared to the synthetic drug in combating contemporary of type 2 diabetes. In *in vitro* experiment of this study, when normal skeletal muscle cell (L6) treated separately with methanolic extract of *P. herbacea* (MEPH) and the isolated major enriched fraction (C5), found to show enhanced glucose uptake. It was also found that ROS generated in L6 myotubes by FFA could be reduced significantly by treating the cells with C5.

In *in vivo* study, *P. herbacea* significantly reduces body weight and fasting blood glucose in high fat-high carbohydrate fed rats. Moreover, there was marked reduction in intraperitoneal glucose tolerance. The current study also revealed the molecular mechanism of insulin resistance in T2DM. Molecules such as PI3K, Akt, p-Akt, Glut4 and IRS (data and image not shown here) involved in the intracellular processing of the signal provided by insulin, are target of this study as recent data has postulated strong evidence that dysfunction of these proteins results in insulin resistance. Treatment of FFA induced L6 cells with MEPH and C5 upregulates the expression of these proteins and triggers the downstream substrate AS160. This result in the recruitment of GLUT4 transporters to the plasma membrane and thereby stimulates glucose uptake. These findings suggest that *P. herbacea* is a potential herb of NER that can improve the metabolic dysfunctions associated with T2DM by mitigating insulin resistance. This positive and promising outcome have led to perform clinical trial. Currently human trial is conducted by forming ethical committee in collaboration with Govt. Ayurvedic College, Guwahati to assess the efficacy of the drug in T2DM.

Discovery of phosphoenolpyruvate carboxykinase inhibitors by virtual ligand screening and validation of its interaction with its active sites. Most available anti-diabetic drugs are known to decrease hepatic gluconeogenesis, does not have a well-defined molecular target and is associated with many gastrointestinal side effects. Thus, there is an urgent need for novel therapeutic approaches. (SERB- NPDF) - Asim Dutta:

Introduction: Phosphoenolpyruvate carboxykinase (PEPCK) is the key rate-limiting enzyme in gluconeogenic pathway, which helps to regulate blood glucose homeostasis (Yang et al., 2009). Overexpression of this enzyme results in pre-diabetes and diabetes and its expression is predominantly regulated by insulin. Insulin levels of diabetic subjects are insufficient to adequately inhibit PEPCK. Thus, inhibition of PEPCK is a promising new therapeutic approach for treatment of diabetes (Wall et al., 2015). One way to alleviate the diabetes-induced hyperglycemia would be to lower the activity of PEPCK; complete inhibition would be undesirable, because it would cause hypoglycemia. With this rationale, there have been efforts to identify the residues in PEPCK that have major but not essential roles in catalysis.

Progress made so far:

Confirmation of PEPCK clone

The PEPCK cytosolic gene obtained from Dharmacon, USA cloned into pDNR-LIB vector. In order to confirm the presence of insert and its correctness, the target gene was amplified by PCR and sequenced.

Site-directed mutagenesis

Site-directed mutagenesis was performed according to the QuikChange protocol (Agilent Technologies) with minor modifications. Plasmids were purified from single colonies and sequenced.

Sub-cloning and expression of wt and mt PEPCK and protein pourification

PEPCK PCR product and pET28a plasmid was digested with NdeI and BamHI restriction enzymes for 2 hrs. The bands were excised and cleaned using Qiagen gel extraction kit. Linearized pET28a and PEPCK PCR product were ligated overnight at 16^0C and transformed into TOP10F competent cells (Thermo Fisher).

Preparation of PEPCK model:

The available crystal structure of human cytosolic PEPCK (PDB ID 1KHF) was downloaded from PDB site. The model was verified and refined in DS 4.1 for molecular docking.

Virtual ligand Screening

Extensive literature survey and data mining on the traditionally used anti-diabetic plants of North East India was done to create the list of anti-diabetic plant origin compounds. The ligands (~ **500**) were assessed for their drug-like properties using Swiss ADME server. Energy minimization of the ligands was performed using [Minimization-Quick Minimization (Dreiding forcefield)] tool of Biovia Discovery Studio (DS) 4.1.

Molecular Docking

The selected modulators (~**200**) were docked into the PEPCK-PEP-2Mn2+ complex. Determination of the probable binding conformation and interactions of modulators showed that out of about 200 compounds, Ephedrine (-634.4 kcal/mol), Caffaic acid (-470 kcal/mol), Farnesol (-453.1 kcal/mol) and Anonaine (-415.3), tetrahydropalmitine (-18.50 kcal/mol) and genistein (23.49 kcal/mol) had similar interactions as seen in the case of GTP. These modulators could be probable competitive inhibitor for the GTP binding site of PEPCK (Fig. 2).

Fig. 1. A. Restriction digestion of *wt* and *mut* insert and vector for cloning and confirmation of positive clones. B. SDS-PAGE analysis of purified wt and mt PEPCK using Ni-NTA resin.

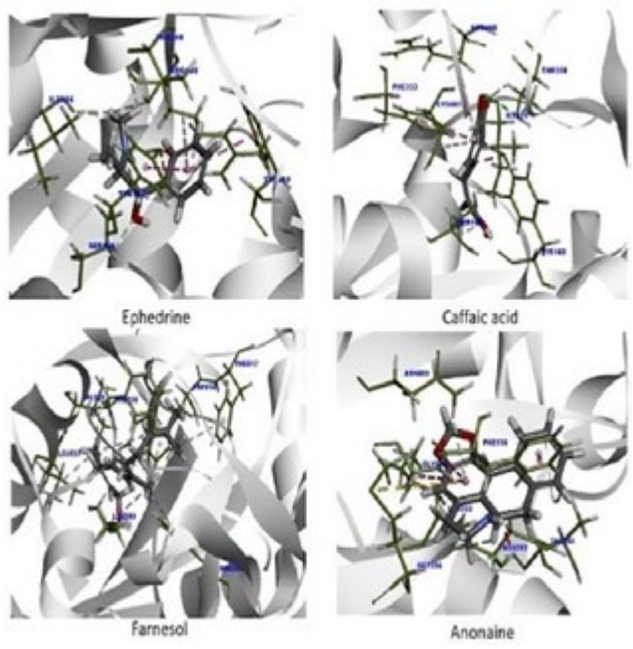


Fig. 2. Likely interaction of modulators with the active sites of PEPCK model.

Microbial Rhamnolipid Coated and Stabilized ZnO-NP and its Anti-cancerous Activity (DBT-RA programme) - Dr. Kaustovmoni Patowary:

ZnO-NPs were synthesised by mixing 50 mL of rhamnolipid (50 mg/L) at 1.1-fold micelle concentration with 50 mL of 1 mM ZnO_3. The solution was incubated at 80°C for 30 min under vigorous stirring. Few drops of 1 M NaOH solution were added under vigorous stirring. The resulting white precipitate was obtained by centrifugation at 5000 rpm for 10 min, washed with sterilized RO water and dried at 70°C under vacuum oven. The dried NPs were grounded and stored in amber coloured container until further use.

ZnO-NPs was screened for its cytotoxicity by MTT assay at different concentrations to determine the IC_{50} value in MDA-MB-231 and MCF-7 cells and in normal skeletal muscles (L6). Its toxicity towards isolated human peripheral blood mononuclear cell (PBMC) was also assessed. The ZnO-NPs induced cytotoxic response in a concentration-dependent manner with an IC_{50} value at 14.31 µg/mL and 13.55 µg/mL against MDA-MB-231 and MCF-7 cells respectively. In the case for L6 cells, ZnO-NP did not induce cytotoxicity as the IC50 value was not obtained even with higher dose of 100µg/mL. The result with PBMC also indicates that the tested sample was non-toxic to the immune cell and able to slightly stimulate proliferation in dose dependent manner compared to control. The data obtained from the MTT assay clearly showed that *ZnO* nanoparticle can potentially induce cytotoxicity towards breast cancer cells without affecting the normal cells.

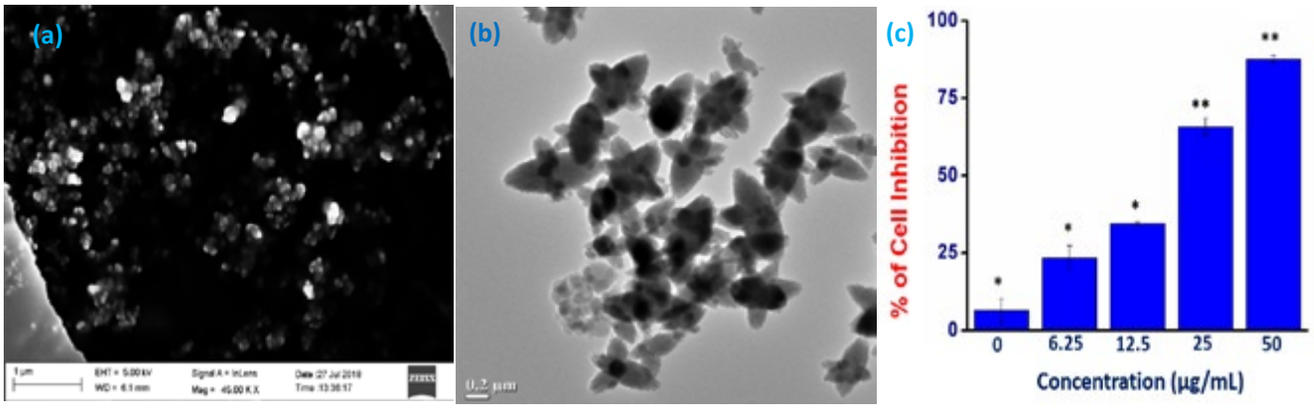


Fig. (a) SEM image of ZnO-NPs (b) TEM image of ZnO-NPs, (c) Growth inhibition of ZnO-NPs against MDA-MB-231 cell line by MTT assay.*$P \geq 0.05$; **$P \geq 0.005$. Value±SD.

Rosy Mondal

DST INSPIRE Faculty

Dr. Rosy Mondal received her Ph.D. from Assam University, Silchar and post-doctoral research training in Boston University School of Medicine, Boston, Massachusetts, USA in 2014. She worked as a Research Scientist II in Silchar Medical College and Hospital in 2014 and joined IASST as Inspire Faculty in 2015. Her field of specialization includes Cancer genomics, Cell free nucleic acid (Liquid biopsy), mitochiondrial genomics, Biomarker development in cancer, prognosis and monitoring of cancer therapy, Oncovirus, Healthcare Genomics

Research Summary

Title: Cancer genomics, mutation detection and comprehensive monitoring of Head and Neck cancer in North East India by liquid biopsy approach

Head and neck cancer is the most commonly diagnosed cancer worldwide, with 90%–95% of the cases reported to be squamous cell carcinoma. The disease is one of the most mystifying, commonly misdiagnosed and poorly understood entities because the lesion is often situated in a relatively inert space where only air and mucus are in transit. Head and neck squamous cell carcinoma (HNSCC) can be silent for a long time without any primary symptoms. In Northeast India, HNSCC is most familiar in the states of Assam, Manipur, Mizoram, Tripura, and Nagaland with an incidence of 54.48%, which acquires 30%–40% cancers at all sites and is the sixth most common cause of death in males and seventh in females.

The clinical viewpoint of cell-free DNA (cfDNA) has sparked the interest of scientists as it opens up a new possibility for non-invasive analysis of tumor-derived genetic materials such as circulating tumor cells (CTCs), cfDNA, cell-free mitochondrial DNA (cfmtDNA), circulating RNA, or microRNAs. The idea of a "liquid biopsy" analysis may provide a means for non-invasive, real-time monitoring, with potential applications of prognosis, response to therapy, and emergence of treatment resistance(Fig.1). However, its success is dependent on robust validation in sufficiently large independent prospectively designed studies. The release of cfDNA into the blood is presumably related to apoptosis and necrosis of cancer cells in the tumor microenvironment. Identifying and decoding these potent biological signals in the form of cfDNA could serve as a better diagnostic marker in terms of "liquid biopsy," which would be convenient for many diagnostic applications against the conventional tissue biopsies approach.

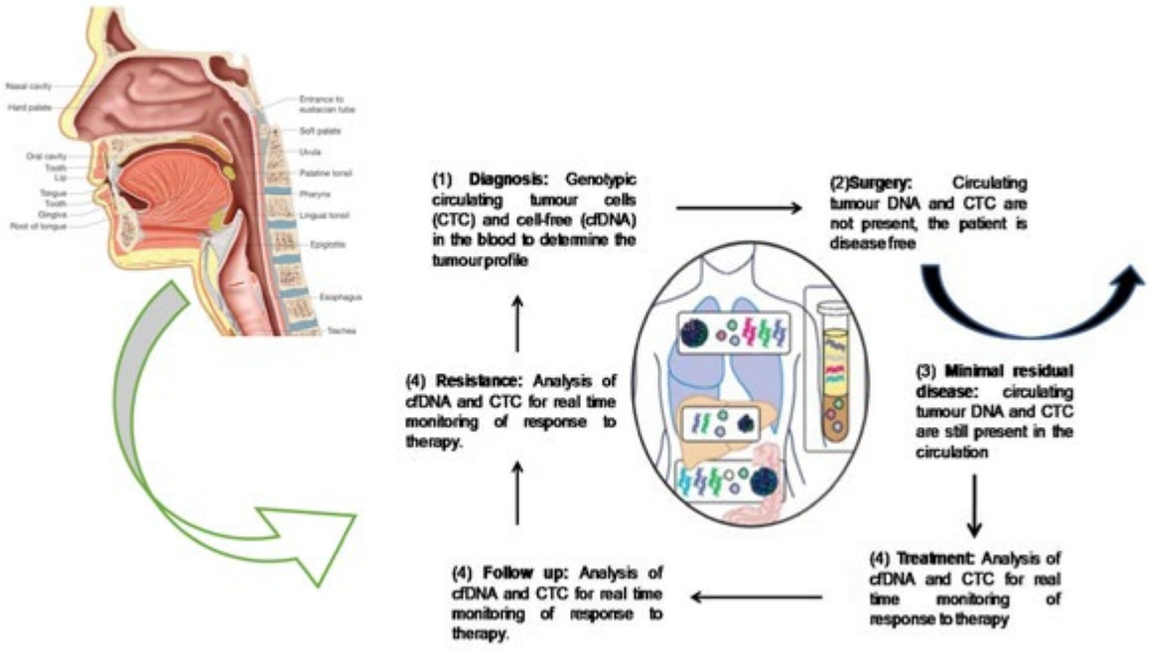


Fig.1. Schematic representation of cell free DNA as diagnosis, prognosis, and follow-up cancer testing in plasma of cancer patients.

In our study data regarding age, gender, lifestyle, occupation and nature of consuming tobacco-betel quid habit (smoking or smokeless) and alcohol intake from cases and healthy controls was abstracted from hospital records and on personal interviews. Molecular pathology reports of the patients found to be HNSCC positive were obtained from the pathology department of the respective hospitals and only positive cases were included in the study. In our lab, we have optimized the cfDNA extraction and storage procedure and establish a standard work flow for the downstream application of cfDNA in HNC (Table.1)

Table 1. Optimized workflow for blood processing and cfDNA isolation

Factors	Recommendations
Blood Collection	Cell-Free BCT Streck™ tubes for whole blood collection.
Plasma Isolation	Two step centrifugation speed of 1000-2000g at 4°C for 10 min and 10,000 -16,000g at 4°C for 10 min for plasma separation.
Plasma Storage	4°C = For Sample processed within 15 min; -80°C = For long-term storage.
cfDNA isolation	Isolation technique Varies from one laboratory to another. Based on our own experience we recommend QIAamp circulating nucleic acid kit with QIAvac 24 plus set up.
cfDNA quantification	Qubit Fluorometer is recommended for cfDNA quantification prior to downstream application.
cfDNA Fragment Size	Bases on our standard isolation approach the determined fragment size of cfDNA using QIAxcel Advanced System was found to be in the range i.e. 68bp, 76bp, 100bp, 163bp and 208bp.

Identification of nuclear somatic variants by Next Generation Sequencing (NGS) approach:

NGS is being used for the detection of somatic variants in a variety of molecular oncology applications. The information generated by targeted gene panels can help in identifying the genes associated with HNC and its associated frequency of mutation. The genome mapping of samples in our study (cell-free DNA, tumor tissue and blood DNA) was mapped into assembly of the human genome (hg19). The mapped generated reads in cell-free DNA samples was found to be 99.7% mapped into reference genome.

Identification and annotation of variants (SNP) in cell-free DNA, tumor DNA and Blood DNA:

Variant annotation in cell-free DNA, tumor tissue DNA and blood DNA identified the presence of 2855 variants in each samples, the individually identified variants for each samples. Among the observed mutations, the nature of the substitution was found to be missense and non-sense (Table 2).

Table 2. Potentially important identified variant along with their annotations.

Sl. No.	CHR POS	Observed Genotype	dbSNP	COSMIC	Gene	location/ function	protein/ coding
1	chr9:21971120	G/A	rs121913388	COSM99191 COSM12475	*CDK-N2A*	Exonic/ Non-sense	p.Arg80Ter/ c.238C>T
2	chr14:105246551	C/T	rs121434592	COSM33765	*AKT1*	Exonic/ Missense	p.Glu17Lys/c.49G>A
3	chr17:7577058	C/A	rs1057520607	COSM10856	*TP53*	Exonic/ Nonsense	p.Glu294Ter/c.880G>T
4	chr17:7577120	C/G	rs28934576	COSM43896	*TP53*	Exonic/ Missense	p.Arg273Pro/c.818G>C
5	chr17:7577120	C/A	rs28934576	COSM10779	*TP53*	Exonic/ Missense	p.Arg273Leu/c.818G>T

Research Output

Extramural projects

Completed projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Achievement
Development and elucidation of mechanism of action of herbs to treat Diabetic neuropathic pain	Funded by: DBT, Govt. of India, New Delhi. Total budget: 40 lakhs Duration: 2014-2018 PI/Coordinator: Dr Rajlakshmi Devi	Bioactive fraction of *Annonareticulata* bark (or) *Ziziphusjujuba* root bark along with insulin attenuates painful diabetic neuropathy through inhibiting NF-κB inflammatory cascade. The finding of this work was vital in development of a poly herbal formulation for treatment of painful diabetic neuropathy. Indian patent filled (201631008543). The research work was published in Frontiers in Cellular Neuroscience, 2017.

Ongoing projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
Chemical profiling of Joha and black rice of NER for Nutritional, Nutraceutical Parameters and Aromatic Compounds.	Funded by:DBT, Govt. of India, New Delhi. Total budget: Rs.1,02,14000.00 Duration: 2016-2019 PI: Dr Rajlakshmi Devi	Isolation, characterization and quantification of phytochemicals in different scented rice of Assam and development of value-added products for health benefit.
Characterization of high value phytochemicals of Anti-diabetic and immunomodulatory properties in North-Eastern banana varieties.	Funded by: DBT, Govt. of India, New Delhi. Total budget: 38 lakhs Duration: 2014-2018 PI: Dr Rajlakshmi Devi	The main goal of the project is to identify, characterize and isolation of bioactive compounds present *in Musa balbisianacolla*, a North Eastern banana variety and enumerate the effect of the compounds in *in-vivo* rat model.
Phytopharmaceutical Development of *Ficus semicordata* Buch.-Ham. ex Sm. as per regulatory guidelines of DCGI.	Funded by: DBT, Govt. of India, New Delhi. Total budget: Rs. 3279600.00 Duration: 2018-2021 PI: Dr. Jagat C. Bora.	To develop a Phytopharmaceutical Drug for the treatment of Diabetes type 2.
Setting up a Quality Control(QC) & Quality Assurance (QA) laboratory facility for the Phytopharmaceutical mission for North East India.	Funded by: DBT, Govt. of India, New Delhi. Total budget: Rs. 19058860.00 Duration: 2018-2021 Co-PI: Dr. Jagat C. Bora.	The goal and objective of the project is to create QA and QC facility for herbal as per guidelines of NABL, FSSAI and AYUSH.
DST-INSPIRE Faculty Award Cell -free nucleic acids as non -invasive for cancer detection.	DST, Govt. of India: ₹35 Lakhs; 2015-2020; PI- Dr. Rosy Mondal (DST-INSPIRE Faculty)	The research aims to detect the presence and fractions of circulating cell free DNA (cfDNA) in plasma of head and neck cancer patients and to determine the feasibility of deep sequencing approach in cancer detection. It also aims to determine if cfDNA copy number variation can be used to dynamically monitor response to therapy in cancer.

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
Early Detection and Comprehensive Monitoring of Head and Neck Cancer using Liquid Biopsy approach: A Study from Northeast India	DBT, Govt. of India: ₹58.4 Lakhs; 2019-2022; Coordinator & PI- Dr. Rosy Mondal (DST-INSPIRE Faculty)	The development of non-invasive liquid biopsy approach, utilizing cfDNA biomarkers, for efficient screening and comprehensive monitoring of HNSCC.

Publications

In cited journals

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month/ Year of publication
Sima Kumari, R. Elancheran, Rajlakshmi Devi	Phytochemical screening, antioxidant, antityrosinase, and antigenotoxic potential of Amaranthusviridis extract	Indian Journal of Pharmacology	Vol 50, issue - 3	July 27th 2018.
Himadri Kalita,Ankita Hazarika,Raghuram Kandimalla,Sanjeeb Kalita, Rajlakshmi Devi	Development of banana (*Musa balbisiana*) pseudo stem fiber as a surgical bio-tool to avert postoperative wound infections	RSC Advances	Vol 8 36791–36801	August 2018.
Kumar, M., Sarma, M.K., Choudhury, Y., Ghosh, S.K., Mondal, R*(*corresponding author)	Somatic Mutations in Circulating Cell-Free DLoop Region of Mitochondrial DNA: A Study from NorthEast India.	Journal of Biological Engineering Research and Review	6(1)/ 08-13	February/2019
Choudhury, J.H., Das, R., Laskar, S., Kundu, S., Kumar, M., Das, P.P., Choudhury, Y., Mondal, R., Ghosh, S.K	Detection of p16 promoter hypermethylation by methylation specific PCR	Methods in Molecular Biology	DOI: 10.1007/978-1-4939- 7565-5_11	2018
Samanta SK, Lee J, Hahm ER, Singh SV.	Peptidyl-prolyl cis/trans isomerase Pin1 regulates withaferin A-mediated cell cycle arrest in human breast cancer cells.	Mol Carcinog.	57(7):936-946	April/ 2018
Sehrawat A, Samanta SK, Hahm ER, St Croix C, Watkins S, Singh SV.	Withaferin A-mediated apoptosis in breast cancer cells is associated with alterations in mitochondrial dynamics.	Mitochondrion	47:282-293	January/2019
Sarkar Bhattacharya S, Mandal C, Albiez RS, Samanta SK, Mandal C.	Mahanine drives pancreatic adenocarcinoma cells into endoplasmic reticular stress-mediated apoptosis through modulating sialylation process and Ca2+-signaling.	Sci Rep.	8(1):3911	March/2018
Raghuram Kandimalla*, Momita Das*, Bhaskar J Gogoi, Krishna N Dutta, R Devi, P Choudhury, Partha P Dutta, N.C. Talukdar, Suman K Samanta. (* First Authors)	Mahanine, A dietary phytochemical, represses mammary tumor burden in rat and inhibits subtype regardless breast cancer progression through suppressing self-renewal of breast cancer stem cells.	*Pharmacological Research*	146, 104330	June/ 2019
Suparna Sen, Siddhartha Borah, Raghuram Kandimalla, Arijit Bora, Suresh Deka.	Efficacy of a rhamnolipid biosurfactant to inhibit *Trichophyton rubrum in vitro* and in a mice model of dermatophytosis.	*Experimental Dermatology*	28(5), 601-608	March/2019
Namita Ojha, Jyotishika Deka, Saurav Holoi, Raghuram Kandimalla, Dolly Gogoi, Tapas Medhi, Manabendra Mandal, Gazi Ameen Ahmed, Arup Jyoti Choudhury.	Chitosan coated silk fibroin surface modified by atmospheric dielectric-barrier discharge (DBD) plasma: a mechanically robust drug release system.	*Journal of biomaterials science polymer edition*	30(13):1142-1160	April/2019
Raghuram Kandimalla*, Himadri Kalita*, Ankita Hazarika*, Sanjeeb Kalita*, Rajlakshmi Devi. (* First Authors)	Development of banana (Musa balbisiana) pseudo stem fiber as a surgical bio-tool to avert post-operative wound infections.	*RSC Advances*	8, 36791-36801	October/2018
Upashi Goswami, Raghuram Kandimalla, Sanjeeb Kalita, Arun Chattopadhyay, Sidharth S Ghosh.	Polyethylene Glycol-Encapsulated Histone Deacetylase Inhibitor Drug-Composite Nanoparticles for Combination Therapy with Artesunate.	*ACS omega*	3(9), 11504−11516.	July/2018

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month/ Year of publication
Bhaswati Choudhury, Raghuram Kandimalla, R. Elancheran, Rupjyoti Bharali, Jibon Kotoky.	Garcinia morella fruit, a promising source of antioxidant and anti-inflammatory agents induces breast cancer cell death via triggering apoptotic pathway.	*Biomedicine & Pharmacotherapy*	103, 562-573	April/2018

Patents

Inventor(s)	Title	File no. for enrollment	Provisional/final patent grant no.	Issue no. of patent office
Devi. R, Dutta KN, Choudhuri P, Samanta SK, et al.,	Developed rice bran oil with higher content of omega3 and omega6 from indigenous rice of Northeast India.	201831035549	Patent filed	-
Samanta SK, Kandimalla R, Gogoi B, Das M, Talukdar NC, Devi R.	Disease subtype irrespective breast cancer regulation through dietary phytochemical mahanine.	2018310300919	Patent filed	-

Presentation in Conferences/seminars

Invited talks

Faculty	Title	Programme Name	Date & Venue
Dr. (Mrs.) Rajlakshmi Devi	Current Status and Requirements of Biomedical Devices	Mechanical Engineering Department, IIT Guwahati,	29 March 2019, IIT Guwahati, Guwahati.
Dr. Jagat C Borah (Keynote speaker)	Investigating Indian Systems Medicines with Modern Theories and Techniques: An Approach Towards Phytopharmaceuticals	Recent Trends in Diabetes Research: Emerging Drug Delivery Technologies and Novel Strategies on	6th and 7th March, 2019. Girijananda Chowdhury Institute of Pharmaceutical Science, Azara, Hatkhowapara, Guwahati,
Dr. Suman K Samanta	Natural Product Based Drug Discovery: A Bench to Bedside approach	"Workshop on Advanced Tools and Techniques on Natural Product Based Drug Discovery"	31st July, 2018; Gauhati University
Dr. Rosy Mondal (Invited Speaker)	CELL-FREE NUCLEIC ACID: AN OLD DISCOVERY, A LATE DEVELOPMENT	National Conference on Green, Sustainable and Evolving Sciences (Gses-2019) & 64th Annual Technical Session of Assam Science Society	JUNE 28–29, 2019 Cotton University, Guwahati, Assam
Dr. Rosy Mondal (Valedictory popular talk)	CELL-FREE NUCLEIC ACID: AN OLD DISCOVERY, A LATE DEVELOPMENT	Basics of DNA Sequencing and its Applications	10-04-2019 to 14-04-2019 University of Kalyani, West Bengal

Contributory

Author(s)	Title	Conference name	Oral/ poster	Date & Venue
Paramita Choudhury, Krishna Nayani Dutta, Suman Kumar Samanta, Rajlakshmi Devi*	An insight into chemical profiling and nutraceutical potential of Aromatic rice (Joha) against metabolic disorder	National conference on "Ethno-medicine and Traditional Health Practices in Northeast region of India"	Poster	25th August 2018 National Institute of Pharmaceutical Education and Research (NIPER)-Guwahati in collaboration with Society for Ethnopharmacology (SFE), India
Paramita Choudhury*, Krishna NayaniDutta, Suman K Samanta, Rajlakshmi Devi	Chemical profiling and nutraceutical potential of aromatic rice (joha) effective against metabolic disorder	6th International Congress of Society for Ethnopharmacology, (SFEC 2019)	Poster	8th- 10th February 2019. Organised by Manipal Academy of Higher Education (MAHE), Manipal in association with Society for Ethnopharmacology
Swarnali Bhattacharjee *, R. Elancharan, R. Devi.	Phytochemical screening, antioxidant, enzyme inhibitory potential of *Garciniapedunculata*Roxb. extract	1st Assam Botany Congress and International Conference on Plant Science	Oral	4th to 6th February, 2019. Organised by Department of Botany, Gauhati University, in collaboration with Botanical Society of Assam and Cotton University, Assam.

Author(s)	Title	Conference name	Oral/ poster	Date & Venue
Manish Kumar, Yashmin Choudhury, Sankar Kumar Ghosh, Rosy Mondal	Clinical utilization of circulating cell-free DNA in identification of early somatic mutations in head and neck squamous cell carcinoma: A pilot study from Northeast India. (Best Poster Presentation Award).	44th Annual Conference ISHG-2019: Genomics for Health and Precision Medicine,	poster	30th January to 1st February 2019 Organized by National Institute of Biomedical Genomics and University of Kalyani, Kalyani, West Bengal
Manish Kumar, Yashmin Choudhury, Sankar Kumar Ghosh, Rosy Mondal	Identification of circulating cell-free mitochondrial DNA D-loop mutation in head and neck squamous cell carcinoma: A study from Northeast India.	Bio-Innovation for Environmental and Health Sustainable Developments (BEHSD-2018), CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, India in association with the Biotech Research Society (BRSI), India.	poster	27-28th Nov 2018 CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow, Lucknow

Conferences/Workshops/Meetings attended

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Dr. (Mrs.) Rajlakshmi Devi	North East symposium on pharmacogenomics & personalized medicine.	16th June, 2018 at Dept. of Pharmacology, Gauhati Medical College.
Dr. (Mrs.) Rajlakshmi Devi, SwarnaliBhattacharjee, Partha Pratim Sarma, Krishna NayaniDutta.	Science Teachers training program.	16th November, 2018 at Regional Science Centre, Guwahati.
PuspanjaliKhound	Advanced Molecular Biotechnology	19th -25th November, 2018 at Advanced level institutional Biotech Hub, Department of Biotechnology, Gauhati University.
NonibalaGurumayum	Advanced Molecular Biotechnology	19th -25th November, 2018 at Advanced level institutional Biotech Hub, Department of Biotechnology, Gauhati University.
Dr. (Mrs.) Rajlakshmi Devi	National Conference on New trends in Multi modal molecular imaging applications for animal studies in drug discovery.	20th-21st November, 2018 at NIPER, Guwahati.
ParthaPratimSarma	National Conference on New trends in Multi modal molecular imaging applications for animal studies in drug discovery.	20th-21st November, 2018 at NIPER, Guwahati.
PuspanjaliKhound	Workshop on Molecular Biology/ Molecular Diagnostics	17th – 24th December, 2018 at Dept. of Bioengineering and Technology, GUIST.
SwarnaliBhattacharjee	Workshop on Molecular Biology/ Molecular Diagnostics	17th – 24th December, 2018 at Dept. of Bioengineering and Technology, GUIST.
NonibalaGurumayum	Workshop on Molecular Biology/ Molecular Diagnostics	17th – 24th December, 2018 at Dept. of Bioengineering and Technology, GUIST.
ParamitaChoudhury	Medical imaging: - preclinical imaging in drug discovery (DBT- NER training program)	7th -11th January, 2019 at Tata Memorial Centre, ACTREC, Kharghar, Navi Mumbai.
NonibalaGurumayum	Medical imaging: - preclinical imaging in drug discovery (DBT- NER training program)	7th -11th January, 2019 at Tata Memorial Centre, ACTREC, Kharghar, Navi Mumbai.
ParthaPratimSarma	Workshop on Gene Cloning, Protein Biochemistry, Structure Biology & Bioinformatics	4th -15th February, 2019 at Tata Memorial Centre, ACTREC, Kharghar, Navi Mumbai.
PuspanjaliKhound	Workshop on Gene Cloning, Protein Biochemistry, Structure Biology & Bioinformatics	4th -15th February, 2019 at Tata Memorial Centre, ACTREC, Kharghar, Navi Mumbai.
Dr. (Mrs.) Rajlakshmi Devi	National Seminar Advancement in the healthcare management	29th – 30th March, 2019, ADTU Pharmacon 2019, Guwahati

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Dr. Rosy Mondal/ Manish Kumar (CSIR-SRF)	44th Annual Conference ISHG-2019: Genomics for Health and Precision Medicine	30th January to 1st February 2019 Organized by National Institute of Biomedical Genomics and University of Kalyani, Kalyani, West Bengal
Dr. Rosy Mondal (Invited Speaker)	Basics of DNA Sequencing and its Applications	10-04-2019 to 14-04-2019 University of Kalyani, West Bengal

Lectures delivered at other institutes

Faculty	Topic	Date & Venue
Dr. (Mrs.) Rajlakshmi Devi	Development of multi targeted therapy from the North Eastern medicinal plants to treat metabolic syndrome.	Department of Biochemistry, Gauhati Medical College. 27th July, 2018.

Other activities

Visits to national/international institutes/laboratories

Faculty/Research scholar	National/international institutes/laboratories	Date
Partha Pratim Sarma	DDRC, THSTI, Faridabad, Haryana	6th-22nd September, 2018.
Dr. (Mrs.) Rajlakshmi Devi	Laboratory of Biological Chemistry, Gifu University, Japan	22nd October to 6th November.
Partha Pratim Sarma	106th INDIAN SCIENCE CONGRESS	3rd -7th January, 2019 at Lovely Professional University, Phagwara, Punjab
Dr. (Mrs.) Rajlakshmi Devi	ADTU Pharmacon 2019 (Poster Evaluator)	29th-30th March, 2019 at ADTU, Guwahati
Dr. Jagat C Borah	Served as selection committee for the selection of JRF at Rajiv Gandhi University, Arunachal Pradesh.	26th October, 2018.
Dr. Jagat C Borah	Served as external expert for practical exam, Biochemistry-I, Deptt. Of Biotechnology, Gauhati University, Assam.	5th February 2019.

Awards/Recognitions/Achievements

Name	Particulars
Dr. (Mrs.) Rajlakshmi Devi	ICMR International Fellowship for Senior Bio-medical Scientists 2018-19
Dr. (Mrs.) Rajlakshmi Devi	Invited as external expert in the "Project work presentation", of B. Tech 4th year students 18th Semester) of Dept. of Biotechnology, NIT, Ap. 29th May 2018.
Paramita Choudhury	Lady Tata Fellowship awarded by Lady Tata Memorial Trust (LTMT).
Paramita Choudhury and Krishna Nayani Dutta.	Second best prize in poster presentation at National conference on "Ethno-medicine and Traditional Health Practices in Northeast region of India" at National Institute of Pharmaceutical Education and Research (NIPER)-Guwahati on 25th August, 2018
Paramita Choudhury	Best poster presentation at the 6th International Congress of Society for Ethnopharmacology, (sfec 2019) organised by Manipal Academy of Higher Education (MAHE), Manipal in association with Society for Ethnopharmacology from 8th- 10th February 2019
Rosy Mandal	Best Poster Presentation Award at 44th Annual Conference ISHG-2019: Genomics for Health and Precision Medicine, Organized by National Institute of Biomedical Genomics and University of Kalyani, Kalyani, West Bengal

A. In the capacity of the Director, participations and presentations of N. C. Talukdar in different meetings/functions in the following meetings.

1. A Guest of Honour lecture in the state level camp of Vidyarthi Vigyan Manthan at 4:30 pm on Valedictory function for the states camp held at Spring Dale International School (SDIS), Bye Lane-3, Sonkuchi Path, Beharbari Chariali, Guwahati-29 on 8th April, 2018.

2. A Guest of Honour lecture on IPR on the occasion of "World Intellectual Prosperity Day" at 2:30 pm in the Conference Hall of New Academic Building, Gauhati University on 26th April, 2018.

3. Participated in the Consultation meeting with all stakeholders of the Phytopharmaceutical Mission in North East Region under the Chairpersonship of Dr. Renu Swarup, Secretary, DBT at Regional centre of IBSD, Sikkim, Gangtok on 1st June, 2018.

4. Chief Guest of the inaugural function and also delivered Keynote lecture at the of the National Seminar"REDIMAP-2018" on the topic " Recent trend in Drug discovery from Herbal Medicine" at ADP (Anandaram Dhekial Phookan) College, Nagaon, Assam on 17th August, 2018.

5. Delivered a lecture as the Chief Guest of the "Orientation Programme 2018", Royal Global University, Guwahati at on 8th August, 2018.

6. Delivered a lecture Chief Guest of the inaugural function of the daylong event of the Vijnana Bharati NE grant at Regional Science Centre/Museum, Khanapara, Guwahati, Assam on 19th Sept, 2018.

7. Was the expert member of the panel for evaluation of Children science projects in the India International Science festival sponsored by Ministry of Science & Technology and Ministry of Earth Science in association with Vijnana Bharati at Indira Gandhi Prathisthan, Lucknow on 8th Oct, 2018.

8. A Chief Guest lecture at Vivekananda Vighyan Niketan, Tihu on the occasion of celebration of completion of 25 years of the school on 12th Oct, 2018.

9. Participated in the discussion program on "Bilateral Collaboration opportunities in the field of Higher Education between Bangladesh and North East India" organized by the Assistant High Commission of Bangladesh and USTM on the occasion of ceremony in the honour of Prof. Abdul Mannan, Chairman of Bangladesh University Grants Commission who delivered speech as a keynote speaker at the 3rd APJ Abdul Kalam Memorial Lecture on 24th Oct, 2018.

10. A Guest of Honour lecture in "National Meet on –North East agriculture-Farmers perspective" (NEAFP-2010) in Valedictory function at Prof. M.S.Swaminathan Conference Hall, ICAR-RC NEH Region, Umiam. 3:20-3:30 PM on 8th Dec, 2018.

11. Participated as one of the Panellists for session "Farmers Projection by 2030" under Technical Session- Day 2 of "National Meet on –North East agriculture-Farmers perspective" (NEAFP-2010) held at ICAR-RC NEH Region, Umiam on 8th Dec, 2018.

B. Director, Dr. N. C. Talukdar participated as expert member in different task force and academics-

1. Meeting of the Board of studies in Biotechnology at Office chamber of the Head of Department of Biotechnology & Bioinformatics, NEHU Shillong at 11:00 am on 6th April, 2018.

2. Meeting of the "Judgement Committee for award of 'best teacher', 'best researcher' and 'best extension specialist' of AAU for the year 2018 in the conference Hall of the Administrative Building, Assam Agricultural University, Khanapara campus, Guwahati on 10th April, 2018.

3. 3rd Scientific Advisory Committee (SAC) & project steering committee (PSC) meeting of DBT funded Chemical Ecology program between NCBS-Bangalore group and North East group at Institute of Bioresources and Sustainable Development, Imphal on 19-20 April, 2018.

4. 5th Research Review Committee meeting of Assam Down Town University on 25th April, 2018 held at Board Room of the University.

5. First CCS meeting for modification of the existing B.Tech and M.Tech syllabus at Department of Bioengineering & Technology, GUIST, Gauhati University on 28th June, 2018.

6. 2nd meeting of the Board of Governors of the Institute of Science and Technology (GUIST) held on 12th July, 2018 at Conference room of GUIST building.

7. Fourth IQAC (Internal Quality Assurance Cell) meeting of Tezpur University held in Board Room, office of the Vice Chancellor, Tezpur University on 8th August, 2018.

8. Chaired the Institutional Ethics Committee at Conference room, Dr. B. Borooah Cancer Institute, Guwahati on 8th Sept, 2018.

9. Participated in the 3rd BoS meeting at NEHU for finalising Synopses and other academic matters conducted by Dept. of Biotechnology and Bioinformatics, NEHU, Shillong on 25th Sept, 2018.

10. 3nd meeting of Board of Governors of the Institute of Science and Technology (GUIST) held at GUIST, Gauhati University, Assam on 30th Oct, 2018.

11. Research Council meeting of the Gauhati University held at Vice Chancellor's Conference Room, Gauhati University on 5th Nov, 2018.

12. Mid-term PSC meeting of the Chemical Ecology Program held at the National Centre for Biological Science, Bangalore on 23rd Nov, 2018.

13. Review of Progress and Onsite inspection of activities of Council for Science and Technology for Rural India (CSTRI) and Indo UK bridging the Rural Urban Divide (INDO-UK BURD) Centre at IIT Mandi, Himachal Pradesh on 5-6th Dec, 2018.

14. 2nd Meeting of the Institutional Ethics Committee (Reconstituted) of Dr. B. Borooah Cancer Institute held at Conference hall on 5th Jan, 2019.

15. Women entrepreneurial network in North Eastern Region of India held in Conference Hall, IBSD, Upper Shillong, Meghalaya on 21st Jan, 2019.

16. Town Hall meeting of CEOs and Managers, BioNEST incubators convened by Dr. Renu Swarup, Secretary, DBT and Dr. Aslam, MD, BIRAC at India Habitat Centre, New Delhi on 1st March, 2019.

17. 7th Foundation Day of BIRAC to be celebrated with the theme of "Nurturing Innovation: Empowering India" at Pullman Hotel, Aerocity, New Delhi on 19th March, 2019.

18. Seventh Research Council Review Meeting on 4th May, 2019 at 2:00 p.m. at Board Room of Assam Down Town University.

C. Evaluation and examination of Thesis by Dr. N.C.Talukdar-

1. As expert/external member for Viva-Voice evaluation of Ph.D. candidate "Ms. Christy Berylnight" for thesis entitled "Development of Native Rhizobium compatible enriched compost for use in Lentil (*Lens culinarus* Medik.) grown in acid soil" at College of Post graduate studies, Umiam, Meghalaya on 25th Sept, 2018.

D. Honour/Recognition –

(i) Special lectures and interactions

1. **Delivered the Annual Day Lecture** "A plant is not a pure eukaryotic system rather a system of diverse collection of micro-organism and eukaryotic cell" of the Botanical society of Assam in the Annual General Meeting held at Seminar Hall, Rangia College, Rangia on 28th Oct, 2018.

2. **Delivered the Foundation Day Lecture** "Plant microbe association/interaction and plant/ecosystem health" of Biswanath Charali College of Agriculture in the Auditorium of BCCA, Biswanath Charali.

3. **Delivered the Foundation Day Lecture** "A holistic view of world population, science, technology, environment, agriculture & future" of the Regional Agricultural Research Station, Shillongoni at its station in Shillongopni on April 1, 2018.

4. **Presented IASST to the gatherings** of PDF from abroad in the 11th Young Investigators' Meeting along side Post-doctoral Satellite Meeting at Redisson Blu Hotel on March 10, 2019 organized by BSI.

5. Interacted as a Resource person for "Meet the Scientist" program in connection with 52nd conference of Assam Science society at Digboi College, Digboi, Assam on 30th Jan, 2019.

(ii) Expert members/Chairman of different National/State Commmittee

Member -DST Secretary's nominee for the Governing Council, Institute of Bioresources and Sustainable Development (IBSD);

1. Member, DBT-NER TEC (Technical Expert Committee), NER-BPMC, New Delhi.
2. Member, DBT-NER STAG (Scientific and Technical Appraisal and Advisory Group), NER-BPMC, New Delhi.
3. Member, Governing Council, *Assam* Science Technology & Environment Council (ASTEC).
4. Member, Scientific Advisory Council (SAC) of Toklai Tea Research Association, Jorhat, Assam; Guwahati.
5. Chairman; Expert committee meeting of Twinning R&D program for NE-Region on Medicinal and Aromatic Plants Biotechnology and Drug Development (MAP).
6. Chairman, Institutional Ethics Committee, BBCRI, Guwahati.
7. Chairman, Institutional Ethics Committee, NIPER, Guwahati.
8. Expert member, DST SEED Review of Progress and On-site inspection of activities of Council for Science and Technology for Rural India (CSTRI) and Indo UK bridging the Rural Urban Divide (INDO-UK BURD) Centre at IIT, Mandi, Himachal Pradesh.

D. Administrative meeting of IASST

1. Meeting with the Chairman, Governing Council and the Heads/Directors of Autonomous Bodies at 11:00 am in Indian National Science Academy (INSA) office, New Delhi on 11th August, 2018.
2. Presented a new proposal submitted to DST under State S&T Programme (SSTP) organised by Karnataka State Council for Science and Technology (KSCST), IISc Campus, Bengaluru at Hotel Paraag, Near Vidhana Soudha, Rajbhavan Road on 16th Nov, 2018.

ACADEMIC ACTIVITIES

POSTDOCTORAL FELLOWS UNDER VARIOUS NATIONAL PROGRAMS

Robinson Jose

DBT RA

Dr. Robinson Jose did his research as a DST INSPIRE Fellow in IBSD, DBT Imphal and received Ph.D. from Gauhati University in 2017. He carried out his Post-Doctoral research (2017-2019) in IASST as a DBT RA. His research interest includes Molecular Plant Pathology and Plant-Fungal Developmental Biology.

Abdul Barik

NPDF

Dr. (Md) Abdul Barik completed his M.Tech and Ph.D. from the Department of Electronics, Tezpur University and currently working in Advanced Materials Science Laboratory, IASST as a National Postdoctorate Fellow (NPDF). His research topic is "Fabrication of Flexible Organic Field-Effect Transistor for the Detection of Bio-Agents and Bio-Molecules in Clinical Laboratory".

Sailendra Goyari

NPDF

Dr. Sailendra Goyari carried out research in IBSD and received Ph.D. Gauhati University in the year 2016. He joined IASST as a Research Associate in 2015 then worked as National Post-Doctoral Fellow (NPDF), SERB during 2016-2018. He worked as Assistant Professor at the University of Science and Technology, Meghalaya (USTM) during 2018 and currently a faculty at Bhattadev University, Bajali.

Seydur Rahman

NPDF

Dr. Seydur Rahman received PhD from North-Eastern Hill University in 2017, Shillong and joined IASST as a National Post-Doctoral Fellow (NPDF). in the same year. His research interests are chemical ecology and cancer biology.

Asim Kr. Dutta

NPDF

Dr. Asim Kr. Dutta completed Ph.D from North Eastern Hill University. He was a SERB NPDF in IASST during 201718 and recently joined as a Research Scientist in a DBT funded project on "Setting up QC/QA Laboratory facility for the Phytopharmaceutical Mission for North East India" in IASST. His field of specialisation is molecular biology, biochemistry and computational biology.

Rinku Moni Kalita

NPDF

Dr. Rinku Moni Kalita completed his PhD from Assam University, Silchar in the field of Forest and agricultural Ecology. He joined IASST as a SERB-NPDF. The focus of his postdoctoral research is on *Assessment of climate change mitigation potential and livelihood sustainability of traditional agroforestry systems in North East India.*

Parijat Saikia

NPDF

Dr. Parijat Saikia completed her Ph.D. from Tezpur University in 2016. She has been working as SERB NPDF in IASST since 2017. Her research addresses soil carbon storage and sequestration in agro-ecosystem and management options for enhanced C storage. Her research also includes management of waste water resources in urban areas of India.

Bhaskar Das

NPDF

Dr. Bhaskar Das received PhD from Indian Institute of Technology (IIT) Guwahati. He is currently working as National Post Doctoral Fellow (DST-SERB) in IASST. His research specialization is algal remediation of petroleum hydrocarbons (PD), biochemical pathway in PD algae and characterization of enzymes and biofuels inside their cells.

Archana Nath

NPDF

Dr Archana Nath received PhD from North Eastern Hill University, Shillong. Presently, she is a SERB-NPDF in IASST. She is working on Carbapenem resistant microbes and their inhibition. She also worked as a Research Scientist-I (Medical) in NEIGRIHMS, Shillong

Kaushik Bhattacharjee

NPDF

Dr. Kaushik Bhattacharjee received Ph.D. from the North-Eastern Hill University. His research interest is in Pharmaceutical microbiology, Medicinal chemistry and Metatranscriptomics. Currently, he is working on characterisation of microbial communities of aroma-oil producing *Aquilaria* sp plants and development of novel bio-induction method of Agarwood formation. He is also reviewer and in editorial board member of few reputed journals.

Anowar Hussain

RA

Dr. Anowar Hussain completed his PhD from Tezpur University on Cancer Biology. He joined IASST as a Research Associate and his research focus is on understanding the role of endophytic bacteria in growth, development and yield of scented rice. He was a recipient of *INSPIRE Fellowship* (DST, GoI) and Visiting Research Associateship (University of Colorado, USA) and a *HOPE Fellow* (JSPS, Japan).

Partha P. Dutta

RA

Dr. Partha Pratim Dutta completed his Ph.D. from Dibrugarh University in Pharmacology in 2018. He joined IASST in July 2017 and presently working as Research Scientist in a DBT funded project on "Setting up QC/QA Laboratory facility for the Phytopharmaceutical Mission for North East India" in IASST. His broad area of interest is bioactive natural products.

Kamal Das

RA

Dr. Das received Ph.D. from Delhi University in 2017 in plant molecular biology and his current research under DBT-RA program is mainly on developing a climate-resilient variety of Som plant through various molecular DNA fingerprinting techniques. He also worked on Sex-DNA linked markers of *Hippopha rhamnoides* of Ladakh and *Jhum* agroecosystems of NE India.

Atanu Adak

RA

Dr. Atanu Adak received PhD from Vidyasagar University, Midnapur by as a DST-INSPIRE fellow. Presently, he is doing his research work as Research Associate at IASST under the DBT's Unit of Excellence Project with Dr. Mojibur R. Khan. His research is on gut microbial diversity of different ethnic community of Assam in relation to their diet. His research also address effect of gut microbiota on blood and stool metabolites by spectroscopic methods.

Ananya Barman

DBT-RA

Dr. Ananya Barman completed PhD in 2017 from IIT, Guwahati. She is now working as a Research Associate II in IASST and her research focus is functional and genetic diversity in different pathogens associated with blister blight and dieback diseases of Tea and application of actinomycetes strains to control these diseases of tea.

Kaustavmani Patowary

DBT-RA

Dr. Kaustuvmani Patowary carried out his research in IASST and received Ph.D. from Gauhati University. His research interest is on bioremediation of hydrocarbon polluted soil and development of efficient bacterial consortia. He has been carrying out his postdoctoral reseach as DBT-RA in IASST on Biosurfactant Mediated Green Synthesis of Eco-Friendly Metal Nanoparticles and their Application in Bioremediation of Petroleum Hydrocarbon Pollutants.

Madhusmita Dehingia

RA

Dr. Madhusmita Dehingia received PhD from Gauhati University for her research carried out in IASST. She worked as a Research Associate in DBT funded Advanced level Institutional Biotech-hub project. Recently she has received DBT Research Associate (DBT-RA) fellowship to conduct her postdoctoral research in College of Veterinary Science, Assam Agricultural University, Khanapara.

MANPOWER GENERATION

List of PhD Awardees

Name of student	Name of supervisor	Title of the thesis	Award giving university
Dr. Achyut Konwar	Dr. Devasish Chowdhury	Fabricating Polymer Nanocomposite Hybrid Biomaterials with Improved Mechanico-Chemical Properties	Gauhati University
Dr. Manash Jyoti Deka	Dr. Devasish Chowdhury	Insight into electrical/optical properties of hybrid carbon nanomaterials	Gauhati University
Dr. Mahananda Baro	Dr. Arup R. Pal	Study on the synthesis of aligned carbon nanotubes at low temperature by plasma enhanced chemical vapour deposition	Gauhati University
Dr. Kaushik Das	Dr. Sarathi Kundu	Structure and organization of organic molecules and nanoparticles at interfaces and in bulk	Gauhati University
Dr. Griha Lakshmi	Prof. N.C.Talukdar	Diversity of cellulolytic microorganisms and cellulose enzymes from earthworms of Imphal, Manipur.	Gauhati University
Dr. Jiumoni Lahkar	Dr. Suresh Deka	Studies on antifungal activity of biosurfactant produced by soil bacteria against phytopathogens *Alternaria solani* and *Colletotrichum capsici*	Gauhati University
Dr. Pranjal Tamuly	Dr.Arundhuti Devi	Physico-Chemical Characterization of the Roadside and Tea Garden soil from Bokakhat to Jorhat, Assam along the National Highway-37	Gauhati University
Dr. Y. B. Chaudhari	Dr. M. R. Khan	Isolation and characterization of cellulolytic microbes and their genes from soils of north-east India.	Gauhati University
Dr. Madhusmita Dehingia	Dr. M. R. Khan	Effect of ethnicity, diet and geography on the gut bacterial composition of few tribes from Assam, Sikkim, Manipur & Telangana and their comparison with the worldwide data.	Gauhati University
Dr. Ankita Hazarika	Dr. (Mrs.) Rajlakshmi Devi	Protective effects of a herbal formulation from Northeast India on metabolic syndrome induced in animal model.	Gauhati University

Competitive Summer Students Program

The Competitive Summer Students Programme (SSP) introduced during the year 2017-18 with provision of Rs. 3000/- PM stipend and saw huge response during the year. Although 350 candidates applied from different institutions across the country, there were 40% seats allocated to candidates from NE region and 60% from outside NE India. The following is the complete list:

Name and affiliation	Supervisor	Topic	Duration
Vaibhav Panjabrao Mane, Dr. Babasaheb Ambedkar Marathwada University, Government Institute of Science, Aurangabad	Dr. Debajit Thakur	Isolation of bacteria from tea rhizosphere soil and in-vitro antimicrobial metabolite/s production by actinobacteria	4th May to 9th June, 2018
Suganya Murugesan, Avinashilingam University, Tamil Nadu	Dr. Soumyadeep Nandi	Comparative study of differentially DNA methylated genes in cancer and normal cell line	17th May to 17th July, 2018
Sejal Kumar, Amity Institute of Marine Science and Technology, Amity University, Noida	Dr. Arundhuti Devi	Study on water quality and estimation of heavy metals in native fish species of Brahmaputra river and Deepor beel, Guwahati	16th May to 17th July, 2018
Narisetty Vijaya Durga, Central University of Punjab	Dr. Mrs. Rajlakshmi Devi	Evaluation of nutritional properties of Garcinia morella and Garcinia pendunculata of N.E. region of India	19th June to 20th July, 2018
Hiya Saharia, University of Delhi	Dr. Gautam Choudhury	Cantor sets and its topological properties: Fractals and Chaos Theory	23rd May to 6th July, 2018
Ravindra Chandra, Guru Ghasidas University, Bilaspur	Dr. Arup Ratan Pal	Synthesis of gold nanoparticles by magnetron sputtering	21st May to 20th July, 2018
Pooja Yadav, Banaras Hindu University	Dr. W. Romi	Culturable microbial community of a fermented fish product - Shidal	27th May to 26th July, 2018
Akanksha Garg, Banaras Hindu University	Dr. M. R. Khan	Characterization of microbes isolated from rice beer for their potential probitic properties	28th May to 26th July, 2018
Mehak Bhalla , University of Delhi	Dr. N. C. Talukdar	Diversity of gut bacteria in rats fed with herbal extract and study of rice innoculated with human gut bacteria	4th June to 3rd August, 2018
Neha Sinha, Dr. D Y Patil Biotechnology and Bioinformatics Institute, Pune	Dr. Debajit Thakur	Exploration of tea (Camellia sinensis) rhizobacteria for the production of PGP substances and antifungal metabolites	7th June to 7th August, 2018
Rohit Ranjan, Banaras Hindu University	Dr. Arundhuti Devi	Biosorption of petroleum hydrocarbons by using water hyacinth (Eichhornia crassipes)	28th May to 10th August, 2018
Sushmita Mena, Assam Down Town University	Dr. Suresh Deka	Antifungal activity of biosurfactant producing bacterial strains	21st June to 20th July, 2018
Santanu Goswami, Tezpur University	Dr. Debajit Thakur & Anupam Bhattacharyya	Identification of differentially expressed genes in myoblast and myotube using NGS data analysis approach	5th June to 25th July, 2018
Sajjadul Kadir Akand, Tezpur University	Dr. Debajit Thakur & Anupam Bhattacharyya	Sequence, phylogenetic, structural study of muga silkworm and effect of pesticides on acetylcholinesterase of muga silkworm by molecular docking approach	5th June to 25th July, 2018
Bipasha Choudhury, Tezpur University	Dr. Debajit Thakur & Anupam Bhattacharyya	Study on functional analysis of BRCAI gene and TPS3 gene and idenfication of potent inhibitor by molecular docking approach	1st June to 25th July, 2018
Chehnaz Sultana, Assam Down Town University	Dr. W. Romi	Isolation and genomic DNA extraction from cultivable microbes of a fermented bamboo shoot of Nagaland	22nd June to 25th July, 2018
Kavyamee Talukdar, Assam Engineering College, Jalukbari, Guwahati	Dr. H. Bailung	Gas discharge characteristics in a planeterrella device	15th June to 25th July, 2018
Mrinal Das, Pub Kamrup College	Dr. Rosy Mondal	DNA: The thread of life	13th June to 27th July, 2018
Madhusmita Kalita, University of Science and Technology, Meghalaya	Dr. Suman Kumar Samanta	Evaluation of nutraceutical parameters of scented rice and other medicinal plant from NER India	20th June to 20th August, 2018
Devabrat Sharma, Gauhati University	Dr. H. Bailung	Understanding the Sun-Earth interaction in a laboratory device	26th June to 1st August, 2018

Name and affiliation	Supervisor	Topic	Duration
Kanmani Roy, B Boruah College, Guwahati	Dr. Sagar Sharma & Dr. N. Sen Sharma	Studies on new types of organic semiconductors for their applications in optoelectrics & Quantitative analysis of the flourescence properties of P(4VP-CO-AN-CO-S): The effect of doping with amino acids	4th June to 3rd August, 2018
Yuva Jyoti Sarma, Gauhati University	Dr. Sumita Kumari Sharma	Study of discharge characteristics of a rf discharge plasma	25th June to 31st July, 2018
Rehana Khatoon, Gauhati University	Dr. Sumita Kumari Sharma	Study of plasma characteristics using a Langmuir probe in a rf discharge plasma	25th June to 31st July, 2018
Antarleena Das, Pandu College	Dr. Biswajit Choudhury	Hydrothermal synthesis of Cu and Cu2O microparticles	2nd July to 31st July, 2018
Archita Kar, Gauhati University	Dr. Devashish Chowdhury	Synthesizing dual emissive carbon dots	25th June to 31st July, 2018
Tadar Yadar, National Institute of Technology, Arunachal Pradesh	Dr. M. R. Khan	Isolation and characterization of microbes from rice beer for probiotic properties	22nd May to 15th July, 2018
Akanksha Mudgal, National Institute of Technology, Arunachal Pradesh	Dr. Joshodeep Boruah	Antibacterial and antioxidant property of Kaempferia galanga	22nd May to 15th July, 2018

Summer Internship/Dissertation Program

Name and affiliation	Supervisor	Topic	Duration
Mrinmoy Patra, BHU	Dr. W. Romi	Molecular identification of culturable vaginal bacterial species of healthy reproductive age women in North East India	8 Jan to 29 Jun, 2019
Nayana Kamsena, BCA, Handique Girls College	Dr. L. B. Mahanta	An automated ER/PR scoring of breast cancer immunohistochemistry images using image processing technique	1 March to 30 May, 2019
Reeta Dey, BCA, Handique Girls College	Dr. L. B. Mahanta	An automated ER/PR scoring of breast cancer immunohistochemistry images using image processing technique	1 March to 30 May, 2019
Pratyashree Changmai, Deptt. IT, GU	Dr. L. B. Mahanta	Automated identification of firearms through associated striations using machine learning	July 2018 – June 2019
F A Ahmed, Pandu College	Dr. Rosy Mandal	Concept and basic techniques in genomics	3 July to 2 August, 2018
Sanjiban K Sinha, IST, GU	Dr. Sarathi Kundu	Preparation and characterization of metallic nanoparticles	5 July – 9 August, 2018
Maitri Khemka, St. Xavier's College, Mumbai	Dr. N. C. Talukdar	Basics Techniques and concepts in Microbiology: Isolation of Bacterial Endophytes from Rice	23 April to 25 May, 2018
Kidar Ete, National Institute of Technology, Arunachal Pradesh	Dr. M. R. Khan	Study of microbes from rice beer of Northeast India for probiotic properties	1 June to 16 July, 2018
Kunaldeep Kalita, Delhi Technological University	Dr. L. B. Mahanta	Computer aided detection of platelets from blood smear images	1 June to 13 July, 2018
Deep Jyoti Saikia, Assam Engineering College, Jalukbari, Guwahati	Dr. L. B. Mahanta	Study of texture and colour feature to detect cervical dysplasia using NSCT	1 January to 30 June, 2018
Gautam Doley, Assam Engineering College, Jalukbari, Guwahati	Dr. L. B. Mahanta	Study of texture and colour feature to detect cervical dysplasia using shearlet transformation	1 January to 30 June, 2018
Lige Nyodu, National Institute of Technology, Arunachal Pradesh	Dr. (Mrs.) Rajlakshmi Devi	Antioxidant activities of scented rice husk of North-Eastern region of India	4 June to 11 July, 2018
Munmun Debnath, National Institute of Technology, Arunachal Pradesh	Dr. (Mrs.) Rajlakshmi Devi	Antioxidant activity of pigmented rice husk of North-East India	11 June to 11 July, 2018
Dristi Choudhury, North Eastern Hill University	Dr. N. C. Talukdar	Animal cell culture	12 July to 25 July, 2018
Parlie Dutta, Gauhati University	Dr. Devashish Chowdhury	Synthesis of carbon nanodot from water hyacinth and its application as a flourescent sensor for herbicide	21 June to 31 July, 2018

Name and affiliation	Supervisor	Topic	Duration
Subhajit Saha, Assam Engineering College, Jalukbari, Guwahati	Dr. L. B. Mahanta	Calculating choroid thickness using computer vision techniques	15 June to 31 July, 2018
Rojsmita Thakuria, Gauhati University	Dr. N. Sen Sharma	Tuning of flourescence property of P(4VP-CO-AN) electrolyte: The effect of doping acidic, basic and neutral amino acids	2 July to 3 August, 2018
Sanjivan Kishore Sinha, Gauhati University	Dr. Sarathi Kundu	Preparation and characterization of metallic nanoparticle	5 July to 9 August, 2018
Fazlil Alam Ahmed, Pandu College, Guwahati	Dr. Rosy Mondal	Concepts and basic techniques in genomics	3 July to 2 August, 2018
Anupam Mahanta, Pandu College, Guwahati	Dr. Arundhuti Devi	Ground water quality assessment of Boragaon area (area near GMC garbage dumping site) along with fractionation study of lead, chromium and arsenic in GMC solid wastes	11 June to 10 August, 2018
Barnali Medhi, Gauhati University	Dr. Arup Ratan Pal	Synthesis of Copper nanoparticles by magnetron sputtering	2 July to 1 August, 2018
Sourav Jyoti Kalita, Assam Engineering College, Jalukbari, Guwahati	Dr. L. B. Mahanta	Computer aided detection of platelets and WBC from blood smear images	17 December, 2018 to 16 March, 2019
Priyangshu Yogi, Assam Engineering College, Jalukbari, Guwahati	Dr. L. B. Mahanta	Computer aided detection of platelets and WBC from blood smear images	17 December, 2018 to 16 March, 2019
Rasna Saikia, CIT Tamilnadu	Dr. Devashish Chowdhury	Fabrication of antimicrobial nano bio-composite film	17 January to 24 April, 2019
Jupitara Borkakoti	Dr. (Mrs.) Rajlakshmi Devi	Nutritional profiling of scented rice variety (Joha) Kola and Kon from NE India.	10 July to 10 August 2018
Farida Akhter	Dr. (Mrs.) Rajlakshmi Devi	Nutritional profiling of scented rice variety (Joha) Maniki Madhuri and one non- scented variety Ranjit from NE India.	10 July to 10 August 2018
Chetan Kashyap Gauhati University	Dr. H. Bailung	Basic experiments on dusty plasma	March – July, 2018
Kanmani Roy	Dr. N. Sen Sarma	Quantitative Analysis of the Fluorescence Properties of P(4vinylpyridine-co-acrylonitrile-co-styrene): The Effect of doping with amino acids	2 Months
Anupam Sonowal, MSc. Biotechnology, IIT Roorkee	Dr. R Devi	-	Jan-Jun, 2019
Alakesh Baishya, Deptt. applied Sc. GU	Dr. M. B. Sahariah	-	July-Sept, 2018
Jyotisman Bora, Department of Physics, Gauhati University	Dr. Arup R. Pal	Deposition of Ag and Au nanoparticles by magnetron sputtering and study of their scattering property	8 January to 25 June 2018
Vishal Rimal	Dr. Devasish Chowdhury	Synthesis of High Thermal Stability Oleic Acid Carbon Dots with tunable band gap	May 2018-June 2018
Md. Ijaz Ullah Muzaddadi	Dr. N. Sen Sarma	Synthesis and Characterization of Hydrogels From PVA wth PEG, glycerol, boric acid and citric acid respectively	6 Months
Rajumani Sarma	Dr. N. Sen Sarma	Poly (1-vinyl-2-pyrrolidone-co-acrylonitrile) and its Polyelectrolytes by treatment with acid like HCl and HNO3	6 Months
Pranab Saikia, Dept. of Applied Sciences, Gauhati University	Dr. Arup R. Pal	Nanostructured material synthesis for optoelectronic device application	3 January to 19 June 2018
Plabita Borpujari	Dr. Devasish Chowdhury	Directed Assembly of Polyvinyl alcohol Carbon dots	January 2018-June 2018
Gargee Krishnatreya	Dr. Devasish Chowdhury	DNA/Carbon dots based Electrochemical detection of N-Notrosodimethylamine	January 2018-June 2018
Nabajyoti Sarma Gauhati University	Dr. H. Bailung	Production of low density and low temperature negative ion rich plasma using magnetic filter with SF6 gas	March – July, 2018
Anirban Kundu BHU, Banaras	Dr. M. R. Khan	Screening of probiotics from rice beer following ICMR guidelines	January-June, 2018
Aishwariya Kartha BHU, Banaras	Dr. M. R. Khan	Screening of probiotics from curd following ICMR guidelines	6 months (January-June, 2018)

PLACEMENTS OF IASST SCHOLARS AT OTHER INSTITUTES

List of lab members appointed in other national laboratories or abroad

Name of the member	Name of supervisor	Position and current laboratory
Dr. Achyut Konwar	Dr. Devasish Chowdhury	Post-Doctoral Fellow, *School of Material Science and Engineering* Tianjin Polytechnic University, China
Dr. Manash Jyoti Deka	Dr. Devasish Chowdhury	Research Associate (RA) CSIR- NEIST, JORHAT, ASSAM
Ms. Aditi Kaushik	Prof. N. C. Talukdar	As British Council scholar to pursue Ph.D. in University of Sheffield, , UK
Ms. Garima Raj	Prof. N. C. Talukdar	As Postdoctoral scholar in Functional Genomics and Bioinformatics Lab, University of Sopron, Hungary.
Dr. Bhaskar Jyoti Gogoi	Prof. N. C. Talukdar	Dibrugarh University, NPDF
Dr. Joshodeep Boruwa	Prof. N. C. Talukdar	Senior Research Scientist II, Jubilant Chemsys Ltd. Noida
Dr. Shyamashree Dasgupta	Prof. N. C. Talukdar	DDRC, THSTI, DBT, New Delhi
Dr. Raghuram Kandimalla	Prof. N. C. Talukdar	Postdoctoral Researcher, University of Louisville, James Graham Brown Cancer Center, 580 S, Preston Street, Louisville, KY 40202.
Dr. Sanjeeb Kalita	Prof. N. C. Talukdar	Postdoctoral Fellow, Institute for Stem Cell Biology and Regenerative Medicine, Bengaluru, India
Ms. Sudarshana Borah	Prof. N. C. Talukdar	Dibrugarh University, CSIR-SRF

PLACEMENTS AT IASST FROM OTHER INSTITUTES

List of lab members who are from other national laboratories or abroad and had joined IASST

Name of the member	Name of supervisor	Earlier laboratory
Dr. M. A. Barik	Dr. J. C. Dutta	Dept of ECE, Tezpur University
Ms. Shilpi Saikia	Prof. N. C. Talukdar	Dept. of Pathology, microbiology & biochemistry, Tezpur University, Tezpur, Assam
Ms. Barsha Deka	Prof. N. C. Talukdar	Dept. of Molecular Biology and Bitechnology, TU
Ms. Ankita Hazarika	Prof. N. C. Talukdar	Dept. of Biotechnology, Gauhati University, Assam
Dr. Aparajita Ghosh	Prof. N. C. Talukdar	Dept. of Biomaterial and Tissue Engineering laboratory, IIT Guwahati

KNOWLEDGE RESOURCE CENTER

The Knowledge Resource Centre (KRC) of IASST provides all type of knowledge and related print and electronic material series. It is a member of the National Knowledge Resource Consortium (NKRC), National Digital Library (NDL), Developing Library Network (DELNET) and Current Science Association (CSA). The center also provides its services to the researchers of other educational institutes in North East India. The KRC's collection include 10,021 books, 2,185 bound periodicals, 105 theses, 184 dissertations, 639 non-book materials (CD, DVD, etc.), 434 research papers (journal articles and chapters in book). The KRC provides its patrons the access to subscribed e-resources like e-journals comprised of scholarly contents via Wi-Fi and LAN (Local Area Network) connections. The institute also has its own Institutional Repository (IR) known as Digital Library of IASST accessible through institute's Wi-Fi or LAN facility which provides access to digital resources produced by the institute.

In the year 2018-2019, the services and activities were improvised with 290 new books procured based on the requisition of the patrons, 421 books circulated, reprographic services of 147,667 pages and 714 scans provided. Recently The KRC has been relocated to the ground floor of 4000 square feet area in the Academic and Administrative building. For the functional convenience, the KRC is partitionized into sections such as Circulation Section, Property Counter, Technical Processing Section, Reading Area, Digital Resource Section, Periodical Section, Book Section, Conference Room, Back Volume Section and Faculty Reading Room.

CONFERENCE/SEMINAR/WORKSHOP/TRAINING COURSE/SYMPOSIUM ORGANIZED

Quarterly Workshop on Hindi

As a part of institute's effort to perform official work in Hindi efficiently, Hindi workshops are organized at IASST in regular intervals. A quarterly workshop on Hindi language implementation, noting & drafting was held on 27 April 2018 in the auditorium of IASST. Sixty employees participated in this workshop. Ms. Binita Bramha, Manager, OIL, Guwahati Refinery, and Mr. Mohan Koirala, Assistant Director, Official Language, Brahmaputra Board, Guwahati were resource persons who provided training to the employees.

Training and Awareness Programme on e-journals

A training and awareness programme of e-journals was held at IASST on 25th May 2018, for empowering faculty members and research scholars for the uses of e-journals subscribed in the Knowledge Resource Center (KRC), IASST. The training programme was conducted by Informatics Publishing Ltd., Bangalore.

Faculty members and research scholars attending the training and awareness programme on e-journals

Training Programme of FT-IR Microscope

A training programme of **FT-IR Microscope was held at IASST during** 29th -30th May, 2018 in the Seminar Hall of IASST. Mr. Aniruddha Pisai, an expert from the Thermo-Fischer provided training on handling and maintenance of Thermo-Fischer Nicolate FT-IR microscope. A total of eighteen Research Scholars attended the program, both from the Physical and the Life Sciences Divisions of IASST.

Training Programme for CPPP e-procurement and e-Publishing System

A training session on e-Procurement and e-Publishing System was held at Seminar Hall of IASST on 6th June 2018. Four officials of National Informatics Center (NIC), Ms. Kavita Barkakoty, Senior Technical Director, Mr. Pranab Chakravarty, Principal Systems Analyst, Mr. Bibhuti Bhusan Deori and Mr. Rezaul Haque, e-Procurement Senior Trainer delivered several lectures and conducted hands-on sessions for enhancing performance in e-Publishing System, e-procurement and e-tendering.

Staff members of IASST attending training programme for CPPP e-procurement and e-Publishing System

An interactive programme of IASST Social Venture and Entrepreneurship Consortium (ISVEC)

The ISVEC organised an interactive programme on 12th July 2018 at IASST in which faculty, doctoral students and postdoctoral fellows of IASST participated. The main aim of this programme was to motivate and expose toward opportunities in hi-tech start-ups particularly for researchers who remain focused but unaware of the wide spectrum of activities of entrepreneurship which emanate from scientific research. It was highlited during the workshop that ISVEC shall conduct idea validation, provide assistance in search of seed funds, help in forming legal entity, securing IPR, scouting for commercial partners and transferring the technology to commercial partner. Under this scheme, the researchers may form enterprise out of their R&D activities. The main aim of this programme was to encourage Hi-tech start-ups by bridging the gap of expertise as available with the narrowly focused scientific researchers and as required for the wide spectrum activities of an enterprise. The Doctoral/ Post-Doctoral researchers of IASST have been encouraged to form start-ups and take the abandoned researches at laboratories up to the application levels. ISVEC shall conduct idea validation, arranging seed funds, help in forming legal entity, securing IPR, scouting for commercial partners and transferring the technology to commercial partner. Under this scheme, the researchers may form enterprise, which may restricts itself to R&D activities only.

Research Scholars of IASST attending interactive programme conducted by ISVEC

Training on LCMS-MS

A hand on training programme on LCMS-MS was held at IASST during 16th -19th July 2018. Mr. Monoj M Kushwaha, Application Specialist of Thermo Fisher Scientific conducted the training program. Research Scholars, both from the Physical and the Life Sciences Divisions of IASST attended the program.

Program Conducted by the Advanced Level Institutional Biotech Hub of IASST

1. Motivational Science Summer Camp (MSSC)

During 24th -27th July 2018, a science summer camp to motivate school students was held at IASST. The camp was organised by the Advanced Level Institutional Biotech Hub of IASST. A total of 17 high school students from Morigaon district of Assam took part in the camp. The students stayed in the campus during the period and were exposed to the scientific environment in various laboratories of IASST. They also learnt some basic techniques of microbiology and molecular biology such as isolation of microbes and DNA from microbial biomass for molecular biology experiments.

Students participating hand on practice demonstration class in the laboratory of Advanced Level Institutional Biotech Hub.

2. Skill Development Training and Workshop on Mushroom Cultivation and Bio-fertilizer Production

A two days skill development training and workshop on mushroom cultivation and bio-fertilizer production was held at IASST during 15th - 16th November 2018. The objective of the workshop was skill development for the rural unemployed youths. A total of sixteen participants from Morigaon district of Assam took part in the workshop. The participants were trained on the principles and different steps such as pure culture preparation, substrate preparation, mushroom bag preparation, harvesting and post-harvest management involved in successful cultivation of mushroom. The participants were also demonstrated how the various mushroom wastes can be converted to vermicompost and how it can be enriched with efficient strains of beneficial bacteria.

Interaction of participants with trainer regarding principles and steps of mushroom cultivation; Participants in the low-cost mushroom production unit of IASST.

User Awareness Programme on Anti-Plagiarism Software

A user awareness programme on iThenticate, anti-plagiarism software was held at IASST on 24th September 2018. The programme was conducted by Mr. Akshay Prasanna, Customer Success Manager, Turnitin. Mr. Prasanna explained the usage and facilities in-built in the Ithenticate Anti-plagiarism Software.

Faculty members and research scholars participating user awareness programme on anti-plagiarism software.

Public Outreach Science Education Programme (POSEP)

The IASST organized a one day Public Outreach Science Education Programme (POSEP) in its campus at Paschim Boragaon, Guwahati on 26th September 2018 in the line of India International Science Festival (IISF) celebration during 5th -8th October 2018 across the country. This one day programme was held to attract the students of schools and colleges to scientific research as a career option. The another goal of this programme was to provide a glimps of how innovation happens in the field of science and new opportunities for innovation are open to school and college students and other people of the society as well. Two hundred 11th standard students from 10 colleges of Assam participated in the program. There were also 100 invited guests was participated from among general public. Various activities included documentary show, popular scientific talks by programme heads of IASST, interaction with scientists, felicitation of child innovators and visit to laboratories and other facilities available inside the campus.

Students participating essay writing competition on this occasion and students visiting laboratory of IASST on the event of POSEP.

Seminar on Bioremediation

A one day seminar on Bioremediation was held at IASST on 28th September 2018 on the occasion of *superannuation for Prof. Suresh Deka of Life Sciences Division, IASST*. Dr. Prashant K. Dhakephalkar, Scientist F- Bio-energy Division, Agharkar Research Institute, Pune and Prof. Piyush Pandey, Department of Microbiology, Assam University delivered invited lectures in the seminar and several students of Prof. Deka who are now serving in different positions also presented their research work in the seminar.

Dr. Prashant K. Dhakephalkar, Scientist F- Bio-energy Division, Agharkar Research Institute, Pune delivering lecture in the seminar.

Brainstorming meeting on "Development and Operationalization of a Flood Forecasting System over the Brahmaputra basin"

On 1st December 2018, a day-long programme on "Brainstorming Meeting on Development and Operationalization of a Flood Forecasting System over the Brahmaputra basin" was organized at IASST auditorium. Dr. N.C. Talukdar, Director, IASST delivered the welcome speech and Dr. B.N. Goswami, Former Director, Indian Institute of Tropical Meteorology, Pune, delivered a lecture on the title theme. Several distinguished Scientists/Engineers/Administrators participated in the meeting and delivered scientific talk on the theme.

Dr. B.N. Goswami, Former Director, Indian Institute of Tropical Meteorology, Pune delivered a lecture in brainstorming meeting on "Development and Operationalization of a Flood Forecasting System over the Brahmaputra basin".

Conference cum Workshop on Host-Microbe Interaction

On 1-2 February, 2019 a conference cum workshop on host-microbe interactions was organized under the DBT's Unit of excellence and Institutional Biotech Hub projects. The workshop deliberated on three themes - human microbiome, plant microbiome and fermented food microbiome. Eight eminent scientists and clinicians and fifty-six registered participants from all over the country presented their research on the broad themes of host-microbe interactions. The event also provided a forum for young researchers to present their work through poster and oral presentations and to gather latest development in the field during extensive discussion with the eminent scientists. This meet was a valuable networking opportunity particularly for young researchers for future collaborative research. The conference began with an opening ceremony and remarks by keynote speaker, Dr. Uday C. Ghoshal (Gastroenterologist from Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow) and continued with interactive panel discussions, oral presentations and posters on topics of interests related to the themes of the conference. The event also included inauguration of the start-up Gut*vicinta*, an extensive undertaking by the human microbiome research team of IASST to understand the complex human microbiome using advanced analytical tools and techniques. The event concluded with a set of workshops on handling of different models like *Caenorhabditis elegans* and mouse to study gut microbiome.

Conference cum Workshop on Host-Microbe Interaction.

Workshop on Integrating Herbal Medicine of NER to Develop Therapeutic Strategies for Metabolic Syndrome

On 15th March 2019, a workshop on Integrating Herbal Medicine of NER to Develop Therapeutic Strategies for Metabolic Syndrome was organized at IASST. Dr. Avinash Narwaria, GM, Emami Ltd., Kolkata delivered a talk on "Regulatory Guidelines for Development of Herbal Product/Phytopharmaceuticals" in the inaugural session. This was followed by presentation of progress of research on the theme carried out in the six participating centre including Drug Development and Research centre, THSTI, New Delhi and IASST, Guwahati. **Dr. Avinash Narwaria, GM,** Emami Ltd. (left) and a section of audience (right) in the workshop.

EMINENT SCIENTISTS/ PERSONALITIES WHO VISITED IASST AND DELIVERED LECTURES

Date	Speaker and their Affiliation		Title of Talk/Lecture
26.04.2018		Dr. Hemant J Purohit Head, Environmental Biotechnology & Genomics Division, National Environmental Engineering Research Institute (CSIR- NEERI), Nagpur	Exploration through genomics tool
10.05.2018		Dr. Rafika Ahmed Chief Environment Scientist, Pollution Control Board, Assam	Environment pollution and Swachhta Pakhwada- citizen role.
18.05.2018		Dr. Asad Rahmani Former Director of Bombay Natural History Society (BNHS), Mumbai, Maharastra	Grassland Birds of the Brahmaputra Floodplains: Neglected and Forgotten
28.05.2018		Mr. Ranbir Singh Client Services Manager, IEEE No-26/1, 5th Floor, WTC-Brigade, Dr. Rajkumar Road, Malleshwaram, Bangalore-560055, Karnataka, India	Institute of Electrical and Electronics Engineers (IEEE): Strategies of search
05.06.2018		Dr. Yashwant Kumar Scientist-C DDRC, Fardiabad Faridabad – 121001 (HARYANA)	Mass spectrometry based metabolomics
06.06.2018		Dr. Ramkrishna Sen Professor, Department of Biotechnology, IIT Kharagpur	A Bio-inspired Journey through the Contemporary Research Challenges in Energy, Environment & Water
20.06.2018		Dr. Shekhar C. Mande Director General, CSIR, New Delhi. Former Director, National Centre for Cell Science NCCS Complex, University of Pune Campus, Pune, Maharashtra 411007	Contributions of Indians to Modern Science and Technology
29.06.2018		Mr. Balram Nair Vice President of Chennai Angels	Raise in Capital for Start-Ups via Angel Investment
19.07.2018		Mr. Manoj M. Kushwaha Application specialist-LSMS Thermo Fisher Scientific	The basics of LCMS and its application
22.07.2018		Dr. M. J. Bordoloi Sr. Principal Scientist NEIST Jorhat, Assam	Natural Products: Drugs and Drug Discovery

Date	Speaker and their Affiliation		Title of Talk/Lecture
09.08.2018		Prof. Sudeshna Mazumdar-Leighton Department of Botany, University of Delhi, New Delhi	Plant insect and virus interaction
05.09.2018		Dr. Dipankar Malakar Application Support Manager, Mass Spectrometry Division, Sciex India	Use of mass spectrometry workflow for metabolite identification having therapeutic value
09.11.2018		Prof. Akio Ebihara Gifu University, Japan	International joint degree programme in Food science and technology : A case study between IIT G and Gifu University
20.11.2018		Dr. Suvendra Kumar Ray Dept. of Molecular Biology and Biotechnology, Tezpur University, Assam.	*Ralstonia solanacearum* pathogenicity in seedlings of Tomato and Brinjal
29.12.2018		Dr. Subhash Thota Associate Professor, Department of Physics, IIT Guwahati, Guwahati - 781 039	Magnetic, Electronic and Crystallographic reconstruction across the Interfaces of Insulating Oxides
04.01.2019		Dr. Praveen Asthana Head, Mega Science Division and Autonomous Institutes Division, Dept. of Science and Technology, New Delhi, Govt. of India	India's engagement with Mega Science projects
21.01.2019		Dr. Kirtee Wani Assistant Manager Grants Program, Venture Center, Pune, Maharashtra	Background information on DBT-BIRAC Biotech Ignition Grant (BIG) scheme, the application process, funding process-flow, guidance on writing winning proposals etc.
11.03.2019		Kelath Murali Manoj Satyamjayatu: The Science & Ethics Foundation, Kerala, India	Murburn concept: A radical perspective on aerobic respiration

VISIT OF EXPERTS TO IASST

Site visit of team of experts for creation of new national facilities in IASST: During the year two site visits happened.

A team from DBT, Govt. of India visited IASST on 10th May 2018. In connection with setting up of an Atal Incubation Centre at IASST. The project is sacnctioned under "BioNEST" scheme of M/S BIRAC to IASST during 2018-19.

Visit of an expert committee constituted by DBT, Govt. of India visited IASST, Guwahati on 11th July 2018 to ensure radiness of site to set up a Quality Control (QC) and Quality Assurance (QA) Laboratory Facility under the Phytopharmaceutical Mission for North East India. The project is sanctioned and has been operated during 2018-19.

Other Important visit to IASST

Students of Gifu University, Japan Team visit: A team of students led by Dr. Akio Ebihara, Gifu University, Japan visited IASST on 19th March 2019 as a part of their student exposure programme to interact and know the science of other countries.

SCIENTIFIC TALK, LECTURE DELIVERED BY IN-HOUSE RESEARCH SCHOLARS AND FELLOWS

Date	Name of Visitor/ Speaker & Affiliation	Title of Talk/Lecture
25.01.2019	Dr. Rinku Moni Kalita BDER Programme	Comparative assessment of carbon sequestration potential and livelihood sustainability of different indigenous land-use systems in Lower Assam, North East India
25.01.2019	Dr. Parijat Saikia BDER Programme	Wetlands of Assam, India: a look into the current scenario and future prospects for their sustainable development using the novel approach of constructed wetlands
25.01.2019	Dr. Kamal Das BDER Programme	Climate resilient marker-assisted generation of prospective germplasm for wide adaptability of Muga silkworm and quality and quantity enhancement of silk production.
06.02.2019	Dr. Raghuram Kandimalla, TKBDD Programme	"Integrating herbal Medicine of NER with contemporary approaches to develop a therapeutic strategy for metabolic syndrome".
06.02.2019	Dr. Suman K Samanta, TKBDD Programme	"Chemical Profiling and characterization of bioactive phytoconstituents of indigenous rice of NER and its efficacy against metabolic Syndrome."
15.02.2019	Dr. Robinson C. Jose BDER Programme	Understanding and solving the problem of false smut of rice (*Oryzae sativa*) due to the fungus *Ustilaginoidea virens*, by the intervention of Genetic Engineering and Nanotechnology
15.02.2019	Md. Abdul Barik AMS Programme	Fabrication of flexible organic field effect transistor for detection of bio-agents and biomolecules in clinical laboratory
15.02.2019	Dr. Asim Kumar Dutta TKBDD Programme	Discovery of human cytosolic phosphoenolpyruvate carboxykinase (cPEPCK) inhibitors by high throughput virtual screening (HTVS) and validation of its interaction with the Phe-triad and/or the GTP binding site
22.02.2019	Dr. Archana Nath BDER Programme	Antimicrobial efficacy of the protected forests derived soil actinomycetes against Class B Carbapenemase producing Gram - ve Bacilli
22.02.2019	Dr. Kaushik Bhattacharjee BDER Programme	Study on fungal inhabitants of resinous and healthy Agarwood plant Aquilaria malaccensis and rhizospheric soil for development of an efficient biological Agarwood induction method
22.02.2019	Dr. Seydur Rahman TKBDD Programme	Impact of *Apis mellifera* and *Apis cerana* products on breast cancer cell lines.
01.03.2019	Dr. Kaustuvmani Patowary BDER Programme	Project "Biosurfactant mediated green synthesis of eco-friendly metal Nanoparticles and their application in bioremediation of Petroleum hydrocarbon pollutants".
01.03.2019	Dr. Ananya Barman BDER Programme	Project "Assessment of diversity and pathogenicity of Blister Blight and Dieback disease causal pathogens prevalent in Tea grown on different Agro-climatic conditions and their biocontrol through Microbe-based formulation/s".

AMS- Advanced Material Sciences, **BDER**- Bio-Diversity and Ecosystem Research, **TKDD**- Traditional Knowledge Based Drug Discovery.

IASST PROGRAMME FOR PROMOTION OF LABORATORY EXPERIENCE-BASED SCIENCE TEACHING & LEARNING

This academic programme of IASST host visits of School, College and University students and also general public for spreading awareness of science in general and stimulating desire to pursue science through exposure to laboratory environment, lab equipment instrumentation facility and interaction with scientists. IASST also passes this interest through participation in exhibitions organized in different part of the country. Through different exhibitions, IASST's research gets exposure to a larger audience.

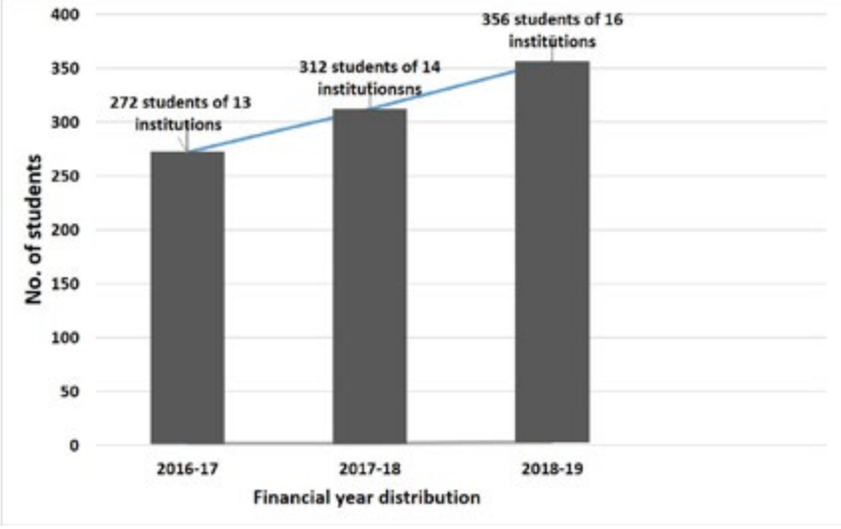
IASST Laboratory visit programme for the students of Schools, Colleges and Universities of North East India for scientific exposure

During the year, IASST hosted of 356 student visitors in 16 batches from schools, colleges and universities of Northeast India. During the visit students were explained the functioning of the sophisticated equipment such as SEM, GC-MS, confocal microscope and also explained different aspects of research under different programmes by institute scientists. Practical demonstrations were also conducted. The visiting students' attention was also drawn towards the need of scientific solution of local problems and also the local bio-resources research, which could give rise to technology for better economy. It was always a great deal of enthusiasm visible in face of the visiting students.

IASST is optimistic that this experience will have long lasting impression and help build science as their career goal. The detail of the visit is listed below:

Date of visit	Name of School / College and standard of students	No. of visitors (Students + Teachers)	Programme visited
06.04.18	Department of Botany, B. Borooah College, Ulubari, Guwahati	27+1	Life Science Department (all labs)
25.06.18	Tihu College, Dept. Of Botany, Tihu	18+1	Life Science Department (all labs)
31.08.18	Bethany School, Garchuk	65+2	BDER
18.09.18	Dept. of Botany, Rangia College, Rangia	19+1	Life Science Department (all labs)
10.10.18	3rd Semester, Department of Botany Dakshin Kamrup College, Mirza	26+1	Environmental Biotechnology Lab, Environmental Chemistry Lab, CIF, Biochemistry and Drug Discovery Lab- I, Biochemistry and Drug Discovery Lab-II
27.10.18	Tihu High School, Tihu	10+4	All labs
29.10.18	BSc 3rd Semester Department of Botany, Pandu College	20+1	Environmental Biotechnology Lab, BDER
19.11.18	DST Manipur School students' visit	65+2	Biochemistry and ecosystem research & BDER
28.11.18	PG 3rd Semester, dept. of Botany of Cotton University, Guwahati	2+1	TKBDD and BDER
02.01.19 & 03.01.19	Outreach Programme for School students of BTAD Area	20+5	TKBDD, BDER, MCS, BAPP, AMS
	Chapaguri Kaklabari High School	4+1	
	Naokata Milan Higher Secondary School	4+1	
	Koklabari Higher Secondary School	4+1	
	Tamulpur Higher Secondary School	4+1	
	Kumarikata Higher Secondary School	4+1	
01.03.19	4th and 6th Semester, MC College, Barpeta	43+2	Biochemistry and Drug Discovery Lab- I, Biochemistry and Drug Discovery Lab-II, Environmental Biotechnology Lab
20.03.19	6th Semester B.Sc. Botany Major, Mangaldai College, Mangaldai	21+3	Vermicomposting facility, Mushroom cultivation facility, Biochemistry and Drug Discovery Lab- I, Biochemistry and Drug Discovery Lab-II

BAPP-Basic and Applied Plasma Physics, **AMS**-Advanced Material Science, **MCS**- Mathematical and Computational Science, **BDER**-Bio-Diversity and Eco-system Research, **TKDD**-Traditional Knowledge Based Drug Development.



Growth in no. of visiting institutions and students to IASST laboratories in the last three financial years.

DISPLAY OF IASST EXHIBITS IN NATIONAL EXHIBITIONS

During the year, IASST participated in 6 exhibitions organized in different parts of the country and displayed IASST research achievements and NE bio-resources requiring research interventions such as silk varieties in NE India, selective sensor for ammonia detection, microbial antifungal formulation, production process for rhamnolipid biosurfactant and agar wood oil production technique developed in IASST, hybrid nanomaterial and plasma coating on bell surface. Research activities under different programme, technologies and innovations of the institute were also presented. The details are listed below:

Date	Name of the exhibition	Place	Organizer
3rd May 2018- 5thMay 2018	Vibrant North-East 2018	Guwahati	Organised by Delhi-based NGO, Centre for Agriculture and Rural Development (CARD), the 'Vibrant North East 2018' is supported by the North Eastern Council, Department of Science and Technology, Ministry of Home Affairs, Ministry of Commerce and Industry and All India Farmers Alliance.
27th -29th July 2018	Report on Government Achievement and scheme Expo at Pragati Maidan,	New Delhi	NNS Media Group
5th- 8thOctober 2018	IISF (India International Science Festival), Lucknow 2018	Lucknow, UP	Ministry of Science and Technology, Government of India; Ministry of Earth Sciences, Government of India; Department of Biotechnology, Government of India; Vijnana Bharati; Government of Uttar Pradesh; National Institute of Immunology
3rd-7th January 2019	106th ISC (Indian Science Congress) held at Lovely Professional University, Jalandhar- Delhi GT Road, Phagwara, Punjab, 144411	Punjab	Indian Science Congress&Lovely Professional University, Jalandhar, Punjab
9th-10th February 2019	Innovation Festival 2019, Khanapara	Khanapara, Guwahati, Assam	Regional Science Center, Khanapara
23rd March 2019 - 25th March 2019	2nd Assam Science Festival, Tezpur University	Tezpur, Assam	Assam Science, Technology and Environment Council (DST, Govt. of Assam) in collaboration with Tezpur University

OTHER ACTIVITIES

IASST'S SCIENTIFIC SOCIAL RESPONSIBILITY

Adoption of Scheduled Tribe Village for Socio-economic Development

North east region of India is home to more than 225 scheduled tribes (ST) scattered across hills (65%) and plains (35%) of the region's total land mass. About 8% of India's population are ST and among 23 ST communities of Assam, Bodo and Kachari are the dominant tribes and they comprise 38% of the total ST population. IASST's efforts for upliftment of economic plight of ST community started in a pilot mode through a ST village adoption programme.

Integration of Multiple Rural Technologies in ST Village near IASST

A long term association of IASST in two Bodo-Kachari-Rabha villages, Bakrapara and Kallapara began in Dec 26, 2016 under its Scientific Social Responsibility. These two villages are located at a distance of 20 km from IASST campus under Rani Development Block of Kamrup Metro District and the status of the two villages in 2016 as determined based on a door-to-door survey is presented in Table 1.

Table 1: Different parameters emerged from a door-to-door survey of the families of the two ST villages during Nov-Dec, 2016.

Parameters	ST village	
	Bakrapara	Kallapara
No. of household	87	85
Population	380	396
Member/household	4.37	4.64
M:F ratio	(196:184)	(185:211)
Literacy	(83%)	76%
Annual income (Rs.) >50% household	20,000-80,000	20,000-80,000
Leased land cultivation	26%	26%
% household involved in local wine making	60%	60%
Average land holding (bigha)	0.5-20	0.5-25
Most of the families of the villages are below poverty line		

Rural Technology Intervention Items And Inputs Support

With a start of only 7 women of each of 7 families of the two villages taking up mushroom cultivation in 2015-16 there was a steady rise in the number of items and the beneficiaries up to March 2019. In 2016-17, few items, namely, mushroom cultivation, eri and duck rearing, black rice cultivation and vermicomposting, were practised by 34, 37, 21, 67 and 5 families, respectively, and during 2017-18 similar number of families were involved (Fig. 1). During 2018-19, few families were provided inputs and trainings for cultivation of *Tapioca* as a leaf food source alternative to *Castor* for eri silk production. Through this, the farmer families get the below ground tuber harvest to meet up their food need from use of their land for eri host-plant cultivation.

As shown in Fig. 2, shown the cumulative income (Rs. 8,81,932/-) of the beneficiaries in different years including the current reporting year was generated from an investment of an amount of Rs. 2,95,170/- as input cost including half day salary of field assistant for two years duration. This input cost does not include depreciation cost of equipment used for mushroom spawn production. The income of the beneficiaries in a year ranged from Rs. 3,000/- to Rs. 55,000/-. The higher income group of beneficiaries practised cultivation/production of more items. With passing years, increasing number of beneficiaries and also beneficiaries with more cultivation/production items were observed. For example, out of total of 146 number of beneficiaries, 38 practised only eri rearing, 65 both eri and duck rearing, 30 eri, mushroom and duck, 10 eri, mushroom, duck and black rice and 1 practised all the five items including tapioca cultivation as alternative host.

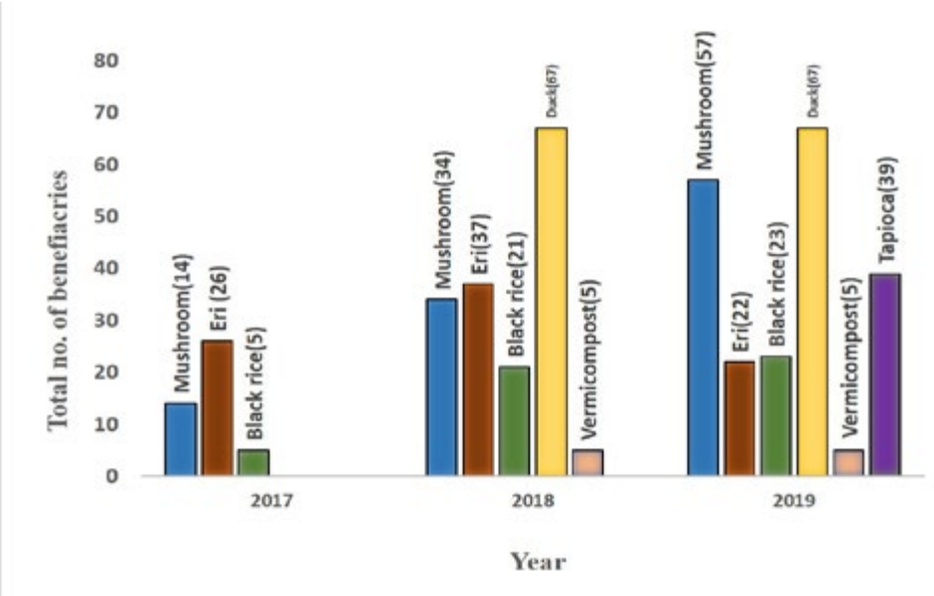


Fig. 1. Total no. of beneficiaries involve in different programme

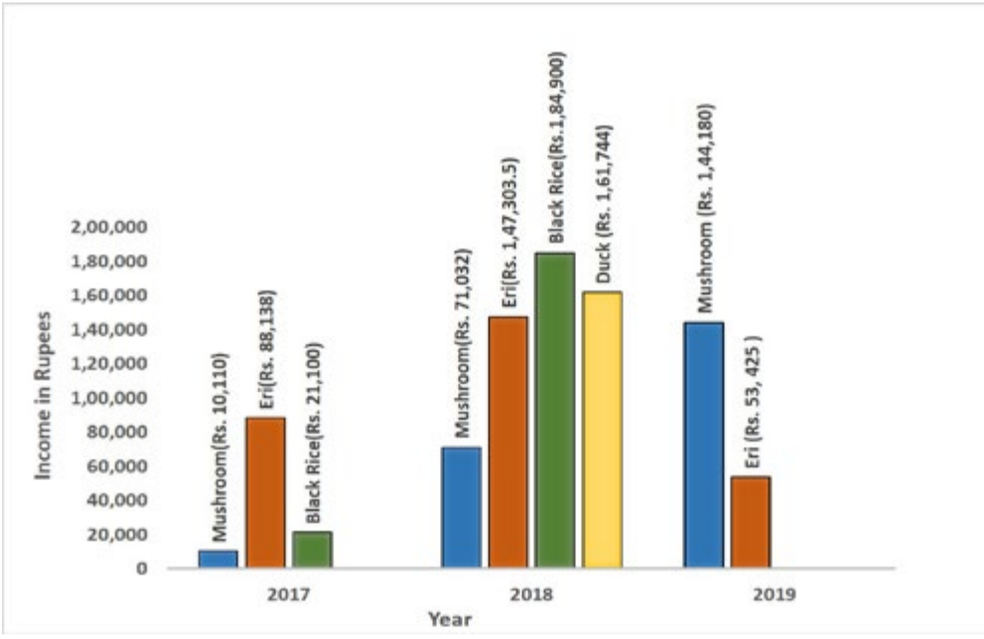


Fig. 2. Income of the beneficiaries from different programme

Overall Outcome and Sustainability of this Venture

The individual families came close together as a group and took up few activities in co-operative manner. For example, a group now raises eriseed as a venture in a common production unit for the entire group of eri producers (Fig. A). The sale of eri cocoon now happens in a single day at a common place for each batch of production. With the assistance of IASST staff, the beneficiary displays a better bargaining power for fair price of their eri cocoons while selling to the private parties who visit the village for purchases of each batch (Fig. B). The village beneficiaries were opened to machine spinning of eri cocoon (Fig. C), and meeting in the single-room library cum meeting place taken on rent from a family by IASST(Fig. D). This library houses books in vernacular language on package of practices, crop diseases, agriculture, health and morals. Health benefit practices such as yoga (Fig. E), health camp, cleaniness drive are now regular features in the village. Ladies now know to sign their names and have opened bank accounts to deposit a part of their earnings. The graduation of the two villages has been gauged by IASST from their shift for performing cultural function from ground in 2017 to a stage in 2018 (Fig. F) and complete voluntary cease of local liquor production and consumption in the families, which created social problems. IASST is planning in future for extensive recycling of waste generated in each production venture in the form of organic manure and its use in organic production of high value crops in homestead, diversification towards allied sectors such as bamboo craft making, establishing village hut for sell of their products as measures for sustainability. Institute is also planning the replication of this venture in more ST/SC villages.

Fig. A. Eri silkworm seed Production unit

Fig. B. Buyer seller meet

Fig. C. Training on reeling by machine

Fig. D. A rented room in the village for interaction with beneficiary

Fig. E. Yoga Program

Fig. F. The teachers who taught alphabet and signing their names conducting chores of the cultural night on the village day

High price of black rice in market has attracted more and more youths for its cultivation. Fifty percent of black rice produced in 2017 has been distributed as seed among the farmers of Bakrapara and Kallapara of Rani.

Scheduled Tribe Students' Capacity Building Programme (STSCBP)

During the year, the institute launched a new initiative in the form of an outreach activity for capacity building of ST students. This activity is part of a formal programme named Scheduled Tribe Students' Capacity Building Programme (STSCBP). STSCBP envisages to enable students' visualization of their science books content by connecting them to laboratory facilities and experiments of IASST through short-duration stay and laboratory exposure in IASST campus. The target groups were (i) class IX and X students, and (ii) class XI and XII students, and the duration of stay in the campus was 2-3 days. During this period of stay, the students' attention was drawn to specific topics of their science text of appropriate class standard, and the IASST's scientist of the specific domain refreshed the theory part first in the form of lectures. This was followed by demonstration of the phenomenon or event or mechanism in laboratory experiments. The first programme was for a batch of 20 students and 05 accompanying teachers from 05 schools of Bodoland Territorial Council (BTC), and it was conducted during 2-3 January 2019. The participating students received the concept of 'plasma', 'DNA' as the element of heredity, how every biological, physical and environmental components of the ecosystem are connected, and the knowledge and role of human being in ensuring ecosystem health. IASST's effort in the said activity was evident from the short speeches presented by the representatives of the students' groups in the valedictory function, which was attended by the Hon'ble MLA of Baksa constituency of BTC, Mr. Thaneswar Basumatary.

Name of school	No. of visitors (students + teachers)
Chapaguri Kaklabari High School	4 students, 1 teacher
Naokata Milan Higher Secondary School	4 students, 1 teacher
Koklabari Higher Secondary School	4 students, 1 teacher
Tamulpur Higher Secondary School	4 students, 1 teacher
Kumarikata Higher Secondary School	4 students, 1 teacher
Total	20 students, 5 Teachers

Faculty members of IASST showing laboratory equipment; Mr. Thaneswar Basumatary, Hon'ble MLA, under BTAD area of Assam delivering speech on the valedictory function of the Scheduled Tribe Students' Capacity Building Programme (STSCBP).

Science Promotion and Social Welfare Club of IASST Research Scholars

In tune with R&D interest, Government's inclination on scientific and social responsibility, and in following the steps of IASST faculty, a group of research scholars of IASST engaged into a noble venture to support the students of families in the neighbouring habitation of IASST who are not getting quality education mainly because of their financial condition. A group of research scholars (Active Members: Ujjal Saikia, Ajay Kr. Saw, Hrishikesh Talukdar, Silpisikha Goswami, Gautomi Gogoi, Jayanta Boruah, Garima Raj, Samiran Upadhaya, Bhaswati Kashyap, Purbajyoti Bhagowati, Polash Jyoti Boruah, Shantanu Das, Dibyayan Deb, Cinmoyee Baruah; Alunmnus: Dr. Achyut Konwar and Dr. Bikash Sharma) from mathematics, physics, chemistry and modern biology area have given birth to a "Science Promotion and Social Welfare Club", and in the last 3 years, these volunteers have been giving tuition free of cost in physics, chemistry, mathematics and biology to the students. The number of beneficiating students is gradually increasing every year as reflected in the graph below. The student volunteers are now planning to consolidate their efforts through an organized structure involving more resource persons and beneficiating students.

EVENTS AND CELEBRATIONS

Swachhta Pakhwada

On 1st May, "Swachata Pakwada" was inaugurated by Prof. Heramba Bailung, Head, Physical Sciences Division. Dr. Neelotpal Sen Sarma, Nodal Officer of the programme from IASST explained the objectives of the ministry and the scheduled activities for the Swachhta Pakhwada programme. On the occasion a guidebook on Waste Management in English, Hindi and Assamese languages was distributed among the employees. All employees took "Cleanliness Pledge" on the occasion. A thorough inspection of the laboratories and corridors in Administration and Academic building of IASST was done to get the idea of the level of cleanliness and waste management system adopted by the scientists and scholars. On 3rd May, scientist and staff of IASST organized an on-spot public gathering in Pamohi Vegetable market about 5 km away from IASST and explained to vendors and public the importance of proper disposal of waste in designated containers. Copy of waste disposal guideline was distributed and how separately disposed green materials can be converted to organic manure. On 4th May, Dr. Heman Deka, Asst. Professor, Department of Botany, Gauhati University delivered a lecture on waste management to the inhabitants to locality surrounding IASST campus and the lecture was followed by interaction session of question and answer. On 8th May, an awareness talk on waste management, hygiene and better sanitation was combined with training on cultivation of mushroom for a group of 30 villagers of Morigaon district of Assam. These villagers were specially invited and brought to the campus with IASST's logistic support. On 9th May, students from Lachitgarh Maddhya Uccha English School, Garchuk and Tetelia High School were invited for a day long programme in which they were given practical demonstration on separation of biodegradable waste from plastics practised in the campus and showed the vermicomposting unit of IASST where organic waste are being concentrated to compost using earthworm. A competition was also organised among the school students on a topic "Plastic and hazardous waste from society" and the winner of the speech competition was given certificate and prize money. On 10th May, Dr. Rafiqua Ahemed, Chief Environment Scientist, Pollution Control Board, Govt. of Assam delivered a talk on activities of Pollution Control Board (PCB) of Assam and services the institute can avail from the PCB. On 14th May, a team of scientist and staff of IASST visited its adapted Bakrapara, village and explain through informal interaction on importance of keeping individual household and common place of village clean and hygienic. The Swachhta Pakhwada was culminated on 15th may after noon with the entire fraternity of IASST taking part in review of the different activities of last two weeks under this programme organized for the first time and making strength for future improvement based on different suggestions/feedback received.

Inauguration programme for releasing of guidebook on Waste Management in English, Hindi and Assamese language (left) and Scientist and Staff of IASST organized an on-spot programme for the public in Pamohi Vegetable market about 5 km away from IASST (right).

World Environment Day

On 5th June 2018, World Environment Day was celebrated at IASST. Prof. Sarada Kanta Sarma, (Retired Professor and Head, Department of Botany, Gauhati University) delivered a talk on the topic "Conservation and management of wetlands of Assam" through which he drew the attention of the participants on the gradual shrinkage of 5000 wetlands spread under 2.2 lakh hectare area in Assam. This is an alarming situation as the wetlands are sites of rich biodiversity, water resources and tourism.

Prof. Sarada Kanta Sarma delivered a lecture on the occasion of World Environment Day (left) and IASST family members (right) participated in planting minor fruit samplings in Bio-resource Conservation Hub of IASST.

Celebration of International Day of Yoga at IASST

The International Day of Yoga was celebrated on 21st June 2018 in the seminar hall of IASST. Mr. Ritam Khan, Faculty of Art of Living, conducted a Yoga session for the students and employees of IASST.

A scene of Yoga Practice conducted by Mr. Ritam Khan, Faculty of Art of Living.

Eye Check-up Camp

As a part of year round health check-up programme, the institute in association with ASG Eye Care Hospital, Guwahati organized a free eye check-up camp on 28th June 2018. The Eye Specialists from the hospital examined around 160 staff members with state-of-art equipment. The objective of the general eye check up was to make the staff aware of the general issue associated with health of eyes and also to provide tips on caring eyes. Members of all categories of IASST staff benefited from the camp immensely.

Eye specialist and institute staff in eye check-up camp in IASST campus.

Independence Day

IASST celebrated the 72nd Independence Day in its campus with a day long programme. The celebrations started with the unfurling of the national flag by the Director of the institute, Dr. N. C. Talukdar, which was followed by the national anthem and short address to the gathering of employees, research scholars and spoke on the roadmaps to be undertaken by the institute for future. Patriotic and devotional songs and dances were performed by the research scholars and staff in IASST auditorium. An Independence Day special short film was also projected in the IASST auditorium.

Director, IASST addressing the IASST fraternity after hoisting of National Flag on the occasion of 72nd Independence Day of India.

Teachers' Day Celebration

Teachers' Day was celebrated on 5th September 2018 with great enthusiasm by the research scholars of IASST and paid tribute to the Bharat Ratna Dr. Sarvepalli Radhakrishnan. The research scholars gifted their supervisors with potted plant, which was a very touchy courtesy for the fraternity. Several talented research scholars performed songs and dances on stage and made the day memorable. An interactive quiz session was held between the faculty members.

A section of jubilant research scholars and their supervisor faculty in IASST auditorium on the auspicious Teacher's Day.

Hindi Week

IASST celebrated Hindi Diwas on 14th September, 2018 as a mark of acknowledgement of HINDI as the National Language. On this occasion, Ms. Binita Bramha, Retd. Manager, OIL, Guwahati Refinery delivered a talk. Hindi noting-drafting competition, Hindi essay writing competition & Hindi hand-writing competition for employees and research scholars and drawing competition for children of employees of IASST and local residents were also organized on this occasion. On 20th September, in the closing ceremony meeting, prizes were distributed to winners of various competitions. Mr. Badri Yadav, Research Officer (Implementation) and Head, Regional Implementation Office (NE), Guwahati attended this function and delivered a speech.

Swachh Bharat Abhiyan

Pursuant to the Hon'ble Prime Minister's call on "Swacch Bharat" (Clean India) campaign and directive from the Ministry of S&T, DST, New Delhi, Govt. of India, faculties, students and staff members of IASST actively participated in cleaning activities of IASST campus and its surroundings on 2nd October, 2018.

Members of IASST family cleaning IASST campus entrance as part of Swachh Bharat Abhiyan on 2nd October, 2018.

Vigilance Awareness Week with Integrity Pledge

IASST observed Vigilance Awareness Week from 29th October to 3rd November 2018 for six days with "Integrity Pledge" led by Dr. N. C. Talukdar, Director, IASST. Shri Vinod Seshan, IAS, IT Secretary/Director, DITEC and Chief Executive Officer of Guwahati Biotech Park, was the chief guest of the function who delivered talk on the theme of this vigilance week "Eradicate Corruption – Build a New India". Shri Seshan dealt with the various issues associated with corruption in office and public life and measures to eradicate corruption. He stressed on the role of people inside and outside the systems in eradicating corruption and contribution in building a New India.

Director IASST administering the Integrity Pledge to the IASST fraternity on Vigilance Awareness Week (left) and Shri Vinod Seshan, IAS, IT Secretary/Director, DITEC the chief guest delivering a talk on the of the theme Vigilance week (right).

Rastriya Ekta Diwas

IASST observed the Rashtriya Ekta Diwas, also known as National Unity Day, on 31st October, 2018 to commemorate the 143rd birth anniversary of Sardar Vallabhbhai Patel, the Iron Man of India. On this occasion, Director of IASST led the '*Run for Unity*' with a March Past from The Administrative-cum-Academic building to the Bio-Resource Conservation Park of IASST. All faculty members, staff members, research scholars and security personnel participate in parade. Later a pledge was administered to the entire IASST fraternity in the IASST auditorium.

40th Foundation Day

IASST celebrated its 40th Foundation Day on 3rd November, 2018 in the institute with various programmes. Professor Subeer S. Majumdar, Director, National Institute of Animal Biotechnology (NIAB), Hyderabad delivered the Foundation Day lecture. This was followed by a lecture by Professor Arun Kumar Tiwari, Adjunct Professor, School of Management Studies, University of Hyderabad. Three prominent scientists, Dr. Kamal Malla Buzarbaruah, VC, AAU, Jorhat, Assam; Professor Gautam Biswas, Director, IIT Guwahati and Dr. Anath Chandra Das, Retired Senior Professor, Physical Research Laboratory, Ahmedabad were felicitated on this occasion. During this occasion research scholars of IASST who were awarded Ph.D during the year were also facilitated. The Foundation Day celebration culminated in a cultural programme with performances by eminent singers Mr. Dipen Baruah and Dr. Anima Choudhury, Mime acting by Mr. Moinul Haque and Kathak dance performance by the mother-daughter duo, Meghranjani and Marami Medhi.

IASST family members participating in Flag hoisting ceremony (left) and in a Marathon race on the occasion of Foundation Day (right).

Dr. Kamal Malla Buzarbaruah, VC, AAU, Jorhat, Assam delivering a lecture (left) and few PhD award receipients (right).

Celebration of Village Day by IASST's adopted villages

The 2nd Village Day of IASST's adopted villages Bakrapara, Kallapara and Satargaon was celebrated on 26th December 2018. More than 1200 villagers of Bakrapara, Kallapara, Satargaon and nearby Panichanda and Sajjanpara villages along with IASST faculty and staff gathered at Bakrapara village under Rani Development Block and participated in different programmes including sports competition, health camp and cultural show held on this occasion. Dr. N. C. Talukdar, Director, IASST along with Prof. Suresh Deka, Dr. D. K. Hore, Dr. Diganta Goswami, Mr. Pradyut Barkataki, Dr. Nalin Mohan from IASST and Mrs. Binita Devi Das Baruah, ex-teacher attended the events. Prize distribution ceremony for various events was organized including an award for the best *eri* cocoon production, which was followed by display of rich ethnic cultural items in a function inaugurated by Dr. N. C. Talukdar, Director, IASST.

Dr. N C Talukdar, Director, IASST inagurating cultural show (left) and participation of villagers in sports (right) organized on 26th December, 2018

Celebration of New Year's Day 2019

IASST fraternity celebrated New Year's Day on 1st January 2019 in the presence of the Director, IASST. The staff members and research scholars of IASST shared their New Year's hopes and aspirations in the get together meeting.

New Year's 2019 first day gathering of IASST family members

Republic Day Celebrations

IASST celebrated the 70th Republic Day on 26th January, 2019 with the customary unfurling of the Tricolor followed by the National Anthem. Director, IASST in his speech urged the faculty, staff and research scholars to put maximum efforts in research, technology and innovation output for raising the quality and standards of the institute in a competitive way and contribute towards building a strong and better India. Several faculty of the institute was also urged to be more innovative and generate technology as a support towards revenue generation efforts and sustainability. Inspirational patriotic short films were also screened on the day.

Director, IASST unfurling the Tricolor on the occasion of the 70th Republic Day

National Science Day, 2019

The National Science Day was celebrated on 28th February 2019 at IASST successfully. The event kicked off with a welcome address by Professor H. Bailung, Head, Physical Sciences Division who spoke on the significance of celebrating the Science Day in remembrance of Sir Chandrashekhar Venkata Raman. Prof. Okhil Kumar Medhi, Former Vice Chancellor, Gauhati University graced the occasion as chief guest and delivered a talk entitled **"Science for the People and People for Science"**.

Prof. Okhil Kr. Medhi, Former Vice Chancellor, Gauhati University delivering lecture on the occasion of National Science Day, 2019

IASST Open Day

To mark the day of inclusion of IASST into the fold of the Autonomous Institutions of the Department of Science and Technology, Government of India on 9th March, the Institute celebrated this day as its first Open Day in the IASST campus. Nearly 600 invited guests, 464 students, 50 teacher/guardians from different parts of the city, 22 schools, 9 colleges and the Assam Don Bosco University participated. Faculty members and research scholars of IASST showcased their work, gave a tour of the laboratories and interacted with the visitors and answered their questions. The Bioresource Conservation Hub, Vermicomposting facility, Animal House and newly constructed CIF buildings were also opened for display for the students. The visiting students were addressed by the Director, IASST who delivered an inspiring lecture in the auditorium. Other eminent personalities, Prof. K. M. Pathak and Prof. Hiralal Duarah, Former VCs, Gauhati University along with Prof. Anil Goswami, Former Principal, Cotton College and Prof. Kalpana Duarah, Former Professor, Gauhati University were also present at the event. Villagers from IASST's adopted villages also took part in the event and they highlighted the ecomonic benefits and overall outlook changes brought in the villages through technological intervention by IASST. An exhibition displaying research output in the form of patents and products along with entrepreneurship-scientist-students' interaction was also arranged in the event. The event was widely covered by various print and audio-visual media.

Registration of students for laboratory visit of IASST (left) and research scholars interacting with students in the laboratory (right) on the occasion of IASST 1st Open Day celebration.

National Entrepreneurship Day

ISVEC-IASST initiated celebration of National Entrepreneurship Day on 9thNovember 2018 in collaboration with Assam Institute of Management (AIM) at the IASST auditorium. The event was attended by more than 100 guests comprising of entrepreneurs, students, faculty members, scientists, researchers and senior officials of MSME tool room. The students of Assam Institute of Management, under the guidance of Dr. Karabi Goswami and Dr. Mreeshi Agarwala, Assistant Professors, AIM also played very active role in organising and conducting this event. The event was inaugurated with lighting of the lamp by the Director of IASST and Director of Assam Institute of Management and the chief guest of the event was Sri Atanu Saha, (Director (S&T), North Eastern Council, Shillong. Sri Atanu Saha delivered the inaugural talk with a presentation on various opportunities for entrepreneurs in the NER and the supports given by NEC for entrepreneurship Development.

Dr. Chinmoy Goswami, Assistant Professor, AIM introduced to the audience the details of national entrepreneurship award, being given by the Govt. of India. Dr. Devasish Chowdhury, Associate Professor, IASST explained about various activities being conducted by ISVEC-IASST. An "Experience sharing by the entrepreneurs" session was co-ordinated by Dr. Sriparna B. Baruah, Senior Faculty, IIE and Dr. Sanjib Raj, Assistant Professor, AIM. Ms Lakhimi Bhuyan, Founder, Zangfai Traditional Jewellery; Mr. Arindom Hazarika, Co-founder, Arohan Foods and Mr. Pranjal Barua, Founder, Mushroom Development Foundation shared experiences gained during their journeys as entrepreneurs. A poster presentation event on "Entrepreneurial Ecosystem" was organised and following posters were presented by the members of the Advanced Level Institutional Biotech Hub, Dakshin Kamrup College, Mirza, Assam**:**

Eri Rearing and its Potential among Rural Women Entrepreneurs in South-Kamrup Area – by Meghasree Baishya, Rashmita Das and Dr. Durlav Narayan Singha

Small scale women entrepreneurship-from waste to wealth – By Nilakshi Gohain, Manabendra Kalita, Dr. Durlav Narayan Singha

A group discussion on incubation centres was organised between Dr. Aseem Mishra, CTO, KIIT incubation center and incubatee of TIC, IIT-G, and Mr. Rajiv Saikia, founder, RD Grow Green India Pvt. Ltd. The session, co-ordinated jointly by Dr. Bula Chowdhury, Scientist, Guwahati Biotech Park and Mr. A.K. Chakraborty, Secretary, ISVEC brought forward some valuable insights.

Panel discussion on "Developing Entrepreneurial Ecosystem in NER India" in the last session of the day was co-ordinated by the Secretary, ISVEC. The panellists were Sri Atanu Saha, Dr. Abhijeet Sharma, Director, Indian Institute of Entrepreneurship, Guwahati and Sri S.K. Das, Assistant Director, MSME-Development Institute, Guwahati, who enlightened the audience on the multiple schemes available for supporting the entrepreneurs. As the coordinator, Secretary, ISVEC put forward 3 specific proposals before the panellists and the audiences for their consideration, viz.

Inclusion of "economics" as an essential part of education at the school level for the coming generations to have better understanding about entrepreneurship

Creating appropriate policies for promotion of mid-career entrepreneurship

Creation of start-up research parks, as facility for R&D to MSME sector and Career Avenue for technically competent youth.

The Chief Guest promised to take-up the matter of education in basic economics at the appropriate forum, and the panellists agreed that there was a need-gap of policies for supporting mid-career entrepreneurship.

Some moments from celebration of National Entrepreneurship Day: Panel discussion (top left), Dr. Barua, Director, AIM addressing the gathering (top right), Dr. Atanu Saha, Director, NEC delivering Chief Guest lecture (bottom left) and expert in interaction with the audience (bottom right).

Science Café at Guwahati

Bangalore Life Science Cluster (BLiSc) in collaboration with the Institute of Advance Studies in Science and Technology (IASST), Guwahati have organized the first"*Science Café*" at Guwahati on 31st January 2019. Over 50 participants including students, researchers, faculties and government officials from various schools, colleges, research institutes and government organisations have actively participated in the event.

Three distinguished scientists delivered stimulating and enlightening talks on biodiversity conservation, medicinal plants and chemical ecology of the Northeast. Dr. Narayan Sharma, faculty at Cotton College State University, presented the first talk in Assamese. In his talk, Dr. Narayan Sharma exquisitely presented the status of primates in protected forests of the Northeast and urged for increased conservation efforts. The second talk of the event was by Prof. Narayan Talukdar, Director, IASST, Guwahati. Prof Talukdar discussed major medicinal plants of the Northeast and eloquently highlighted their conservation aspects. The final talk of the event was by Dr. Shannon Olsson, faculty at the National Centre for Biological Sciences, TIFR, Bangalore. Dr. Shannon highlighted the importance of chemical communication in nature with special attention to the communication amongst microbes, plants and animals. This was followed by a robust interactive session and tea/coffee where all the participants actively participated and interacted with the speakers.

Participants have appreciated this joint initiative by BLiSc, Bangalore & IASST, Guwahati and requested for more such kind of events in Assam.

SUPERANNUATION OF IASST EMPLOYEE

Prof. Suresh Deka

On 27th September 2018, a farewell meeting was organized to bid farewell to Prof. Suresh Deka on account of his superannuation Prof. Deka was felicititated and showered with praise through speech by faculty, students and staff members of IASST for his dedicated services to the institute over a span of 30 years. Professor Deka through a written speech shared with emotion his experiences and attachment with IASST on its long march of 40 years since inception towards stability and programme. The IASST family wishes Prof. Deka good health and happiness all throughout his post-superannuation days.

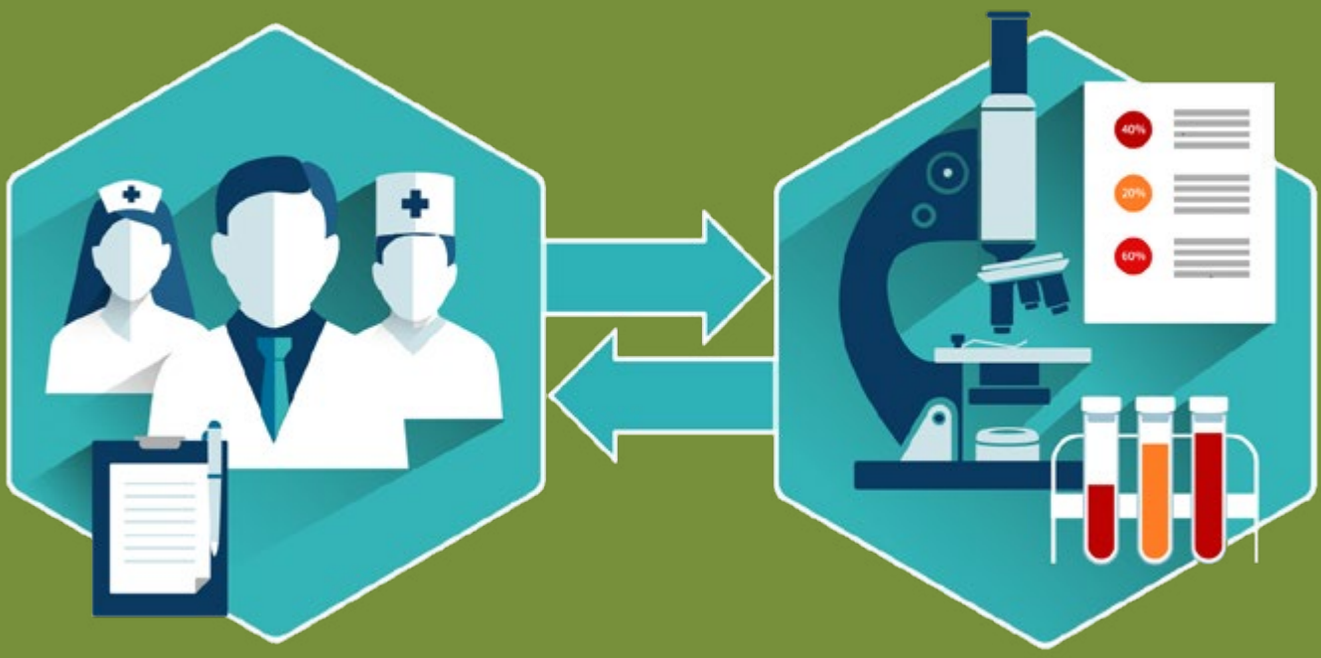
Prof. Suresh Deka being felicititated on the day of his superannuation.

Mr. Umesh Deka

On 25th April 2019, a farewell meeting was organised for Mr. Umesh Deka, Multi Tasking Staff (MTS) on account of his superannuation. Mr. Umesh Deka was given a warm felicitation and the faculty, students and staff members of IASST in their speech appreciated Deka's contribution to the institute and wished him healthy and prosperous life.

Mr. Umesh Deka felicitated on the day of his superannuation.

IASST'S TRANSLATIONAL RESEARCH EFFORT



A paradigm shift for seeing that excitement of laboratory science and research could also have connection to solution of real life requirements, caught imagination of IASST's scientific fraternity. Accordingly, a IASST's Social Venture and Entrepreneurship Consortium (ISVEC) was opened as an organized mode of research translational activities. ISVEC's activities and outcome during 2018-19 provide some evidence of getting some of its activity consolidated gradually.

IASST SOCIAL VENTURE & ENTREPRENEURSHIP CONSORTIUM (ISVEC)

ISVEC strived to build on the initiatives of its formation year (2017-18). The focus was on - (1) developing a robust network of experts for support required to start functioning of its incubation centre on strong footings (2) encouraging innovation and spirit of entrepreneurship among the stakeholders of IASST & other institutions of NER India (3) exploring extramural funding for the incubation centre (4) commercialisation of technologies developed at IASST. A few major activities/ achievements of ISVEC are as follows:

Developing Support Network

During the year, ISVEC management engaged itself in "building of support network with organisations and experts in the area through formal MOUs, interactions with institutional heads and participation in exchange programmes.

A) An MoU was signed between IASST and the Assam Institute of Management, Govt. of Assam, for collaboration in the fields of R&D commercialisation, innovation & entrepreneurship, (B) MSME Development Institute, Guwahati was consulted extensively and ISVEC received valuable guidelines in planning and execution of techno-commercial feasibility study project, sponsored by DSIR. (C) Indian Institute of Entrepreneurship experts were consulted on various aspects of entrepreneurship development and ISVEC was assured of support whenever approached. (D) The industry association of ISVEC begin with participation in the National Launch of India Innovation Growth Programme,(IIGP2.0) , organised by FICCI at Guwahati, on their invitation. (E) A few prominent incubation centers of the country such as, KIIT Incubation Center- Bhubaneswar, Venture Center – Pune, Guwahati Biotech Park, AIC – CCMB, were approached for guidance and inputs for a sound beginning of ISVEC, and these incubation centers have expressed their willingness for extension of support to IASST.

MoU with Assam Institute of Management - 27.09.2018; 18.06.2018 Lecture by Sri Balram Nair, VP, The Chennai Angels.

ISVEC Service & Efforts to Spread Awareness on Business Incubation and Start-ups

A) Celebration of National Entrepreneurship Day:

On 9th November 2018, IASST and its neighbouring Assam Institute of Management (AIM) , under MOU organised a day-long celebration of National Entrepreneurship Day at IASST auditorium. Sri Atanu Saha, Director (S&T), of NEC was the chief guest of the function. The details of the function is presented under "Events and Celebrations" section of the "Other Activities" chapter of the Annual Report.

B) Expert visit to ISVEC and interactions with staff of IASST:

During the year 2018-19, ISVEC arranged visits of - Sri Balram Nair, Vice President, The Chennai Angels, Mr. Sriniwas Lanka, Advisor to the Govt. of India on Jan Aushadhi Scheme, representatives of FICCI, Villgro Innovation

Foundation, Venture Center Pune, These experts delivered lectures and ISVEC team interacted and worked out modalities of their future engagements with ISVEC.

C) On 11th October 2018, the secretary ISVEC delivered an invited talk at Kaziranga University, on 'Entrepreneurship as a career' as a part of ISVEC service for cause of spreading awareness on the topic.

Exploring Extramural Funding for the Incubation Centre

IASST was selected for incubation/start-up activities as one of the 41 BioNEST centres in the country and of the only three in the NE India under BioNEST scheme of M/s BIRAC, Department of Biotechnology, Govt. of India. The Bio-incubator of ISVEC has been named "Full Spectrum Bio-incubator for NER at IASST". The ISVEC team of IASST also participated in the meeting of BioNest representatives of the country, held in India Habitat Centre, New Delhi.

Initiatives for Technology Commercialisation

DSIR sponsored study on "Techno-commercial feasibility of coating on copper alloys, using Plasma technology of IASST"

IASST received this extramural grant for the basic and applied plasma programme under A2K+ scheme of DSIR for conducting a techno-commercial feasibility study towards its possible commercialisation. The aim of this study is technology landscaping , finding suitable market fit through industry interactions, and in parallel taking the technology from TRL3 to TRL8. In 2018-19 the project personnel for this study visited the industrial clusters at Sarthebari, Hajo, Barpeta, Hojai, & Barpeta Road in Assam and have planned for further visit of industrial clusters in UP, West Bengal and Orissa states.

Finalization of the logo of ISVEC

Out of several entries in the competition for ISVEC logo, the one designed by PhD scholar Sri Purbajyoti Bhagowati was chosen and subsequent guidance from the Delhi based Branding firm 'Brand Doodles' and Dr. N.C. Talukdar, Director, IASST culminated in the final design of the logo, which was officially accepted.

A New Start-up in ISVEC

The microbiome research group of IASST has launched a startup, Gut*vicinta* – a next generation healthcare service (www.gutvicinta.com). Based on their research on human microbiome conducted with the ethnic groups of India, the group plans to provide microbiome based diagnostic services and therapeutics. Official formalities are being carried out now.

TECHNOLOGY GENERATION AND PILOT SCALE DURING 2018-19

Protective Coating on Copper Alloys

Surface degradation of materials made up of copper alloys is a serious problem. To address this issue, IASST had developed an environmentally friendly plasma based technology in collaboration with BARC, Mumbai. Currently up-scaling as well as commercial feasibility study of this technology is in progress to explore the marketability of the technology. Images of some Bell metal/brass items coated using IASST patented technology is presented below:

Kamakhya Plaque made of copper alloy coated with plasma based technology (left) and few other brass items on which plasma coating was being standardized (right).

Continuation of Production Improvement of the Nutraceutical Candy *Garcilona*

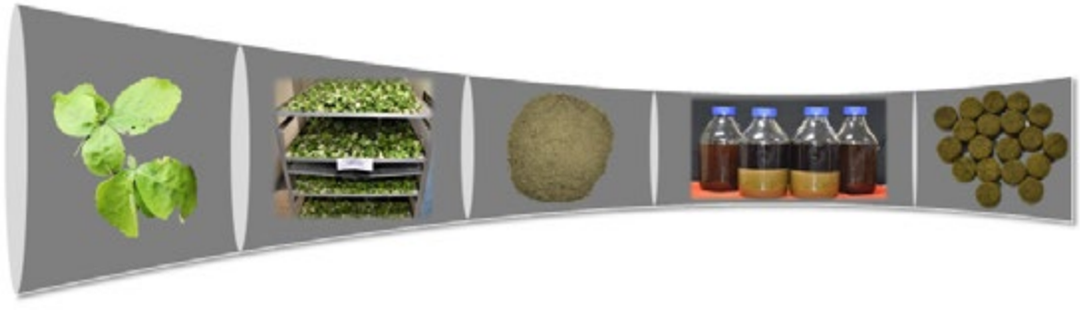
During test-marketing, it was observed that the *garcinia* based candy, *Garcilona*, developed at the incubation centre of IASST, was losing compositional stability with time. Also the production cost was found to be more than the competitive products. Efforts continue to address these challenges by formulation improvisation and process optimization. Partial success has been achieved in the efforts.

Production of an antioxidant rich beverage using black rice

A techniques has been developed to produce antioxidant rich beverage resembling red wine (Patent Application No. 201931019623). BIRAC grant **of Rs. 36 lakhs** under **Promoting Academic Research Conversion to Enterprise (PACE) scheme of DBT govt. of India has approved for optimisation of the fermentation process production of the rice beverage.**

Herbal formulation for clinical trial of type 2 diabetics

Using Premna herbacea, a herb used in Indian System of Medicines such as Ayurveda, Sowa-Rigpa, Unani and Siddha an anti-diabetic standardized enriched fraction with marker compounds have been prepared and Phase-I clinical trial is in progress to assess efficacy and safety in pre-diabetic and diabetic patients. It is aimed to develop a drug as per AYUSH regulation.



Processing of *Premna herbacea* shoot to standardized extract tablet.

Liquid antifungal product for foliar application in tea fungal diseases

A liquid antifungal product has been developed using the strain *Streptomyces* sp. TT-3 and validated in commercial Tea Estates of Assam for the application against major foliar tea fungal diseases. The product is effective in control of Fusarium Dieback, Black Rot (causal agent, *Corticium* sp.), Red Rust (causal agent, *Cephaleuros* sp. in both stem and leaf) and Mealy-Bug in commercial Tea Estates. Mass scale production process for the strain TT-3 is standardized.

Streptomyces sp. TT-3 based antifungal product package developed by the Green harvest Pvt. Ltd., Guwahati for marketing.

ACADEMIA-INDUSTRY COLLABORATION

Collaboration of IASST with Emami Ltd., Kolkata and CSIR-IIIM, Jammu

Taking a clue of the global trends and opportunities in plant based medicines, in India, DCGI promulgated guidelines for phytopharmaceutical drug development (similar to US-FDA botanical guidance) in 2015. This new regulation has given a new hope for innovations and development of new drugs from botanicals in a scientific way and would help in the global acceptance of the use of herbal products by modern medical profession.

Under the Phytopharmaceutical Mission, a project "Phytopharmaceutical Development of *Ficus semicordata Buch.-Ham. ex Sm.* as per regulatory guidelines of DCGI" is going on at IASST in collaboration with the Emami Ltd. Kolkata and CSIR-IIIM Jammu.

Commercialization of Antioxidant Rich Beverage Developed at IASST by 'Kryzmal Super Foods Private Limited'

A company named 'Kryzmal Super Foods Private Limited' has approached IASST for commercialization of the technique of production of antioxidant rich beverage using black rice developed at IASST.

Signing of Agreement between IASST and M/S Green Harvest (India) Bio-Tech Pvt. Ltd, Guwahati

On 27th March, 2019 an agreement was signed between IASST and M/S Green Harvest (India) Bio-Tech Pvt. Ltd, Guwahati through which the liquid antifungal products of IASST will be mass produced and marketed by the Company partner.

Technology transfer Agreement signed between the IASST and M/S Green Harvest (India) Bio-Tech Pvt. Ltd, Guwahati, Assam on 27th March, 2019.

PROMOTION OF MEDICINAL PLANTS BASED PRODUCTS

Quality Control and Quality Assurance Laboratory (QC/QA) in IASST under Phytopharmaceutical Mission of India

A QC/QA laboratory started operation in IASST for quality analysis of food and herbal products produced both under Ayush and phytopharmaceutical mode using regulatory guidelines and certification of products. Development of NABL accredited microbiology and animal cell based bioassay laboratory is taken up. IASST has already obtained ISO Certification. The QC/QA laboratory is expected to play an important role in enhancing user confidence and business of herbal products of North East India.

CONSULTANCY SERVICES

During this year, IASST has received offer for providing few consultancy services:

1. Biodiversity assessment of Dibru-Saikhowa reserve forest from Oil India Limited (OIL) for four months. A Rs. 12.2 lakh consultancy project is allotted to IASST for surveying and reporting the plant and animal diversity for an area of 20 KM^2 on the basis of which OIL will carry out oil exploration.

2. Assessment and control measure for major diseases of muga silk worm for a period of six months. IASST has been selected for this consultancy service at a cost of Rs. 37 lakh.

3. ISVEC executed through IASST's TKBDD lab, as paid outsourced service, the analysis of clinical experimental samples on effectiveness of a drug. The samples were from M/s Bordoloi Biotechnology (India) Pvt. Ltd. With this experience, now ISVEC is ready to undertake more similar types of R&D research assignments from Industries.

R&D SUPPORTING ACTIVITIES

(Engineering, Administration, Information Technology and Finance)

Administrative Staff

First row (L to R): Gora Gupta, Assistant; Prabodh Kr. Deka, S.O. (Admin.); B. Bose, Consultant; Dharmeswar Das, Chief Consultant; Dr. Narayan C. Talukdar, Director; Dr. Diganta Goswami, Registrar; Pradyut Borkataki, Finance & Accounts Officer; Suresh Sharma, S. O. (Acctts.); Ramen Mahanta, Superintendent; Nabajyoti Choudhury, Programme Manager; Rabin Ch. Kalita; Superintendent.

Second row (L to R): Lelin Gogoi, PS to the Director; Prabhat Barma, Assistant; Diganta Das, Assistant; Kumud Baishya, Library Assistant; Lakhi K. Saud, MTS; Dwijendra Deka, Superintendent; Ratul Baishya, MTS; Ksh. Sharmina Devi, Receptionist; Nirmali Devi, Hindi Assistant; Pinky Taye, Assistant; Saraswati Bora, Superintendent; Subrata Goswami, Technical Assistant; Bolin Das, MTS; Rajesh Sharma, PRO.

Third row (L to R): Dinesh Deka, Gardener; Pranab Talukdar, Driver; Sanjib Kr. Das, Driver; Moommee Deka, Assistant (Accounts); Sarala Deka, Library MTS; Hemanta Sarma, Assistant (Accounts).

Fourth row (L to R): Ajay Baishya, Mali; Dr. Anil Kumar, Technical Co-ordinator; Nripen C. Goswami, MTS; Bimal Das, Driver.

Technical and Supporting Staff

First row (L to R): Prakash Kumar Kachari, Field Supervisor; Nayan Talukdar, Technical Officer; Gautam Kr. Medhi, IEME; Montu Deka, Assistant Engineer; Tarini Dev Goswami, Assistant Librarian & Center In-Charge (KRC); Juri Pathak, Technical Officer; Hiranya Kumar Das, EMC; Jayanta Borthakur, Network & System Administrator; Subhrojit Sengupta, Technical Assistant (KRC).

Second row (L to R): Madhu Ram Kalita, MTS; Mukta Ram Kumar; Dijoraj Roy Choudhry, Plumber; Bikash Das, JE (Electrical); Kumud Patgiri, Electrician; Kishor Das, Electrical helper; Debajit Deka, Jr. Network Administartor; Uddipta Deka, Resident Electrician.

First row (L to R): Bijoy Borah, casual worker; Prafulla Das, casual worker; Junu Boro, casual worker; Ghanashyam Das, supervisor; Sangita Boro, casual worker; Rinki Das, Front office Assistant; Prasanta Ch. Das, Secretarial Assistant; Padmini Rajbonshi, casual worker; Jagannath Das, casual worker; Pabitra Talukdar, casual worker.

Second Row (L to R): Manab Chandra Pathak, casual worker; Ramen Talukdar, casual worker; Bhagaban Boro, casual worker; Bimal Saikia, casual worker; Satya Singh Swargiary, casual worker; Rajiv Rongpi, casual worker; Ripan Saikia, casual worker; Kanak Kalita, casual worker; Ajit Boro, casual worker; Deepak Das, casual worker; Lakshman Das, casual worker; Nipen Boro, casual worker; Manoranjan Boro, casual worker; Rabin Deka, casual worker.

A. MEETINGS AND ACTIVITIES OF VARIOUS COMMITTEES

A.1 Governing Council Meetings

Eleventh meeting of the Governing Council, IASST

The eleventh meeting of the governing council of IASST was held on 15th September 2018 in the technology bhavan, Department of Science and Technology (DST), New Delhi under the chairmanship of Professor Ashutosh Sharma, Secretary, DST, Govt. of India. The major recommendations/approvals of the meeting were-

1. Approval of signing of the MOU between DST, New Delhi and IASST, Guwahati in pursuance of the Rule 229 (xi) of GFR 2017.

2. Approval of IASST Annual Report 2017-2018.

3. Approval of all the recommendations of 10th finance committee meeting held on 28.07.2018.

4. Ratification of promotion of Dr. Suresh Deka, LSD, IASST from Professor I to Professor II.

5. Approval of recruitment of 3 scientist positions against vacancies in addition to already advertised 8 nos of scientist positions.

Professor Ashutosh Sharma, Secretary DST chairing the 11th GC meeting of IASST

A.2 Finance Committee Meetings

Tenth meeting of finance committee, IASST

The 10th meeting of finance committee of IASST, Guwahati was held at the institute campus, Guwahati on 27.07.2018. The major recommendations of this committee were-

1. Approval of audited accounts of IASST for the FY 2017-18.

2. Approval of budget estimate of ₹ *41.26 crores* for the FY 2018-19 and fund allocation of ₹30 crores.

3. Recommendation for initiation of process for creation of 12 nos. of additional administrative posts at different levels.

4. Approval of ongoing major civil construction activities of the Institute.

Eleventh meeting of finance committee, IASST

The 11th meeting of finance committee of IASST was held at Technology Bhawan, Ministry of Science & Technology, Govt. of India, New Delhi on 27.02.2019. The major recommendations of this committee were-

1. Approval of budget estimate for the FY 2019-20.

2. Recommendation for initiation of process for creation of post of Hindi Assistant.

3. Recommendation for submission of revised estimates for ongoing major construction activities.

A scene from the 11th FC *meeting of IASST held in the Technology Bhavan, DST, New Delhi*

A.3 Building works committee (BWC) meetings

Seventeenth BWC meeting, IASST

The 17th BWC meeting was held at IASST on 08.05.2018 under the chairmanship of Dr. N. C. Talukdar, Director. The major decisions/deliberations of the meeting are as below-

i) Approval of construction of the academic staff quarter

ii) Approval of estimate of electrical cable tray costing ₹*28,13,500 for the CIF building.*

Eighteenth BWC meeting, IASST

The 18th BWC meeting was held at IASST on 02.08.2018. The major deliberations/ decisions are as below-

i) Constitution of a sub committee to examine consultancy charges of architect M/S Design Consortium for the CIF building.

ii) Approval of VRF system of central air conditioning of CIF building at a cost of ₹1,39,076.

iii) Approval of allotment of work "ST/SC training facility" to M/S Elemente Design Home, Uttarakhand at a total work value of 1, 64, 57,400.

Nineteenth BWC meeting, IASST

The 19th BWC meeting was held on 25.02.2019 at IASST. Major discussion/ deliberations are as below-

i) Discussion on delay in execution of the construction of CIF and animal house facility.

ii) Review of progress of construction of academic staff quarter building.

iii) Approval of construction of an observatory building (recreational facility for children) at an estimated cost of ₹ 50.4 lakhs.

A.4 Activities of Vigilance, RTI and Women Cell in IASST

The institute has a part-time vigilance officer appointed by DST, Govt. of India, New Delhi who deals with all vigilance matter pertaining to IASST, Guwahati. The vigilance officer furnishes certain reports/returns to the Chief Vigilance officer on regular basis. The vigilance officer is not directly associated in decision making or finalization of tenders/purchase and audit matters. No vigilance case is pending or contemplated against any employees of IASST during 2018-19.

The institute has a Central Public Information Officer (CPIO) who furnishes information under Right to Information Act (RTI) 2005. During the year 2018-19, 5 nos of applications under RTI Act 2005 were received online and replies were sent both online and in hard copies. The institute submitted all the RTI quarterly returns for the year 2018-19 in the central information commission (CIC) RTI annual return information system.

IASST has a women cell constituted for woman welfare and to attend problems/inconveniences of women employees in IASST which also acts as Internal Complaints Committee (ICC) to deal with Sexual Harassment of Women at Workplace. No complaints were filed to the Women Cell during the year 2018-19.

B. MAJOR ADMINISTRATIVE ACTIVITIES

B.1 Recruitment of academic staff

IASST started recruitment process to fill up eight vacant faculty positions in areas namely natural product chemistry, bio-diversity and eco-system research program/wetland ecology, sericulture/seri biotechnology, plasma physics, applied mathematics, molecular biology, system biology and biophysics. The advertisement was published in the month of August 2017. Interviews were held in Nov.-Dec. 2018 after shortlisting of candidates. Out of the eight positions only three were filled up, none found suitable for other positions. The institute readvertised to fill up remaining vacant positions and also for additional three vacancies vide advt. no 164 dated 28.11.2018. From January 2019 onwards screening and shortlisting of applicants and interviews for various positions were held. Interviews of shortlisted candidates were carried out in two phases- first presentation of research achievement and future research plan followed by personal interactions with committee members comprising of eminent scientists from all over the country. Altogether, eight positions have been filled up and recruitment of remaining three positions is under process. The following are details of candidates recruited.

Sl. No.	Name and designation	Research field	Qualification and other details
1	Dr. Jagat Ch. Borah Associate Prof. II	Natural Product Chemistry	Ph.D. from CSIR-NEIST, Jorhat PDF at Mount Sinai School of Medicine, New York City, USA
2	Dr. Mrinal Kr. Das Asstt. Prof. II	Molecular Biology	Ph.D. from University of Delhi Newton Post Doctoral Fellow at University of Leicester, England
3	Dr. Subir Biswas Asstt. Prof. II	Plasma Physics	Ph.D. from SINP-Calcutta University, PDF at Weizmann Institute of Science, Israel
4	Dr. Santu Das Asstt. Prof. II	Applied Mathematics	Ph.D. from IIT Guwahati
5	Dr. R. Prahlad Hepat Asstt. Prof. II	Sericulture/Seri biotechnology	Ph.D. from Andong National University, South Korea, PDF at University of Kentucky, USA
6	Dr. Prasenjit Manna Asstt. Prof. II	Medicinal Chemistry	Ph.D. from Bose Institute- Jadavpur University, PDF at LSU Health Sci. Centre, USA, Ramalingaswami Fellow at CSIR-NEIST Jorhat
7	Dr. Biswajit Chaudhury Asstt. Prof. II	Advanced Material Science	Ph.D. from Tezpur University PDF at IIT Guwahati, DST INSPIRE Faculty at IASST
8	Dr.(Mrs.) Kamatchi Asstt. Prof. II	Biophysics	Ph.D. from CLRI-University of Madras, DST INSPIRE Faculty at NIT Tiruchirappalli, TN

B.2 Information technology, e-governance and e-finance promotion at IASST

Following the footsteps of digital India and for smooth operation of the institute, IASST introduced the following new facilities during this year-

Installation of rack servers with virtualization

IASST has replaced its old blade server infrastructure with 2 rack servers for critical applications. These 2 physical servers are now equivalent to 11 nos of virtual machines (VM) having been installed with industry leading virtualization softwares. A total cost of ₹2479400 was involved in the process. This helps us to reduce the use of electricity and cooling requirement.

Installation of next generation firewall

New next generation firewall with better firewall throughput has been installed at IASST for upgradation of institute security system. Additionally, some new security features like cloud sand boxing for real time threat protection and user based authentication have also been enabled.

Strengthening the surveillance system and LAN extension

IASST has strengthened its surveillance system by installing new CCTV cameras in some common places of the IASST campus. Institute also extended its local area network by laying underground fibers & cat 6 cables and also installed manageable network switches in areas like newly constructed Admin and KRC block of old admin building.

Installation of open source monitoring system

An open source monitoring system for IT infrastructure management has been installed at IASST which will help IT unit to address both immediate and unforeseen operational issues, including infrastructure and IT processes.

Extension of virtual classroom setup

The virtual classroom setup has been extended from second floor class room to conference hall and auditorium of the institute. The 40th foundation day program of the institute was successfully broadcasted in parallel in all these rooms. With the help of this, all three rooms virtually become a single room. More than 200 audiences participated in the program through this virtual audio visual system.

Foundation day program held in the auditorium (Left) is being broadcasted to second floor classroom of IASST (Right).

Re-designing and modification of the stock module in the e-finance package and barcoding and asset verification for fixed assets.

E-finance package is in operation at IASST since the year 2012 and during 2018-19, some extra features such as barcode label printing, SMS alert, automatic order generation etc have added in the stock module of the software.

Along with this, for all fixed assets of the institute, verification, data entry and computer based labeling have also been accomplished with the help of an out sourced team.

Development of online requisition portal for CIF facility

IASST had started an online portal for submission of online requisition for various instruments of CIF for external as well as internal users. After successful registration, requisition can be submitted for the instrument. Report on the experiment can be downloaded through this online portal. A payment gateway is also being integrated with this portal, so that external users can process their payment online.

Status of GeM purchasing

During the year 2018-19, items of value more than ₹ 59 Lakhs have been purchased via Government e-marketplace (GeM).

B.3 Civil infrastructure creation during the year 2018-19

Pre-engineered SC/ST training facility

This is a light gauge steel frame structured (LGSFS) G+2 storied building constructed by the contractor M/S Elemente Designers Home, Uttarakhand. Total value of the work is ₹1,64,57,400. The building is in completion stage.

SC/ST training facility getting complete

Academic staff quarter

To provide housing facility mostly for scientists, one residential complex comprising of three buildings having 6 units of Type IV quarter, 5 units of Type V quarter and 8 units of studio apartment are under construction. The buildings are G+2 storeyed with provision of car parking. The work was allotted to M/S Bimal Agarwala, Guwahati at a work value of ₹710.00 lakh.

Architectural design of the academic staff quarter.

Construction of observatory building

As a part of recreational facility for children, an observatory is under construction in the Bio Conservation Hub (BCH) of IASST. The work is allotted to M/S Bimal Kumar Agarwala at a work value of ₹ 50.40 lakhs. The work is expected to be completed by September, 2019.

Opening and operation of mini sports complex

During the year 2018-19, gymnasium equipment costing an amount of ₹*20 lakh (approx.)* has been installed in the mini sports complex. The mini sports complex also houses a badminton court. Students, staff and residents of the IASST complex are availing these facilities for better health and fitness.

Snapshots of mini sports complex

Renovation and remodeling of administrative block

The location of Admin block and Library has been interchanged and the admin and accounts office is shifted to the first floor to a renovated and remodeled office block. The work was allotted to M/S Sunrise Associates, Guwahati at a work value of ₹*37, 31,630*. The work was started on 16.02.2018 and completed on 25.11.2018. The office is now functioning fully from its new block.

Renovated administrative block

Designing and making of museum

To facilitate the display of important animal and plant specimen and the local artifacts to commom people a small museum has been built in the vertical extension portion of the main building. The work was allotted to M/S Aditi Library Services at a work value of ₹9, 97,577. The work was started on 12.10.2018 and completed on 05.04.2019.

Renovation and remodeling of IASST library/KRC

The IASST library has been shifted to a renovated and remodeled block in the ground floor. The work was allotted to M/S Aditi Library Services, Guwahati.

Renovated and remodelled IASST library

Development of Bio Conservation Hub

The Bio Conservation Hub of the IASST has been developed by introducing new features as below:

i) **Demarcation line for BCH**- The work was allotted to the contractor/S Pradip Kumar Talukdar at a work value of ₹10, 10,853/-. The demarcation line covers Som plantation, pond, medicinal garden and valuable wood plantation area.

ii) D**ressing, leveling and earth filling work at BCH**- This work was allotted to M/S Hima Enterprise at a total work value of ₹34,95,123/-.

iii) **Renovation and repairing of boundary wall from BCH gate no.2 to Gate No.3-** The work was allotted to M/S Darshan at a work value of ₹12,06,472/-.

iv) **Development of small tea garden-** In the BCH area a small tea garden has been developed by planting about 200 nos. of tea plants of various clones along with 16 nos. of shade trees.

Bio conservation hub of IASST

B.4 Staff welfare measures

IASST has been persistently carrying out several welfare measures and introducing new ones time to time for the welfare of the employees.

Medical facility

The institute has its medical reimbursement system through which expenses of both indoor and outdoor treatment for all the regular employees and their family members are reimbursed as per CGHS rules and rates. In addition to regular employees, the medical facility is also extended to research scholars and temporary employees engaged for short term on contract basis. One part time allopathic doctor is also engaged as consultant for 3 days a week for consultation in the institute as well as in his private chamber. Facilities like rest bed, pressure machine and common medicines are available in the institute. A dedicated room equipped with routine medical equipment and medicines is being used as Doctor's Chamber in the main building. Beside this the institute empanelled few renowned hospitals of Guwahati to provide medical facilities as per central government/CGHS rates. These includes-1) Ayursundra Superspecialty Hospital, Gorchuk, Guwahati-35 (2) Hayat Hospital, Lalganesh, Guwahati-34, (3) Arya Hospital, Rehabari, Guwahati-8, (4) GNRC limited, Guwahati-6 (5) GNRC Limited, Sixmile, Guwahati-22 (6) Narayana Superspecialty Hospital, Amingaon, Guwahat-31 (7) Panacea Medical Research and Diagnostic, Bhangagarh, Guwahati and (8) ASG eye hospital, sixmile, Guwahati. Out of these, Hayat Hospital, Arya Hospital, Ayursundra Superspecialty Hospital and Panacea provide medical facility to beneficiaries on credit basis. These hospitals also organized "Health checkup and Awareness camps" at IASST time to time to spread awareness about risky non-communicable diseases and advise on good life style and healthy living to keep doctors away.

Canteen and mess facility

The institute canteen is outsourced to a private caterer who serves meals, snacks and beverages in hygienic condition to employees, students and guests at subsidized rates. The private caterer also provides hygienic food to the boarders and guests in the Dorothy Hodgkins Students and Scientists' Home. In addition to this there is a private canteen within the complex which remains open from morning till evening.

Benevolent fund

An IASST employees' Benevolent Fund was established by equal contribution from employees and the institute. All the regular staff members are by default the members of the Fund. The fund envisages a benefit in the form of one-time payment to nominees of the members in case of death and permanent disability while in service.

Group insurance

A group insurance scheme for the employees of the institute is operating with the Life Insurance Corporation of India. All the regular employees of the institute are members of the scheme. Subscription for the scheme is made by the institute to get appropriate insurance cover for each group of employees.

Housing facility

The institute has limited housing facility. Six nos. of quarters in the old residential building are allotted to few essential service staff of the institute. The Dorothy Hodgkins Students' and Scientists' Home (SSH) also houses the superintendent of SSH in absence of dedicated type quarter. The Director is residing in the newly built quarter in the midst of Bio Conservation Hub. The SSH and the Old hostel together accommodates 52 nos. of research scholars. Moreover, there are 3 nos. of VIP suites and 6 nos. of scientist rooms in SSH for accommodating guests who visit IASST from various parts of India and abroad. A new building containing twelve nos. of quarter for essential service staff and two dormitories (One each for boys and girls) is constructed and already occupied. Each of the dormitories have arrangement of 12 Godrej bunker beds for students who visit IASST for various training and summer internship programmes. The Academic Staff quarter building consisting of 6 nos. of Type IV, 5 nos. of Type V and 8 nos. of Studio Apartment is under construction and is likely to be completed soon.

B.5 Different government policies adopted in IASST

Reservation policy

The Institute is following post based rosters to meet the prescribed percentage of reservations for SC/ST/OBC categories in all its new recruitments as per Government of India Rules.

Official language policy

The institute is paying emphasis on implementation of provisions of Official Language Act and the rules made and instructions issued thereunder. All the letter heads of the institute are in bilingual format. Annual report of the Institute is published both in English and Hindi. All the nameplates and signboards of the institute are made bilingual (English and Hindi). The institute appointed a Hindi assistant who is looking after the implementation of the official language at IASST. The employees have started getting used to writing note in the file in official Hindi language. Four nos. of Hindi workshop and four nos. of official language implementation committee meeting were also organized in the institute during 2018-2019. The institute is also celebrating Hindi Diwas every year with great zeal to popularize Hindi as a "Rajbhasa".

A Hindi Inspection Team of DST, Govt. of India visited IASST on 15th March 2019 and interacted with the employees of IASST. They encouraged the employees to conduct official activities in Hindi language and also discussed about various benefits of using Hindi in the office. Mr. K.N Singh, Asst. Director (OL), DST; delivered a talk in IASST auditorium.

Visit of Hindi Inspection Team from DST, Govt. of India

B.6 Revenue generation

The Institute realizes that there has to be efforts towards revenue generation venture without affecting the primary mandates of high quality basic research and academic programme of producing Ph.Ds. and training graduate level students for developing research skill. Through several extramural grants, institute earns overhead charges which are handy in reducing the maintenance cost provision from core budget. Besides, the internal source of income generation during 2018-19 is highlighted in the following table.

Source of Income	Amount (₹)
Laboratory instrument use charges	3,64,257.00
Sale proceeds of institute products	7,76,676.00
Other receipts (tender paper charge, bank interest etc.)	31,92,083.00
Hostel/guest house receipt	16,37,037.00
Total	**59,70,053.00**

B.7 ISO 9001-2015 Certification process

Adoption of quality management system is a strategic planning of IASST for sustainable development initiatives to improve its overall performance. Therefore it is desirable to implement the quality management system based on International Standard. This will help in provision of consistent delivery of products and services that meet the demand of cliental groups and stakeholders with applicable statutory and regulatory requirements. The International Standards Organization (ISO) has already audited the institute for assessing achievement of the institute in development of a common Higher Level Structure (HLS) for management system standards, issued under an ISO directive and considered for award of ISO 9001-2015 certification. The institute as whole and the laboratories are developed in

conformity with the standard prescribed and calibration of the instruments have been made accordingly at regular interval. The ISO auditors have already recommended for ISO 9001-2015 certification of the institute and reward of certificate is awaited.

Visit of ISO team to one of the IASST laboratories.

B.8 Initiation for a new campus for expansion of IASST R&D activities

The IASST land area campus of 20 acre is fully utilized for different infrastructures including labs extension and residential buildings. For expansion of its research activities of present and also future, need for more land is becoming apparent. The Department of Science and Technology under Ministry of S & T, GoI was approached to request Govt. of Assam to allot more land to IASST in the neighbourhood of its current campus. Accordingly, the Hon'ble Minister, Science & Technology and the secretary, DST, Govt. of India wrote to the Chief Minister and Chief Secretary, Govt. of Assam, vide letter D.O AI/1/81/IASST/2017 Dtd. 13.11.2017 and letter D.O AI/5/12/IASST/2017 Dtd. 3.11.2017 respectively. However, no Govt. land and could be obtained due to non-availability. On suggestion of officials of Govt. of Assam, the Chief, BTC was approached if additional land for extension of R & D activities of IASST could be allotted. The Chief, BTC responded positively and requested IASST to make a PowerPoint presentation on different types of activities of IASST and how their expansion activities in additional land will benefit people of BTC and Assam. The executive members of BTC were very happy to learn different research, development and outreach activities of IASST and passed a resolution to allocate about 200 acres Govt. land to IASST in Kokilabari farm which is about one and a half hour distance from IASST's campus.

Dr. N.C. Talukdar, Director, IASST showing different R&D activities of IASST to the Executive Members of BTC through PowerPoint presentation on 14th March 2019.

FINANCIAL STATEMENTS

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

INDEPENDENT AUDITOR'S REPORT

TO
THE MEMBERS
THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
GUWAHATI

We have audited the accompanying Financial Statements of **The Institute of Advanced Study in Science & Technology, Paschim Boragaon, Garchuk, Guwahati** which comprise the Consolidated Balance Sheet as at 31st March, 2019, the Consolidated Receipts and Payments Account and the Consolidated Income and Expenditure Account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for Financial Statements :

Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance of the society in accordance with the Accounting Standards generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from misstatement, whether due to error or fraud.

Auditor's Responsibility :

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with ethical requirements and plans and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the society's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Cond..P/2

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.रस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35:असम:भारत
Guwahati-781035: Assam:India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उच्च अध्ययन संस्थान
Institute of Advanced Study in
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Paschim Boragaon, Guwahati-35:Assam:India

निदेशक/Director
आई.ए.एस.टी, पश्चिम बड़ागाव

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K P SARDA COMPANY
SC-11, Parmeshwari Building, 2nd Floor
Chatribari Road, Guwahati - 781001, Assam
http://kpsardaco.org.in

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

Opinion:

In our opinion and to the best of our information and according to the explanations given to us, the financial statements give the information required by the Act in the manner so required and give a true and fair view in conformity with the accounting principles generally accepted in India :

(a) In the case of the Balance Sheet, of the state of affairs of the Society, as on 31st March, 2019;

(b) In case of the Income and Expenditure Account of the Income/Expenditure of Society for the year ended 31st March, 2019;

(c) In case of the Receipts and Payment Account of the Receipts/Payments of Society for the year ended 31st March,2019

We further report that:

(a) We have obtained all the information and explanations to the best of our knowledge and belief were necessary for the purpose of our audit;

(b) In our opinion, proper books of account, as required by law have been kept by the Society so far as appears from our examination of those books;

(c) The Balance Sheet, the Receipts and Payments Account and the Income and Expenditure Account dealt with by this Report are in agreement with the books of account.

For K.P. Sarda & Co.
Chartered Accountants
FRN : 319206E

K.P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No.054555

Place : Guwahati
Date : 20/06/2019

Finance & Accounts Officer
IASST, Gauhati Boragaon
Guwahati-781035, Assam, India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उच्च अध्ययन संस्थान

निदेशक/Director
आई.ए.एस.टी., पश्चिम बड़ागाव
IASST, Paschim Boragaon

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CHARTERED ACCOUNTANTS

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

CONSOLIDATED BALANCE SHEET AS ON 31ST MARCH, 2019

PARTICULARS	Schedule	Amount (₹) 2018-19	Amount (₹) 2017-18
CAPITAL FUND & LIABILITIES			
Capital Fund	1	707,168,018.11	644,347,469.72
Reserve & Surplus	2	77,492.00	70,292.00
Earmarked Funds	3	23,651,463.32	26,545,877.49
Current Liabilities and Provisions	4	167,491,788.01	132,111,508.33
TOTAL :		**898,388,761.44**	**803,075,147.54**
ASSETS			
Fixed Assets	5	682,812,786.60	627,167,815.80
Investments	6	10,077,181.00	20,143,750.00
Current Assets, Loans and Advances	7	205,498,793.84	155,763,581.74
TOTAL :		**898,388,761.44**	**803,075,147.54**

NOTES ON ACCOUNT - SCHEDULE "8"

In terms of our report of even date annexed hereto.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35:असम:भारत
Guwahati-781035: Assam:India

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Institute of Advanced Study
Science & Technology
पश्चिम बड़ागाव, गुवाहाटी-35, असम, भारत
Paschim Boragaon, Guwahati-35, Assam, India

निदेशक/Director
आई.ए.एस.एस.टी. पश्चिम बड़ागाव
IASST, Paschim Boragaon
Guwahati-781035

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

CONSOLIDATED INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2019

EXPENDITURE		Amount (₹)	INCOME		Amount (₹)
DST GENERAL FUND :			**DST GENERAL FUND :**		
General Expenses	66,423,477.48		Revenue Grant	243,786,000.00	
Salary & Allowances	107,717,490.00		Penal Interest	4,282.00	
Institutional Projects	877,041.00		Interest From Advance	6,135.00	
Financial Assistance for			Bank Interest	20,035.00	
Seminar/Workshop	100,000.00		Other Income	1,259,534.00	245,075,986.00
Workshop & Conference	19,500.00	175,137,508.48			
			MISCELLANEOUS & OTHERS :		
MISCELLANEOUS & OTHERS :			Bank Interest	553,838.00	
Audit Fees	109,740.00		Penal Interest	10,407.00	
Mess Expenditures	1,778,665.00		Interest on FD	285,970.00	
Bank Charges	4,783.80	1,893,188.80	Other Income	5,255,800.82	
			Mess Dues	1,672,764.57	
Surplus transferred to			Contribution to Employees		
a) Unutilised Grant	68,648,491.52		Benevolent Fund	7,200.00	7,785,980.39
b) Capital Fund	7,175,577.59				
c) Benevolent Fund	7,200.00	75,831,269.11			
		252,861,966.39			252,861,966.39

NOTES ON ACCOUNT - SCHEDULE "8"

In terms of our report of even date annexed hereto.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

K. P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.ए.टी. पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35(असम)भारत
Guwahati-781035 Assam:India

कुलसचिव/Registrar

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आई.ए.एस.ए.टी. पश्चिम बड़ागाव
IASST, Paschim Boragaon
Guwahati-781035 Assam:India

विज्ञान एवं प्रौद्योगिकी उच्च अध्ययन संस्थान
Institute of Advanced Study in Science & Technology
पश्चिम बड़ागाव, गुवाहाटी-35 असम भारत
Paschim Boragaon,Guwahati-35 Assam:India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

CONSOLIDATED RECEIPTS & PAYMENTS ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2019

RECEIPTS		Amount (₹)	PAYMENTS		Amount (₹)
To **OPENING BALANCE :**			By **DST GENERAL FUND :**		
Cash in Hand	20,000.00		General Expenses		68,942,061.76
Cash at Bank (As per Schedule 7)	59,690,547.74	59,710,547.74	Capital Expenses		155,495,922.30
			Salary & Allowances		110,349,333.00
			Empowerment of SC/ST people		500,626.00
" **Grant- in-Aid**			Institutional Projects		109,383.00
Capital Grant	96,499,000.00		Workshop & Conference		19,500.00
Revenue Grant (Annexure "F")	288,140,457.00	384,639,457.00	Financial Assistance for Seminar/Work		100,000.00
			" **EXTRAMURAL PROJECTS :**		
" **OTHER RECEIPTS :**			Contingency		3,089,438.68
Bank Interest	2,634,976.00		Consumables		12,221,011.67
Interest on FD	285,970.00		Overheads		2,366,704.00
TA Grant	806,275.00		Salary		30,816,381.00
Penal Interest	14,689.00		Travel		1,928,224.82
Other Income	6,896,742.82		Training		597,614.00
Mess Dues	1,672,764.57		Miscellaneous		0.00
Interest from Advance	6,135.00	12,317,552.39	Equipments		13,331,021.52
" Earnest Money Received		70,000.00			
			" **MISCELLANEOUS & OTHERS :**		
" Fixed Deposit Matured		60,484,267.00	Mess Expenditures		1,778,665.00
			Audit Fees		109,740.00
" Advance for LC/TT (HDFC A/c)		171,909.96	Bank Charges		4,783.80
" Advance from Project to Overhead		8,239,715.00	" Investment in Fixed Deposits		50,077,181.00
" Security Deposits		4,552,087.00	" Advance for LC/TT (HDFC A/c)		171,909.96
" Contribution to Employees Benevolent Fund		7,200.00	" Advance from Project to Overhead		8,239,715.00
			" Inter Fund Transfer within Project		1,050,000.00
" Inter Fund Transfer within Project		1,050,000.00			
			" **CLOSING BALANCE :**		
			Cash in hand	20,000.00	
			Cash at Bank (As per Schedule 7)	69,923,519.58	69,943,519.58
		531,242,736.09			531,242,736.09

We have verified the above statement of Receipts & payments Account of the Institute of Advanced Study in Science & Technology, Paschim Boragaon, Guwahati - 781 035, Account - Plan for the period from 1st April 2018 to 31st March, 2019 from the Books of Accounts and vouchers

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

K P Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

3

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35:असम:भारत
Guwahati-781035: Assam:India

कुलसचिव/Registrar

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 1 : :: CAPITAL FUND ::

	Amount(₹) 2018-19	Amount (₹) 2017-18
Opening Balance	644,347,469.72	484,434,575.62
Add : Contribution towards Capital Fund (Addition to Fixed Assets)	146,838,869.80	217,395,240.00
Add : Surplus for the year	7,175,577.59	6,477,854.79
Add : Transferred from Unutilised Grant	0.00	14,494,005.31
	798,361,917.11	722,801,675.72
Less : Depreciation for the year	91,193,899.00	78,454,206.00
	707,168,018.11	**644,347,469.72**

SCHEDULE - 2 : :: RESERVES & SURPLUS ::

	Amount(₹) 2018-19	Amount (₹) 2017-18
IASST Employees Benevolent Fund (664178)	77,492.00	70,292.00
	77,492.00	**70,292.00**

SCHEDULE - 4 : :: CURRENT LIABILITIES AND PROVISIONS ::

		Amount(₹) 2018-19	Amount (₹) 2017-18
CURRENT LIABILITIES :			
Unutilised Grant in Aid	(As per Annexure "A")	138,350,268.82	120,286,647.10
Earnest Money		1,138,398.00	1,068,398.00
Security Deposit Payabl	(As per Annexure "B")	10,771,106.23	6,219,019.23
Other Current Liabilitie	(As per Annexure "C")	17,232,014.96	4,537,444.00
		167,491,788.01	**132,111,508.33**

SCHEDULE - 6 : :: INVESTMENTS ::

	Amount(₹)
Opening Balance	20,143,750.00
Add : Investment made during the year	50,077,181.00
Add : Interest Accrued	626,487.00
Less : TDS	0.00
Less : Fixed Deposit matured during the year	60,484,267.00
Less : Interest received during the year	285,970.00
Balance as on 31/03/2019	**10,077,181.00**

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
IASST, Paschim Boragaon
Guwahati-781035, Assam India

कुलसचिव/Registrar

निदेशक/Director

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 7 : :: CURRENT ASSETS, LOANS & ADVANCES ::

		Amount(₹) 2018-19	Amount(₹) 2017-18
(A) CURRENT ASSETS :			
Cash in hand		20,000.00	20,000.00
Balance with Banks	**Account No.**		
SBI Khanapara Branch	(943972)	158,215.28	289,733.30
SBI Khanapara Branch - Workshop	(943723)	181,366.83	174,587.83
Vijaya Bank - Travel	(000441)	163,176.29	161,746.29
SBI Khanapara - International Conference	(635294)	12,335.00	11,912.00
SBI - IASST Corpus Fund	(943064)	209,149.53	168,236.53
SBI Garchuk Branch - Project	(260721)	42,695,018.75	33,330,401.69
SBI - Herbal Medicine N.C. Talukdar	(862670)	937,247.43	14,794,200.98
SBI - IASST Employees Benevolent Fund	(664178)	80,217.00	70,292.00
SBI - Students & Scientist Home (IASST)	(412886)	479,212.79	568,064.62
SBI G.U. Branch - Upgrading	(131613)	48,670.86	47,004.86
Vijaya Bank - Overhead/Miscellaneous	(000466)	24,354,135.06	10,074,367.64
HDFC Bank- Project	(120592)	604,774.76	0.00
	TOTAL (A)	69,943,519.58	59,710,547.74
(B) LOANS, ADVANCES & OTHER ASSETS :			
Crest Award		343,770.00	343,770.00
TDS		126,315.00	126,315.00
Inter Fund Transfer (IASST Fund to Herbal Medicine)		1,050,000.00	0.00
Advances against Expenditure of Grants (Annexure "D")		21,233,625.28	14,478,828.00
Advances against Fixed Assets (Annexure "E")		100,607,425.02	77,321,607.00
Advance from Extramural Project to Overhead		11,850,309.00	3,610,594.00
Advance from DST to Project		343,829.96	171,920.00
	TOTAL (B)	135,555,274.26	96,053,034.00
	TOTAL (A+B)	**205,498,793.84**	**155,763,581.74**

5

K. Barua & Co. Guwahati Chartered Accountants

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बोरागाव
IASST, Paschim Boragaon
गुवाहाटी-35, असम:भारत
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Paschim Boragaon, Guwahati-35, Assam:India

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़गाँव
IASST, Paschim Boragaon
गुवाहाटी-35, असम:भारत
Guwahati-781035, Assam:India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 3 : **:: EARMARKED FUNDS ::**

	Particulars	Salary	Contingency	Travel	Consumables	Training	Overhead	Misc.	Bank Interest	Refund Against Advance (Receipt)	Refund (Payment)	Total(₹)
a)	**Opening Balance**	12,895,126	2,563,468	279,560	7,079,960	616,369	415,171	1,861,040	2,797,138	291,309	-2,253,264	26,545,877
b)	**Addition to the Funds**											
	i) Grants	29,001,587	2,393,003	1,368,000	8,597,567	885,000	2,109,300	0	0	0	0	44,354,457
	ii) Other Receipts	0	0	806,275	0	0	0	381,408	1,630,930	0	0	2,818,613
		29,001,587	2,393,003	2,174,275	8,597,567	885,000	2,109,300	381,408	1,630,930	0	0	47,173,070
	TOTAL (a+b)	41,896,713	4,956,471	2,453,835	15,677,527	1,501,369	2,524,471	2,242,448	4,428,068	291,309	-2,253,264	73,718,947
c)	**Payment towards objectives of Funds**	30,816,381	3,089,439	1,928,225	12,221,012	597,614	2,366,704	0	0	0	0	51,019,374
d)	**Advances**											
	PY Advance Adjusted	0	11,000	69,600	73,150	114,200	0	0	0	0	0	267,950
	CY Advance Given	0	131,920	242,900	170,329	248,000	0	0	0	0	0	793,149
		-0	120,920	173,300	97,179	133,800	0	0	0	0	0	525,199
e)	**Current Liabilities**											
	PY Liability Adjusted	121,691	60,000	0	0	0	0	0	0	0	0	181,691
	CY Liability Created	0	0	0	0	0	0	0	0	0	0	0
		-121,691	-60,000	0	0	0	0	0	0	0	0	-181,691
f)	**Expenditure towards objectives of Funds (c-d+e)**	30,694,690	2,908,519	1,754,925	12,123,833	463,814	2,366,704	0	0	0	0	50,312,484
g)	**Adjustment of Refund**	1,278,114	-199	39,040	220,000	0	0	180,000	0	291,309	-2,253,264	-245,000
h)	**Net Balance as at the year end (a+b-f-g)**	9923909.4	2048150.8	659870.2	3333694.8	1037555.0	157767.0	2062447.9	4428068.2	0.0	0.0	23651463.3

Barua & Co. Chartered Accountants Guwahati

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 5 : **:: FIXED ASSETS ::**

PARTICULARS OF DEPRECIATION ALLOWABLE AS PER THE IT ACT, 1961 IN RESPECT OF EACH ASSET OR BLOCK OF ASSETS, AS THE CASE MAY BE, IN THE FOLLOWING FORM

Particulars	W.D.V on 01/04/18	Additons/(Deletion) >180 days	Additons/(Deletion) <180 days	Total	Depreciation	W.D.V on 31/03/19
Block "A" : 0%						
Land	0.00	0.00	0.00	0.00	0.00	0.00
Block "B" : 10%						
Building & Site Development	364,361,061.66	46,357,995.00	63,540,490.00	474,259,546.66	44,248,930.00	430,010,616.66
Furniture & Fixtures	32,722,696.45	1,856,432.00	1,319,555.00	35,898,683.45	3,523,891.00	32,374,792.45
Block "C" : 15%						
Equipments	209,242,777.67	19,695,823.80	4,606,038.00	233,544,639.47	34,686,242.00	198,858,397.47
Air Conditioner	4,061,831.00	482,457.00	442,977.00	4,987,265.00	714,866.00	4,272,399.00
Refrigerator	10,798.00	0.00	0.00	10,798.00	1,620.00	9,178.00
Projector	78,778.00	0.00	0.00	78,778.00	11,817.00	66,961.00
Vehicles	6,687,637.00	0.00	0.00	6,687,637.00	1,003,146.00	5,684,491.00
Block "D" : 40%						
Library	1,518,762.00	1,864,353.00	112,362.00	3,495,477.00	1,375,718.00	2,119,759.00
Computer	8,479,629.02	4,611,012.00	1,949,375.00	15,040,016.02	5,626,131.00	9,413,885.02
Printer & Xerox Machine	2,003.00	0.00	0.00	2,003.00	801.00	1,202.00
Computer Software	1,842.00	0.00	0.00	1,842.00	737.00	1,105.00
	627,167,815.80	74,868,072.80	71,970,797.00	774,006,685.60	91,193,899.00	682,812,786.60

K. Sarda & Co. Chartered Accountants Guwahati

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE " 8 " : SIGNIFICANT ACCOUNTING POLICES :

1. **ACCOUNTING CONVENTION :**

   The Financial Statements are prepared on the basis of historical cost convention, unless otherwise stated and on the Accrual method of Accounting.

2. **REVENUE RECOGNITION :**

   (a) Income on Interest bearing securities and Term Deposits is recognised on accrual basis as and when these are realised.

   (b) Income other than Interest Income are recognised on Cash basis.

3. **INVESTMENTS :**

   Term deposits with Banks are taken as Investments and valued at accrual basis.

4. **FIXED ASSETS :**

   Fixed Assets are stated at cost of acquisiton, inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisiton less depreciation.

5. **DEPRECIATION :**

   (a) Depreciation on Fixed assets purchased/acquired/ constructed out of Government Grants is charged on WDV Method as per the rates specified under the Income Tax Act, 1961.

   (b) Depreciation is charged to Capital Fund by way of reducing the net value of Fixed Assets.

6. **GOVERNMENT GRANTS/SUBSIDIES :**

   Revenue Grants are shown on realisation basis and expenditure thereof is charged to appropriate revenue heads. In the case Capital Grant, the Capital Fund is credited to the extent of the amount of acquisition of fixed assets and the balance remains in Unutilised Grant.

K. P. Sarda & Co. Guwahati Chartered Accountants

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
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Guwahati-781035, Assam India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उन्नत अध्ययन संस्थान
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Paschim Boragaon, Guwahati-35, Assam India

निदेशक/Director
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

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NOTES ON ACCOUNTS :

(i) No provision has been made in respect of Leave Salary.

(ii) Purchase of consumable items during the year are treated as expenditure and charged to revenue.

(iii) In the opinion of the Management, the Current Assets, Loans and Advances have a value on realisation equal or atleast to the aggregate amount shown in the Balance Sheet.

(iv) Balances under Current Liabilities, Loans and Advances are subject to conformation /reconciliation /adjustments, if any.

(v) No provision is made for Contingent Liability, except for cases where provision needs to be made, based on expert opinion.

(vi) Previous years figure have been rearranged and regrouped wherever considered necessary to facilitate comparison.

(vii) Any Surplus balance that remains in Income & Expenditure A/c after adjusting the Revenue Expenditure with the Revenue Grant and Other Income is transferred to Unutilised Grant and Capital

(viii) Bank Interest received in SBI Khanapara (DST) during the year is not recognised as Income instead shown as Current Liability because it will be refunded to DST, Govt. of India.

(ix) Any surplus of revenue grant alongwith other income over revenue expenditure of Extramural Projects is transferred to earmarked fund and it isn't included in the preparation of the Consolidated Income & Expenditure Account.

K. P. Sarda & Co. Guwahati Chartered Accountants

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Annexure "A" - Unutilised Grant		**Amount(₹)**
Opening Balance		120,286,647.10
Add : Capital Grant received during the year	96,499,000.00	
Add : Unutilised Revenue Grant for the year	68,648,491.52	165,147,491.52
		285,434,138.62
Less : Contribution towards Capital Fund (Addition to Fixed Assets)		146,838,869.80
Less : Fund refund to Funding Agency during 2016-17 (Extramural Projects)		245,000.00
Closing Balance		138,350,268.82

Annexure "B" - Security Deposit Payable	
Works & Service	225,469.00
Repairing and Maintanence (SSH)	19,392.23
Building & Site Development	10,526,245.00
	10,771,106.23

Annexure "C" - Other Current Liabilities	**Amount(₹)**
DST Govt of India	3,821.00
Equipments	17,565.00
Advance from Extramural Project to Overhead	11,850,309.00
Advance from DST to Project	343,829.96
Bank Interest Refundable to DST, Govt. of India	770,690.00
Upgrading	300,262.00
Employee Provident Fund	48,844.00
Sundry Payables	2,846,694.00
Inter Fund Transfer (IASST Fund to Herbal Medicine)	1,050,000.00
	17,232,014.96

Guwahati

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Annexure "D" - Advance against expenditure on grant : **Amount(₹)**

Current year unadjusted advance :

	Project	DST General	Total	
Salary	0.00	4,266,044.00	4,266,044.00	
Empowerment of SC/ST	0.00	47,968.00	47,968.00	
Works and Services	0.00	5,484,706.00	5,484,706.00	
Contingency	131,920.00	229,765.00	361,685.00	
Travel	242,900.00	165,560.00	408,460.00	
Consumables	170,329.00	866,984.28	1,037,313.28	
Training & Conference	248,000.00	451,774.00	699,774.00	12,305,950.28

Earlier years unadjusted advance :

	Project	DST General	Total	
Salary	0.00	5,579,915.00	5,579,915.00	
Contingency	27,840.00	538,425.00	566,265.00	
Travel	125,092.00	34,180.00	159,272.00	
Consumables	77,000.00	600,848.00	677,848.00	
Empowerment of SC/ST	0.00	60,000.00	60,000.00	
Training & Conference	112,500.00	1,184,133.00	1,296,633.00	
Works and Services	0.00	583,742.00	583,742.00	
Outsourcing	4,000.00		4,000.00	8,927,675.00

TOTAL : **21,233,625.28**

Annexure "E" - Advance against Fixed Assets :

Current year unadjusted advance :

	Project	DST General	Total	
Building & Site Development	0.00	24,875,882.00	24,875,882.00	
Computer & Peripherials	0.00	42,714.00	42,714.00	
Equipment	5,461,215.00	2,637,479.02	8,098,694.02	33,017,290.02

Earlier years unadjusted advance :

	Project	DST General	Total	
Computer & Peripherials	0.00	984,401.00	984,401.00	
Furniture & Fixture	0.00	94,324.00	94,324.00	
Equipment	0.00	66,511,410.00	66,511,410.00	67,590,135.00

100,607,425.02

Finance & Accounts Officer
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Guwahati

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

ANNEXURE : "F"

DETAILS OF GRANT-IN-AID FOR THE FINANCIAL YEAR 2018-19

SI.	Particulars	Capital Grant (₹)	Revenue Grant (₹)	Amount(₹)
1	DST General Fund	85,208,000.00	243,786,000.00	328,994,000.00
2	DBT-JRF (Arun Kumar)	0.00	365,000.00	365,000.00
3	Biotech Hubs	0.00	753,000.00	753,000.00
4	Culture Collection - D. Thakur	0.00	427,001.00	427,001.00
5	DBT RA (Ananaya Barman)	0.00	597,200.00	597,200.00
6	DBT-JRF (Chandana Malakar)	0.00	390,000.00	390,000.00
7	INSPIRE Fellow (Ibnul Farid)	0.00	368,000.00	368,000.00
8	DBT RA (Kamal Das)	0.00	568,400.00	568,400.00
9	DBT RA (Kaustavmoni)	0.00	597,200.00	597,200.00
10	DBT RA (Rabinson)	0.00	626,000.00	626,000.00
11	DBT Scented Rice Programme (R Devi)	0.00	1,785,000.00	1,785,000.00
12	Dev. Of Antigrated (Soumyadeep Nandi)	3,006,000.00	860,000.00	3,866,000.00
13	Dev. Of nano particle - Poultry Salmonellosi	0.00	229,000.00	229,000.00
14	Effect of Traditional Dietary MR Khan (New	0.00	3,436,000.00	3,436,000.00
15	Engineered Bioremediation (A Devi)	0.00	1,785,760.00	1,785,760.00
16	Feasibility study copper alloy (H Bailung)	25,000.00	975,000.00	1,000,000.00
17	Glycolipid	0.00	586,000.00	586,000.00
18	Head & Neck Cancer (Rosy Mondal)	850,000.00	1,560,000.00	2,410,000.00
19	INSPIRE Faculty (Anamika Kalita)	245,000.00	1,655,000.00	1,900,000.00
20	INSPIRE Faculty (Sagar Sarma)	0.00	1,700,693.00	1,700,693.00
21	INSPIRE Faculty (B Choudhury)	0.00	1,592,468.00	1,592,468.00
22	INSPIRE Fellow (Bidyut Chutia)	0.00	736,000.00	736,000.00
23	INSPIRE Fellow (Kangkana Bora)	0.00	451,082.00	451,082.00
24	INSPIRE Fellow (Palash Jyoti Baruah)	0.00	368,000.00	368,000.00
25	INSPIRE Fellow (Purbajyoti Bhagabaty)	0.00	736,000.00	736,000.00
26	INSPIRE Fellow (Rakesh Rusel Khanikar)	0.00	368,000.00	368,000.00
27	INSPIRE Faculty (Rosy Mondal)	0.00	1,712,679.00	1,712,679.00
28	INSPIRE Fellow (Subhankar Pandit)	0.00	368,000.00	368,000.00
29	INSPIRE Fellow (Sweety Biswas)	0.00	367,617.00	367,617.00
30	INSPIRE Fellow (Tulsi Joshi)	0.00	368,000.00	368,000.00
31	INSPIRE Fellow (Y bailung)	0.00	368,000.00	368,000.00
32	PAP Smear Images (L B Mahanta)	0.00	291,000.00	291,000.00
33	Lady Tata (Paramita Choudhury)	0.00	157,500.00	157,500.00
34	Molecular & Biochemical Studies (J Boruah)	0.00	556,000.00	556,000.00
35	NPDF (Archana Nath)	0.00	960,000.00	960,000.00
36	NPDF (Ashim Kr Dutta)	0.00	910,000.00	910,000.00
37	NPDF (Bhaskar Das)	0.00	960,000.00	960,000.00
38	NPDF (Kaushik Bhattachajee)	0.00	960,000.00	960,000.00
39	NPDF (Parijat saikia)	0.00	880,300.00	880,300.00
40	NPDF (Rinkumoni)	0.00	910,000.00	910,000.00
41	NPDF (Seydur Rahman)	0.00	910,000.00	910,000.00
42	NPDF Fellowship (Abdul Barik)	0.00	910,000.00	910,000.00
43	Plasma modified	0.00	1,000,000.00	1,000,000.00
44	PM 10 & PM 2.5 (A Devi)	0.00	609,400.00	609,400.00
45	QA & QC (N C Talukdar)	7,165,000.00	3,904,000.00	11,069,000.00
46	Ramalingaswami (S Nandi)	0.00	1,610,000.00	1,610,000.00
47	ST People Arunachal Pradesh (N C Talukda	0.00	710,000.00	710,000.00
48	INSPIRE Faculty Award (Wahengbam Romi	0.00	1,416,157.00	1,416,157.00
		96,499,000.00	288,140,457.00	384,639,457.00

Finance & Accounts Officer
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कुलसचिव/Registrar

निदेशक/Director
आई.ए.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

INDEPENDENT AUDITOR'S REPORT

TO
THE MEMBERS
THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
GUWAHATI

We have audited the accompanying Financial Statements of **Extramural Projects** of **The Institute of Advanced Study in Science & Technology, Paschim Boragaon, Garchuk, Guwahati** which comprise the Balance Sheet as at 31st March, 2019, the Receipts and Payments Account and the Income and Expenditure Account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for Financial Statements :

Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance of the society in accordance with the Accounting Standards generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from misstatement, whether due to error or fraud.

Auditor's Responsibility :

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with ethical requirements and plans and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the society's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Cond..P/2

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K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

Opinion:

In our opinion and to the best of our information and according to the explanations given to us, the financial statements give the information required by the Act in the manner so required and give a true and fair view in conformity with the accounting principles generally accepted in India :

(a) In the case of the Balance Sheet, of the state of affairs of the Society, as on 31st March, 2019;

(b) In case of the Income and Expenditure Account (Earmarked Fund) of the Income/Expenditure of Society for the year ended 31st March, 2019;

(c) In case of the Receipts and Payment Account of the Receipts/Payments of Society for the year ended 31st March,2019

We further report that:

(a) We have obtained all the information and explanations to the best of our knowledge and belief were necessary for the purpose of our audit;

(b) In our opinion, proper books of account, as required by law have been kept by the Society so far as appears from our examination of those books;

(c) The Balance Sheet, the Receipts and Payments Account and the Income and Expenditure Account dealt with by this Report are in agreement with the books of account.

For K.P. Sarda & Co.
Chartered Accountants
FRN : 319206E

K. P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No.054555

Place : Guwahati
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.टी.
IASST, Paschim Boragaon
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

BALANCE SHEET OF EXTRAMURAL PROJECTS AS ON 31ST MARCH, 2019

PARTICULARS	Schedule	Amount (₹) 2018-19	Amount (₹) 2017-18
CAPITAL FUND & LIABILITIES			
Capital Fund	1	80,736,418.74	87,329,028.22
Earmarked Funds	2	23,651,463.32	26,545,877.49
Current Liabilities and Provisions	3	40,509,924.62	36,293,512.18
TOTAL :		**144,897,806.68**	**150,168,417.89**
ASSETS			
Fixed Assets	4	80,736,418.74	87,329,028.22
Investments	5	77,181.00	10,143,750.00
Current Assets, Loans and Advances	6	64,084,206.94	52,695,639.67
TOTAL :		**144,897,806.68**	**150,168,417.89**

NOTES ON ACCOUNT - SCHEDULE "7"

In terms of our report of even date annexed hereto.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

K. P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
IASST
Guwahati-781035, Assam, India

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निदेशक/Director
आई.ए.ए.एस.टी. पश्चिम बड़ागाव
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

RECEIPTS & PAYMENTS ACCOUNT OF EXTRAMURAL PROJECTS FOR THE YEAR ENDED 31ST MARCH 2019

RECEIPTS		Amount (₹)	PAYMENTS	Amount (₹)
To **OPENING BALANCE :**			By **EXPENDITURES :**	
Cash in Hand	0.00		Contingency	3,089,438.68
Cash at Bank (As per Schedule 6)	48,124,602.67	48,124,602.67	Consumables	12,221,011.67
			Overheads	2,366,704.00
			Salary	30,816,381.00
" **Grant- in-Aid**			Travel	1,928,224.82
Capital Grant	11,291,000.00		Training	597,614.00
Revenue Grant (Annexure "D")	44,354,457.00	55,645,457.00	Miscellaneous	0.00
" Bank Interest		1,290,413.00	" **FIXED ASSETS :**	
			Equipments	13,331,021.52
" TA Grant		806,275.00		
			" Investment in Fixed Deposit	50,077,181.00
" Fixed Deposit Matured		60,484,267.00		
			" Advance to Misc./Overhead	8,239,715.00
" Other Receipt		381,408.00		
			" Inter Fund Transfer	1,050,000.00
" Inter Fund Transfer		1,050,000.00		
			" **CLOSING BALANCE :**	
" Advance from DST (HDFC Bank A/c)		171,909.96	Cash in hand	0.00
			Cash at Bank (As per Schedule 6)	44,237,040.94
		167,954,332.63		167,954,332.63

We have verified the above statement of Receipts & payments Account of Extramural Projects of the Institute of Advanced Study in Science & Technology, Paschim Boragaon, Guwahati - 781 035, Account - Plan for the period from 1st April 2018 to 31st March, 2019 from the Books of Accounts and vouchers produced before us.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
IASST, Paschim Boragaon
Guwahati-781035, Assam India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उन्नत अध्ययन संस्थान
Institute of Advanced Study in Science & Technology
पश्चिम बड़ागाव, गुवाहाटी-35, असम, भारत
Paschim Boragaon, Guwahati-35, Assam, India

निदेशक/Director
आई ए एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
Guwahati-781035, Assam

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 1 : :: CAPITAL FUND ::

	Amount(₹) 2018-19	Amount (₹) 2017-18
Opening Balance	87,329,028.22	66,695,239.22
Add : Contribution towards Capital Fund (Addition to Fixed Assets)	7,618,215.52	34,483,737.00
	94,947,243.74	101,178,976.22
Less : Depreciation for the year	14,210,825.00	13,849,948.00
	80,736,418.74	**87,329,028.22**

SCHEDULE - 3 : :: CURRENT LIABILITIES AND PROVISIONS ::

		Amount(₹) 2018-19	Amount (₹) 2017-18
CURRENT LIABILITIES :			
Unutilised Grant in Aid	(As per Annexure "A")	38,030,131.66	34,602,347.18
Earnest Money		1,068,398.00	1,068,398.00
Inter Fund Transfer (IASST Fund to Herbal Medicine)		1,050,000.00	0.00
Other Current Liabilities	(As per Annexure "B")	361,394.96	622,767.00
		40,509,924.62	**36,293,512.18**

SCHEDULE - 4 : :: FIXED ASSETS ::

	Amount(₹)
Equipment as on 01/04/2018	87,329,028.22
Add : Addition on or before 03/10/2018	7,201,394.52
Add : Addition after 03/10/2018	416,821.00
Less : Depreciation for the year	14,210,825.00
Equipment as on 31/03/2019	80,736,418.74

SCHEDULE - 5 : :: INVESTMENTS ::

	Amount(₹)
Opening Balance	10,143,750.00
Add : Investment in Fixed Deposit during the year	50,077,181.00
Add : Interest Accrued	340,517.00
Less : TDS	0.00
Less : Fixed Deposit matured during the year	60,484,267.00
Balance as on 31/03/2019	**77,181.00**

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आई.ए.एस.टी.
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SCHEDULE - 6 : :: **CURRENT ASSETS, LOANS & ADVANCES ::**

		Amount(₹) 2018-19	Amount(₹) 2017-18
(A) CURRENT ASSETS :			
Balance with Banks	**Account No.**		
SBI Garchuk Branch - Project	(260721)	42,695,018.75	33,330,401.69
SBI - Herbal Medicine N.C. Talukdar	(862670)	937,247.43	14,794,200.98
HDFC Bank	(120592)	604,774.76	0.00
	TOTAL (A)	44,237,040.94	48,124,602.67
(B) LOANS, ADVANCES & OTHER ASSETS :			
Crest Award		343,770.00	343,770.00
TDS		2,291.00	2,291.00
Inter Fund Transfer (IASST Fund to Herbal Medicine)		1,050,000.00	0.00
Advance to Overhead A/c		11,850,309.00	3,610,594.00
Advances against Expenditure of Grants (Annexure "C")		1,139,581.00	614,382.00
Advances against Equipments		5,461,215.00	0.00
	TOTAL (B)	19,847,166.00	4,571,037.00
	TOTAL (A+B)	**64,084,206.94**	**52,695,639.67**

K. K. Sarda & Co. Guwahati Chartered Accountants

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IASST, Guwahati-781035

कुलसचिव/Registrar

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़गाँव
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SCHEDULE - 2 : **:: EARMARKED FUNDS ::**

	Particulars	Salary	Contingency	Travel	Consumables	Training	Overhead	Misc.	Bank Interest	Refund Against Advance (Receipt)	Refund (Payment)	Total(₹)
a)	**Opening Balance**	12,895,126	2,563,468	279,560	7,079,960	616,369	415,171	1,861,040	2,797,138	291,309	-2,253,264	26,545,877
b)	**Addition to the Funds**											
	i) Grants	29,001,587	2,393,003	1,368,000	8,597,567	885,000	2,109,300	0	0	0	0	44,354,457
	ii) Other Receipts	0	0	806,275	0	0	0	381,408	1,630,930	0	0	2,818,613
		29,001,587	2,393,003	2,174,275	8,597,567	885,000	2,109,300	381,408	1,630,930	0	0	47,173,070
	TOTAL (a+b)	41,896,713	4,956,471	2,453,835	15,677,527	1,501,369	2,524,471	2,242,448	4,428,068	291,309	-2,253,264	73,718,947
c)	**Payment towards objectives of Funds**	30,816,381	3,089,439	1,928,225	12,221,012	597,614	2,366,704	0	0	0	0	51,019,374
d)	**Advances**											
	PY Advance Adjusted	0	11,000	69,600	73,150	114,200	0	0	0	0	0	267,950
	CY Advance Given	0	131,920	242,900	170,329	248,000	0	0	0	0	0	793,149
		-0	120,920	173,300	97,179	133,800	0	0	0	0	0	525,199
e)	**Current Liabilities**											
	PY Liability Adjusted	121,691	60,000	0	0	0	0	0	0	0	0	181,691
	CY Liability Created	0	0	0	0	0	0	0	0	0	0	0
		-121,691	-60,000	0	0	0	0	0	0	0	0	-181,691
f)	**Expenditure towards objectives of Funds (c-d+e)**	30,694,690	2,908,519	1,754,925	12,123,833	463,814	2,366,704	0	0	0	0	50,312,484
g)	**Adjustment of Refunc**	1,278,114	-199	39,040	220,000	0	0	180,000	0	291,309	-2,253,264	-245,000
h)	**Net Balance as at the year end (a+b-f-g)**	9923909.4	2048150.8	659870.2	3333694.8	1037555.0	157767.0	2062447.9	4428068.2	0.0	0.0	23651463.3

Guwahati

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE " 7 " : SIGNIFICANT ACCOUNTING POLICES :

1. **ACCOUNTING CONVENTION :**

   The Financial Statements are prepared on the basis of historical cost convention, unless otherwise stated and on the Accrual method of accounting.

2. **REVENUE RECOGNITION :**

   (a) Income on Interest bearing securities and Term Deposits is recognised on accrual basis as and when these are realised.

   (b) Income other than Interest Income are recognised on Cash basis.

3. **INVESTMENTS :**

   Term Deposits with Banks are taken as Investments and valued at accrual basis.

4. **FIXED ASSETS :**

   Fixed Assets are stated at cost of acquisiton, inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisiton less depreciation.

5. **DEPRECIATION :**

   (a) Depreciation on Fixed assets purchased/acquired/ constructed out of government grants is charged on WDV Method as per the rates specified under the Income Tax Act, 1961.

   (b) Depreciation is charged to Capital Fund by way of reducing the net value of Fixed Assets.

6. **GOVERNMENT GRANTS/SUBSIDIES :**

   (a) Revenue grants are shown realisation basis and expenditure thereof is charged to appropriate revenue heads. In the case Capital Grant, the Capital Fund is credited to the extent of the amount of acquisition of Fixed Assets and the balance remains in Unutilised Grant.

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी. पश्चिम बोरागाँव
IASST, Paschim Boragaon
गुवाहाटी-781035, Assam, India
Guwahati-781035

Guwahati
Chartered Accountants

कुलसचिव/Registrar

निदेशक/Director
आई.ए.एस.एस.टी. पश्चिम बड़ागाँव
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NOTES ON ACCOUNTS :

(i) Any surplus of Revenue Grant alongwith Other Income over Revenue Expenditure is transferred to Earmarked Fund.

(ii) No provision has been made in respect of Leave Salary.

(iii) Purchase of consumable items during the year are treated as expenditure and charged to revenue.

(iv) In the opinion of the Management, the Current assets, Loans and Advances have a value on realisation equal or atleast to the aggregate amount shown in the Balance Sheet.

(v) Balances under Current Liabilities, Loans and Advances are subject to conformation /reconciliation /adjustments, if any.

(vi) No provision is made for Contingent Liability, except for cases where provision needs to be made, based on expert opinion.

(vii) Previous years figure have been rearranged and regrouped wherever considered necessary to facilitate comparison.

(viii) As projects are earmarked funds, its transactions have not been included in the preparation of Consolidated Income & Expenditure Account.

Guwahati

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PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Annexure "A" - Unutilised Grant	**Amount(₹)**
Opening Balance	34,602,347.18
Add : Capital Grant received during the year	11,291,000.00
	45,893,347.18
Less : Contribution towards Capital Fund (Addition to Fixed Assets)	7,618,215.52
Less : Fund refund to Funding Agency during 2016-17	245,000.00
Closing Balance	38,030,131.66

Annexure "B" - Other Current Liabilities		**Amount(₹)**
Equipment		17,565.00
DST General Fund		
Vijaya Bank - Conference (000918)	107,090.00	
SBI Garchuk - Seminar (888433)	64,830.00	
HDFC Bank	171,909.96	343,829.96
		361,394.96

Annexure "C" - Advance against expenditure on grant :		**Amount(₹)**
Current year unadjusted advance :		
Contingency	131,920.00	
Travel	242,900.00	
Consumables	170,329.00	
Training & Conference	248,000.00	793,149.00
Earlier years unadjusted advance :		
Contingency	27,840.00	
Travel	125,092.00	
Consumables	77,000.00	
Training & Conference	112,500.00	
Outsourcing	4,000.00	346,432.00
TOTAL :		**1,139,581.00**

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Guwahati-781035, Assam, India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उच्च अध्ययन संस्थान

K. Purkayastha & Co. Guwahati Chartered Accountants

निदेशक/Director
आई.ए.एस.ए.टी. पश्चिम बड़ागाव
IASST, Paschim Boragaon
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

ANNEXURE : "D"

DETAILS OF GRANT-IN-AID OF EXTRAMURAL PROJECTS FOR THE FINANCIAL YEAR 2018-19

Sl.	Name of the Project	Capital Grant (₹)	Revenue Grant (₹)	Amount(₹)
1	DBT-JRF (Arun Kumar)	0.00	365,000.00	365,000.00
2	Biotech Hubs	0.00	753,000.00	753,000.00
3	Culture Collection - D. Thakur	0.00	427,001.00	427,001.00
4	DBT RA (Ananaya Barman)	0.00	597,200.00	597,200.00
5	DBT-JRF (Chandana Malakar)	0.00	390,000.00	390,000.00
6	INSPIRE Fellow (Ibnul Farid)	0.00	368,000.00	368,000.00
7	DBT RA (Kamal Das)	0.00	568,400.00	568,400.00
8	DBT RA (Kaustavmoni)	0.00	597,200.00	597,200.00
9	DBT RA (Rabinson)	0.00	626,000.00	626,000.00
10	DBT Scented Rice Programme (R Devi)	0.00	1,785,000.00	1,785,000.00
11	Dev. Of Antigrated (Soumyadeep Nandi)	3,006,000.00	860,000.00	3,866,000.00
12	Dev. Of nano particle - Poultry Salmonellosis	0.00	229,000.00	229,000.00
13	Effect of Traditional Dietary MR Khan (New)	0.00	3,436,000.00	3,436,000.00
14	Engineered Bioremediation (A Devi)	0.00	1,785,760.00	1,785,760.00
15	Feasibility study copper alloy (H Bailung)	25,000.00	975,000.00	1,000,000.00
16	Glycolipid	0.00	586,000.00	586,000.00
17	Head & Neck Cancer (Rosy Mondal)	850,000.00	1,560,000.00	2,410,000.00
18	INSPIRE Faculty (Anamika Kalita)	245,000.00	1,655,000.00	1,900,000.00
19	INSPIRE Faculty (Sagar Sarma)	0.00	1,700,693.00	1,700,693.00
20	INSPIRE Faculty (B Choudhury)	0.00	1,592,468.00	1,592,468.00
21	INSPIRE Fellow (Bidyut Chutia)	0.00	736,000.00	736,000.00
22	INSPIRE Fellow (Kangkana Bora)	0.00	451,082.00	451,082.00
23	INSPIRE Fellow (Palash Jyoti Baruah)	0.00	368,000.00	368,000.00
24	INSPIRE Fellow (Purbajyoti Bhagabaty)	0.00	736,000.00	736,000.00
25	INSPIRE Fellow (Rakesh Rusel Khanikar)	0.00	368,000.00	368,000.00
26	INSPIRE Faculty (Rosy Mondal)	0.00	1,712,679.00	1,712,679.00
27	INSPIRE Fellow (Subhankar Pandit)	0.00	368,000.00	368,000.00
28	INSPIRE Fellow (Sweety Biswas)	0.00	367,617.00	367,617.00
29	INSPIRE Fellow (Tulsi Joshi)	0.00	368,000.00	368,000.00
30	INSPIRE Fellow (Y bailung)	0.00	368,000.00	368,000.00
31	PAP Smear Images (L B Mahanta)	0.00	291,000.00	291,000.00
32	Lady Tata (Paramita Choudhury)	0.00	157,500.00	157,500.00
33	Molecular & Biochemical Studies (J Boruah)	0.00	556,000.00	556,000.00
34	NPDF (Archana Nath)	0.00	960,000.00	960,000.00
35	NPDF (Ashim Kr Dutta)	0.00	910,000.00	910,000.00
36	NPDF (Bhaskar Das)	0.00	960,000.00	960,000.00
37	NPDF (Kaushik Bhattachajee)	0.00	960,000.00	960,000.00
38	NPDF (Parijat saikia)	0.00	880,300.00	880,300.00
39	NPDF (Rinkumoni)	0.00	910,000.00	910,000.00
40	NPDF (Seydur Rahman)	0.00	910,000.00	910,000.00
41	NPDF Fellowship (Abdul Barik)	0.00	910,000.00	910,000.00
42	Plasma modified	0.00	1,000,000.00	1,000,000.00
43	PM 10 & PM 2.5 (A Devi)	0.00	609,400.00	609,400.00
44	QA & QC (N C Talukdar)	7,165,000.00	3,904,000.00	11,069,000.00
45	Ramalingaswami (S Nandi)	0.00	1,610,000.00	1,610,000.00
46	ST People Arunachal Pradesh (N C Talukdar)	0.00	710,000.00	710,000.00
47	INSPIRE Faculty Award (Wahengbam Romi)	0.00	1,416,157.00	1,416,157.00
		11,291,000.00	44,354,457.00	55,645,457.00

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

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	Project Name	Opening Balance	Grant -in-Aid (a)	Interest (b)	Inter Transfer (c)	Maturity of FD (d)	TA Grant (e)	Misc. Receipts (f)	Advance (g)	Total Receipts (h) = (a+b+c+d+e+f+g)
1	Plasma Based Synthesis (A R Pal)	6,694,045.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
2	Androgen	-25,353.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
3	Aquatic Biodiversity	-17,308.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
4	DBT-JRF (Arun Kumar)	134,333.00	365,000.00	0.00	0.00	0.00	0.00	0.00		365,000.00
5	Bharalu River	-579,338.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
6	Bio Informatics	255,256.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
7	Biosurfactance	96,709.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
8	Biotech Hubs	2,910,139.00	753,000.00	0.00	0.00	0.00	0.00	0.00		753,000.00
9	Brain storming	-80,259.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
10	Brain storming meeting-3	-50,888.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
11	CSIR	-73.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
12	CSIR (Neelam, Gitumoni, Yogesh)	201,600.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
13	Culture Collection - D. Thakur	328,784.00	427,001.00	0.00	0.00	0.00	0.00	0.00		427,001.00
14	DBT -Crest (D Devi)	-142,289.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
15	DBT RA (Ananaya Barman)	429,200.00	597,200.00	0.00	0.00	0.00	0.00	0.00		597,200.00
16	DBT-JRF (Chandana Malakar)	20,000.00	390,000.00	0.00	0.00	0.00	0.00	0.00		390,000.00
17	INSPIRE Fellow (Ibnul Farid)	48,904.00	368,000.00	0.00	0.00	0.00	0.00	0.00		368,000.00
18	DBT RA (Kamal Das)	0.00	568,400.00	0.00	0.00	0.00	0.00	0.00		568,400.00
19	DBT RA (Kaustavmoni)	182,388.00	597,200.00	0.00	0.00	0.00	0.00	0.00		597,200.00
20	DBT RA (Robinson)	137,687.00	626,000.00	0.00	0.00	0.00	0.00	0.00		626,000.00
21	DBT Scented Rice Programme (N C Talukdar)	774,061.30	0.00	0.00	0.00	0.00	0.00	0.00		0.00
22	DBT Scented Rice Programme (R Devi)	1,506,513.00	1,785,000.00	0.00	0.00	0.00	0.00	0.00		1,785,000.00
23	Dev. Of Antigrated (Soumyadeep Nandi)	0.00	3,866,000.00	0.00	0.00	0.00	0.00	0.00		3,866,000.00
24	Dev. Of nano particle - Poultry Salmonellosis	487,918.10	229,000.00	0.00	0.00	0.00	0.00	0.00		229,000.00
25	Diabetic Neurepathic	396,435.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
26	DST (J Medhi)	-63,015.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
27	Education	-33,598.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
28	Effect of Traditional Dietary MR Khan (New)	2,192,827.00	3,436,000.00	0.00	0.00	0.00	0.00	19,500.00		3,455,500.00
29	Electronic Alloys magnetic	-5,362.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
30	Engineered Bioremediation (A Devi)	0.00	1,785,760.00	0.00	0.00	0.00	0.00	0.00		1,785,760.00
31	Feasibility study copper alloy (H Bailung)	0.00	1,000,000.00	0.00	0.00	0.00	0.00	0.00		1,000,000.00
32	Flora & Fauna	-50,567.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
33	Food colour	-1,153.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
34	Glycolipid	721,897.00	586,000.00	0.00	0.00	0.00	0.00	0.00		586,000.00
35	Govt of Assam	-148,113.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
36	Head & Neck Cancer (Rosy Mondal)	0.00	2,410,000.00	0.00	0.00	0.00	0.00	0.00		2,410,000.00
37	Herbal Medicine	22,266,100.98	0.00	288,038.00	1,050,000.00	0.00	0.00	0.00		1,338,038.00
38	Image Processing (Tabassum Y)	3,132.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
39	INSPIRE Faculty (Anamika Kalita)	0.00	1,900,000.00	0.00	0.00	0.00	0.00	0.00		1,900,000.00
40	INSPIRE Faculty (Sagar Sarma)	-6,271.00	1,700,693.00	0.00	0.00	0.00	0.00	0.00		1,700,693.00
41	INSPIRE Faculty (B Choudhury)	556,945.00	1,592,468.00	0.00	0.00	0.00	0.00	0.00		1,592,468.00
42	INSPIRE Fellow (Bidyut Chutia)	0.00	736,000.00	0.00	0.00	0.00	0.00	0.00		736,000.00
43	INSPIRE Fellow (Kangkana Bora)	845.00	451,082.00	0.00	0.00	0.00	0.00	0.00		451,082.00
44	INSPIRE Fellow (Palash Jyoti Baruah)	0.00	368,000.00	0.00	0.00	0.00	0.00	0.00		368,000.00
45	INSPIRE Fellow (Purbajyoti Bhagabaty)	0.00	736,000.00	0.00	0.00	0.00	0.00	0.00		736,000.00
46	INSPIRE Fellow (Rakesh Rusel Khanikar)	526.00	368,000.00	0.00	0.00	0.00	0.00	0.00		368,000.00
47	INSPIRE Faculty (Rosy Mondal)	536,295.00	1,712,679.00	0.00	0.00	0.00	0.00	0.00		1,712,679.00
48	INSPIRE Fellow (Subhankar Pandit)	-5,779.00	368,000.00	0.00	0.00	0.00	0.00	0.00		368,000.00
49	INSPIRE Fellow (Sweety Biswas)	-42,970.00	367,617.00	0.00	0.00	0.00	0.00	0.00		367,617.00
50	INSPIRE Fellow (Tulsi Joshi)	-12,450.00	368,000.00	0.00	0.00	0.00	0.00	0.00		368,000.00
51	INSPIRE Fellow (Y bailung)	-15,252.00	368,000.00	0.00	0.00	0.00	0.00	0.00		368,000.00

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

	Project Name	Opening Balance	Grant -in-Aid (a)	Interest (b)	Inter Transfer (c)	Maturity of FD (d)	TA Grant (e)	Misc. Receipts (f)	Advance (g)	Total Receipts (h) = (a+b+c+d+e+f+g)
52	Intestinal Microbiota	-48,071.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
53	Jhumming	1,720.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
54	PAP Smear Images (L B Mahanta)	491,324.00	291,000.00	0.00	0.00	0.00	0.00	0.00		291,000.00
55	Lady Tata (Paramita Choudhury)	0.00	157,500.00	0.00	0.00	0.00	0.00	0.00		157,500.00
56	Molecular & Biochemical Studies (J Boruah)	0.00	556,000.00	0.00	0.00	0.00	0.00	0.00		556,000.00
57	Muga cultivation (ASTEC)	504,000.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
58	Nano Material & Bimaterials	131,198.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
59	NPDF (Archana Nath)	0.00	960,000.00	0.00	0.00	0.00	0.00	0.00		960,000.00
60	NPDF (Ashim Kr Dutta)	120,914.00	910,000.00	0.00	0.00	0.00	0.00	0.00		910,000.00
61	NPDF (Bhaskar Das)	0.00	960,000.00	0.00	0.00	0.00	0.00	0.00		960,000.00
62	NPDF (Kaushik Bhattachajee)	0.00	960,000.00	0.00	0.00	0.00	0.00	0.00		960,000.00
63	NPDF (Parijat saikia)	161,000.00	880,300.00	0.00	0.00	0.00	0.00	0.00		880,300.00
64	NPDF (Rinkumoni)	162,791.00	910,000.00	0.00	0.00	0.00	0.00	0.00		910,000.00
65	NPDF (Rupamoni Thakur)	201,125.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
66	NPDF (Seydur Rahman)	199,941.00	910,000.00	0.00	0.00	0.00	0.00	0.00		910,000.00
67	NPDF Fellowship (Abdul Barik)	-80,806.00	910,000.00	0.00	0.00	0.00	0.00	0.00		910,000.00
68	Oxidative degradation	-171,901.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
69	Physico Sensor	-87,445.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
70	Plasma modified	-11,159.00	1,000,000.00	0.00	0.00	0.00	0.00	0.00		1,000,000.00
71	PM 10 & PM 2.5 (A Devi)	0.00	609,400.00	0.00	0.00	0.00	0.00	0.00		609,400.00
72	Polymer Based Sensors	-568.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
73	Proton Exchange	-137,261.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
74	QA & QC (N C Talukdar)	0.00	11,069,000.00	0.00	0.00	0.00	0.00	0.00		11,069,000.00
75	R Devi (Banana)	1,810,000.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
76	Ramalingaswami (S Kundu)	-0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
77	Ramalingaswami (S Nandi)	339,917.00	1,610,000.00	0.00	0.00	0.00	0.00	0.00		1,610,000.00
78	Ramanujan Fellow	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
79	NPDF (Sailendra Gayri)	195,570.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
80	ST People Arunachal Pradesh (N C Talukdar)	0.00	710,000.00	0.00	0.00	0.00	0.00	0.00		710,000.00
81	Structure of Enzymes	25,466.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
82	Women Scientist (Sumita Kumari)	1,197,742.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
83	Tissue Repairs	602,214.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
84	UGC Grant (MD Shadab)	4,011.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
85	VRP (A K Sahu)	879,340.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
86	INSPIRE Faculty Award (Wahengbam Romi)	-47,204.00	1,416,157.00	0.00	0.00	0.00	157,425.00	0.00		1,573,582.00
87	IASST Fund	2,070,242.29	0.00	1,002,375.00	0.00	60,484,267.00	648,850.00	361,908.00	171,909.96	62,669,309.96
	Total	48,124,602.67	55,645,457.00	1,290,413.00	1,050,000.00	60,484,267.00	806,275.00	381,408.00	171,909.96	119,829,729.96

Finance & Accounts Officer
IASST, Paschim Boragaon
Guwahati-781035, Assam India

Registrar

Director

Guwahati

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

	Project Name	Expenditure (i)									Investment in FD	Inter Transfer	Advance to Overhead A/c	Closing Balance
		Salary	Contingency	Equipment	Travel	Consumable	Training	Overhead	Misc.	Refund				
1	Plasma Based Synthesis (A R Pal)	55,556.00	47,183.00	5,461,215.00	29,132.00	207,924.00	0.00	203,174.00	0.00	0.00	0.00	0.00	0.00	689,861.00
2	Androgen	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-25,353.00
3	Aquatic Biodiversity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-17,308.00
4	DBT-JRF (Arun Kumar)	454,433.00	40,233.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4,667.00
5	Bharalu River	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-579,338.00
6	Bio Informatics	213,600.00	1,770.00	0.00	18,377.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21,509.00
7	Biosurfactance	0.00	1,770.00	39,100.00	23,043.00	15,987.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16,809.00
8	Biotech Hubs	1,032,000.00	636,549.00	966,000.00	40,015.00	0.00	146,198.00	89,392.00	0.00	0.00	0.00	0.00	0.00	752,985.00
9	Brain storming	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-80,259.00
10	Brain storming meeting-3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-50,888.00
11	CSIR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-73.00
12	CSIR (Neelam, Gitumoni, Yogesh)	201,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	Culture Collection - D. Thakur	316,800.00	14,984.00	0.00	96,694.00	138,711.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	188,596.00
14	DBT -Crest (D Devi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-142,289.00
15	DBT RA (Ananaya Barman)	525,600.00	55,555.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	445,245.00
16	DBT-JRF (Chandana Malakar)	330,000.00	49,543.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30,457.00
17	INSPIRE Fellow (Ibnul Farid)	348,000.00	28,448.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40,456.00
18	DBT RA (Kamal Das)	387,407.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	180,993.00
19	DBT RA (Kaustavmoni)	539,846.00	57,953.00	0.00	24,864.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	156,925.00
20	DBT RA (Rabinson)	539,846.00	63,880.00	0.00	10,781.00	8,305.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	140,875.00
21	DBT Scented Rice Programme (N C Talukdar)	667,200.00	11,277.00	0.00	49,627.00	154,140.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-108,182.70
22	DBT Scented Rice Programme (R Devi)	1,216,371.00	82,917.00	1,212,114.00	24,055.00	1,015,569.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-259,513.20
23	Dev. Of Antigrated (Soumyadeep Nandi)	37,936.00	0.00	0.00	0.00	0.00	0.00	150,000.00	0.00	0.00	0.00	0.00	0.00	3,678,064.00
24	Dev. Of nano particle - Poultry Salmonellosis	172,800.00	1,770.00	0.00	45,849.00	152,694.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	343,805.10
25	Diabetic Neuropathic	17,968.00	1,770.00	0.00	22,854.00	353,843.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	DST (J Medhi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-63,015.00
27	Education	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-33,598.00
28	Effect of Traditional Dietary MR Khan (New)	1,354,258.00	44,015.00	0.00	51,553.00	2,090,218.44	132,143.00	398,000.00	0.00	0.00	0.00	0.00	0.00	1,578,139.56
29	Electronic Alloys magnetic	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-5,362.00
30	Engineered Bioremediation (A Devi)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,785,760.00
31	Feasibility study copper alloy (H Bailung)	92,142.00	4,500.00	0.00	12,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	891,358.00
32	Flora & Fauna	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-50,567.00
33	Food colour	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-1,153.00
34	Glycolipid	172,800.00	4,106.00	0.00	9,360.00	5,900.00	0.00	175,000.00	0.00	0.00	0.00	0.00	0.00	940,731.00
35	Govt of Assam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-140,113.00
36	Head & Neck Cancer (Rosy Mondal)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,410,000.00
37	Herbal Medicine	4,576,756.00	59,218.00	4,876,860.70	363,693.00	4,231,476.03	319,273.00	0.00	0.00	0.00	0.00	0.00	8,239,715.00	937,147.25
38	Image Processing (Tabassum Y)	0.00	1,770.00	0.00	0.00	0.00	0.00	1,362.00	0.00	0.00	0.00	0.00	0.00	-0.00
39	INSPIRE Faculty (Anamika Kalita)	480,000.00	0.00	0.00	0.00	21,664.00	0.00	35,000.00	0.00	0.00	0.00	0.00	0.00	1,363,336.00
40	INSPIRE Faculty (Sagar Sarma)	714,006.00	37,779.00	0.00	6,975.00	0.00	0.00	26,250.00	0.00	0.00	0.00	0.00	0.00	909,412.00
41	INSPIRE Faculty (B Choudhury)	1,136,045.00	12,276.00	0.00	0.00	642,582.00	0.00	35,000.00	0.00	0.00	0.00	0.00	0.00	323,510.00
42	INSPIRE Fellow (Bidyut Chutia)	558,484.00	20,000.00	0.00	15,044.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	142,472.00
43	INSPIRE Fellow (Kangkana Bora)	389,760.00	57,116.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5,051.00
44	INSPIRE Fellow (Palash Jyoti Baruah)	380,866.00	20,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-32,866.00
45	INSPIRE Fellow (Purbajyoti Bhagabaty)	522,000.00	20,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	194,000.00
46	INSPIRE Fellow (Rakesh Rusel Khamikar)	351,128.00	32,815.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-15,417.00
47	INSPIRE Faculty (Rosy Mondal)	1,056,706.00	11,058.00	0.00	11,607.00	1,128,019.00	0.00	35,000.00	0.00	0.00	0.00	0.00	0.00	6,584.00
48	INSPIRE Fellow (Subhankar Pandit)	349,000.00	21,822.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-8,601.00
49	INSPIRE Fellow (Sweety Biswas)	313,548.00	20,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-8,901.00
50	INSPIRE Fellow (Tulsi Joshi)	319,000.00	17,770.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18,780.00
51	INSPIRE Fellow (Y bailung)	377,000.00	21,034.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-45,286.00

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PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

	Project Name	Expenditure (i)									Investment in FD	Inter Transfer	Advance to Overhead A/c	Closing Balance
		Salary	Contingency	Equipment	Travel	Consumable	Training	Overhead	Misc.	Refund				
52	Intestinal Microbiota	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-48,071.00
53	Jhumming	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,720.00
54	PAP Smear Images (L B Mahanta)	360,000.00	73,028.00	0.00	48,901.00	0.00	0.00	44,000.00	0.00	0.00	0.00	0.00	0.00	256,395.00
55	Lady Tata (Paramita Choudhury)	157,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	Molecular & Biochemical Studies (J Boruah)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	556,000.00
57	Muga cultivation (ASTEC)	0.00	1,770.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	502,230.00
58	Nano Material & Bimaterials	86,400.00	30,031.00	0.00	7,235.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7,532.00
59	NPDF (Archana Nath)	658,167.00	2,115.00	0.00	0.00	104,319.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	95,399.00
60	NPDF (Ashim Kr Dutta)	660,000.00	13,762.00	0.00	13,600.00	53,658.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	189,894.00
61	NPDF (Bhaskar Das)	658,167.00	41,599.00	0.00	85,701.00	0.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	74,533.00
62	NPDF (Kaushik Bhattacharjee)	660,000.00	0.00	0.00	0.00	53,990.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	146,010.00
63	NPDF (Parijat saikia)	660,000.00	10,656.00	0.00	0.00	118,834.00	0.00	91,738.00	0.00	0.00	0.00	0.00	0.00	160,072.00
64	NPDF (Rinkumoni)	660,000.00	62,211.00	0.00	0.00	22,632.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	227,948.00
65	NPDF (Rupamoni Thakur)	0.00	0.00	0.00	0.00	147,010.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54,115.00
66	NPDF (Seydur Rahman)	660,000.00	0.00	0.00	0.00	218,166.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	131,775.00
67	NPDF Fellowship (Abdul Barik)	577,500.00	1,770.00	0.00	86,445.00	23,648.00	0.00	103,562.00	0.00	0.00	0.00	0.00	0.00	36,269.00
68	Oxidative degradation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-171,901.00
69	Physico Sensor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-87,445.00
70	Plasma modified	615,360.00	18,065.00	0.00	15,727.00	245,463.00	0.00	94,226.00	0.00	0.00	0.00	0.00	0.00	0.00
71	PM 10 & PM 2.5 (A Devi)	24,360.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	585,040.00
72	Polymer Based Sensors	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-568.00
73	Proton Exchange	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-137,261.00
74	QA & QC (N C Talukdar)	136,102.00	36,870.00	0.00	0.00	0.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	10,796,028.00
75	R Devi (Banana)	137,280.00	24,318.00	416,821.00	46,850.00	89,475.00	0.00	100,000.00	0.00	0.00	0.00	0.00	0.00	995,256.00
76	Ramalingaswami (S Kundu)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-0.00
77	Ramalingaswami (S Nandi)	1,149,643.00	566,782.00	0.00	117,983.00	53,175.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62,334.00
78	Ramanujan Fellow	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
79	NPDF (Sailendra Gayri)	81,613.00	1,770.00	0.00	0.00	110,768.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,419.00
80	ST People Arunachal Pradesh (N C Talukdar)	0.00	15,700.00	0.00	0.00	0.00	0.00	50,000.00	0.00	0.00	0.00	0.00	0.00	644,300.00
81	Structure of Enzymes	0.00	0.00	0.00	0.00	14,160.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11,306.00
82	Women Scientist (Sumita Kumari)	457,742.00	8,008.00	143,253.82	0.00	73,456.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	515,282.18
83	Tissue Repairs	600,000.00	0.00	0.00	2,214.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
84	UGC Grant (MD Shadab)	0.00	1,841.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,170.00
85	VRP (A K Sahu)	720,000.00	50,000.00	0.00	78,600.00	30,740.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	INSPIRE Faculty Award (Wahengbam Romi)	751,680.00	10,905.00	0.00	190,689.00	665,462.00	0.00	35,000.00	0.00	0.00	0.00	0.00	0.00	-127,358.00
87	IASST Fund	144,405.00	617,356.68	215,657.00	378,756.82	29,023.00	0.00	0.00	0.00	0.00	50,077,181.00	1,050,000.00	0.00	12,227,172.75
	Total	30,816,381.00	3,089,438.68	13,331,021.52	1,928,224.82	12,221,011.67	597,614.00	2,366,704.00	0.00	0.00	50,077,181.00	1,050,000.00	8,239,715.00	44,237,040.94

Finance & Accounts Officer
आई.ए.एस.टी.
IASST, Paschim Boragaon
गुवाहाटी-35
Guwahati-781035

कुलसचिव/Registrar

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35 ; असम; भारत
Guwahati-781035;Assam;India

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

INDEPENDENT AUDITOR'S REPORT

TO
THE MEMBERS
THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
GUWAHATI

We have audited the accompanying Financial Statements of **DST General Fund** of **The Institute of Advanced Study in Science & Technology, Paschim Boragaon, Garchuk, Guwahati** which comprise the Balance Sheet as at 31st March, 2019, the Receipts and Payments Account and the Income and Expenditure Account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for Financial Statements :

Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance of the society in accordance with the Accounting Standards generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from misstatement, whether due to error or fraud.

Auditor's Responsibility :

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with ethical requirements and plans and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the society's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Cond..P/2

Finance Officer
आई.ए.एस.टी.
IASST, Paschim Boragaon
गुवाहाटी-35, असम, भारत
Guwahati-35, Assam, India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी संस्थान
Guwahati

निदेशक/Director
भा.ए.प्र.सं.टी., पश्चिम बड़ागाव
IASST, Paschim Boragaon
Guwahati-781035, Assam

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+91 361 2512159
kpsarda@gmail.com

K P SARDA COMPANY
CHARTERED ACCOUNTANTS

SC-11, Parmeshwari Building, 2nd Floor
Chatribari Road, Guwahati - 781001, Assam
http://kpsardaco.org.in

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

(2)

Opinion:

In our opinion and to the best of our information and according to the explanations given to us, the financial statements give the information required by the Act in the manner so required and give a true and fair view in conformity with the accounting principles generally accepted in India :

(a) In the case of the Balance Sheet, of the state of affairs of the Society, as on 31st March, 2019;

(b) In case of the Income and Expenditure Account of the Income/Expenditure of Society for the year ended 31st March, 2019;

(c) In case of the Receipts and Payment Account of the Receipts/Payments of Society for the year ended 31st March,2019

We further report that:

(a) We have obtained all the information and explanations to the best of our knowledge and belief were necessary for the purpose of our audit;

(b) In our opinion, proper books of account, as required by law have been kept by the Society so far as appears from our examination of those books;

(c) The Balance Sheet, the Receipts and Payments Account and the Income and Expenditure Account dealt with by this Report are in agreement with the books of account.

For K.P. Sarda & Co.
Chartered Accountants
FRN : 319206E

(CA. K P Sarda)
Partner
Membership No.054555

Place : Guwahati
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उच्च अध्ययन संस्थान
Institute of Advanced Study in Science & Technology

निदेशक/Director

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

BALANCE SHEET OF DST GENERAL FUND AS ON 31ST MARCH, 2019

PARTICULARS	Schedule	Amount (₹) 2018-19	Amount (₹) 2017-18
CAPITAL FUND & LIABILITIES			
Capital Fund	1	542,274,345.44	471,370,023.16
Current Liabilities and Provisions	2	115,038,341.16	92,184,188.92
TOTAL :		**657,312,686.60**	**563,554,212.08**
ASSETS			
Fixed Assets	3	540,984,359.41	471,370,023.13
Current Assets, Loans and Advances	4	116,328,327.19	92,184,188.95
TOTAL :		**657,312,686.60**	**563,554,212.08**

NOTES ON ACCOUNT - SCHEDULE "5"

In terms of our report of even date annexed hereto.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

K. P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी.
IASST, Guwahati

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उच्च अध्ययन संस्थान

निदेशक/Director
आई.ए.एस.एस.टी.
IASST, Guwahati

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

INCOME AND EXPENDITURE ACCOUNT OF DST GENERAL FUND FOR THE YEAR ENDED 31ST MARCH 2019

EXPENDITURE		Amount (₹)	INCOME	Amount (₹)
Expenditure on Grants			Revenue Grant	243,786,000.00
Salary (Details 1)		107,717,490.00	Penal Interest	4,282.00
Contingency (Details 2)		23,933,252.00	Interest From Advance	6,135.00
Bank Charges		12,554.38	Bank Interest	20,035.00
Consumables (Details 3)		10,067,868.94	Other Income	1,259,534.00
Training & Conference		2,605,411.00		
Travelling		1,414,760.00		
Honorarium		3,217,640.00		
Security Service		2,277,869.00		
Works and Services (Details 4)		22,894,122.16		
Financial Assistance for Seminar/Worksho		100,000.00		
Workshop & Conference		19,500.00		
Institutional Projects (Details 5)		877,041.00		
Surplus transferred to				
a) Unutilised Grant	68,648,491.52			
b) Capital Fund	1,289,986.00	69,938,477.52		
		245,075,986.00		245,075,986.00

NOTES ON ACCOUNT - SCHEDULE "5"

In terms of our report of even date annexed hereto.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35: असम:भारत
Guwahati-781035: Assam:India

कुलसचिव/Registrar

निदेशक/Director
आई.ए.ए.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

RECEIPTS AND PAYMENTS ACCOUNT OF DST GENERAL FUND FOR THE YEAR ENDED 31ST MARCH 2019

RECEIPTS		Amount (₹)	PAYMENTS		Amount (₹)
To **OPENING BALANCE :**			By **SALARY & ALLOWANCES :**		
Cash in hand	20,000.00		Salary	82,001,511.00	
Cash at Bank	806,215.95	826,215.95	N.P.S Contribution	10,256,338.00	
(As per Schedule 4)			Gratuity Premium	6,914,595.00	
			NSDLS Service Charges	11,072.00	
" **GRANT-IN-AID :**			Children Education	1,631,190.00	
From Ministry of Science and Technology Department of Science & Technology, New Delhi			Medical Expenses	2,327,520.00	
			Leave Travel Concession	564,184.00	
			Leave Encashment	2,654,830.00	
Capital Grant :			EPF Contribution	1,070,626.00	
AI/IASST/CAP/003/2018/1	3,014,000.00		EPFO Service Charge	49,032.00	
AI/IASST/CAP/003/2018/2	4,069,000.00		Summer Traineeship	265,096.00	
AI/1/7/IASST/2016	40,000,000.00		Labour and Wages	2,320,763.00	
AI/IASST/CAP/003/2018/3	15,898,000.00		Telephone, Internet & Newspap	157,652.00	
AI/IASST/CAP/003/2018/4	4,055,000.00		Uniform Allowances	124,924.00	110,349,333.00
AI/1/7/IASST/2016	12,700,000.00				
AI/IASST/CAP/003/2018/5	5,472,000.00	85,208,000.00	" **GENERAL EXPENDITURE :**		
			Contingency	22,644,152.00	
Revenue Grant :			Bank Charges	12,554.38	
AI/IASST/SAL/003/2018/1	35,839,000.00		Consumables	10,134,924.22	
AI/IASST/GEN/003/2018/1	15,333,000.00		Training & Conference	2,818,976.00	
AI/IASST/GEN/003/2018/2	20,700,000.00		Travelling	1,576,533.00	
AI/IASST/SAL/003/2018/2	48,383,000.00		Honorarium	3,217,640.00	
AI/IASST/ST-GEN/003/2018/1	28,858,000.00		Security Service	2,277,869.00	
AI/IASST/SAL/003/2018/3	43,301,000.00		Works and Services	26,259,413.16	68,942,061.76
AI/IASST/GEN/003/2018/3	4,183,000.00				
AI/IASST/SAL/003/2018/4	22,504,000.00		" **CAPITAL EXPENDITURE :**		
AI/IASST/GEN/003/2018/4	7,097,000.00		Equipments	19,321,125.30	
AI/IASST/ST-GEN/003/2018/2	5,092,000.00		Library	1,976,715.00	
AI/IASST/SAL/003/2018/5	7,496,000.00		Computer & Peripherals	6,540,487.00	
AI/IASST/GEN/003/2018/5	5,000,000.00	243,786,000.00	A.C.	925,434.00	
			Furniture & Fixtures	3,073,351.00	
" **INTEREST :**			Building & Site Development	123,658,810.00	155,495,922.30
Bank Interest	790,725.00				
Interest From Advance	6,135.00		" Institutional Projects		109,383.00
Penal Interest	4,282.00	801,142.00			
			" Empowerment of SC/ST People		500,626.00
" Security Deposits (Net)		4,552,087.00			
			" Workshop & Conference		19,500.00
" Other Income		1,259,534.00			
			" Financial Assistance for Seminar/Workshop		100,000.00
			" Advance for LC/TT (HDFC A/c)		171,909.96
			" **CLOSING BALANCE :**		
			Cash in hand	20,000.00	
			Cash at Bank	724,242.93	744,242.93
			(As per Schedule 4)		
		336,432,978.95			336,432,978.95

We have verified the above statement of Receipts & payments Account of the DST General Fund of Institute of Advanced Study in Science & Technology, Paschim Boragaon, Guwahati - 781 035, Account - Plan for the period from 1st April 2018 to 31st March, 2019 from the Books of Accounts and vouchers produced

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.टी.
IASST
गुवाहाटी
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आई.ए.एस.टी., पश्चिम बड़ागाव
IASST, Paschim Boragaon

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 1 : :: CAPITAL FUND ::

	Amount(₹) 2018-19	Amount (₹) 2017-18
Opening Balance	471,370,023.16	345,921,128.16
Add : Contribution towards Capital Fund (Addition to Fixed Assets)	139,220,654.28	181,752,859.00
Add : Surplus for the year	1,289,986.00	0.00
	611,880,663.44	527,673,987.16
Less : Depreciation for the year	69,606,318.00	56,303,964.00
	542,274,345.44	**471,370,023.16**

SCHEDULE - 2 : :: CURRENT LIABILITIES AND PROVISIONS ::

		Amount(₹) 2018-19	Amount (₹) 2017-18
CURRENT LIABILITIES :			
Unutilised Grant in Aid	(As per Annexure "A")	100,320,137.16	85,684,299.92
Security Deposit Payable	(As per Annexure "B")	10,751,714.00	6,199,627.00
Other Current Liabilities	(As per Annexure "C")	3,966,490.00	300,262.00
		115,038,341.16	**92,184,188.92**

SCHEDULE - 4 : :: CURRENT ASSETS, LOANS & ADVANCES ::

		Amount(₹) 2018-19	Amount(₹) 2017-18
(A) CURRENT ASSETS :			
Cash in hand		20,000.00	20,000.00
Balance with Banks	**Account No.**		
SBI Khanapara Branch	(943972)	158,215.28	289,733.30
SBI Khanapara Branch - Workshop	(943723)	181,366.83	174,587.83
Vijaya Bank - Travel	(000441)	163,176.29	161,746.29
SBI Khanapara - International Conference	(635294)	12,335.00	11,912.00
SBI - IASST Corpus Fund	(943064)	209,149.53	168,236.53
	TOTAL (A)	744,242.93	826,215.95
(B) LOANS, ADVANCES & OTHER ASSETS :			
Advance to Extramural Project			
Vijaya Bank - Conference (000918)		107,090.00	107,090.00
SBI Garchuk - Seminar (888433)		64,830.00	64,830.00
HDFC Bank for LC/TT		171,909.96	0.00
Advances against Expenditure of Grants	(Annexure "D")	20,094,044.28	13,864,446.00
Advances against Fixed Assets	(Annexure "E")	95,146,210.02	77,321,607.00
	TOTAL (B)	115,584,084.26	91,357,973.00
	TOTAL (A+B)	**116,328,327.19**	**92,184,188.95**

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी

K. Sarda & Co. Guwahati Chartered Accountants

निदेशक/Director
आई.ए.एस.एस.टी.
IASST

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 3 : **:: FIXED ASSETS ::**

PARTICULARS OF DEPRECIATION ALLOWABLE AS PER THE IT ACT, 1961 IN RESPECT OF EACH ASSET OR BLOCK OF ASSETS, AS THE CASE MAY BE, IN THE FOLLOWING FORM

Particulars	W.D.V on 01/04/18	Additons/(Deletion) >180 days	Additons/(Deletion) <180 days	Total	Depreciation	W.D.V on 31/03/19
Block "A" : 0%						
Land	0.00	0.00	0.00	0.00	0.00	0.00
Block "B" : 10%						
Building & Site Development	306,997,817.66	46,357,995.00	63,540,490.00	416,896,302.66	38,512,606.00	378,383,696.66
Furniture & Fixtures	32,214,777.00	1,856,432.00	1,319,555.00	35,390,764.00	3,473,099.00	31,917,665.00
Block "C" : 15%						
Equipments	116,175,363.45	12,494,429.28	4,189,217.00	132,859,009.73	19,614,660.00	113,244,349.73
Air Conditioner	4,061,831.00	482,457.00	442,977.00	4,987,265.00	714,866.00	4,272,399.00
Refrigerator	10,798.00	0.00	0.00	10,798.00	1,620.00	9,178.00
Projector	78,778.00	0.00	0.00	78,778.00	11,817.00	66,961.00
Vehicles	1,828,422.00	0.00	0.00	1,828,422.00	274,263.00	1,554,159.00
Block "D" : 40%						
Library	1,518,762.00	1,864,353.00	112,362.00	3,495,477.00	1,375,718.00	2,119,759.00
Computer	8,479,629.02	4,611,012.00	1,949,375.00	15,040,016.02	5,626,131.00	9,413,885.02
Printer & Xerox Machine	2,003.00	0.00	0.00	2,003.00	801.00	1,202.00
Computer Software	1,842.00	0.00	0.00	1,842.00	737.00	1,105.00
	471,370,023.13	67,666,678.28	71,553,976.00	610,590,677.41	69,606,318.00	540,984,359.41

Finance & Accounts Officer, IASST, Guwahati-781035

Kulasachiv/Registrar

Nideshak/Director, IASST, Paschim Boragaon

P. Sarda & Co. Guwahati Chartered Accountants

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE " 5 " : SIGNIFICANT ACCOUNTING POLICES :

1. **ACCOUNTING CONVENTION :**

   The Financial Statements are prepared on the basis of historical cost convention, unless otherwise stated and on the Accrual method of accounting.

2. **REVENUE RECOGNITION :**

   (a)Income on Interest bearing securities and Term Deposits is recognised on accrual basis as and when these are realised.

   (b) Income other than Interest Income are recognised on Cash Basis.

3. **INVESTMENTS :**

   Term deposits with Banks are taken as Investments and valued at accrual basis.

4. **FIXED ASSETS :**

   Fixed Assets are stated at cost of acquisiton, inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisiton less depreciation.

5. **DEPRECIATION :**

   (a) Depreciation on Fixed assets purchased/acquired/ constructed out of Government Grants is charged on WDV Method as per the rates specified under the Income Tax Act, 1961.

   (b) Depreciation is charged to Capital Fund by way of reducing the net value of Fixed Assets.

6. **GOVERNMENT GRANTS/SUBSIDIES :**

   Revenue Grants are shown as income on realisation basis and expenditure thereof is charged to appropriate revenue heads. In the case Capital Grant, the Capital Fund is credited to the extent of the amount of acquisition of Fixed Assets and the balance remains in Unutilised Grant.

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़गाव
IASST, Paschim Boragaon
गुवाहाटी-781035 (असम) भारत
Guwahati-781035 (Assam) India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी उन्नत अध्ययन संस्थान
Institute of Advanced Study in Science & Technology
पश्चिम बड़गाव, गुवाहाटी-781035 (असम) भारत
Paschim Boragaon, Guwahati-781035 (Assam) India

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़गाव
IASST, Paschim Boragaon

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

NOTES ON ACCOUNTS :

(i) No provision has been made in respect of Leave Salary.

(ii) Purchase of consumable items during the year are treated as expenditure and charged to revenue.

(iii) In the opinion of the Management, the Current Assets, Loans and Advances have a value on realisation equal or atleast to the aggregate amount shown in the Balance Sheet.

(iv) Balances under Current Liabilities, Loans and Advances are subject to conformation /reconciliation /adjustments, if any.

(v) No provision is made for Contingent Liability, except for cases where provision needs to be made, based on expert opinion.

(vi) Previous years figure have been rearranged and regrouped wherever considered necessary to facilitate comparison.

(vii) Bank Interest received in SBI Khanapara during the year is not recognised as Income instead shown as Current Liability because it will be refunded to DST, Govt. of India.

(viii) Any surplus balance that remains in Income & Expenditure A/c after adjusting the Revenue Expenditure with the Revenue Grant and Other Income is transferred to Unutilised Grant.

K. P. Sarda & Co. Guwahati Chartered Accountants

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35; असम भारत
Guwahati-781035; Assam India

कुलसचिव/Registrar

निदेशक/Director
आई.ए.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Annexure "A" - Unutilised Grant	**Amount(₹)**
Opening Balance	85,684,299.92
Add : Capital Grant received during the year	85,208,000.00
Add : Unutilised Revenue Grant for the year	68,648,491.52
	239,540,791.44
Less : Contribution towards Capital Fund (Addition to Fixed Assets)	139,220,654.28
Closing Balance	100,320,137.16

Annexure "B" - Security Deposit Payable	**Amount(₹)**
Works & Service	225,469.00
Building & Site Development	10,526,245.00
	10,751,714.00

Annexure "C" - Other Current Liabilities		**Amount(₹)**
Bank Interest Refundable to DST, Govt. of India		770,690.00
Upgrading		300,262.00
Employee Provident Fund		48,844.00
Sundry Payables:		
Computer and Peripherals	62,614.00	
Repairing & Maintanence Equipment	18,375.00	
Repairing & Maintanence Electricals	114,450.00	
Chemical & Glassware	676,071.00	
Repairing & Maintanence General	424,193.00	
Furniture & Fixture	19,446.00	
Printing & Stationeries	64,270.00	
Construction of Director Quarter	1,467,275.00	2,846,694.00
		3,966,490.00

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.ए.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35:असम:भारत
Guwahati-781035: Assam:India

कुलसचिव/Registrar

निदेशक/Director

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Annexure "D" - Advance against expenditure on grant :		Amount(₹)
Current year unadjusted advance :		
Salary	4,266,044.00	
Empowerment of SC/ST	47,968.00	
Contingency	229,765.00	
Works and Services	5,484,706.00	
Travel	165,560.00	
Consumables	866,984.28	
Training & Conference	451,774.00	11,512,801.28
Earlier years unadjusted advance :		
Salary	5,579,915.00	
Empowerment of SC/ST	60,000.00	
Contingency	538,425.00	
Training & Conference	1,184,133.00	
Works and Services	583,742.00	
Travel	34,180.00	
Consumables	600,848.00	8,581,243.00
TOTAL :		**20,094,044.28**

Annexure "E" - Advance against Fixed Assets :		Amount(₹)
Current year unadjusted advance :		
Building & Site Development	24,875,882.00	
Computer & Peripherials	42,714.00	
Equipment	2,637,479.02	27,556,075.02
Earlier years unadjusted advance :		
Computer & Peripherials	984,401.00	
Furniture & Fixture	94,324.00	
Equipment	66,511,410.00	67,590,135.00
		95,146,210.02

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-781035, असम:भारत
Guwahati-781035, Assam:India

K. P. Sarda & Co. Guwahati Chartered Accountants

कुलसचिव/Registrar

निदेशक/Director

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Details of Income & Expenditure

Details 1 : Salary and Allowances :	Amount(₹) 2018-19	Amount(₹) 2017-18
General Fund :		
Salary	79,320,824.00	
N.P.S Contribution	10,256,338.00	
Gratuity Premium	6,914,595.00	
NSDLS Service Charges	11,072.00	
Children Education	1,631,190.00	
Medical Expenses	2,327,520.00	
Leave Travel Concession	564,184.00	
Leave Encashment	2,654,830.00	
EPF Contribution	1,119,470.00	
EPFO Service Charge	49,032.00	
Summer traineeship	265,096.00	
Labour and Wages	2,320,763.00	
Telephone, Internet & Newspaper	157,652.00	
Uniform Allowances	124,924.00	
	107,717,490.00	**99,955,858.00**

Details 2 : Contingency Expenses :	Amount(₹) 2018-19	Amount(₹) 2017-18
General Fund :		
Meeting Expenses	2,677,890.00	1,691,768.00
Advertisement	1,908,582.00	736,107.00
Postage	259,914.00	139,951.00
Electricity & Power	9,813,100.00	8,772,919.00
Audit Fee	41,300.00	35,400.00
Telephone Charges	85,041.00	65,613.00
Repairs & Maintenance - Vehicle	2,042,601.00	1,302,164.00
Printing & Stationery	2,725,406.00	2,569,992.00
Computer Stationery	665,699.00	385,887.00
Hospitality	3,202,137.00	3,759,740.00
Conveyance	88,779.00	88,624.00
Legal Fees	156,930.00	0.00
Newspapers & Periodicals	99,625.00	173,933.00
Initiative for Income Generation	166,248.00	0.00
	23,933,252.00	**19,722,098.00**

Details 3 : Laboratory Consumables :	Amount(₹) 2018-19	Amount(₹) 2017-18
General Fund :		
Laboratory Gas Refilling	271,959.00	123,077.00
Chemicals & Glassware	8,369,583.12	9,481,687.00
Sample Analysis	202,796.82	1,685,521.00
Sample Collection	41,116.00	266,748.00
Renewal/Other Fee Payments	670,394.00	943,773.00
Experimental Animal Maintenance	512,020.00	118,815.00
	10,067,868.94	**12,619,621.00**

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी. पश्चिम बरागाव
IASST, Paschim Boragaon
गुवाहाटी-35, असम, भारत
Guwahati-781035, Assam, India

कुलसचिव/Registrar
विज्ञान एवं प्रौद्योगिकी के उच्च अध्ययन संस्थान

निदेशक/Director
आई.ए.एस.टी. पश्चिम बरागाव
IASST, Paschim Boragaon

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Details of Income & Expenditure

Details 4 : Works & Services :	Amount(₹) 2018-19	Amount(₹) 2017-18
General Fund :		
Repairing & Maintenance (Equipment)	6,986,279.16	5,433,814.00
Gardening & Landscaping	241,336.00	223,842.00
Repairing & Maintenance (Electrical)	2,132,739.00	1,437,219.00
Repairing & Maintenance (General)	12,582,314.00	14,460,139.00
Repairing & Maintenance (SSH)	951,454.00	151,215.00
	22,894,122.16	**21,706,229.00**

Details 5 : Institutional Projects :	Amount(₹) 2018-19	Amount(₹) 2017-18
General Fund :		
Commercialisation of Research Output	10,760.00	0.00
Empowerment of Sc/St People	767,658.00	366,020.00
Institutional Projects Production of Candy	32,681.00	0.00
Protective & Decorative Coating on Bell Metal	65,942.00	0.00
	877,041.00	**366,020.00**

K. P. Barua & Co. Guwahati Chartered Accountants

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी.
IASST, Paschim Boragaon
गुवाहाटी-781035, असम, भारत
Guwahati-781035, Assam India

कुलसचिव/Registrar

निदेशक/Director

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

GFR 12 - A
[See Rule 238 (1)]

FORM OF UTILIZATION CERTIFICATE
FOR AUTONOMOUS BODIES OF THE GRANTEE ORGANIZATION

UTILIZATION CERTIFICATE FROM 1st APRIL, 2018 TO 31st MARCH, 2019
in respect of recurring/non recurring
GRANTS-IN-AID/ SALARIES/CREATION OF CAPITAL ASSETS

1. **Name of the Scheme** : The Institute of Advanced Study in Science & Technology
2. **Whether recurring or non-recurring grants** : Recurring and Non-Recurring Grants
3. **Grants position at the beginning of the Financial year :**

 (i) Cash in Hand/Bank : 826,215.95
 (ii) Unadjusted Advances : N/ A
 (iii) Total : Nil

4. Details of grants received, expenditure incurred and closing balances : (Actuals)

Unspent Balances of Grants received years (Rs.)	Interest earned thereon (Rs.)	Interest deposited back to the Government (Rs.)	Sanction Number	Sanction Date	Amount (Rs.)	Total Available funds (Rs.) (5=(1+2+3-4)	Expenditure incurred (Rs.) (as per Annexure: II attached)	Closing Balances (Rs.) 7=(5-6)
1	2	3			4	5	6	7
826,215.95	2,060,676.00	-	Annexure: I	Annexure: I	328,994,000.00	331,880,891.95	331,136,649.02	744,242.93

Grant-in-aid-General	Grant-in-aid-Salary	Grant-in-aid-Creation of Capital Assets	Total
69,843,480.72	110,349,333.00	150,943,835.30	331,136,649.02

5 Details of grants position as on : 31/03/2019

 (i) Cash in Hand/Bank : 7,44,242.93
 (ii) Unadjusted Advances : N/ A
 (iii) Total : Nil

Note:
During the FY 2018-19 Institute has earned Rs.7,90,725.00.00 as Interest and Rs.12,69,951.00 as Other Receipt. Utilisation Certificate does not have the provision for showing of Other Receipt seperately and therefore this amount is added in interest earned coloum.

Certified that I have satisfied myself that the conditions on which grants was sanctioned have been fulfilled/are being fulfilled and that I have exercised following checks to see that the money was actually utilized for the purpose for which it was sanctioned :

(1) The main accounts and other subsidiary accounts and registers (including assets registers) are maintained as prescribed in the relevent Act/Rules/Standing instructions (mentioned the Act/Rules) and have been duly audited by designated auditors. The figures depicted above tally with the audited figures mentioned in financial statements/ accounts.

(2) There exists internal controls for safeguarding public funds/assets, watching outcomes and achievements of physical targets against the financial inputs, ensuring quality in assset creation etc and the periodic evaluation of internal controls is exercised to ensure their

(3) To the best of our knowledge and belief, no transactions have been entered that are in violation of relevant Act/ and scheme guidelines.

(4) The responsibilities among the key functionaries for execution of the scheme have been assigned in clear terms and are not general in

(5) The expenditure on various components of the scheme was in the proportions authorized as per the scheme guidelines and terms and conditions of the grants-in-aid.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

Place : Guwahati
Date : 20/06/2019

(Pradyut Borkataki)
Chief Finance Officer
Head of the Finance
वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़गाव
IASST, Paschim Boragaon
गुवाहाटी-35:असम:भारत
Guwahati-781035:Assam:India

(N.C. Talukdar)
Head of the Organisation
निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़गांव
IASST, Paschim Boragaon
Guwahati-781035:Assam:India

K. P. Sarda & Co. Chartered Accountants Guwahati

(CA. K P Sarda)
Partner
Membership No. 054555

UDIN : 19054555AAAABI1680

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K P SARDA & COMPANY CHARTERED ACCOUNTANTS
SC-11, Parmeshwari Building, 2nd Floor
Chatribari Road, Guwahati - 781001, Assam
http://kpsardaco.org.in

Annexure: I

Sl. No.	Sanction Letter No.	Date	Amount (₹)
1	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/GEN/003/2018/1 dtd. 07/05/2018	07/05/2018	15,333,000.00
2	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/CAP/003/2018/1 dtd 08/05/2018	08/05/2018	3,014,000.00
3	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/SAL/003/2018/1 dtd. 08/05/2018	08/05/2018	35,839,000.00
4	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/GEN/003/2018/2 dtd. 28/6/2018	28/06/2018	20,700,000.00
5	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/CAP/003/2018/2 dtd 28/06/2018	28/06/2018	4,069,000.00
6	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/SAL/003/2018/2 dtd 28/06/2018	28/06/2018	48,383,000.00
7	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/1/7/IASST/2016 dtd 11/09/2018	11/09/2018	40,000,000.00
8	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/ST-GEN/003/2018/1 dtd 27/09/2018	27/09/2018	28,858,000.00
9	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/GEN/003/2018/3 dtd 27/09/2018	27/09/2018	4,183,000.00
10	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/SAL/003/2018/3 dtd 27/09/2018	27/09/2018	43,301,000.00
11	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/CAP/003/2018/3 dtd 27/09/2018	27/09/2018	15,898,000.00
12	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/SAL/003/2018/4 dtd 30/01/2019	30/01/2019	22,504,000.00
13	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/GEN/003/2018/4 dtd 22/02/2019	22/02/2019	7,097,000.00
14	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/CAP/003/2018/4 dtd 22/02/2019	22/02/2019	4,055,000.00
15	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/ST-GEN/003/2018/2 dtd 22/02/2019	22/02/2019	5,092,000.00
16	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/SAL/003/2018/5 dtd 28/02/2019	28/02/2019	7,496,000.00
17	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/CAP/003/2018/5 dtd.19/03/2019	19/03/2019	5,472,000.00
18	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/1/7/IASST/2016 dtd 22/03/2019	22/03/2019	12,700,000.00
19	Government of India, Ministry of Science and Technology, Department of Science & Technology, New Delhi vide letter no. AI/IASST/GEN/003/2018/5 dtd.19/03/2019	19/03/2019	5,000,000.00
	Total		328,994,000.00

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ाग
IASST, Paschim Boragaon
गुवाहाटी-35:असम:भारत
Guwahati-781035 Assam India

K. P. Sarda & Co. Guwahati Chartered Accountants

Annexure: II

HEADWISE EXPENDITURE DETAILS OF CORE BUDGET ACTIVITIES AS ON 31.03.2019

Major Head	Subhead	Expenditures	
		Subheadwise	Major Headwise
SALARY			
	Salary	84,587,370.00	**110,349,333.00**
	NPS Contribution	10,267,410.00	
	EPF Contribution	1,119,658.00	
	Gratuity Premium	6,914,595.00	
	Medical	2,327,520.00	
	LTC	564,184.00	
	Leave Encashment	2,654,830.00	
	Children Education	1,631,190.00	
	Uniform	124,924.00	
	Telephone/ Internet/Newpaper	157,652.00	
GENERAL			
	Contingency	22,644,152.00	**69,843,480.72**
	Bank Charges	12,554.38	
	Consumables	10,134,924.22	
	Training & Conf./Seminar	2,938,476.00	
	Travel	1,576,533.00	
	Honorarium	3,217,640.00	
	Security Service	2,277,869.00	
	Institutional Projects	610,009.00	
	Works & Services	26,431,323.12	
CAPITAL			
	Computer & Peripherals	6,540,487.00	**150,943,835.30**
	AC	925,434.00	
	Equipments	19,321,125.30	
	Furniture & Fixture	3,073,351.00	
	Library	1,976,715.00	
	Building & Site Development	119,106,723.00	
Total		**331,136,649.02**	**331,136,649.02**

S. Sarda & Co. Guwahati Chartered Accountants

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाः
IASST, Paschim Boragaor
गुवाहाटी-35:असम:भारत
Guwahati-781035:Assam:India

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

INDEPENDENT AUDITOR'S REPORT

TO
THE MEMBERS
THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
GUWAHATI

We have audited the accompanying Financial Statements of **Miscellaneous, Student & Scientist Home, Upgrading Benevolent and Corpus Fund** of **The Institute of Advanced Study in Science & Technology, Paschim Boragaon, Garchuk, Guwahati** which comprise the Balance Sheet as at 31st March, 2019, the Receipts and Payments Account and the Income and Expenditure Account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for Financial Statements :

Management is responsible for the preparation of these financial statements that give a true and fair view of the financial position and financial performance of the society in accordance with the Accounting Standards generally accepted in India. This responsibility includes the design, implementation and maintenance of internal control relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from misstatement, whether due to error or fraud.

Auditor's Responsibility :

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those standards require that we comply with ethical requirements and plans and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the society's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of the accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Cond..P/2

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-781035, Assam, India

कुलसचिव/Registrar

निदेशक/Director
आई.ए.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon

+91 98640 60803, 94350 17315
+91 361 2512159
kpsarda@gmail.com

K P SARDA COMPANY
CHARTERED ACCOUNTANTS

SC-11, Parmeshwari Building, 2nd Floor
Chatribari Road, Guwahati - 781001, Assam
http://kpsardaco.org.in

K P SARDA & COMPANY
CHARTERED ACCOUNTANTS

Opinion:

In our opinion and to the best of our information and according to the explanations given to us, the financial statements give the information required by the Act in the manner so required and give a true and fair view in conformity with the accounting principles generally accepted in India :

(a) In the case of the Balance Sheet, of the state of affairs of the Society, as on 31st March, 2019;

(b) In case of the Income and Expenditure Account of the Income/Expenditure of Society for the year ended 31st March, 2019;

(c) In case of the Receipts and Payment Account of the Receipts/Payments of Society for the year ended 31st March,2019

We further report that:

(a) We have obtained all the information and explanations to the best of our knowledge and belief were necessary for the purpose of our audit;

(b) In our opinion, proper books of account, as required by law have been kept by the Society so far as appears from our examination of those books;

(c) The Balance Sheet, the Receipts and Payments Account and the Income and Expenditure Account dealt with by this Report are in agreement with the books of account.

For K.P. Sarda & Co.
Chartered Accountants
FRN : 319206E

(CA. K P Sarda)
Partner
Membership No.054555

Place : Guwahati
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी.
IASST, Paschim Boragaon
गुवाहाटी-35, असम, भारत
Guwahati-781035, Assam India

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

BALANCE SHEET OF Miscellaneous, SSH, Upgrading, Benevolent & Corpus Fund AS ON 31ST MARCH, 2019

PARTICULARS	Schedule	Amount (₹) 2018-19	Amount (₹) 2017-18
CAPITAL FUND & LIABILITIES			
Capital Fund	1	84,157,253.93	85,648,418.34
Reserves & Surplus	2	77,492.00	70,292.00
Current Liabilities and Provisions	3	11,943,522.23	3,633,807.23
TOTAL :		**96,178,268.16**	**89,352,517.57**
ASSETS			
Fixed Assets	4	61,092,008.45	68,468,764.45
Investments	5	10,000,000.00	10,000,000.00
Current Assets, Loans and Advances	6	25,086,259.71	10,883,753.12
TOTAL :		**96,178,268.16**	**89,352,517.57**

NOTES ON ACCOUNT - SCHEDULE "7"

In terms of our report of even date annexed hereto.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

K. P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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गुवाहाटी-35:असम:भारत
Guwahati-781035: Assam:India

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निदेशक/Director

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

CONSOLIDATED INCOME & EXPENDITURE ACCOUNT OF Miscellaneous, SSH, Upgrading, Benevolent & Corpus Fund FOR THE YEAR ENDED 31ST MARCH 2019

EXPENDITURE		Amount (₹)	INCOME		Amount (₹)
Audit Fees		109,740.00	**OTHER RECEIPTS :**		
			Bank Interest	553,838.00	
Mess Expenditures		1,778,665.00	Penal Interest	10,407.00	
			Interest on FD	285,970.00	
Bank Charges		4,783.80	Other Income	5,255,800.82	
			Mess Dues	1,672,764.57	7,778,780.39
Surplus transferred to					
a) Benevolent Fund	7,200.00		Contribution to Employees		
b) Capital Fund	5,885,591.59	5,892,791.59	Benevolent Fund		7,200.00
		7,785,980.39			7,785,980.39

NOTES ON ACCOUNT - SCHEDULE "7"

In terms of our report of even date annexed hereto.

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

K. P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

वित्त एवं लेखा अधिकारी
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

CONSOLIDATED RECEIPTS & PAYMENTS ACCOUNT OF Miscellaneous, SSH, Upgrading, Benevolent & Corpus Fund FOR THE YEAR ENDED 31ST MARCH 2019

RECEIPTS		Amount (₹)	PAYMENTS	Amount (₹)
To **OPENING BALANCE :**			By **EXPENDITURES :**	
Unspent as on 31/03/2018		10,759,729.12	Mess Expenditures	1,778,665.00
			Audit Fees	109,740.00
" **OTHER RECEIPTS :**				
Bank Interest	553,838.00		" Bank Charges	4,783.80
Penal Interest	10,407.00			
Interest on FD	285,970.00		" **CLOSING BALANCE :**	
Other Income	5,255,800.82		Unspent as on 31/03/2019	24,962,235.71
Mess Dues	1,672,764.57	7,778,780.39		
" Advance from Extramural Project		8,239,715.00		
" Earnest Money (Misc./Overhead)		70,000.00		
" Contribution to Employees Benevolent Fund		7,200.00		
		26,855,424.51		26,855,424.51

For K P Sarda & Co.
Chartered Accountants
FRN : 319206E

K. P. Sarda & Co. Guwahati Chartered Accountants

(CA. K P Sarda)
Partner
Membership No. 054555

Place : G u w a h a t i
Date : 20/06/2019

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Guwahati-781035

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SCHEDULE - 1 : :: CAPITAL FUND ::

	Amount(₹) 2018-19	Amount (₹) 2017-18
Opening Balance	85,648,418.34	71,818,208.24
Add : Surplus for the year	5,885,591.59	6,477,854.79
Add : Contribution towards Capital Fund (Addition to Fixed Assets)	0.00	1,158,644.00
Add : Transferred from Unutilised Grant	0.00	14,494,005.31
	91,534,009.93	93,948,712.34
Less : Depreciation for the year	7,376,756.00	8,300,294.00
	84,157,253.93	**85,648,418.34**

SCHEDULE - 2 : :: RESERVES & SURPLUS ::

	Amount(₹) 2018-19	Amount (₹) 2017-18
IASST Employees Benevolent Fund (664178)	77,492.00	70,292.00
	77,492.00	**70,292.00**

SCHEDULE - 3 : :: CURRENT LIABILITIES AND PROVISIONS ::

CURRENT LIABILITIES :	Amount(₹) 2018-19	Amount (₹) 2017-18
Advance from Extramural Projects	11,850,309.00	3,610,594.00
Security Deposit (SSH)	19,392.23	19,392.23
Earnest Money (Misc./Overhead)	70,000.00	0.00
DST Govt of India	3,821.00	3,821.00
	11,943,522.23	**3,633,807.23**

SCHEDULE - 5 : :: INVESTMENTS ::

	Amount(₹)
Opening Balance	10,000,000.00
Add : Investment made during the year	0.00
Add : Interest Accrued during the year	285,970.00
Less : Interest received during the year	285,970.00
Balance as on 31/03/2019	**10,000,000.00**

SCHEDULE - 6 : :: CURRENT ASSETS, LOANS & ADVANCES ::

CURRENT ASSETS :		Amount(₹) 2018-19	Amount(₹) 2017-18
TDS Receivable		124,024.00	124,024.00
Balance with Banks	**Account No.**		
SBI - IASST Employees Benevolent Fund	(664178)	80,217.00	70,292.00
SBI - Students & Scientist Home (IASST)	(412886)	479,212.79	568,064.62
SBI G.U. Branch - Upgrading	(131613)	48,670.86	47,004.86
Vijaya Bank - Overhead/Miscellaneous	(000466)	24,354,135.06	10,074,367.64
TOTAL :		**25,086,259.71**	**10,883,753.12**

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer

कुलसचिव/Registrar

निदेशक/Director

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SCHEDULE - 4 : **:: FIXED ASSETS ::**

PARTICULARS OF DEPRECIATION ALLOWABLE AS PER THE IT ACT, 1961 IN RESPECT OF EACH ASSET OR BLOCK OF ASSETS, AS THE CASE MAY BE, IN THE FOLLOWING FORM

Particulars	W.D.V on 01/04/18	Additons/(Deletion) >180 days	Additons/(Deletion) <180 days	Total	Depreciation	W.D.V on 31/03/19
Block "A" : 10%						
Building & Site Development	57,363,244.00	0.00	0.00	57,363,244.00	5,736,324.00	51,626,920.00
Furniture & Fixtures	507,919.45	0.00	0.00	507,919.45	50,792.00	457,127.45
Block "C" : 15%						
Equipments	5,738,386.00	0.00	0.00	5,738,386.00	860,758.00	4,877,628.00
Vehicles	4,859,215.00	0.00	0.00	4,859,215.00	728,882.00	4,130,333.00
	68,468,764.45	0.00	0.00	68,468,764.45	7,376,756.00	61,092,008.45

Finance & Accounts Officer

Registrar

Director

Guwahati

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE " 7 " : SIGNIFICANT ACCOUNTING POLICES :

1. **ACCOUNTING CONVENTION :**

   The Financial Statements are prepared on the basis of historical cost convention, unless otherwise stated and on the Accrual method of accounting.

2. **REVENUE RECOGNITION :**

   (a) Income on interest bearing securities and term deposits is recognised on accrual basis as and when these are realised.

   (b) Income other than interest income are recognised on cash basis.

3. **INVESTMENTS :**

   Term deposits with Banks are taken as investments and valued at accrual basis.

4. **FIXED ASSETS :**

   Fixed Assets are stated at cost of acquisiton, inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisiton less depreciation.

5. **DEPRECIATION :**

   (a) Depreciation on Fixed assets purchased/acquired/ constructed out of government grants is charged on WDV Method as per the rates specified under the Income Tax Act, 1961.

   (b) Depreciation is charged to Capital Fund by way of reducing the net value of fixed assets.

वित्त एवं लेखा अधिकारी
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NOTES ON ACCOUNTS :

(i) No provision has been made in respect of Leave Salary.

(ii) Purchase of consumable items during the year are treated as expenditure and charged to revenue.

(iii) In the opinion of the Management, the Current Assets, Loans and Advances have a value on realisation equal or atleast to the aggregate amount shown in the Balance Sheet.

(iv) Balances under Current Liabilities, Loans and Advances are subject to conformation /reconciliation /adjustments, if any.

(v) No provision is made for Contingent Liability, except for cases where provision needs to be made, based on expert opinion.

(vi) Previous years figure have been rearranged and regrouped wherever considered necessary to facilitate comparison.

(vii) Any surplus balance that remains in Income & Expenditure A/c after adjusting the expenditure with the income is transferred to Capital Fund.

K. P. Barua & Co. Guwahati Chartered Accountants

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Institute of Advanced Study in
भारत

निदेशक/Director
आई.ए.एस.एस.टी. पश्चिम बड़ागाव
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Guwahati

"Only two things are infinite, the universe and human stupidity, and I'm not sure about the former."

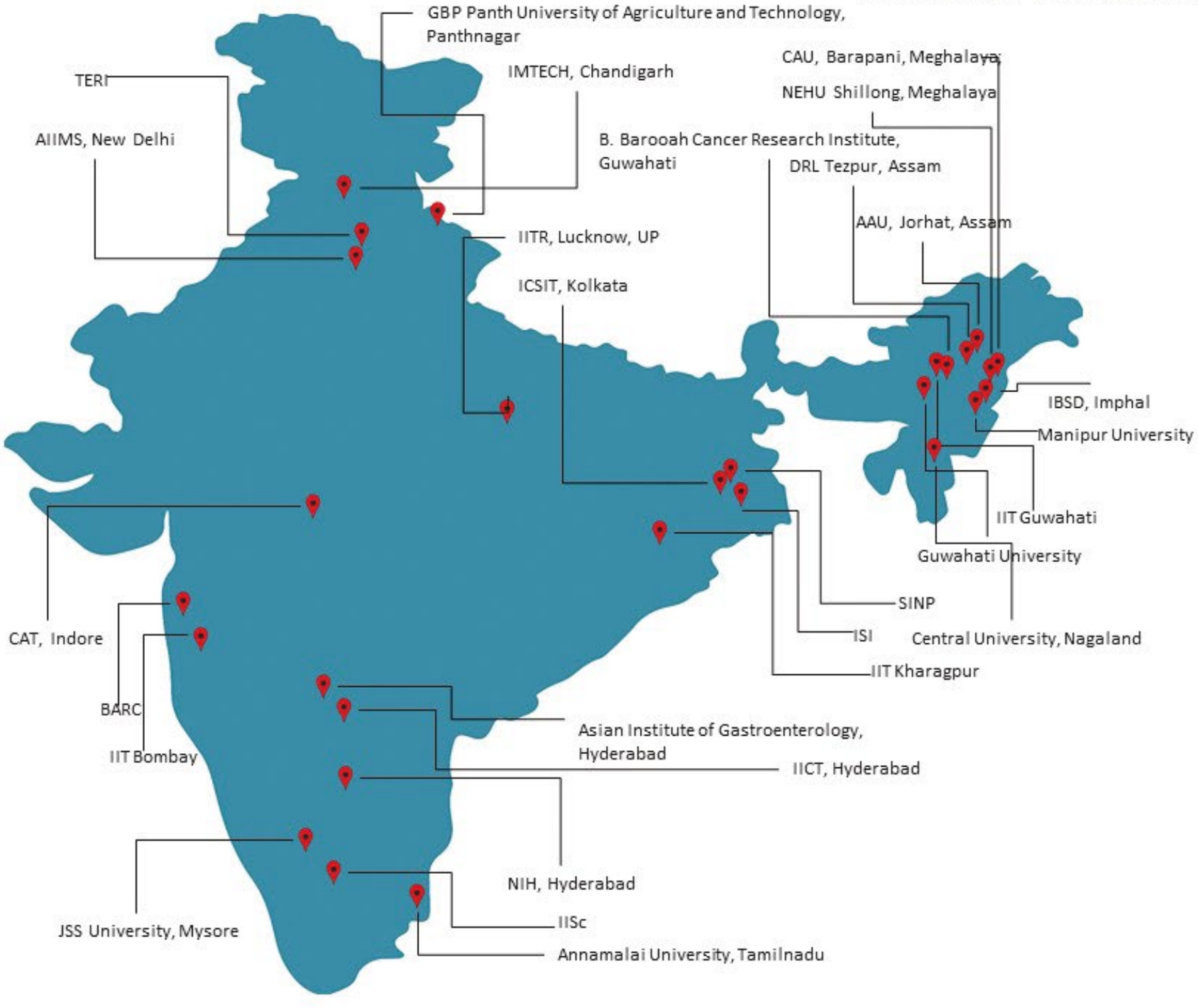
Albert Einstein

"I would rather have questions that can't be answered than answers that can't be questioned."

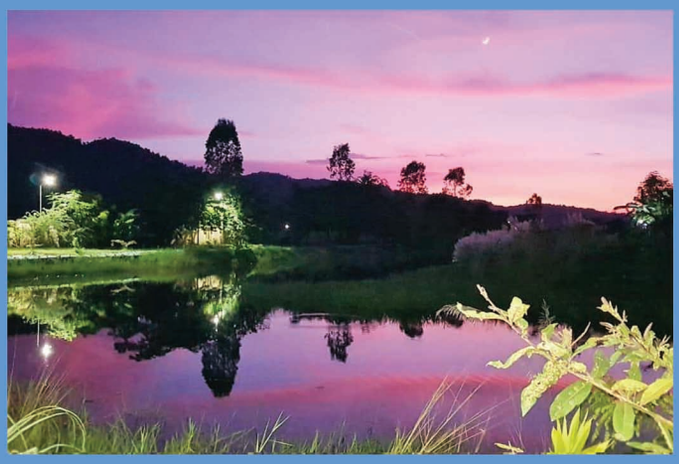
Richard Feynman

International Collaboration

National Collaboration



Glimpses of IASST Campus




TIMBER YIELDING PLANTS (BLOCK-I)
TIMBER YIELDING PLANTS (BLOCK-II)

Institute of Advanced Study in Science and Technology (IASST)

An Autonomous Institute under Department of Science and Technology Govt. of India

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