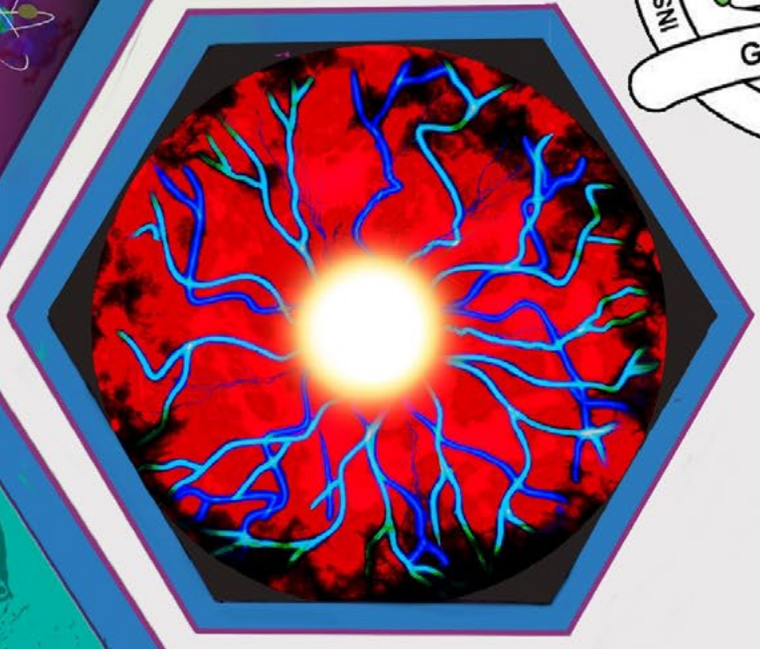
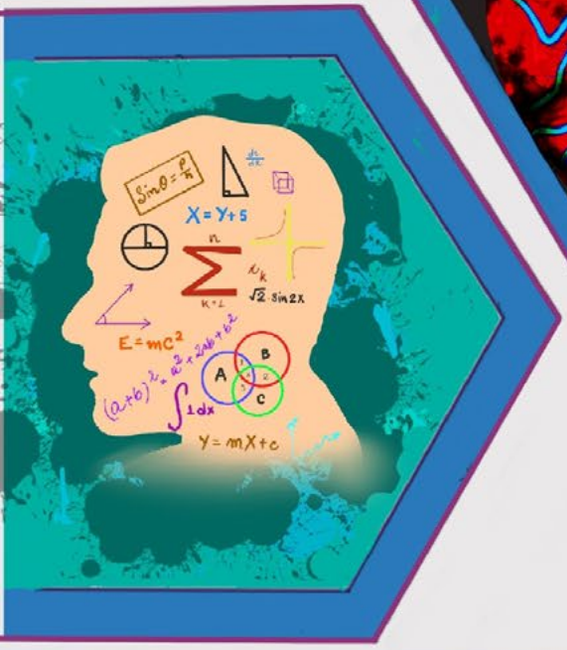
Annual Report
2020-21





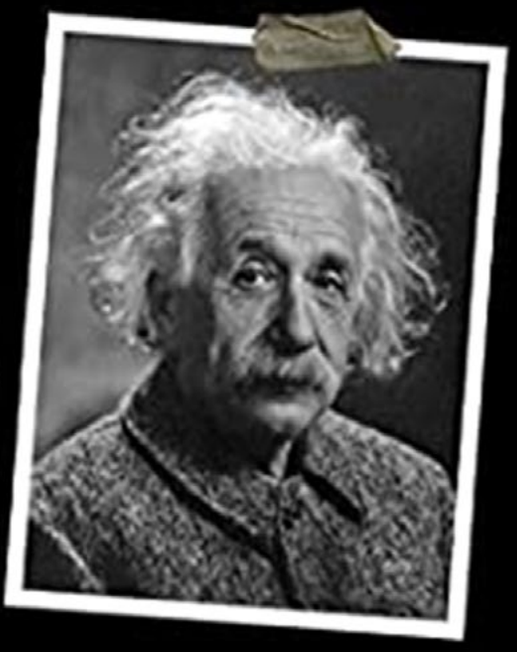
INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
GUWAHATI
1979

INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY (IASST)

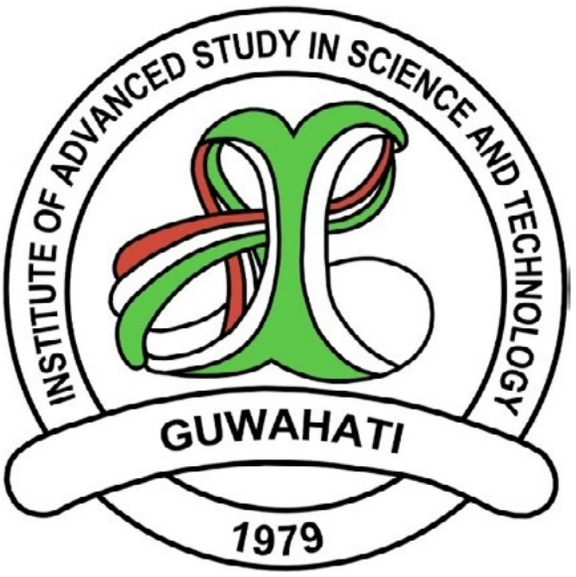
An Autonomous Institute Under Department of Science & Technology,
Govt. of India

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”
—Marie Curie

"Education is not the learning of facts, but the training of the mind to think."
-Albert Einstein



ANNUAL REPORT
2020-21



Institute of Advanced Study in Science and Technology (IASST)
An Autonomous Institute under Department of Science and Technology, Govt. of India

CONTENTS

FOREWORD

It is my pleasure, as the present Director of the Institute of Advanced Study in Science and Technology (IASST), Guwahati, to forward the annual report (2020-2021) of the Institute. The report underscores the achievements and progress made over the period, reaffirming our commitment to excellence in some of the most difficult times, overshadowed by the Covid-19 pandemic. Established in 1979, by the foremost scientific society of North-East India, the Assam Science Society, IASST acquired the distinction of an autonomous research institute, under the Department of Science and Technology (DST), Ministry of Science and Technology, Govt. of India, in March 2009.

Mandated and envisioned as a centre for excellence in frontiers of cutting-edge research, IASST remains uniquely positioned to impact scientific knowledge and cater to the needs of the society, through its state of art facilities and highly trained manpower. Among the landmarks of the continued progress of IASST, the ISO 9001:2015 certification received in 2015, was a turning point, on its journey, in achieving international standards.

In the year 2020-2021, 99 research scholars including 52 female and 47 male students, and 19 faculty members were working at IASST; and the academic activity of the institute was well supported by motivated and dedicated administrative staff. Five thrust areas of research that have been identified are: basic and applied plasma physics, advanced material sciences, traditional and modern drug discovery and disease diagnosis, mathematical and computational sciences, bio-diversity and ecosystem research. State of the art facilities is provided by our continuously modernized research laboratories and infrastructure amenities, computational and bioinformatics facility, and the knowledge-resource centre (KRC) housing thousands of books, journals, and periodicals. These facilities enable and empower deep thinking and focus on Research and Development among the scholars from IASST, as well as from several other Institutes, Colleges, and Universities. The research ecosystem of IASST has been significantly reinforced by the recent tie-up with the Academy of Scientific and Administrative Research (AcSIR), and the signing of MoU with several national and International Institutes of repute, for recognition of our Ph.D. programme and academic exchange activity. Concurrently, our commitment and determination for the development of the weaker and underprivileged section of society have been strengthened by the keen interest of our students and faculty in societal welfare activities. The progress of the SC/ST Development and Training Programme of IASST received noteworthy indebtedness from DST, Govt. of India. In the economically backward

villages adopted by IASST, the outreach programmes have been commendable, under constrained pandemic circumstances. In addition, the participation of the IASST community in co-curricular and extracurricular work is praiseworthy.

As India became affected by the onrush of the Covid-19 pandemic, in March 2020, the Government of India was forced to impose a long country-wide lockdown, to stall the spread of the corona virus. However, the members of the IASST fraternity did not lose hope, courage, and patience, even at that critical juncture; and have given their best performance by continuously striving against the challenges. That is the reason why, the year 2020-2021, has also witnessed significant achievements, despite unprecedented hardship and constraints. In the reported period with a faculty strength of 19, IASST can report the completion of 9 extramural and 21 ongoing projects; publication of 61 papers in peer-reviewed national and international journals, 02 book chapters, and 02 popular articles. Further, 02 Indian patents were filed and 02 patents were granted, 07 students were awarded the Ph.D. degree, and 17 postgraduate and undergraduate students received hands-on training in different disciplines. Besides, several workshops, seminars, virtual conferences, key events, and awareness programmes were organized. Thus, the Science Day and World Cancer Day programmes, to name a few, were coordinated under the banner of the 75th year of Independence of India (Azadi Ka Amrit Mahotsav). I am deeply indebted to the several distinguished scientists, eminent personalities, and health care professionals who delivered the lectures on these and other occasions.

IASST is also devoted to nurturing and promoting the applied research to improve the economic development of our country, for marching towards the Atmanirbahr Bharat (Self-reliant India). The IASST 'Societal Venture and Entrepreneurship Council (ISVEC)' established under the BioNest Programme of Biotechnology Industry Research Assistance Council (BIRAC), is well into accomplishing this objective. The indigenously developed technology on the production of antioxidant-rich beverages from black rice of Manipur was transferred to a startup company that will be incubated at ISVEC. The RT-PCR based Covid-19 testing facility at IASST in collaboration with Guwahati Medical College and Hospital was inaugurated in 2020 by the then Health & Family Welfare, Education and Finance Minister and the present honorable Chief-Minister of Assam. To date this centre has done nearly 120,000 Covid-19 tests; consequently, it has received wide appreciation from the Government of Assam and DST, Govt. of India.

Progressive emphasis has been accorded to R&D activities in Science and Technology and Industrial Development, for advanced growth of the country. This endorses the focus on women empowerment on every front and therefore there is a steady growth in the number of female students and research scholars joining IASST. To accommodate the growing number of female scholars, the proposal for construction of a 100-bed capacity women's hostel possessing modern amenities is accepted in principle by the Governing Council and the Finance Committee of the IASST; subsequently, a piece of land has been identified and construction-related processes are in progress. Some other remarkable accomplishments of this period are the establishment of the Research and Development Cell, an Intellectual Property Right (IPR) Cell (as a part of R&D Cell), and framing the guidelines for Extramural Research Projects and IPR. The foundation of a Centre for Interdisciplinary Research, for the genesis of ideas and the wider ramifications of interdisciplinary output; and renaming the discipline of "Traditional Knowledge-Based Drug Development and Delivery" to 'Traditional and Modern Drug Discovery and Disease Diagnosis" are worth mentioning.

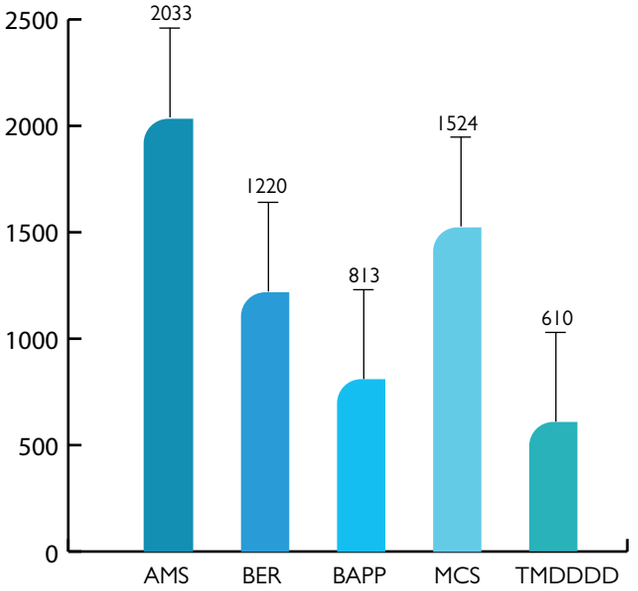
In a nutshell, despite disruption from the world -wide devastating pandemic, the year 2020-2021 was quite gratifying and eventful; nonetheless, we strongly believe that the coming year will be more fruitful academically and scientifically, and our contribution for the sustainable growth, and development of India, will be significantly enhanced.

I take this opportunity to express my gratitude and sincere thanks to the Department of Science and Technology, members of the Governing Council (GC), Scientific Advisory Committee (SAC), and several other committees for their guidance and suggestions; faculty members, research scholars and staff of IASST for their enormous contribution, hard work, and whole hearted support towards the progression of the Institute.

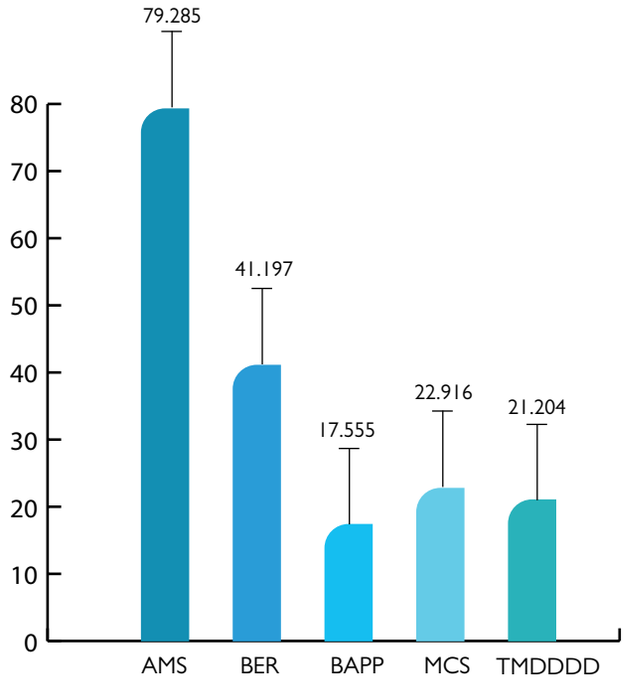
(Ashis K. Mukherjee),
Ph.D., D. Sc., FRSB, FWAST
Director

RESEARCH OUTPUT AT A GLANCE

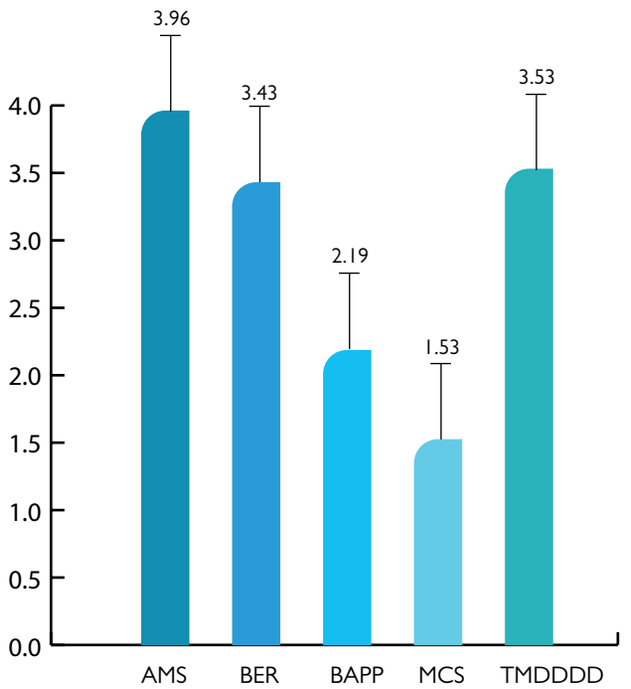
Number of Publications



Total Impact Factor

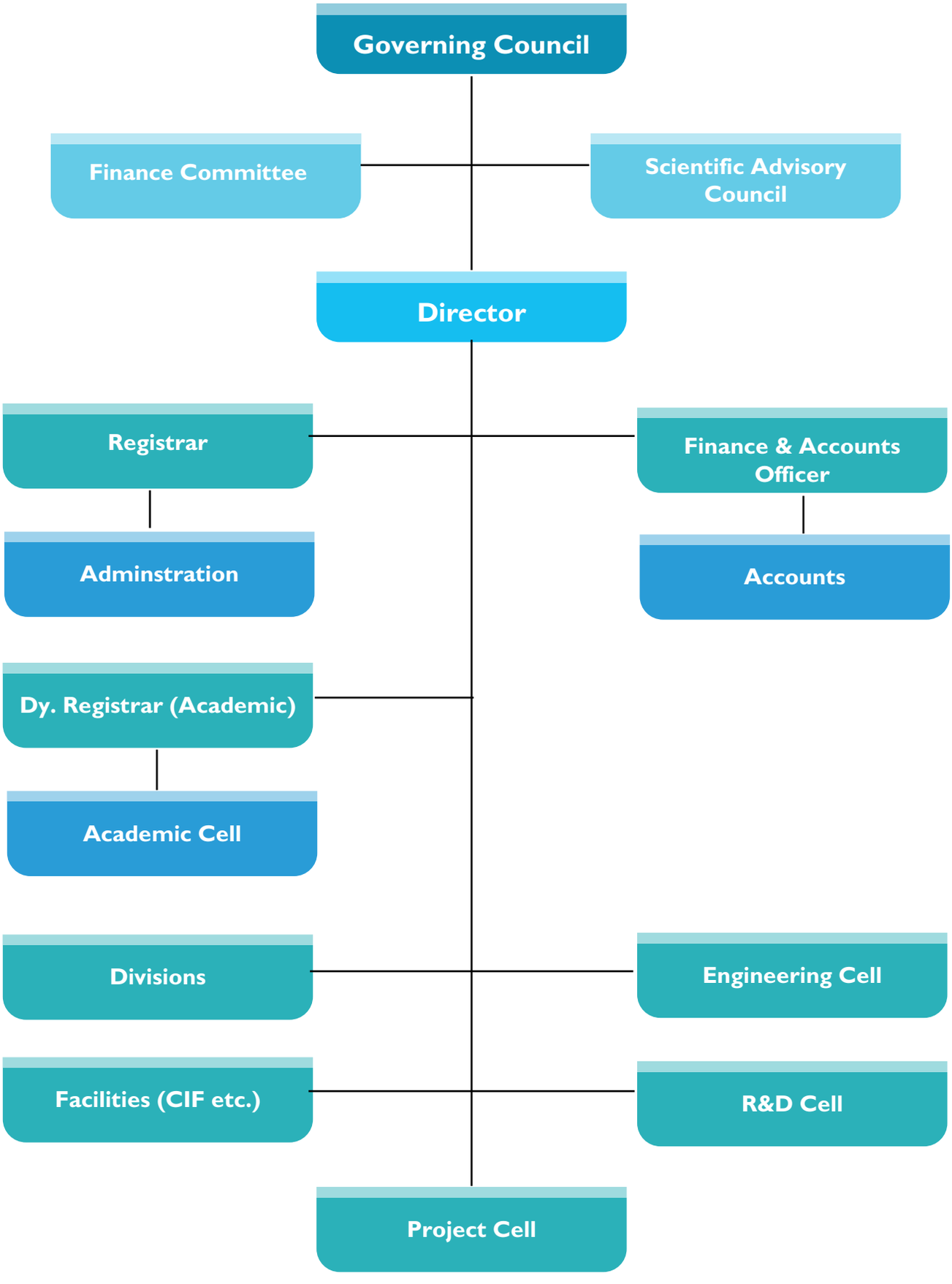


Impact Factor/Paper



AMS	=	Advanced Material Science
BER	=	Biodiversity and Ecosystem Research
BAPP	=	Basic and Applied Plasma Physics
MCS	=	Mathematical and Computational Science
TMDDDD	=	Traditional and Modern Drug Discovery and Disease Diagnosis

IASST ORGANIZATION AND MANAGEMENT



IASST COMMITTEES

GOVERNING COUNCIL (GC) OF IASST

Chairperson

Prof. Abhay Karandikar,
Director, IIT Kanpur.

Members

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

Prof. Kamal Lochan Panigrahi
IIT Kharagpur

Prof. P. J. Handique
Vice-Chancellor,
Gauhati University

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

Up to 22.11.2020

Prof. Heremba Bailung
Director (Additional charge)
IASST, Guwahati

W. e. f. 23.11.2020 onwards
Prof. Ashis Kumar Mukherjee
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 Eng.
& 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. Pranob Goswami
Head, Centre of Energy
IIT Guwahati

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

Prof. Arun Chattopadhyay
Dept. of Chemistry
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

Prof. Heremba Bailung
Head, Physical Sciences Division
IASST, Guwahati

FINANCE COMMITTEE (FC) OF IASST

Chairperson

Up to 22.11.2020

Prof. Heremba Bailung
Director (Additional charge)
IASST

From 23.11.2020 onwards
Prof. Ashis Kumar Mukherjee
Director
IASST, Guwahati

Members

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

Mr. Sunil Kumar
Joint Secretary and Head AI Division
DST, New Delhi

Prof. Heremba Bailung
Head, Physical Sciences Division
IASST, Guwahati

Mr. Uttam Ch. Das
Registrar
IIT Guwahati

Member-Secretary

Up to 28.02.2021

Mr. Pradyut Borkataki
FAO, IASST, Guwahati

From 01.03.2021 onwards
Dr. Diganta Goswami
FAO (Additional charge**)**
IASST, Guwahati

BUILDING WORKS COMMITTEE (BWC) OF IASST

Chairperson

Up to 22.11.2020
Prof. Heremba Bailung
Director (Additional charge)
IASST, Guwahati

From 23.11.2020
Prof. Ashis Kumar Mukherjee
Director
IASST, Guwahati

Members

Prof. Sudeep Talukdar
Department of Civil engineering
IIT Guwahati

Chief Engineer
CPWD, Shillong or his nominee

Prof. Heremba Bailung
Head, Physical Sciences Division,
IASST Guwahati

Member Secretary:

Dr. Diganta Goswami
Registrar
IASST, Guwahati

Vigilance, RTI, Women Cell and its activities during 2019-20 in 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

Up to 27.01.2021
Prof. Neelotpal Sensarma
PSD, IASST

w.e.f. 28.01.2021
Dr. Devasish Chaudhury
Associate Professor II
PSD, IASST

Appellate Authority (RTI), IASST

Up to 22.11.2020
Prof. Heremba Bailung
Director (Additional charge)
IASST

From 23.11.2020
Prof. Ashis Kumar Mukherjee
Director, IASST

Central Public Information Officer (CPIO), IASST

Dr. Diganta Goswami
Registrar, IASST

Chairperson, Women Cell, IASST

Dr. (Mrs.) Munima B. Sahariah
Assoc. Professor II
MCS Division, IASST

Nodal Public Grievance officer, IASST

Dr. Jagat Ch. Borah
Assoc. Professor II
LSD, IASST

INSTITUTIONAL BIOSAFETY COMMITTEE (IBSC)

IASST has constituted the Institutional Biosafety Committee (IBSC) under the Department of Biotechnology (DBT), Govt. of India for monitoring the biosafety aspects of R&D activities involving manipulation, handling, utilization and shipment of the following regulated biological materials that fall under restricted categories as elaborated in "Section 6" of the "Guidelines of the Institutional Biosafety Committee (IBSC), IASST, Guwahati" and as per the standard biosafety guideline issued by the DBT.

It is mandatory for every researcher/principal investigator (faculty, scientists, students) in IASST (and other institutes involved in collaborative research with IASST) who are engaged in or intend to carry out research activities (including Ph.D., a dissertation project, external funded project, and in-house core project) and large-scale experiments/production/field release involving manipulation, handling, utilization and shipment [exchange (inter-state and inter-institutional supply/receipt within India), import and export] of the above regulated biological materials to inform and get prior approval/clearance from IBSC, IASST or through the IBSC from the Review Committee on Genetic Manipulation (RCGM), DBT, New Delhi, Genetic Engineering Appraisal Committee (GEAC), DBT, New Delhi or other statutory authorities. IBSC review meetings are arranged to monitor and approve research proposals and ongoing R&D work regularly. The last IBSC meeting was held on 15th March 2021 at IASST, Guwahati.

ETHICS COMMITTEE (HUMAN)

The current Ethics Committee (Human studies) of IASST registered (Registration No. ECR/248/Indt/AS/2015/RR-18) under Central Drugs Standard Control Organization (CDSCO), GoI.

Chairman

Dr. R.C. Deka, MBBS, MD (ENT)
Distinguished Honorary Professor,
Delhi Pharmaceutical Sciences and Research University,
Mehrauli - Badarpur Rd, Sector 3,
Pushp Vihar, New Delhi, Delhi 110017
Tel: 9810663435, Email: rcdeka1@gmail.com

Member

Dr. Ena Dowerah, MBBS, MD (Pathology)
Professor, FAAMC, Joti Gaon, Barpeta, Assam 781301
Tel: 98640 66615, Email: dowerahena@gmail.com

Dr. Anup Kumar Das, MBBS, MD (Pathology)
Pathologist, Ayursundra Private Healthcare Ltd.
DNB Plaza, GS Rd, Near Hanuman Mandir,
Lachit Nagar, Guwahati, Assam 781007
Tel: 99540 82214, Email: dranupdas@gmail.com

Dr. Krishna Gogoi, MBBS, MD (Pathology)
Senior Consultant (Microbiologist)
Sri Sankaradeva Nethralaya,
96, Basistha Road, Beltola, Guwahati-781028
Ph: 9864015831, Email: gogoi.krishna@gmail.com

Dr. Gunabhi Ram Sarma, MBBS, MS (General Surgery)
Retd doctor, ESI Hospital, Guwahati-781028
Tel: 7086296828, Email: gunabhisarma@gmail.com

Dr. Bhabesh Das, MD, PhD
Ex-Principal, Govt. Ayurvedic College & Hospital,
Sundarbari, Jalukbari, Guwahati- 781014
Ph: 9435041757, Email: drbhabeshdas001@gmail.com

Dr. M. C. Kalita, PhD
Professor, Department of Biotechnology,
Gauhati University, Guwahati-781014
Ph: 9957181630, Email: mckalitagu@gmail.com

Dr. Jagat C. Borah, PhD
Associate Professor, Life Science Division,
IASST, Guwahati-35
Tel: 8974058967, Email: borahjc@gmail.com

Mr. Diganta Gogoi, LLB
Advocate, Guwahati High Court, Guwahati-1
Tel: 98540 70695, 95773 67040,
Email: digantagogoi1972@gmail.com

Dr. Indrani Dutta, PhD
Professor,
Omeo Kumar Das Institute of Social Change and Development
VIP Road, Upper Hengrabari (opposite Hotel Ginger)
Six Mile, Guwahati-36
Tel: 9435194718, Email: indranee.dutta@gmail.com

Ms Sabita Das
Ahom Gaon, Garchuk, Guwahati-35
Tel: 9954198368

Dr. M. R. Khan, PhD
Member Secretary
Associate Professor, Life Science Division,
IASST, Guwahati-35
Tel: 94018 77449, Email: mojibur.khan@gmail.com

ETHICS COMMITTEE (ANIMAL)

The current Institutional Animals Ethics Committee (IAEC) of IASST registered (Registration No.1706/GO/ReBi/S/13/CPCSEA) under Committee for Control and Supervision of Experiments on Animals (CPCSEA), GoI, New Delhi. The committee is constituted with the following members.

Main Nominee

Dr. Pritom Mohan
Professor, Pharmacology & Toxicology
College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam.
Contact No: 09436354207
Email: dr_mohanp21@rediffmail.com

Link Nominee

Dr. Sashanka Sekhar Dutta
4-Kanaklata Path, Survey, Beltola, Guwahati, Assam-781028.
Contact No: 9818241962
Email: drsashanka@gmail.com

Scientist From outside the Institute

Dr. P. Chattopadhyay
Scientist, Defence Research and Development Organization.
Ministry of Defence, Post Bag No:2, Solmara Cantt., Tezpur-784001, Assam
Contact No: 8876289892

Socially aware Nominee

Dr. Smriti Rekha Dutta
4-Kanaklata Path, Survey, Beltola, Guwahati, Assam-781028.
Contact No: 9868542072
Email: drsmriti@rediffmail.com

Scientist from different discipline

Dr. D. Devi
Ex-Associate Professor, LSD. IASST.
Chenikuthi. Guwahati-3
Contact No: 9678073712
Email: dipali.devi@gmail.com

Biological Scientist, Chairperson

Dr. N. C. Talukdar
Ex-Director, IASST
Contact No: 9862089461
Email: nctalukdar@yahoo.com

Scientist Incharge of Animal House Facility. Member Secretary.

Dr. R. Devi
Associate Professor-II & Head, LSD
IASST.
Contact No: 9706033567
Email: rajlakshmi@iasst.gov.in

Scientist from different discipline

Dr. D. Thakur
Associate Professor-II, LSD
IASST
Contact No: 7002295340
Email: debajitthakur@iasst.gov.in

Veterinarian

Dr. S. Tamuli
Professor, Pathology.
College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati, Assam.
Contact No:9435402514
Email: tamuli_sm@yahoo.com

INSTITUTIONAL MANPOWER (2020-21)

Prof. Heremba Bailung (w.e.f. 01/03/2020 till 22/11/2020)	Director (Additional charge)
Prof. Ashis Kumar Mukherjee (w.e.f. 23/11/2020)	Director

Basic and Applied Plasma Physics

Prof. Heremba Bailung	Professor II and Head
Prof. Joyanti Chutia	Project Scientist & Former Emiratus Scientist
Dr. Subir Biswas	Asstt. Professor II
Dr. Kamatchi S	Asstt. Professor II
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	SRF (DST-INSPIRE)
Ibnul Farid	SRF (DST-INSPIRE)
Bidyut Chutia	SRF (DST-INSPIRE)
Palash J. Baruah	SRF (DST INSPIRE)
Kuldip Kalita	Project Scientist
Hannan Ashrafi Haque	Project Scientist
Abhijit Baruah	Project Scientist
Parismita Kalita	JRF
Paragjyoti Sut	JRF
Prathana Gogoi	JRF
Dibyajyoti Bora	JRF
Krishna Kanta Swargiary	Technician
Bipul Kumar Das	Multi-Tasking Staff

Advanced Material Sciences

Dr. Neelotpal Sen Sarma	Professor I and Head R&D
Dr. Devasish Chowdhury	Assoc. Professor II
Dr. Arup Ratan Pal	Assoc. Professor II
Dr. Sarathi Kundu	Assoc. Professor II
Dr. Munima B. Sahariah	Assoc. Professor II
Dr. Biswajit Choudhury	Asstt Professor II
Dr. Anamika Kalita	DST INSPIRE Faculty
Dr. Robinson Jose	DBT-RA
Sristi Mazumdar	SRF
Deepshikha Gogoi	SRF
Bandita Kalita	SRF
Jayanta Sharma Boruah	SRF
Bablu Basumatary	JRF (NFST Fellowship)
Santanu Podder	SRF
Subhankar Pandit.	SRF (DST-INSPIRE)
Sweety Biswasi	SRF (DST-INSPIRE)
Gautomi Gogoi	CSIR-SRF
Ankita Deb	SRF
Jahnabi Gogoi	SRF
Purbajyoti Bhagowati	SRF (DST-INSPIRE)
Samiran Upadhyay	SRF
Payal Saha	JRF
Raktim Jyoti Sarmah	SRF
Tishamoni Kashyap	SRF
Jyotisman Bora	SRF
Kabyashree Phukan	CSIR JRF
Bijay Kumar Sah	CSIR SRF
KangkanJyoti Goswami	JRF
Sazzadur Rahman	JRF (DST INSPIRE)
Sanu Sarkar	CSIR-JRF
Sanjib Sau	JRF (DST INSPIRE)
Hridoy Jyoti Bora	Project Assistant
Nasrin Sultana	JRF (DST INSPIRE)
Dhrubanka Sarma	JRF
Bhargab Kakati	Project Fellow
Rachita Newar	JRF (DST INSPIRE)
Manash P. Nath	CSIR-JRF
Manju K. Jaiswal	JRF (DST INSPIRE)
Suvankar Deka	JRF
Babul Ch. Deka	Multi-Tasking Staff

Traditional and Modern Drug Discovery and Disease Diagnosis

Prof. Ashis K. Mukherjee	Director, IASST
Dr. (Mrs.) Rajlakshmi Devi	Assoc. Prof. II and Head, LSD
Dr. Jagat Ch. Borah	Assoc. Professor II
Dr. Rosy Mondal	DST INSPIRE Faculty
Dr. Suman Kumar Samanta	CSIR Pool Scientist
Juri Pathak	Technical Officer-A
Julie Bordoloi	Technical Assistant-II
Subrata Goswami	Technical Assistant-I
Dr. Asim Kumar Dutta	Research Scientist
Dr. Partha Pratim Dutta	Research Scientist
Dr. Yunus Sheikh	Research Associate
Dr. Saydur Rahman	Research Associate
Sagar Ramrao Barge	SRF
Paramita Choudhury	JRF
Puspanjali Khound	JRF
Swarnali Bhattacharjee	JRF
Bhaswati Kashyap	JRF
Barsha Deka	SRF
Nonibala Gurumayum	JRF
Kasturi Dutta	JRF
Deepsikha Swargiary	JRF
Devi Basumatary	CSIR-JRF
Gurumayum Shalini Devi	JRF (DST-INSPIRE)
Pranamika Sharma	JRF
Kangkan Jyoti Kalita	JRF
Junmoni Nath	JRF
Himangshu Sarma	JRF
Partha Pratim Sarma	JRF
Semim Akhtar Ahmed	JRF
Neeraj Sarma	Project Scientist-I
Sumi Pait	Project Associate-I
Simanta Bharadwaj	Technical Assistant
Bandita Pathak	Technical Assistant
Deepmala Devi	Technical Assistant
Dipumoni Barman	Asistant
Plabita Baruah	Technical Assistant
Tarun Talukdar	Multi-Tasking Staff
Sabin Kalita	Multi-Tasking Staff
Haren Medhi	Multi-Tasking Staff
Abinash Nath	Animal Keeper
Gwhwm Basumatary	Animal Keeper

Biodiversity and Ecosystem Research

Dr. (Mrs.) Arundhuti Devi	Assoc. Prof-II
Dr. M.R. Khan	Assoc. Prof-II
Dr. Debajit Thakur	Assoc. Prof-II
Dr. Rahul Pralhad Hepat	Asstt. Prof.II
Dr. Kaushik Bhattacharya	NPDF
Dr. Kaustavmani Patowary	Research Associate

Anupam Bhattacharya	Senior Research Associate
Dr. Kamal Das	Research Associate
Dr. Atanu Adak	Research Associate
Rictika Das	DST Women Scientist
Dibyajyoti Koiri	JRF
Ria Deb	JRF
Bhaswati Devi	JRF
Bhuwan Bhaskar	SRF
Rabiya Sultana	JRF (UGC MANF)
Tulsi Kumari Joishy	Senior Research Associate
Santanu Das	SRF
Barsha Deka	CSIR-SRF
Arun Kumar	DBT-JRF
Bidyarani Devi	CSIR JRF
Moirangthem Goutam Singh	ICMR-JRF
Juri Saikia	JRF (RGNF)
Chingakham Juliya Devi	CSIR-UGC-JRF
Shabiha Nudrat Hazarika	JRF
Monalisa Kalita	JRF
Tomali Sinha	CSIR- JRF
Jinu Medhi	UGC-JRF
Madhurankhi Goswami	SRF
Chandana Malakar	DBT-SRF
Nilam Sarma	SRF
Surajit Basak	JRF
Manomohan Huzuri	Technical Assistant
Srikanta Baishya	Multi-Tasking Staff
Rajkumari Mazumdar	Technical Assistant
Pranami Bharadwaj	JRF
Aditya Narayan Knowar	JRF
Manisha Goswami	Women Scientist-A
Kaushik Paul	Project Assistant
Lakshmi Kanta Soud	MTS

Mathematical and Computational Sciences

Dr. Gautam Choudhury	Assoc. Prof-II
Dr. (Mrs.) Lipi B. Mahanta	Assoc. Prof-II
Dr. Santu Das	Asstt. Prof. II
Niranjan Bhagobaty	Technical Officer-B
Snigdha Mahanta	JRF
Silpisikha Goswami	JRF
Devabrat Sharma	JRF
Anjana Begum	JRF (UGC MANF)
Elima Hussain	SRF
Bolin Das	Multi-Tasking Staff

Administration and Accounts

Dr. Diganta Goswami	Registrar
Pradyut Borkataki	Finance & Accounts Officer
Rajesh Sharma	PRO
Suresh Ch. Sarma	Section Officer (Accounts)
Rabin Ch. Kalita	Section Officer (Administration)
Bijuphukan Bhagabati	Technical Officer (A)
Ramen Mahanta	Superintendent
Dwijendra Deka	Superintendent
Lelin Gogoi	Superintendent
Munindra Singh	Technical Assistant
Diganta Das	Assistant
Gora Gupta	Assistant
Prabhat Ch. Barma	Assistant
Kumud Baishya	Assistant
Nimai Hazam	Driver
Madhabi Das	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
Balabhadra Pathak	Multi-Tasking Staff
Dinesh Deka	Multi-Tasking Staff
Munna Basfor	Multi-Tasking Staff

Temporarily engaged person

Dr. Dhruba Sharma	Deputy Registrar (Academic)
Jayanta Borthakur	Network & System Administrator
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 (Accounts)
Ksh. Sharmina Devi	Receptionist
Sanjubi Sharma	Project Assistant
Nirmali Devi	Hindi Assistant
Moonmee Deka	Assistant (Accounts)
Milan Jyoti Das	Technical Assistant
Mehjabin Ali	Project Assistant
Lachman Thapa	Driver
Pranab Talukdar	Driver

Bimal 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 person

Md. Mahammad	JE (Civil)
Bikash Jyoti Das	JE (Elect)
Shankar Daimari	Work Supervisor
Muktaram Kumar	Work Supervisor
Kumud Patgiri	Electrician
Uddipta Deka	Resident Electrician
Dijoraj Roy Choudhury	Plumber
Anima Baishya	Cleaner
Ajay Baishya	Mali

Knowledge Resource Centre

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Sarala Deka	Multi-Tasking Staff

Temporarily engaged person

Subhrajit Sengupta	Professional Assistant

IASST Consultants

Consultant

Prof. Dharmeswar Das
Former Director &VC (A), ICAR-IVRI, Izatnagar
Dean, Faculty of Vety. Science, AAU

Consultant (Flood forecasting Project)

Prof. B.N. Goswami, FNA, FASc, FNASc, FTWAS
Former Director, IITM, Pune, SERB Distinguished Fellow
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Consultant Medical Officer

Dr. Satyabrata Deka
M.B.B.S., DPM (Ped)

RESEARCH ACTIVITIES

BASIC AND APPLIED PLASMA PHYSICS

Basic and Applied Plasma Physics (BAPP) Section of the Physical Sciences Division of IASST has been engaged in the investigation of waves and instabilities associated with ion acoustic waves and dust acoustic waves. Nonlinear structures in dusty plasmas have been considered a challenging area in recent years and some new observations have been made during last year. A new device for the investigation of waves in magnetised plasma has been installed. A successful synthesis of nanoparticles in gas phase plasma using precursor gas (e.g., acetylene) in an indigenously developed quartz reactor has paved the way for the investigation of the growth process of nanoparticles and their well-defined collective behaviour as dusty plasma with nanometer-size particles. Cold atmospheric pressure plasma (CAP) has also been explored to utilise the highly reactive plasma for advanced material synthesis as well as for potential biomedical applications. The reactors have been augmented using liquid electrodes to investigate plasma liquid interactions facilitating nanomaterial synthesis of high photocatalytic performance. Using the magnetron plasma co-sputtering method, we have developed bimetallic conjugated nanostructured films for improved performance of the proton exchange membrane fuel cell reducing the platinum load.

Prof. Heremba Bailung

Dr. Subir Biswas

Dr. Nirab Chandra Adhikary

Bidyut Chutia

Parismita Kalita

Palash Jyoti Boruah

Rakesh Ruchel Khanikar

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Dibyajyoti Bora

Paragjyoti Sut

Reetesh Borpatra Gohain

Punam Talukdar

Binay Kumar Choudhary

K K Sargiary

Dr. Kamatchi S Sankaranarayanan

A. Basic and Applied Plasma Physics

Coordinator: Prof. Heremba Bailung

A.1. In situ production of nanodusty plasma and characterization of dust density wave

A large volume 3D dust cloud containing in-situ grown carbonaceous nanoparticles (a-C:H) has been produced by the reactive rf discharge (13.56 MHz, capacitively coupled) of Argon and Acetylene gas mixture. The device is indigenously designed for the investigation of the growth dynamics of nanoparticles and dynamical structures in nano-dusty plasma.

Dust density (acoustic) waves (DDW) have been quite an intense topic of a theoretical and experimental study in dusty plasma physics. These density waves provide a unique opportunity to study the wave dynamics at the kinetic level due to the larger size of dust particles and the smaller charge-to-mass ratio in a system where the characteristic frequency is small (~ Hz) also allow for the use of diagnostic tools as simple as video imaging.

The dust cloud formed inside the quartz tube is illuminated by a green laser sheet (532 nm, 100 mW) and the wave dynamics is recorded by using a high-speed camera at 400-1000 frames per second A typical snapshot of the DDW, is shown in Figure 1. The wave is propagating along the direction of gravity from the bottom edge of the dust void. In fact, particle growth initiates in this highly intense plasma region (dust void). To maintain a high spatial resolution (~ 0.08 mm), the whole wave field is recorded by segmenting the wave field into 3 separate regions and thin rectangular sections in 3 different directions of propagation are considered for analysis.

To study the wave dynamics, various techniques such as space-time plots of the wave fronts, Fast Fourier transformation, time-resolved Hilbert transformation etc. are employed. Typical examples of the space-time plot are shown in Figure 2. The bright bands are the wave fronts that are propagating in both space and time. The slope of these bands provides the phase velocity of the wave.

Time-resolved Hilbert transformation analysis shows the spatio-temporal evolution of both frequency and wave number in the selected region of interest shown in Figure 3. Both frequency and wave number are higher near the void region and gradually decreases to the bottom.

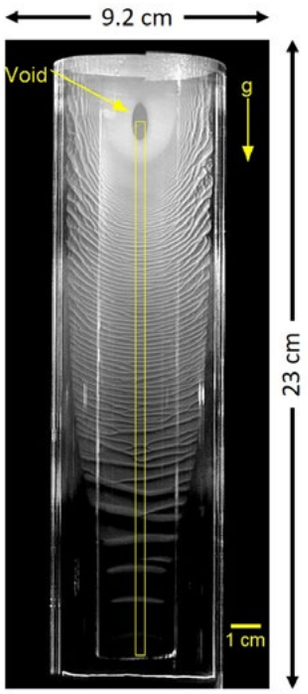


Figure. 1: Typical snapshot of the DDW propagating parallel to the direction of gravity. The (yellow) thin rectangular box is the region considered for wave analysis.

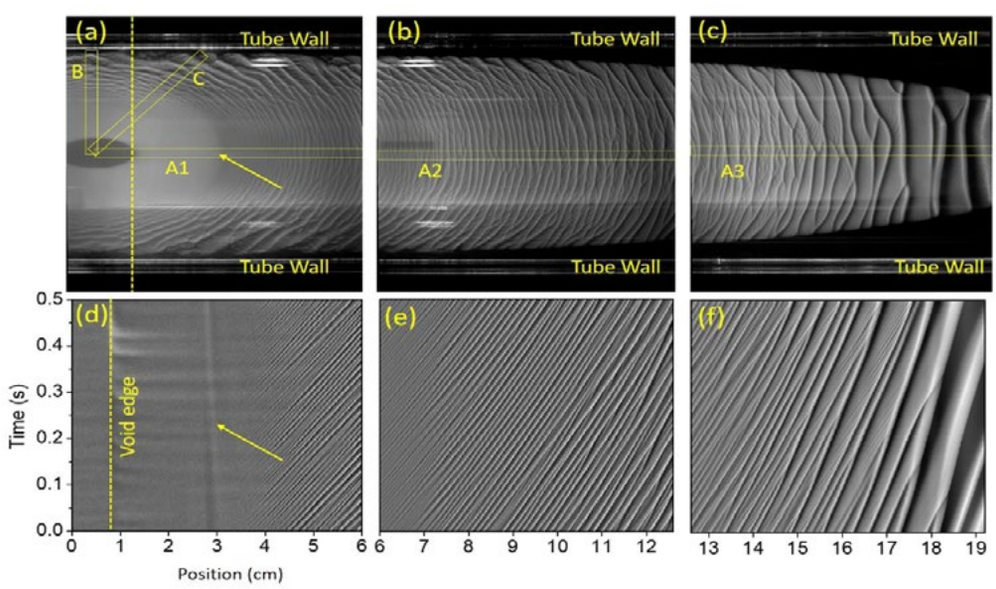


Figure 2: (a), (b), and (c) are the typical snapshots of the three consecutive segments of the wave field. (d), (e), and (f) are the space-time plots of region (a), (b), and (c), respectively. The (yellow) dashed lines and arrows in (a) and (d) represent the right edge of the void and the cloud edge with no DDW, respectively. The thin yellow rectangular boxes 1, 2, and 3 are the regions considered for wave analysis propagating in three different directions from the dust void i.e., parallel, perpendicular and at an angle of 45^0 (oblique) to the direction of gravity, respectively.

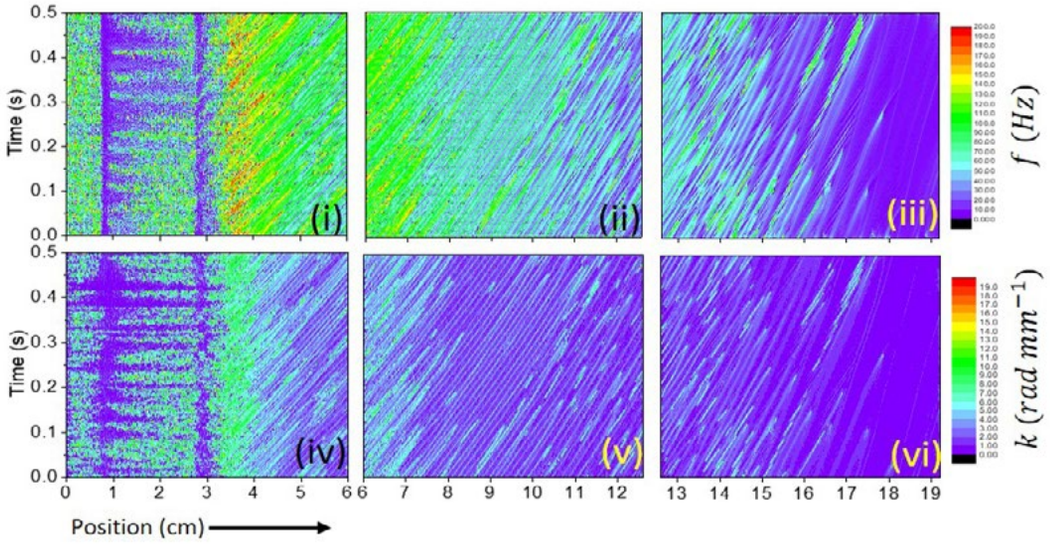


Figure 3: (i), (ii), and (iii) represent the spatio-temporal evolution of frequency, and (iv), (v) and (vi) represent the spatio-temporal evolution of wave number, . The colour bars show the numerical values of frequency and wave number.

A.2. Generation of plasma using liquid electrodes for various applications

Since the beginning of 21st century, plasma technology has been involved in various biomedical and environmental applications. From the treatment of cancer to the water purification, its involvement increases to the humankind. Moreover, from the last few years, plasma has also been immensely engaged in the fabrication of high-quality nanomaterials. Generation of plasma in and above a liquid surface gains a lot of attention as it involves both the physical and chemical processes simultaneously.

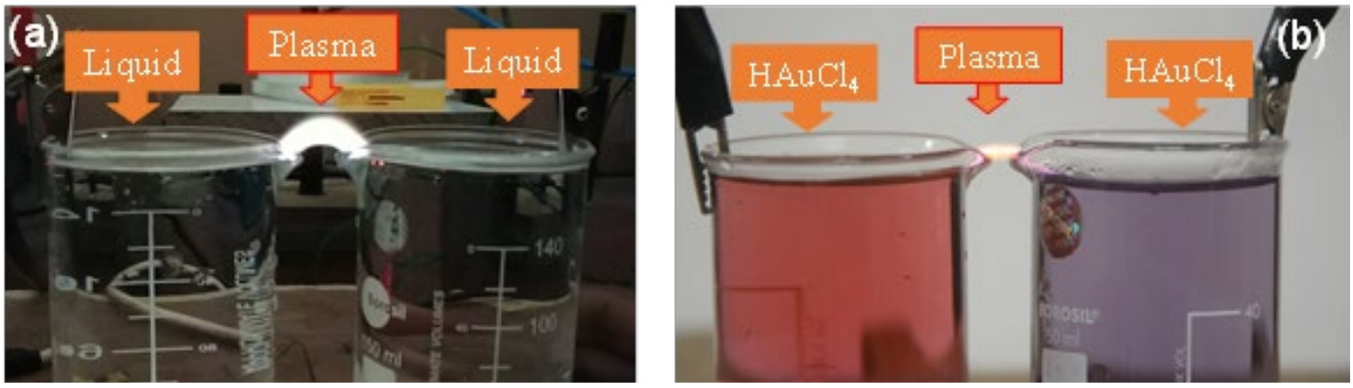


Figure 4: (a) Generation of plasma between two liquids, and (b) synthesis of two different sized Au nanoparticles.

We developed a new technique to generate the plasma using liquid electrodes. The experimental set-up consists of two glass beakers containing liquid (distilled water) (Figure 4a). A DC/AC high voltage is applied to the liquid in such a way that the liquids from both the beakers create a discharge at the contact point. The plasma channel is maintained up to a few centimetres of separation. Using noble metal precursor solution ($HAuCl_4$) we have successfully synthesized gold nanoparticles. The colour of the solution changes to pink, which indicates the formation of Au nanoparticles which is shown in Figure 4(b). By changing the concentration of $HAuCl_4$ solutions Au nanoparticles having different sizes are easily synthesized.

We also examined the phenomena of water bridges maintained by the electro-hydrodynamic effect. Figure 5(a) shows the formation of a hanging water bridge connecting the two beakers. We have established the liquid molecules cross over the bridge, however, the flow dynamics in a water bridge is not clear. An example of the fluid cross over is shown in Figure 5(b). The prime emphasis of this work is to generate the plasma without the physical involvement of metal electrodes. One of the important applications of liquid electrodes is to synthesize highly pure nanoparticles. When metal electrodes physically involve in the synthesis process there is a high probability of transfer of metal ions from the electrode through the plasma to the precursor solution, which often act as an impurity. Simultaneous synthesis of different sized nanoparticles reduces the synthesis cost, which can help to scale up the process to a larger extent.

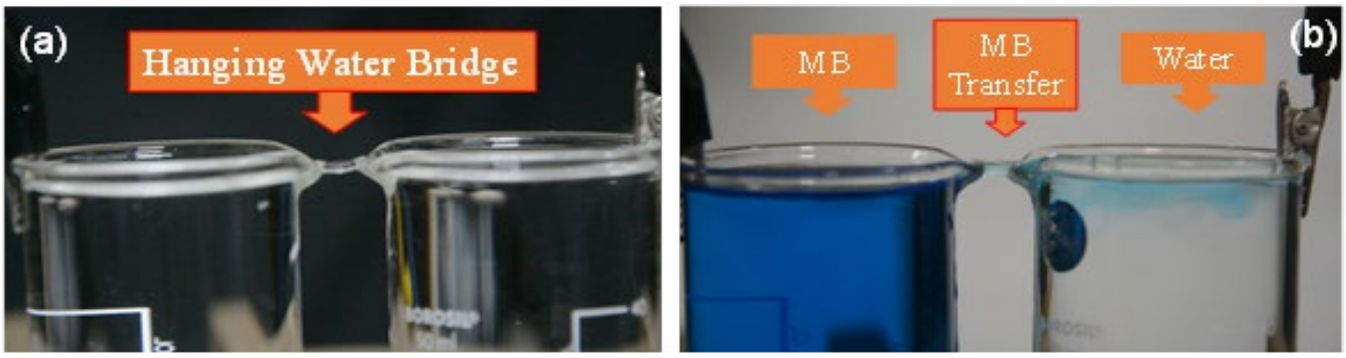


Figure 5: (a) Formation of Water Bridge, and (b) cross over of Methylene blue molecules through the bridge.

Moreover, the liquid bridge can be used in textile industries, where selective transfer of dye molecules is very essential to dazzles the cloths with different colours.

A.3. Atmospheric Pressure Plasma Jet for degradation of organic water pollutant

With the increasing population, water demand is growing every day. At the same time, there has been a dramatic increase in the number of organic pollutants detected in water, presenting a serious public health risk. Mainly, dye present in wastewater from the textile industry is widespread. Therefore, the removal of organic pollutants from wastewater happens to be an important environmental goal as it enables water reuse, thus relieving the stress on the freshwater reserves. As a consequence, new technologies for the removal of dyes from wastewater have been investigated. In recent years, nonthermal atmospheric plasma technology has been considered for water treatment because the plasmas are sources of excited species, charged particles, radicals and UV radiation, among others, each of which are themselves advanced oxidation techniques. In the present study, an indigenously developed atmospheric plasma jet has been found effective for the removal of a model organic pollutant methylene blue (MB). Figure 6 shows the schematic of the plasma jet used for dye degradation.

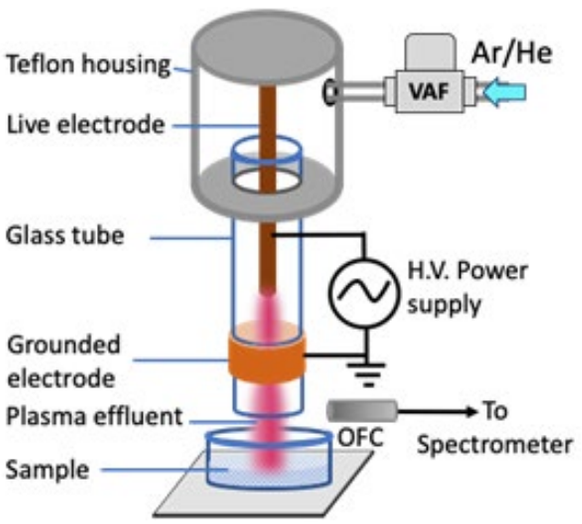


Figure 6: Schematic of the set-up. VAF=variable area flowmeter, Ar=Argon, He=Helium

The discharge s generated by applying a high voltage of 6 KV at a frequency of 30 KHz. Argon and helium have been used as the plasma forming at a flow rate of 1 standard litre per minute. The plasma plume comes out into the open air with the flow of the gas and is applied to the sample to be treated. A Methylene Blue solution has been prepared in distilled water for plasma treatment. The various reactive species present in the argon and the helium plasma jet has been investigated using Optical Emission Spectroscopy (OES). The degradation of MB has been investigated using UV-Vis absorption spectroscopy.

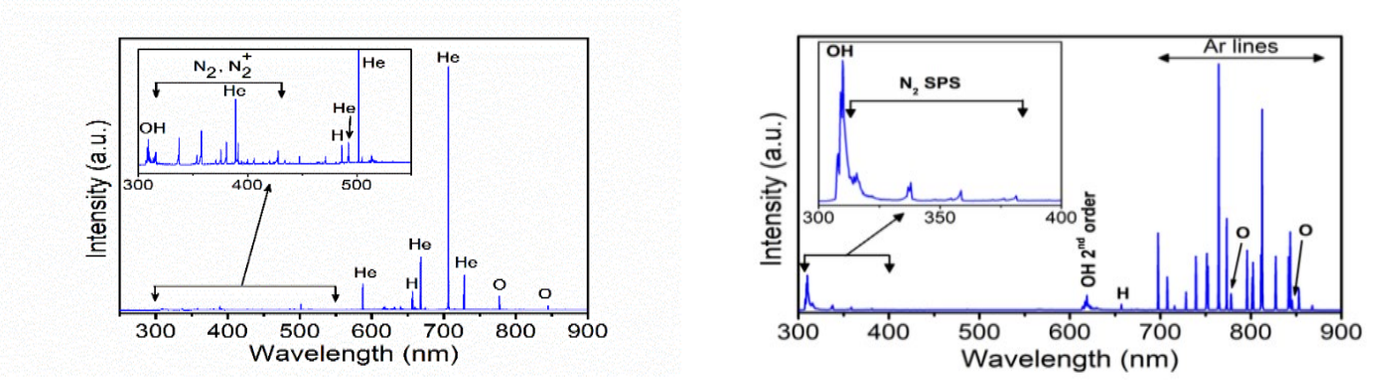


Figure 7: Emission spectra of (a) Argon, and (b) Helium plasma jet.

Figure 7 shows the UV-Vis spectra of the dye solution for different plasma exposure times. The absorbance is directly proportional to the concentration of dye molecules in the solution which is in accordance with Beer-Lambert law.

Among the various reactive oxygen species responsible for degradation, OH is the primary oxidant owing to its higher oxidation potential. This is reflected by the presence of H_2O_2. For a plasma exposure of 8 min, more than 95% degradation has been observed for the argon plasma jet. Table 1 shows the degradation rates for both the argon and helium plasma jet. It has been found that the degradation of organic pollutants by using the nonthermal argon plasma jet is more effective and, therefore, becomes more cost-effective. For large scale plasma treatment, the system can be upscaled by using a multi-jet plasma system.

Table 1: Degradation of MB over treatment time

Time (min)	Ar	He
2	50.0	23.1
4	77.0	56.7
6	91.7	80.1
8	96.0	90.2
10	98.5	95.7
12	99.1	98.3

A.4 Performance measurement of low platinum loaded PtTi binary electrocatalysts for Proton Exchange Membrane (PEM) fuel cells

Fuel cells (FCs) are a clean, efficient and sustainable energy source that produces electrical energy from supplied fuels by electrochemical reactions. It has several benefits over conventional combustion-based technologies and can be used in a wide range of applications, including transportation, material handling, stationary, portable, and emergency backup power applications.

In this work, PtTi electrocatalysts have been synthesized by simultaneous sputter deposition of Pt and Ti targets on carbon paper. The electrocatalysts are prepared under optimized co-sputtering conditions to achieve the nanopillar-like structure of catalyst on the electrode surface. These pillar-like structures offer more surface area than a thin film and exhibit better electrochemical activity. The catalyst deposited carbon paper is used as a Gas Diffusion Layer (GDL) for the fabrication of Membrane Electrode Assembly (MEA). The performance of the prepared electrode catalysts is carried out in a single fuel cell test station, and shown in Figure 8 it is a polarization curve. The maximum power density of the assembled MEAs is found to be 0.388, 0.514, 0.557, 0.604, 0.522 and 0.409 W cm^2 for MEA1, MEA2, MEA3, MEA4, MEA5 and MEA6 respectively. The best prepared MEA i.e., MEA4 exhibits a maximum power density of 0.604 W cm^{-2} in comparison to the SMEA's (standard MEA) power density of 0.618 W cm^{-2}. The density, size and shape of the nanopillars formed at the electrode surface play a key role in cell performance. Our best prepared MEA with five times less PtTi catalysts loading than standard Pt/C exhibits nine times high Pt mass-specific power density than standard Pt/C without significant loss in cell performance.

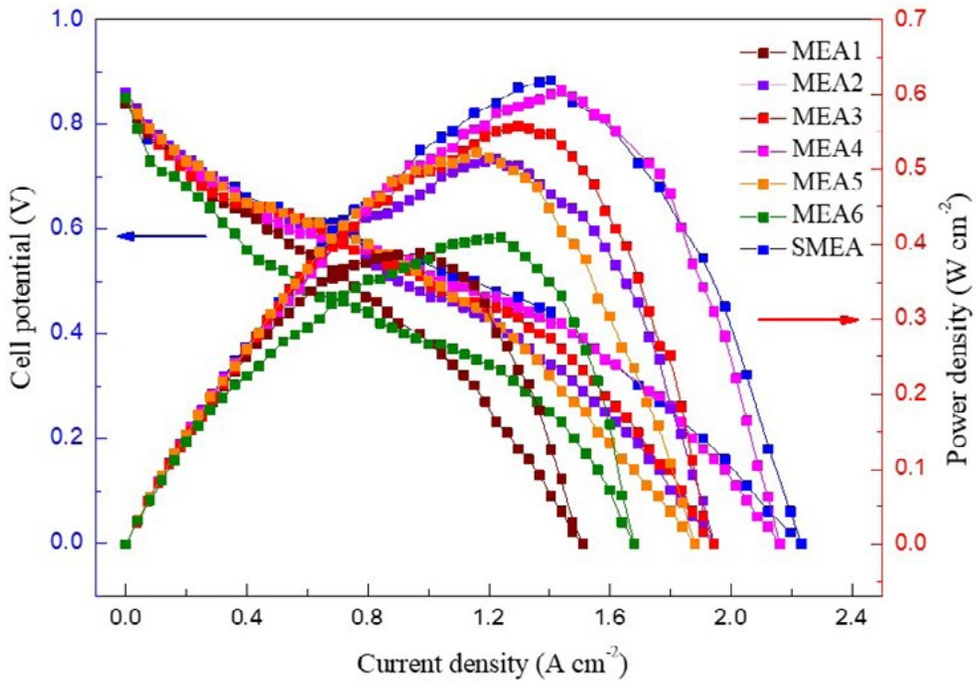


Figure 8: Polarization curves of the assembled MEA. The potentials of the assembled cells are obtained by supplying an increasing current through a DC electronic load and recorded to calculate the power density of the cells.

B. Linear Device for Magnetized Plasma Experimental Facility

Coordinator: Dr. Subir Biswas

Magnetic confinement of hot plasmas in fusion devices like Tokamak and Stellarator is a promising approach to achieve controlled fusion as a green energy source for mankind. However, the cross-field particle transport due to the waves-instabilities and turbulence is till now one of the main concerns for fusion research. Moreover, the interaction of the waves with the particles leads to the mechanism for the heating of the fusion plasma. Therefore, the study of waves-instabilities and turbulence both in the linear and nonlinear regime, coupling between waves and interaction of wave-particles received huge attention from the very beginning of plasma physics research and it is still active field research due to many unsolved problems.

However, Complex field geometry, the simultaneous occurrence of various modes and the limitation of using some conventional diagnostics due to high heat flux restrict the study of wave-instabilities in a controlled manner in magnetic-fusion devices like Tokamak, Stellarator etc. A linear device is suitable for such types of studies in a controlled way. Waves and instabilities are also ubiquitous in astrophysical plasmas. The study of them in a laboratory in a controlled way would be the direct simulation and the exploration of those astrophysical phenomena.

The design and fabrication of a linear magnetized device are already ongoing. Fabrication of the vacuum chamber of the device including installation of a vacuum pumping system is completed. A diffusion pump along with a rotary pump is used to obtain the base pressurembar. The schematic diagram of the vacuum vessel is shown in Figure 9. Vacuum vessel has two parts: (i) main plasma chamber of 110 cm and 25 cm of length and diameter, respectively containing 16 radial ports which are easily accessible for plasma diagnostics purposes, and (ii) an extension part of 33 cm is attached with the main chamber for connecting the vacuum pump assembly.

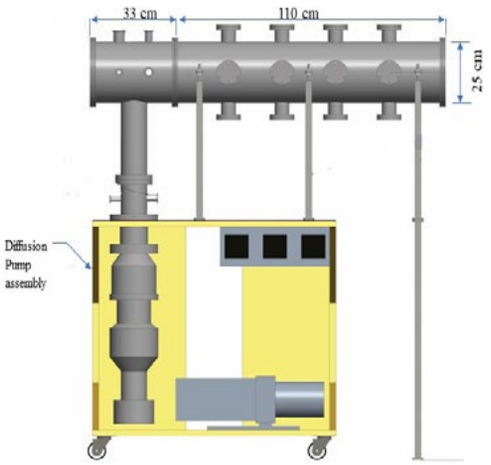


Figure 9: Schematic of the vacuum vessel with diffusion pump assembly.

Plasma is created in this device with filament assisted DC-discharge. A set of 7 solenoid magnetic coils will be installed in the device for producing a uniform axial magnetic field throughout the main plasma chamber. Designing of the magnetic coil system is completed. The design value of a magnetic field is 500 Gauss which will be obtained by sending 100 A current through each solenoid containing 100 numbers of turns.

C. Plasma Medicine: Effect of Cold Atmospheric Plasma on Proteins

Coordinator: Dr. Kamatchi Sankaranarayanan

C.1. Effect of cold atmospheric plasma (CAP) on proteins

One of the major challenges in protein stability is that proteins can self-assemble and aggregate which alters the native structure of proteins. In this regard, it is crucial to understand the role of radiation especially CAP on the structural changes in proteins. We employed various methods in understanding the role of cold atmospheric plasma radiation of the energy of 1 eV, on two different proteins present in the serum – Bovine Serum Albumin (BSA), and Hemoglobin (Hb), as well as to elucidate the process associated with direct application in therapeutics. The work is substantiated with several spectroscopic studies such as UV-visible spectroscopy, Fluorescence spectroscopy, and Circular Dichroism Spectroscopy. Through steady-state fluorescence spectroscopy and by following tryptophan fluorescence, we observed that the emission intensity quenches the protein when treated with plasma radiation. Circular Dichroism Spectroscopy reveals the structure of the protein remains intact for both BSA and Hb. N-acetyl tryptophanamide (NATA) which resembles the tryptophan in the protein, was analyzed separately and we observed a similar quenching of fluorescence as shown by native proteins. We performed time-resolved fluorescence experiments and the lifetime of the samples after plasma treatment remains the same as that of the control. We have shown that plasma radiation can triggers protein self-assembly holding structural integrity. SEM shows uniform self-assembly of BSA and Hb after plasma treatment.

This work will help to design protein self-assembled systems, and may in future bring possibilities of creating novel biomaterials with the aid of plasma radiation.

C.2. Viscoelastic properties upon glycation of proteins

Non-enzymatic glycation is a slow multistep reaction that involves the reaction of free amino groups in proteins, nucleic acids and lipids with glucose or its metabolites giving rise to the formation of early glycation products also called Amadori products. Amadori products on oxidative modification give rise to the formation of highly heterogeneous and reactive advanced glycation end products (AGEs).

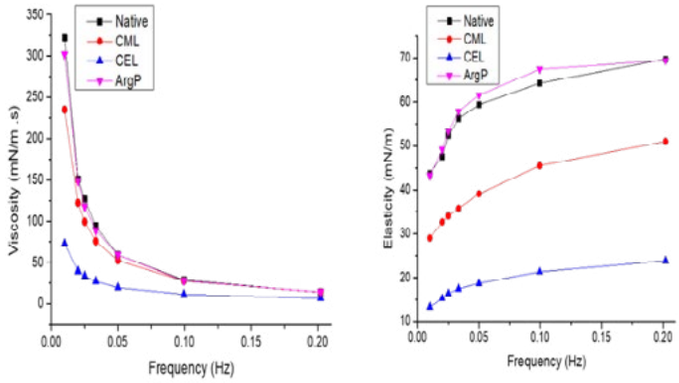


Figure 10: Viscosity and elasticity analysis of the protein in its native and glycated states.

Carboxymethyl lysine (CML), carboxyethyl lysine (CEL), and argpyrimidine (Arg-P), are the major AGEs (modification of lysine and arginine residues) reported by both in vitro and in vivo studies. Arg-P is a major AGEs observed in conditions of familial amyloidotic polyneuropathy which is characterized by the localized deposition of amyloids. In this work, we have extracted myosin from chicken breast muscles and purified the protein for further use. SDS-PAGE analysis of the protein revealed multiple bands and conforming with the molecular weight of 220 kDa as reported in the literature. Glycation of protein myosin (CML, CEL and Arg-P modifications) affects the self-assembly and leads to drastic changes in the proteins visco-elastic behavior (Figure 10).

D. Nonlinear Dust Ion Acoustic (DIA) Shock Wave Structures in Solar F Corona Region

Coordinator: Dr. Nirab C Adhikary

The formation of DIA shock waves in a dusty plasma consisting of mobile positive and negative ions, nonthermal electrons and negatively charged static dust particles in a magnetised plasma is theoretically studied. Three-dimensional ZakarovKuznetsov Burgers (ZKB) nonlinear wave equation is derived considering the ion kinematic viscosity in this plasma system. The considered parameters are reliable in Solar F Corona (dust corona) region. From the transform solution of the nonlinear ZKB equation, the different nature of oscillating (dispersive) shock structures was analyzed for different plasma parameters such as ion kinematic viscosities (μ_+, and μ_-), ion density ratio μ_n,, nonthermal electrons α_e, electron density ratio μ_e, dust density ratio μ_d and external magnetic field Ω_B

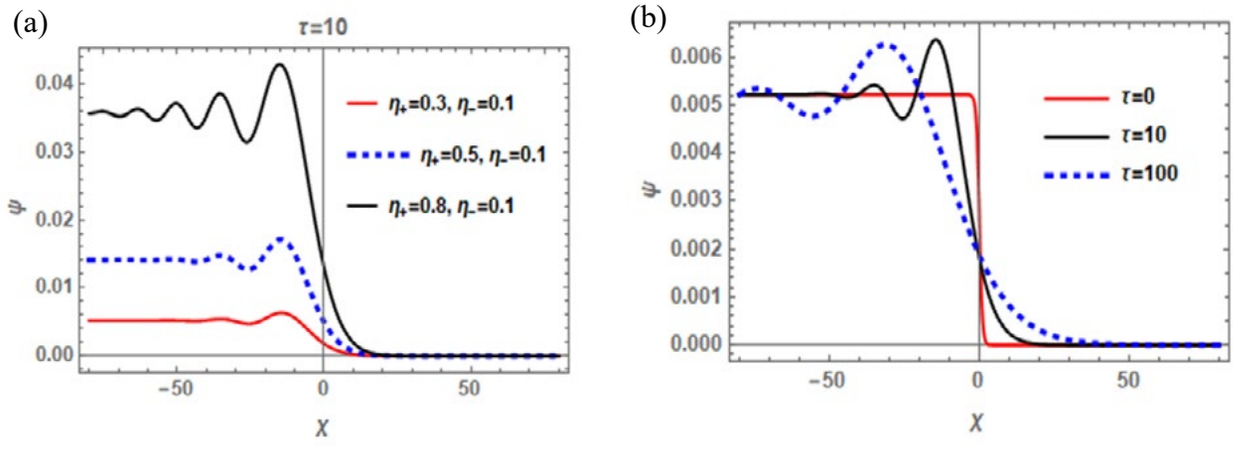


Figure 11: (a) The oscillating shock wave potential for different dissipative parameters, and (b) time evolution of oscillating compressive shock wave at .

In Figure 11(a), the effect of dissipative terms & on the compressive shock wave potential profile at $\tau=10$ is shown by keeping the other parameters constant as $\alpha_e=0.2$, $\mu_n=0.1$, $\mu_e=0.81$, $\mu_d=10^{-10}$, $\Omega_B=0.2$. It was observed that increasing the dissipation due to kinematic viscosities increase the shock strength and this increased the amplitude of compressive shock waves. Figure 11(b) shows the temporal evaluation of the shock profile at a different time (τ=0,10 100), it shows the structures of the profile as time passes. The shock formation becomes more prominent on increasing magnetic field, (Ω_B=0.2, 0.3, 0.5), thereby the amplitude of shock wave increases and also this leads to increasing the number of oscillations ahead of the shock wave front [Figure 12]. Here, the other parameters are η_+= 0.3, η_-=0.1, μ_n=0.1, $\mu_e=(1-\mu_n-\mu_d)$, $\mu_d=10^{-10}$, α_e=0.2.

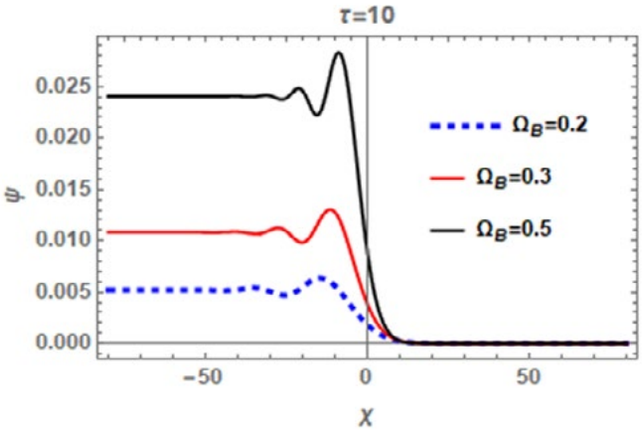


Figure 12: The oscillating shock wave potential at the different magnetic fields, .

D.1. Influence of climatic indices (AMO, PDO, ENSO) and temperature on rainfall in the Northeast Region of India

This study explores the spatiotemporal rainfall variability in the Northeast region of India combined with an analysis of the effects of temperature and natural climatic indices El-Nino Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO), and Atlantic Multi-Decadal Oscillation (AMO)) on rainfall. The multi-time scale features of rainfall time series for periods 1871-2016 were analysed based on the continuous wavelet transform method. Cross wavelet and wavelet coherence explore cross-correlation between temperature, natural climatic indices, and rainfall during 1950-2016 [data are collected from Indian Meteorological Department (IMD)]. Results of the continuous wavelet transform revealed a significant cycle of 12 months on a monthly scale and a 2-8 year period on an annual and seasonal scale (Figure13).

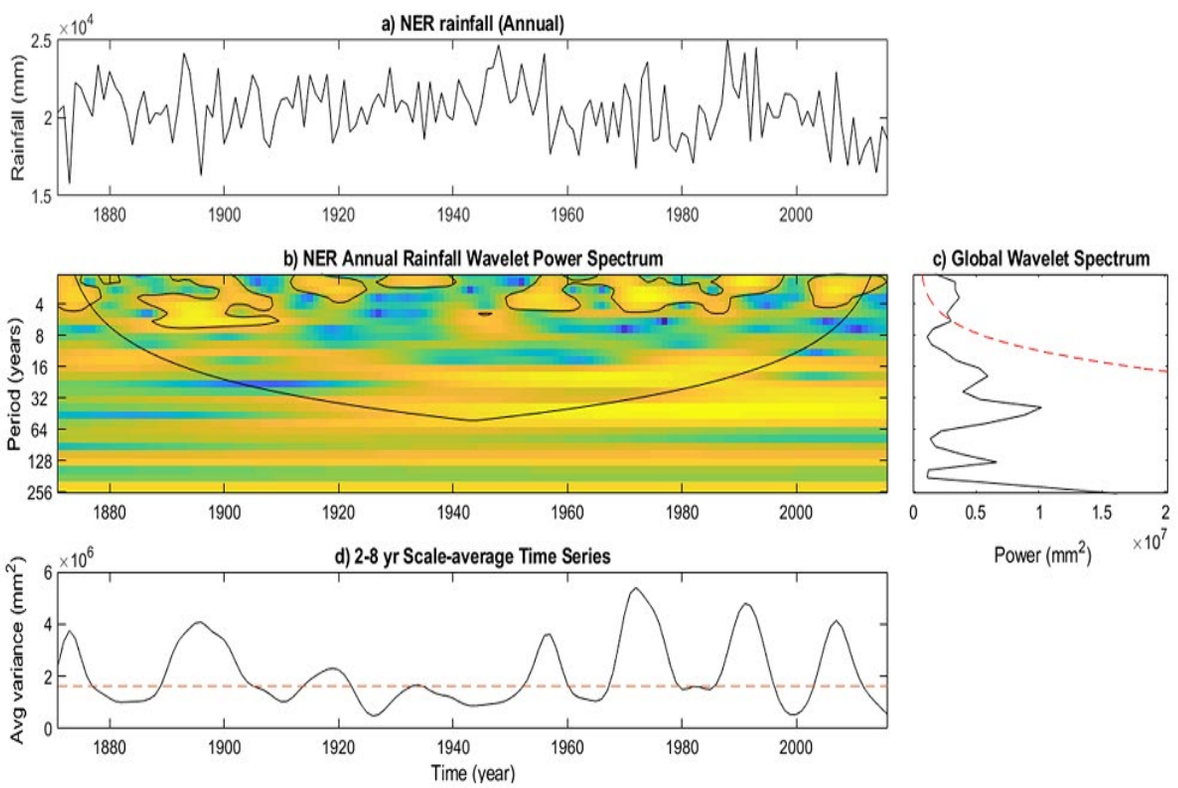


Figure 13: (a) Rainfall series of Northeast region 1871–2016. (b) The wavelet power spectrum. The colour in the figure indicates the structure of rainfall variety [the power ranges from strong (dark yellow shades) to weak (deep blue shades)]. (c) The global wavelet power spectrum. The dashed line is the 5% significance level for the global wavelet spectrum. (d) Scale-average wavelet power over 8–16-month band for monthly value and 2–8 years for annual value.

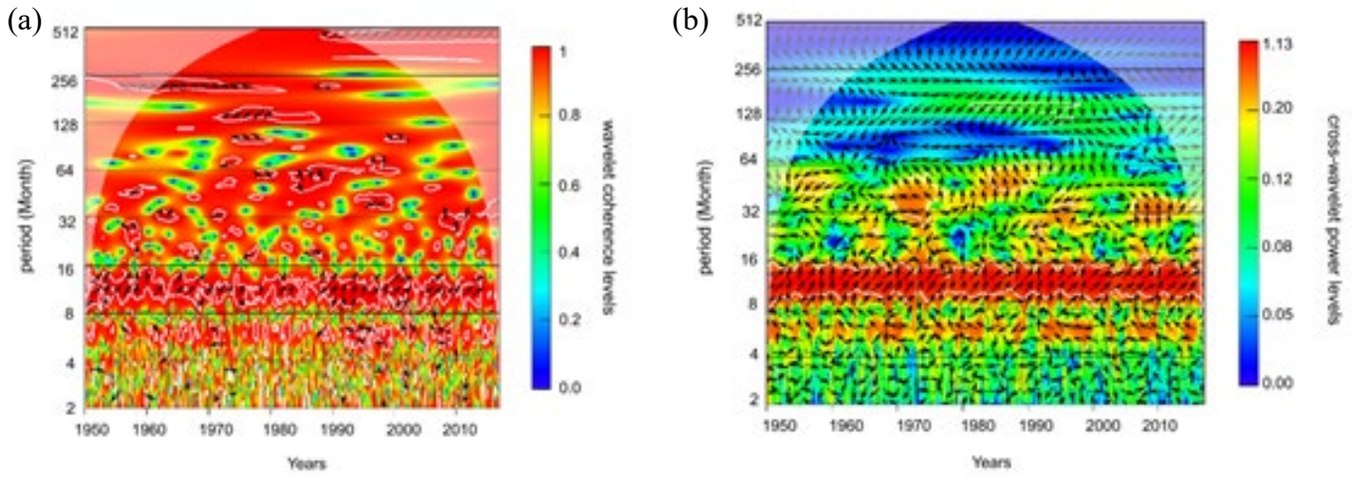


Figure 14: (**a**) Cross-wavelet spectrum and (**b**) wavelet coherence between ENSO index and monthly total rainfall. The white contour curves mark the zones with 95% wavelet coherence; the thin curve denotes the boundaries of the influence cone.

The cross wavelet and wavelet coherence results showed that the temperature affects rainfall only on an intra-annual (0.5-1 years) scale. ENSO affects rainfall on both intra-annual (0.5-1 years) and inter-annual (1-10 years) scales. PDO affects rainfall on both the inter-annual (1-10 years) and decadal (10-21 years) scale. AMO affects rainfall only on the decadal (10-21 years) scale. The result that comes out from this study is useful for climate change assessment, agriculture, and water resources management points of view of the Northeast region of India.

RESEARCH OUTPUT

Extramural Research Projects

Completed projects

Title of the project	Funding Agency: Total Fund, Duration, PI/Coordinator	Achievements
Study of dynamical behavior of nanodusty plasma produced in a reactive gas discharge	**Funding Agency:** DST, Govt. of India (Women Scientist Scheme) **Total Fund:** INR 31.00 Lakh **PI/Coordinator:** Dr. Sumita Kumari Sharma **Duration:** December, 2017- March, 2021	• Study of dust formation using reactive gas in plasma under different inert gas environments and optimization of discharge parameters for controlled growth. • Parameterization of nanodusty plasma containing plasma grown particles in a reactive gas discharge. • Study of low-frequency wave dynamics, structure formation processes and instabilities involving plasma grown dust particles.
Feasibility study of commercial scale coating on copper alloys using radio frequency plasma technology	**Funding Agency:** DSIR, Govt. of India **Total Fund:** INR 20.00 Lakh **Duration:** January, 2019- October, 2020 **PI/Coordinator:** Heremba Bailung	• Study of the techno-commercial status of surface protection of bell metal and brass in the main commercial centres in India. • Up-scaling of plasma-based surface coating technology for surface protection of copper alloys.

Ongoing projects

Title of the project	Funding Agency: Total Fund, Duration, PI/Coordinator	Goal
Development of Pt-based ternary Oxygen reduction reaction (ORR) catalyst with low Pt loading by simultaneous sputtering method for Proton exchange membrane (PEM) fuel cell.	**Funding Agency:** SERB, Govt. of India **Total Fund:** INR 21.27 Lakh **Duration**: December, 2020 - December 2023 **PI/Coordinator:** Prof. Joyanti Chutia **Co-Investigator:** Dr. Arup Ratan Pal	• Preparation of Anode – Cathode electrode catalysts on carbon paper will by three magnetrons sputtering system. • Characterization of the electrode catalysts with AFM, SEM, TEM, XRD, XPS etc. • Different Pt alloys with two other components from Ru, Ni, Pd etc. will be prepared as catalysts. • Cell performance of the prepared electrodes will be investigated in a single fuel cell test station
Application of Dielectric Barrier Discharged Cold Atmospheric Plasma for the treatment of Inflammation	**Funding Agency:** ICMR, Govt. of India **Total Fund:** INR 55.38 Lakh **Duration**: January, 2021- January, 2024 **PI/Coordinator:** Dr. Subir Biswas **Co-Investigator:** Dr. P Manna and Dr. J. Borah	• Design and development of dielectric barrier discharged cold atmospheric plasma source for biomedical application. • Collection of monocytes and proper cell culture for differentiation of monocyte-derived macrophages (MDM). • Study the effects of the treatment of the monocytes and the MDM by CAP and evaluating their viabilities. • Investigation of the possibilities to drive the polarization of MDM toward M1/M2 phenotypes with the exposure of CAP. • Detection of reactive oxygen species(ROS) and reactive nitrogen species (RNS) in the medium of monocyte and MDM; analyse those to investigate their effect on MDM. • The final objective is to use a CAP plasma source in the treatment of human inflammation.
Rheological Behaviour of the Concomitant Self-Assembly of Protein/Peptides Prompted by Water Soluble Inorganic Nanomaterials: A Fundamental Advancement Towards the Central Dogma of Parkinson's Disease.	**Funding Agency:** SERB, Govt. of India (Startup Research Grant) **Total Fund:** INR 28.10 Lakh **Duration:** January, 2021 – January, 2023 **PI/Cordinator**: Dr. Kamatchi Sankaranarayanan	• To understand the rheological behaviour of proteins/peptides which tend to form amyloid fibrils.

Publications

In cited journals

Author's name	Title	Journal name	Volume & Issue no./ page no.	Month/Year of publication
Palash J. Boruah, Rakesh R. Khanikar and Heremba Bailung	Novel single-step synthesis and shape transformation of Au/CuO micro/nanocomposites using plasma – liquid interaction	Nanotechnology	32/245601	March/2021
Pallabi Pathak	Ion Acoustic Peregrine Soliton Under Enhanced Dissipation	Frontiers in Physics	8/603112	February/2021
Yoshiko Bailung, Bidyut Chutia, Tonuj Deka, Abhijit Boruah, Sumita K. Sharma, Sandeep Kumar, Joyanti Chutia, Yoshiharu Nakamura and Heremba Bailung	Vortex formation in a strongly coupled dusty plasma flow past an obstacle	Physics of Plasmas	27/123702	December/2020

Author's name	Title	Journal name	Volume & Issue no./ page no.	Month/Year of publication
Rakesh R. Khanikar, Palash J. Boruah and Heremba Bailung	Development and optical characterization of an atmospheric pressure non-thermal plasma jet for superhydrophobic surface fabrication	Plasma Research Express	2/045002	October/2020
Priya Mehta, Seenuvasan Vedachalam, Gopal Sathyaraj, Somenath Garai, Gangasalam Arthanareeswaran, Kamatchi Sankaranarayanan	Fast Sensing Ammonia at Room Temperature with Proline Ionic Liquid Incorporated Cellulose Acetate Membranes.	Journal of Molecular Liquids	305/112820	2020
B Boro, A N Dev, B K Saikia, N C Adhikary	Nonlinear dust ion acoustic shock wave structures in solar F corona region	Physics of Plasmas, AIP Pub	27(12)/122901	December/2020
A Singh, S Thakur, N C Adhikary	Influence of climatic indices (AMO, PDO, and ENSO) and temperature on rainfall in the Northeast Region of India	S N Applied Sciences, Springer Pub	2(10)/1	September/2020
B Boro, AN Dev, BK Saikia, NC Adhikary	Nonlinear Wave Interaction with Positron Beam in a Relativistic Plasma: Evaluation of Hypersonic Dust Ion Acoustic Waves	Plasma Physics Reports, Springer Pub	46(6)/641	June/2020

Book Chapter

Authors Name	Chapter Title	Book Title	Publisher	Year/ Month of Publication
Subir Biswas	Spectroscopic Measurement of Magnetic Field in High Density Plasma	Advanced in Science and Technology, Volume II	McGraw Hill	January, 2021
A. N. Dev, B. K. Saikia, and N. C. Adhikary	Ion Acoustic SolitaryWave Propagation in Collisional Magnetized Nonthermal Plasma	Recent Trends in Applied Mathematics	Springer Publication	2021
B. Boro, A. N. Dev, B. K. Saikia and N. C. Adhikary	Nonlinear Solitary and Shock Wave Propagation in Positron Beam Driven Multicomponent Plasma	Advances in Science and Technology Volume-II	McGraw Hill Education (India) Private Limited	October, 2020

Presentation in Conference/seminars

Invited talks

Faculty	Title	Programme name	Date & Venue
H. Bailung	Vortex formation in strongly coupled dusty plasma flow past an obstacle	13th International Conference on Plasma Science & Applications	26-28 December 2020, Ravensaw University, India (Virtual)
H. Bailung and Palash Jyoti Baruah	Nanomaterial synthesis by plasma discharge in liquid and their characterization for photocatalytic activity	National Conference on Recent Trends in Science & Technology	18-20 August, 2020) Assam Science &Technology University, Guwahati (Virtual)
H. Bailung, Y. Bailung & Sandeep Kumar	Vortex dynamics in strongly coupled dusty plasma	4th Asia Pacific Conference on Plasma Physics -AAPPS-DPP Conference	26-31 October, 2020 e-Conference

Faculty	Title	Programme name	Date & Venue
Dr. Kamatchi Sankaranarayanan	Panel Discussion on Women in Science	Resource person, Global Women Breakfast by IUPAC on the occasion of International Day of Women and Girls in Science, by DG Vaishnava College, Chennai, TN	9th February, 2021 DG Vaishnava College, Chennai, TN
Dr. Kamatchi Sankaranarayanan	Invited Talk on Women and Girls in Science	Resource person for the celebration of International Women and Girls in STEM organized by NGM College, Coimbatore, TN	13th Feb. 2021 NGM College, Coimbatore, TN

Contributory

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Bidyut Chutia, Tonuj Deka, Yoshiko Bailung, Sumita K. Sharma and Heremba Bailung	Observation and characterization of repetitive particle growth process in capacitively coupled rf discharge of Ar-C_2H_2 gas mixture	Springer International Conference on Trends in Modern Physics 2021 (TiMP 2021)	Oral	26-27th February 2021, Department of Physics, Assam Don Bosco University, Tepesia, Assam, India
Bidyut Chutia and Heremba Bailung	Generation of a spiral density wave in a dusty plasma medium for the COMPACT experimental facility	1st Science Definition COMPACT Workshop (A Science Definition Workshop for COMPACT, the proposed Next Generation Microgravity Complex Plasma Laboratory for the International Space Station)	Oral (Virtual)	15-20th January 2021
Bidyut Chutia, Tonuj Deka, Yoshiko Bailung, Sumita K. Sharma and Heremba Bailung	Characterization of an in-situ grown nano dusty plasma in a capacitively coupled rf discharge with Ar-C_2H_2 gas mixture	13th International Conference on Plasma Science and Applications (ICPSA-2020)	Oral (Virtual)	26-28th December 2020, Ravenshaw University, Cuttack, India
Palash J. Boruah and Heremba Bailung	Single Step Synthesis of spindle shaped Copper Oxide Nanoparticles by Plasma – Liquid Interaction and its Photocatalytic Activity	28th National Conference on Condensed Matter Physics – Condensed Matter Days 2020 (CMDAYS20)	Oral (Virtual)	11-13th December 2020, National Institute of Technology, Silchar, Assam, India
Dibyajyoti Bora and Subir Biswas	Design of magnet coils system for spatially uniform axial continuous magnetic field of a linear magnetized plasma device	3rd National Conference on Recent Advances in Science and Technology (NCRAST-2020)	Poster	17-19th August, 2020; Online (Organized by Assam Science and Technology University (ASTU); Guwahati)
Dibyajyoti Bora and Subir Biswas	Magnet coil system design consideration for a linear magnetized plasma device	13th International Conference on Plasma Science and Applications (ICPSA-2020)	Oral + Poster	26-28th December, 2020; Online (Organized by Ravenshaw University, Cuttack)

Workshops/School/Meeting attended

Faculty/Research Scholar	Workshops/School	Date & Venue
Dibyajyoti Bora	3rd National Conference on Recent Advances in Science and Technology (NCRAST-2020)	17-19th August, 2020; Online (Organized by Assam Science and Technology University (ASTU); Guwahati)
Dibyajyoti Bora	13th International Conference on Plasma Science and Applications (ICPSA-2020)	26 - 28th December, 2020; Online (Organized by Ravenshaw University, Cuttack)

Faculty/Research Scholar	Workshops/School	Date & Venue
Dr. Kamatchi Sankaranarayanan	Virtual Symposium: Systems Chemistry, Organized by Advanced Science Research Centre, the City University of New York in connection with Ben-Gurion University of the Negev, Weizmann Institute of Science, Emory University, University of Groningen, Johns Hopkins University	15th - 18thMay, 2020
Dr. Kamatchi Sankaranarayanan	Trends in Physics and Future Prospects 2021, organized by the Department of Physics, Indian Institute of Technology Jammu	11th – 13thJanuary, 2021
Dr. Kamatchi Sankaranarayanan	Biophysika-5 held at Centre for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, New Delhi-110025	23rd February, 2021.
Dr. Kamatchi Sankaranarayanan	Government officials Training in 3D Printing/Additive Manufacturing in the online mode under Futureskills Prime program, MeITY, Govt. of India organized by NIELIT, Chennai	01st -12th March, 2021

Recognitions/ Awards/Achievements

Name	Particulars
Prof. H. Bailung	Acted as Topic Editor in the special issue entitled "Peregrine Soliton and Breathers in Wave Physics: Achievements and Perspectives", published by Frontiers in Physics.
	Acted as Member of the Program Advisory Committee (PAC), High Energy Physics, Plasma etc. SERB-DST.
	Nominated as Expert member of Assessment Committee of Institute for Plasma Research (IPR), Gandhinagar, Gujrat.
	Nominated as Member of the Governing Body of Brahmaputra College, Guwahati by the Assam Science and Technology University, Guwahati
Dr. Subir Biswas	Nominated and acted as an academic member of the organizing committee of the 3rd National Conference on Recent Advances in Science and Technology (NCRAST-2020)
	Act as an expert for evaluating the posters in the poster presentation competition in 3rd National Conference on Recent Advances in Science and Technology (NCRAST-2020)
Dr. Sumita Kumar Sharma (DST-INSPIRE Faculty & DST Women Scientist)	Selected as Assistant Professor – II, Department of Physics at the Assam Don Bosco University, Sonapur, Kamrup, Assam.

ADVANCED MATERIAL SCIENCES

The Advanced Material Sciences group is actively engaged in the research activities for the development of polymeric sensor materials, carbon-based nanomaterials for biomedical applications, soft-condensed matter physics, modelling and simulation of materials, development of nanostructured materials for energy conversion and storage, and development of plasmonic materials for photovoltaics and photocatalysis.

Several important developments have taken place during the last year. A Polymer-graphene quantum dot conjugate system has been developed for sensing ammonia vapour. New donor-acceptor-donor type of organic semiconductors based on the regioisomers of diketopyrrolopyrroles has been studied using density functional theory. Enhancement of air-stability, π-stacking ability, and charge transport properties of fluoroalkyl side chain engineered n-type naphthalene tetracarboxylic diimide compounds are also investigated. Some new studies have been carried out which are based on green and sustainable approaches, e.g. pH responsive smart drug delivery system, Fluorescence-based detection of trifluralin herbicide with calcium modified carbon dots derived from polyethylene glycol, actinobacteria mediated synthesis of bioconjugate of carbon dot with enhanced biological activity and palmitic acid–carbon dot hybrid vesicles for absorption of uric acid. In the plasma-based synthesis of nanomaterials, the synthesis of rubrene containing organic semiconductor film has been carried out for plasmon enhanced diode and transistor devices. Graphene oxide thin film has been developed by a one-step plasma process and its application in photodetection is also explored. The utilization of interband transition in metal nanostructures for high-performance UV detectors is another important development. In computational materials science, global minima geometry and electronic properties of small titanium nitride nanoclusters have been studied. Spin-orbit coupling and magnetic ground state in the Mn_2PtSn Heusler compound is another significant analysis. In soft matter research, few vital investigations are carried out, e.g. structure and reversible hysteresis nature of human serum albumin (HSA) monolayer at the air-water interface, compact protein layer formation on hydrophilic surface and collapse of Langmuir monolayer formed by the mixture of short- and long-tailed fatty acid molecules. In addition, pH-dependent reversible emission behaviour of lysozyme coated fluorescent copper nanoclusters and growth of gold nanocrystals below the organic monolayers have also been studied. In two-dimensional materials research, highly innovative work has been carried out jointly with the Basic and Applied Plasma Physics group on the preparation of two-dimensional nanosheets of g-C_3N_4 with air-water interfacial plasma which may find applications in energy conversion and storage. In research work on Metal Organic Frameworks (MOFs), the development of organic linkers of Naphthalene Diimide (NDI) via simple condensation reaction with different pendant moieties such as isoniazid, pyridine, isophthalic acid, salicylic acid derivatives etc. has been carried out and successfully derived porous MOFs with hexagonal architecture from potential NDI linkers that have tremendous possibilities in the area of adsorption and removal of contaminants of environmental concern. Significant progress has also been made in understanding and solving the problem of false smut of rice (*Oryzae sativa*) due to the fungus *Ustilaginoidea viren* with the intervention of genetic engineering and nanotechnology.

Prof. Neelotpal Sen Sarma

Dr. Devasish Chowdhury

Dr. Arup Ratan Pal

Dr. Munima B Saharia

Dr. Sarathi Kundu

Dr. Anamika Kalita

Biswajit Choudhury

Ankita Deb

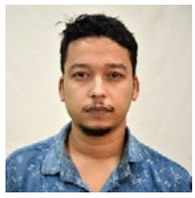
Bhargab Kakati

Jahnabi Gogoi

Suvankar Deka

Kabyashree Phukan

Manju Kumari Jaiswal



Sanu Sarkar

Payal Saha

Gautomi Gogoi

Hridoy Jyoti Bora

Nasrin Sultana

Kangkan Jyoti Goswami

Trishamoni Kashyap

Jyotisman Bora

Santanu Podder

Raktim Jyoti Sarmah

Manash Pratim Nath

Sazzadur Rahman

Samiran Upadhyaya

Bablu Basumatary

Dhrubanka Sarma

Purbajyoti Bhagowati

Subhankar Pandit

Sweety Biswasi

Babul Deka

A. Synthesis of High-value Polymers and Development of Sensors

Coordinator: Dr. Neelotpal Sen Sarma

The Advanced Material Sciences group at IASST has been working to develop various sensors particularly soft sensors to estimate controlled variables. Our group has also developed soft materials, and has been designing materials for Bio-medical applications. Here is an account of the accomplishments during the last year.

A.1. Polymer-graphene quantum dot conjugate system for sensing ammonia vapour

Ammonia is a toxic gas that can cause various respiratory diseases. There are many ammonia sources such as chemical industries, laboratories, and life-stock, in addition to its natural origin. Hence, the detection of ammonia is of utmost importance. Herein, we report a bio-based synthesis of graphene quantum dots using the leaf extracts of ***Elaeocarpus***

serratus. The quantum dots were found to emit bright pink colour under UV lamps (Figure 15). Further, the synthesized quantum dots were complexed with poly(n-vinylpyrrolidone-co-acrylonitrile-co-methacrylic acid) via in-situ incorporation. All the synthesized materials were well characterized using various sophisticated techniques. The polymer composite was found to have enhanced electrical properties compared to the original copolymer. At 80 °C, the AC conductivities of the copolymer and the polymer-GQD composite were found to be 1.9 $\times 10^{-7}$ and 1.6 $\times 10^{-5}$ cm^{-1}, respectively. The activation energy of the copolymer was increased from 0.115 to 0.725 on forming the composite. The copolymer showed no ionic nature, whereas the polymer composite was found to be 61.56 % ionic in nature. A portable electronic device was fabricated using the polymer composite for the selective and reversible detection of ammonia vapour in the presence of other organic vapours, with a detection limit of 0.232 ppm. A two-fold decrease in impedance value was observed in the presence of ammonia vapour at room temperature, while the current-voltage characteristic plot showed a five-fold increase in current density at 90 °C in the presence of ammonia vapour. Such a drastic change in the electrical properties of the sensor is attributed to the weak physisorption of the ammonia vapour into the polymer matrix. Furthermore, to check the sensor's practical applications, we studied its impedance response in the presence of the gases released from the rotten fish sample. Interestingly, the sensor showed a significant decrease in the impedance which indicates that the polymer composite could be used for the real-time detection of ammonia.

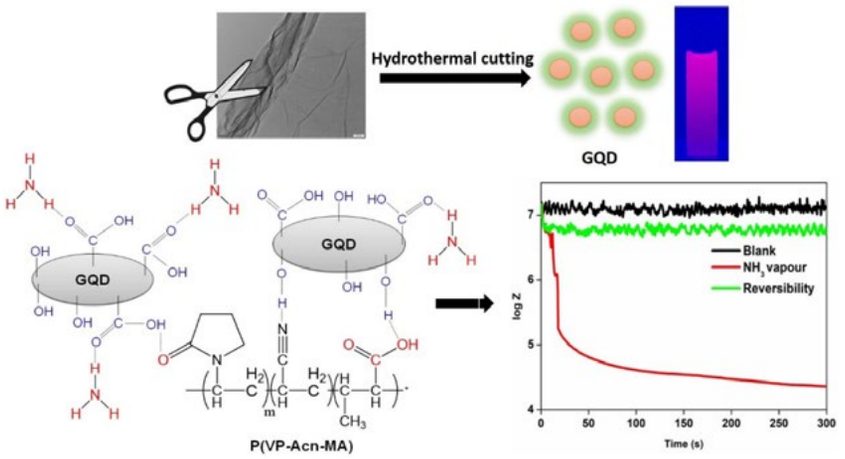


Figure 15: Biosynthesis of Graphene QD, and its composite with poly(n-vinylpyrrolidone-co-acrylonitrile-co-methacrylic acid) for efficient and selective detection of ammonia.

A.2. New donor–acceptor–donor type of organic semiconductors based on the regioisomers of diketopyrrolopyrroles: A DFT study

The present work describes computational studies on structural, electronic, charge transport and photovoltaic properties of donor-acceptor-donor (D-A-D) type of compounds based on two regioisomers of diketopyrrolopyrrole. Diketopyrrolo[3,4-c]pyrrole (DPP1), a well-known electron acceptor moiety and its regioisomer diketopyrrolo[3,2-b] pyrrole (DPP2) are coupled with various electron donor groups containing fused ring system to obtain model compounds of D-A-D type of architecture. The donor groups include meta-benzodithiophene, ortho-benzodithiophene, carbazole, dithienopyrrole, dithienosilole and dithienothiophene. An analysis of their properties

reveals that these compounds possess unique characteristics and advantages over each other. Density functional theory (DFT) calculations show that the DPP2-based compounds exhibit lower hole reorganization energy (λh) than the corresponding DPP1-based compounds, while the DPP1-based compounds have lower electron reorganization energy (λe) than the corresponding DPP2-based compounds, which is in line with the observed ionizational potential (IP) and electron affinity (EA) values (Figure 16). The calculated open circuit voltage (Voc) and the fill factor (FF) values of the DPP2-based compounds as donors with fullerene-like PC61BM as an acceptor are higher than the DPP1-based compounds as donors. Charge density difference (CDD) calculation shows DPP2 based compounds exhibit better

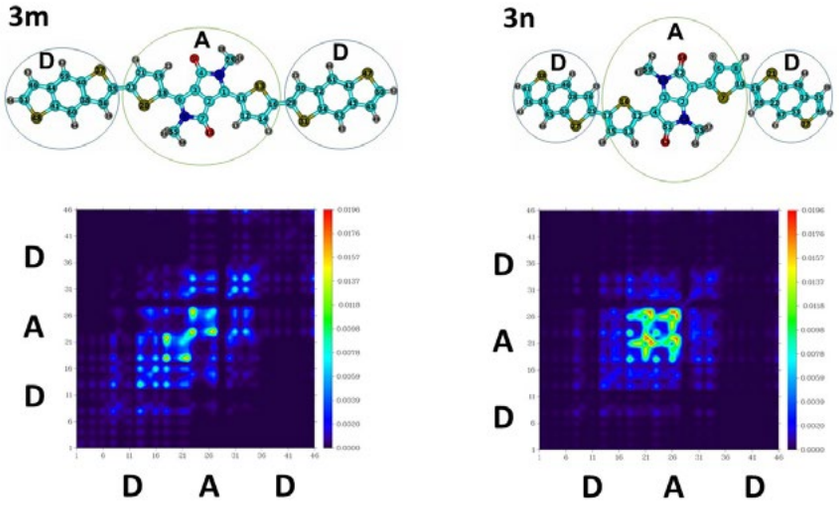


Figure 16: Transition density matrix (TDM) of compounds 3m and 3n (H atoms are omitted in all the molecular systems).

intramolecular charge transfer (ICT) properties as compared to their DPP1 counterpart. The weaker electron-hole coherence may lead to easy exciton dissociation in the case of DPP1-based compounds at donor/acceptor interface, which is also supported by their comparatively lower exciton binding energy as compared to DPP2 counterparts.

A.3. Enhancement of air-stability, ϖ-stacking ability, and charge transport properties of fluoroalkyl side chain engineered n-type naphthalene tetracarboxylic diimide compounds

In this study, the impact of fluoroalkyl side chain substitution on the air-stability, π-stacking ability, and charge transport properties of the versatile acceptor moiety naphthalene tetracarboxylic diimide (NDI) has been explored. A density functional theory (DFT) study has been carried out for a series of 24 compounds having different side chains (alkyl, fluoroalkyl) through the imide nitrogen position of NDI moiety. The fluoroalkyl side chain engineered NDI compounds have much deeper highest occupied molecular orbitals (HOMO) and lowest unoccupied molecular orbitals (LUMO) than those of their alkyl substituted compounds due to the electron withdrawing nature of fluoroalkyl groups (Figure 17). The higher electron affinity (EA > 2.8 eV) and low-lying LUMO levels (<−4.00 eV) for fluoroalkyl substituted NDIs reveal that they may exhibit better air-stability with superior n-type character. The computed optical absorption spectra (~386 nm) for all the investigated NDIs using time-dependent DFT (TD-DFT) lie in the ultra-violet (UV) region of the solar spectrum. In addition, the low value of the LOLIPOP (Localized Orbital Locator Integrated Pi Over Plane) index for fluoroalkyl side chain comprising NDI compounds indicates better π–π stacking ability. This is also in good agreement with the predicted π–π stacking interaction obtained from a molecular electrostatic potential energy surface (ESP) study. The π–π stacking is thought to be of cofacial interaction for the fluoroalkyl substituted compounds and herringbone interaction for the alkyl substituted compounds. The calculated results shed light on why side chain engineering with fluoroalkyl groups can effectively lead to better air-stability, π-stacking ability and improved charge transport properties.

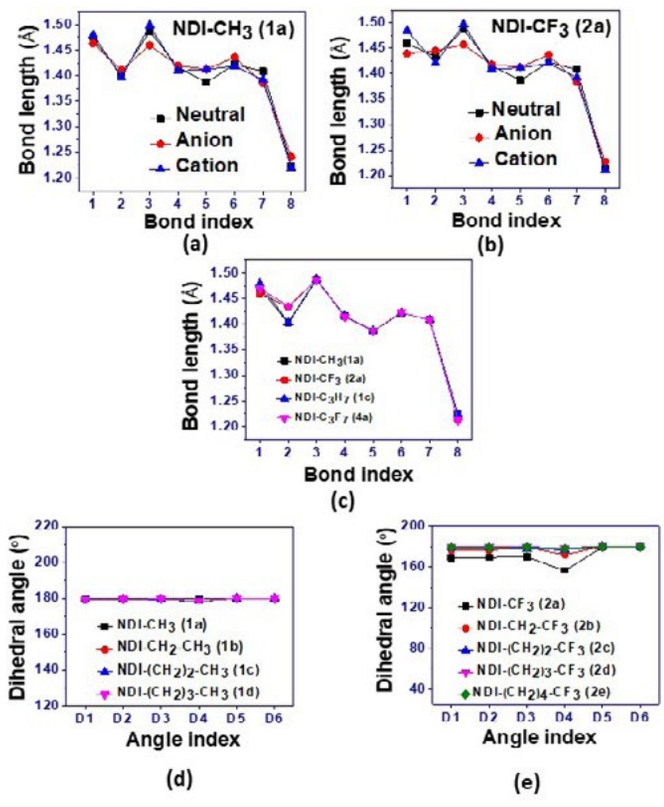


Figure 17: Graphical representation of (a–c) bond lengths in neutral and ionic states of NDI compounds, and (d, e) comparison of dihedral angles for some of the studied NDI compounds.

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

With this objective in mind last year, we developed a pH responsive smart drug delivery system, Fluorescence-based detection of trifluralin herbicide, carbon dot with enhanced biological activity and hybrid vesicles which can absorb toxins.

B. Material Nanochemistry

Coordinator: Dr. Devasish Chowdhury

B.1. pH-responsive smart drug delivery system

This work demonstrates the development of a pH-responsive smart drug delivery system (Figure 18). Herein, we fabricated a hybrid cotton patch nanocomposite incorporated with jute carbon dots to carry out the drug release study. Notably, jute was used for the first time as a precursor in synthesizing fluorescent carbon dots and used water as the dispersion medium. An herbal formulation of neem leaf (*Azadirachtaindica)* extract was taken as the model drug to

exemplify the release study. It was found that the hybrid jute carbon dot-cotton patch showed two distinct release profiles at pH 5 and pH 7, where the release was shown to be higher at pH 5 than at pH 7. In cases, where due to the growth of pathogenic bacterial infection around the cut/wound region pH gets lowered, this enhanced release of the drug from the fabricated patch at pH 5 will be desirable. Besides, different characterization techniques such as FT-IR spectroscopy, TGA, tensile measurement, and SEM were applied to study the physicochemical properties of the patch. The development of such stimuli-responsive behavior of hybrid cotton patch would pave the way for utilizing systems as smart wound dressing material using sustainable materials.

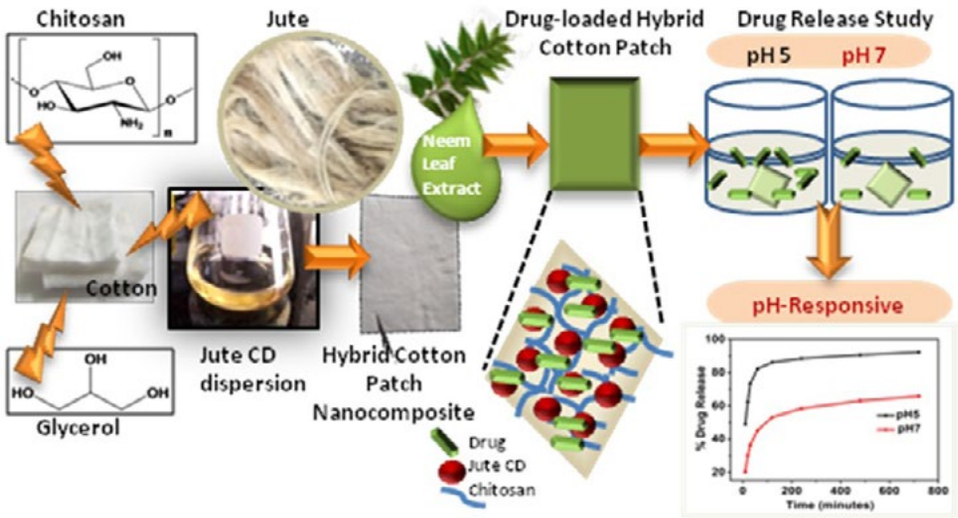


Figure 18: Schematic representation of developed pH-responsive drug delivery vehicle.

B.2. Calcium modified carbon dots derived from polyethylene glycol: Fluorescence-based detection of trifluralin herbicide

In this work, fluorescent carbon dots were synthesized from polyethylene glycol. The carbon dots were below 10 nm in size which was confirmed through Dynamic Light Scattering studies and Transmission Electron Microscope images. Carbon dot was further conjugated with Ca^{2+} to form metal ion conjugated polyethylene glycol carbon dot exhibited. The metal ion conjugated polyethylene glycol carbon dot exhibits enhanced photoluminescence properties. Fluorescence of the Ca-modified carbon dots was quenched in the presence of trifluralin. The development of such a fluorescent-based detection system will lead to the development of visual detection kits for detecting herbicides in general (Figure 19).

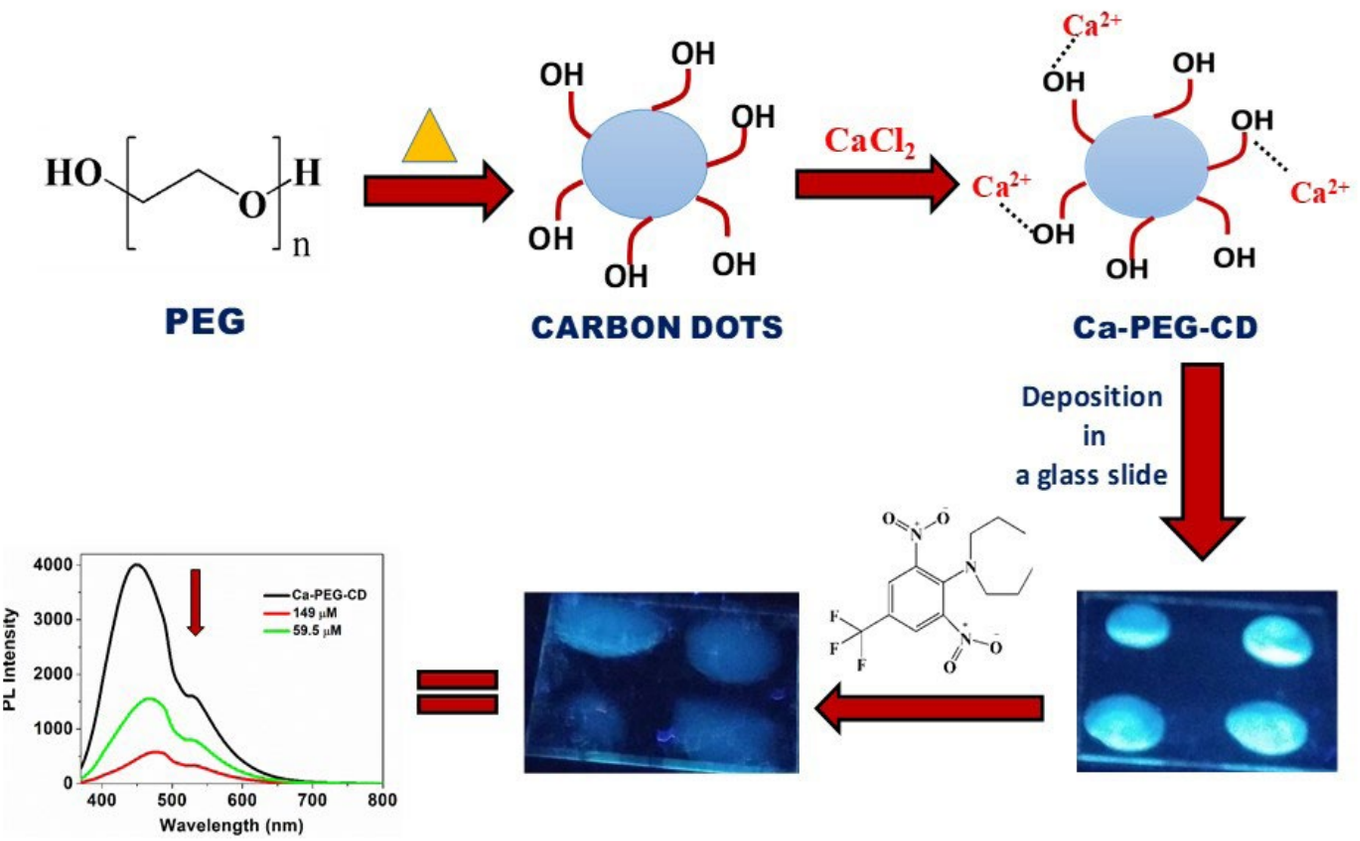


Figure 19: Schematic representation of fluorescent-based detection system developed for trifluralin herbicide.

B.3. Actinobacteria mediated synthesis of bioconjugate of carbon dot with enhanced biological activity

It is a challenging and daunting task of discovering antibiotics. Hence it is of paramount importance to put efforts into increasing the efficiency of the currently available antimicrobial compounds.

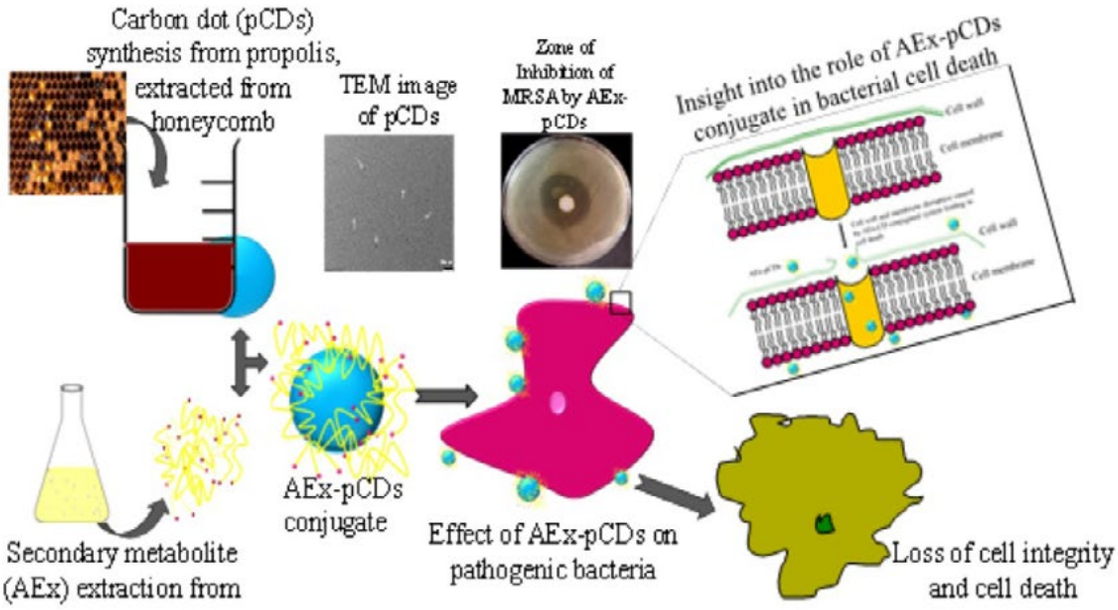


Figure 20: Schematic representation of developed Actinobacteria mediated synthesis of bioconjugate of carbon dot with enhanced biological activity.

In this work, we have successfully synthesized carbon dots from propolis (natural resinous mixture produced by honey bees), and conjugated them with extracellular metabolites of Actinobacteria. It was demonstrated for the first time that by conjugating it with carbon dots synthesized from propolis the properties of extracellular metabolites of Actinobacteria can be enhanced. Actinobacteria-propolis carbon dots conjugate (AEx-pCDs), the microbial activity is better than the antibacterial rifampicin which was taken as the positive control (Figure 20).

B.4. Palmitic acid–carbon dot hybrid vesicles for absorption of uric acid

Human health is always sensitive to the effect of toxins accumulate in the body due to various reasons like metabolic activities, and metabolic disorders etc. Hence, there is a dire need to develop ways to remove such unwanted metabolites. We successfully fabricated a carbon dot-palmitic acid hybrid vesicles and demonstrated that it can absorb the uric acid (UA) product of nucleic acid metabolism. Interestingly, the nanohybrid was found to be an efficient UA absorber (~ 80%) compare to pure palmitic acid vesicles (~60%) confirming the role of carbon dot in absorption and subsequent removal of excessive UA from the blood. The electrostatic interaction operated between carbon dot and UA inside the palmitic acid vesicles is the prime factor for UA absorption. The development of such a nanohybrid vesicles system will lead to a system that can be used for unwanted/excessive metabolites removal from our body.

C. Plasma Based Synthesis of Nanomaterials

(Coordinator: Dr. Arup Ratan Pal)

Synthesis of various kinds of nanomaterials by plasma-based processes is the focus of research of Plasma Nanotechnology Laboratory. Conventional as well as alternative plasmonic nanomaterials, carbon nanomaterials, polymer nanofilms and nanocomposite films are prepared by atmospheric pressure or low pressure novel plasma-based processes for application in photodiode and phototransistor devices which may be useful as a light sensor or a biosensor.

C.1. Organic semiconductor film by a plasma-based process for plasmon enhanced diode and transistor devices

Our group has been working on the synthesis of organic and inorganic semiconductor nanomaterials using plasma-based processes for their application in various optoelectronic purposes. Amongst the synthesized semiconductor materials plasma polymerized aniline-crystalline rubrene (PPA-CRB) thin film has got considerable attention owing to the pyro-phototronic effect it exhibits. We have tried to explore the effect of plasmonic gold nanoparticles (Au NPs) when combined with such a fully organic pyro-phototronic semiconductor framework. The fabricated hybrid system thus merges plasmonics with the photo-induced surface polarization dependent pyro-electric effect exhibited by the organic matrix. Investigation of the photoelectrical properties of an Au incorporated device (ITO/PPA-CRB/Au NPs/Al) reveals that the incorporation of plasmonic Au NPs into the reference device (ITO/PPA-CRB/Al) affects the photocurrent generation considerably with increased pyro-current as well as enhanced photovoltaic current (Figure 21). Due to the inclusion of Au NPs, the negatively charged oxide surface layer (OSL) formed above the PPA-CRB accumulates more negative charge at the surface because of the high free electron density of plasmonic Au, thereby strengthening the polarization induced in the OSL further. Therefore, the pyro current sees an enhancement in the device as compared to the reference device. Tunability of plasmon resonance absorption band of Au NPs (throughout the visible and NIR regimes) works for the further betterment of the fabricated device by making it applicable for light harvesting in the NIR region too. Besides fabricating this layered device, we have also attempted to synthesize a new material of crystalline rubrene with gold nanostructures to form a composite (CRC). The thin film composite material is synthesized successfully using a single-step and environment-friendly plasma-based process. The as-synthesized composite material is used to fabricate a high performance and operationally stable plasmon thin film transistor device where an extraordinary responsivity of 25 A/W is achieved at the peak wavelength (530 nm) of plasmonic absorption.

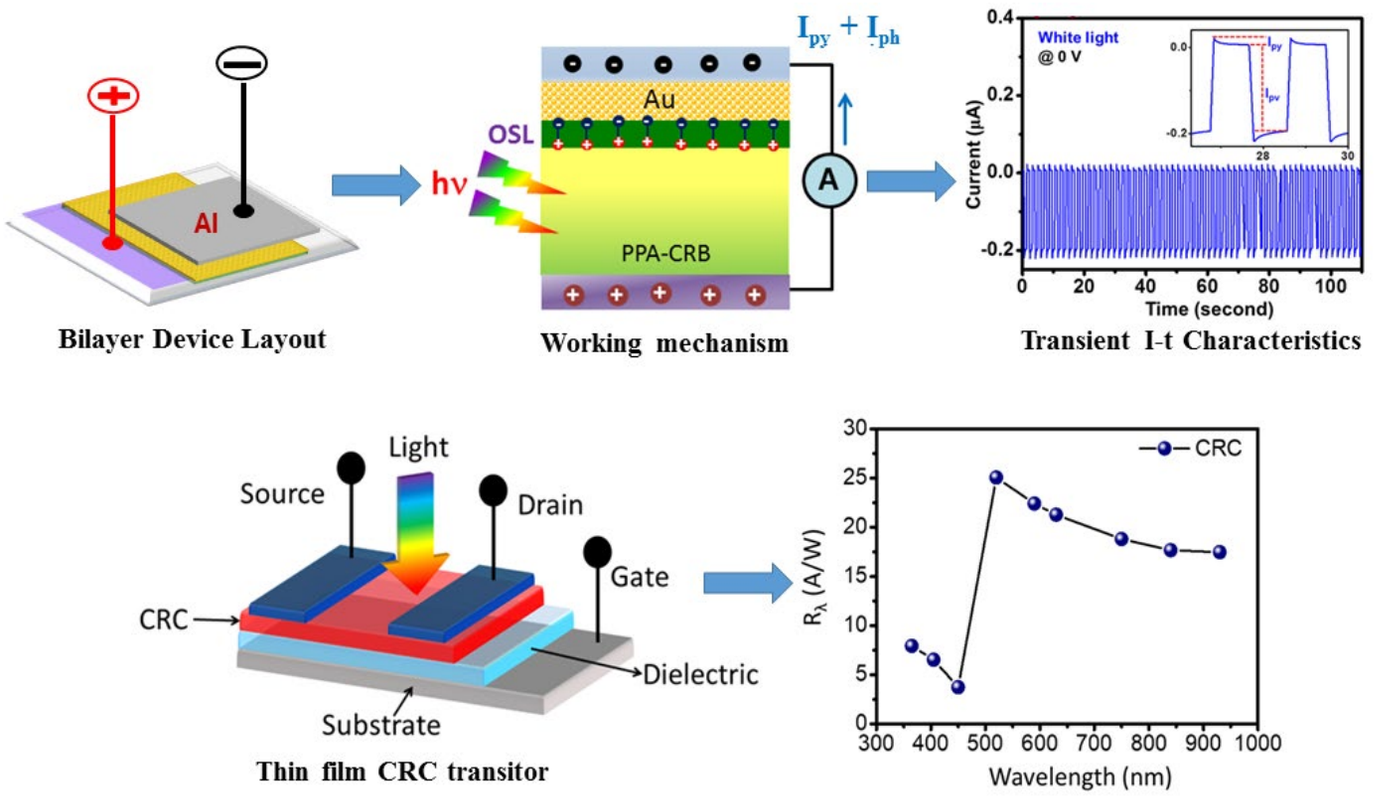


Figure 21: Schematic presentation of the fabrication of plasmon enhanced diode, and transistor devices, their working mechanism and performance parameters.

C2. Graphene oxide thin film by PECVD and its application in photodetection

Graphene Oxide (GO) thin film is prepared by a single step Plasma Enhanced Chemical Vapour Deposition (PECVD) process without the use of any catalyst and post deposition treatment. UV-Vis spectrophotometry, Raman Spectroscopy, Transmission Electron Microscopy, and X-Ray Photoelectron Spectroscopy analyses are carried out for the determination of the structure and defects present in graphene. An attempt has been made to utilize the GO film as a transparent electrode by incorporating it with ZnO and gold nanoparticles for UV light detection. Two ZnO based

UV-A detectors having configuration GO/ZnO/Au_film (device-1) and GO/Au_np/ZnO/Au_film (device-2) are fabricated (Figure 22). The single-crystal hexagonal wurtzite ZnO is sputtered on top of GO in device-1 and the case of device-2 Au_np is sputtered on GO followed by ZnO by reactive magnetron sputtering. From the photoelectrical characterization, the open-circuit voltage (V_{oc}) and short circuit current (I_{sc}) of Device-1 is measured to be 6 mV and 544 nA respectively, whereas the value of these quantities is 6 mV and 1.52 µA respectively in the case of Device-2. The current ratio when the incident light is switched off and again switched on in the case of Device-1 is 452 nA whereas this ratio is found to be 816 nA in Device-2. Device-1 shows a response speed of about 36 µs whereas the response speed of Device-2 is found to be 29 µs. The pyrophototronic effect induced in ZnO is the origin of such an ultrafast response. The incorporation of Au nanoparticles helps in achieving better response time in Device-2. The Au nanoparticles also help in improving the pyroelectric current apart from the photocurrent. From this study, we conclude that in graphene oxide-based devices the utilization of plasmonic Au nanoparticles paves the way for improving the performance of UV detectors through their highly efficient interband transitions.

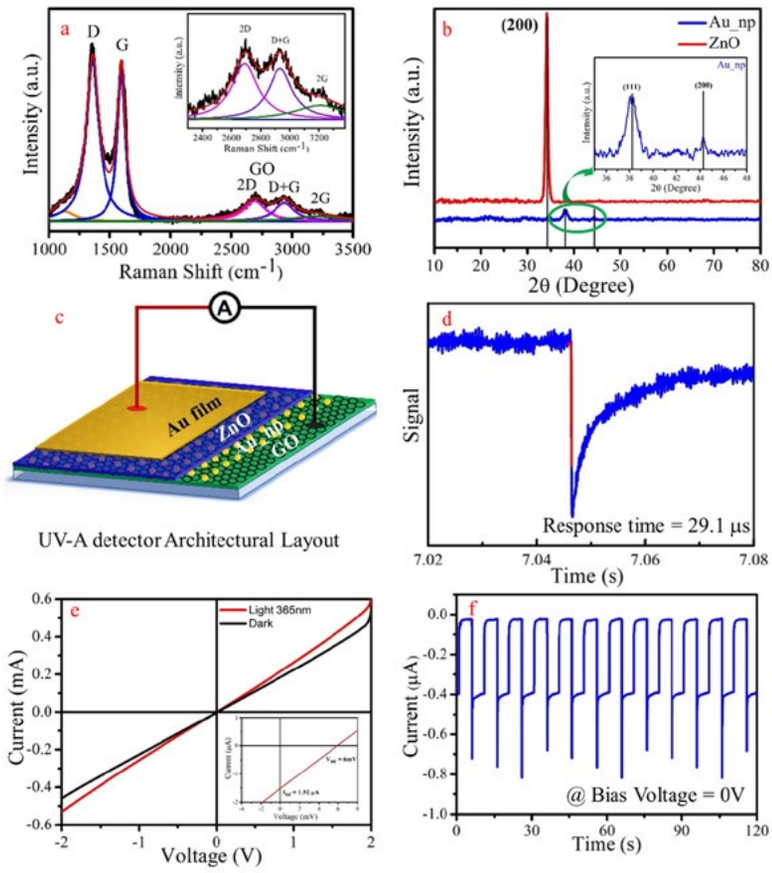


Figure 22: (a) Raman spectra of Graphene Oxide, (b) XRD of ZnO and Au nanoparticles, (c) Architectural layout of the device, (d) Response time, (e) IV characteristics, and (f) On-Off switching of the device.

C.3. Utilization of interband transition in metal nanostructures for high performance UV detector

The detection of UV radiation is very much essential in the context of energy harvesting, health, safety, astronomical research, and the environment. In that content, the UV photodetectors gain tremendous attention in present-day technology. It is now well known that plasmonic metal nanostructures have the ability to generate carriers from both intraband and interband transitions.

Here, we have explored a new aspect of extracting the interband transition generated charge carriers of plasmonic titanium nitride (TiN_x) in an all-metal nitride-based device geometry with tantalum nitride (TaN_x) as a base semiconductor. The maximum value of photoresponsivity at 310 nm is measured to be 42 mA/W in a self-powered condition (Figure 23). Such high performance is achieved by the concomitant contribution of the interband transition of TiN_x and the excitonic effect of TaN_x. The device also shows some performance enhancement in the visible region due to the plasmonic contribution of TiN_x nanostructure. After comparing all the performance parameters of our photodetector with the existing literature, it may be concluded that our device has the potential to stand as an all nitride self-powered UV-photodetector for harvesting both interband transition generated carriers and the plasmon-induced hot carriers of TiN_x in a single device configuration.

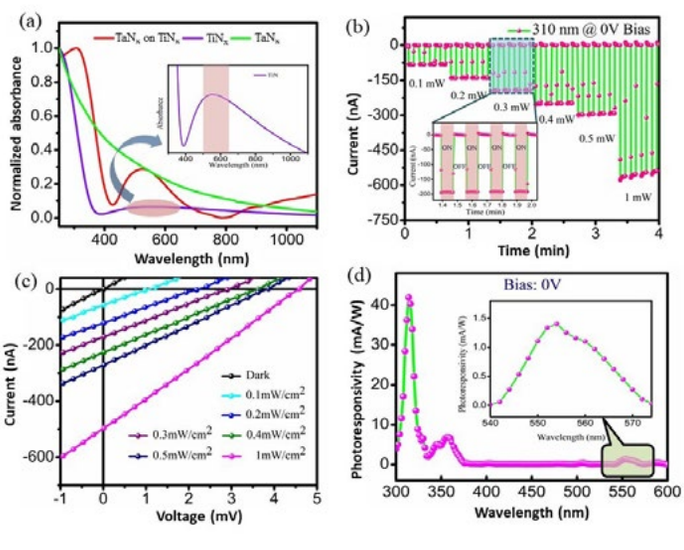


Figure 23: (a) Absorbance spectra, (b) I-t, and (c) I-V characteristics of the fabricated device under the illumination of 310 nm LED at 0 V bias, (d) Photoresponsivity spectrum of the device.

We have also successfully utilized the interband transition in gold nanoparticles for the fabrication of a highly responsive ultrafast UV photodetector (Figure 24). In the excitonic part, we have chosen a high bandgap semiconductor (ZnO) which also absorbs light in the same region where the interband transition of plasmonic material takes place. So, upon proper UV illumination, charge carriers are generated due to the synchronized contribution of the individual materials leading to boosting the performance of the device. The fabricated devices in addition to displaying a very high photoconversion efficiency also demonstrated ultra-fast response speed. The pyroelectric current induced in the non-centrosymmetric wurtzite ZnO is the origin of such an ultrafast response. At a wavelength of 365 nm, the maximum photoresponsivity and specific detectivity of the fabricated device are measured at 4.68 AW^{-1} and 8.18 × 10^{11} Jones, respectively in biased condition, thus making it one of the best among its compeer UV photodetectors. Additionally, the device demonstrates an ultrafast response time of 15 µs in the self-powered condition, which is another feather in its cap. So, this study opens a new avenue for the application of combined carrier generation by interband transition and pyroelectric effect for the fabrication of a highly responsive ultrafast pyrophototronic UV detector.

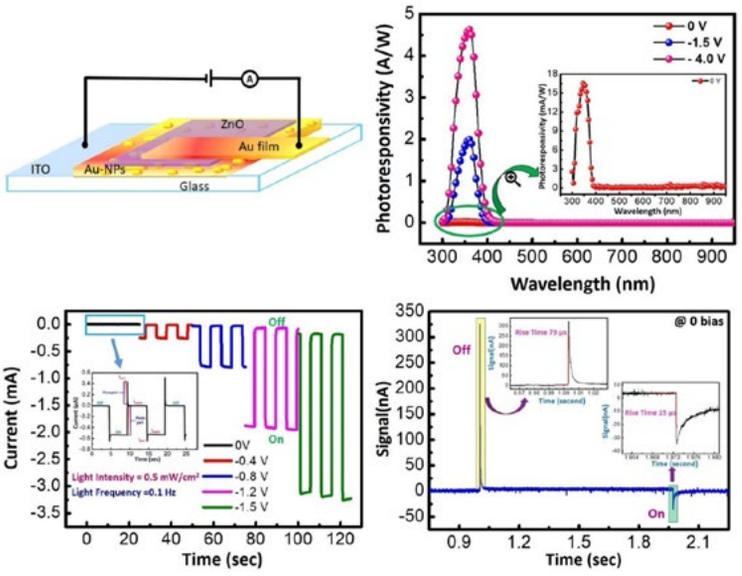


Figure 24: Device layout of Au-ZnO UV detector device and performance parameters.

D. Materials Modelling and Simulation

Coordinator: Dr. Munima B. Sahariah

D.1. Global minima geometry and electronic properties of small titanium nitride nanoclusters

Titanium nitride (TiN) is a well-established material for plasmonic activities nowadays. The bulk TiN has been studied rigorously over the years, both experimentally and theoretically. However, to the best of our knowledge, there is no report on TiN nanoclusters. In this work, we generated the minimum energy structures of TiN nanoclusters, i.e. the global minima and some of their local minima. The obtained structures were studied thoroughly based on their electronic properties, and the results were compared with the bulk counterpart. For the prediction of the global minima structure of TiN nanoclusters, ab initio molecular dynamics (AIMD) was used. The electronic properties were calculated using density functional theory (DFT). After obtaining the global minima structures of the nanocluster systems, the electronic properties were studied on the basis of Bader charge, electron localization function (ELF) and density of states (DOS) (Figure 25). Bader charge analysis of the clusters indicated that the Ti-N bond in these nanoclusters has covalent nature. This is further confirmed from the ELF analysis, where ELF basins

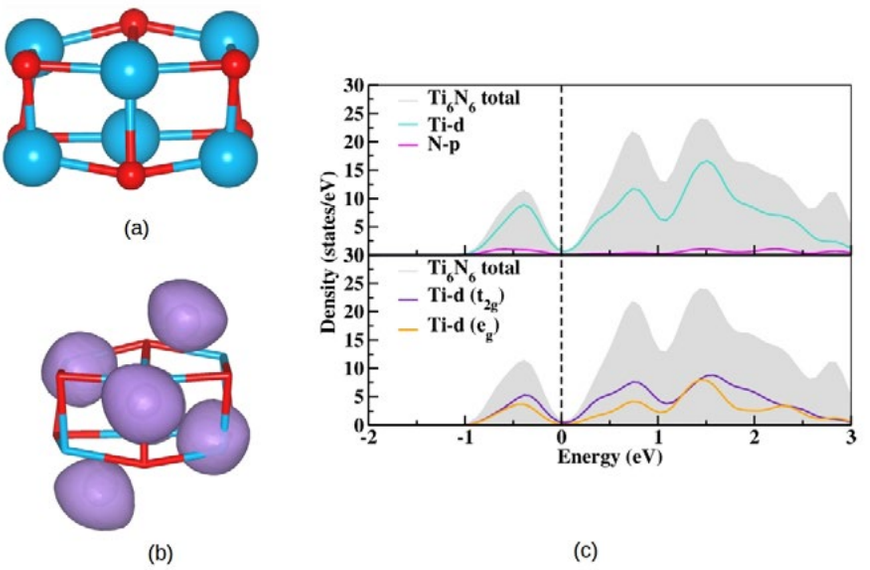


Figure 25: (a) Global minima geometry, (b) ELF plot and (c) DOS plot of Ti6N6 nanocluster.

were present at a high isosurface value. The excess Ti-d electrons are found to be responsible for the conductivity of the nanoclusters. In DOS calculation, a prominent pseudogap is observed in the vicinity of the Fermi level. The t2g-eg hybridization of Ti-d electrons is responsible for the presence of this pseudogap in the clusters. These properties of the nanoclusters are also compared with the bulk counterpart, and it is found that most of the results are similar to the bulk TiN.

D.2. Spin orbit coupling and magnetic ground state in Mn_2PtSn Heusler compound

The spintronic devices have privileges like non-volatility, less electric power consumption, increased data processing speed and high density recording due to the dependence on spin degree of freedom.

The materials having high magnetic anisotropy energy are prospective materials for application in non-volatile memory technologies. Mn_2 -based Heusler alloys show these properties, so we have considered the Mn_2PtSn as the sample compound for our study. The inverse tetragonal Heusler compound Mn_2PtSn has been optimized with three different collinear magnetic structures, i.e., ferromagnetic, antiferromagnetic and ferrimagnetic, and the effect of spin-orbit coupling (SOC) on electronic and collinear magnetic properties of the compounds has been studied. We have found that the ferrimagnetic spin order is more stable at the ground state than the other two spin orders, irrespective of the inclusion of SOC. All the results are verified by examining the density of states and bandstructure calculations and the contributions from valence electrons of magnetic atoms through the charge density distribution of the atoms. The non-spherical shape of spin-resolved charge distribution around the Mn atom implies a bonding between Mn and Pt atoms (Figure 26). A significant value of magnetocrystalline anisotropy (MCA) energy is found for the ferrimagnetic spin order. The less magnetic moment and high MCA energy make the ferrimagnetic spin order of the compound suitable for spin-transfer-torque based devices.

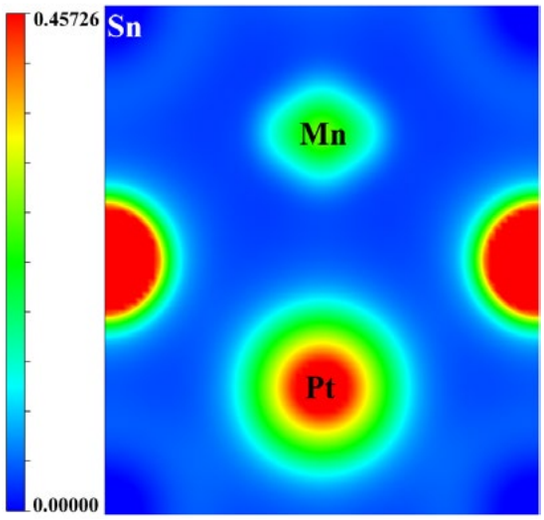


Figure 26: Spin-up charge density distribution of bulk Mn_2PtSn for (010) lattice plane in case of ferrimagnetic spin order without considering the SOC.

E. Soft Materials

Coordinator: Dr. Sarathi Kundu

Structural and physical properties of different soft materials are explored at interfaces and in solutions. Under different physicochemical conditions, such materials show specific structures, interactions and fascinating properties.

E.1. Structure and reversible hysteresis nature of human serum albumin (HSA) monolayer at the air–water interface

Compression-decompression surface pressure versus molecular area isotherm cycle of human serum albumin (HSA) monolayer was performed on the water surface at four different subphase pH conditions, i.e., below and above the isoelectric point (pI ≈ 4.7) of HSA. For all pH conditions, the decompression curve nearly follows the compression curve, however, at pH ≈ 5.0, hysteresis is observed at higher surface pressure. Out-of-plane structures and in-plane morphologies show that only the film thickness variation takes place with the change in surface pressure. With an increase in surface pressure, the oblate-shaped HSA molecules start tilting making an angle with the water surface and as the monolayer is decompressed the molecules regain their initial untilted monomolecular configuration as shown in Figure 27. Depending upon the

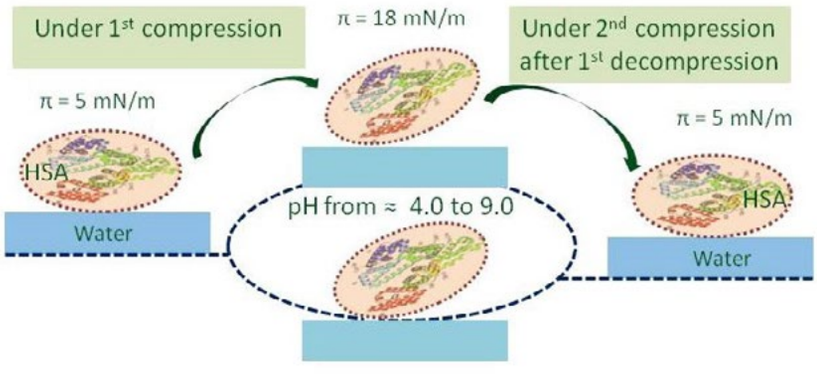


Figure 27: Schematic representation of the structural modifications of HSA monolayer on the water surface for reversible hysteresis at different subphase pH.

subphase pH and local surface charge of the protein molecule, electrostatic repulsive interaction dominates over the van der Waals attraction and as a result decompression curve follows the compression curve as the molecules repel each other, however, closer to the isoelectric point as strength of the interactions reverses, hysteresis is obtained at higher surface pressure and accordingly monolayer behaviour modifies on the water surface.

E.2. pH-dependent reversible emission behaviour of lysozyme coated fluorescent copper nanoclusters

An environment-friendly method was used to prepare lysozyme coated fluorescent copper nanoclusters (CuNCs) of 2.87±0.09 nm. The valency of the prepared CuNCs lies between 0 and +1. The pH-dependent fluorescence emission behaviour of the synthesized ultra-small CuNCs was studied in buffer solution within the pH range, approximately from 2.5 to 7.5. The CuNCs showed excellent stability in the whole pH range and showed highly reversible emission behaviour with pH variation. For having such superior property, we propose that the lysozyme coated CuNCs can be used as a potential candidate for pH sensing. Spectroscopy study confirms that the structural modification of lysozyme protein is responsible for showing such reversible optical behaviour.

E.3. Compact protein (bovine serum albumin/human serum albumin) layer on a hydrophilic surface

Langmuir monolayers of globular proteins (bovine serum albumin, i.e., BSA and human serum albumin, i.e., HSA) are formed on the water surface at pH ≈ 7.0, and compact protein layers are deposited on hydrophilic silicon surface using the Langmuir-Blodgett (LB) deposition method. The compact bimolecular layered structure of the protein films was deposited on silicon surface at a higher surface pressure of the BSA and HSA monolayers as shown in Figure 28. Mostly the thickness of the molecular layers increases as the molecular tilting takes place and new molecules are deposited inside the vacant positions of the layer and as a result the electrons per unit area increase. Electron density profiles obtained from the deposited BSA and HSA films also confirm that the increment in molecular tilting and electrons per unit area is protein specific. Electron density profiles and surface morphology of the deposited films confirm that interrupted layer-by-layer or Frank-van der Merwe growth mode is followed in such protein multilayer deposition.

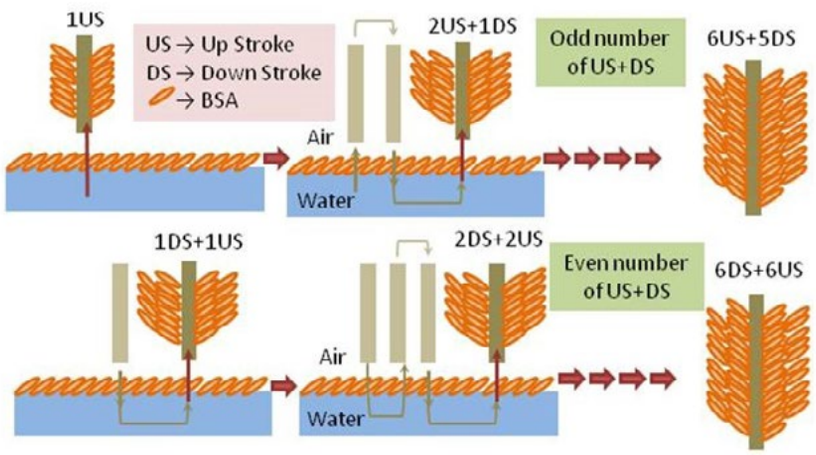


Figure 28: Schematic representation of protein (BSA, HSA) layer growth on a solid substrate with an increasing number of up and down strokes under the LB method.

E.4. Chloroaurate ions below organic monolayers: gold nanocrystal growth

Structures and growth nature of gold nanocrystals below the octadecylamine (ODA) and octadecanethiol (ODT) monolayers were studied for different chloroauric acid concentrations and surface pressures of the monolayers. The presence and growth kinetics of crystalline gold below the monolayers was obtained from the Au (111) peak intensity, whereas, the evolution of the amount of gold and chlorine was obtained from the Au Mand Cl K_{α} fluorescence intensities. The growth of gold nanoparticles and nanocrystals below

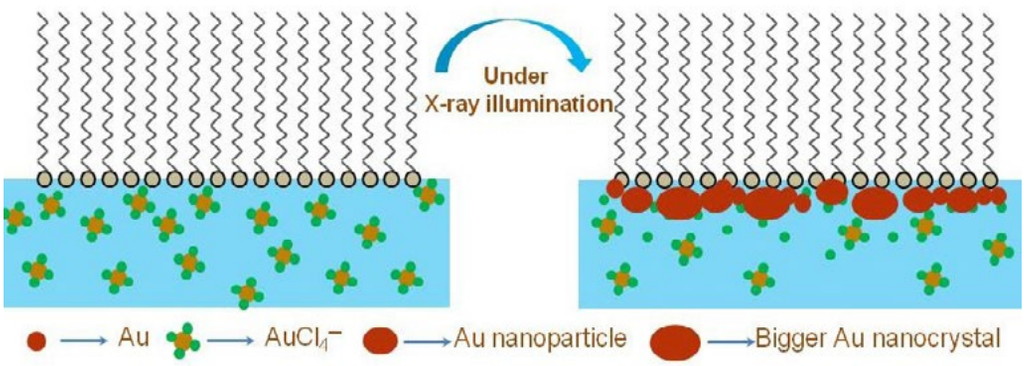


Figure 29: Schematic representation of the growth of gold nanoparticles and nanocrystals below the organic (ODA/ODT) monolayer.

the organic (ODA/ODT) monolayer is shown schematically in Figure 29. Gold accumulation is less than chlorine for octadecylamine but was the opposite for octadecanethiol monolayer. Growth nature depends upon the physicochemical conditions of the organic monolayer and aqueous subphase.

E.5.Collapse of Langmuir monolayer formed by the mixture of short- and long-tailed fatty acid molecules

Surface pressure versus molecular area isotherms of stearic acid (SA), behenic acid (BA), and their mixtures are studied at high subphase pH (≈ 9.5) in presence of Ba^{2+} ions. It is found that the collapse pressure and dip pressure points of binary fatty acid monolayer varies depending on the relative amount of the two components and nearly follow the Langmuir growth model. Out-of-plane structures imply that SA shows a multi-layered structure that gradually decreases with the decrease in SA proportion in the mixed film. The transition from constant pressure to constant area collapse is observed when the weightage of BA becomes ≥ 66% for the mixed film. The change in the collapse behaviour and collapsed structure is explained using the two-dimensional percolated networks formed by the tail-tail hydrophobic interactions of relatively more hydrophobic long-chained BA molecules.

F. Two-dimensional Materials

Coordinator: Dr. Biswajit Choudhury

F.1. Two-dimensional nanosheets with air-water interfacial plasma

An air-water interfacial plasma is used for the first time to obtain ultrathin g-C_3N_4 nanosheets. This work has been carried out jointly with the Basic and Applied Plasma Physics group. Earlier attempts to separate layers from two-dimensional g-C_3N_4 has relied mostly upon ultrasonication and chemical methods. The Ultrasonication method can successfully generate nanosheets, but the process takes several hours to complete. The chemical process usually occurs at a shorter time but the process requires strong acids. Unlike these methods, the plasma process that we have undertaken is a green method and requires a short time for separating the layers. The method generates a high yield (75 % w/w) of the nanosheets. With this approach, we could generate ultrathin nanosheets of g-C_3N_4 of thickness 3.78 nm at a plasma treatment time of 150 min. The thickness reduces by 30 times as compared to bulk g-C_3N_4. We have found that exfoliation is assisted by the incorporation of nitrogen vacancies and self-incorporated defects. These defects are successfully probed by positron annihilation spectroscopy (PAS) and X-ray photoelectron spectroscopy (XPS). Positron lifetime spectroscopy (PLS) reveals defect-induced intensity enhancement in the sample. The defect-activated nanosheets show strong optical absorption extended up to 600 nm and prolonged separated photogenerated carriers. Time-resolved photoluminescence (TRPL) spectroscopy reveals a short carrier lifetime due to bound exciton and a long carrier lifetime due to defect trapped carriers. These defect-enriched g-C_3N_4 nanosheets show superior performance in the photodegradation of rhodamine B (RhB) from water under a white LED light. Figure 30 shows the mechanism of plasma mediated exfoliation and defect activation (a,b) in g-C3N4 with the corresponding atomic force microscopy (AFM) images (c,d).

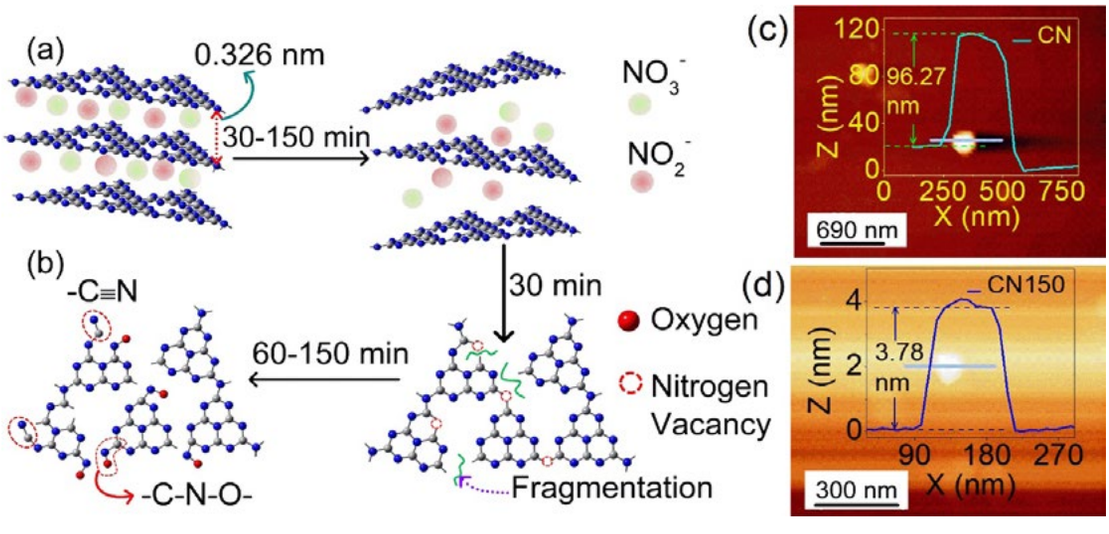


Figure 30: Mechanism of plasma-induced (a) exfoliation, and (b) defect formation in g-C_3N_4 nanosheets. Atomic force microscopy (AFM) images of (c) bulk, and (d) CN150 nanosheets, wherein CN150 is g-C_3N_4 nanosheets after 150 min of plasma treatment.

G. Metal Organic Frameworks

Coordinator: Dr. Anamika Kalita

G.1. Potential linkers and derived metal organic frameworks

Metal Organic Frameworks (MOFs) as the hybrid porous entity have emerged as excellent materials of great potential in the fields of gas adsorption, storage, and separation. MOFs structures attract tremendous attention owing to several exciting properties like high crystallinity, large surface area, well-defined pore size, and volume, easily tailorable structures, chemical functionality and so on. Among many progressing attempts to develop advanced high-performance MOF materials, ligand functionalization is considered to be one of the most effective ways and indisputably the most underexploited area of research that rapidly draws immense scientific attention. Amongst various organic molecules available for preparing organic ligands/linkers, 1,4,5,8-Naphthalene Diimide derivatives (NDIs), a class of neutral, π-conjugated, planar, highly redox-active compounds possessing ease of substitution with varied functionality on the diimide nitrogen, are often considered as excellent candidates for making potential functional ligands for construction of MOF structures. Their planar, aromatic structure and electron-deficient core strongly interact with guest species. Therefore, our research group mainly focused on the development of organic linkers of Naphthalene Diimide via simple condensation reaction with different pendant moieties such as isoniazid, pyridine, isophthalic acid, salicylic acid derivatives etc. with suitable coordinating sites to have potential interaction with metal ions to construct porous MOFs. As a continuation of the earlier work, successfully derived porous MOFs with hexagonal architecture from potential NDI linkers have tremendous possibilities in the area of adsorption and removal of contaminants of environmental concern. The derived porous MOF confirmed an enhanced dual adsorption behaviour of environmentally concerned pollutants such as carbon dioxide (CO_2) gas, and water-soluble organic dye (methylene blue) selectively on a single platform under ambient atmospheric conditions (Figure 31). Adsorption analysis demonstrated that the derived framework displayed a more than 60-fold higher uptake of CO_2 gas over the other gases under ambient atmospheric conditions. Similarly, the MOF platform also shows the dye adsorption capacity of 2.47 mg/g and a 99% selective removal of water-soluble organic dye, methylene blue rapidly within 120 min, that too in a selective manner from the aqueous phase which is a great advantage over other existing methods. Therefore, the findings of the present system as a single platform have the potential to adsorb selectively and rapidly both the major contaminants of environmental concern and may create a consequential contribution towards environmental remediation.

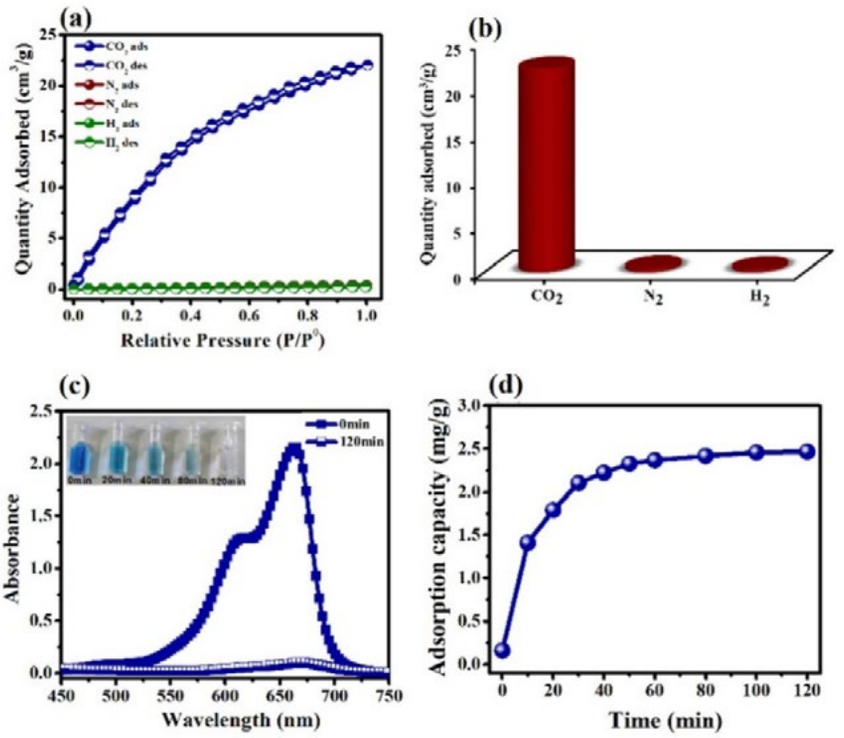


Figure 31. (a), and (b) presenting the selective adsorption of CO_2 gas over other gases, and (c), and (d) presenting the adsorption and removal of water-soluble organic dye, methylene blue from the aqueous phase on derived MOF platform.

H. Genetic Engineering and Nanotechnology

Coordinator: Dr. Robinson Jose

H.1. 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

Ustilaginoidea virens, the causative fungus for the false smut of rice, creates one of the severe grain diseases and leads to quantitative and qualitative losses to the edibility of rice in most of its growing places on earth and is currently an emerging disease worldwide. Despite the importance of *U. esculenta* in rice production, relatively few studies have been conducted to illustrate the complex interactome and the pathogenicity. In this work, microscopic and proteomic analyses were carried out by comparing infected and uninfected grains of the susceptible variety and between the susceptible and resistant rice grain varieties to *U. virens* for understanding the molecular and ultrastructural factors involved in smut formation. Figure 32 shows representative SEM images of infected rice surface (Dharam) with various magnifications. (A-D). The micrograph clearly showed spores of Aspergillus and Penicillin species present on the rice surface. Proteins were extracted from the infected and uninfected rice grains of susceptible plant variety and from the resistant grain varieties to *U. virens* during the false smut forming season (October - December).

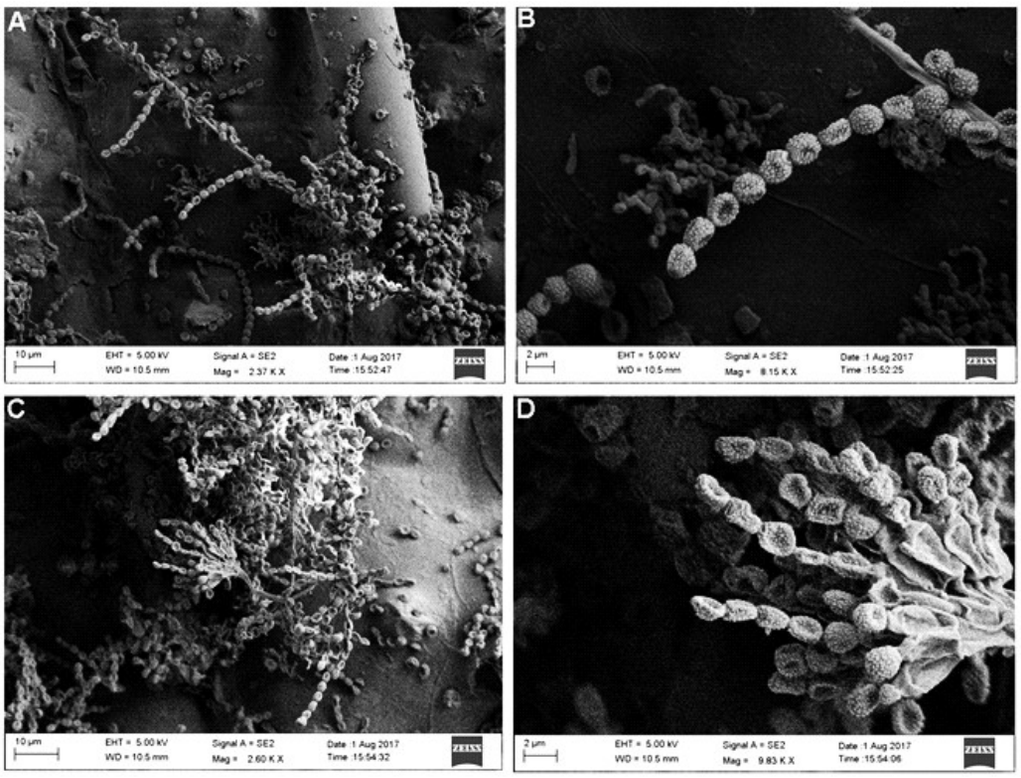


Figure 32: Scanning electron micrographs of the infected rice surface (Dharam) with various magnifications. (A-D). The micrograph clearly showed spores of Aspergillus and Penicillin species present on the rice surface.

Essential proteins detected to be differentially regulated due to smut formation, as was observed by both 2D and 1D SDS-PAGE profiles were identified using LC-MS/MS analysis. The proteins were found to be involved in diverse biological processes like cell redox homeostasis, energy, stress tolerance, structural proteins, enzymatic activities, and proteins involved in the metabolic pathways. *U. virens* produce diverse functional proteins, particularly host degrading enzymes during the formation of smut gall and metabolically and structurally required proteins that discretely alters the host and its biological processes to sustain and proliferate in the host. Such fundamental study will help understand the smut formation and give insight into molecular signatures of susceptible and resistant rice grain varieties.

RESEARCH OUTPUT

Patents

Inventor(s)	Title	File no. for enrollment	Provisional/final patent grant no.	Issue no. of patent office
Neelotpal Sen Sarma, Devasish Chowdhury, Niloy Paul, Bedanta Gogoi	Polymer Based Sensor Device for Sensing Nitroaromatic Compounds	3613/ DEL/2014	Patent No. 336085	

Extramural Research Projects

Completed Projects

Title of the project	Funding Agency: Total Fund, Duration, PI/Coordinator	Achievements
Plasma Based Synthesis of Materials for Plasmonic Infrared Photodetector	**Funding Agency:** SERB, Government of India **Total fund:** INR 83.20 Lakh **Duration:** March, 2018 - March, 2021 **PI/Coordinator:** Dr. Arup R Pal, IASST **Co-Investigator:** Prof. H. Bailung, IASST	• Prepared graphene based transparent electrode by atmospheric pressure glow discharge plasma-enhanced chemical vapour deposition process. • Synthesized plasmonic near-infrared absorbing nanostructures by magnetron sputtering with the tunability of plasmon absorption band by optimization of synthesis conditions. • Developed plasmonic near-infrared photodetector and studied the device performance as well as device photo-physics. • Published three research papers in cited journals.
Plasmonic Hybrid Nanomaterials based on Carbon Nanomaterials and Metal Oxides for Energy and Environmental Applications (DST INSPIRE Faculty)	**Funding Agency:** DST, Government of India **Total Fund:** INR 35.00 lakh **Duration:** April, 2016 –March, 2021 **PI/ Coordinator:** Biswajit Choudhury, IASST	• Successful exfoliation of layered carbon nitride materials by the use of air-liquid interfacial plasma. • Development of plasmonic photocatalyst that works on the entire range of visible regions of illumination. • Defect induced charge carrier dynamics evaluation with spectroscopic techniques such as positron annihilation spectroscopy and optical spectroscopy. • The project is completed with an output of 5 research papers and three book chapters.

Ongoing Projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
Non-collinear Magnetism in Heusler Materials	**Funding Agency:** SERB, Government of India **Total Fund:** INR 25.20 Lakh **Duration:** 2020 - 2023 **PI/Coordinator:** Dr. Munima B. Sahariah	This research aims to understand the stability and pinning behaviour of the noncollinear skyrmionic magnetic structure in Mn-based Heusler alloy.
A Facile Strategy Towards Naphthelene Diimide based Metal-Organic Frameworks Polymer Composite Membrane as Traps for Selective Capture of CO_2	**Funding Agency**: DST, Government of India **Total Fund:** INR 35.00 Lakh **Duration:** 2018- 2023 **PI/Coordinator:** Dr. Anamika Kalita	The project aims to design potentially active organic linkers and their derived Metal-Organic Frameworks (MOFs) by employing Naphthalene Diimide as the core entity with various pendant groups such as salicylic acid, pyridine, isoniazid, isophthalic acid having -OH, -COOH, -NH2 as coordinating sites. Adsorption behavior of environmentally concerned pollutants via using those derived MOFs and their derived polymer composites will also be investigated.

Publications

In Cited Journals

Author's name	Title	Journal name	Volume & Issue no./ page no.	Month/Year of publication
Samiran Upadhyaya, Bedanta Gogoi, Neelotpal Sen Sarma	Poly(n-vinylpyrrolidone-co-acrylonitrile-co-methacrylic acid)-graphene quantum dot conjugate: Synthesis, structural and electrical characterization for sensing ammonia vapour	Journal of Materials Chemistry C	9 / 2165	January / 2021
Gautomi Gogoi, Labanya Bhattacharya, Smruti R Sahoo, Sridhar Sahu, Neelotpal Sen Sarma, Sagar Sharma	Enhancement of air-stability, π-stacking ability, and charge transport properties of fluoroalkyl side chain engineered n-type Naphthalene tetracarboxylic diimide compounds	RSC Advances	11 / 57	December / 2020
Samiran Upadhyaya, Achyut Konwar, Devasish Chowdhury, Neelotpal Sen Sarma	High-performance water-borne fluorescent acrylic-based adhesive: synthesis and application	RSC Advances	10 / 25408	July / 2020
Gautomi Gogoi, Labanya Bhattacharya, Shohidur Rahman, Neelotpal Sen Sarma, Sridhar Sahu, Basanta Kumar Rajbongshi, Sagar Sharma	New Donor-Acceptor-Donor type of organic semiconductors based on the regioisomers of diketopyrrolopyrroles: A DFT study	Materials Today Communicati-ons	25 / 101364	June / 2020
Ankita Deb, Achyut Konwar, Devasish Chowdhury	pH-Responsive Hybrid Jute Carbon Dot-Cotton Patch	ACS Sustainable Chemistry and Engineering	8 (19) / 7394	April / 2020
M. Dhupal, Devasish Chowdhury	Phytochemical-Based Nanomedicine for Advanced Cancer Theranostics: Perspectives on Clinical Trials to Clinical Use,	International Journal of Nanomedicine	15 / 9125	November / 2020
Jahnabi Gogoi, Devasish Chowdhury	Calcium-modified carbon dots derived from polyethylene glycol: fluorescence-based detection of Trifluralin herbicide	Journal of Materials Science	55 / 11597	September / 2020
Jahnabi Gogoi, Shubham Shishodia, Devasish Chowdhury	Tunable electrical properties of carbon dot doped photo-responsive azobenzene–clay Nanocomposites	RSC Advances	10 / 37545.	October / 2020
Devasish Chowdhury, Sristi Majumdar, Debajit Thakur	Actinobacteria mediated synthesis of bioconjugate of carbon dot with enhanced biological activity.	Applied Nanoscience	10 / 2199	April / 2020
Jayanta S. Boruah, Devasish Chowdhury	Palmitic acid–carbon dot hybrid vesicles for absorption of uric acid	Applied Nanoscience	10/ 2207	April / 2020
Kailash Barman, Prantu Dutta, Devasish Chowdhury, Pranjal K. Baruah	Green Biosynthesis of Copper Oxide Nanoparticles Using Waste *Colocasia esculenta* Leaves Extract and Their Application as Recyclable Catalyst Towards the Synthesis of 1,2,3-triazoles,	Bio Nano Science	11 / 189	March /2021
Deepshikha Gogoi, Amreen A Hussain, Sweety Biswasi, Arup R. Pal	Crystalline rubrene via a novel process and realization of a pyro-phototronic device with a rubrene-based film	Journal of Materials Chemistry C	8(19)/ 6450	April / 2020

Author's name	Title	Journal name	Volume & Issue no./ page no.	Month/Year of publication
Santanu Podder, Bablu Basumatary, Deepshikha Gogoi, Jyotisman Bora, Arup R. Pal	Pyro-phototronic application in the Au/ZnO interface for the fabrication of a highly responsive ultrafast UV photodetector	Applied Surface Science	537/ 147893	September / 2020
Bablu Basumatary, Santanu Podder, Bikash Sharma, Arup R. Pal, Munima B Sahariah, Neelotpal Sen Sarma, Dinkar S Patil	Single-step preparation of Graphene Oxide transparent electrode by PECVD and its application in a fast-response UV-A-selective pyrophototronic device	Journal of Electronic Materials	49(9)/ 5467	July / 2020
Raktim J. Sarmah, Sarathi Kundu	Structure, morphology and reversible hysteresis nature of human serum albumin (HSA) monolayer on water surface	International Journal of Biological Macromolecules	174/ 377	January/2021
Raktim J. Sarmah, Bijay K. Sah, Sarathi Kundu	Compact protein (bovine serum albumin/human serum albumin) layer under Langmuir-Blodgett deposition on hydrophilic Si (001) surface	Thin Solid Films	715/138419	November/ 2020
Subhankar Pandit, Sarathi Kundu	pH-Dependent reversible emission behaviour of lysozyme coated fluorescent copper nanoclusters	Journal of Luminescence	228/ 117607	August/ 2020
Suresh Kumar Soni, Kaushik Das, Ashim Chandra Bhowal, Raktim J. Sarmah, Philippe Fontaine, Sarathi Kundu	Chloroaurate ions below organic monolayers: Competitive accumulation and gold nanocrystal growth	Chemical Physics Letters	754/ 137774	July/ 2020
Bijay K. Sah, Sarathi Kundu	Collapse of Langmuir monolayer formed by the mixture of short- and long tailed fatty acid molecules	Colloid and Interface Science Communications	36/ 100261	April/ 2020
Anamika Kalita, Samiran Upadhyaya, Neelotpal Sen Sarma	Salicylic Acid Appended Naphthalene Diimide Organic Linkers: A Systematic Investigation towards Electronic Aspects	Chemistry Select	5(41)/12672	November/ 2020

Conference Proceedings

Author's name	Title	Journal name	Volume & Issue no./ page no.	Month/ Year of publication
Manash Barthakur, Jayanta Sarmah Boruah, Pankaj Kalita, Devasish Chowdhury	Conjugation of citrate capped gold nanoparticles with gabapentin to use as biosensor	Materials Today: Proceedings	https://doi.org/10.1016/j.matp.2020.06.422	July / 2020
Bijay Kumar Sah, Sarathi Kundu	Surface pressure and pH dependent structure and optical emission behaviors of protein (BSA) thin films	AIP conference Proceedings (Published by American Institute of Physics)	2265/030266 https://doi.org/10.1063/5.0017722	November/ 2020
Subhankar Pandit, Sarathi Kundu	Optical Responses of Bovine Serum Albumin (BSA) in Presence of TiO_2 Nanoparticles	AIP conference Proceedings (Published by American Institute of Physics)	2265/ 030028 https://doi.org/10.1063/5.0017401	November/ 2020
Raktim J. Sarmah, Sarathi Kundu	Modifications of DMPA (1,2-dimyristoyl-*sn*glycero-3-phosphate) monolayer at air-water interface in presence of cholesterol	AIP conference Proceedings (Published by American Institute of Physics)	2265/ 030267 https://doi.org/10.1063/5.0017472	November/ 2020

Book Chapters

Authors Name	Chapter Title	Book Title	Publisher	Year/Month of Publication
Sarathi Kundu	Organic thin films: Langmuir monolayers and multilayers	Recent Advances in Thin Film Research	Springer	September / 2020
Bijay Kumar Sah, Sarathi Kundu	pH Dependent Structural and Morphological Modifications of Protein Thin Film	Advanced in Science and Technology, Volume II	McGraw Hill	January / 2021
Biswajit Choudhury	Functionalized Nanogold: Its fabrication and needs	Functionalized Nanomaterials I	CRC Press	August / 2020

Presentation in Conferences/Seminars

Invited Talks

Faculty	Title	Programme name	Date & Venue
Dr. Devasish Chowdhury	Nano-Bio composite as food packaging materials	Seminar on "Sustainable Plastic Technology: The need of the hour"	January 19, 2021 Organized by Assam Science and Technology University
Dr. Devasish Chowdhury	Nanotechnology for Sustainable future	Webinar on ''Nanotechnology: Scope and Challenges''	December 7, 2020 Organized by school of Technology, ADBU
Dr. Devasish Chowdhury	Nano-Bio-Polymer Composite: A new age Hybrid Material	Video talk in "What expert says" talk series of North -East Science Movement (NESM)	August 20, 2020
Dr. Devasish Chowdhury	Nanotechnology for Sustainable Energy	Webinar "Recent Advances in Energy Conversion Technology"	September 10, 2020 Organized by Assam Science and Technology University
Dr. Arup R. Pal	Career Prospects in Applied Plasma Research	National e-Conference on Researches in Science & Technology	September 13, 2020 Organized by Women's College - Agartala and Govt. Degree College – Dharmanagar, Tripura
Dr. Munima B Sahariah	Defects in interface structure: A DFT study	AICTE Sponsored online ATAL-Faculty Development Program on "Material Modeling for Nano-Electronic Devices-MMNED 2020"	November 2-6, 2020 Organized by Shri Shankaracharya TechnicalCampus-SSGI, Bhilai, India
Dr. Sarathi Kundu	Protein-polyelectrolyte and protein-nanocluster systems	"International Online Conference on Macromolecules (ICM–2020)"	November 13-15, 2020 Organized by at Mahatma Gandhi University, Kottayam, Kerala
Dr. Biswajit Choudhury	Measuring Techniques for Studying Optical Properties of Nanomaterials	Webinar on "Advanced Experimental Techniques in the field of Nanoscience and Technology"	August 26, 2020 Organized by DHSK College, Dibrugarh, Assam
Dr. Biswajit Choudhury	Defect Engineered Semiconductor Nanostructures with Tailored Optical and Magnetic Responses	"28th National Conference (Virtual) on Condensed Matter Physics"	December 12, 2020 organized by NIT Silchar, Assam
Dr. Biswajit Choudhury	Research Opportunities In Materials Physics And Nanotechnology	"Webinar on Physics"	March 31/2021 Organized by Mehr Chand Mahajan DAV College for Women, Chandigarh, India

Contributory

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Gautomi Gogoi, Sweety Biswasii, Dr. Arup Ratan Pal, Dr. Neelotpal Sen Sarma, Dr. Sagar Sharma	Studies of Naphthalene tetracarboxylic diimide based compounds for their application in organic optoelectronics	Oral presentation at the International E-Conference on Current Trends in Chemical Research	Oral	August 22, 2020 Organized by Nowgong college
Samiran Upadhyaya, Neelotpal Sen Sarma	Biosynthesis of gold nanoparticles by using the aqueous leaf extract of Elaeocarpus serratus	Online Poster Presentation at The First International e-conference on Recent Advances in Physics and Materials Science-2020 (IC-RAPMS-2020)	Poster	July 9-10, 2020 Organized by Kurseong College, Darjeeling, West Bengal in collaboration with St. Joseph's College, Darjeeling, West Bengal
Ankita Deb, Achyut Konwar, Devasish Chowdhury	Hybrid Jute Carbon Dot-Cotton Patch as Stimuli-Responsive Drug Delivery System	3rd National Conference on Recent Advances in Science and Technology, NCRAST 2020	Poster	August 17-19, 2020 Organized by Assam Science and Technology University
Jayanta Sarmah Boruah, Devasish Chowdhury	Nano-assisted Engineered Vesicles for Absorption of a Well-known Body Toxin, Uric Acid	3rd National Conference on Recent Advances in Science and Technology, NCRAST 2020	Poster	August 17-19, 2020 Organized by Assam Science and Technology University
Jayanta Sarmah Boruah, Devasish Chowdhury	Carbon nanoparticle-vesicles nanocomposites for biomedical applications	3rd International Conference on Nanomaterials Science and Mechanical Engineering	Oral	October 12-14, 2020 Organized by University of Aveiro, Portugal
Ankita Deb, Achyut Konwar, Devasish Chowdhury	Hybrid Jute Carbon Dot-Cotton Patch as pH-Responsive Drug Delivery System	International E-Conference on Current Trends in Chemical Research	Oral	August 22, 2020 Organized by IQAC, Nowgong College, Nagaon, Assam
Ankita Deb, Achyut Konwar, Devasish Chowdhury	Hybrid Jute Carbon Dot-Cotton Patch as pH-Responsive Drug Delivery System	6th International conference on Nanoscience and Nanotechnology (ICONN-2021)	Poster	February 1-3, 2021 Organized by SRM Institute of Science and Technology, Kattankulathur
Jahnabi Gogoi, Devasish Chowdhury	Fluorescent detection of Trifluralin herbicide using Metal conjugated Polyethylene glycol carbon dot	3rd National Conference on Recent Advances in Science and Technology, NCRAST 2020	Poster	August 17-19, 2020 Organized by Assam Science and Technology University
Jahnabi Gogoi, Devasish Chowdhury	Carbon dot doped photo-responsive Azobenzene-clay nanocomposites with tunable electrical properties	International Conference on Advances in Nano-optoelectronics and its Application (ICANOPA-2020)	Oral	October 12-14, 2020 Organized by Rajiv Gandhi University, Arunachal Pradesh
Jahnabi Gogoi, Devasish Chowdhury	Carbon Dot Doped Photo Responsive Azobenzene Clay Nanocomposite With Tunable Electrical Properties	6th International Conference on Nanoscience and Nanotechnology (ICONN-2021)	Poster	February 1-3, 2021 Organized by SRM Institute of Science and Technology, Kattankulathur
Sazzadur Rahman, Devasish Chowdhury	Polysaccharide Based Nanocomposite as an Alternative Packaging Material	3rd National Conference on Recent Advances in Science and Technology, NCRAST 2020	Poster	August 17-19, 2020 Organized by Assam Science and Technology University
Sazzadur Rahman, Devasish Chowdhury	Polysaccharide composite film as an alternative of food packaging material	6th International Conference on Nanoscience and Nanotechnology (ICONN-2021)	Poster	February 1-3, 2021 Organized by SRM Institute of Science and Technology, Kattankulathur

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Kabyashree Phukan, Devasish Chowdhury	Nano-bioconjugate with high antioxidant activities	3rd National Conference on Recent Advances in Science and Technology, NCRAST 2020	Poster	August 17-19, 2020 Organized by Assam Science and Technology University
Kabyashree Phukan and Devasish Chowdhury	Anti-inflammatory and Antioxidant activity of nano bioconjugate	6th International Conference on Nanoscience and Nanotechnology (ICONN-2021)	Poster	February 1-3, 2021 Organized by SRM Institute of Science and Technology, Kattankulathur
Santanu Podder, Arup R. Pal	Hot carrier generation in plasmonic titanium nitride and its application in optoelectronics	3-Day Web-Conference "National Conference on Recent Advances in Science and Technology (NCRAST-2020)"	Poster	August 17-19, 2020 Organized by Assam Science and Technology University
Deepshikha Gogoi, Arup R. Pal	Realization of a Pyro-phototronic device with crystalline rubrene synthesized by a unique one-step plasma based Method	3-Day Web-Conference "National Conference on Recent Advances in Science and Technology (NCRAST-2020)"	Poster	August 17-19, 2020 Organized by Assam Science and Technology University, Guwahati
Purbajyoti Bhagowati	Electronic Properties of Small Titanium Nitride Nanoclusters from the First Principles Calculation	28th National (Virtual) Conference on Condensed Matter Physics, CMDAYS20	Oral	December 11-13, 2020 Organized by National Institute of Technology, Silchar, Assam
Payal Saha	Electronic Properties of Mn_2PtSn Inverse Heusler Compound	28th National (Virtual) Conference on Condensed Matter Physics, CMDAYS20	Oral	December 11-13, 2020 Organized by National Institute of Technology, Silchar, Assam
Sarathi Kundu	Organic thin films	3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020)	Oral	August 17-19, 2020 Organized by Assam Science and Technology University, Guwahati
Ashim Chandra Bhowal, Sarathi Kundu	Effect of nanoparticles in the structure and electrical behaviour of PEDOT: PSS nanocomposite thin films	3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020)	Oral	August 17-19, 2020 Organized by Assam Science and Technology University, Guwahati
Bijay Kumar Sah, Sarathi Kundu	Mixed fatty acid behaviours at air-water interfaces	3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020)	Poster	August 17-19, 2020 Organized by Assam Science and Technology University, Guwahati
Subhankar Pandit, Sarathi Kundu	Reversible Emission Behaviour of Lysozyme Capped Fluorescent Copper Nanoclusters (CuNCs) as pH Sensor	3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020)	Poster	August 17-19, 2020 Organized by Assam Science and Technology University, Guwahati
Trishamoni Kashyap, Biswajit Choudhury	Synergy of Semiconductor and Surface Plasmon Excitation on the Overall Photocatalytic Performance of Mono and Bimetallic Au, Ag Decorated g-C3N4	28th National (Virtual) Conference on "Condensed Matter Days 2020" (CMDAYS2020)	Oral	December 11-13, 2020 Organized by NIT Silchar, Assam
Suvankar Deka, Biswajit Choudhury	Shape Evolution of $BiVO_4$ Nanostructure with an Engineered Band Gap	28 th National (Virtual) Conference on "Condensed Matter Days 2020" (CMDAYS2020)	Oral	December 11-13, 2020 Organized by NIT Silchar, Assam

Author(s)	Title	Conference name	Oral/ Poster	Date & Venue
Manju K. Jaiswal, Biswajit Choudhury	Semiconductor Metal-Oxide Photocatalyst for Methylene Blue Degradation under UV Irradiation	28 th National (Virtual) Conference on "Condensed Matter Days 2020" (CMDAYS2020)	Oral	December 11-13, 2020 Organized by NIT Silchar, Assam
Anamika Kalita	Hexagonal Porous MOF Rods for CO_2 Adsorption.	"RSC Poster Twitter Conference 2020"	Poster	July23-24, 2020 hosted by The RSC Porous Materials Interest Group (Twitter; Online)
Anamika Kalita	Stimuli Responsive Naphthalene Diimide as Invisible Ink. (This work was selected as one of the top 500 best posters in LatinXChem 2020 and as a special recognition, this work was given an opportunity to upload in digital platform SciMeetings by ACS Publications)	"LatinXChem 2020 Twitter Conference"	Poster	September7, 2020 Organized by LatinXChem initiative (Twitter; Online)

Conferences/Workshops/Meetings attended

Faculty/Research Scholar	Workshops/School	Date & Venue
Jayanta sarmah Boruah , Ankita Deb, Kabyashree Phukan, Jahnabi Gogoi, Sazzadur Rahman	3rd National Conference on Recent Advances in Science and Technology, NCRAST 2020	August 17-19, 2020 Organized by Assam Science and Technology University
Jayanta sarmah Boruah	3rd International Conference on Nanomaterials Science and Mechanical Engineering	October 12-14, 2020 Organized by University of Aveiro, Portugal
Ankita Deb, Kabyashree Phukan, Jahnabi Gogoi, Sazzadur Rahman	6th International Conference on Nanoscience and Nanotechnology (ICONN-2021)	February 01-03, 2021 Organized by SRM Institute of Science and Technology, Kattankulathur
Jahnabi Gogoi	International Conference on Advances in Nano-optoelectronics and its Application (ICANOPA-2020)	October 12-14, 2020 Organized by Rajiv Gandhi University, Arunachal Pradesh
Deepshikha Gogoi, Santanu Podder	3-Day Web-Conference "National Conference on Recent Advances in Science and Technology (NCRAST-2020)"	August 17-19, 2020 Organized by Assam Science and Technology University
Dr. Arup R. Pal	Training workshop on "Preventive Vigilance" through virtual platform for nominated officers of AIs	October 29, 2020 Organized by the Department of Science & Technology, Govt. of India
Purbajyoti Bhagowati, Payal Saha	28th National (Virtual) Conference on Condensed Matter Physics, CMDAYS20	December 11-13, 2020 Organized by National Institute of Technology, Silchar, Assam
Payal Saha	Online training workshop on Computational Density Functional Theory	July 04-05, 2020 Organized by Thanthai Periyar Government Polytechnic College Vellore, Tamil Nadu, India
Payal Saha	International Webinar on Recent Aspects In Physics	July 27-29, 2020 Organized by Department of Physics, Lakhimpur Girls' College, Assam, India
Dr. Sarathi Kundu	International Online Conference on Macromolecules (ICM–2020)	November 13-15, 2020 Organized by Mahatma Gandhi University, Kottayam, Kerala

Faculty/Research Scholar	Workshops/School	Date & Venue
Dr. Sarathi Kundu, Ashim Chandra Bhowal, Bijay Kumar Sah, Subhankar Pandit	3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020)	August 17-19, 2020 Organized by Assam Science and Technology University, Guwahati, Assam
Dr. Sarathi Kundu	National Workshop on Municipal Solid Waste and its Impact	September 03-05, 2020 Organized by Assam Science and Technology University (ASTU), Guwahati
Trishamoni Kashyap, Manju K. Jaiswal, Suvankar Deka	National conference on CMDAYS2020 (online mode)	December 11-13, 2020 Organized by NIT Silchar, Assam
Trishamoni Kashyap	National Webinar on "Autopsy on the Anatomy of a Nanoparticle-nCOV" (online mode)	July 26, 2020 Organized by Department of Physics, Sipajhar College, Assam
Trishamoni Kashyap, Manash P Nath, Manju K. Jaiswal, Suvankar Deka	A webinar series on "Advanced Experimental Techniques in the Field of Nanoscience and Technology" (online mode)	August 25-26, 2020 Organized by Department of Physics, DHSK College, Dibrugarh, Assam
Trishamoni Kashyap	A webinar on "Sustainable Materials for Food Packaging" (online mode)	November 09, 2020 Organized by IASST, Assam
Suvankar Deka, Manju K. Jaiswal	Nonlinear Optical Microscopy	July 09, 2020 Organized by Royal Global University, Assam
Trishamoni Kashyap, Manash P. Nath, Manju K. Jaiswal, Suvankar Deka	National Science Day, Poster Presentation – "Light Matter Interaction: A Spotlight on the Streams of Photons"	February 28, 2021 Organized by IASST, Guwahati, Assam
Dr. Anamika Kalita	Attended National level Workshop on "Introduction to the world of MATLAB"	May 21, 2020 Organised by Progressio Alas
Dr. Anamika Kalita	Attended Five Days Virtual Faculty Development Program on "Vital Visionary Approach for Researchers-Recent Chemistry Perspective"	July 20-24, 2020 Organized by Kongu Engineering College, Tamilnadu
Dr. Anamika Kalita	Attended one-week online workshop on "Nanotechnology and Nanomaterials for Interdisciplinary Application (NNIA-2020)"	July27-31, 2020 Organized by Mechanical Engineering, MANIT-Bhopal
Dr. Anamika Kalita	Attended 1st ChemAsianJ Virtual Symposium "Chemistry in India"	August 26, 2020
Dr. Anamika Kalita	Attended 3-days lecture workshop on "Recent Trends in Material Science"	September 28-30, 2020 Sponsored by Indian Science Academies and Department of Physics, Kongu Engineering College, Tamilnadu

Other Activities

M.Sc. / B. Tech projects/training courses offered at IASST

Name of Student	Programme and Supervisor	Title of work	Duration
Joysmita Nandi	B.Sc. / Dr. S. Kundu	To Study Thermodynamics and Phase Transitions in Langmuir Monolayers, Monolayer Isotherms, Behavior of Isotherms of Different Molecules by Theoretical and Experimental Analysis	2 Months (Jan. -Feb. 2021)

Awards/Recognitions/Achievements

Name	Particulars
Dr. Biswajit Choudhury	Included in Stanford list of top 2 % scientist in the applied physics section for the calendar year 2019.
Dr. Biswajit Choudhury	Award for India Top 1% Cited Paper from Institute of Physics (IOP), UK in Materials Science.

Name	Particulars
Dr. Biswajit Choudhury	Topic Editor for a special issue "Recent Advances in Plasmonic Photocatalysis" in the journal "Frontiers in Chemistry".
Nasrin Sultana	Awarded DST Inspire Project on "Phosphorene-Biodegradable Polymer Composites: A robust platform towards the detection of biomolecules for health care Applications" under the supervision of Prof. N. S. Sarma.
Ankita Deb	Awarded 3rd prize in poster presentation in 3rd National Conference on Recent Advances in Science and Technology, NCRAST 2020, organized by Assam Science and Technology University (ASTU), Guwahati, Assam during August 17-19, 2020. Title of the poster: Hybrid Jute Carbon Dot-Cotton Patch as Stimuli-Responsive Drug Delivery System
Deepshikha Gogoi	Awarded First Prize in poster presentation in 3-Day Web-Conference "National Conference on Recent Advances in Science and Technology (NCRAST-2020)", organized by ASTU, Guwahati during August 17-19, 2020. Title of the poster: Realization of a Pyro-phototronic device with crystalline rubrene synthesized by a unique one-step plasma based method
Sweety Biswasi, Bablu Basumatary, Santanu Podder and Jyotisman Bora	Awarded First Prize in the poster competition, organized by IASST, Guwahati on the occasion of National Science Day – 2021, on February 28, 2021. Title of the poster: e-Skin and its possibilities
Dr. Ashim Chandra Bhowal	Awarded 3rd prize in poster presentation in 3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020) organized by Assam Science and Technology University (ASTU), Guwahati, Assam during August 17-19, 2020. Title of the poster: Effect of nanoparticles in the structure and electrical behaviour of PEDOT: PSS nanocomposite thin films
Dr. Sarathi Kundu	Acted as an External Examiner for conducting the Practical Examination of M.Sc. Physics (Physics Laboratory-III) of University of Science and Technology (USTM), Meghalaya during February 18-19, 2021.
Dr. Sarathi Kundu	Chaired a technical session in the International Online Conference on Macromolecules (ICM–2020) held at Mahatma Gandhi University, Kottayam, Kerala, India during November 13-15, 2020.
Dr. Sarathi Kundu	Acted as an expert for evaluating the posters in the poster presentation competition in the 3rd National Conference on Recent Advances in Science and Technology (NCRAST-2020) organized by Assam Science and Technology University (ASTU), Guwahati, Assam during August 17-19, 2020.
Dr. Biswajit Choudhury	Co-chaired a special session on "Condensed Matter Physics" in CMDays, August 2020, Organized by NIT Silchar.
Dr. Arup R. Pal	Acted as a judge for poster and model competition organized by the Department of Physics, Gauhati University on the occasion of Foundation Day Celebration of the department on February 23, 2021.

Popular Articles

Author (s)	Title	Newspaper / Magazine Name	Date of Publication
Arup R. Pal	IASST develops a new process for synthesizing crystalline Rubrene useful for optoelectronic devices	Vigyan Samachar	May 22, 2020
Dr. Devasish Chowdhury	IASST scientists develop herbal medicine loaded smart bandages for wounds	Vigyan Samachar	May 26, 2020
Dr. Devasish Chowdhury	IASST develops an electrochemical sensing platform for detecting carcinogenic & mutagenic compounds in food	Vigyan Samachar	May 21, 2020

MATHEMATICAL AND COMPUTATIONAL SCIENCES

At present, there are 3 (three) faculty members working actively in three broad areas of research, namely,

1. Stochastic Modelling with special reference to queueing theory.
2. Computer Vision and Pattern Recognition.
3. Hydrodynamics and Applied Mathematics

Dr. Gautam Choudhury

Dr. Lipi B. Mahanta

Dr. Santu Das

Niranjan Kr. Bhagobaty

Ms. Elima Hussain

Anjana Begum

Devabrat Sharma

Bolin Das

A. Stochastic Modelling with Special Reference to Queueing Philosoph

Coordinator: Dr. Gautam Choudhury

A.1 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, Manufacturing Systems, Inventory Systems etc. ensuing a very important research domain in today's world.

A.2 Reliable Queueing System

Random vacation policy and Modified vacation policy with two types of heterogeneous service are studied showing the application in the Telecommunication system (Figure 33).

In Random Vacation Policy, the server takes the maximum number of random vacations till it finds any customer waiting in the queue at a vacation completion epoch. If no arrival occurs after completing the maximum number of random vacations, the server stays dormant in the system and waits for the upcoming arrival. The modified vacation policy captures the operation of a closed down period, type I vacation period, type 2 vacation period, a start-up period and a dormant period. Here, type I vacations take a short period of random duration and type 2 vacations take a long period of random duration. Figure 34 displays an application.

A3. Unreliable Queueing System

An unreliable queueing system is characterised by random failure of the service station which is practically inevitable. During that period the system remains unavailable for a random period where it is sent for repair. In many practical situations, the repair is not immediate but subject to some delays due to various reasons usually referred to as delay time.

An unreliable queue with two types of general heterogeneous service and optional re-service policy is examined. The server

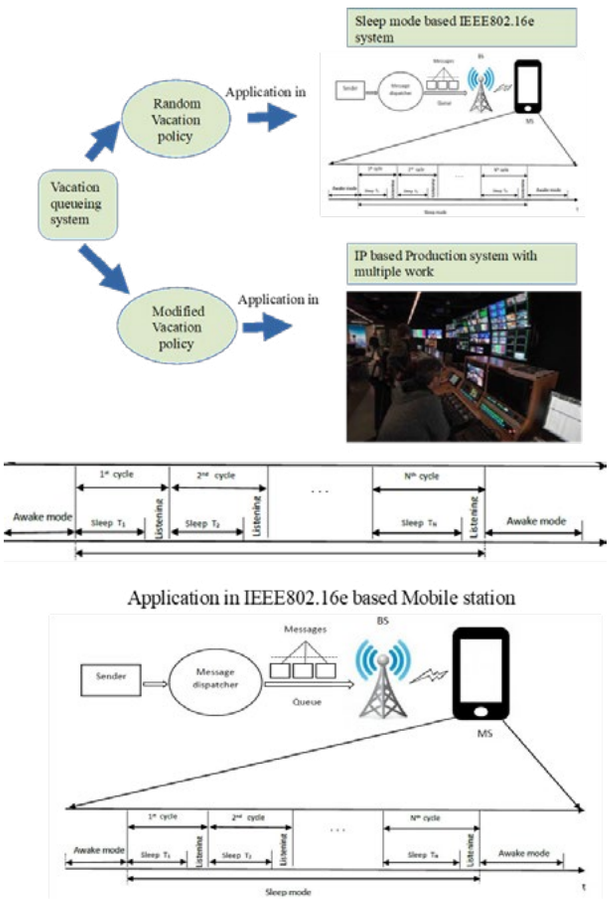


Figure 33: Queuing System

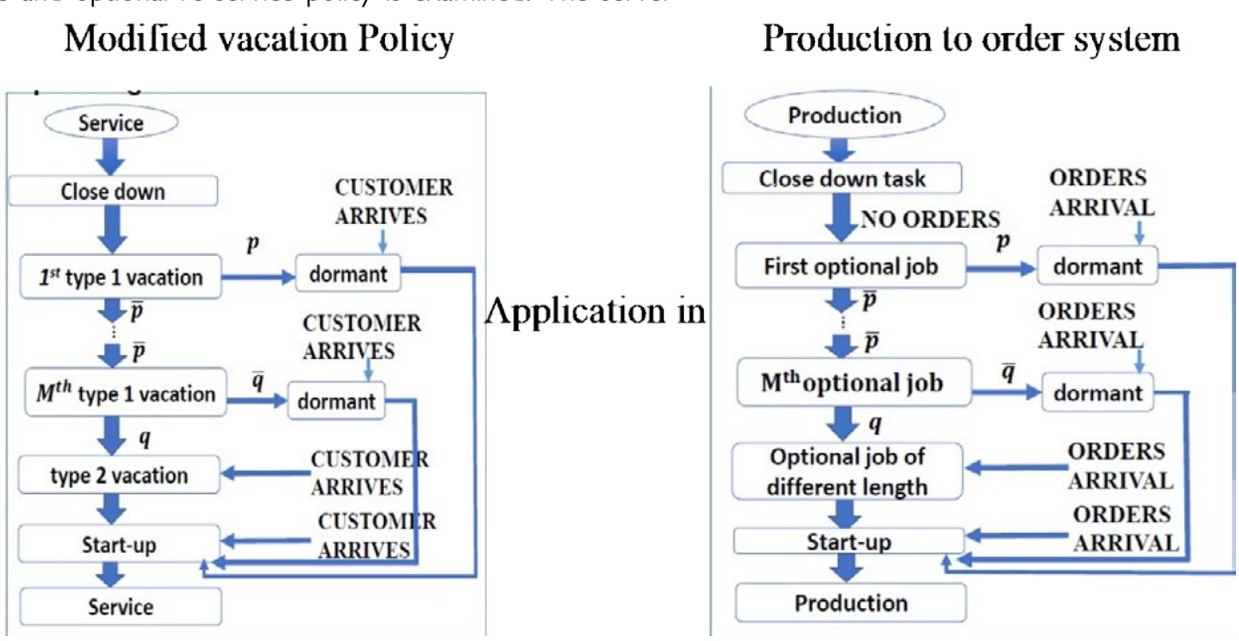


Figure 34: Modified Vacancy and Production to Order System

renders two types of service to an arriving unit with an option to repeat the same service once in case of dissatisfaction. While in service, the server may break down at any moment which is then sent for repair subjected to some further delays. After the server is repaired, the server completes its remaining services.

Further, the factor of unreliability has also been studied with retrial queues which are characterized by the feature that a customer that finds the server busy upon arrival, is obliged to leave the service area and repeat his demand for service after some time called "retrial time". Queues in which customers are allowed to conduct retrials have been widely used to model many practical problems in telephone switching systems, telecommunication networks and computers competing to gain service from a central processing unit.

For these types of queueing systems, various stochastic processes such as queue length process, waiting time process, busy period processes, backlog processes and reliability analysis have been carried out. Further, Stochastic Decomposition Result has been established which allows the system behavior to be analyzed by considering separately distribution of system (queue) size with no vacation and additional system size due to vacation.

B. Artificial Intelligence in Medical Image Analysis

Coordinator: Dr. Lipi B Mahanta

Artificial intelligence-based solutions are changing healthcare for the better. We saw it coming over the past years, and as COVID-19 has put an extra accent on the use of such tools, that initial wave grew into a tsunami. These solutions enable more decisive power to all health professionals and reduce the patient to doctor skewed ratio. Accurate diagnosis is the platform for proper medical treatment and follow-ups. With this motivation, a team in IASST, under the mentorship of Dr. Lipi B Mahanta, attempts to bridge the gap between technology and medical biology. The theme of the research group in MCSD involves the latest AI techniques aiming for state-of-the-art results. Few studies are briefly introduced below:

B.1 Cervical Cancer

Pap smear is often employed as a screening test for diagnosing cervical precancerous and cancerous lesions. Manual pathological observations used in clinical practice require exhaustive analysis of thousands of cell nuclei in a whole slide image to visualize the dysplastic nuclear changes, making the process tedious and time-consuming. Automated nuclei segmentation and classification exist but are challenging to overcome issues like nuclear intra-class variability and clustered nuclei separation.

To address such challenges, we put forward an instance segmentation and classification framework (Figure 35) built on an Unet architecture by adding residual blocks, densely connected blocks, and a fully convolutional layer as a bottleneck between encoder-decoder blocks for Pap smear images. The proposed model outperforms two state-of-the-art deep learning models Unet and Mask_RCNN, with an average Zijdenbos similarity index of 97% related to segmentation along with binary classification accuracy of 98.8%. Experiments on hospital-based datasets using liquid-based cytology and conventional pap smear methods along with benchmark Herlev datasets (Table 2) proved the superiority of the proposed method over Unet and Mask_RCNN models in terms of the evaluation metrics under consideration.

Another study investigated the classification based on The Bethesda System, which is a multi-class problem. Six different deep convolutional neural networks- Alexnet, Vggnet (vgg-16 and vgg-19), Resnet (resnet-50 and resnet-101), and Googlenet architectures - were explored for the multi-class (four-class) diagnosis of cervical precancerous and cancerous lesions. The

Table 2: Details of data acquired for the study

LBC dataset (own)	Images acquired
NILM	900
LSIL	360
HSIL	250
SCC	160
Total no. of images	1670
Conventional dataset (own)	
NILM	796
LSIL	247
HSIL including SCC	278
Total no. of images	1320
Herlev dataset (benchmark)	
Superficial squamous	74
Intermediate squamous	70
Columnar squamous	98
Mild dysplasia	182
Moderate dysplasia	146
Severe dysplasia	197
Carcinoma in situ	150
Total no. of images	917

(NILM Negative for Intraepithelial malignancy; LSIL: low grade squamous intraepithelial lesion; HSIL: high grade squamous epithelial)

study also incorporated their relative assessment. The study highlighted the addition of an ensemble classifier with three of the best deep learning models for yielding the highest accuracy (Table 3). This study employs whole slide pap smear images without relying on segmentation techniques, making the framework more robust.

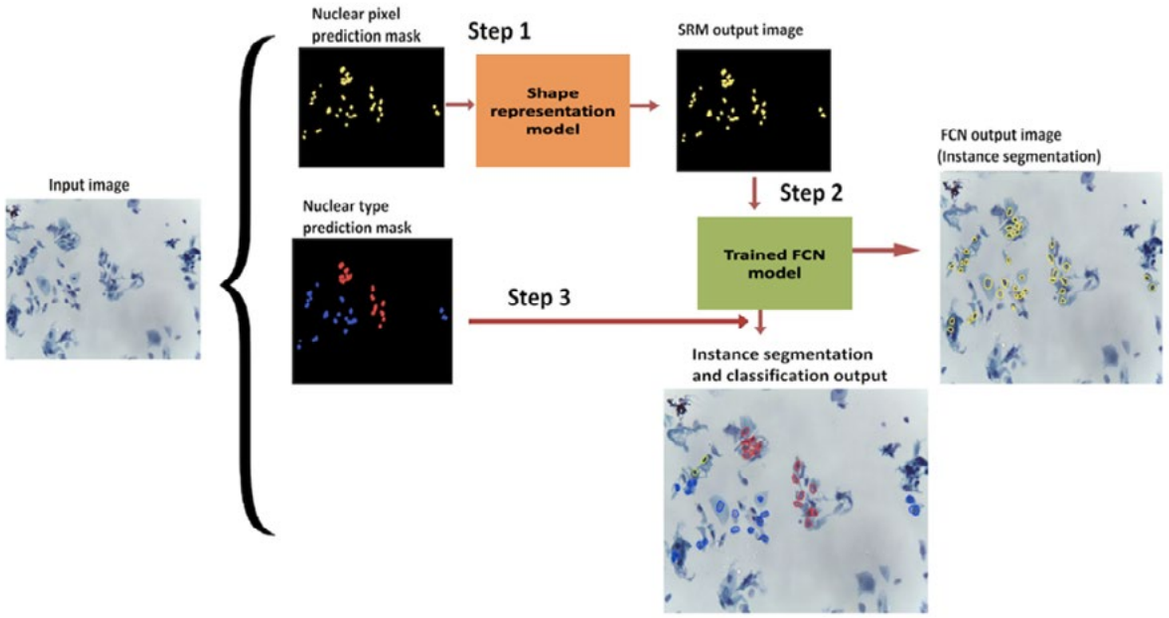


Figure 35: The overall workflow of the study methodology. The trained FCN model produces an instance segmentation image as output when no nuclear type prediction mask is available. The colors in instance segmentation and classification output represents individual nuclei type of normal and abnormal class.

Table 3: *p*-values of McNemar's test conducted for different networks and the four classes.

Models	NILM	LSIL	HSIL	SCC
Alexnet	0.789	0.677	0.789	0.567
Vgg-16	0.555	0.321	0.677	0.578
Vgg-19	0.078	0.456	0.067	0.291
Resnet-50	0.058	0.056	0.057	0.067
Resnet-101	0.051	0.042	0.025	0.034
Googlenet	0.050	0.047	0.033	0.032
Ensemble	0.01	0.01	0.00	0.01

The study also included epidemiological research to understand the regional factors contributing to the cause of dysplasia. The significant factors revealed are the location of residence (last three years), mother tongue, type of occupation of family, socio-economic status, type of 3rd delivery, type of contraceptive method, age at menopause, source of drinking water, consumption of vegetables from own plantation, family history of cancer and pain in the abdomen. Residence indicates any environmental (air, water, and soil) factors contributing to the cause. The study also revealed that although no patient reported any problem with the cervix, a significant number were found to be in suspicious states of dysplasia (Figure 36). The same is revealed in the figure.

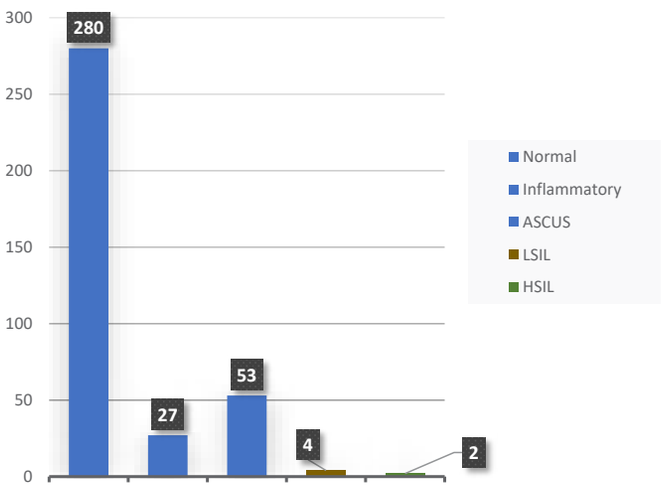


Figure 36: Pathological findings of the study (figures in per cent)

B2. Oral Cancer

Oral Squamous Cell Carcinoma (OSCC) is the most prevalent form of oral cancer. A study was conducted to identify OSCC based on a morphological and textural feature of hand-cropped cell nuclei by traditional machine learning methods. Forty biopsy slides were used for the study, from which a total of 452 hand-cropped cell nuclei were considered for morphological and textural feature extraction and further analysis. A combined approach is proposed after making a comparative analysis of commonly used methods in the segmentation technique (Figure 37). Our proposed methodology achieves the best segmentation of the nuclei. Henceforth the features extracted were fed into five classifiers, Support Vector Machine (SVM), logistic regression, linear discriminant, k-nearest neighbours, and decision tree classifier. Classifiers were also analyzed by training time. Another contribution of the study is a significant indigenous cell level dataset of OSCC biopsy images. We achieved 99.78% accuracy applying a decision tree classifier in classifying OSCC using morphological and textural features. Recent studies using biopsy images reveal computer-aided diagnosis for oral sub-mucous fibrosis (OSF) carried out using machine learning algorithms. Still, no research has yet been outlined for multi-class grading of oral squamous cell carcinoma (OSCC). With this motivation, a study applying deep learning attempts to classify OSCC into its four classes as per Broder's system of histological grading (Figure 38). The study is conducted on oral biopsy images applying two methods: i) through the application of transfer learning using pre-trained deep convolutional neural network (CNN) wherein four candidates pre-trained models, namely Alexnet, VGG-16, VGG-19, and Resnet-50, were chosen to find the most suitable model for our classification problem, and ii) by a proposed CNN model. Although the Resnet-50 model achieves the highest classification accuracy of 92.15%, the experimental

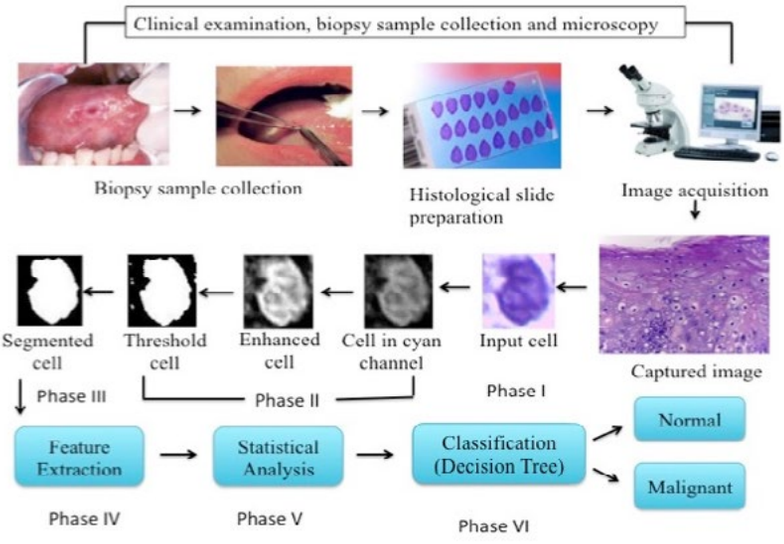


Figure 37: Graphical abstract with different phases involved in the classification of cells.

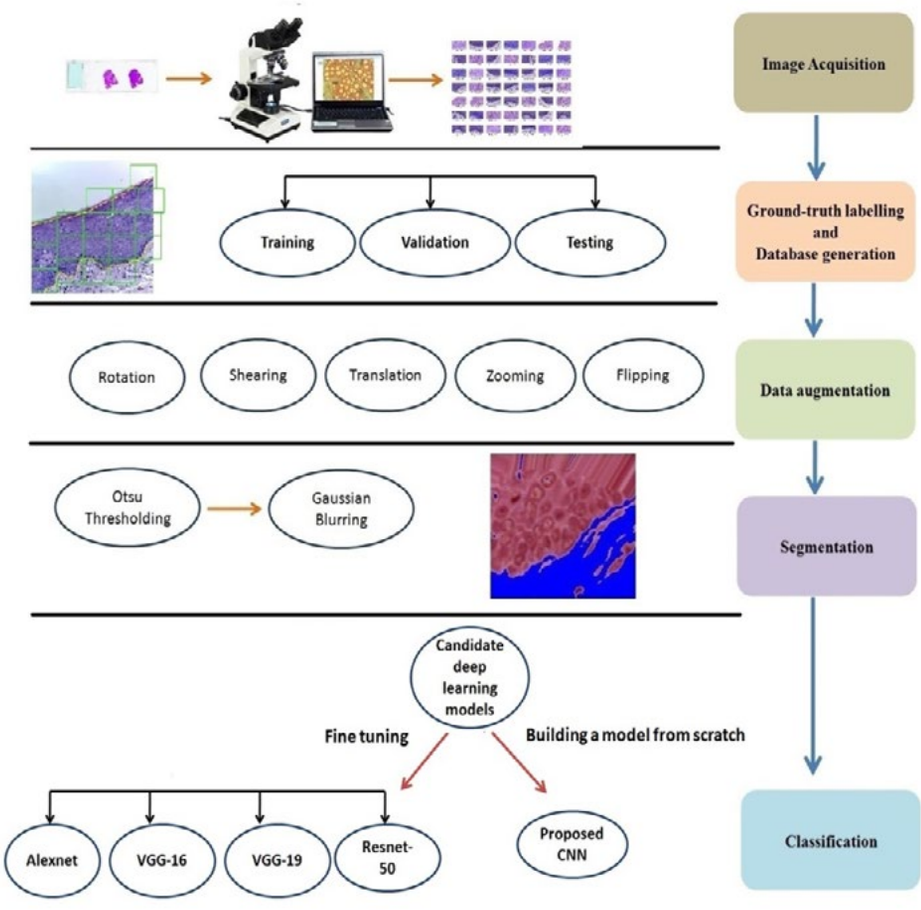


Figure 38: Overall workflow of the proposed methodology.

findings highlight that the proposed CNN model outperformed the transfer learning approaches displaying accuracy of 97.5%.

C. Flood Prediction Models and Mathematical Treatment of Geophysical Fluid

Coordinator: Dr. Santu Das

Adequate mathematical modelling which is pertinent to describe a physical phenomenon is of significant importance in a modern scientific study – be it analytical or numerical study including the statistical analysis of experimental data. The mathematical research of my group is primarily aimed at building an appropriate mathematical model for the following three primary research directions.

C.1. Wave-structure interaction problem – fundamental theoretical developments

This research area focuses on meeting the demand of habitable zone by building very large floating structures in addition to tracking sea-ice movement in the polar region due to climate change and global warming. The interaction between water waves and floating elastic structures/sea-ice gives rise to a new kind of coupled wave, known as a hydroelastic or flexural-gravity wave. The following work deals with the wave scattering process due to ice-crack when the acting compressive force on it is very high – specifically when multiple propagating modes exist as an outcome of wave blocking. We have demonstrated how different wave modes transform to provide different flow patterns across the ice-crack (lower sub-graph of Figure 39). The specific root tracking, as seen from the middle sub-graph of Figure 39, resolves the issues of mode coalescence and provides a bounded solution to the mathematical problem.

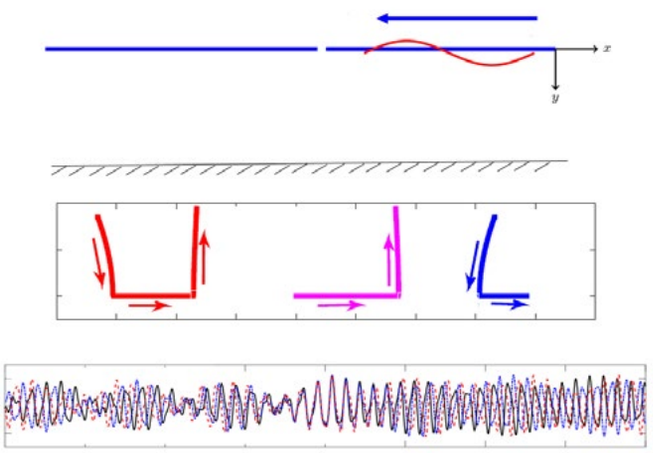


Figure 39: Schematic diagram, movement of multiple propagating modes and flow pattern across the crack (doi: 10.1017/jfm.2021.200)

C.2. Acoustic-gravity wave (AGW) propagation under different ocean bottom features

Here we aim to understand the propagation of AGW when slight ocean water compressibility is added into the physical system and how the elasticity and vertical oscillation of a portion of the ocean bottom and sea-ice influence the propagation. Figure 40 provides the phase speed of different AGW modes for different ice thicknesses under the influence of ocean floor elasticity. Figure 41 displays free-surface wave propagation due to the oscillation of ocean floors of different lengths.

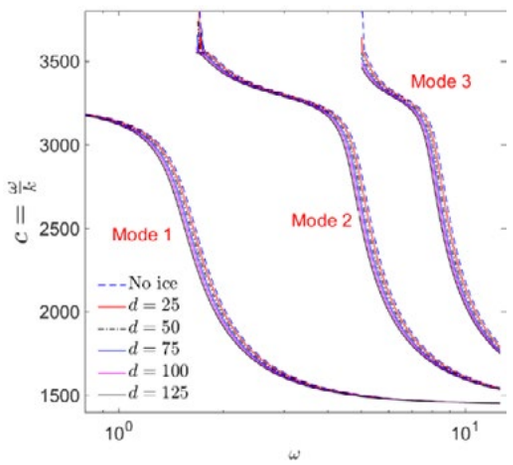


Figure 40: Phase speed of AGW for various ice thickness (unpublished)

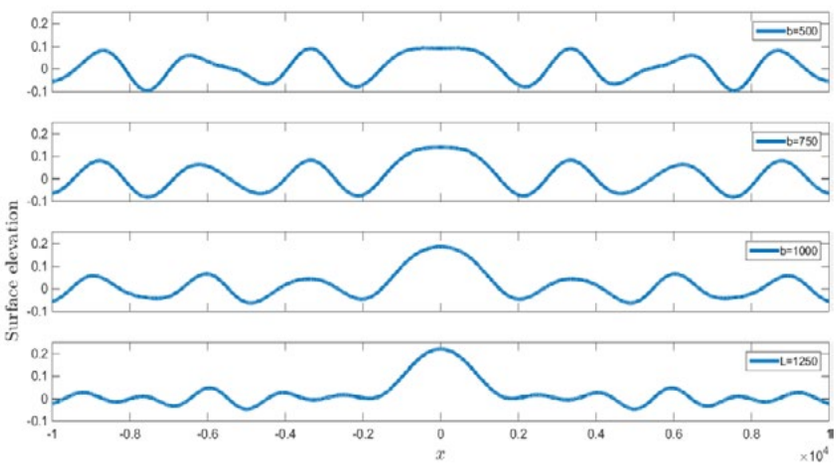


Figure 41: Surface profile due to ocean bottom oscillation for different length of oscillating bottom (http://www.iwwwfb.org/Abstracts/iwwwfb36/IWWWFB36GLOBAL005.pdf)

C.3. Flood prediction of the Brahmaputra River basin – emphasis on Indian Summer Monsoon Rainfall (ISMR)

The Brahmaputra River in India (Assam state) is subject to high variation in flow rate across the season, abrupt channel configuration change, and colossal sediment transport, contributing to a higher risk of channel overflow. The geographical features of the Himalayan range in this area, such as slope, flow from other tributaries, canopy layers, soil characteristics, etc., act as a catalyst in flooding.

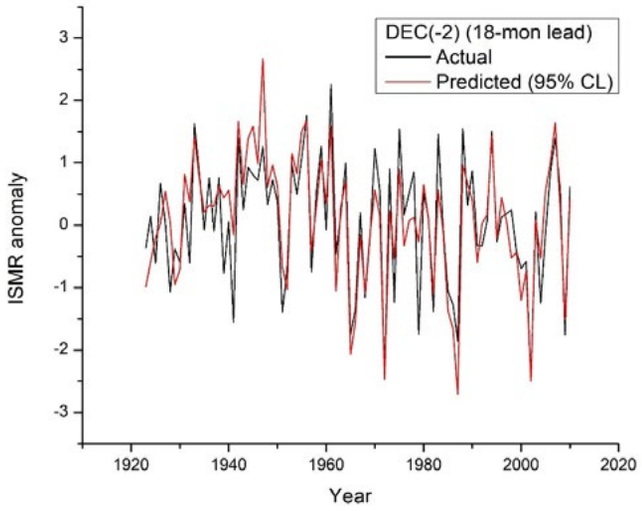


Figure 42: Hindcast prediction of ISMR using CNN – 18 months' prediction with 95% confidence interval (unpublished)

Every year, during the monsoon, a vast area in the basin gets affected by the overflow of the river and thus puts the lives of thousands of people in danger. Moreover, compared to other parts, the North East of India (NEI) receives quite a higher amount of yearly average rainfall. Recently, researchers started an extensive study of the Brahmaputra basin, taking into account the variable topography, water height level monitoring, soil characteristics, etc., and predict the arrival of an incoming flood (flood pulse). Undoubtedly, incorporating of a better rainfall pattern prediction in the river basin area with the existing hydrological model will profoundly improve the flood prediction accuracy. We are currently building a Convolutional Neural Network (CNN) to predict Indian Summer Monsoon Rainfall (ISMR) that can be incorporated into the hydrological model in the future. Preliminary data shows that our current CNN model can predict (hindcast) up to 18 months lead time with sufficiently high accuracy (Figure 42).

RESEARCH OUTPUT

Extramural Research Projects

Completed projects

Title of the project	Funding Agency; Total fund; Duration; PI/ Coordinator	Achievements
On the Development of an Automated Image Analysis System for Detection of Cervical Pre-Cancerous and Cancer Lesions Using Liquid Cytology Based Pap Smear	DBT, Government of India; Rs. 50.93 Lakhs; 3 years; PI-Dr Lipi B Mahanta	a. Set up of Liquid-Based Cytology Unit in GMCH. b. Set up of Digital Microscope in GMCH. c. Set up a repository of digital images of all smears with associated patient information and smear reports and conducted an epidemiological study. d. Developed a database of Pap Smear images systematically, viz. feature statistics, diagnostics details, etc., which can be used by all interested scientists or physicists either for learning, discussing, or for any scientific research. e. We have developed suitable image processing & segmentation techniques for the images. f. We have developed suitable classification techniques for further classification of malignant cases according to the Bethesda system of Cervical cell classification.
Development of software for field test of cervical cancer using pap-smear images	IASST; 3.32 Lakhs. 6 months; Dr. Lipi B Mahanta	a. Conversion of the developed algorithms into python-based open-source software. b. Training and testing the deployed deep learning model with a new dataset generated from different sources comprising at least 2000 images. c. Designing a complete Graphical User Interface (GUI) to make it user-friendly for hospital use regarding field trials of this software. d. Hosting the software in a Cloud Server so that it can be remotely accessible by the authorized medical centres for use in field trials

Ongoing projects

Title of the project	Funding Agency; Total fund; Duration; PI/ Coordinator	Goals
Flexural-Gravity Waves: A Complete Theoretical Development	Funded by: MHRD, Govt. of India, New Delhi, Total Budget: 70.1 lakhs Duration: 2019 - 2021 Co-PI: Dr. Santu Das	To develop a mathematical model to study the blocking effect in finite ice-sheet/VLFS. The recently analysed flexural-gravity wave blocking dynamics for floating structures will be studied for submerged flexible horizontal structures. In addition, the effect of the elastic ocean bottom, a major influential factor in building railway tracks in polar regions, will be incorporated. An attempt will be made to include non-linearity into the physical problems. All these proposed studies will be backed up by time-domain simulations wherever possible.

Publications

In Cited Journals

Author (s)	Title	Journal name	Volume & Issue no./ page no.	Month / Year of publication
Priyanka Kalita and Gautam Choudhury	A single server queue under random vacation policy	RAIRO-Oper. Res.	55, 225-251	2021
Anjana Begum and Gautam Choudhury	Analysis of an unreliable single server batch arrival queue with two types of services under Bernoulli vacation policy	Communications in Statistics - Theory and Methods	9, 2136-2160	2021
Gautam Choudhury, Akhil Goswami, Anjana Begum and Hemanta Kumar Sarmah	Stochastic Decomposition Result of an Unreliable queue with Two Types of Services	Mathematics and Statistics	8, 225-232	2020
Gautam Choudhury and Lotfi Tadj	An Unreliable Batch Arrival Retrial Queueing System with Bernoulli VacationSchedule and Linear Repeated Attempts: Unreliable Retrial System with Bernoulli Schedule	International Journal of Operations Research and Information Systems	11, 83-109	2020
Chandana Ray Das, Lipi B. Mahanta, Himakshi Borah, Elima Hussain, Arundhuti Devi, Manjula Chowdhury, A.C. Adhikari	A Study on epidemiological factors and its association with pathological findings for precancerous symptoms of cervical cancer	Indian Journal of Public Health Research & Development	10(12), 592-597.	April 2020
Tabassum Yesmin Rahman, Lipi B. Mahanta*, Anup K. Das, Jagannath D Sarma	Towards Digital Diagnosis of Oral Cancer: A Study on Optimum Preferences of Histopathological Techniques and Features	Medico-legal Update	20, 3, 231-238	July-September 2020
Tabassum Yesmin Rahman, Lipi B. Mahanta*, Anup K. Das, Jagannath D Sarma	A histopathological image repository of the normal epithelium of Oral Cavity and Oral Squamous Cell Carcinoma	Data in Brief	29, 105114,	April 2020
Elima Hussain, Lipi B. Mahanta, Chandana Ray Das, Ratna Kanta Talukdar	A comprehensive study on the multi-class diagnosis of Pap smear images using a fusion-based decision from ensemble deep convolutional neural network	Tissue and Cell,	65, 101347	August 2020

Author (s)	Title	Journal name	Volume & Issue no./ page no.	Month / Year of publication
Daisy Das, Lipi B. Mahanta*, Shabnam Ahmed, Basanta Kr. Baishya	Classification of Childhood Medulloblastoma into WHO defined multiple subtypes based on Textural Analysis	Journal of Microscopy,	279, 1, 26–38	June 2020
Elima Hussaina, Lipi B. Mahanta*, Manish Chowdhury, Chandana Ray Das, Manjula Choudhury	A feature contexted fully convolutional neural network for segmentation and classification of cervical nuclei in Pap smear images	Artificial Intelligence in Medicine	107, 101897	July 2020,
Navarun Das, Elima Hussain, Lipi B. Mahanta*	OralNet: A Deep framework for multi-class classification of Oral Squamous cell carcinoma from biopsy images	Neural Networks	128, 47-60,	August 2020,
Elima Hussain, Lipi B. Mahanta*, Himakshi Borah, Chandana Ray Das	Liquid based-cytology Pap smear dataset for automated multi-class diagnosis of precancerous and cervical cancer lesions	Data in Brief	30, 105589	April 2020,
Rahman Tabassum Yesmin, Mahanta Lipi B., Choudhury Hiten, Das Anup K., Sarma Jagannath D.	Study of morphological and textural features for classification of oral squamous cell carcinoma by traditional machine learning techniques	Cancer Reports	3(1):e1293	October 2020
Lipi B. Mahanta and Alpana Deka	An Ensemble Based Offline Handwritten Signature Verification System.	Stat., Optim. Inf. Comput.,	8, 902–914.	December 2020,
S. C. Barman, S. Das, T. Sahoo and M. H. Meylan	Scattering of flexural-gravity waves by a crack in a floating ice sheet due to mode conversion during blocking	Journal of Fluid Mechanics	911	March (online)/ 2021

Presentation in Conferences / Seminar

Invited talks:

Faculty	Title	Programme name	Date and Venue
Dr. Santu Das	Very Large Floating Structure (VLFS) in Oceans - Its History, Present Status and Significance in Future	ATAL Faculty Development Programme on *Mathematical Modelling of Problems in Coastal and Offshore Engineering*	16 September 2020 (Online) Department of Mathematics, IIT Guwahati, Guwahati – 781039, Assam
Dr. Santu Das	The Genesis of Negative Energy Waves in Hydrodynamics	*Alumni Symposium on Mathematics and Computing* (ASMC 2020	19 September 2020 (Online) Department of Mathematics, IIT Guwahati, Guwahati – 781039, Assam
Dr. Santu Das	Acoustic-gravity wave (AGW) propagation under sea-ice in an ocean having elastic floor	Minisymposium on *Mathematical Aspects of Water Waves and Applications*	14 October 2020 Department of Mathematics, IIT Ropar, Rupnagar, Punjab 140001

Contributory:

Author (s)	Title	Conference name	Oral/ Poster	Date and Venue
Daisy Das, Lipi B. Mahanta*, Basanta K Baishya, Shabnam Ahmed	Classification of Childhood Medulloblastoma and its subtypes using Transfer Learning features - A Comparative Study of Deep Convolutional Neural Networks	International Conference on Computer, Electrical & Communication Engineering (ICCECE), pp. 1-5, doi: 10.1109/ ICCECE48148.2020.9223104.	Oral	Kolkata, India, 2020

Author (s)	Title	Conference name	Oral/ Poster	Date and Venue
Barun Barua, Genevieve Chyrmang, Kangkana Bora*, R Suresh, and Lipi B. Mahanta	2D IMAGE STITCHING TO GENERATE A FILM OF FIRED BULLETS	International Conference on Computing and Communication Systems (I3CS-2020)	Oral	10- 11 August 2020
Daisy Das, Lipi B. Mahanta*, Basanta K Baishya, Shabnam Ahmed	Classification of Childhood Medulloblastoma and its subtypes using Transfer Learning features - A Comparative Study of Deep Convolutional Neural Networks	International Conference on Computer, Electrical & Communication Engineering (ICCECE), pp. 1-5, doi: 10.1109/ICCECE48148.2020.9223104.	Oral	Kolkata, India, 2020
M. H. Meylan*, T. Sahoo and S. Das	Flexural gravity wave scattering for compressed ice	35th International Workshop on Water Waves and Floating Bodies (IWWWFB - 2021)	Oral (virtual mode)	25-28 August, 2020 Department of Naval Architecture & Ocean Engineering, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, South Korea
S. Das* and M. H. Meylan	The effect of compressed ice-shelves on acoustic-gravity wave (AGW) propagation in an ocean having elastic floor	Workshop on Mathematics of Sea Ice and Ice Sheets (MoSSI)	Oral (virtual mode)	9-12 November, 2020 CARMA - University of Newcastle, Newcastle, NSW - 2308, Australia
S. Das*	Root finding method for the dispersion relation of waves in compressed and viscous sea ice	65th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM 2020)	Oral (virtual mode)	9-11 December 2020 GITAM Deemed to be University, Hyderabad campus, Telangana 502329, India

Conferences/Workshops/Seminars/Meetings attended

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Dr. Santu Das	Alumni Symposium on Mathematics and Computing (ASMC 2020)	19-20 September 2020 Department of Mathematics, IIT Guwahati, India
Dr. Santu Das	International Conference on Advances in Differential Equations and Numerical Analysis - 2020 (ADENA 2020)	12- 15 October 2020 Department of Mathematics, IIT Guwahati, India
Dr. Santu Das	Minisymposium on Mathematical Aspects of Water Waves and Applications	12-15 October 2020 Department of Mathematics, IIT Ropar, India
Dr. Santu Das	Workshop on Mathematics of Sea Ice and Ice Sheets (MoSSI)	9-12 November, 2020 CARMA - University of Newcastle, Newcastle, NSW – 2308, Australia
Dr. Santu Das	65th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM 2020)	9-11 December 2020 GITAM Deemed to be University, Hyderabad campus, Telangana 502329, India
Mr. Devabrat Sharma	Basic Training Course on Satellite Meteorology and its Applications in Numerical Weather Prediction	5- 9 October 2020 North Eastern Space Application Centre & Indian Meteorology Society - Shillong Chapter
Mr. Devabrat Sharma	Online Training in AI/ML for Atmosphere-Ocean Application for Beginners	15-19 February 2021 Indian Institute of Tropical Meteorology, Pune

Contribution to World Database

Author (s)	Title	Database	Year
Daisy Das, Lipi B Mahanta	CHILDHOOD MEDULLOBLASTOMA MICROSCOPIC IMAGES	IEEE DtataPort, 20202 Online https://dx.doi.org/10.21227/w0m0-mw21	2020

BIODIVERSITY AND ECOSYSTEM RESEARCH

The biodiversity and Ecosystem Research (BDER) program encompasses an extensive collection of research opportunities in the domain of, the chemistry of ecology, human gut microbiome, plant-microbe interactions, and seri-biotechnology. Remediation of polluted wastewater and soil by using various chemical and biological techniques and restoration of disturbed/polluted ecosystems are being evaluated under this research program. Further, the impact of air pollution on the health of humans with special reference to the lung has been conducted. One of the areas of focus under BDER is on understanding the nature of the human microbiome and its links with the well-being of the human body, and how this knowledge can be translated for microbiome-based therapeutics. Extensive research has been undertaken with the diverse ethnic groups of north-east India to reveal ethnicity factors influencing the gut microbiome. Under the plant-microbe interactions currently focused on understanding the fungal pathogens of Tea (*Camellia sinensis*), molecular diagnosis, mode of infections, and biological control. Also explored and characterized the tea fungal pathogens associated with different stages of Blister Blight disease progression which will help to a better understanding of the pathogens associated with this devastating foliar disease and prepare a strategy to control the disease in field condition. Further, a potential plant growth-promoting actinobacterial strain namely, *Streptomyces sp*. TT3 endowed with antifungal metabolites production is evaluated for growth and fungal diseases suppression in tea plantations. One research team in Seri-Biotechnology Laboratory under the BER programme is focused on utilizing endemic *Antheraea assama* silk of North-East India in the fabrication of smart neural conduits to mimic the dynamic microenvironment of nerves. This group is also working on the development of biodegradable and environment-friendly energy storage devices using silk fibroins from Indian non-mulberry silks such as *Antheraea assama* and *Philosamia ricini* in combination with electrically conductive materials.

Dr. Arundhati Devi

Dr. Mojibur R Khan

Dr. Debajit Thakur

Dr. Rajiv Borah

Dr. Kaustuvmani Patowary

Tamali Sinha

Chandana Malakar

Somarani Dash

M. Bidyarani Devi

Rictika Das

Shabiha Nudrat Hazarika

Pranami Bharadwaj

Aditya Narayan Konwar

Chingtham Thanil Singh

Rajkumari Mazumdar

Santhousa Boro

Asish Kumar Parasar

Rashid Habib Abedeen

Manash Jyoti Rava

Manisha Goswami

Suprakash Rabha

Maloyjo Joyraj Bhattacharjee

Anupam Bhattacharya

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Nabajyoti Das

Lakshmi Kanta Soud

Mehjabin Ali

Bhaswati Devi

Rakesh Sarkar

A. Chemistry of Ecology, Natural Resource Management and Sustainable Development

(Coordinator: Dr. Arundhuti Devi)

A.1. Study on biochemical aspects of phenolics in tea with special reference to catechins

Two third of the tea growing area of North East India is covered by Tocklai vegetative (TV) cultivars. The present study investigates the principal catechins, total polyphenol (TP) and caffeine content in thirty-one TV cultivars (TV1-TV31), and four popular cultivars, viz. Betjan, Kharijan, S.3A/3, and T.3E/3 in three harvesting seasons i.e., pre-monsoon, monsoon and autumn. The changes of these parameters, antioxidant activity along the formation of theaflavins during black tea processing have been determined with representative cultivars. A comparative study between two green tea processing techniques, viz. orthodox and CTC (curl, tear and crush) concerning quality parameters, sensory profiles, antioxidant activity and health risks associated with consumption was also carried out. The results showed that monsoon harvested crops had the highest average content of total catechin (TC), (−)-epigallocatechin-3-gallate (EGCG), (−)-epicatechin-3-gallate (ECG), and caffeine. A representative UPLC chromatogram of cultivar TV1 in monsoon is presented in Figure 43. The TC levels varied from 129±0.03 to 214±4.72, 151±4.21 to 238±8.41, and 121±4.45 to 181±5.82 mg g-1 in pre-monsoon, monsoon and autumn, respectively. The most predominant catechin EGCG in pre-monsoon, monsoon and autumn varied from 52.2±1.07 to 111±1.24, 70.4±1.03 to 141±1.35, and 58.4±2.47 to 108±2.15 mg g-1, respectively. The caffeine content in pre-monsoon, monsoon and autumn varied from 27.1±0.32 to 48.7±0.50, 35.3±1.56 to 55.0±1.34 and 27.6±1.11 to 40.7±0.42 mg g-1, respectively. The catechin contents exhibited a significant positive correlation (p≤0.05) with TP in all three seasons (Figure 44). TC contents in cultivars TV23, TV17 and TV15; and EGCG contents in TV10, TV11, and TV9 were significantly higher (p ≤ 0.05).

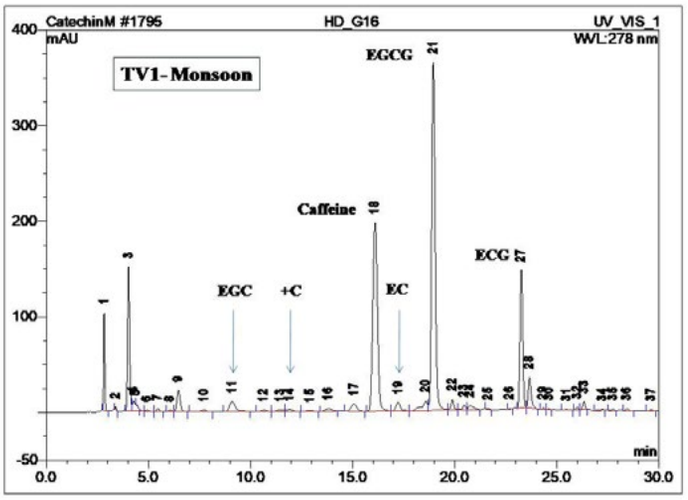


Figure 43: UPLC chromatogram of TV1 in monsoon season

The variations in biochemical contents could be attributed to environmental factors such as day length, sunlight, and temperature, etc. across the seasons. Tea leaves undergo complex chemical transformations during black tea processing (Figure 45). The results demonstrated that the most prolific changes were observed after the complete maceration of tea leaves. The TC, EGCG, and ECG levels decreased by 96, 97 and 89%, respectively as the process progressed from fresh leaves to black tea. The TP level decreased by 26 to 37% throughout the processing path. The caffeine content increased by 18% during processing. The total theaflavin reaches the highest level at 20 minutes of fermentation, and then decreases 13-36% at 40 minutes. Cultivar TV23 and S.3A/3 had a high content of total theaflavin at 17.9 and 16.9 mg g-1. The antioxidant activity was observed to be decreased by 31% for the black tea stage as compared to fresh leaves. This is also observed that the total phenolic contents exerted a greater effect on antioxidant activity rather than catechins and theaflavins.

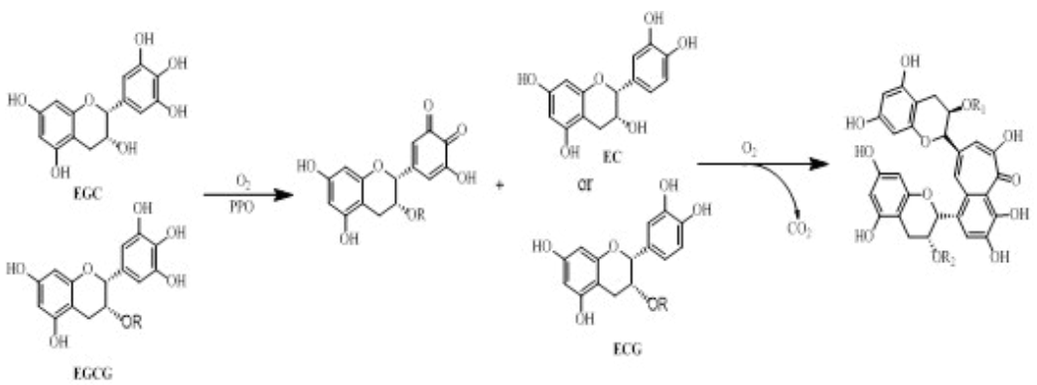
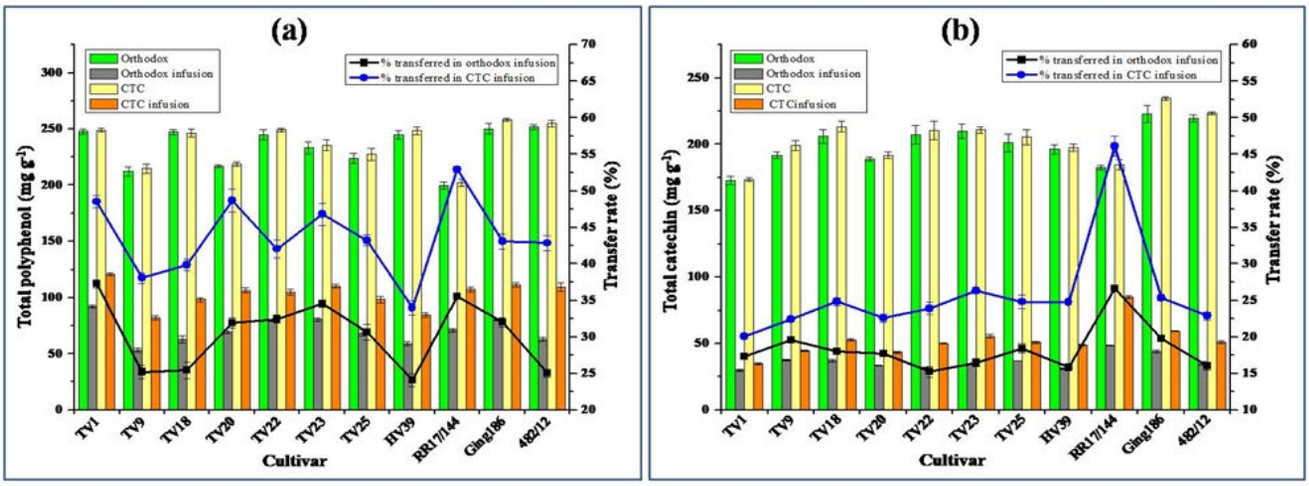


Figure 45: Oxidation and condensation of catechins in tea to form major theaflavins.

This study provides an insight full observation of black tea processing which will immensely help in improving the quality of processed tea. The study on green tea revealed that CTC green tea infusions had 13.3, 7.5, 7.1, 9.8, 5.4, 17.3, 17.1, 18.6% more TP, TC, EGCG, ECG, (−)-epigallocatechin (EGC), (−)-epicatechin (EC), water extract, theanine level, respectively than the infusions prepared from orthodox green tea. The TP and TC content in orthodox and CTC green tea along with that in infusion are presented in Figure 46. The sensory evaluation preferred orthodox over CTC processing mode. The estimated daily intake (EDI) was also evaluated assuming consumption of 10 g green tea (equivalent to 750 mL) per day. EDI study revealed that EGCG level is free from the risk of hepatotoxicity and caffeine will not inflict any health hazard.

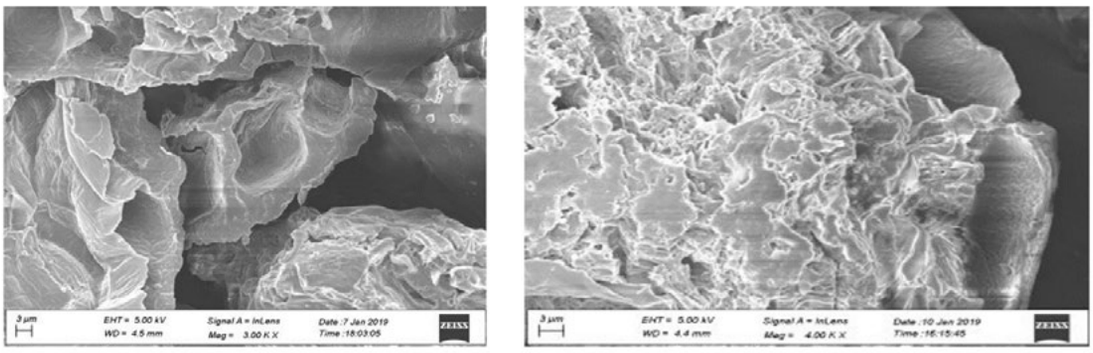


PPO = polyphenol oxidase
R = 3,4,5-trihydroxybenzoyl or H
R^1=R^2=H: theaflavin (TF1)
R^1=3,4,5-trihydroxybenzoyl, R_2=H: theaflavin-3-gallate (TF2A)
R^1=H, R^2=3,4,5-trihydroxybenzoyl: theaflavin-3′-gallate (TF2B)
R^1=R^2= 3,4,5-trihydroxybenzoyl: theaflavin-3,3′-digallate (TF3)

Figure 46: Average content (mg g^{-1}) of total polyphenol **(a)** and total catechin **(b)** in CTC and orthodox green tea, in infusion, and their per cent transfer into infusions (error bars specify the standard error).

A.2. *Saraca asoca* leaf powder as a biomass-based adsorbent for removal of methylene blue in water

Many of the dyes are carcinogenic in nature and their existence in the aquatic system prevents normal biochemical reactions occurring in living systems creating a major problem for the environment. Dyes impart colour, which is aesthetically unacceptable and reduces sunlight penetration into natural water. Amongst the techniques for the removal of dyes from water, adsorption on a suitable adsorbent is a low cost and environment-friendly process. In the present study, water spiked with the common dye, Methylene Blue (MB), was incubated with Saracaasoca leaf powder (SALP), a low cost, locally available biomaterial as an adsorbent. The batch adsorption process was carried out with pH, initial concentration of dye, adsorbent loading and temperature as the variables. The adsorbent material was characterized with SEM, EDX, FTIR, CHNS, zeta potential, TGA, AAS measurements and a number of physical parameters such as bulk density, moisture content, etc., was also determined. Adsorption kinetics was tested with Lagergren pseudo-first-order, Ho's pseudo-second-order and intra-particle diffusion models. The validity of Langmuir, Freundlich and Temkin isotherm models were tested with the adsorption equilibrium data to work out the adsorption capacities. The batch adsorption under appropriate conditions can remove the dye from water from 82 to 96 %. Langmuir adsorption capacity had values of 30 to 125 mg g-1. These results along with the thermodynamic measurements indicated SALP to be promising adsorption for removal of the dye, methylene Blue from water.



(A) (B)

Figure 47: SEM images of *Saraca asoca* leaf powder before **(A)** and after adsorption **(B)** of the dye

Our research is focused on understanding the gut microbiome of the ethnic communities of the north-east of India and the development of next-generation probiotics for better gut health.

B. Human Microbiome and Health

(Coordinator: Dr. Mojibur Rohman Khan)

B.1. Human gut microbes are associated with systolic blood pressure in the Indian rural population

Emerging studies have revealed a strong link between the gut microbiome and several human diseases. Since the human gut microbiome mirrors variations in lifestyle and environment, whether associations between disease conditions and gut microbiome are consistent across populations— particularly in communities practising traditional subsistence strategies whose microbiomes differ markedly from industrialists–remain unknown. Cardiovascular diseases are the leading cause of mortality in the world including India affecting 55 million people and high blood pressure is one of the primary risk factors for cardiovascular diseases. We examined the associations between the gut microbiome and blood pressure along with 14 other variables associated with lifestyle, dietary habits, disease conditions, and clinical blood markers in the three Assamese populations (Figure 48 A, B). Our analysis reveals a robust link between the gut microbiome diversity as well as composition and systolic blood pressure. Moreover, several genera previously associated with hypertension in non-Indian populations were also associated with systolic blood pressure in this cohort and these genera were predictors of elevated blood pressure in these populations. These findings confer opportunities to design personalized, preventative, and targeted interventions harnessing the gut microbiome to tackle the burden of cardiovascular diseases in India.

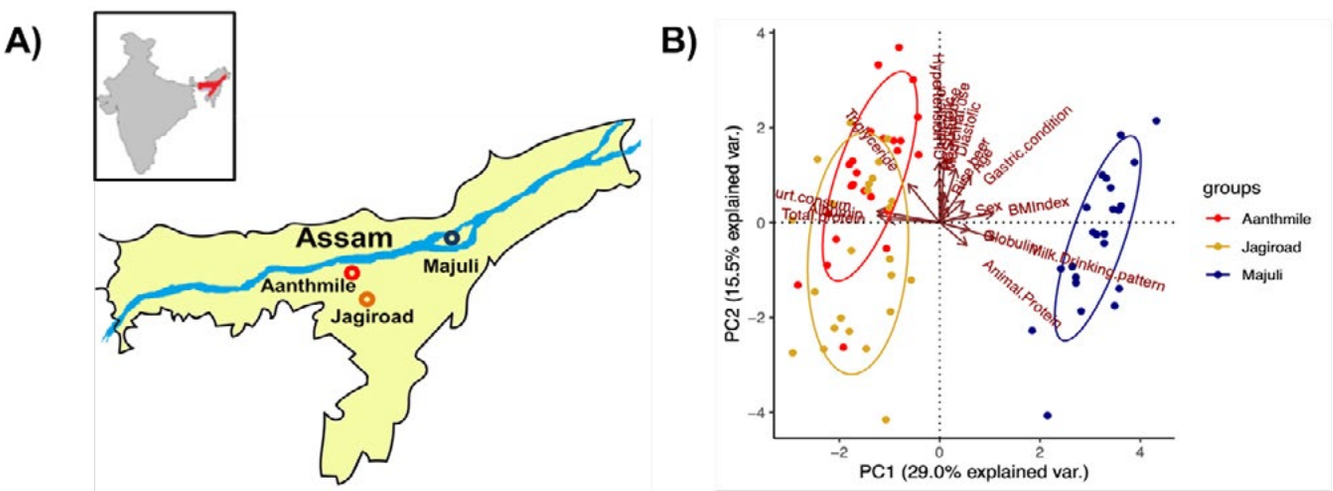


Figure 48: Lifestyle, dietary, and clinical blood markers differ between Assamese populations. **(A)** Map showing three different sampling locations of Assam in which Nepali populations inhabits Aanthmile and Jagiroad who practice agropastoralism. Satra of Majuli are native Assamese and animal herders. **(B)** A Principal Components Analysis (PCA) differentiates populations based on their diet and clinical blood markers. Among 2 axes, PC1 separates individuals by lifestyle attributes such as consumption of animal protein, milk and Body Mass Index (BMI). PC2 is associated with several risk factors for chronic diseases, including age and systolic blood pressure.

B.2. Gut microbiome of *Mishing* population and study on the effect of modern lifestyle

The *Mishing* community is the second largest ethnic group residing in the state of Assam. Generally, they reside in the northern bank of the river Brahmaputra bordering the foothills of Arunachal Pradesh. This community is also the largest ethnic community of the largest riverine island 'Majuli'. Most of the people are rural dwellers and depend largely on agricultural activities for their livelihood. Their traditional diet is rich in fermented food (alcoholic rice beverages, fish and pork). Rice-based alcoholic beverage (called as *Apong)* forms an integral part of their daily diet. The *Mishing* community prepares two different varieties of *Apong*; in a variety called '*Poro Apon*', rice is initially roasted and then mixed with the ash of rice husk. Thereafter starter cake is introduced and the mixture is allowed to ferment for a period of 10-15 days. After fermentation, while decanting the fermented liquid it is passed through ash. As a result, the final drink is dark in colour and has a savoury taste of 'dark ale'. The other variety called '*Nogin Apong*' is prepared by mixing rice with the starter cake which is then allowed to ferment. After fermentation, the clear liquid is decanted and consumed as such. This drink appears white to pale yellow in colour and has similarities with '*Sake*' and '*Makegoli*' of Japan and Korea, respectively. Interestingly, they prefer only one type of beverage only. Our study with the *Mishing* community has revealed that their gut microbiome is mainly dominated by the bacterial genera *Prevotella, Succinivibrio, Agathobacterium, Roseburia, Faecalibacterium* etc and the microbiota is enriched with functions such as energy metabolism, carbohydrate metabolism, xenobiotics degradation etc. On comparing the gut microbiome of *Poro Apong* drinkers to that of the *Nogin Apong* consumers, it was observed that 16 genera of bacteria were significantly different. Our study is ongoing to compare their gut microbiome with a *Mishing* population residing near Guwahati who migrated from those villages 15-20 years ago.

B.3. Development of next-generation probiotic

In continuation of earlier work on developing next-generation probiotics from traditional fermented food and beverages, few bacteria isolated from curd were tested in the experimental model organism *Caenorhabditis elegans* for probiotic properties. A bacterium *Lactobacillus plantarum* JBC5 enhanced the mean lifespan by 27.81% compared to control (Figure 49A.). The age-related parameters of youngness, such as pharynx pumping and locomotory activity were also significantly increased with JBC5 treatment (Figure 49B.). The effect of JBC5 on other age-related parameters such as lipofuscin (ageing pigment) and fat accumulation was also studied. Lipofuscin content increases with ageing in *C. elegans*. We observed that feeding with JBC5 reduced the level of lipofuscin (Figure 49 C.). Fat accumulation was also lower in JBC5-treatment (Figure 49D.).

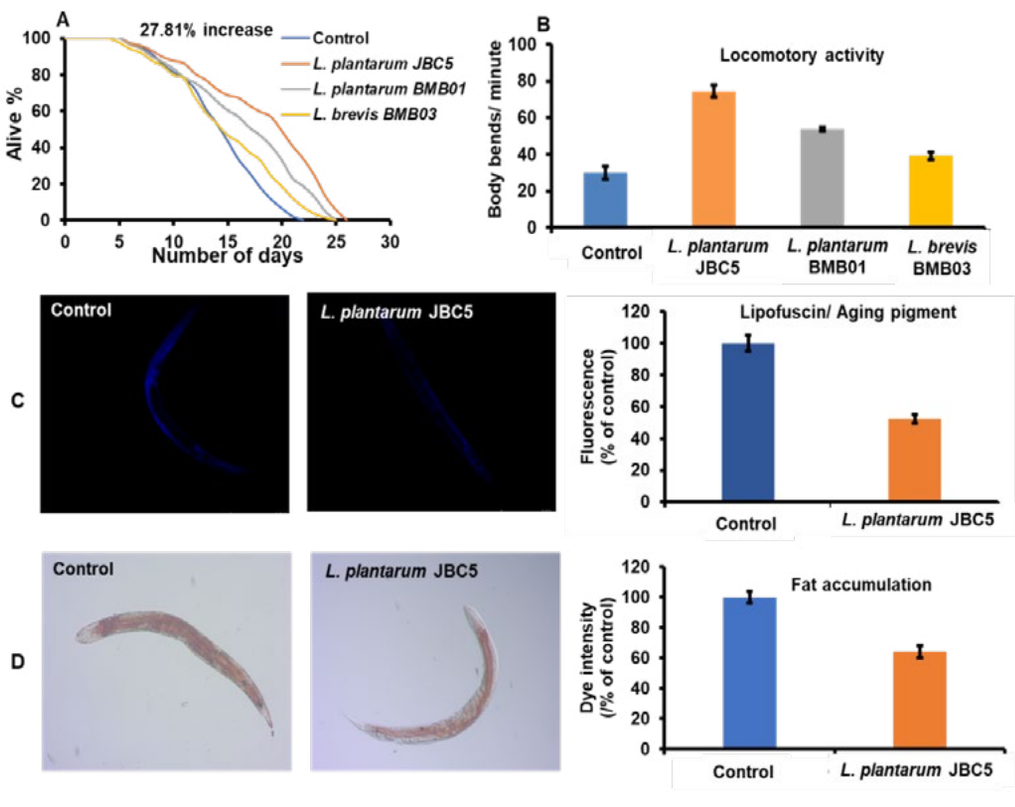


Figure 49: Effect of *L. plantarum* JBC5 on longevity **(A)**, locomotory activity **(B)**, lipofuscin, **(C)** and fat storage **(D)** of *C. elegans*.

Age-dependent dysfunction of mitochondria produces more reactive oxygen species (ROS) in *C. elegans*. It was observed that JBC5 treatment significantly reduced mitochondrial ROS (Figure 50 A.). Furthermore, we performed longevity assays with genetic mutants (longevity pathways) of *C. elegans* as well as validation with semi-quantitative RT-PCR to understand the mechanisms. The RT-PCR results have shown that JBC5 induced the expression of genes involved in p38 MAPK signallings, such as *pmk-1* and *skn-1*, while showed no increase in the expression of *daf-2* and *daf-16* genes. These results showed that the anti-ageing effects of JBC5 were due to activation of the p38 MAPK pathway, which is also known to be involved in immune and stress responses (Figure 50 B.)

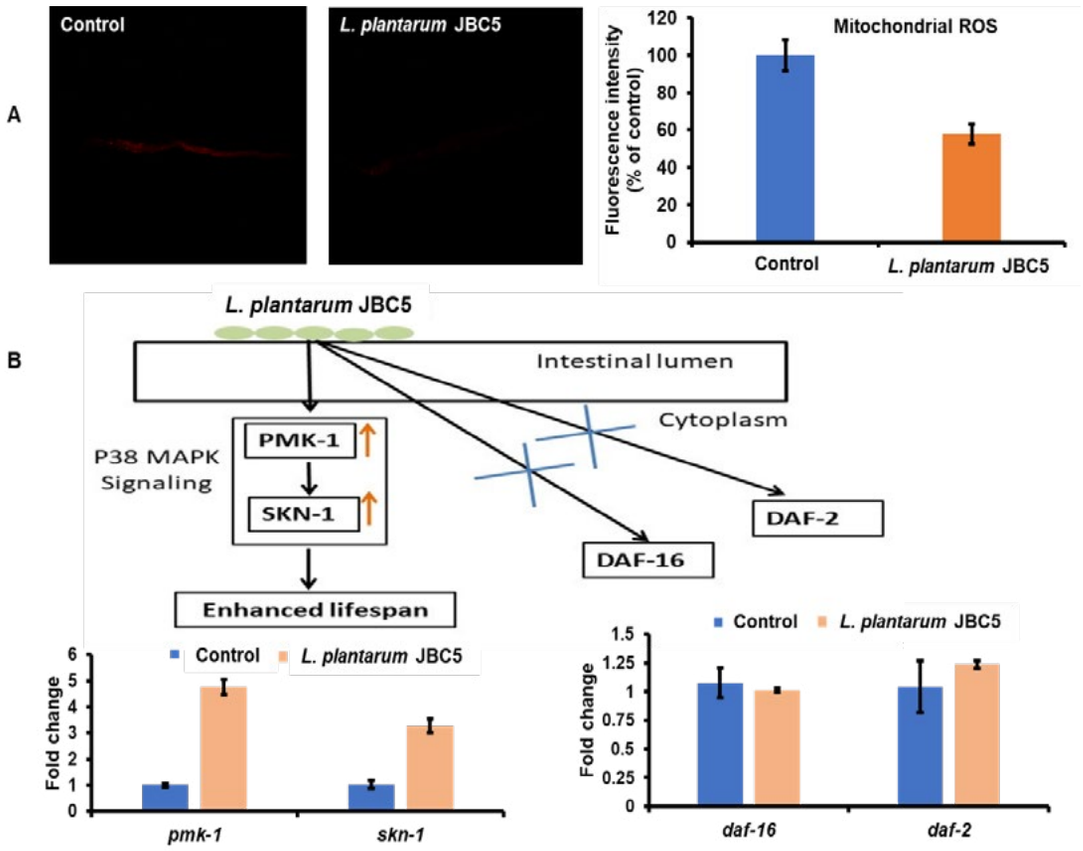


Figure 50: **(A)** Effect of *L. plantarum* JBC5 on mitochondrial ROS. **(B)** The pathway involved in the lifespan extension.

C. Tea Microbial Pathogen Interactions and Microbial Control of Tea Fungal Diseases

(Coordinator: Dr. Debajit Thakur)

C.1. Exploration and characterization of tea fungal pathogens associated with Blister Blight disease

Tea (*Camellia sinensis* L. Kuntze) is one of the most widely consumed beverages worldwide. However, tea plants are affected by many different diseases causing a significant reduction in global tea production. Blister blight is one such serious and damaging leaf disease of tea. An assessment of blister blight disease was carried out at the Tea Development Centre in Umsning, Meghalaya. A considerable number of tea varieties showed characteristic blister blight symptoms that ranged from preliminary yellow spots in the upper leaf surface, matured white sporulating blisters in the lower leaf surface, and delayed brown necrotic lesions throughout the surfaces of the leaves. From unsterilized leaf lesions of tea clones and seed *jats* such as AV2, Betjan, Nandadevi, TV1, TV14, TV18, and TV19 yielded a total of 42 blister blight associated fungal pathogens at all three stages of the disease cycle (Figure 51.).

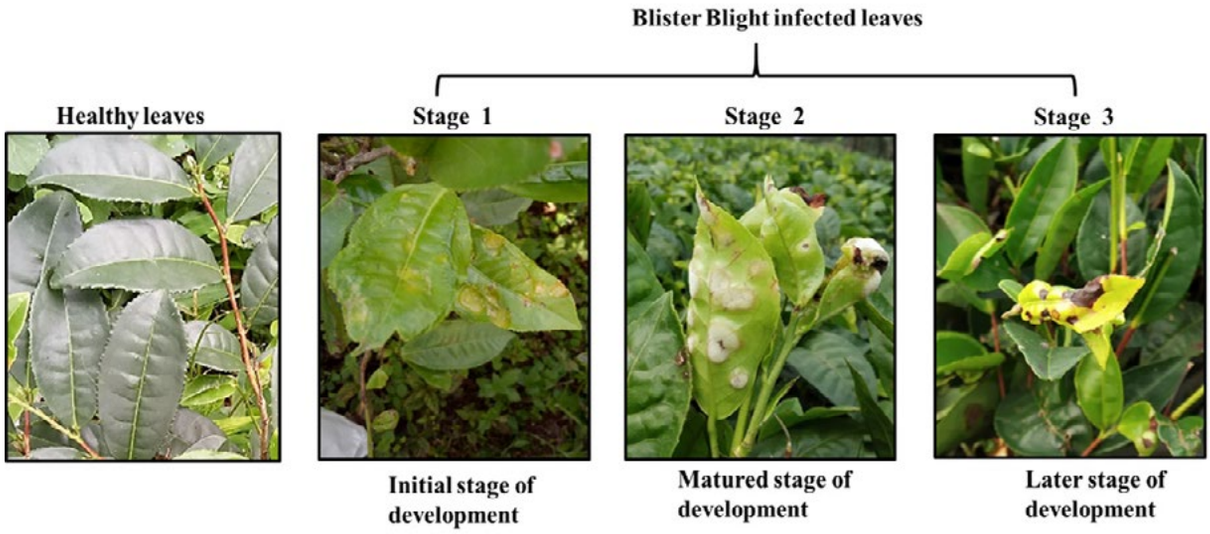


Figure 51: Blister blight disease of tea (*Camellia sinensis* L. Kuntze). Different stages of blister blight disease were surveyed in the tea development centre of Umsning, Meghalaya and photographed.

From the initial and matured blister blight lesions, 30 isolates were isolated and the remaining 12 isolates were isolated from necrotic leaves. The 30 isolates were further segregated into five groups based on colony morphology. Cultural and molecular characterization revealed that out of the 30 isolates, 22 belong to the genus *Pestalotiopsis* while 8 were included in the genus *Nigrospora*. These two dominant fungal taxa were consistently isolated and identified from the initial and matured stages of blister lesions. Samples of *Pestalotiopsis* that were grouped on morphological characters were also found to be clubbed in the same clusters based on genetic analysis while *Nigrospora* samples completely formed a different cluster. Pathogenicity analysis was carried out with the representative isolates of group I to V on TV17 tea plantlets developed symptoms that were in contrast with blister blight symptoms (Figure 52). The isolates *Pestalotiopsis* sp. MGA4 (group I), *Pestalotiopsis* sp. MGA6 (group II), and *Pestalotiopsis* sp. MGA37 (group IV) developed typical leaf spots, however, foliar symptoms caused by *Pestalotiopsis* sp. MGA22 (group III) were white fuzzy growth at the centre surrounded by blackish brown regions. *Nigrospora* sp. MGA38 (group V) caused the formation of dark brown, semi-circular lesions on the foliages.

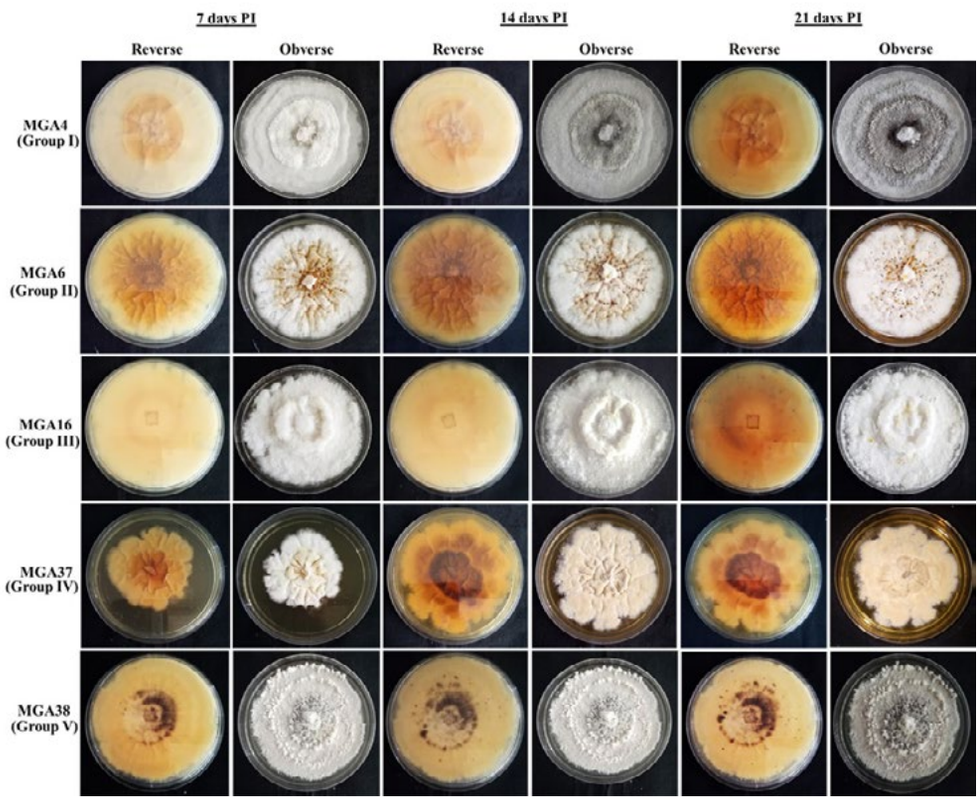


Figure 52: Morphological characteristics of group I to V isolates. Colony morphology of the isolates on PDA in Petri plates incubated at 28 °C.

Isolation of *Pestalotiopsis* sp. and *Nigrospora* sp. from blister blight infected tea leaf lesions suggests that these two fungi might share the same niche with the causal pathogen *E. vexans* under ideal environmental conditions and might be possibly involved in community formation during blister blight infection. Interestingly, if present individually both the species are capable of causing disease symptoms on the tea plant that varies significantly from characteristics blister blight lesions. Frequent isolation of two or more pathogens indicates co-existence and more importantly formation of microbial consortium and interspecies synergistic interaction. Such an association network might be vital in blister blight disease

development. However, further studies are required for a detailed understanding of microbial interactions in blister blight disease *in vitro* as well as in the natural environment.

Blister blight is a devastating disease of tea. Our work reveals that the blister blight lesions are colonized by fungi *Pestalotiopsis* and *Nigrospora*. These two endophytes can also act as potent pathogens of tea capable of inflicting serious damage to tea production. *Pestalotiopsis* and *Nigrospora* may cause additional pathogenesis during blister blight disease which might in, turn, lead to blister blight disease development and progression. This new study of identification and microbial community formation in blister blight disease are important advancements in the field of tea disease that can eventually be of help in blister blight disease management and control measures.

C.2. Antagonistic and plant growth promoting potential of *Streptomyces* sp. TT3 isolated from tea *(Camellia sinensis)* rhizosphere soil

The tea plantations of Northeast India offer a suitable environment for a large number of fungal diseases and pest invasion which is responsible for the considerable amount of crop loss annually. As a result, the tea industry is entirely dependent upon the agro-chemical inputs to encounter these problems. However, the extensive application of chemicals as fungicides, pesticides, and fertilizers sequentially deteriorated the soil fertility, quality tea production, and environment as well. Therefore, we have carried out the research on tea rhizosphere soil of Northeast India for isolation and characterization of diverse PGPRs with their functions. During our study, we have found the actinobacterial strain TT3 to be having a broad spectrum of antifungal activity against different tea foliar fungal pathogens including our newly reported tea foliar fungal pathogen *Nigrospora sphaerica* infected in Tea. The sequencing and analysis of the 16S rRNA gene of TT3 shared the highest similarities with *Streptomyces* genus such as *S. kronopolitis* NEAU-ML8, *S. chattanoogensis* KPP02992, and *S. lydicus* A2, and thus, the actinibacterium strain TT3 is designated as *Streptomyces* sp. TT3.

In another study, *Streptomyces* sp. TT3 showed promising plant growth promoting activity such as the production of IAA, siderophore, and ammonia along with phosphate solubilization which are important traits for the plant growth and proved its potential to be considered as a PGP strain. The *Streptomyces* sp. TT3 exhibited potential antagonistic activity against the tested fungal pathogens Figure 3.). Further, ethyl acetate extraction of TT3 i.e., EA-TT3 crude extract consisting of a mixture of metabolites significantly suppressed the growth of fungal pathogens (Figure 53).

Streptomyces sp. TT3 showed positive PCR amplification of the beta-ACP synthase and ketosynthase genes of the PKS-II gene. Amplification of PKS-I ketosynthase, methylmalonyl transferase domain sequences, and NRPS adenylation domain sequences is not detected. In our study, the type II PKS gene was observed in *Streptomyces* sp. TT3 which showed excellent antifungal activity. PKS-II gene present in the *Streptomyces* sp. TT3 was predicted by using the DoBISCUIT

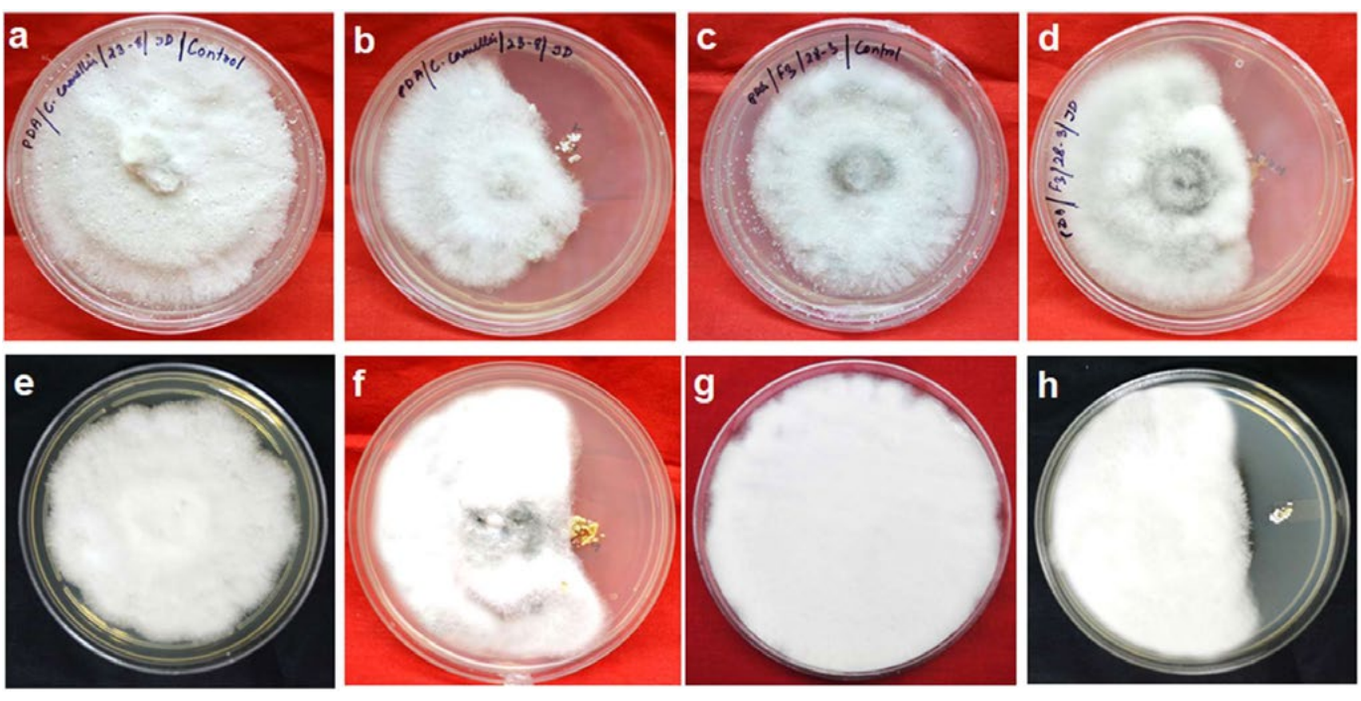


Figure 53: Antagonistic activity of *Streptomyces* sp. TT3 by spot inoculation method. **(a)** control plate of *R. solani*, **(b)** test plate of *R. solani*, **(c)** control plate of *N. sphaerica*, **(d)** test plate of *N. sphaerica*, **(e)** control plate of *F. oxysporum*, **(f)** test plate of *F. oxysporum*, **(g)** control plate of *P. theae*, **(h)** test plate of *P. theae*.

database involved in the production of pathway product actinorhodin which is a benzoisochromane quinone dimer polyketide antibiotic classified under the quinone class of compounds. To detect the other potential volatile compounds in the *Streptomyces* sp. TT3, we have performed the GC–MS analysis of EA-TT3 crude extract. We have found the five most significant compounds from the EA-TT3 crude extract with different retention times and abundance (Figure 54). Thus, we assume that these compounds could be the key contributing factor for the antifungal activities of EA-TT3.

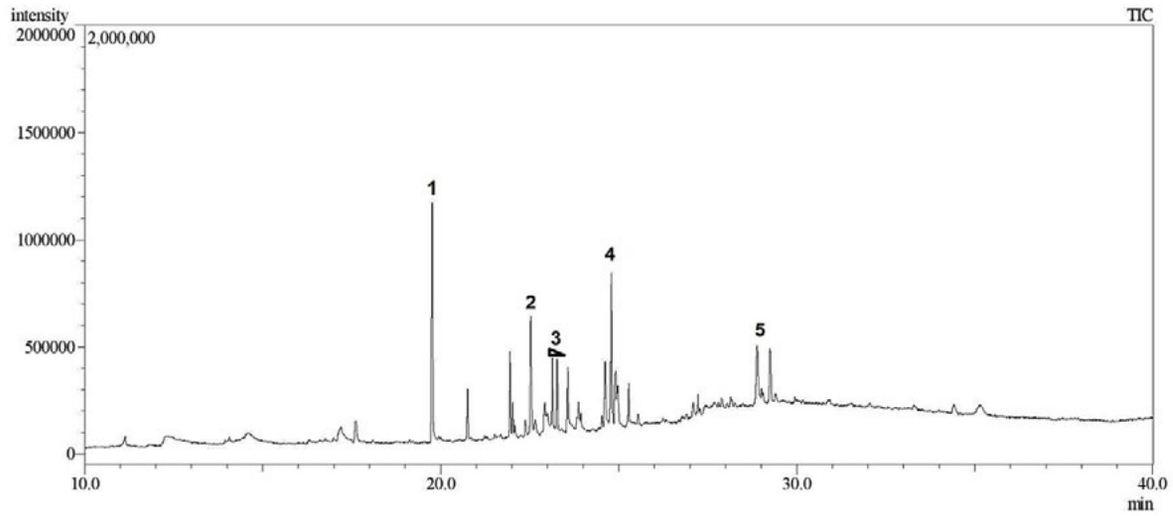


Figure 54: GC-MS chromatogram of ethyl acetate extract of *Streptomyces* sp. TT3 (EA-TT3). The selected peaks in the chromatogram showing five major chemical constituents identified from EA-TT3 extract. 1. Phenol, 2,4-bis(1,1-dimethylethyl)-, 2. Hexanoic acid, pentyl ester, 3. Eicosanoic acid, 2- (acetyloxy)-1-[(acetyloxy)methyl] ethyl ester, 4. Pyrrolo[1,2-a] pyrazine-1,4-dione, hexahydro-3-(2-methylpropyl), 5. Octahydro-2H-pyrido(1,2-a) pyrimidin-2-one.

From the present study, it is indicated that this tea rhizosphere-derived *Streptomyces* sp. TT3 has the potential to consider as antifungal and PGP metabolites producing strain and this strain could be safely and efficiently used as an alternative to chemical inputs for fungal diseases suppression and growth promotion in the tea field with further investigation in future.

D. Seri-Biotechnology

(Coordinator: Dr. Rahul Pralhad Hepat)

Sericulture is one of the principle sources of financial support and livelihood opportunity to people of North-East (NE) India. Among different varieties of silk, NE India produces 94% of the costliest variety of silk globally, which is silk of *Antheraea assamensis* Helfer and is popularly known as Muga silkworm. Muga is a semi-domesticated multivoltine insect that is unique as well as geographically confined to North East India. But diseases caused by viruses are a major obstacle in rearing silkworms. In this study, we focussed on the Antheraea assamensis cytoplasmic polyhedrosis virus (AaCPV) which is one of the main risk factors restricting sustainable development in this area. *A. assamensis* silkworm from a rearing site with viral infection symptoms were analyzed by electron microscopy that revealed polyhedral occlusion bodies (OBs) with several icosahedral virus particles embedded. Analysis of its genetic material showed ten segments of dsRNA, which confirmed this virus as a possible member of the genus cypovirus. Secondly, genomic RNA of the virus has been sequenced via HiSeq 2000 NGS platform and currently, I am analyzing the structure and function of its genomic segments, and confer its relationship with other cypoviruses.

D.1. Molecular and Biological Characterization of Cypovirus Isolated from Muga Silkworm, *Antheraea assamensis* Helfer:

Previously, we have isolated and characterized a virus isolated from an infected Muga silkworm. We have extracted occlusion bodies (OBs) from dead insect cadavers and purified OB's. Subsequently, the purified OB's was then analyzed for their ultrastructure by using scanning and transmission electron microscopy. The size and shape of the virions closely resembled cypoviruses, a double-stranded RNA virus that infects many lepidopteran insects including silkworms (Annual Report 2019-2020). The physiological function of AaCPV has been studied, infection by AaCPV dramatically

affects weight loss, growth retardation, and change in tegument coloration, death to pupation, reduced cocoon size and emergence of healthy adult in A. assamensis.

The electrophoretic gel analysis of nucleic acid extracted from the OB's revealed ten putative segments of dsRNA, their sizes ranging from 3.7 Kb to 400 bp. The molarity of the first band appeared as doublet-band (with two co-migrating bands) (Figure 55A.). Subsequently, the viral genome was unaffected by treatment of DNase-I but completely disappeared after treatment with RNase-A (data not shown). The pathogenicity of the viral isolate was confirmed by feeding on a leaf treated with vomit drops from dying Muga silkworm after 72 h feeding Furthermore, SDS-PAGE analysis of total polyhedral proteins from OB's showed an intense band at 28-30 kDa, characteristic of the cypovirus polyhedrin with other bands above and below (Figure 55B).

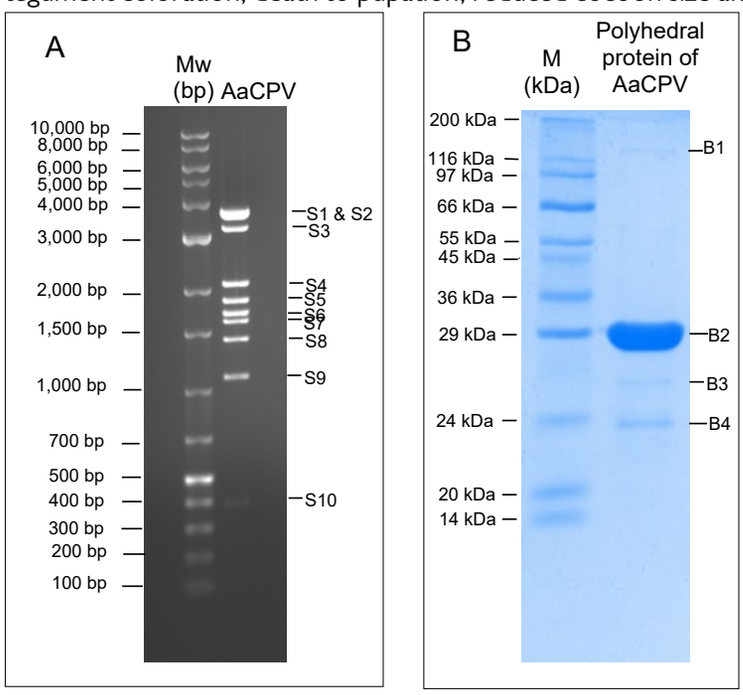


Figure 55. Electrophoretic and polyhedral protein analysis of AaCPV. (A) Electrophoretic analysis of AaCPV genome consisting of ten putative dsRNA segments using 1 % agarose gel. (B) SDS-PAGE (12%) of solublized polyhedral proteins of OB's of AaCPV showing prominent band at 29-30 kDa, expected size of polyhedrin protein.

The resulting raw data from the viral genome contains 20,360,088 total reads consisting of 2,056,368,888 bp (Table 4). Currently, we are filtering out adopter-only reads and reads containing more than 5% unknown sequences and low-quality reads. The resulting read will be mapped to the reference genome and annotation will be performed. The annotated open reading frames (ORFs) will be identified using a BLASTx search against the NCBI non-redundant protein database. Finally, the structure and function of each viral segment will be studied with respect to its infectivity to the silkworm.

Table 4. Raw data statistics of AaCPV genome

AaCPV Genome	Total Read bases (bp)	Total reads	GC(%)	AT(%)	Q20(%)	Q30(%)
	2,056,368,888	20,360,088	40.0	60.0	98.11	94.27

E. Biomaterials and Tissue Engineering

(Coordinator: Dr. Rajiv Borah)

E.1. Electroconductive biomaterials (ECBs)

Electroconductive biomaterials (ECBs) in combination with electrical stimulation (ES) can remarkably improve nerve regeneration processes. In the peripheral nervous system (PNS), ES was demonstrated to upregulate the expression of neurotrophic factors and their receptors followed by elevation of gene expression of various regeneration associated proteins. It was suggested that ES induces axonal outgrowth through elevation of intracellular neuronal cyclic adenosine monophosphate (cAMP), which in turn activates Protein kinase A (PKA) for promotion of transcription of regeneration associated proteins.

In addition to ES, intrinsic conductive properties and charge transfer characteristics of ECBs is critical for electrically stimulated neural regeneration. The ECBs should be able to offer favourable charge transfer with the plasma membrane to evoke an action potential through membrane depolarization during ES, which is essential for neurite regeneration. This process is favourably to occur under low stimulation voltage within a safe limit for living tissues for which the ECBs should have sufficient charge storage capacity (CSC) and low electrochemical charge-transfer resistance (R_{ct}). CSC, which is the available charge density within a voltage range, should be higher so that a greater number of charges are available for membrane depolarization. For effective ES, charge-transfer reactions at the ECB-tissue interface should induce the transition from electron flow to ion flow in the tissue. Hence, R_{ct} should be low enough to make accessible the available charges in ECBs (Figure 56)

With this perspective notion, aligned microfibers of nature-derived ***Bombyx mori*** silk fibroin were coated with an electrically conducting polymer, polypyrrole nanoparticles (PPy NPs) through in situ polymerization method and later the conductive scaffolds were functionalized with Indian origin non-mulberry ***Antheraea assama*** silk fibroin (AASF) to impart enhanced cell affinity. The electrochemical behaviour of the aligned scaffolds was evaluated in different electrolytes including cell culture media in terms of CSC and R_{ct}. The potential of the conductive scaffolds was assessed with the help of neural differentiation of primary adipose-derived mesenchymal stem cells (pADMSCs).

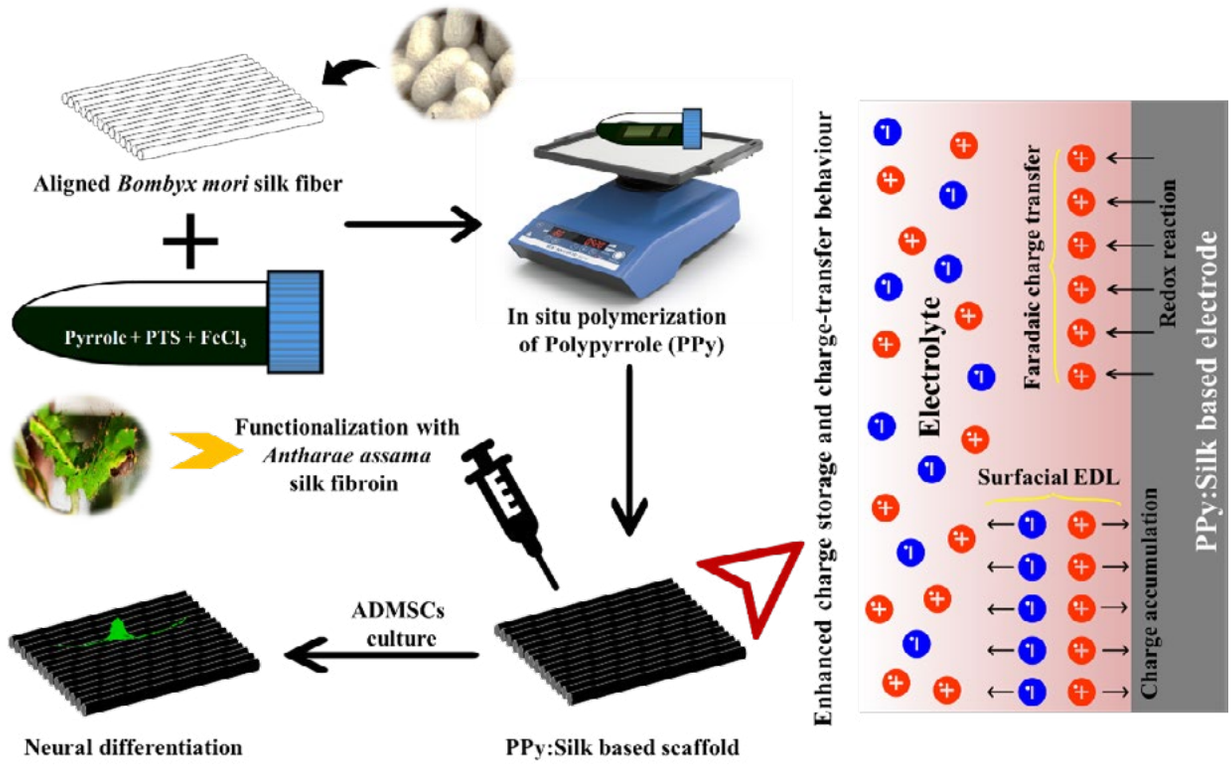


Figure 56: Schematic illustration of the fabrication process of highly conductive PPy: Silk based aligned scaffolds with higher charge storage capacity and lower charge transfer resistance and its efficacy evaluation in terms of neural differentiation of ADMSCs.

RESEARCH OUTPUT

Extramural Research Projects

Completed Projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Achievements
Optimization of method of red wine production using black rice	Biotechnology Industry Research Assistance Council (BIRAC) Total fund: Rs.35.69 lakh Duration: 18 months (August 2019-February, 2021) PI: Dr. Mojibur R. Khan	A technology for wine production was optimized using black rice of Manipur and the process was scaled up to 33 litres per batch. A patent was filed for the process of wine production as below: Inventors: Khan M. R. and Bhaskar Bhuwan Application no.: 201931019623 Title: Production of antioxidant-rich red wine-like alcoholic beverage using black rice Date published: 20/11/2020 The technology for wine preparation in this project has been transferred to a start-up, ***Golden Beverages*** and its commercial production is underway.

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Achievements
NER-Bioinformatics Infrastructure Facility	DBT, Govt. of India Total Fund: Rs. 54.30 lakhs Duration: 2017-2021 (3 years 6 months) Coordinator:_Dr. Debajit Thakur	The Department of Biotechnology (DBT), Government of India, funded the establishment of the Bioinformatics Infrastructure Facility at the Institute of Advanced Study in science and Technology in the year 2011-2012. The functions of the centre include acquisition, creation and development of programmes and biological data management. The basic and advanced level workshop organized by the centre helped the researchers to analyse their biological data equipping various bioinformatics tools and applications and encouraging college students to pursue bioinformatics as a career.
Optimization of method of red wine production using black rice	Biotechnology Industry Research Assistance Council (BIRAC) Total fund: Rs.35.69 lakh Duration: 18 months (August 2019-February, 2021) PI: Dr. Mojibur R. Khan	A technology for wine production was optimized using black rice of Manipur and the process was scaled up to 33 litres per batch. A patent was filed for the process of wine production as below: Inventors: Khan M. R. and Bhaskar Bhuwan Application no.: 201931019623 Title: Production of antioxidant-rich red wine like alcoholic beverage using black rice Date published: 20/11/2020 The technology for wine preparation in this project has been transferred to a start-up, ***Golden Beverages*** and its commercial production is underway.
NER-Bioinformatics Infrastructure Facility	DBT, Govt. of India Total Fund: Rs. 54.30 lakhs Duration: 2017-2021 (3 years 6 months) Coordinator:_Dr. Debajit Thakur	The Department of Biotechnology (DBT), Government of India, funded the establishment of the Bioinformatics Infrastructure Facility at the Institute of Advanced Study in science and Technology in the year 2011-2012. The functions of the centre include acquisition, creation and development of programmes and biological data management. The basic and advanced level workshop organized by the centre helped the researchers to analyse their biological data equipping various bioinformatics tools and applications and encouraging college students to pursue bioinformatics as a career.

Ongoing Projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator: Co-Investigator:	Goal
PM10 and PM2.5 Related Health Effects in North-East India: Source Identification and Cohort Analysis	DST, Govt. of India Total Fund: Rs.18,40,200/- Duration: 2019-2022 PI: Dr. Arundhuti Devi	This study has been focused on the 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 for industrial, vehicular, and refinery areas. 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.
Engineered Bioremediation Approaches for Onsite Treatment of Soil Contaminated with Crude Oil	DBT, Govt. of India Total fund: Rs. 5905960/- Duration: 2019-2022 PI: Dr. Arundhuti Devi	This project addresses the implementation of on-site bioremediation of soil contaminated with crude oil. Treatment of organic pollutants, like hydrocarbons, is a widely researched subject, and many lab-scale technologies have been presented. However, on-site success stories are limited. While concentrated efforts have been made to develop analytical methodologies for highly sensitive detection of these pollutants and to elucidate their eco-toxicological profiles mostly using in vitro and in vivo models, studies on remediation of environmental metrics such as soil, water contaminated with these pollutants are limited to bench scale research. Few available leads using either chemical or biological methods developed at lab scale lack the feasibility of implementation in the field.

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator: Co-Investigator:	Goal
ST/SC Community Development Program in IASST	Department of Science and Technology (under SEED division) Total fund: Rs.13,98,71,508.00 Duration: 03 years (1st April, 2020-31st March 2023) PI/Coordinator: Coordinator: Prof. Ashis Kumar Mukherjee PIs: Dr. Mojibur R. Khan (Component-I) Dr. Dhruba Sharma (Component-II)	i) Documentation of indigenous traditional knowledge (ITK) associated with various ethnic fermented foods, traditional herbs and edible insects and protection of their IPR. ii) To develop a method of production of fermented functional foods, beverages with improved quality, safety and health benefits. iii) To develop a method of production of herbs and edible insects of nutrition and health benefits. iv) To identify beneficial functional ingredients of heritage foods and beverages. v) To train SC-ST people to adopt an improved method of production and to develop a commercialization strategy for marketing heritage food and beverage.
Development of Hybrid Electroactive Biomaterials for Peripheral Nerve Regeneration	Department of Science & Technology (DST), Govt. of India Total fund: INR 35 Lakh PI/Coordinator: Dr. Rajiv Borah	i) To fabricate aligned/microchannel structured Indian non-mulberry silk based electrically conductive nerve guidance channels/conduits mimicking the dynamic microenvironment of peripheral nerve. ii) To evaluate the efficacy of the highly conductive silk based neural scaffold by *in vitro* electrical stimulation of nerve cells for faster axonal regeneration.
Development of layered double hydroxide (LDH) nanoclays for topical delivery of RNAi for sustained protection of economically important plants against pest attack	Department of Biotechnology (DBT), Govt. of India Total fund: INR 41.9 Lakhs PI/Coordinator: Dr. Rajiv Borah Co-Investigator: 1. Dr. Avishek Dey, IIT Guwahati 2. Dr. Rahul P. Hepat, IASST Guwahati	i) To develop a cost-efficient method for topical application of dsRNA as an alternative to transgenic RNAi against pest attack or pathogens. ii) To establish the proof of concept of the efficacy of the two-dimensional LDH nanoclays as an efficient delivery vehicle of gene-specific dsRNA against pests or pathogens.
Exploration and conservation of antimicrobial metabolites producing Actinobacteria prevalent in protected forest ecosystems of North East India to develop an antimicrobial metabolite producing actinobacterial database (AMPAD) for utilization against human and microbial pathogens, agro-protective and production system.	DBT, Govt. of India Total Fund: Rs. 74.152 lakhs; Duration: 2019-2022; PI: Dr. Debajit Thakur Collaboration with University of Agricultural Sciences, Dharwad, Maharashtra	The project work aims to explore actinobacteria with antimicrobial potential in the soil of protected forest ecosystems and biodiversity hotspots of North-East India. With a contrasting environment existing in the ecosystems, the study hypothesizes that these pristine natural habitats harbour actinobacterial diversity possessing unique and efficient antimicrobial capability. These precious actinobacterial isolates having antimicrobial activity against methicillin-resistant *Staphylococcus aureus* (MRSA), multidrug-resistant clinical pathogens, plant pathogens and plant growth promoting actinobacteria need to be preserved and utilized in a systematic way to develop a Web-based curated "Antimicrobial Metabolites Producing Actinobacterial Database (AMPAD)" at IASST, Guwahati, Assam.
Understanding the mechanisms of resistance to sucking pest, *Helopeltis theivora* and development of microbe-based bioformulation against major tea pests	DBT, Govt. of India Total Fund: Rs. 27.446 lakhs Duration: 2019-2022; PI: Dr. Debajit Thakur Collaboration with TTRI-TRA, Jorhat Assam and Bose Institute, Kolkata	This project work aims to identify the Actinobacterial extracellular metabolites effective against tea pests as well as the development of bioformulations for sustainable management of three major pests of tea viz. tea looper (*Hyposidra talaca*), tea mosquito bug (*Helopeltis theivora*) and red spider mite (*Oligonychus coffeae*) in commercial tea estates of Assam.
Molecular and Biological Characterization of Cypovirus Isolated from Muga Silkworm, *Antheraea assamensis* Helfer and Understanding Mechanism of Interaction with Silkworm.	DST-SERB; 36.70 Lakhs; 2020-2023; PI: Dr. Rahul Hepat Co-PI: Dr, Mojibur Khan, Dr. Rajiv Borah	To understand the proliferation of the virus and its mechanism of interactions with Muga silkworm

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator: Co-Investigator:	Goal
Development of diagnostic Kits for quick detection of CTV, HLB and Phytophthora rot diseases in Citrus of North East India	DBT-NER; 57.85 Lakhs; 2021-2023 PI: Dr. Rahul Hepat Co-PI: Dr. Rajiv Borah	Genetic variability of CTV among citrus species and development of the rapid and sensitive immunochromatographic strip-based diagnostic kit for detection of CTV strains in infected Khasi mandarin.

PUBLICATIONS

In cited journals

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month / Year of publication	Impact factor
Deka H, Sarmah P. P, Devi A, Tamuly P and Karak T	Changes in major catechins, caffeine, and antioxidant activity during CTC processing of black tea from North East India	RSC Advances	DOI:10.1039/ d0ra0952 9j	2021	3.361
Deka H, Barman T, Dutta J, Devi A, Tamuly P, Paul R. K and Karak T	Catechin and caffeine content of tea (*Camellia sinensis* L.) leaf significantly differ with seasonal variation: A study on popular cultivars in North East India	Journal of Food Composition and Analysis	DOI:10. 1016/j.jfca.2020. 103684	2020	4.556
Deka H, Barman T, Sarmah P.P, Devi A, Tamuly P, Paul R.K and Karak T	Quality characteristics of infusion and health consequences: a comparative study between orthodox and CTC green teas	RSC Advances	DOI:10,32833–32842	2020	3.361
Deka J, Das H, Devi A and Bhattacharyya K.G	*Saraca asoca* Leaf Powder as a Biomass-based Adsorbent for Removal of Methylene Blue in Water	Journal of Advances in Chemical Science	DOI: 10.22607/ IJACS.2021. 901001.	2020	NA
Kumar A, Baruah A, Tomioka M, Iino Y, Kalita M.C and Khan M.R	Caenorhabditis elegans: a model to understand host-microbe interactions	Cellular and Molecular Life Sciences	DOI: 10.1007/ s00018-019-03319-7.	2020	9.261
Deb D, Das S, Adak A and Khan M.R	Traditional rice beer depletes butyric acid-producing gut bacteria *Faecalibacterium* and *Roseburia* along with fecal butyrate levels in the ethnic groups of Northeast India	3 Biotech	DOI: 10.1007/ s13205-020-02280-8	2020	2.406
Pulipati P, Sarkar P, Jakkampudi A, Kaila V, Sarkar S, Unnisa M, Reddy D.N, Khan M.R and Rupjyoti Talukdar	The Indian gut microbiota—Is it unique?	Indian Journal of Gastroenterology	DOI:10.1007/ s12664-020-01037-8	2020	1.08
Barman A and Thakur D	Identification and characterization of fungi associated with blister blight lesions of tea (*Camellia sinensis* L. Kuntze) isolated from Meghalaya, India.	Microbiological Research	DOI: 10.1016/j. micres. 2020.126561.	Nov 2020	5.415

Author (s)	Title	Journal name	Volume & Issue no./page no.	Month / Year of publication	Impact factor
Dutta J and Thakur D	Evaluation of Antagonistic and Plant Growth Promoting Potential of *Streptomyces* sp. TT3 Isolated from Tea (*Camellia sinensis*) Rhizosphere Soil.	Current Microbiology	DOI:10.1007/ s00284-020-02002-6.	April, 2020	2.188
Upadhyay J*, Das T.M, and Borah R	Electrochemical performance study of Polyaniline and Polypyrrole based flexible electrodes	International Journal of Polymer Analysis and Characterization	DOI: 10.1080/ 1023666X.2021. 1891799	February 2021	2.583
Borah R*, Ingavle G.C, Kumar A, Sandeman S, and Mikhalovsky S	Surface functionalized conducting nanofibers for electrically stimulated neural cell function	Biomacromolecules	DOI: 10.1021/ acs. biomac.0c01445	January, 2021	6.988
Ojah N, Borah R, Ahmed G.A, Mandal M and Choudhury A.J*	Surface modification of electrospun silk/AMOX/PVA nanofibers by dielectric barrier discharge plasma: studies of physicochemical properties, drug delivery and *in-vitro* biocompatibility	Progress in Biomaterials	DOI: 10.1007/ s40204-020-00144-1	Nov, 2020	NA

Book Chapters

Authors Name	Chapter Title	Book Title	Publisher	Year /Month of Publication
Kumar A, Dash S and Khan M.R	Microbiota Functions in *Caenorhabditis elegans*	Microbiome-Host Interactions	CRC Press	2021
Kumar A and Khan M.R	*Caenorhabditis elegans* as Pathogenesis Model to Understand Bacterial Virulence	Model Organisms for Microbial Pathogenesis, Biofilm Formation and Antimicrobial Drug Discovery.	Springer	2020
Sharma K, Sarma N.S and Devi A	Paper Mill Effluents: Identification of Emerging Pollutants in Taranga Beel of Assam, India.	Water, Environment, Climate and Health	Springer	2020
Borah R, Upadhyay J and Bhaskar B	Trends in Stimuli Responsive Biomaterials in Tissue Engineering	Biomaterials in Tissue Engineering and Regenerative Medicine: From Basic Concepts to State of the Art Approaches	Springer	March 2021
Hazarika S.N and Thakur D	Actinobacteria	Beneficial Microbes in Agro-ecology: Volume 1: Bacteria	Elsevier	May 2020

Popular article

M. R. Khan and J. Medhi (2021). Role of the human microbiome in infection and protection against COVID-19. *Dream 2047*, *ISSN* 0972-169X, Vol. 24:16-17.

Patents

Patents (granted):

1. M. R. Khan, S. Sen, N. C. Talukdar (2021) A method for *in vitro* production of fragrant compounds from *Aquilaria malaccensis*. Patent No. 355515.
2. M. R. Khan, S. Sen, N. C. Talukdar (2021) A method for production of fragrant compounds from resinous chips of *Aquilaria malaccensis*. Patent No. 355518.

Contribution to World Database

Author (s)	Title	Database	Accession no.
A. Kumar, T. Joishy and M. R. Khan	16S rDNA sequence of *Lactobacillus plantarum* strain JBC5	NCBI	MG824976
A. Kumar, T. Joishy and M. R. Khan	Bile salt hydrolase gene (Lpbsh1) a sequence of *Lactobacillus plantarum* strain JBC5	NCBI	MW846636
A. Kumar, T. Joishy and M. R. Khan	Collagen-binding protein gene (Lpcbp) a sequence of *Lactobacillus plantarum* strain JBC5	NCBI	MW846637
A. Kumar, T. Joishy and M. R. Khan	Plantaricin biosynthesis gene (Pln) sequence of *Lactobacillus plantarum* strain JBC	NCBI	MW846638
A. Kumar, T. Joishy and M. R. Khan	Species-specific (Plantarum) the gene sequence of *Lactobacillus plantarum* strain JBC5	NCBI	MW846639
S. N. Hazarika and D. Thakur	Endophytic bacteria/16S rRNA	NCBI	MW898446- MW898449; MW905606- MW905624; MW898680-MW898687; MZ008002-MZ008004

Presentation in Conferences/seminars/webinar

Faculty/research scholar	Title	Conference/ Workshop/Exhibitions	Mode	Date & Venue
Rajiv Borah, Joseph Christakiran, Biman B. Mandal	Silk based electroactive biomaterials for neural applications	TERMIS-EU 2020 Tissue Engineering & Regenerative Medicine International Society-EU Chapter	Oral (Virtual)	May 28, 2020, Manchester, UK
Rajiv Borah, Joseph Christakiran, Sangeeta Deka	Aligned and electroconductive Antheraea Assama silk/ polypyrrole nanofibrous scaffold for electrically stimulated axon regeneration	3rd National Conference on Recent Advances in Science and Technology (NCRAST 2020)	Oral	August 17-19, 2020, Assam Science and Technology University, Guwahati, Assam, India
Rajkumari Mazumdar, Debajit Thakur	Exploration of Actinobacteria from Selected Forest Ecosystems of Assam for the production of antimicrobial metabolites	International Symposium on Anti-Microbial Resistance (BIOCREST 2021)	Oral (Virtual)	24-26 February 2021; Organized by School of Biotechnology at Amrita Vishwa Vidyapeetham, CHARM at University of California San Diego, Bugworks Inc. and C-CAMP.
Pranami Bharadwaj and Debajit Thakur	Assessment of endophytic Actinobacteria from commercially grown Tea (*Camellia sinensis*) cultivars for their role in agro-protection	International Symposium on Anti-Microbial Resistance (BIOCREST 2021)	Poster (Virtual)	24-26 February 2021; Organized by School of Biotechnology at Amrita Vishwa Vidyapeetham, CHARM at University of California San Diego, Bugworks Inc. and C-CAMP.
Juri Saikia and Debajit Thakur	Evaluation of Antagonistic Potential of Endophytic Actinomycetes, *Streptomyces* sp. RVRA3 Derived From Orchid (Orchidaceae) Against Certain Phytopathogens	International Symposium on Anti-Microbial Resistance (BIOCREST 2021)	Poster (Virtual)	24-26 February 2021; Organized by School of Biotechnology at Amrita Vishwa Vidyapeetham, CHARM at University of California San Diego, Bugworks Inc. and C-CAMP.

Faculty/research scholar	Title	Conference/ Workshop/Exhibitions	Mode	Date & Venue
Shabiha Nudrat Hazarika and Debajit Thakur	Antifungal activity of endophytic actinobacteria isolated from *Camellia sinensis* against pathogenic fungi	International Symposium on Anti-Microbial Resistance (BIOCREST 2021)	Poster (Virtual)	24-26 February 2021; Organized by School of Biotechnology at Amrita Vishwa Vidyapeetham, CHARM at University of California San Diego, Bugworks Inc. and C-CAMP.
Aditya Narayan Konwar, Debajit Thakur	Antimicrobial potential of culturable actinobacteria prevalent in unique forest ecological niches of Northeast India	International Symposium on Anti-Microbial Resistance (BIOCREST 2021)	Poster (Virtual)	24-26 February 2021; Organized by School of Biotechnology at Amrita Vishwa Vidyapeetham, CHARM at University of California San Diego, Bugworks Inc. and C-CAMP.
Shabiha Nudrat Hazarika, Pranami Bharadwaj, Rictika Das, Aditya Narayan Konwar	A cupful of tea facts	National Science Day 2021	Poster	February 2021; Organized by Institute of Advanced Study in Science and Technology, Guwahati

Conferences/Workshops/Meetings attended

Faculty/research scholar	Conference/Workshop/Exhibitions	Date & Venue
Dr. Rajiv Borah	One-Week Online Faculty Development Programme on "Mentoring Pedagogy and Teaching for Higher Education"	August 03-10, 2020, IIT Guwahati

Other Activities

Honours/Awards/Recognitions

Name	Particulars
Pranami Bharadwaj	Received Second Prize in the Click O' Bio (Photograph related to Antimicrobial Resistance) contest organised by School of Biotechnology at Amrita Vishwa Vidyapeetham, CHARM at University of California San Diego, Bugworks Inc. and C-CAMP.
Dr. Suravi Kalita	Selected as Post-doctoral Fellow, Homi Bhabha Centre for Science Education (HBCSE), Tata Institute of Fundamental Research (TIFR), Mumbai.

Lectures delivered at other institutes

Name	Title	Date & Venue
Dr.Arundhuti Devi	Municipal solid waste and its impact on the surface water quality of Deepor Beel	Sept 4, 2020, National Workshop on Municipal Solid Waste and its impact at Assam Science and Technology University, Tetelia Road, Near Assam Engineering College, Jalukbari, Guwahati-781013, Assam
Dr. Rahul P. Hepat	Webinar on Ph.D. and Post Doc Opportunities for Indian Students Abroad	Aug 16, 2020, Eruditus training Foundation

TRADITIONAL AND MODERN DRUG DISCOVERY AND DISEASE DIAGNOSIS

The Northeast Region (NER) of India is a part of world mega biodiversity hotspots, blessed with a wide range of physiographic and ecoclimatic conditions and the geographical 'gateway' for much of India's endemic flora as well as fauna. More than 80% of the locals of NER depends on natural resources for their day-to-day life especially on medicinal plants for their primary healthcare system based on traditional knowledge as they have limited access of modern healthcare facility. IASST, as a premier institute in this region, has been taking a leading role in exploring the traditional knowledge of locals to develop evidence-based therapy to promote health maintenance as well as diagnose and treat diseases. In developing countries, the majority of people rely on traditional medicines; however, many of these practices have not been rigorously and systematically studied or reported. 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. The Institute has also directed its research towards disease diagnosis and therapeutic monitoring. In cancer research, early detection is of high significance thus liquid biopsy helps in detecting the intact circulating tumour cells (CTCs) and cell-free circulating DNA (cfDNA) in blood. The detection of biomarkers using cfDNA is one of the promising non-invasive methods. These can serve as potential biomarkers for early detection of tumours, to determine treatment, prognosis and disease recurrences. Liquid biopsy has the advantages of being non-invasive, rapid, precise, and especially real-time. Also, it delivers information directly from affected organs/cells without a detour to surrogate tissue. For future in-depth research in these fields, we aim to integrate the traditional knowledge with experimental biology, biochemical evaluation, natural and synthetic chemistry, pharmacology, molecular biology to reach the goal of therapeutic and nutraceutical products for prevention and cure various diseases as diabetes, cardiovascular diseases, NAFLD, cancer etc.

Dr. Rajlakshmi Devi

Dr. Jagat Borah

Dr. Suman Kumar Samanta

Tarun Talukdar

Sagar Ramrao Barge

Neeraj Sarma

Deepsikha Swargiary

Paramita Choudhury

G. Shalini Devi

Himangshu Sarma

Swarnali Bhattacharjee

Puspanjali Khound

Nonibala Gurumayum

Himangshu Sarma

Semim Akhtar Ahmed

Plabita Baruah

Dipumani Barman

Devi Basumatary

Bhaswati Kashyap

Simanta Bharadwaj

Partha Pratim Sarma

Barsha Deka

Pranamika Sarma

Sushmita Das

Bandita Pathak

Anushree Roy

Paran Baruah

A. Characterization of Neurotrophins from Indian Snake Venom and Unveiling their Cellular Signaling Pathways to Induce Neuritogenesis: Therapeutic and Diagnostic application.

(Coordinator: Prof. Ashis K Mukherjee)

A.1. Understanding the neuritogenesis mechanism of nerve growth factor (NGF) from Indian Russell's viper venom by quantitative proteomic analysis

A previously unexplored NGF isoform (named RVV-NGFa) from Indian Russell's viper venom (RVV) was purified and characterized. The RVV-NGFa having a mass of 17388.725 Da, induced neuritogenesis in phaeochromocytoma PC-12 cells but did not show cytotoxicity against mammalian cells, hemolytic activity, platelet modulation, and interference in blood coagulation system which are the characteristic pharmacological properties of RVV indicating RVV-NGFA does not possess toxicity. However, the neuritogenesis mechanism of snake NGF was unknown; therefore, we are trying to explore the neuritogenesis pathways of RVV-NGFa by quantitative proteomics as well as transcriptomic analyses. The quantitative proteomic analysis has demonstrated differentially expressed intracellular proteins, both common and unique, in PC-12 cells post-treatment with mouse 2.5S-NGF (positive control) and RVV-NGFa.

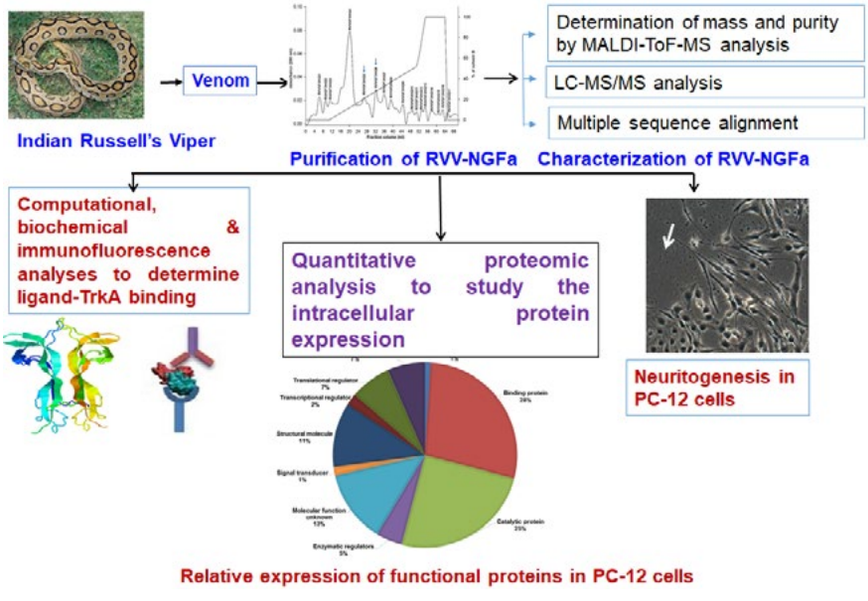


Figure 57: Schematic diagram showing the molecular mechanism of neuritogenesis by RVV-NGFa.

The functions of overexpressed common and unique proteins by RVV-NGFa are found to be antiapoptotic (cell survival), maintenance, and neuritogenesis (unpublished result). The results of inhibition of cellular signalling pathways by pathway-specific chemical inhibitors in unison with proteomic analysis have demonstrated that activation of extracellular signal-regulated MAPK1 as the major pathway for neuritogenesis whereas PKC pathway has a minor role in RVV-NGFa-induced neuritogenesis; however, JNK pathway might not have any role in neuritogenesis by RVV-NGFa. This is a unique finding to elucidate the molecular mechanism of neuritogenesis of a snake venom NGF (Figure 57). Future studies involving transcriptomic analysis in unison with proteomic analysis data will provide the neuritogenesis pathways followed by RVV-NGFa are in progress.

A.2. Therapeutic application of snake RVV-NGFa and venom-derived synthetic peptides in neuritogenesis and clinical diagnosis of breast cancer

The recombinant RVV-NGFa- and/or TrkA receptor binding region of the RVV-NGFa can be developed as a peptide-based drug prototype for the prevention and/or treatment of neurodegenerative disorders. The homology modelling to identify the TrkA receptor binding site of the snake venom toxins was done. Based on computational analysis, four peptides that do not show sequence homology to any snake venom toxins reported in the NCBI database were designed thus showing they do not exist/occur in nature and thus representing an invention rather than discovery. By in silico analysis and laboratory experiments, the invented custom peptides show interaction with the TrkA receptor and this binding results in neuritogenesis with high specificity, a high conversion rate of normal to neurite bearing PC-12 cells. Further, these peptides do not show toxicity, hemolytic activity, or bind to HEK-293, and L6 cells lacking TrkA receptor. Therefore, it may be anticipated that these peptides have great therapeutic potential for the treatment of neurodegenerative disorders.

To date, breast cancer is diagnosed by several classical and laboratory tests to determine the cancer prognosis. Studies from other laboratories have shown that overexpression of two extracellular receptors- TrkA and p75NTR in a majority of human solid cancers including breast cancer as compared to the expression of these receptors in a normal cell. Therefore, ex-vivo or in-vivo targeting of TrkA and/or p75NTR overexpressed in certain types of cancers, for example, breast cancer, may function as a biomarker for quick diagnosis of such cancers. The development of a snake venom NGF-based ex-vivo diagnostic tool and an in-vivo imaging technique for breast cancer detection, will augment the traditional clinic-pathological methods of cancer detection. We have initiated collaboration with the computation biology group for the image analysis of fluorescence signal post binding of fluorescence labelled peptides to cancer tissues for the detection of different stages of breast cancer.

B. Traditional knowledge-based drug discovery

(Coordinator: Dr. (Mrs.) Rajlakshmi Devi)

B.1. Qualitative analysis of bioactive phytochemicals present in Joha and Black rice through targeted LCMS/MS method

Rice (*Oryza sativa* L. indica) has been considered as one of the major diets in many communities. The different pigmented and scented rice draw special attention due to their high nutritional value and/or characteristic aroma. Joha rice from NER of India was reported to have anti-inflammatory and anti-arthritic activities. Black rice is composed of different kinds of nutrients and phytochemicals including mainly anthocyanin and flavonoids, which significantly enhanced glucose tolerance, and controlled the hyperlipidaemic conditions. The targeted LC-MS/MS analysis suggested that both the rice varieties contain various bioactive components. The analysis confirms the presence of oryzanol and ferulic acid in both the methanolic extract samples. Different poly phenols and flavonoids like apigenin, 4-hydroxy benzoic acid, apigenin, tricin, coumarin, avenasterol, coumaric acid, phenyl alanine, phenylsuccinic acid, α-tocophenol, caffeic acid, etc. are identified in scented rice samples (Figure 58). On the other hand, protocatechuic acid, and dehydroxy myricetin are detected in black rice extract, whereas those are not detected in scented rice extract. Petunidin galactoside, a known anthocyanin for its strong antioxidant property, is significantly higher in black rice compared to the scented rice variety. However, oryzanol and hydroxy decosanoic acid are more than threefold higher in scented rice seeds extract.

B.2. Evaluation of the cardioprotective effect of *Garcinia pedunculata* against isoproterenol-induced myocardial infarction in Wistar Rats

Myocardial infarction (MI) is one of the major health issues in the global population and is a common presentation of ischemic heart disease. MI is characterized by the increased myocardial metabolic demand, decreased supply of oxygen and nutrients via coronary circulation to the heart tissue along with increased oxidative stress, leading to cell death in the myocardium. It is well established that subcutaneous injection of a high concentration of isoproterenol, a synthetic adrenoceptor agonist, can deplete the energy reserve of the myocardium and induce severe oxidative stress and result in necrotic lesions in the myocardium.

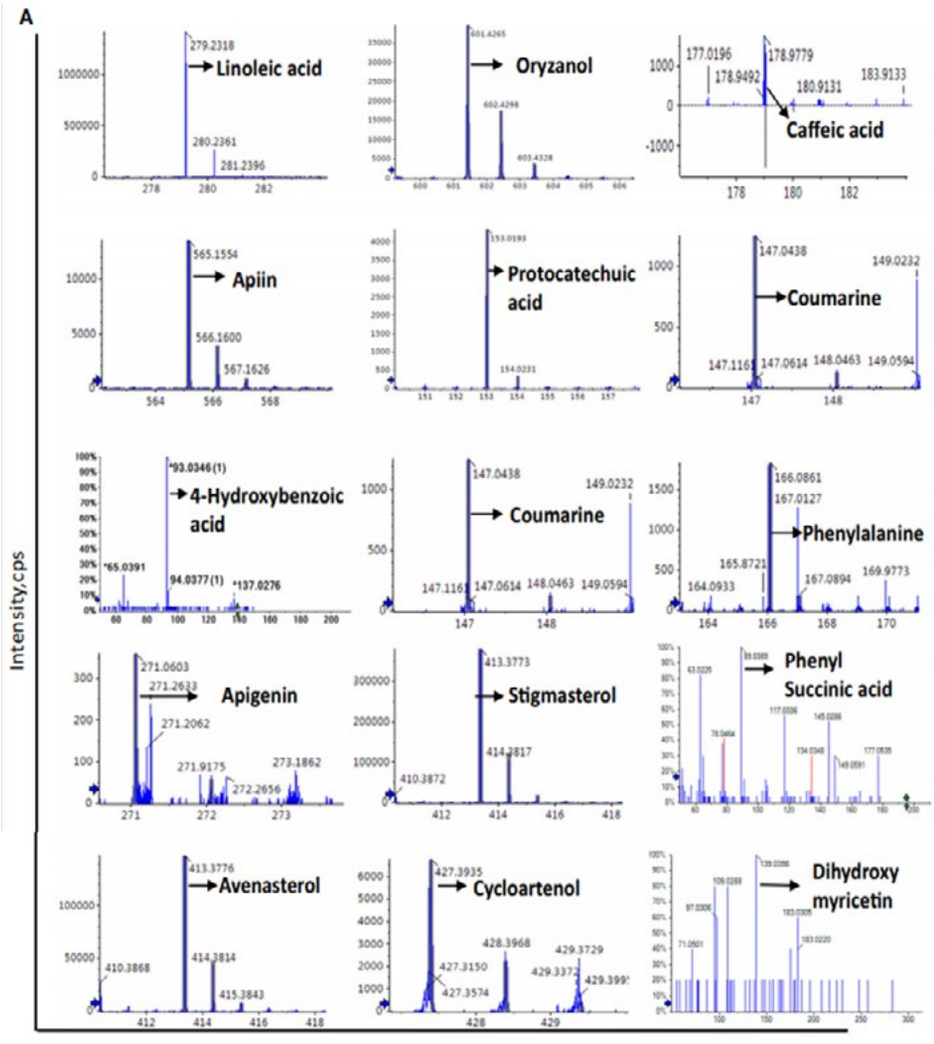


Figure 58: Targeted LC-MS/MS analysis confirms the presence of oryzanol, linoleic acid, and ferulic acid in both the methanolic extract samples. Apigenin, 4-hydroxy benzoic acid, apiin, tricin, coumarin, avenasterol, coumaric acid, phenyl alanine, phenylsuccinic acid, α-tocophenol, and caffeic acid were detected in Kon joha. Protocatechuic acid and dehydroxy myricetin were detected in black rice.

In the present study, male Wistar rats were injected with isoproterenol (85 mg/kg) for two consecutive days subcutaneously to induce acute myocardial infarction. The rats were pre-treated with *Garcinia pedunculata* Roxb. (chloroform extract, 100 and 200 mg/kg BW) for 28 days, doses given orally every alternate day (Figure 59). It was found that pre-treatment with the extract ameliorated the effect of isoproterenol as shown in the biochemical markers including CK-MB, CK, and LDH decreased activity and levels (Figure 60), which were significantly elevated in the isoproterenol-induced MI group without any treatment. These results indicate the cardioprotective effect of *G. pedunculata* against isoproterenol-induced myocardial infarction in rats.

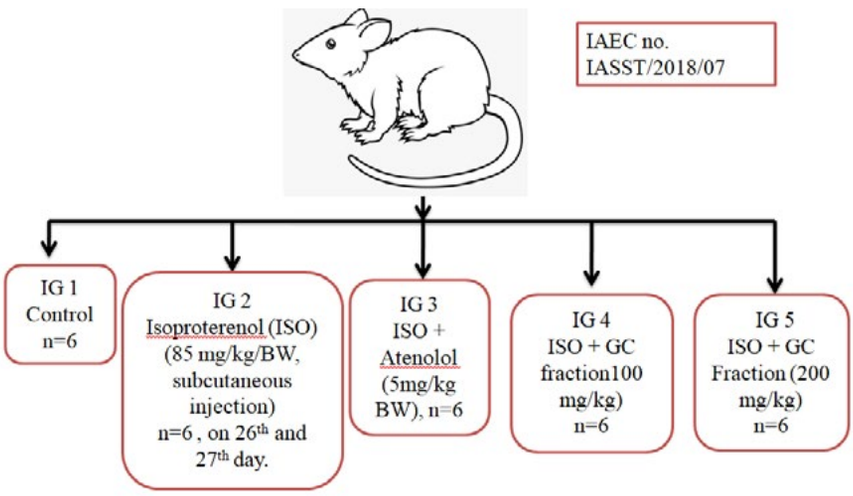


Figure 59: Diagrammatic representation of the experimental set-up in the animal study.

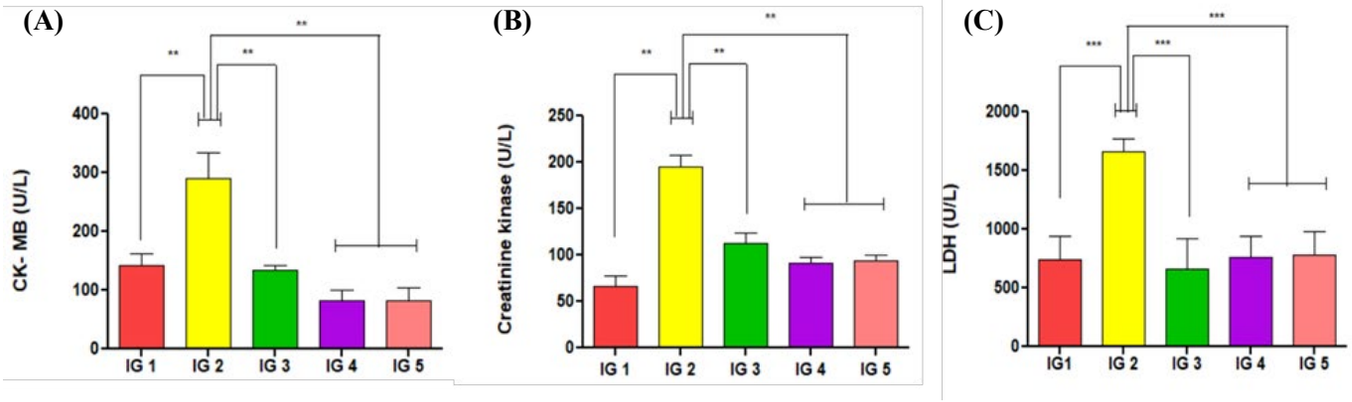


Figure 60: Graphs depicting serum CK-MB **(A)**, Creatinine Kinase **(B)** and LDH **(C)** levels. Data expressed as mean ± SD for groups of three observations, ** (Statistically significant ($P < 0.05$) compared to isoproterenol treated group *i.e.,* IG 2, control and treated group(s) as calculated by one-way ANOVA followed by Dunnet's multiple comparison tests).

B.3. Role of *Clerodendrum glandulosum* Lindl. in attenuation of atherogenesis: mechanistic insight into oxidative stress and endothelial dysfunction

Clerodendrum glandulosum (CG, F: Vervenaceae) Lindl. is a perennial plant having immense medicinal value and is commonly known as East Indian Glory Bower and locally as "Nefafu" in Assamese. In India, it is endemic to the hilly areas of the Eastern Himalayas and the entire North Eastern Region (NER). CG is used widely in the Indian indigenous system of Medicine and the decoction of the aerial parts is used to treat high blood pressure and diarrhoea. CG has been reported and proved to be immensely helpful for several other conditions *viz*. hypertension, abdominal pain, antihelminthic, antidote, blood purifier, colics in infants, cough, diabetes, diarrhea, dysentery, and gastric disorders.

Atherosclerosis is characterized by the accumulation of lipids within the artery wall wherein there is an ongoing inflammatory response because of the high plasma concentrations of cholesterol, particularly those of low-density lipoprotein (LDL) cholesterol. Recent advances have established a fundamental role for inflammation in mediating all stages of this disease from initiation through progression leading to the thrombotic complications of atherosclerosis. Lifestyle changes, along with certain treatments that reduce coronary risk also limit inflammation which helps ameliorate the lipid accumulation thereafter. In the case of lipid-lowering with statins, this anti-inflammatory effect does not appear to correlate with a reduction in low-density lipoprotein levels. Herbal formulations and plant extracts are being researched for finding further insights into combating inflammation in atherosclerosis and thus, targeting the therapy for this scourge of growing worldwide importance.

In the present study, HepG2 cells were treated with palmitate conjugated to BSA for the generation of reactive oxygen species (ROS). Prior to palmitate, the cells were pre-treated with ethyl acetate fraction (25 µg, 50 µg and 75 µg) of CG methanol-water extract and Metformin (60 µM). ROS was measured by DCFDA fluorescent tagging using standard FACS protocol.

Mitochondrial stress tests for HepG2 cells were also performed after treatment with palmitate (125µM) for 16 hours and after that were processed according to XFe analyser standard protocols.

Reactive Oxygen Species (ROS) generated by Palmitate was effectively reduced by ethyl acetate fraction. At concentrations of 100µg EAF lowered DCFDA stained cell populations similar to those of controls (Figure 61).

The mitochondrial stress test revealed that basal respiration effectively increased on cells administered with 50µg of EAF significantly ($P<0.05$), in comparison to that of palmitate. The activity was higher than those of standard metformin (60µM). ATP production also showed an increment in comparison

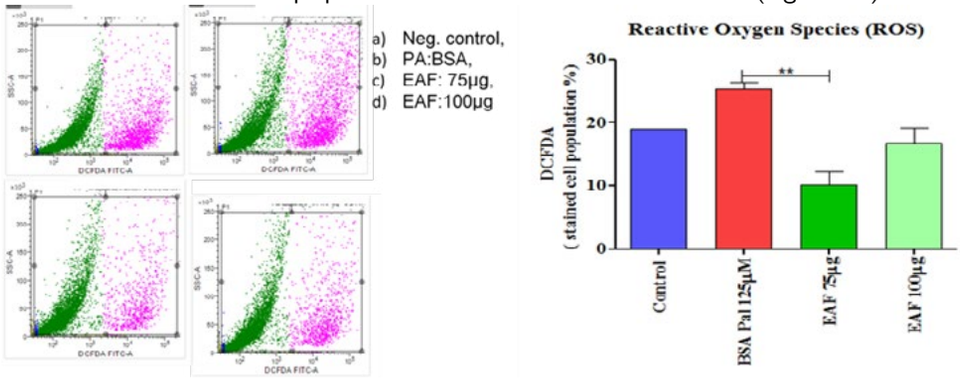


Figure 61: (A) Figure showing the two cell populations: Green (unstained), pink (DCFDA stained). **(B)** % cell populations stained in DCFDA.

to those of standards. Spare respiratory capacity and maximal respiration effectively showed a spike on pretreatment of cells with EAF (50µg) approaching those of the controls without palmitate treatment. EAF fraction worked effectively for the concentration of 50µg in amelioration of mitochondrial stress as indicated by the results (Figure 62).

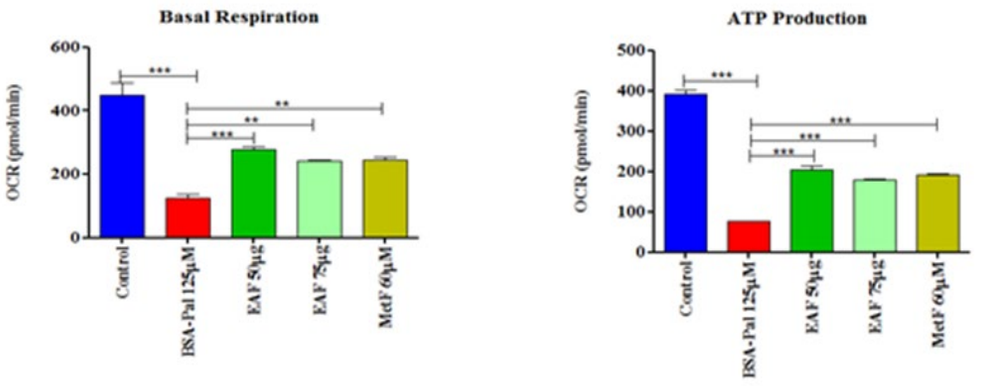


Figure 62: Graphs depicting the **(A)** basal respiration, **(B)** ATP production, **(C)** spare respiratory capacity and **(D)** maximal respiration for the healthy control, palmitate treated, EAF (50 µg) + palmitate, EAF (75 µg) + palmitate and Metformin (60 µM) + palmitate for Mitochondrial stress test in live and viable cells.

C. Traditional Knowledge-Based Drug Discovery

(Coordinator: Dr. Jagat C Borah)

The North East Region of India is a genetic treasure house of plant, animal and microbial resources. The region is one of the 12 mega-biodiversity rich zones of the world and forms a distinctive part of the Indo-Burma Hotspot. There is a need to put these invaluable plant genetic resources to use for the economic growth of the region in particular and to the nation in general, through scientific interventions. In recent years, due to the renewed interest in herbal products globally, the inclusion of Indian medicinal plants in US and EU pharmacopeia as there are opening up new directions.

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 new hope for innovations and the development of new drugs from botanicals in a scientific way and would help in the global acceptance of the use of herbal products by the modern medical profession.

Our group is contributing towards the mitigation of diabetes and its complications by investigating traditionally used medicinal plants. Work is focused on translational research towards the development of phytopharmaceutical drugs and/or lead molecules and/or Investigational New Drug (IND) from ethno-medicinal plants for Treatment of Diabetes Mellitus type 2 and its complications.

C.1. Anti-diabetic potential of *Tribulus terrestris* L. through the modulation of hepatic glucose production.

The plant, *Tribulus terrestris* L., (TT) also known as Gokhru/Gokshura in Ayurveda, has a long history in the application for the treatment of diabetes and diabetic nephropathy. But pharmacological evidence to understand the action of the plant and underlying mechanisms to support the proper and safe use in clinics are indispensable. Insulin resistance in the liver is a characteristic feature and major contributing factor to type 2 diabetes. Insulin resistance can lead to elevated gluconeogenesis and reduced glycogen synthesis in the liver and then causes hyperglycemia. The study was aimed to investigate the therapeutic potential of the extract, fractions and isolated constituent(s) of *Tribulus terrestris* on hepatic insulin resistance in type 2 diabetes and to elucidate the underlying cellular mechanisms through the modulation of the gluconeogenic pathway. The seed of the plant *Tribulus terrestris* was subjected to cold maceration extraction using solvent methanol at normal room temperature. Further, MeOH crude extract of TT was fractionated using n-Hexane, Ethyl acetate and n-Butanol. Further, the TT MeOH crude extract was screened through different types of bio assays in vitro in the rodent hepatocyte cell line CC1. The effect of TT MeOH crude extract (5-100 µg/mL) and free fatty acids (FFA, 0.75 mM) on the viability of anti-adenomatous polyposis coli clone CC1 cells using the alamar blue reduction assay was carried out to determine the proper doses for further experiments. The HPLC spectrum of butanol and water fraction showed the presence of the same major compound. Cell viability study showed that the treatment of CC1 cells

with TT MeOH crude extract up to 75 µg/ml and FFA had no detectable cell toxicity. TT MeOH crude extract restored the glucose uptake significantly with the highest uptake was observed in 1 µg/mL concentration. Among all the fractions, butanol fraction showed the most significant glucose uptake activity with the highest uptake at drug concentration 1 µg/mL (Figure 63).

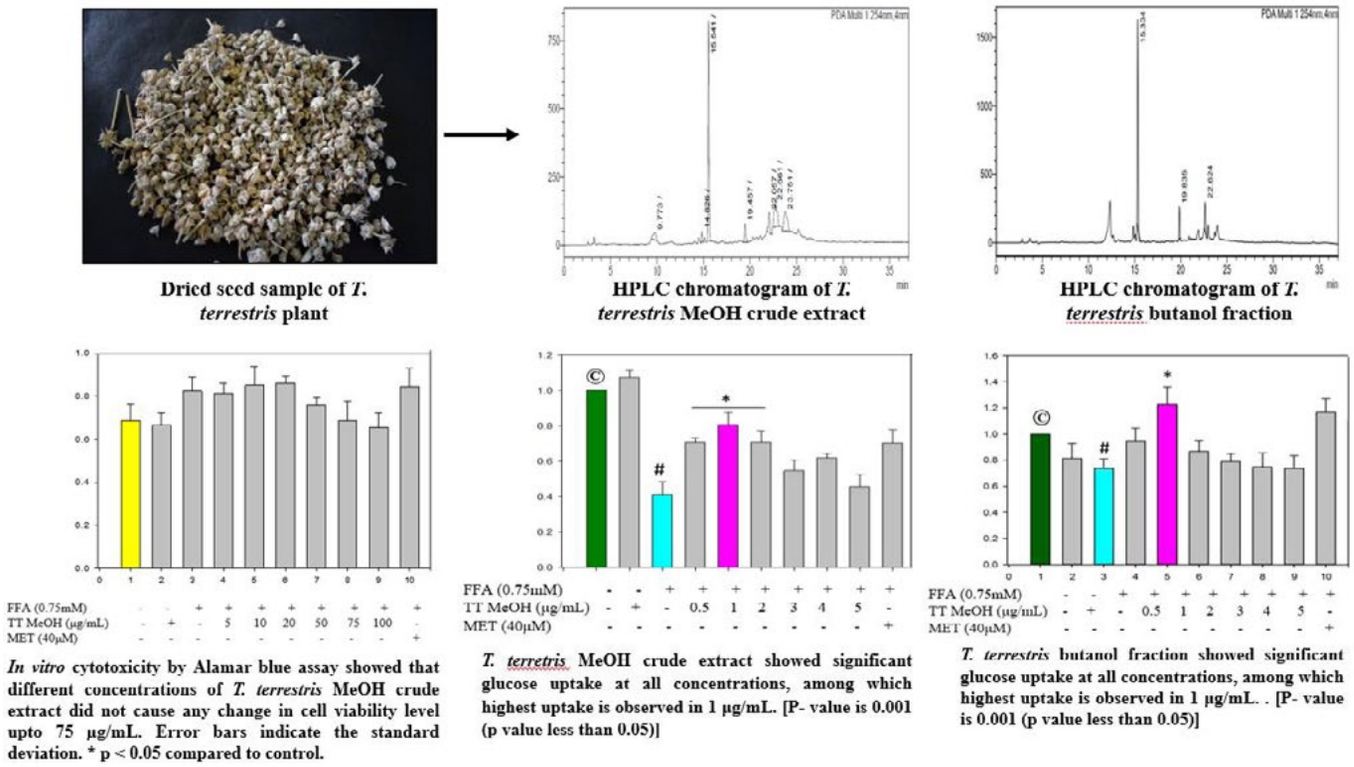


Figure 63: Results of chemical fingerprinting of TT MeOH crude extract, butanol fraction and in vitro bio- assays. The TT MeOH crude extract and butanol fraction increases glucose uptake activity in the diabetic CC1 hepatocyte model and helps in reducing hyperglycemia.

D. Breast Cancer Chemoprevention

Coordinator: Dr. Suman K Samanta

D.1. Breast cancer is a relatively complex and heterogeneous disease and rather classified into diverse subtypes, categorized with a discrete gene expression monogram including luminal subtype, (HER-2)-positive, basal-like and normal-like breast cancer. Chemoprevention related research work represents a promising approach for lessening mortality as well as the disease-follow-up cost from this devastating disease. Chemoprevention for a subset of breast cancer, especially an estrogen for growth/estrogen receptor (ER), is still clinical unmet. Currently, accessible medication for the prevention of ER+ breast cancers includes aromatase inhibitors (e.g., Exemestane) and astute estrogen receptor modulators (like Tamoxifen). While clinical evidence for the efficacy of these interventions in reducing the incidence of ER+ breast cancer is influential, but with pronounced side effects. Augmented risk of uterine cancer, thromboembolism and cataracts are some of the well-documented side effects associated with Tamoxifen use. Likewise, aromatase inhibitors have peculiar side effects, including reduced bone strength and osteoporosis. Therefore, a non-toxic chemopreventive intervention efficacious against dissimilar subtypes of breast cancer is still desirable.

Murraya koenigii (the common name is curry tree and "Krishnanimba" in Ayurveda) is such type of well-known Indian medicinal plant with a reach of several alkaloids and used in the treatment of various disorders including cancer for the past few decades. This plant material widely found mainly southern and north-eastern part of India and people use in their daily food also for its characteristic aroma. One of the major potential active carbazole alkaloids, Mahanine [C23H25NO2, MW: 347.458, IUPAC Name: 3,5-dimethyl-3-(4-methylpent-3-enyl)-11H-pyrano[3,2-a] carbazol-9-ol] have isolated from the leaves of the plant material and has a broad-spectrum antiproliferative activity in a different array of cancer. Murraya koenigii leaf being a rich source of bioactive secondary metabolites has received attention in drug development research. The formation of secondary plant metabolite(s) in medicinal plants depends on several factors and in this study the cause of variation in bioavailability and content of a vital bioactive phytochemical namely,

mahanine in the MK leaves from different geographical locations of varying soil properties and weather parameters was determined. Due to the easy isolation processes, very high bioavailability and minimal toxicity, the molecule is a tentative target as a future chemopreventive drug molecule. In this project, it will be an effort to establish Mahanine as a choice of chemopreventive agent for breast cancer and make it available in the market for all.

Figure 64 depicts the map of India and the Global Positioning System (GPS) tracked location from where the ***Murraya koenigii*** leaf samples, as well as soil samples, have been collected. From every location, samples are collected in quintuplets. The location was from southern, eastern, the north eastern, northern and western parts of India and the state were Andhra Pradesh (AP), West Bengal (WB), Assam (AS), Delhi (DL) and Maharashtra (MH) respectively with indicated GPS location. India-map and states map viz. AP, WB, AS, MH, DL were taken from a google search (URL: https://in.pinterest.com) and further painted to highlight the collection point. Quantification of mahanine (in microgram per mg) in EtOAC fraction of each collected sample. The graph represents the average quantity with SD of quintuplet samples from each location.

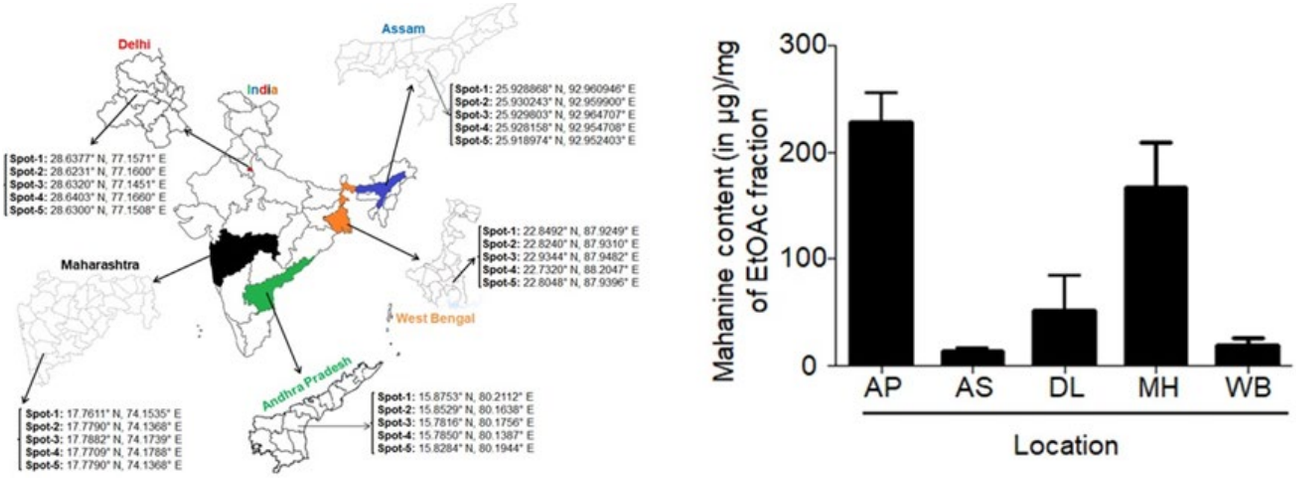


Figure 64: GPS tracked location of the Murraya koenigii leaf as well as soil samples; graph representing the average quantity with SD of quintuplet samples from each location.

E. Cancer Genomics, Mutation Detection and Comprehensive Monitoring of Head and Neck Cancer in North East India by Liquid Biopsy Approach

(Coordinator: Dr. Rosy Mondal)

Head and Neck Cancers account for approximately 30–40% of all cancer sites, in India. The Cancer Atlas project by the ICMR reported the incidences of HNCs in Assam, Manipur, Mizoram, Tripura, and Nagaland are found to be higher (54%). The world's highest incidence of cancers in men, which was of the lower pharynx (11.5/100,000 people) and the tongue (7.6/100,000 people), was reported from Mizoram. The possible reasons for the higher incidence of HNCs in India include extensive use of tobacco, ***pan masala*** (which include betel quid, areca nuts, and slaked lime), and ***gutkha***. In India, there is variability in the management of these patients. Liquid biopsy is a minimally invasive detection method for molecular biomarkers in body fluids which may serve as a novel tool in the management of head and neck cancer. Blood contains two types of cancer-derived materials that are susceptible to detailed molecular analysis: intact circulating tumour cells (CTCs) and cell-free circulating DNA (cfDNA). The detection of biomarkers using cfDNA is one of the promising non-invasive methods. These can serve as potential biomarkers for early detection of tumour, to determine treatment, prognosis and disease recurrences. Liquid biopsy has the advantages of non-invasive, rapid, precise, and especially real-time.

We have collected biological samples (n=28) from GMCH, Guwahati with written consent from the patients before any surgical interventions or therapeutic treatments. The blood samples were processed and the plasma cfDNA was extracted according to ***QIAamp*** Circulating Nucleic Acid ***Kit*** (QIAGEN, Germany). The genomic DNA was isolated from preselected regions of tumour tissue and blood by QIAamp® DNeasy® Kits (QIAGEN, Germany). We have standardized the protocol of effective isolation and quantification of cfDNA in our lab.

E.1. Development of pipeline for the identification and annotation of variants (SNP) in cell-free DNA, tumour and blood DNA by Next-Generation Sequencing approach

We have processed 15 cancer patients' samples for sequencing using the Ion torrent platform (Ion AmpliSeq technology). We have used the Ion AmpliSeq™ Cancer Hotspot panel covering approximately 2,800 COSMIC mutations. Out of 2800 mutations, we have detected 1884 SNVs in our analysis. Among them, 2 SNVs are consistent across all the patients in NE Region. The pipeline involves a quality control approach of the raw sequencing data, mapping in the human genome, annotation study, gene enrichment analysis. Our pipeline identified several SNVs in cell-free DNA that has been used for cancer panel design of Head and Neck cancer in the North Eastern region. The mutations are in the exonic region of the gene and non-synonymous in nature. Our analysis revealed that the identified mutations affected Androgen Receptor Signaling Pathway, MAPK signalling, DNA damage response, MAPK signalling pathway and TGF-beta Receptor Signaling Pathway. Network analysis showed the protein interacts with MDM2, BCL2L1, MDM4, CDKN1A, ATM, CREBBP (Figure 65).

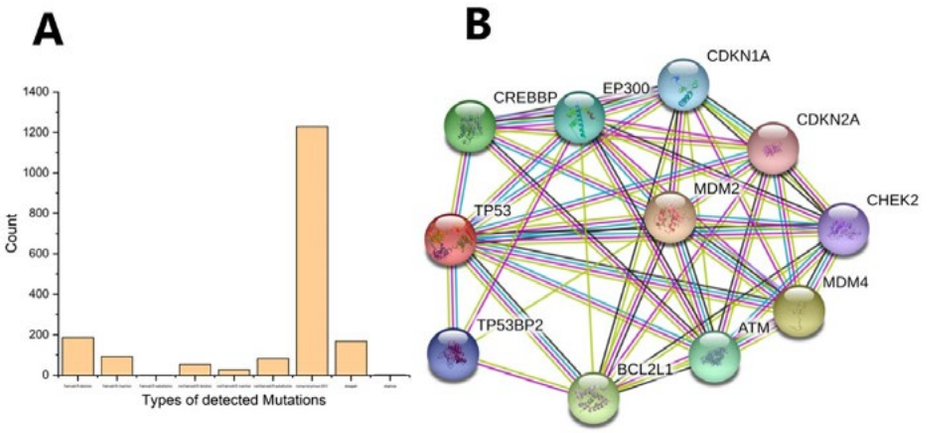


Figure 65: (A) Identified mutation types by using NGS data analysis using Ion torrent sequencing technology. **(B)** Interaction analysis of identified genes.

E.2. Prevalence of HPV infection in patients

We examined 20 samples of HNSCC. The isolated genomic DNA from HNSCC tissue samples was subjected to PCR to detect the presence or absence of HPV. The specific MY09(F)/MY11(R) primer designed for the human papilloma virus (HPV) L1 region along with positive and negative controls were analysed. The HPV positive control DNA sample which we have tested for MY09(F)/MY11(R) primer is HPV16+, however, it was HPV18-. Among HPV positive cases, two prevalent genotypes, HPV- 16 and HPV-18 were investigated by PCR using HPV-16L1 and HPV-18L1 specific primer. It was found that the HPV infection was present in 30% of the HNSCC cases as examined by PCR. HPV-16, HPV-18 and both HPV-16 & HPV-18 co-infection was detected in 20%, 5% and 5% respectively in HNSCC patients by PCR (Figure 66).

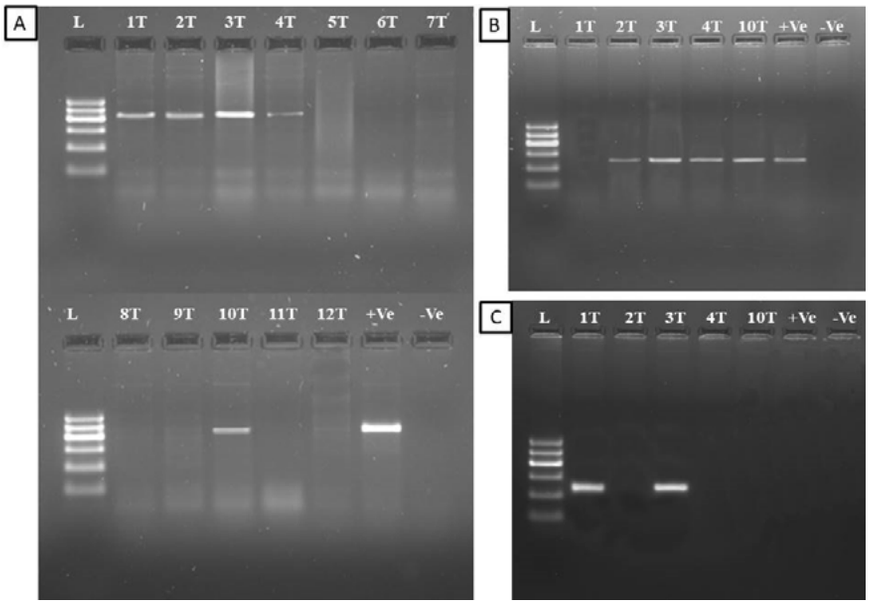


Figure 66: 2.5% agarose gel stained with EtBr showing **(A)** 450bp amplified product of HPV L1 (L= Molecular weight marker of 100 bp range, 1T-12T= sample, +ve= positive control, -ve= negative control), **(B)** 291bp of HPV-16 L1 **(C)** 292bp of HPV-18 L1 amplified product (L= Molecular weight marker of 100 bp range; 1T, 2T, 3T, 4T, 10T= sample, +ve= Positive control of HPV, -ve= negative control)

Extramural Research Projects

Completed Projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Achievement
Chemical profiling of Joha and Black rice of NER for nutritional, nutraceutical parameters and aroma compounds.	DBT, Govt. of India Total budget: 102.14 lakhs Duration: 3 years 6 months (2016-2020) PI: Dr (Mrs) Rajlakshmi Devi	Isolation, characterization and quantification of phytochemicals in different scented rice of Assam and development of value-added products for health benefit.
Integrating herbal medicine of NER with contemporary approaches to develop therapeutic strategies for metabolic syndrome.	DBT, Govt. of India Total budget: 10.44 crore Duration: 3 years 6 months (2016-2020) Co- PI: Dr (Mrs) Rajlakshmi Devi	The main goal of this project is to evaluate 10 herbal formulations commonly used by traditional healers against diabetes mellitus, through in-vitro bioactivity guided fractionation and animal model study and then qualitative and quantitative chemical profiling of the extracts and bioactive fraction through phytochemical analysis using sophisticated instruments like HPLC, HPTLC, LC MS MS, NMR etc and validation of those fractions. The final goal is to integrate herbal medicine with a contemporary approach for the cure of diabetes in a preventive and curative mode.

Ongoing Projects

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
Characterization of high-value phytochemicals of anti-diabetic and immunomodulatory properties in North-Eastern banana varieties.	DBT, Govt. of India Total budget: 36 lakhs Duration: 3 years (2018-2020) PI: Dr (Mrs) Rajlakshmi Devi	To study the bioactive compound(s) present in *Musa balbisiana* and study the effect of those compounds in *in vivo* model system.
Evaluation of antioxidant and anti-hyperlipidemic properties of few selected medicinal plants used by the tribal population of Goalpara district, Assam	DBT, Govt. of India Total budget: 19 lakhs Duration: 3 years (2019-20202 PI: Dr (Mrs) Rajlakshmi Devi	To study the antioxidant and anti-hyperlipidemic properties of few selected medicinal plants used by the tribal population of Goalpara district, Assam.
Empowerment of Tribal population of selected District of Assam by scientific exploration of *Musa balbisiana*- a versatile medicinal plant of Northeast.	DBT, Govt. of India Total budget: 71 lakhs Duration: 3 years (2020-2023) PI: Dr (Mrs) Rajlakshmi Devi	To empower tribal population of selected District of Assam by scientific exploration of an endemic banana species (*Musa balbisiana*)- a versatile indigenous species of Assam having lots of medicinal and economic value
Phytopharmaceutical Development of Ficus semicordata Buch. -Ham. ex Sm. as per regulatory guidelines of DCGI (No,BT/PR28069/TRM/120/192/2018).	DBT, Govt. of India Total budget: 197.288 lakh Duration: 3 years (2018-2021) PI: Dr. Jagat C. Borah	For the development of Phytopharmaceutical Drug in collaboration with CSIR and Industry.
Molecular and biochemical studies on indigenous medicinal plants from North East India including *Urginea Indica* (Bon Pollundu) and *Dactyloscapnos scandens* for the development of potential anti-diabetic formulation (No.BT/PR25194/NER/95/1071/2017) Dated: 15-03-2019	DBT, Govt. of India Total budget: 95.186 lakh Duration: 3 years (2019-2022) PI: Dr. Jagat C. Borah	Development of potential anti-diabetic formulation.
Chemical investigation and therapeutic evaluation for linking marker compound(s) with the anti-diabetic potential of young shoots of *Wendlandia glabrata* D.C. and fruits of *Phoebe cooperiana,* used by indigenous ST people of Arunachal Pradesh. (No. BT/PR24712/NER/95/828/2017)	DBT, Govt. of India Total budget: 85.959 lakh Duration: 3 years (2018-2021) PI: Dr. Jagat C. Borah	Development of standardized chemically defined anti-diabetic potential enriched fraction with pre-clinical data for future Phytopharmaceutical development.

Title of the project	Funding Agency; Total fund; Duration; PI/Coordinator	Goal
Cell-free nucleic acids as non -invasive for cancer detection	DST, Govt. of India Total budget: 35 Lakhs; Duration: 3 years 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 the plasma of head and neck cancer patients and to determine the feasibility of a 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.
Early detection and comprehensive monitoring of head and neck cancer using liquid biopsy approach: A study from Northeast India	DBT, Govt. of India Total budget: 58.4 Lakhs Duration: 3 years (2019-2022) Coordinator & PI- Dr. Rosy Mondal (DST- INSPIRE Faculty)	The development of a non-invasive liquid biopsy approach, utilizing cfDNA biomarkers, for efficient screening and comprehensive monitoring of HNSCC.
A novel approach for the integration of dietary phytochemicals with conventional drug and development of a therapeutic strategy through assessment of dissimilar biochemical parameters for breast cancer management	CSIR, Govt. of India Total fund: 28 lakhs Duration: 3years (2020-2023) PI: Dr. Suman K Samanta	Investigation of the efficacy of a dietary phytochemical (as a chemopreventive agent) alone and/or combination with Tamoxifen/ Exemestane administration for anticipation of breast cancer in the different subtype.

PUBLICATIONS

In cited journals

Author (s)	Title	Journal name	Volume & Issue no./ page no.	Month/ Year of publication	Impact factor
Paramita Choudhury, Krishna N. Dutta, Akanksha Singh, Dipankar Malakar, Manoj Pillai, Narayan C. Talukdar, Suman Kumar Samanta, and Rajlakshmi Devi	Assessment of nutritional value and quantitative analysis of bioactive phytochemicals through targeted LC-MS/MS method in selected scented and pigmented rice varietals	Journal of Food Science	85/6	19th April 2020	3.167
Paramita Choudhury, Krishna Nayani Dutta, Prashanta Kumar Deb, Narayan C Talukdar, Suman Kumar Samanta, Rajlakshmi Devi	Quantitative analysis of bio-active phytochemical (s) in selected scented rice varieties (*Oryza sativa*) reveals its intake towards advantage against metabolic disorders	Indian Journal of Traditional Knowledge	20/1	2021	0.731
Raghuram Kandimalla, Momita Das, Sagar R. Barge, Partha Pratim Sarma, Dibya Jyoti Koiri, Arundhuti Devi, Arjun Kumar Karki, Anil Kumar, Rajlakshmi Devi, Bikas C. Pal, Narayan C. Talukdar, Suman Kumar Samanta	Variation in the biosynthesis of an effective anticancer secondary metabolite, mahanine in Murraya koenigii, conditional on soil physicochemistry and weather suitability	Scientific Reports	10(1): 20096	18th November 2020	4.379
Swarnali Bhattacharjee, Rajlakshmi Devi	A comprehensive review of Garcinia pedunculata Roxb. and its therapeutic potential.	Mini-reviews in Medicinal Chemistry	21/1	16th February 2021	2.733
Sagar Barge , Dhananjay Jade , Gokul Gosavi, Narayan Chandra Talukdar, Jagat Borah	*In-silico* screening for identification of potential inhibitors against SARS-CoV-2 transmembrane serine protease 2 (TMPRSS2).	European Journal of Pharmaceutical Sciences.	V-162 105820	March 2021	4.384

Author (s)	Title	Journal name	Volume & Issue no./ page no.	Month/ Year of publication	Impact factor
Parul Kamboj, Soumalya Sarkar, Sonu Kumar Gupta, Neema Bisht, Deepika Kumari, Md. Jahangir Alam, Sagar Barge, Bhaswati Kashyap, Barsha Deka, Simanta Bharadwaj[3], Seydur Rahman, Partha Pratim Dutta, Jagat C. Borah, Narayan Chandra Talukdar[3]*, Sanjay K. Banerjee* and Yashwant Kumar*	Methanolic extract of Lysimachia candida Lindl. prevents high-fat-high-fructose-induced fatty liver in rats: Understanding the molecular mechanism through untargeted metabolomics study.	Frontiers in Pharmacology	V-12, 653872	15th April 2021	5.810

Patents

Inventor(s)	Title	File no. for enrollment	Provisional/ final patent grant no.	Issue no. of patent office
Bhaswati Kashyap, Simanta Bharadwaj, Sagar Barge, Barsha Deka, Yunush Sheikh, Seydur Rahman, Aparajita Ghosh, Partha Dutta, Raghuram Kandimalla, Jagat C Borah, Mohan C Kalita, Rantu Sharma, Deepsikha Swargiary, Sanjay Banerjee and Narayan C Talukdar.	A herbal composition from Premna herbacea, useful for prevention of Obesity and Type 2 diabetes and a method for its extraction	PCT/ IN2019/050887, 2019 and WO 2020/115767, June 2020.	Nil	Nil
Jagat C Borah, Narayan C Talukdar, Pranjan Barman, Naba Kumar Hazarika, Seydur Rahman, Yunus Sheikh, Kangkan Kalita.	Herbal formulation for prevention of Type 2 Diabetes Mellitus and conditions associated therewith.	No. 202031027554, June 2020.	Nil	Nil

Presentation in Conferences/seminars

Invited talks

Faculty	Title	Programme Name	Date & Venue
Dr. Rosy Mondal	Cancer Genomics	International Webinar on Challenges and Opportunities in Biotechnology and Biochemistry	1st Feb 2021, Burdwan Institute of Management and Computer Science, affiliated to The University of Burdwan

Contributory

Author(s)	Title	Conference name	Oral/poster	Date & Venue
Himangshu Sarma	Multiphase Use of Natural Fiber Extracted for Musa balbisiana Colla: A Potential Medicinal Plant in Northeast, India	3rd National Conference on Recent Advances in Science and Technology (NCRAST-2020 under TEQIP –III)	Poster	17th -19th August, 2020 at Assam Science & Technology University, Guwahati, Assam -781014

Conferences/Workshops/Meetings/Webinar attended

Faculty/Research scholar	Conference	Date & Venue
Puspanjali Khound	International virtual conference on "Frontiers in health sciences" organized by Cotton University and IITG	7-8th August 2020
Nonibala Gurumayum	International virtual conference on "Frontiers in health sciences" organized by Cotton University and IITG	7-8th August 2020

Faculty/Research scholar	Conference	Date & Venue
Puspanjali Khound	National Webinar on "SARS-CoV-2: Complexities in the viral genome and prospects of its control" organized by Institutional Biotech Hub (IBH) and IQAC, DKD College, Dergaon, Assam	14th August 2020
Puspanjali Khound	International Webinar entitled "Insights from transdisciplinary approaches for responding to COVID-19 impacts in aquatic- social- ecological systems" organized by Department of Zoology (ZSA Unit), Jawaharlal Nehru College, Boko under DBT Star Status Scheme, in collaboration with Zoological Society of Assam (ZSA)	15th August 2020
Puspanjali Khound	International Webinar on "The Impact of COVID-19 pandemic on Women and Family Health" organized by IQAC, College of Education, Nagaon, ZSA	17th August 2020
Puspanjali Khound	National Webinar on "Areca-nut induces genomic changes that lead to carcinogenesis: Cytogenetic to Molecular Genetic Studies" organized by Department of Zoology in collaboration with Internal Quality Assurance Cell (IQAC), Nowgong College, Nagaon, Assam	18th August 2020.
Nonibala Gurumayum	National Webinar on "Areca-nut induces genomic changes that lead to carcinogenesis : Cytogenetic to Molecular Genetic Studies" organized by Department of Zoology in collaboration with Internal Quality Assurance Cell (IQAC), Nowgong College, Nagaon, Assam	18th August 2020.
Puspanjali Khound	International Webinar on "Humans as an Intelligent Species Where have they come from? Where are they going?" organized by ZSA	21st August 2020
Puspanjali Khound	National Webinar on "Transforming Indian Higher Education: A Journey from NPE, 1986 to NEP, 2020" organized by ZSA Unit of Bahona College & Majuli College and Zoological Society of Assam (ZSA)	6th September 2020.
Puspanjali Khound	International Webinar on the topics "Community Conservation of the Greater Adjutant Stork by Changing Perceptions and Linking to Assamese Tradition" organized by Department of Botany and Internal Quality Assurance Cell (IQAC) of Birjhora Mahavidyalaya	18th September 2020
Puspanjali Khound	National Webinar on the topics "Normal Wave Dynamics in Dwarf Plasmas" organized by Department of Physics and Internal Quality Assurance Cell (IQAC) of Birjhora Mahavidyalaya	19th September 2020
Himangshu Sarma	Participated in AICTE Sponsored International E-Conference on Pharmacy Practice and Therapeutics held at Nirmala College of Pharmacy, Mangalagiri, Andhra Pradesh, India in Collaboration with Wilkes University, USA & Myongji University, South Korea, 19-20th August 2020.	19-20th August 2020
Nonibala Gurumayum	Two days Online webinar on Next-generation sequencing for deciphering host pathogen interactions held organized by Indian Phytopathological Society in collaboration with Bionivid Technology Pvt. Ltd.	4-5th February 2021.
Nonibala Gurumayum	Workshop on Principle of confocal microscopy & its application in biomedical field co-conducted by Leica Microsystems and BioNest-IASST	19th February 2021
Dr. Rosy Mondal	International Virtual workshop on 'COVID 19: RT-PCR Diagnosis and Therapeutics'	5-7th August 2020, University of Kalyani Kalyani, Nadia

Other Activities

a. In 2020, Prof. Ashis K. Mukherjee was recognized as the topmost two per cent scientists of the world in Biochemistry and Molecular Biology.

b. In 2021, Prof. Ashis K. Mukherjee was selected as an Expert Member of World Health Organization (WHO) committee under Neglected Tropical Diseases for Control and Prevention of snakebite envenoming.

c. Prof. Ashis K. Mukherjee was elected as Outstanding Professor in the Faculty of Biological Sciences, The Academy of Scientific and Innovative Research (AcSIR) (an Institution of National Importance established by an Act of Parliament, India) in 2021.

d. Dr. Rajlakshmi Devi acted as PhD viva examiner of Mr. Mrinmoy Gautam of Dr. M.G. R Medical University, Tamil Nadu, India on 17/02/2021

e. Dr Rajlakshmi Devi organized a number of meetings during 2020-2021 at villages like Mataikhar, Garbhanga under Rani Block, Kamrup (M) to make people aware of the scientific exploration of *Musa balbisiana* – a versatile medicinal plant of Northeast India and encouraged farmers of those villages for extensive plantation of *Musa balbisiana* under DST, Govt. of India.

f. Dr Rajlakshmi Devi becomes the Secretary of the IASST Branch of Assam Science Society- a scientific organization of Assam. The main motto of this society is "Science to the masses" and working dedicatedly and tirelessly for the scientific development of Assam since 1953.

g. Dr Rajlakshmi Devi becomes Convener of the Sub-committee "Woman and Science" of Assam Science Society- the parent organization of IASST for the year 2021-2023.

h. School-level Class undertook by Dr. Rajlakshmi Devi: Lab experience-based science education for school students: an outreach programme initiated by IASST under Department of Science and Technology, New Delhi.

i. Dr. Rajlakshmi Devi undertaken AcSIR Classes for Ph D students for 3 credits (1 credit for 14 classes) for the session of 2020-2021.

Visits to national/international institutes/laboratories

Faculty	National/international institutes/ laboratories	Date
Dr. Jagat C Borah	Department of Pharmaceutical Analysis, NIPER Guwahati, Assam.	Served as External Expert for 4th semester dissertation examination on 20 & 21 July 2020.
Dr. Jagat C Borah	NIPER Guwahati, Assam	Served as Expert member for screening applications for the post of Junior Technical Assistant in Biological and Pharmaceutical Sciences on 21-09-2020.
Dr. Jagat C Borah	NIPER Guwahati, Assam	Served as Expert member for screening applications for the post of Technical Supervisor Grade-I 0n 13-10-2020.

M. Pharm/ M.Sc. / B. Tech projects/training courses offered at IASST

Name(s) of trainee	Programme and supervisor	Course/ Funding	Title of work	Duration
Bhanita Nath	Third semester of M. Pharm at Regional Institute of Paramedical and Nursing Science, Mizoram.	Self	Effect of *Musa balbisiana* on brain senescence of ageing rats induced by D-galactose.	Start: 9/10/2020 (1 year)
Suchita Shalini	Second year student of M. Sc (Pharm) Biotechnology pro-gramme. NIPER, Guwahati	Self	Comparative analysis of bioactive phytochemicals present in four different banana varieties of North-East India.	Start: 15/10/2020 (1 year)

ACADEMIC ACTIVITIES

ACADEMIC SECTION

Prof. Heremba Bailung

Dhruba Sharma

Niranjan Kr. Bhagobaty

Prasanta Ch. Das

Ph.D.s Attained

Name of Student	Name of Supervisor	Title of the Thesis	Award giving University
Binita Borgohain	Prof. H. Bailung	Studies on sheath characteristics in low temperature plasma relevant to low earth orbit (LEO) condition.	Gauhati University
Sristi Majumdar	Dr. Devasish Chowdhury (Supervisor) and Dr. Debajit Thakur (Co-Supervisor)	Novel Carbon Nanomaterial for Detection, Diagnostic and Therapeutic Applications	Gauhati University
Bijay Kumar Sah	Sarathi Kundu	Structure and Morphology of Model Membranes and Protein Thin Films	Gauhati University
Priyanka Kalita	Dr. Gautam Choudhury	Analysis and application of some queueing models under different vacation policies	Gauhati University
Mr. Manas Jyoti Das	Dr Lipi B Mahanta	Analysis and Classification of Computed Tomography and Histological Images of Lung- A Wavelet Approach	Gauhati University
Suravi Kalita	Dr. Arundhuti Devi	Relation between the carbon content and the physicochemical parameters of water, sediment and macrophytes of Deepor Beel, Guwahati, Assam	Gauhati University
Ranjita Das	Dr. Debajit Thakur	Exploration and diversity of Actinobacteria prevalent in microbiologically unexplored protected forest ecosystems of Assam for antimicrobial metabolites	Gauhati University

Summer Internship/Winter Internship/Dissertation Program/M. Sc./B.Tech Projects/Training courses offered at IASST

Name and Affiliation	Program	Supervisor	Topic	Duration (months)
Ravindra Chaandra	Intern (M.Sc. 3rd Semister Project)	Dr. Subir Biswas	Designing of a filament assisted DC-discharge plasma source	2
Ms. Chandrawali Sarma	Winter Intern (M.Sc. Biotechnology)	Kamatchi S	Ionic liquids mediated protein extraction from silk fibres	2
Ms. Madhusmita Kalita				2
Joysmita Nandi	B.Sc.	Dr. Sarathi Kundu	To Study Thermodynamics and Phase Transitions in Langmuir Monolayers, Monolayer Isotherms, Behavior of Isotherms of Different Molecules by Theoretical and Experimental Analysis	2

Name and Affiliation	Program	Supervisor	Topic	Duration (months)
Tarali Das	UG Project	Dr. Lipi B Mahanta	Study on effects of different pre-processing techniques on colposcopic images	5
Divya Subhasini	UG Project		Study on effects of different pre-processing techniques on colposcopic images	5
Ankit Kumar Shah	UG Project	Dr. Lipi B Mahanta	A study on normalization of colposcopy images for quantitative analysis	4
Kapil Rabha	PG Project		Computer assisted automated identification of handloom gamosa using ALEXNET	7
Tariq Aziz	PG Project		Computer assisted automated identification of handloom gamosa using VGG16	7
Sarujit Dey	PG Project		Computer assisted automated identification of handloom gamosa using VGG19	7
R Mala	PG Project		Computer assisted automated identification of handloom gamusa using first-order statistical histogram features	7
Prince Shahu	PG Project		Computer assisted automated identification of handloom gamusa transform domain texture features	7
Bishnu Prasad Sarmah	PG Project		Computer assisted automated identification of handloom gamusa using porosity analysis.	7
Sanjoy Pator	Internship		Training of Cnn Model for Cervical Cancer Images using Keras	3
Dayananda Dowarah	Internship		Development of a Software for field test of Cervical Cancer using Pap Smear Images	5
Bhanita Nath	Third semester of M. Pharm at Regional Institute of Paramedical and Nursing Science, Mizoram.	Dr. Rajlakshmi Devi	Effect of *Musa balbisiana* on brain senescence of aging rats induced by D-galactose.	12
Suchita Shalini	Second year student of M. Sc (Pharm) Biotechnology programme. NIPER, Guwahati		Comparative analysis of bioactive phytochemicals present in four different banana varieties of North-East India.	12

PLACEMENT OF IASST SCHOLARS

Name of the member	Name of the supervisor	Position and current laboratory
Saidur Rahman	Dr. N. C. Talukdar	Assistant Professor, Downtown University, Assam
ParthaPratim Dutta	Dr. J. C. Borah	Assistant Professor, Downtown University, Assam
Deepshikha Gogoi	Dr. A. R. Pal	Assistant Professor, Abhayapuri College, Assam
Abinash Nath	Dr. (Mrs.) R. Devi	Lab Attendant, AIIMS Guwahati
Dipjyoti Kalita	Dr. M. R. Khan	Admin. Assistant, IIT, Guwahati
Nihar Ranjan Choudhary	Dr. Dhruba Sharma	Sub Inspector, Assam Police
Dweepan Barman	Dr. Dhruba Sharma	Section Assistant, Irrigation Dept., Govt of Assam,

PLACEMENTS AT IASST FROM OTHER INSTITUTES

Sl. No	Name of the member	Name of the supervisor	Earlier Laboratory
1	Manisha Goswami	Dr. Arundhuti Devi	Gauhati University

Sl. No	Name of the member	Name of the supervisor	Earlier Laboratory
2	Chandrabhan Kakoty	Dr. Devashish Choudhury	Foundation for MSME Clusters, Sutra Consulting, Metro Cash and Carry India Pvt Ltd, GCMMF (Amul), Tata Consultancy Services
3	Dr. Tania Paul Das		APT Research Foundation, Pune
4	Dr. Maloyjo Joyraj Bhattacharjee	Dr. M.R.Khan	Academia Sinica, Taipei, Taiwan (Wen-Hsiung Li)
5	Dr. Sushmita Das	Dr. M.R. Khan	Handique Girls College
6	Mr. Rakesh Sarkar		CMJ Breweries Pvt. Lab
7	Mr. Rashid Habib Abedeen		Lower Assam Academy
8	Mr. Asish Kr. Parasar		Aaryanak Foundation
9	Miss Dipjyoti Kalita		
10	Mr. HirokjyotiDeka		Pollution control board
11	Mr. Minku Das	Dr. Devashish Choudhury	IOCL Bongaigaon Refinery
12	Mr. HridoyJyoti Bora	Dr. Anamika Kalita	NIT- Meghalaya
13	Mr. Kaushik Paul	Dr. Rajib Borah	Bodoland University

KNOWLEDGE RESOURCE CENTER

Dr. Tarini Dev Goswami

Subhrojit Sengupta

Ratul Baishya

Sarala Deka

Glimpses of KRC

The Knowledge Resource Centre (KRC), the preeminent the hub of learning and research activities in IASST, Guwahati, has been significantly enriched in 2020-2021. The extant facilities were empowered by the addition of 340 new books and services extended to the academic community. In a year fragmented by the Covid-19 pandemic, the procurement of books based on the requisition of the patrons, circulation of 421 books, the photocopy and printing services of 80,150 pages and 485 scans bear witness to the services rendered by the KRC.

KRC has connected the remote North Eastern Region to knowledge resources beyond its boundaries through memberships to the National Knowledge Resource Consortium (NKRC), National Digital Library (NDL), Developing Library Network (DELNET) and Current Science Association (CSA). The access and usability of KRC is enhanced by individual sections dedicated to Circulation, Technical Processing Section, Reading Area, Digital Resource Section, Periodical Section, Book Section, Property Counter, Mini Conference Room, Back Volume Section and Faculty Reading Room, providing smooth functioning of the center and better services to the users. The KRC collection include 7730 Books, 2939 bound periodicals, 109 Theses, 184 dissertations, 506 research papers (Journal articles and chapters in books). The center provides its patrons the access to subscribed e-resources like e-journals comprised of scholarly

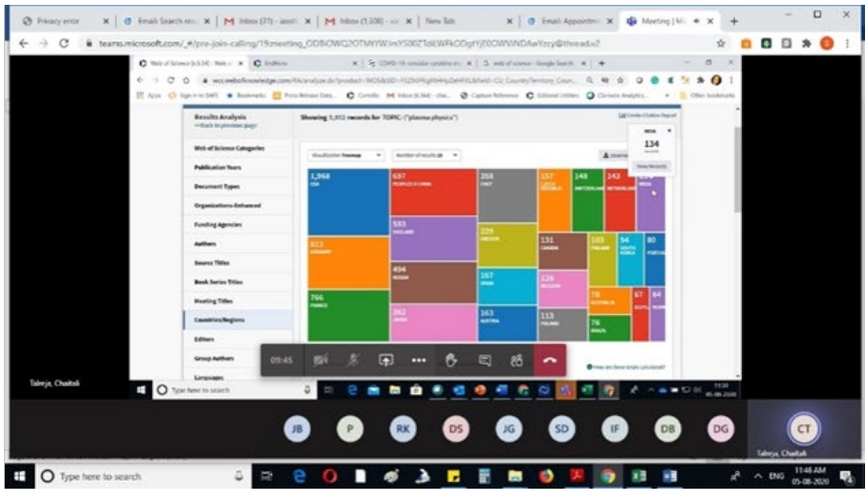
content via Wi-Fi and LAN (Local Area Network) connections and also manages the use of iThenticate, a plagiarism checks software and Grammarly, a writing assistant software. There is an Institutional Repository (IR)/ Digital Library of KRC having the resources of institute research papers, annual reports, theses, newspaper clippings, rules and regulations, etc., accessible through institute's Wi-Fi or LAN connectivity. The center provides its services to the researchers of other educational and research institutes in North East India. Since its inception, the KRC has been playing an important role in providing information and various academic services to its users using modern tools to the scientific community involved in Research and Development activities in the institute.

MEETING/CONFERENCE/SEMINAR/WORKSHOP/TRAINING COURSE/SYMPOSIUM ORGANIZED

It is a matter of pride that IASST Guwahati was able organize a total of 10 programmes that included user awareness, webinars, online workshops, and virtual celebration of annual events like the Hindi Pakhwada and International Women's Day. Four individual programmes, using virtual platforms, were organized by KRC-IASST to enhance user awareness on software usage. The vital requirement to integrate funding, collaborator discovery, and publishing was addressed through an awareness programme organized by KRC-IASST in association with ProQuest LLC, United States. "e-Hindi" was the main theme of the webinar to celebrate Hindi Pakhwada and inculcate ease of using Hindi in everyday office communication. Five highly relevant webinars were organized by Team BioNest-IASST at IASST on Sustainable Materials, Bio-Entrepreneurship, High Tech BioStartups, Confocal Microscopy and the International Women's Day. The events, organizers, resource persons and participants are detailed subsequently. IASST remains indebted to them all for upholding the standards of scientific communication, interaction and exchange.

KRC-IASST- Clarivate Analytics, United States, user Awareness Programme on Web of Science

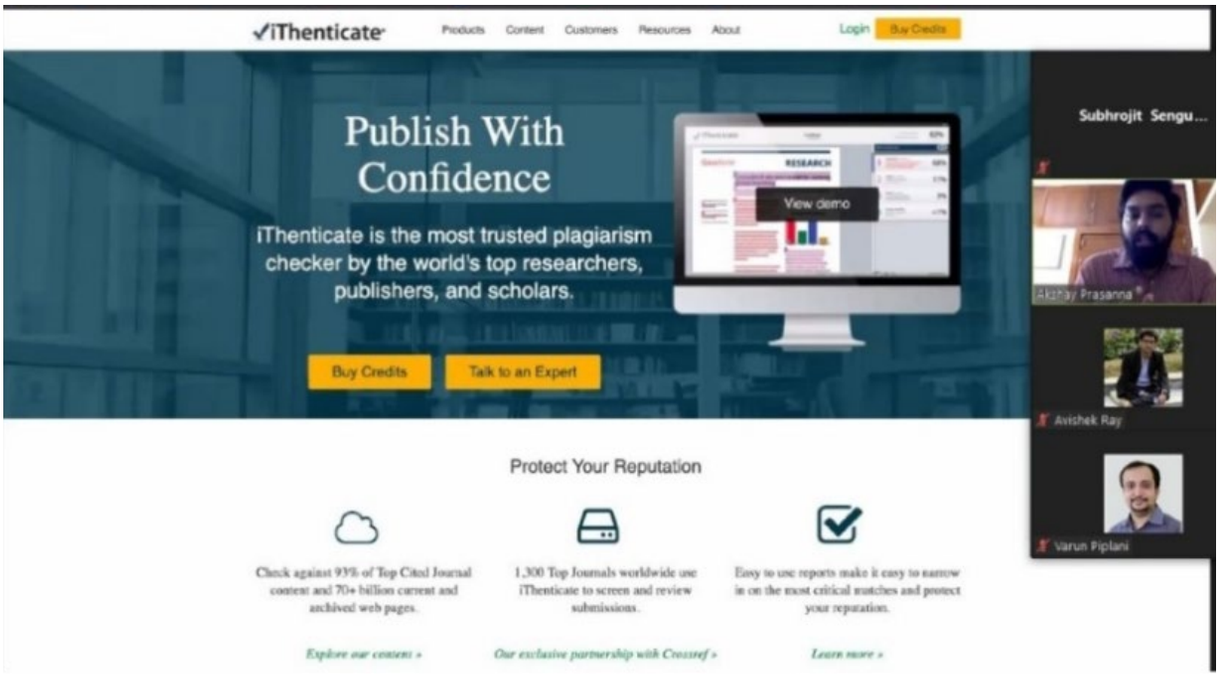
KRC-IASST in association with Clarivate Analytics (United States), organized an user awareness programme on Web of Science, on 5th August 2020, using a virtual platform. Mrs. Chaitali Talreja, Senior Analyst/Solution Consultant at Clarivate Analytics, India deliberated on the citation website, the databases, and its significant features, in her talk on "Usage of Web of Science". The meeting was attended by the faculty members and research scholars of IASST.



Mrs. Chaitali Talreja presenting on the usage of Web of Science

KRC-IASST-Turnitin, LLC, United States user Awareness Programme on Anti-Plagiarism Software- iThenticate

A user awareness programme on iThenticate, an anti-Plagiarism software, was organised by KRC-IASST in association with Turnitin, LLC, USA. The virtual programme conducted on 27th August 2020, was helmed by Mr. Akshay Prasanna, Customer Success Manager, Turnitin. He discussed the usage and facilities in-built in the iThenticate Anti-Plagiarism Software.



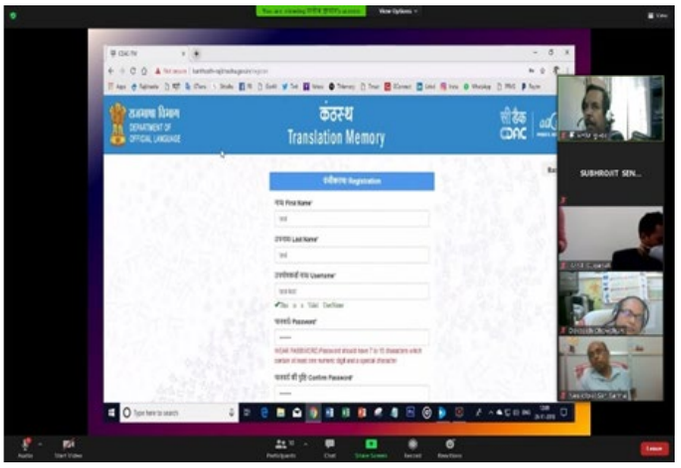
Mr. Akshay Prasanna, Customer Success Manager, Turnitin, explained the usage and facilities in- built in the iThenticate Anti-Plagiarism Software.

KRC-IASST-ProQuest LLC, United States User Awareness Programme of PIVOT

KRC-IASST in association with ProQuest LLC, United States organized a virtual user awareness programme on PIVOT on the 25th of September 2020. Mr. Subrata Chakrabarty, Customer Manager, ProQuest India, underscored the vital requirement of a tool like PIVOT, in premier research organizations like IASST. The tool for accelerating the research process by integrating funding, collaborator discovery was appreciated by all participants.

IASST Webinar on Hindi Pakhwada

IASST virtually joined the nation-wide Hindi Pakhwada celebrations held from 14th-30th September 2020. To mark the occasion, Mr. Manoj Kumar, Senior Translator, Employees' State Insurance Corporation, delivered a lecture on "e-Hindi". His emphasis inculcating the ease of using Hindi in everyday office communication has encouraged the IASST staff, scholars and faculty to enhance Hindi usage and communication.



Mr. Manoj Kumar, Senior Translator, Employee's State Insurance Corporation talked on the occasion of Hindi Pakhwada

IASST webinar on Sustainable Materials for Food Packaging

Team BioNest-IASST at IASST organized a webinar on Sustainable Materials for Food Packaging, on 9th November 2020. Prof. Ashis Kr. Mukherjee, Director, IASST, welcomed the three distinguished speakers, in his opening address. Prof. Vimal Katiyar, Dept. of Chemical Engineering, and Co-coordinator, Center of Excellence for Sustainable Polymers, IIT Guwahati, delivered the first lecture of the webinar on "Introduction to Sustainable Polymers". Dr. Lakshmikant Shivnath Badwaik, Associate Prof. Department of Engineering and Technology, Tezpur University, addressed the issue of "Food Processing Waste as a Source of Valuable Compounds for Sustainable Food Packaging". Prof. K. Byrappa, former Vice-Chancellor, Mangalore University presented an excellent lecture on "Nanotechnology for Sustainable Food packaging Material".

Speakers of the webinar on Sustainable Materials for Food Packaging

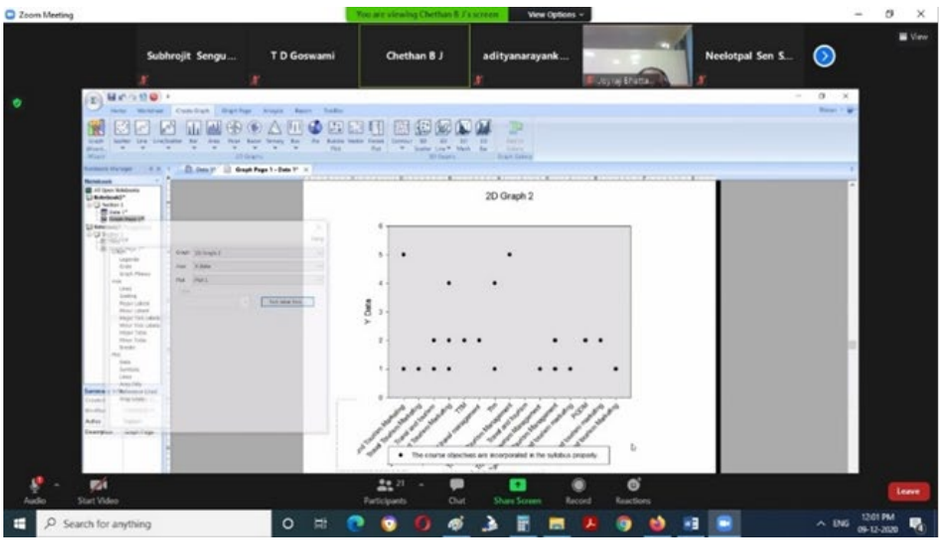
BioNest-IASST webinar on Bio-Entrepreneurship Ecosystem in North Eastern Region (NER)

Bio-Entrepreneurship Ecosystem in NER was addressed by Team BioNest-IASST at IASST, on 11th November 2020. The Inaugural address Prof. Ashis Kr. Mukherjee, Director, IASST was followed by a talk on the Innovations, Entrepreneurship status in Biotech and Allied areas, was delivered by Dr. Bula Choudhury, Senior Scientist, Guwahati Biotech Park, Govt. of Assam and Co-ordinating Officer NE Cell, NDRC, Govt. of India. The webinar was appreciated by all the participants.

Dr. Bula Choudhury, speaker of the webinar on Bio-Entrepreneurship Ecosystem in North Eastern Region (NER)

KRC-IASST user Awareness Programme of SigmaPlot 14.5 Software

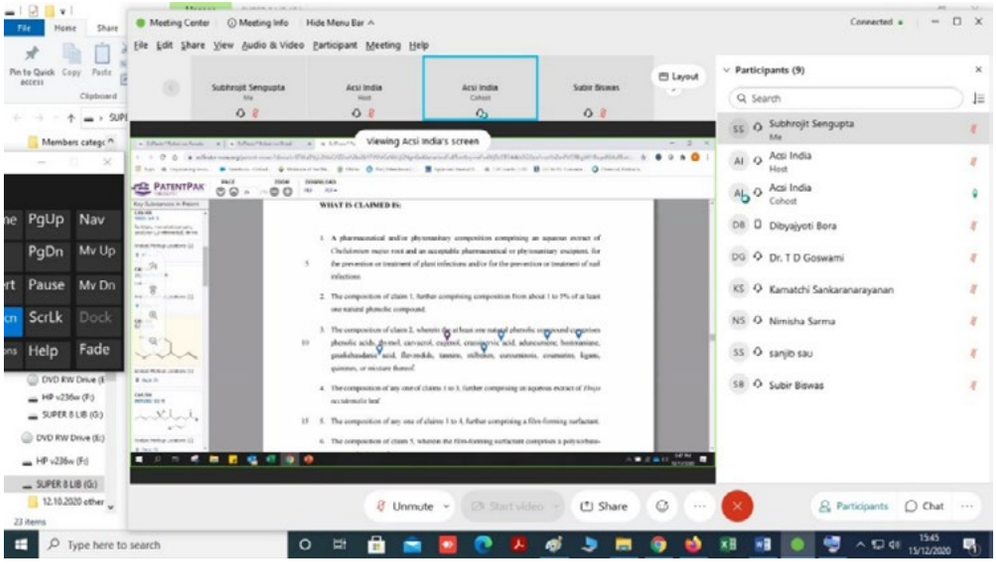
KRC-IASST in association with ProQuest India held a user awareness programme on SigmaPlot 14.5 Software at IASST on 9th December 2020. Mr. Chethan BJ, Training Manager, ProQuest India, delineated the advantages of the proprietary software package for scientific graphing and data analysis.



Mr. Chethan B.J., Training Manager, ProQuest India, explained the facilities of the tool and its importance SigmaPlot software

KRC-IASST-American Chemical Society, SciFinder software, User Awareness Programme

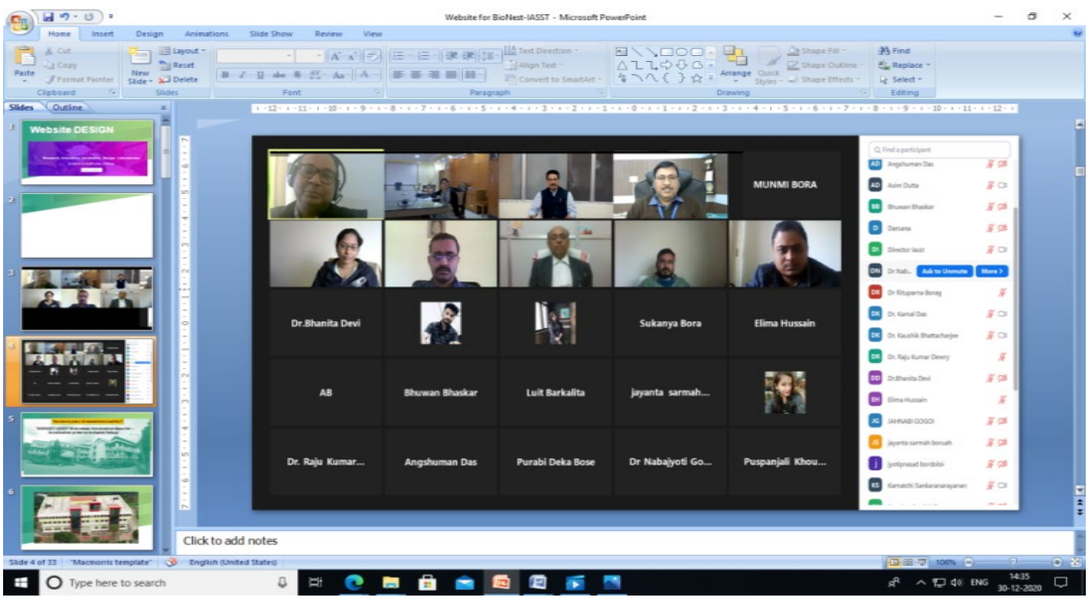
KRC-IASST, in association with India office of American Chemical Society, organized a user awareness programme based on SciFinder Software, a Chemical Abstracts Service (CAS) on 15th December 2020. Mr. Rohan Kohok, Customer Success Specialist, ACS International, Ltd., discussed the database acess through this software. The salient features of this software was well received by the participants.



A screenshot of the online demonstration of SciFinder

BioNest-IASST webinar on Role of Engineers, MBAs & Scientists in High Tech BioStartups

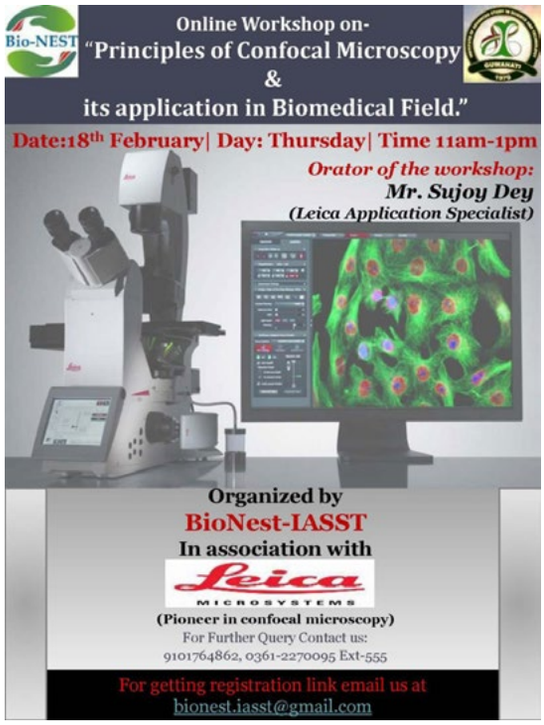
Team BioNest-IASST organized a webinar on Role of Engineers, MBAs & Scientists in High Tech BioStartups, on the 30th December 2020. Prof.Ashis Kr. Mukherjee, Director, IASST delivered the welcome address. Prof. Probodh Borah, Head of the Department of Animal Biotechnology, College of Veterinary Science, Assam Agricultural University, Guwahati and coordinator of the BIF & State Biotech Hub delivered the lecture on BioStartups; which was appreciated by all the participants.



Webinar screenshot

BioNest-IASST workshop on Principles of Confocal Microscopy and its Biomedical Application

BioNest-IASST conducted an online workshop on Principles of Confocal Microscopy and its Biomedical Application, on 18th February 2021. Prof. Ashis Kr. Mukherjee, Director, IASST delivered the welcome speech. Mr. Sujoy Dey, Leica Application Specialist of Leica Microsystems gave a presentation on confocal microscope and its application in biomedical field.

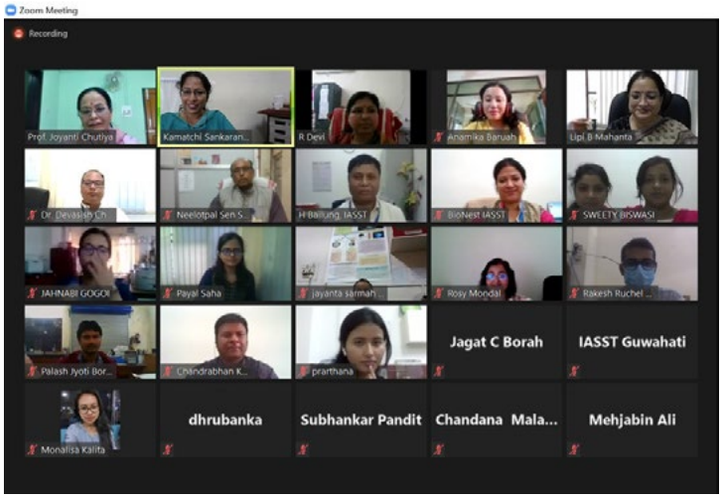


A screenshot of the online presentation on confocal microscope and its application in biomedical field

BioNest-IASST Workshop on International Women's Day 2021

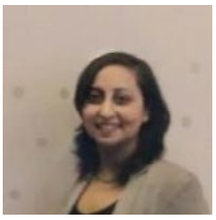
"Choose to Challenge" themed virtual workshop by BioNest-IASST, marked the occasion of International Women's Day. Prof. H. Bailung delivered the welcome speech. Around 60 participants participated in the program which was divided into two sections. The first half was about the "Success stories of Bio entrepreneurs and their journey." Dr. Swapnil Sinha, Director, BioAptagen Pvt. Ltd. and Ms. Anamika Baruah, Director, Foundation for Advancement of Essential Diagnostics incubated at IIT- Guwahati Biotech Park helmed a well-documented and very interesting session. The second session was a Panel Discussion on STI: "Empowering women in Science", featuring- Dr. Joyanti Chutia, Former Director, IASST; Dr. Madhurima Goswami, Head, Chandraprabha Saikiani Centre for Women Studies, Tezpur University, and Dr. Rajlakshmi Devi, Head of Life Science Division, IASST. The program was coordinated and mediated by Dr. Kamatchi Sankaranarayanan and Dr. Lipi B Mahanta of IASST.

Accomplished women of IASST and outside taking part in the webinar



Screenshots of the workshop

EMINENT SCIENTISTS / PERSONALITIES WHO VISITED IASST AND DELIVERED LECTURES (INCLUDING ONLINE MODE USING DIGITAL PLATFORM)

Date	Photo of Scientists/ Speaker	Name of Scientists/ Speaker and their affiliations	Title of the talk/ lecture
5.8.2020		Mrs. Chaitali Talreja, Senior Analyst/Solution Consultant at Clarivate Analytics, India.	Usage of Web of Science
27.8.2020		Mr. Akshay Prasanna, Customer Success Manager, Turnitin	Usage and facilities in- built in the iThenticate Anti-Plagiarism Software
25.9.2020		Mr. Subrata Chakrabarty, Customer Manager, ProQuest India	PIVOT, a tool for accelerating the research process by integrating funding, collaborator discovery, and publishing.
28.9.2020		Mr. Manoj Kumar, Senior Translator, Employees' State Insurance Corporation	e-Hindi
25.9.2020		Mr. Sanjay Rajan, Sr. Training & Consultant ProQuest-315, AKD Tower, Sector -14	Nurture Your Academic Research with PIVOT-RP
9.11.2020		Prof. Vimal Katiyar, Dept of Chemical Engineering IIT Guwahati; Co-coordinator, Centre of Excellence for Sustainable Polymers, IIT Guwahati	Introduction to SustainablePolymers
9.11.2020		Dr. Lakshmikant Shivnath Badwaik, Associate Prof. Department of Engineeringand Technology, Tezpur University.	Food Processing Waste as a Source of Valuable Compounds for Sustainable Food Packaging
9.11.2020		Prof. K. Byrappa, Former Vice-Chancellor, Mangalore University	Nanotechnology for Sustainable Food packaging Material

Date	Photo of Scientists/ Speaker	Name of Scientists/ Speaker and their affiliations	Title of the talk/ lecture
11.11.2020		Dr. Bula Choudhury, Senior Scientist & Co-ordinator Entrepreneurs Guwahati Biotech Park, Govt. of Assam, Co-ord8inating Officer NE Cell, ndrc, Govt. of India	Bio-Entrepreneurship Ecosystem in the Northeast Region
9.12.2020		Mr. Chethan BJ, Training Manager, ProQuest India	Facilities of SigmaPlot software for scientific graphing and data analysis.
15.12.2020		Mr. Rohan Kohok, Customer Success Specialist, ACS International, Ltd	Uses and advantages of SciFinder software.
30.12.2020		Prof. Probodh Borah, Head of the Department of Animal Biotechnology, College of Veterinary Science, Assam Agricultural University, Guwahati and coordinator of the BIF & State Biotech Hub	Role of Engineers, MBAs & Scientists in High Tech BioStartups
18.2.2021		Mr. Sujoy Dey, Leica Application Specialist of Leica Microsystems	Confocal microscope and its application in biomedical field.
8.3.2021		Dr. Swapnil Sinha, Director, BioAptagenPvt. Ltd	Success stories of Bio entrepreneurs and their journey
8.3.2021		Ms. Anamika Baruah, Director, Foundation for Advancement of Essential Diagnostics incubated at IIT-Guwahati Biotech Park	Success stories of Bio entrepreneurs and their journey
8.3.2021		Dr. Madhurima Goswami Head, Chandraprabha Saikiani Centre for Women Studies Tezpur University Napaam-784028, Assam	Panel Discussion on STI: Empowering Women in Science

Date	Photo of Scientists/ Speaker	Name of Scientists/ Speaker and their affiliations	Title of the talk/ lecture
8.3.2021		Dr. Joyanti Chutia Emeritus Scientist and Former Director DST-IASST Guwahati	Panel Discussion on STI: Empowering Women in Science
21.3.21		Mr.Udayan Borthakur, Head Media Production & Communication Division, Wildlife Genetics Division, Aranyak.	Glimpses of the activities of Aaranyak and work done by them in wildlife genetic laboratory
21.3.21		Dr. Bibhuti Prasad Lahkar, Head, Elephant Research Conservation Division, Aranyak	Grassland ecosystem and conservation and management and work done at ManasNational Park
24.3.21		Dr. Ashok K Varma, Tata Memorial Centre, Advanced Centre for Treatment, Research and Education in Cancer (ACTREC)	Interdisciplinary genomics, proteomics and Structural Biology
31.3.21		Prof. Prasad K. Bhaskaran, Professor & former Head of Department, Ocean Engineering & Naval Architecture at IIT Kharagpur	Tropical cyclones, storm surges and coastal flooding in the North Indian Ocean region

VISIT OF EXPERTS/DIGNITARIES TO IASST

CAG Audit visit to IASST, Guwahati

An inspection team from Controller Auditor General (CAG), Kolkata, India, comprising of the Senior Audit Officer, the Assistant Audit Officer and the Auditor visited and stayed at IASST during 8th to 24th February 2021. The two fold objective was to conduct a local audit from FY 2017-18 to 2019-20 and simultaneously carry out an annual inspection of the institute.

Visit of Minister of Health & Family Welfare, Government of Assam

Dr. Himanta Biswa Sarma, the present Chief Minister Assam, visited IASST on 1st June, 2020 in his capacity as the then Minister of Finance, Transformation & Development, Health & Family Welfare, PWD and Education. Dr. Himanta Biswa Sarma, inaugurated the fully equipped RT-PCR based facility, with 1000 tests per day capacity, in collaboration with Guwahati Medical College and Hospital, Guwahati. It endorsed the importance of validated test reports to enhance early detection, disease surveillance, and underscored research potential of this platform at IASST, in combating Covid -19.

Inauguration of Covid 19 testing and research laboratory at IASST

Hon'ble minister, Dr. Himanta Biswa Sarma inaugurating the Covid 19 testing and research laboratory at IASST

IASST came forward to help the society in the Covid-19 pandemic, by offering its laboratory for RT-PCR testing to enhance the testing capacity under 'testing-tracking-isolation' policy. In collaboration with the National Health Mission (NHM), Govt. of Assam, a Covid-19 testing and research laboratory was set up. The Covid-19 testing and research laboratory was inaugurated by the then honorable Minister of Health and Family Welfare, Dr. Himanta Biswa Sarma (currently Chief Minister of Assam) on 1st June, 2020. Dr. Sarma reiterated in his inaugural address that the laboratory set-up in collaboration with Guwahati Medical College and Hospital, Guwahati, was equipped to conduct one thousand RTPCR tests for COVID-19 per day. During the first wave of Covid-19, the laboratory conducted 1,05,639 RT-PCR tests. This testing and research laboratory of IASST has become one of the prominent Covid-19 testing centre in Assam. IASST was honored by a token of appreciation by honorable Minister.

Photo Caption: Covid 19 test samples being examined and analysed

Government of Assam

Department of Health & Family Welfare,
Government of Assam

PRESENTS

Certificate of Appreciation to

Institute of Advanced Study in
Science and Technology, IASST

The valuable contribution made by your esteemed institution in the fight against Covid-19 in the State of Assam will be remembered for posterity.

The Department of Health & Family Welfare, Government of Assam takes utmost pride in honouring your distinguished institution as a mark of gratitude on behalf of the people of Assam.

Shri. Samir Kr. Sinha, IAS
Principal Secretary
Health & Family Welfare
Government of Assam

Dr. Himanta Biswa Sarma
Hon'ble Minister
Health & Family Welfare
Government of Assam

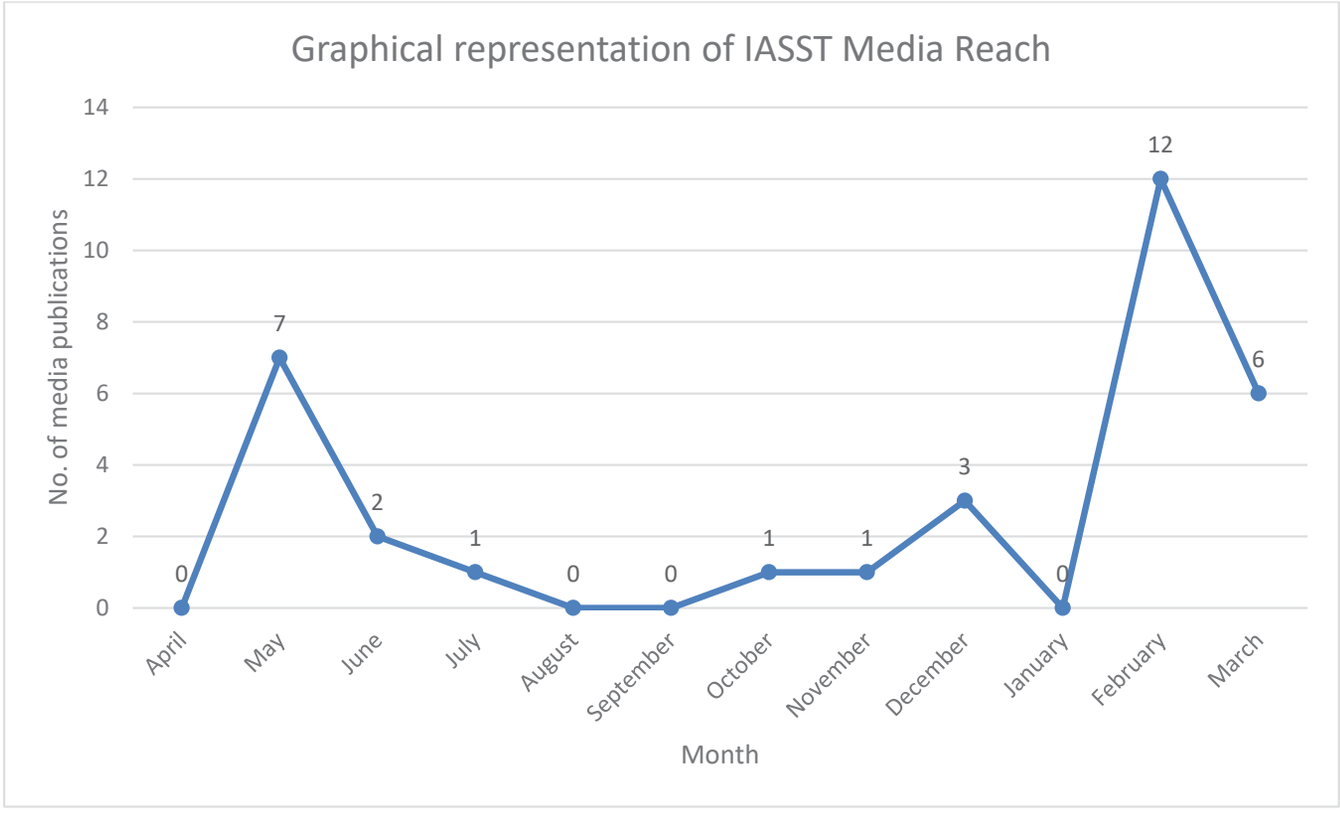
IASST awarded for its contribution in support to dealing with the pandemic by the Hon'ble minister, Dr. Himanta Biswa Sarma

IASST Media Reach

The different media houses covered the news of IASST thirty-three times during April 2020 to March 2021. The news is basically about the research work and various events and celebrations that was held in the institute. As an institute of repute, news on IASST gets covered by various media houses, and has become a proud tradition. It symbolizes the importance of the institute as it is a premiere DST institute in Assam.

Sl.	Topic of the Programme	Name of the newspaper/ web news portal etc.	Date of publication
1.	Computer-aided image processing technique to protect weavers	The Assam Tribune	10.5.2020
2.	Nature breathes easy at Deepor Beel now	The Assam Tribune	14.5.2020
3.	IASST develops electrochemical biosensor to detect chemical compounds in food	devdiscourse.com	22.5.2020
4.	Platform for detecting Carcinogenic compounds in food	indiathinkers.com	22.5.2020
5.	IASST develops electrochemical sensing platform for detecting carcinogenic & mutagenic compounds in food	civilhindipedia.com (Hindi News)	22.5.2020
6.	Electrochemical sensing platform developed to detect carcinogenic & mutagenic compounds in food: IASST	affairscloud.com	23.5.2020
7.	IASST develops electrochemical sensing platform for detecting carcinogenic & mutagenic compounds in food	netindian.in	24.5.2020
8.	Assam man (Milan Jyoti Das, IASST) discovers swab test tech that does away with PPE	Times of India	5.6.2020
9.	Indian scientists develop software to detect cervical cancer	Times of India website	19.6.2020
10.	What is clinical trial by Partha Pratim Dutta, IASST	Asomiya Pratidin	26.7.2020

Sl.	Topic of the Programme	Name of the newspaper/ web news portal etc.	Date of publication
11.	PhD awarded to Bijay Kumar Sah, CSIR-SRF of IASST	The Assam Tribune	7.10.2020
12.	Happiness of Mudoi Uncle by Dr. Anowar Hussain, IASST	Amar Asom	26.11.2020
13.	Prof. A.K. Mukherjee takes over as IASST Director	The Assam Tribune	5.12.2020
14.	Prof. A.K. Mukherjee takes over as IASST Director	Amar Asom	5.12.2020
15.	Red wine to be prepared from Manipur's Black Rice	PurvanchalPrahari	24.12.2020
16.	Snake venom: from deadly toxins to anti-cancer therapeutics	The Assam Tribune	4.2.2021
17.	IASST observed World Cancer Day 2021	PurvanchalPrahari	4.2.2021
18.	World Cancer Day observed	The Assam Tribune	5.2.2021
19.	World Cancer Day at IASST	Amar Asom	5.2.2021
20.	Awareness meeting on the occasion of World Cancer Day	DainikAsam	5.2.2021
21.	Awareness meeting on the occasion of World Cancer Day	PurvanchalPrahari	5.2.2021
22.	World Cancer Day at IASST	AsomiyaKhabor	5.2.2021
23.	World Cancer Day at IASST	DainikAgrodut	5.2.2021
24.	World Cancer Day at IASST	AsomiyaPratidin	5.2.2021
25.	Tezpur University and IASST ink MoU for academic research	AsomiyaKhabor	19.2.2021
26.	Tezpur University and IASST ink MoU for academic research	Sentinel newspaper (E- Edition)	19.2.2021
27.	State governments science award announced for 2021	Dainik Assam	19.2.2021
28.	International Day of Forest 2021	Dainik Assam	22.3.2021
29.	Celebration of International Day of Forest at IASST Guwahati	Dainik Assam	23.3.2021
30.	Dr.Ashis Kumar Mukharjee, Director , IASST selected as member of World Health Organization's (WHO) Committee	Dainik Assam	24.3.2021
31.	International Day of Forest Organized at IASST, Guwahati	PurbanchalProhori	24.3.2021
32.	International Day of Forest celebrated at IASST	AsomiyaKhabor	24.3.2021
33.	Importance of conservation of forests emphasised	Assam Tribune	24.3.2021



के नवीन भवन के उद्घाटन के

आईएएसएसटी, गुवाहाटी में विश्व कैंसर दिवस पर जागरुकता कार्यक्रम

खेलतला : कैंसर संबंधी जागरूकता बढ़ाने तथा इसकी रोकथाम, पहचान और उपचार खोज को प्रोत्साहित करने के लिए कल 4 फरवरी 2021 को विज्ञान एवं प्रौद्योगिकी उच्च अध्ययन संस्थान आईएएसएसटी गुवाहाटी में विश्व कैंसर दिवस मनाया जाएगा। इस अवसर को चिन्हित करने के लिए एक सभा का आयोजन किया जाएगा तथा आईएएसएसटी परिवार के सदस्य के मध्य विभिन्न जागरूकता पोस्टर के साथ मैराथन दौड़ का भी आयोजन होगा। वैज्ञानिक सत्र का आरंभ निदेशक प्रोफेसर आशीष के मुखर्जी करेंगे। इस आयोजन में आईएएसएसटी के प्रख्यात वैज्ञानिकों के बीच कैंसर को लेकर संभावित भविष्य के शोध के बारे में चर्चा की जाएगी। (निर्स)

IASST observed World Cancer Day 2021 published in PurvanchalPrahari on 4th February 2021

Minneapolis on May 25.

Filmmaker Basu Chatterjee passes away

In the life of middle-class India in the 1970s, joys were clean and uncomplicated – being the first in queue before the ration shop or reading a letter that says your salary has gone up by Rs 50. Watching a Basu Chatterjee movie with the whole family gave that same feeling. The Ajmer-born filmmaker, a master of middle-class minutiae, passed away in Mumbai on Thursday. P4

HC notices to Assam & CIL on mining

The Gauhati high court on Thursday issued notices to the Centre, Assam government, Coal India and other stakeholders after taking up a suo motu case against mining of coal by Coal India Limited in Dehing Patkai, which is one of the last remaining lowland evergreen forests in India. The forest spreads across Dibrugarh and Tinsukia districts. P3

HC allows unmarried woman to terminate 23-week pregnancy

Mumbai: The Bombay high court has permitted an unmarried woman to terminate her over 23-week pregnancy, observing that giving birth to a child out of wedlock would cause her much mental and physical anguish. The Medical Termination of Pregnancy (MTP) Act prohibits termination of pregnancy beyond 20 weeks.

A bench of justices S J Kathawalla and Surendra Tavade in an order on Tuesday also took note that the 23-year-old woman, a resident of Ratnagiri district, failed to undergo pregnancy termination within the 20 weeks permissible limit "mainly because she could not consult" a doctor in time due to the lockdown.

The bench permitted her to undergo the procedure at a medical facility of her choice by Friday. On May 29, following the woman's petition, another bench of the high court directed a medical board at the civil hospital in Ratnagiri to assess her for any possible health risks, if she underwent the medical termination procedure.

The woman is over 23 weeks pregnant, as per the plea filed last week.

In her petition, the woman said while the pregnancy was a result of a consensual relationship, she cannot carry it to term since she is unmarried and hence, giving birth would cause her "social stigma". The woman said in her plea that she would not be able to "handle the child as an unmarried single parent".

The petitioner also said it would not be possible for her to get married in future because of the social stigma, and that she was mentally not ready to be a mother.

The MTP Act permits abortions up to 12 weeks of pregnancy after consultation with a doctor. For termination of pregnancy between 12 to 20 weeks, medical opinion of two doctors is required. Beyond 20 weeks, exceptions are legally permissible only if continuation of the pregnancy poses a threat to the mothers health and life. PTI

▶Continued on P 3

Assam man discovers swab test tech that does away with PPE

Kangkan Kalital
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Guwahati: Assam man Milan Jyoti Das is all set to revolutionise the process of swab collection for Covid-19 test in the region with his innovation that minimises the risk of contamination of frontline workers. In Das's innovative system, frontline workers can collect the swab from the safety of a sanitized chamber that does away with the need for personal protective gears. The Meghalaya health department is expected to be one of the first in the region to adopt this technology for the safety of its frontline staff.

A technical assistant with the Institute of Advanced Studies in Science & Technology (IASST), Das said the system can be carried to remote areas as it works on solar energy. In hospitals and other test centres, such chambers are being used but the workers have to be masked and wrapped in PPE. Das's innovation only requires the use of gloves.

Assam man (Milan Jyoti Das, IASST) discovers swab test tech that does away with PPE published in Times of India on 6th May 2020

আলোকপাত কৰিব অসম চৰকাৰৰ বাজিক পঞ্চায়ত মীনাক্ষী কাৰ্দ্দঙেও অনুষ্ঠান পৰিৱেশন কৰিব।

আইএএছএছটি-তেজপুৰ বিশ্ববিদ্যালয়ৰ মাজত বুজাবুজিৰ চুক্তি

মহানগৰ খবৰ, ১৬ ফেব্রুৱাৰী ঃ শিক্ষা আৰু গৱেষণামূলক কামৰ বাবে ইনষ্টিটিউট অব এডভান্স ষ্টাডী ইন ছায়েঞ্চ এণ্ড টেকন'লজী (আই এ এছ এছ টি)ৰ মাজত ১৫ ফেব্রুৱাৰীত এখন বুজাবুজি চুক্তি স্বাক্ষৰিত হয়। বুজাবুজিৰ চুক্তিখনত স্বাক্ষৰ কৰে তেজপুৰ বিশ্ববিদ্যালয়ৰ পঞ্জীয়ক ড° বীবেন দাস আৰু আইএছএছটিৰ পঞ্জীয়ক ড° দিগন্ত গোস্বামীয়ে। উল্লেখযোগ্য যে জালুকবাৰীৰ আইএএছএছটিৰ সভাকক্ষত অনুষ্ঠিত এক গাম্ভীৰ্যপূর্ণ পৰিবেশত চুক্তিখন আনুষ্ঠানিকভাৱে সম্পাদিত হোৱাৰ সময়ত উপস্থিত থাকে বিশ্ববিদ্যালয়খনৰ উপাচার্য অধ্যাপক বিনোদ কুমাৰ জৈন আৰু আইএএছএছটিৰ সঞ্চালক অধ্যাপক আশিস কুমাৰ মুখার্জী। দুয়োখন শৈক্ষিক প্রতিষ্ঠানৰ মাজত সম্পাদি বুজাবুজিৰ চুক্তিখনে দুয়োখন শিক্ষানুষ্ঠানৰে শিক্ষা আৰু গৱেষণাৰ লগতে সমগ্র উত্তৰ-পূর্বাঞ্চলৰ বিজ্ঞান আৰু গৱেষণাৰ ক্ষেত্রত বিশেষ সুফল হ'ব বুলি আশা কৰা হৈছে। আনহাতে দুয়োখন শিক্ষানুষ্ঠানৰ উদ্যোগত বিভিন্ন ধৰণৰ পৰীক্ষা-নিৰীক্ষাৰ জৰিয়তে নতুনত্বৰ সন্ধান হ'ব বুলিও আশা কৰা হৈছে।

TezpurUniversity and IASST ink MoU for academic research published in AsomiyaKhabor on 19th February 2021

আই এ এছ এছ টিৰ সঞ্চালক

ড° আশিস কুমাৰ মুখার্জী বিশ্ব স্বাস্থ্য সংস্থাৰ কমিটীৰ সদস্য মনোনীত

মহানগৰ বাতৰি সেৱা

গুৱাহাটী, ২৩ মার্চ ঃ গুৱাহাটীৰ পশ্চিম বৰা পাৰত থকা বিজ্ঞান আৰু প্রযুক্তিবিদ্যা উচ্চ অধ্যয়ন প্রতিষ্ঠান চমুকৈ আই এ এছ এছ টিৰ সঞ্চালক তথা বিশিষ্ট বিষবিদ্যাবিদ অধ্যাপক ড° আশিস কুমাৰ মুখার্জীক বিশ্ব স্বাস্থ্য সংস্থাৰ বিষাক্ত সর্প দংশনৰ প্রতিকাৰ আৰু প্রতিৰোধৰ বাবে গঠন হোৱা বিশেষ বিশেষজ্ঞ কমিটীৰ অভিজ্ঞ সদস্য হিচাপে নির্বাচন কৰিছে। উল্লেখ্য যে ২৬ বছৰ ধৰি বিষাক্ত সর্প দংশন বোধ আৰু ইয়াৰ প্রতিকাৰ সম্পর্কত অভিজ্ঞতা থকা অধ্যাপক আশিস কুমাৰ মুখার্জীয়ে ২০১৮ চনত মৌলিক আৰু ব্যবহাৰিক জীব বিজ্ঞানত বাষ্ট্রপতিপৰা সম্মান লাভ কৰিছে। বিষাক্ত সর্প বিষ আৰু ইয়াৰ প্রতিকাৰ সম্পর্কত পি এইচ ডি আৰু ডি এছ চি ডিগ্রী লাভ কৰা অধ্যাপক মুখার্জীয়ে বর্তমান ঔষধি গৱেষণাৰ সর্প বিষৰ নিৰাময় আৰু ইয়াৰ গুণাগুণ সম্পর্কত গৱেষণাৰ কামত নিয়োজিত হৈ আছে। তদুপৰি বিষাক্ত সর্প দংশনৰ বিষৰ প্রতিকাৰ আৰু প্রতিৰোধৰ বাবে আই চি এম আৰ ডি টি ৰাষ্ট্রৰ গঠন কৰি দিয়া সমিতিত অধ্যাপক মুখার্জীয়ে সদস্য হিচাপে কার্যনির্বাহ কৰি আছে। এই সম্পর্কত বিশিষ্ট বিজ্ঞানী অধ্যাপক আশিস কুমাৰ মুখার্জীয়ে কয় যে বহু বছৰপৰা বিশ্ব স্বাস্থ্য সংস্থাই এই বিশেষজ্ঞ কমিটীৰ কামৰ মাজেৰে বিশ্বজুৰি সর্প দংশন বোধ আৰু প্রতিকাৰৰ বিষয়ত যথেষ্ট গুৰুত্ব দি আছে। বিশেষকৈ প্রাণ্ডপ্রধান দেশবোৰত এই কমিটীয়ে বিশেষ গুৰুত্ব দি আহিছে। দেশৰ বিভিন্ন অঞ্চলত বিষাক্ত সর্প দংশনত বহুসংখ্যক লোকৰ মৃত্যু হৈছে। বিশ্বস্বাস্থ্য সংস্থাৰ তথ্য মতে, বিশ্বত বছৰি বিষাক্ত সর্প দংশনৰ ফলত ৫০,০০০পৰা ১২৫,০০০জন লোকৰ মৃত্যু হয়। আকৌ বিষাক্ত সর্প দংশনৰ ফলত ভাৰতত বছৰি ১১,০০০পৰা ৫০,০০০জন লোকৰ মৃত্যু হয়।

Dr.Ashis Kumar Mukharjee, Director, IASST selected as member of World Health Organization's (WHO) Committee, news published in Dainik Assam on 24th March 2021

A few Newspapers Clippings

SCIENTIFIC TALK, LECTURE DELIVERED BY IN-HOUSE FACULTIES

Date	Name of the speaker and affiliation	Title of the talk/ lecture
24.03.21	Prof. A. K. Mukherjee, Director, IASST	Discussion on research and development for IASST

OTHER ACTIVITIES

IASST'S SCIENTIFIC SOCIAL RESPONSIBILITY

Training Programme on Mushroom Cultivation at Satargaon, Rani, Kamrup (Rural)

On 11th December 2020, about 17 villagers participated in the training programme on Mushroom Cultivation at Satargaon, Rani, in Kamrup (Rural). The training to improve the livelihood options of the villagers was imparted by two IASST employees Ms. Mehzabin Ali and Mr. Prakash K. Kachari.

Adoption of Scheduled-Tribe Villages for Socio-Economic Development

IASST, has to date, adopted three villages in the Rani Development Block of the Kamrup (Rural); namely Bakarapara, Kallapara and Sataragaon, located about 40 km away from IASST. The adoption of the first two villages was initiated 2016 and implemented in 2017; the subsequent adoption of Satargoan marked the positive impact of the programme. All three villages were selected considering their poor economic conditions (mostly under BPL), low literacy, limited sources of livelihood, and high incidence of alcoholism that exacerbated the poverty.

Scientific interventions taken

The institute has taken all the initiative to motivate and train the beneficiaries selected for different venture (activity) at the institute campus and at the villages.

Technology intervention and development: A bench mark survey was done in the three villages to identify the minimum skills, socio-economic conditions and available minimum resources in the villages. Taking cognisance of their status, the following technology interventions undertaken with minimum input supply with the basic objective of improving the socio-economic status of the selected villages.

Scientific interventions: Eri rearing, mushroom, papaya, brinjal and ghost pepper cultivation, vermi-post production and Covid-19 aid through distribution of food, detergents and masks envinced an enhanced and varied livelihood options. Hands on training in the villages and at IASST, especially for mushroom cultivations, has begun to create interest and economic returns among the villagers of the three villages adopted by IASST.

Eri rearing: Most of the women of the villages considered Eri rearing as one of the major sources of livelihood and income. Therefore, in the last five batches, 28 farm women involved in Eri rearing in Bakarapara, Kallapara and Satargaon villages were enabled to sell Cocoon Rs. 950/- per KG & larvae ranging Re. 1/- per piece, earning about Rs. 1,33,040/- in total. Consequently, it is noteworthy that many women are now coming forward to adopt Eri culture as one of the major sources of income.

Eri rearing farmers

Mushroom Cultivation and Training Programme: Mushroom locally known as 'Nigum', is one of the most popular food items among the tribal communities. More than 86 were enabled to take up women mushroom cultivation and produced 1385.8 kg, leading to earning a total of Rs. 277160/- (@ Rs. 200/- per kg). A training programme on mushroom cultivation was conducted at Satargaon on 11 Dec, 2020, with 17 households participating in the programme. Mehjabin Ali and Prakash Kumar Kachari (IASST) demonstrated the complete process and provided requisite material from materials IASST in 17 bags have been prepared and distributed by them. At a selling price of Rs. 200/- per kg, the total production of 25.5 kg fetched a total income of Rs. 5,100/-


Farm ladies involved in Mushroom Cultivation works

Distribution of Brinjal Saplings


Distribution of Brinjal saplings at Satargaon on 25th August, 2020

21 households in Sataragaon village have received 163 brinjal saplings and 29 plants in 8 households have been successfully raised. The total harvest is estimated at 9.180 kg.. The product is sold at Rs. 30/- per kg) and further production is being continued.

Harvesting brinjal

Distribution of Omita (Papaya) Saplings

Distribution of ***Omita*** (Papaya) saplings at Satargaon on 3rd November, 2020

On the occasion of 42th Foundation day of IASST, papaya saplings were distributed to the villagers of Satargaon. 141 saplings distributed to 23 households in the village. 73 papaya plants that have grown to a height of 3.5 ft in 20 households has been observed to date.

Training Programme on Mushroom Cultivation at Satargaon

Training programme on mushroom cultivation 11 Dec, 2020

Training programme on mushroom cultivation has been conducted at Satargaon on 11 Dec, 2020. 17 households have participated in the programme. All the materials had been provided by IASST. 17 bags have been prepared by them. Mehjabin Ali and Prakash Kumar Kachari (IASST) had demonstrated the complete process. The total production is 25.5 kg. The total income is Rs. 5,100/- (@ Rs. 200/- per kg.)

Production and Distribution of *Bhut Jalakia* (Ghost Pepper)

Harvesting of Ghost pepper

On 18th November 2019, 322 seedlings of Bhut Jalakia (Ghost Pepper) had been distributed among 23 households of Satargaon village. A total of 17,693 ghost pepper was harvested, and an amount of Rs. 53,079 /- (@ Rs. 3/- per pc fruit) has been earned as income. In the following year, on the 23rd of December, 2020, 307 saplings were distributed to 47 households in Satargaon and 723 spalings distributed to 103 households in Bakarapara and Kallaparaon.

Distribution of ghost pepper saplings at Satargaon on 23rd Dec, 2020

Distribution of ghost pepper saplings at Bakarapara and Kallapara

Ghost pepper had been distributed at Bakarapara and Kallaparaon 23th December, 2020. 723 number of saplings have been distributed to 103 households.

Vermi-Compost Production: Vermi-Compost: 2 farmers from Bakarapara village are actively associated with Vermi-Composting and earned an income of Rs. 2310/- (total production of 77 kg, @ Rs. 30 per kg).

Vermi-Compost Production Unit

Other Social Activities

Distribution of Food, Detergents, and Masks during Covid-19 Pandemic:


Distribution of food commodities during Covid-19 Pandemic at Satargaon, Bakarapara and Kallapara on 11thApril, 2020

A total of 71 households (61 households of Satargaon and 10 households of Bakarapara & Kallapara) received food materials such as cereals, lentils, cooking oil, vegetables and detergents to help them during the Covid-19 Pandemic. Two masks per person were distributed, thus 222 persons at Satargaon, 426 persons at Bakarapara and 432 persons at Kallapara; amounting to a total of 2160 masks distributed among the three villages.


Distribution of Mask at Satargaon and Bakarapara on 28th Jan and 3rd Feb, 2021

Installation of Street Light


Two solar street lights have been installed at Satargaon on 20th November, 2020.

EVENTS AND CELEBRATIONS

National Lecture Series: On the Occasion of National Celebration of 75th year of India's Independence– "Azadi Ka Amrut Mahotsava".

Under the auspices of the "Azadi Ka Amrut Mahotsava", National Lecture Series: On the Occasion of National Celebration of 75th year of India's Independence, two lectures by eminent scientists were organized for the academic community at large and the IASST community.

Dr. Ashok K Varma, from the Advanced Centre for Treatment, Research and Education in Cancer (ACTREC), Tata Memorial Centre, Navi-Mumbai, delivered a talk entitled "**Interdisciplinary genomics, proteomics and Structural Biology based approach for Translational Research**" on 24-03-2021.

Prof. Prasad K. Bhasakaran, Department of Ocean Engineering and Naval Architecture, IIT Kharagpur, West Bengal, delivered a talk entitled "Tropical cyclones, storm surges and coastal flooding in the North Indian Ocean region" on 31-03-2021.

75th Year of India's Independence: Azadi ka Amrit Mahotsava

Celebration of International Day of Forests at IASST, Guwahati on 21th March 2021

Institute of Advanced Study in Science and Technology (IASST), a ISO 9001:2015 premier Scientific Research Organization in the North Eastern Region of India, celebrated International Day of Forests on 21th March 2021 as part of 75th Year of India's Independence: Azadi ka Amrit Mahotsav. The program was attended by students,employees and staff of IASST. In addition, high school science teachers from the BTAD area of Assam and biotech hub coordinators from the entire NE India joined the program online.

On the occasion of this programme a meeting was held and Dr. Devasish Chowdhury, Associate Professor, IASST welcomed the participants. Prof. Ashis K. Mukherjee, Director, IASST delivered his speech on this occasion. He stressed the need of importance of conservation of forests and emphasized joint collaboration between IASST and Aaranyak.

Mr. Udayan Borthakur from Aaranyak gave glimpses of the activities of Aaranyak and work done by them in wildlife genetic laboratory. Dr. Bibhuti Prasad Lahkar spoke about grassland ecosystem and conservation and management and work done at Manas National Park.

There was also detailed discussion between IASST and Aaranyak of possible and potent areas of collaboration and a possible MoU in this regard in which both Prof. Mukherjee and Dr. Bibhab Kumar Talukdar, CEO, Aaranyak participated.

Display of Original Copy of Indian Constitution

The Knowledge Resource Center (KRC)/ Library of IASST boasts of a prized and priceless possession - the original bound copy of the Constitution of India. The authorities of KRC displayed the historical document for public view and reference on 14th May 2020.Thus, the signatures of the Constituent Assembly members, who affixed their signatures to endorse the Constitution of India, on pages are made up with double golden borders on all sides, are open to public viewing.

The original bound copy of the Constitution of India has been kept in a special dedicated wooden almirah in the lobby of KRC, as befitting a treasured possession, amidst the more than 8000 books classified and well preserved in various shelves of the KRC and library of IASST.

Observation of Anti-terrorism Day on 21st May 2020

To commemorate India's Anti-Terrorism Day day, IASST organised a pledge- taking ceremony on 21st May, 2020, to mark the death anniversary of Prime Minister Rajiv Gandhi. The staff, faculty members and research scholars to take an oath to abstain from any kind of violence and terrorist activities.

World Environment Day on 5th June 2020

On World Environment Day on 5th June 2020, seedlings of fruits and valuable plant species including world famous Ghost pepper locally known as '***Bhoot Jolokia***' were planted at IASST. Prof. Heramba Bailung, Director (Additional Charge), IASST, inaugurated the plantation programme along with faculties, staff, officers, research scholars of the institute. It was a true celebration on the sub theme theme 'Celebrate Biodiversity' under the main theme 'Time for Nature' for the year 2020.

Members of the IASST take part in the celebration of World Environment Day

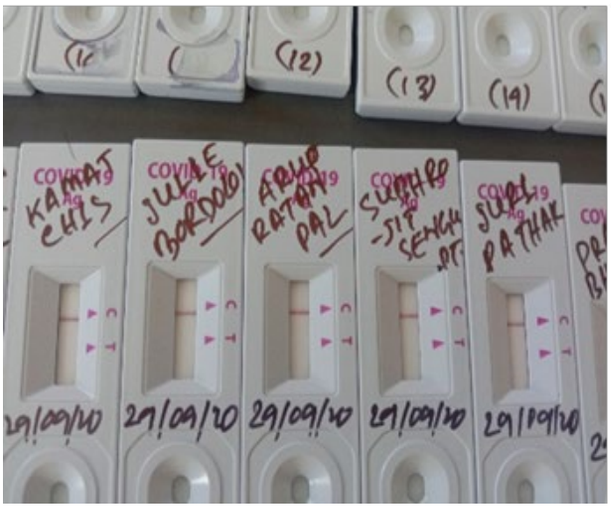
Celebration of International Day of Yoga at IASST

A scene of Yoga Practices

IASST celebrated the 6th International Day of Yoga on 21st June 2020 in virtual mode entitled "**My Life My Yoga**". Considering the need for social distancing due to COVID-19 pandemic, the Institute arranged a special guided yoga practices like Kriya, Asana, Pranayama, Bandha, or Mudra. The IASST community, including, faculty members, research scholars, staff members are enthusiastically participated in the yoga session.

COVID-19 Testing at IASST on 8th & 10th August 2020 and 28th & 29th Sept 2020

A free Covid 19 testing programme was held at IASST on 8th &10th August 2020 and 28th & 29th September 2020. IASST conducted the testing in association with National Health Mission (NHM), Govt. of Assam to stop spreading of the Covid-19 strain in the institute and among the family members of IASST. The samples are analyzed with Rapid Antigen and RT-PCR.




A scene of Covid 19 testing at IASST

74th Independence Day on 15th August 2020

IASST celebrated the 74th Independence Day in its campus with a day-long programme. The celebration started with the unfurling of the national flag by the Director (Additional Charge) of IASST, which was followed by the national anthem and short address to the gathering of employees, research scholars.


IASST family members took part in the hoisting the national flag following the Covid 19 protocol on the occasion of 74th Independence Day

Hindi Pakhwada and competition, prize distribution on 14th – 30th September 2020

The Hindi Pakhwada was celebrated at IASST during 14-30 September 2020. Prof. H. Bailung, Director (Additional Charge), IASST inaugurated the event following the Covid-19 protocol with minimum numbers of officials at IASST Conference hall by lighting the lamp. During this period, 5 different competitions were organised for IASST family through online and offline mode including drawing, essay, noting-drafting, self-composed poems/ articles, quiz competitions. A Hindi quarterly workshop was also organised by online mode on 28th September 2020 on topic 'Hindi and Information technology- e- Hindi'. Mr. Manoj Kumar, Sr. Hindi Officer, Employees' State Insurance Corporation, delivered the talk on 'e- Hindi'.

On 30th September, 2020 the closing of was done by distributing prizes for various competitions held during the Hindi Pakhwada.

IASST members participating in the various competitions organized on the occasion of hindi pakhwada and winners with their certificates

Covid19 Awareness Banners at Durga Puja Pandals on 22nd October 2020

IASST hoarding banner both local and English languages in various locations of Durga Puja pandals in greater Guwahati, Assam

During the Durga Puja festival during 22nd to 26th October 2020, IASST launched an awareness campaign, in the local and English languages about the protocols to be followed to prevent the spread of coronavirus. The banners and hoardings were displayed in various locations in Greater Guwahati (Latasil, Barowari, Silpukhuri, Gitanagar, Narengi, Beltola, Survey, Lakhimandir, Bhetapara, Lokhra, etc.)

Vigilance Awareness Week 2020

On 27th October 2020, Vigilance Awareness Week at IASST was initiated with an "Integrity Pledge" led by Prof. H. Bailung, Director (Additional Charge). On 28th October, 2020, a virtual interaction was organized on the theme for 2020, "Vigilant India, Prosperous India (सतक भारत, समृ भारत)". Prof. H. Bailung welcomed the invited speaker, Mr. Abu Sufian, M.Sc. (Agri.), IPS, Dy. Inspector General of Police, Railway, Assam, Ulubari, Guwahati. Dr. Neelotpal Sen Sarma, Vigilance officer of IASST, introduced the invited speaker to the audience. Sri Sufian spoke on the various issues and incidences related to the corruption at various length of our society.

Integrity Pledge taken by the IASST people

National Unity Day (Rashtriya Ekta Diwas) on 31st October 2020

IASST observed the Rashtriya Ekta Diwas, also known as National Unity Day, on 31st October 2020 to commemorate the 145th birth anniversary of Sardar Vallabhbhai Patel, the iron man of India. On this occasion, Director (Additional Charge) of IASST led the "Run for Unity" with a March Past in the campus of the institute. All the faculty members, staff members, research scholars and security personnel participate in the parade. Later, a pledge was taken by entire IASST fraternity in the institute auditorium.

Director (Additional Charge) administering the pledge to the IASST family members on Rashtriya Ekta Diwas or National Unity Day

42nd Foundation Day on 3rd November, 2020

3rd November, 2020, marked the 42nd Foundation Day of IASST; celebrations were initiated by hoisting the institute flag, and singing of the state anthem. Director (Additional Charge) Dr. H. Bailung and Registrar, IASST, Dr. Diganta Goswami and Dr. Nalin Kumar Mohan delivered speeches to mark the occasion. Plantation of saplings at the Bio Conservation Hub, were followed by plantation of papaya tree saplings at the IASST adopted village of Satargaon in Rani to enhance livelihoods.

Welcoming Prof. Ashis K. Mukherjee, New Director of IASST on 23rd Nov 2020

Prof. Ashis Kr. Mukherjee, Director welcomed by the IASST family

A meeting in both online and offline mode was held at IASST on 23rd November 2020 to welcome the present Director of IASST Prof. Ashis Kr. Mukherjee, from the Department of Molecular Biology and Biotechnology, Tezpur University, Assam. He was warmly welcomed by the Registrar, staff, faculty and research scholars of IASST. In the meeting Prof. Mukherjee addressed the IASST family through online medium and motivated everyone with his speech.

Prof. Ashis Kr. Mukherjee, Director addressing the IASST family

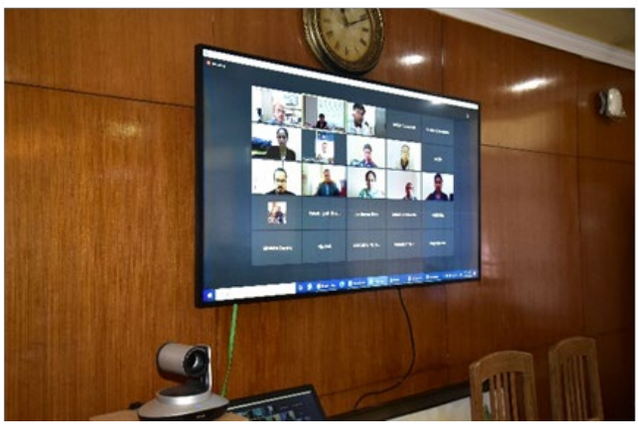
71st Constitution Day on 26th November 2020

IASST celebrated the 71st Constitution Day at the IASST campus, near Chinton Chora where all the IASST family members took a pledge to uphold the values of the Constitution of India. The copy of the original copy of the Constitution was also displayed by KRC near the reception of the Administrative building as a special commemorative mark.

Some of the scenes of the observation of Constitution Day

Curtain Raiser event for IISF 2020

IASST conducted its Curtain Raiser Event of IISF 2020 in virtual mode on December 05, 2020. Dr. Heramba Bailung, Senior Professor, IASST, in his welcome address, said the aims of IISF 2020 centre around public engagement in Science and STEM solutions to improve our lives. Several events like Young Scientists' Conclave, Women Scientists' Conclave, Water Segment, Waste Management, Sanitation, Vigyanyatra, traditional craft, artisans meet were an essential part of IISF. Video screening of the curtain-raiser for IISF 2020 and showcasing the IASST documentary formed the final part of the documentary. More than 100 students, research scholars, faculty members, and common people, including the IASSTs family, attend the program virtually.



Images of Curtain Raiser Event held at IASST virtually for IISF 2020

Celebration of Republic Day on 26 January 2021

IASST celebrated the 72th Republic Day, with flag hoisting and a speech by the honourable director, IASST, Professor Ashish Kumar Mukherjee. Professor Mukherjee delivered his messages on the significance of the day for the citizens of India and his vision for the development of IASST. A cultural programme was organized by the research scholars with patriotic songs and poem. After having light refreshment, a friendly cricket match was played between the research scholars and the staffs of IASST.

50th year of DST made by Vigyan Prasar

On 1st February 2021, IASST organised a documentary show in the institute auditorium on the occasion of the celebration of 50th anniversary of Department of Science and Technology (DST), Govt. of India on 3rd May 2021. The documentary was made by Vigyan Prasar covering the history of DST and its roles to the nation. The faculty, research scholars, officers, staff of the institute attend the programme and enjoyed.

IASST, World cancer day celebration on 4th Feb, 2021

The 21st World Cancer Day was celebrated at IASST with a marathon run and an awareness campaign to mark this occasion. The scientific session began with an informative talk by Director, Prof. Ashis K Mukherjee and followed by a special talk from Prof. Siddhartha S Ghosh, Department of Bioscience and Bioengineering, IIT-Guwahati. The eminent cancer scientist delivered a riveting talk on "**Translational Research on Cancer Theranostics**". In another session, Dr. Anupam Das, MS, Associate Professor, Head and Neck Oncology, Dr. Bhubaneshwar Borooah Cancer Institute (BBCI), Guwahati, delivered his awareness talk titled "**Burden of Oral Cancer, Screening and Early Detection**." This talk was followed by Dr. (Major) Upasana Baruah Joshi, MD (O&G), Assistant Professor, Gynecological Oncology, Dr. Bhubaneshwar Borooah Cancer Institute (BBCI), Guwahati who delivered an awareness talk on female cancer titled "**Breast and Cervical cancer**." Dr. Devasish Choudhury, Dr. Jagat Chandra Borah and Dr. Sarathi Kundu) of IASST conducted a brainstorming discussion on interdisciplinary research on cancer for its early detection, diagnosis and treatment, considering the alarming increase in cancer incidences and the necessity in North East India.

Prof. Siddhartha S Ghosh delivering the lecture

Dr. Anupam Das and Dr. Upasana Baruah delivering the lecture

Glimpses of the brainstrorming session

Celebration of National Science Day on 28 February, 2021

The 35th National Science Day was celebrated with pomp and gaiety at Institute of Advanced Study at Science and Technology (IASST), Guwahati, following all covid protocols. The program was chaired by Prof. M. C. Kalita, working president and Dr. Jagadindra Ray Choudhury, General Secretary of the Assam Science Society. The inaugural speech was delivered by the Director of IASST, Dr. Asish K. Mukherjee, in which he motivated the research scholars to work hard in achieving their goals by following the three D's to success viz. Discipline, Dedication and Determination. After the inaugural speech the newsletter of Bionest was unveiled. Prof. M. C. Kalita, during his speech enlightened everyone by narrating the history of Assam Science Society he also mentioned the society's ongoing projects from restoration of rivers to various social and environmental endeavors. Dr. Jagadindra Ray Choudhury delivered his speech, underlining the importance of honesty by narrating the story of Dr. Subrahmanyan Chandrasekhar, a student of Dr. C. V. Raman.

There were three invited talks, the first talk was on Nobel award in Physiology or Medicine by Dr. Sachin Kumar, Department of Bioscience& Bioengineering, IIT Guwahati, in which he emphasized on the Hepatitis C virus. The second lecture was delivered by Dr, Sanjeev Kalita, Department of Physics, Gauhati University, where he explained black hole, the space time fabric and the modern era of telescopes to study it. The third lecture was given by Dr. B. Anand, Department of Bioscience& Bioengineering, IIT Guwahati, encompassing the Nobel Award in Chemistry with an insight on CRISPER- CAS technology and the potential of gene editing in the field of new age medicine.

Following these was a poster competition by the research scholars of IASST on popular science topics. At the end the annual wall magazine "**Vijayanam**" was inaugurated. The program ended by the distribution of prizes to the winners of poster competition followed by valedictory speech.

International Day of Forest on 21 March, 2021

The 2021 Theme for the International Day of Forests is "Forest restoration: a path to recovery and well-being." IASST, celebrated IDF as part of the 75th year of India's Independence-Aazadi Ka Amrut Mahotsava. The programme was attended by research scholars, scientists, and staff of IASST. In addition, science teachers of high school from the Bodoland Territorial Council (BTC) area of Assam and coordinators of Biotech hub of entire northeast join the programme through virtually. Prof. Ashis Kr. Mukharjee, Director of the institute address the gathering of the programe and stress the need of importance of conservation of forest and emphasis on joint collaboration between IASST and an environmental NGO, Aaranyak. In the programme Dr. Bibhuti Prasad Lahkar, Mr. Udayan Borthakur and Dr. Bibhav Kr. Talukdar from Aaranyak spoke about grassland ecosystem, conservation and management and work done at Manas National Park, wildlife genetic laboratory of Aaranyak.

Prof. Ashis Kr. Mukherjee, Director, IASST delivering the talk on the occasion of the International Day of Forests (IDF), the programme was conducted via both offline and online modes following Covid-19 guidelines.

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DEVELOPING SUPPORTING NETWORK

MoU between IASST with Tezpur University, Assam

1. A MoU was signed between IASST and Tezpur University, Napaam, Tezpur, Assam, India on 15th February 2021 to continue cooperative efforts between TU and IASST to enable the exchange of students and research scholars and for the exchange of academic and research information between the two Institutions.

MoU between IASST with Dept. of Biotechnology, Govt. of India

1. A MoU between Dept. of Biotechnology, Ministry of Science & Technology, Govt. of India &Institute of Advanced Study in Science and Technology (IASST) Guwahati was signed on 22.07.2020 for collaborative research on phytopharmaceutical development of Ficus Semicordata Buch.-Ham. Ex Sm.

MoU between IASST with Arya Wellness Centre, Guwahati

1. A MoU was signed between IASST and Arya Wellness Centre, Guwahati for Collaborative research on pathological image databases on different types of cancer and development of cancer diagnosis decision-making software etc.

MoU between IASST with Golden Beverages, Guwahati

1. A MoU was signed between IASST and Golden Beverages, Guwahati for the transfer of Technology from IASST.

SUPERANNUATION OF IASST EMPLOYEES

Retirement of Mr. Gora Gupta

On 31st May 2020, a farewell meeting was organised to bid farewell to Mr. Gora Gupta, Laboratory Assistant on account his superannuation. Mr. Gupta was given a warm felicitation. The faculty members, research scholars and staff members of IASST in their speech appreciated Mr. Gora's contribution to the institute and wished him good health and prosperous life.

Retirement of Mr. Munindra Singh

On 31st March, 2021, a farewell meeting was organised to bid farewell to Mr. Munindra Singh, Technical Assistant on account his superannuation. Mr. Singh was given a warm felicitation. The faculty members, research scholars and staff members of IASST appreciated Mr. Singh's contribution to the institute and wished him good health and prosperous life.

IN MEMORY OF THOSE WHO SERVED IASST

Obituary for the Demises of Dr. Mahanta Kr. Kalita

Late, Dr. Mahanta Kr. Kalita, former Registrar of IASST, left for heavenly abode on April 13, 2020. Dr. Kalita was born in 1944 at Puran Katahi village, Chhaygaon, Kamrup Distrct of Assam. Dr. Kalita passed his matriculation with good results securing letter marks in three subjects from Chhaygaon Higher Secondary School. A brilliant student all along, he completed his BSc from Cotton College in 1966, and MSc in Physics from Gauhati University in 1969. He started his service career as a lecturer at Nalbari College in the year 1969. Later, he did Ph.D. in plasma physics from Gauhati University in 1982. In 1984, he left the lecturer's job from Nalbari College and joined the Institute of Advanced Study in Science and Technology (IASST), Guwahati, as a research scientist. Later on, he served as Registrar and retired from this post in 2003.

He was one of the persons instrumental in IASST becoming a national level S & T institute in 2009. Dr. Mahanta Kr. Kalita was an active member of the Assam Science Society since his student life, and was the pioneer of the scientific movement in Assam. He was secretary-general and then working president of the Assam Science Society for a long time. He was also the North-East Zonal Secretary of Bharat Jana Bigyan Jatra. Till his final days, he was Rector of the Abhiruchi Institute of Physical Education, Assam. He was a kind-hearted and efficient administrator with an optimistic outlook. He left an indelible impression on anyone who had come in contact with him. His death, besides being a personal loss to his family, is also a significant loss to the state of Assam and the scientific communities. IASST fraternity will always remember his contribution towards the growth and development of the IASST. The IASST family prays to almighty for eternal peace of his soul.

R & D SUPPORTING ACTIVITIES

(Engineering, Administration, Information Technology and Finance)

FINANCE & ACCOUNTS SECTION


Dr. Diganta Goswami


Suresh Sarma


Ramen Mahanta


Hemanta Sarma


Moonmee Deka


Pradyut Borkatay


Sanjubi Sharma


Niren Sharma

Bipul Kumar Das

ADMINISTRATION SECTION


Dr. Diganta Goswami


Rajesh Sharma


Rabin Ch. Kalita


Dwijendra Deka


Lelin Gogoi


Prabhat Barma


Diganta Das


Bijuphukan Bhagabati


Kumud Baishya


Dr. Anil Kumar


Pinky Taye


Nirmali Devi


Ksh. Sharmina Devi


Nayan Talukdar


Prakash Kumar Kachari


Satish Ch. Das


Balabhadra Pathak


Nimai Hazam


Madhabi Das


Munna Basfor

Dinesh Ch. Deka

Anima Baishya

Manindra Deka

Madan Kr. Das

Pradip Das

Lachman Thapa

Pranab Talukdar

Bimal Das

IASST SOCIAL VENTURE AND ENTEPRENEURSHIP CONSORTIUM (ISVEC)

Prof. Asish K Mukherjee

Devasish Chowdhury

Chandrabhan Kakoty

Tania Paul Das

Minku Das

INFORMATION TECHNOLOGY UNIT

Jayanta Borthakur

Debajit Deka

ENGINEERING SECTION

Montu Deka

Md Mahammad

Bikash Jyoti Das

Mukta Ram Kumar

A. Meetings and Activities of Various Committees

A.1 Governing Council Meetings

Fourteenth meeting of the Governing Council, IASST

The fourteenth meeting of the Governing council of IASST was held on 20th January, 2021 under the chairmanship of Professor Abhay Karandikar Director, IIT Kanpur through online mode.

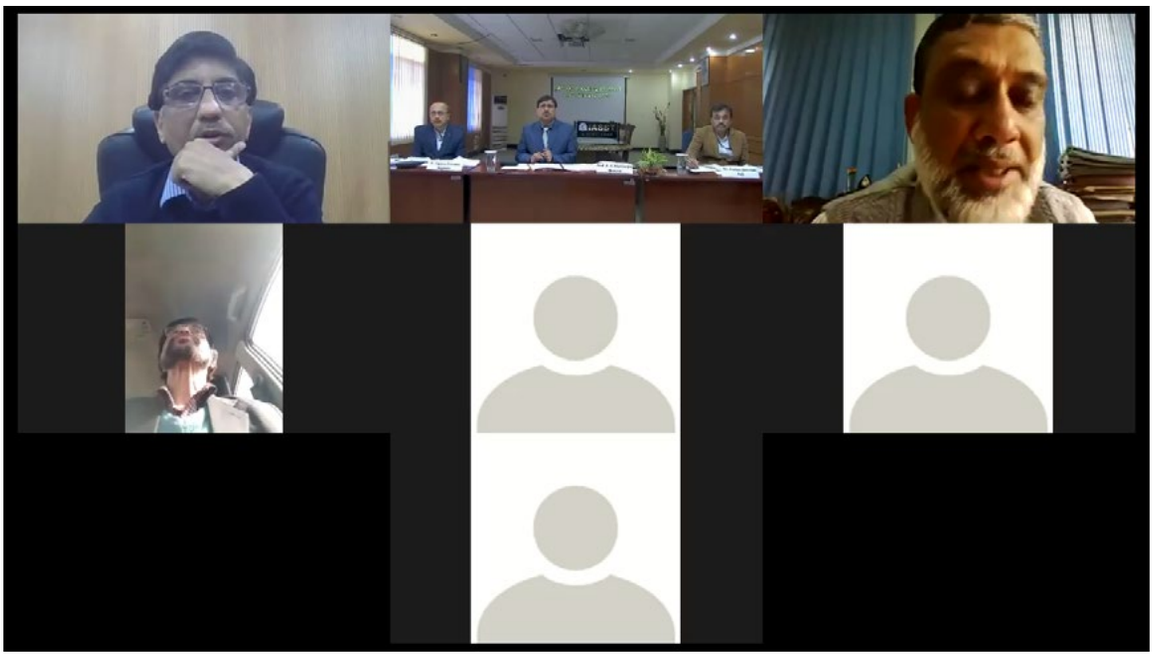


Photo caption: Prof. Abhay Karandikar, Director, IIT Kanpur chairing the 14th GC meeting of IASST

The major recommendations/approval of the meeting were-

1. Approval of all the recommendations of 13thFC meeting of IASST held on 29/12/2020
2. Approval ofConstruction of a new Women Hostel in the IASST Campus
3. Approval of two designated Head of Division(HOD) of Life Sciences and Physical Sciences
4. Approved the proposal ofestablishment of a Research and Development(R&D) Cell in the institute
5. Approved proposal for establishment of a Centre for Interdisciplinary research
6. Approved renaming of "Traditional knowledge based Drug Development & Delivery" to "Traditional and Modern Drug Discovery and Disease Diagnosis"

A.2 Scientific Advisory Council (SAC) Meetings

Tenth Meeting of Scientific Advisory Council (SAC) of IASST

Tenth meeting of Scientific Advisory Council (SAC), IASST held on 17th and 18th July,2020 under the Chairmanship of Prof. Padmanavan Balaram, former Director, IISc Bangalore through video conferencing

Major recommendations/approval of the meeting are-

1. Approved the procurement of four high end equipment (XPS, XRD, Microtome and NMR) to strengthen the research infrastructure of IASST
2. Recommended that adequate provisions may be made by the Governing Council of IASST to engage retired Scientists of the institute enabling them to make scientific contribution beyond superannuation.

Photo caption: A scene from 10th SAC meeting held on 17th and 18th July, 2020

3. Approved the commencement of PDF program of the IASST to engage fresh Ph. D. holders (One PDF in each program)

A.3 Finance Committee of IASST

Thirteenth Meeting of the Finance Committee of IASST

The thirteenth meeting of Finance Committee of IASST, Guwahati was held on 29.12.2020 under the Chairmanship of Professor Ashis Kumar Mukherjee, director IASST through video conferencing.

Major recommendations of the Committee were:

1. Recommended budget estimate of Rs 40.65 crores for the financial year 2021-2022
2. Suggested to submit a consolidated proposal elaborating details that resulted in the revision of original budget estimate from Rs12.77 crores to Rs31.80 crores
3. Recommended the proposal for creation of Corpus Fund from own sources of the institute subject to concurrence of Ministry of Science and Technology, Govt. of India.
4. Recommended the proposal for construction of a 100 capacity Women Hostel for the female research scholars.

A scene from 13th FC meeting held through Video Conferencing on 29.12.2020

A.5 Vigilance, RTI, Women Cell and its activities during 2020-21

The institute has a part-time Vigilance Officer appointed by the Department of Science and Technology, 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 2019-2020. The Vigilance Awareness week was observed in the institute during Oct 27, 2020 to Nov 2, 2020.

The institute has a Central Public Information Officer (CPIO) who furnishes information under Right to Information Act (RTI) 2005. During the year 2020-21, 11 nos. of application 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 2020-21 in the Central Information Commission (CIC) RTI Annual Return Information System. The institute submitted the Transparency Audit of Disclosures u/s 4 of the Right to Information Act 2005 to the CIC and third party Audit for the period 2019-20 was conducted and completed by CSIR-HRDC, Ghaziabad in compliance with CIC guidelines and received certificate in August, 2020 for the same.

IASST has a women cell comprising of four members from academics and administration which has been constituted to attend to the offences/inconveniences of women workers working at different capacities at IASST. The overall responsibility of this cell is to ensure a comfortable working environment for the women workers. In case of an offence, the committe approaches the parties independently to take account of the matter and works out a way to settle the issue in an impartial and amicable manner. In the year 2020-21, no offences/inconveniences have been registered to this cell.

B. Major Administrative, IT and Engineering activities

B.1 Information Technology Activities

Launching of IASST new website: The redesigning of IASST new website (https://iasst.gov.in) was completed in the month of August 2020. After getting security audit clearance certificate website is live for public from 1st November 2020. The website was redesigned and developed as per the GIGW guidelines and hosted in NIC cloud. The new dynamic website has a user friendly Content Management system for updating and maintenance of the contents. Total cost involved in the process was Rs. 5,77,500/.

Photo caption: IASST New Website

Backup Solution with unified storage: - A unified storage of raw capacity 80 TB with backup solution for backing up IASST's mission critical server's data and user system data has been installed at IASST. This backup solution is taking backup of institute servers and virtual machines as well as some important client PCs. Made arrangement for backing up of research scholar's important research data, so that in case of their system failure they can retrieve their important data. A total cost of Rs. 15, 99,937/- was involved in the process.

Status of GeM purchasing: - During the year 2020-21, items of value more than Rs. 136 Lakhs have been purchased via Government e-marketplace (GeM).

B.2 Civil and Electrical Infrastructure Creation

33/.433 KV Electrical Substation: IASST requested APDCL for up gradation of feeder power supply of IASST substation from 11 kV to 33 kV. Based on their communication, APDCL agreed to install a 33 kV Substation (SS) at IASST premises with a 33 kV dedicated transmission line from Garchuk SS. APDCL informed about the sanction of 33 kV dedicated line to the Sub-station at IASST. An MOU was signed between IASST and APDCL to set-up 33/11 kV SS at the IASST premise and agreed to keep provision for a 33 kV bay for use of the institute in the proposed 33/.433 SS at IASST. The following works related to construction of 33/.433 Substation at IASST are done/ under progress

1. **Supply, installation & Commissioning of LV Panels for 33/.433 KV IASST Substation:** The work was allotted to M/S North eastern Engineers, Guwahati at a work value of Rs 57,85,515/-. The work is in progress.

2. **Supply, installation and commissioning of two nos. of 33/0.433KV 1600KVA Oil filled Transformer for 33/.433 KV IASST Substation:** The work was allotted to M/S North eastern Engineers, Guwahati at a work value of Rs 50,60,000/-. The work is in progress.

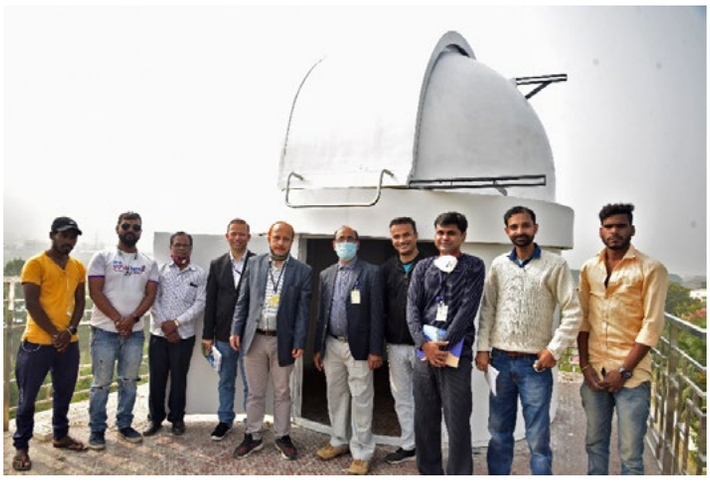
3. **Installation and commissioning of 33/.433 KV substation of IASST:** The work was allotted to M/S North eastern Engineers, Guwahati at a work value of Rs 9,51,552/-. The work is in progress.

4. **Construction of 33KV line, 11 KV&LT composite from 33/11kv Garchuk substation to proposed 33/11 kv substation at IASST campus (Line length 5.2 km)** The work was done by Assam Power Distribution Corporation Ltd(APDCL) at a cost of Rs1,23,17,334. The work is complete.

B.3 Observatory Building

Telescope dome and telescope installation

An astronomical telescope (Celestron CGX-L Equatorial 1400 Schmidt-Cassegrain Optical Telescope) along with its dome have been installed on 15 December, 2021 the terrace of the observatory building of the institute. Aperture of the telescope is with focal ratio f/11. A camera (Celestron Skyris 236 Camera) for astronomical imaging is also attached with the telescope. Telescope is placed inside the observatory dome of about m in diameter and m in height. Dome head is motorized control with forward and reverse switched movement. Along with this main telescope, a small telescope (Celestron Advanced VX 6" Schmidt-Cassegrain Small Optical Telescope) is also procured for its advantage of carrying it at various places.



Telescope installation

Photo of astronomical observatory dome and telescope

The main purpose of this telescope is to give the exposure about the night sky and various astronomical events to the students of the nearby Schools and colleges. In future, an astronomical club will be formed for observing and recording of the various astrophysical phenomena and to spread the awareness about those phenomena among the common people of our society. Exhibitions of various astronomical phenomena will also be arranged for the students from various schools and colleges.

B.4 Animal House Facility Building

Animal study is an integral part of research especially in the field of Biochemistry and Drug Discovery. Animal House Facility (AHF) is maintained in the institute premises which houses experimental albino rat, mouse and rabbit and this cater to the need of scientists of traditional knowledge-based drug discovery programme of IASST and also the scientist of Tezpur University, Assam Ayurvedic College, IIT Guwahati etc. In view of increasing requirements of space in AHF for both scientists of IASST and other institute, construction of a state-of-the-art new AHF of 8000 sq. ft. has been initiated during 2016-17 and it is in the verse of completion. Currently different species of laboratory animals available in AHF are Albino rats (Wistar), Albino mice (Swiss), Guinea pigs (Duncan Hartley) which are maintained and used as per guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) Government of India, and Animal Welfare Division and guidance of the institute CPCSEA committee.

B.5 Medicinal Plan Garden

The Northeastern Region of India is unique in its ecoclimatic condition and blessed with diversified flora and fauna. Research on traditional medicinal plants is a core branch at IASST. Therefore, the MPC of IASST has been maintaining-medicinal herbs, shrubs and trees in its campus. Several of these medicinal plants are investigated for their potential in the treatment of metabolic syndrome such as diabetes, cardiovascular diseases (CVD) and cancer based on traditional knowledge. Bioactivity guided fractionation and evaluation of bioactive principles of some of these herbs under traditional knowledge-based drug discovery programme are carried out with case by having them in the MPC. The MPC also maintains several medicinal herbs and plants of common use in general health care practice as folklore medicine, particularly for institute scientist, students and other visitor to the institute. An inventory book containing a detailed photographic and descriptive record of available plants is under preparation. Some of the important medicinal plants of the collection in MPC are *Ambellica officinalis, Citrus grandis*, *Citrus morella, Clerodendrum colebrookianum, Clerodendrum philippinum, Terminalia chebula, Vinca rosea, Eugenia jambolana, Punica granatum, Ocimum sanctum, Cuinamomum tamala, Murrya koenigii, Piper longum, Rauwalfia tetraphylla, Terminalia arjuna, Musa balbisiana, Tinospora cordifolia, Alpinia galangal, Stevia etc*.

B.6 Central Instrumentation Facility (CIF) and Drug Development Centre building

To cater to the need of the various research groups of IASST and nearby institutes, IASST has state of the art advanced instrumentation facility. The CIF has number of sophisticated instruments like Scanning Electron Microscopy (SEM), Transmission Electron Microscope (TEM), X-ray Diffractometer, Atomic Force Microscope, LCMS, GC-MS, Atomic Absorption Spectroscopy, Fourier Transformed Infra-red spectroscopy, Gene sequencer, Confocal Microscope, Flow Cytometer, BD FACS Melody Multi-Colour Analyzer cum High Speed Cell Sorter; Langendroff System with PowerLab Data Acquisition system, Extracellular Flux Analyzer etc. In addition, Pico-second time resolved spectrofluorometer and Micro-Raman spectroscopy was recently installed.

The CIF is carrying out analysis of number of samples from other institutes like Gauhati University, Cotton University, IIT Guwahati, Tezpur University, Mizoram University, NIT Meghalaya, NIT Nagaland, NEHU, Assam Don Bosco University, Assam Downtown University, University Science and Technology Meghalaya, University of Madras, RIPANS, and Aizawl etc.

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. Through this portal analysis of sample is digitalize. All external samples from requisition to generation of report are online.

B.7 Bioinformatics Infrastruture Facility (BIF)

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. Since its inception, DBT is continuously funding the centre to support infrastructure and software and form the year 2021 the BIF is supported by institute's core fund. The functions of the centre include acquisition, creation and development of programmes and databases by organizing workshops and seminars in the field of bioinformatics. In the year of 2012, Centre had procured one high-end workstation. Presently, the software, 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, and scientists of the entire North Eastern Region.

Area of specialization:

- Molecular Biology & Bioinformatics.
- Population genetic studies of rare and endemic insect & fish sp.
- Bioresources database construction.
- NGS (WGS, WES, RNA-Seq) Data analysis.
- Drug Discovery & Docking.
- Molecular Dynamics Simulation.

B.8 Sports Complex

A mini sports complex building with the provision of space for indoor sport facility is available within the IASST campus. The mini sport building is a two storey house structure with a buildup area of 400 Sq. m. The Gymnasium tools and Table Tennis boards are available at the ground floor of the complex. The mini sports complex also houses an indoor badminton court. Students, staff and residents of the IASST campus are availing these facilities for better health and fitness

Photo caption: Outside and inside the sports complex.

B.9 AZADI KA AMRUT MAHOTSAVA

75th Year of India's Independence

Celebration of International Day of Forests at IASST, Guwahati on 21th March 2021

Institute of Advanced Study in Science and Technology (IASST), a ISO 9001:2015 premier Scientific Research Organization in the North Eastern Region of India, celebrated International Day of Forests on 21th March 2021 as part of 75th Year of India's Independence: Azadi ke Amrit Mahotsava. The program was attended by students, employees and staff of IASST. In addition, high school science teachers from the BTAD area of Assam and biotech hub coordinators from the entire NE India joined the program online.

On the occasion of this programme a meeting was held and Dr. Devasish Chowdhury, Associate Professor, IASST welcomed the participants. Prof. Ashis K. Mukherjee, Director, IASST delivered his speech on this occasion. He stressed the need of importance of conservation of forests and emphasized joint collaboration between IASST and Aaranyak.

Mr. Udayan Borthakur from Aaranyak gave glimpses of the activities of Aaranyak and work done by them in wildlife genetic laboratory. Dr. Bibhuti Prasad Lahkar spoke about grassland ecosystem and conservation and management and work done at Manas National Park.

There was also detailed discussion between IASST and Aaranyak of possible and potent areas of collaboration and a possible MoU in this regard in which both Prof. Mukherjee and Dr. Bibhab Kumar Talukdar, CEO, Aaranyak participated.

B.10 Entrepreneurship & Innovation Activities at IASST

Various activities of BioNest-IASST

To translate IASST research output for benefit of society and promote science-based entrepreneurship, 'IASST Social Venture & Entrepreneurship Consortium' (ISVEC), was established and inaugurated by Prof. Ashutosh Sharma, Secretary, Dept. of Science & Technology, Govt. of India.

IASST's entrepreneurship program got a big boost when IASST received a funding under BioNest program for establishment of BIRAC-BioNest Facility at IASST.

Bio-NEST program under BIRAC provides support to establish bio-incubators either as a standalone entity or as a part of the academia. The BioNest –IASST is nestled in Institute of Advanced Study in Science and Technology (IASST) to help the incubators wherein Innovation & Entrepreneurship, Networks & Collaboration, Resource management & Outreach is taken care of for emerging Biotech/Life Science Startup Ventures. It shall thrive to provide instrumentation platforms for small and medium scale industries (SME's), Academic Institutions & hospitals, to further their research programs in biotechnology, life sciences and biomedical sciences. In addition, BioNest-IASST will offer short term industrial training courses as well as facilities to Ph.D/M.Sc/B.Tech/M.Tech Biotech students to carry out their dissertation and project work.

The BioNest-IASST building is spread around 10,000 sq. ft area in the CIF of IASST comprising of incubation spaces for Biotech startups, R&D Labs, Bootstrapping area and Common Instrumentation Facility to kick-start their operations. BioNest-IASST will provide a 3-5-year incubation facility for start-ups and also the required infrastructure for the new company to work independently thereafter. Technological assistance and support will be imparted all the way through the maturation phases of the start-ups until their progression into a fully fledged company. BioNest-IASST will execute the hand-holding to the start-ups with respect to Intellectual property rights, Regulatory and Venture capital support along with funding support from DST, DBT and BIRAC, Startup India fund under Government of India.

Workshops conducted

Principles of Confocal Microscopy and its Biomedical Application

BioNest-IASST has organized an online Workshop on "Principles of Confocal Microscopy and its Biomedical Application." on 18th February 2021, Thursday from 11 am to 1 pm. It was co-organized by Leica Microsytems. Dr. Tania Paul Das-Manager (S&T) of BioNest-IASST welcomed the participants and introduced Mr. Sujoy Dey who is the Leica Application Specialist and also the orator of the workshop. The workshop initiated with the opening statement of the Director of IASST-Dr. Ashis Kr. Mukherjee. Almost 65 participants registered to attend the workshop. During the session, participants understood the essence of using Confocal Microscope and also the Working Principle & Variants of Confocal microscope. Live-cell imaging by 'Stellaris Confocal Microscope' was demonstrated and the workshop ended with the Q&A round. Dr. Devasish Chowdhury, Associate Professor, Physical Science Division (IASST) gave the vote of thanks to the whole team of Leica Microsystems and Team BioNest-IASST for organizing the Workshop.

Photo caption: Sceen shot of first slide

Global Bio India Roadshow

BioNest-IASST at Guwahati, Assam has organizing a curtain raiser Roadshow event: "Global Bio-India 2021 (Transforming lives) - A mega international congregation of biotechnology stakeholders organized by DBT and BIRAC." on 25th February, Thursday, 11:00-13:00. The acclaimed speakers of the event were: Dr. Shikha Taneja Malik, Program Manager, National Biopharma Mission, BIRAC, Dept of Biotechnology, GoI and Dr. Mrutyunjay Suar, CEO, KIIT TBI, Director General,

KIIT University, Bhubaneswar. The THEME of the event was: KHOJJ (Knowledge Harnessing and Orientation from Job Seekers to Job Givers).

A total of 38 participants registered for the event and Dr. Shikha Taneja Malik was successful in spreading awareness about various funding schemes of BIRAC. Dr. Mrutyunjay Suar gave an interactive talk on changing the mindset and building enabling ecosystem in NER.

Global Bio-India 2021, the largest Bio event, showcased opportunities in Indian Biotechnology sector to the world. Salient components of Global Bio-India 2021 included events such as Bio-partnering, Policy dialogues, CEOs Roundtable, Global Regulators Meet, Investors Meet & Exhibition Pavilions.

This mega international congregation of biotechnology stakeholders included representation from national & international bodies, Ministries, Industries, Bio-clusters, Research institutes, and others. In the three days' program, The Day 1 of GBI-2021 has showcased Atmanirbhar Bharat Conclave wherein India's campaign 'Make in India' to provide resilience and self-sufficiency" to the country was focused. The session highlighted National Priorities, examples from India's experience in turning Covid pandemic challenges into opportunities for developing domestic innovation ecosystem gaining self-sufficiency in requirements. Bill and Melinda Gates Foundation (BMGF), Wellcome Trust and GAVI have positioned India as key vaccine developer and manufacturer. On Day 2, insights were provided on the phytopharmaceuticals and Traditional Knowledge from AYUSH perspective. Focus was on the opportunities of innovation from business and regulatory aspects, and process of drug development through Traditional systems as well as scope and challenges prevalent in this sector. As a part of the Blue Economy, the Department of Biotechnology (DBT) has developed a consortium programme/ virtual centres of Marine Sciences with strong linkages proposed to the 'Advanced Marine Station for Ocean Biology', which is part of the Deep Ocean Mission of Ministry of Earth Sciences. Feasible strategies to support innovative technological interventions to tackle problems associated with Neglected Tropical Diseases (NTDs), Antimicrobial Resistance (AMR), and other infectious diseases in India was discussed on Day 3. Lastly a session was conducted on affordability and accessibility of medicines with quality. Though, the regulators and policy makers across world are finding innovative ways to enhance the quality of medicines by framing the regulatory approval processes transparent and more efficient, there is a need for collaboration for harmonizing regulations and policies across different nations.

Roadshow flyer

Newsletters published

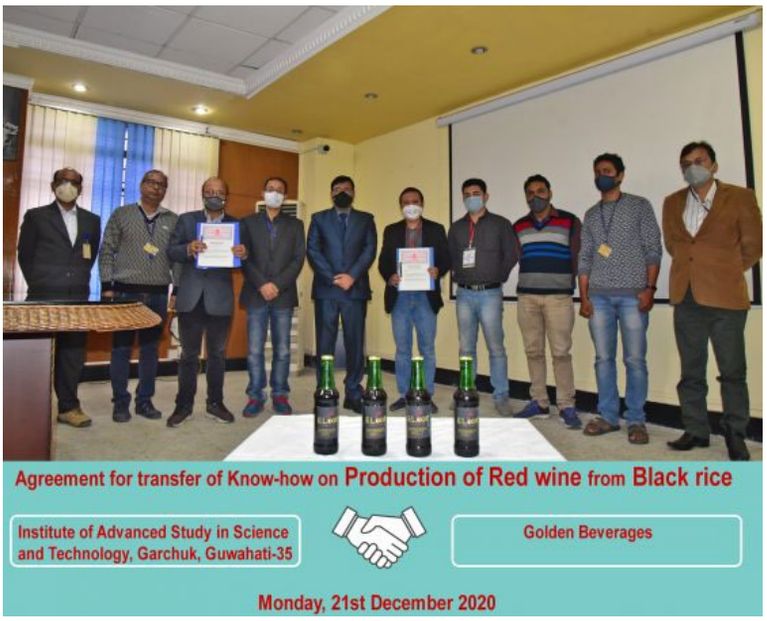
BioNest – IASST in association with ISVEC has published the sixth volume of the periodic Newsletter - CREATORS. The sixth volume was unveiled on the occasion of National Science Day to showcase the recent activities of BioNest and achievements of IASST.


Release of newsletter and front page

Technology transfer & Signing of MoUs

Technology transfer between Golden Beverages and IASST

A beverage was prepared using aromatic black rice of Manipur which showed promising biochemical properties and a patent was filed for the process by Dr. Mojibur R Khan and his Ph.D. student Mr. Bhuwan Bhaskar. The research was funded by Biotechnology Industry Research Assistance Council (BIRAC) under the Promoting Academic Research Conversion to Enterprise (PACE) scheme. Under this research, a pilot scale fermentation process was optimized for the production of a beverage. The anthocyanins in the wine give the attractive color and the fermentation process brings appealing taste and aroma. Also, it is rich in antioxidant content (Cyanidin and Delphinidin) and is organoleptically identical to red wine. Several biochemical properties were analyzed in IASST as well as in other laboratories including FSSAI. The beverage was also subjected to sensory analysis with volunteers to evaluate the consumer choices as well as market accountability. The results indicated a considerable demand and commercialization of the beverage was of utmost need. In this regard, IASST has taken a noble initiative to bring such artisanal drinks to the supermarkets with technical collaboration with Golden Beverages. Professor Ashis K. Mukherjee, Director, IASST officially transferred this novel technology by signing a MoU with Golden Beverages represented by Dr. Diganta Goswami, Registrar, IASST and Mr. Hamendra Chandra Das and Dr. Rahul Deori from Golden Beverages for pilot scale production of this rice-beverage. The event was witnessed by Dr. Devasish Chowdhury, BioNest-IASST where pilot scale production of this traditional beverage will be initiated. This will boost the economy of the region by providing jobs to unemployed youths of the region.



MoU signing ceremony

MoU between KIIT- Technology Business Incubator and IASST

KIIT- Technology Business Incubator is a lead Incubator of Eastern Cluster and an established BIRAC Regional Techno-Entrepreneurship Promotion Centre (BRTC). Therefore, to establish a strong framework of Collaboration IASST Ghy have signed a MoU with KIIT TBI in March 2021.

The areas of co-operation were predominantly:

- ✓ Enhancement of academic interactions between institutions in and around NER
- ✓ Institutionalization of New incubators
- ✓ Capacity building of existing TBIs
- ✓ Mining of techno-commercial resource pool of East and North East region to create linkages between innovation and Market
- ✓ Developing joint capacity building workshops and specialized training programs in Bioentrepreneurship for first generation technopreneurs.
- ✓ Developing joint research projects of common interests
- ✓ Complementary exchange and seeding of Startups from local region and mature ecosystem.
- ✓ Providing physical and virtual incubation services
- ✓ Exchange of Scientists, technologists and research personnel for knowledge sharing purposes.

Other Activities

Saplings of ghost pepper, also known as ***Bhut Jolokia*** was distributed on 23rd December 2020 for cultivation at two villages- Satargaon and Bakarapara, Near Rani, Guwahati which were adopted by IASST.

The Bhut jolokia is an interspecific hybrid chili pepper cultivated in North-east India. It is a hybrid of *Capsicum chinense* and *Capsicum frutescens* and is known as the world's hottest chilli pepper.

Along with this, sapling of red pumpkin (Scientific name: *Cucurbita maxima*) was also distributed to the villagers which they can grow and sell in the market for their own profits.

The event was represented by Prof. Ashis Kr. Mukherjee (Honorable Director), Dr. Diganta Goswami (Registrar), Dr. Neelotpal Sen Sarma (Associate Professor-II PSD), Dr. Lipi B Mahanta (Associate Professor-II CCNS) and Dr. Tania Paul Das (Manager -S&T of BioNest-IASST). The sapling distribution programme was well organized by Mr. Prakash K. Kachari under the vigilance of Prof. Nalin Kr. Mohan (Consultant, Tribal Area Development Program and Former Director of Extension Education and Chief Scientist at Assam Agriculture University.

A scene of ***bhut Jolokia*** seedling distribution

B.11 Staff Welfare Measures

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

1. Medical Facility

The institute has its medical reimbursement system through which bills on expenses of both indoor and outdoor treatment in respect of all employees and their family members are reimbursed as per CGHS rules and rates. In addition to regular employees the medical facility is also provided 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 empaneled few renowned hospitals of Guwahati to provide medical facilities as per central government/CGHS rates. These includes-1) Ayursundra Superspecialty Hospital, Garchuk, 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 and (7) Panacea Medical Research and Diagnostic, Bhangagarh, Guwahati. Out of these, Hayat Hospital, Arya Hospital, Ayursundra Super Specialty 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.

2. 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. There is facility of serving snacks and beverages inside the main building through Vending Machine. The private caterer also provides hygienic food to the boarders and guests in the Dorothy Hodgkins Students and Scientists' Home.

3. Benevolent Fund

An IASST employees' Benevolent Fund was established by equal contribution from employees and the Institute. All the regular staff members are member 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.

4. 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.

5. Housing Facility

The institute has limited housing facility. Six (6) nos. of quarters in the old residential building are allotted to few essential service staff of the institute. In the new Essential Service Staff Quarter (ESSQ) twelve nos. of essential staff reside. In the essential Service quarter complex, there is arrangement of 12 Godrej bunker beds in each of the separate dormitory rooms for boys and girl's accommodation who visit IASST for different training and summer internship programme. The Director is residing in the newly built quarter in the midst of Bio Conservation Hub. The Superintendent of the SSH and PS to the Director also reside in the campus in their respective quarters. In the SSH and the Old hostel, accommodation have been made for 52 nos. of research scholars. Moreover, there are 3 (three) nos. of VIP suites and six (6) nos. of scientist room in SSH for accommodating guests who visit IASST from various parts of India and abroad. The Academic Staff quarter building consisting of 6 nos. of Type IV, 5 nos. of Type V and 8 nos. of Studio Apartment is almost ready for occupation.

B.12 Different Government policies adopted in IASST

1. Reservation Policy

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

2. Official Language Policy

The institute is paying emphasis on implementation of provisions of Official Language Act and the rules made and instructions issued there under. 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 (Hindi and English). 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. Three nos. of Hindi workshop and three nos. of Official Language Implementation committee meeting were also organized in the institute during 2020-21. The institute is also celebrating Hindi Diwas in every year with great zeal to popularize Hindi as a "Rajbhasa".

B.13 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 of core budget. Besides, the internal source of income generation during 2019-20 is highlighted in the following table.

Source of Income	Amount (₹)
Laboratory Instrument uses charge	9,99,480.00
Sale Proceeds of institute products	3,42,693.00
Other Receipts (tender paper charge, bank interest etc.)	31,51,298.00
Hostel/guest house receipt	20,33,879.00
Total	**65,27,350.00**

FINANCIAL STATEMENTS

INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GUWAHATI - 781035

AUDIT REPORT FOR THE YEAR ENDED 31ST MARCH, 2021

U.K. RATHI & CO.
Chartered Accountants

Block-A, 1st Floor
House No 86, Prasad House
Near NE TV Complex
A. K. Azad Road
Rehabari, Guwahati – 781008

U.K. RATHI & CO.
Chartered Accountants
FRN with ICAI: 326128E

Block-H, 1st Floor
House No 86, Prasad House
Near NE TV Complex
A. K. Azad Road
Rehabari, Guwahati – 781008

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, 2021, 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

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

Registrar
Institute of Advanced Study in Science & Technology
Paschim Boragaon, Guwahati-35

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

Landline: 0361-2636565 (O), Mobile: +91-9435701090 (M), e-mail: ukrathi1981@gmail.com

U.K. RATHI & CO.
Chartered Accountants
FRN with ICAI: 326128E

Block-A, 1st Floor
House No 86, Prasad House
Near NE TV Complex
A. K. Azad Road
Rehabari, Guwahati – 781008

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, 2021;

(b) In case of the Income and Expenditure Account of the Income/Expenditure of Society for the year ended 31st March, 2021;

(c) In case of the Receipts and Payment Account of the Receipts/Payments of Society for the year ended 31st March,2021

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 U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No.064719

UDIN : 21064719AAAAZA2524
Place : Guwahati
Date : 07/08/2021

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

Registrar
Institute of Advanced
Study in Science & Technology
Paschim Boragaon,Guwahati-35

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी. पश्चिम बड़ागाव
IASST, Paschim Boragaon
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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, 2021

PARTICULARS	Schedule	Amount (₹) 2020-21
CAPITAL FUND & LIABILITIES		
Capital Fund	1	877,492,240.04
Reserve & Surplus	2	11,532.00
Earmarked Funds	3	73,509,095.69
Secured Loans and Borrowings	4	0.00
Unsecured Loans and Borrowings	5	0.00
Deferred Credit Liabilities	6	0.00
Current Liabilities and Provisions	7	137,278,750.40
TOTAL :		**1,088,291,618.13**
ASSETS		
Fixed Assets	8	834,175,341.80
Investments - From Earmarked/Endowment Funds	9	0.00
Investments - Others	10	62,442,787.56
Current Assets, Loans and Advances	11	191,673,488.76
TOTAL :		**1,088,291,618.13**
SIGNIFICANT ACCOUNTING POLICIES	24	
CONTINGENT LIABILITIES AND NOTES ON ACCOU	25	

In terms of our report of even date annexed hereto.

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

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

Registrar
Institute of Advanced Study in Science & Technology
Paschim Boragaon,Guwahati-35

वित्त एवं लेखा अधिकारी (i/c)
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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

CONSOLIDATED INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2021

PARTICULARS	Schedule	Amount (`) 2020-21
INCOME		
Income from Sales/Services	12	0.00
Grant/Subsidies	13	202,000,000.00
Fees/Subscriptions	14	0.00
Income from Investments (Income on Invest. From earmarked/endow. Funds transferred to Funds)	15	0.00
Income from Royalty, Publication, etc.	16	0.00
Interest earned	17	1,292,409.00
Other Income	18	9,304,581.96
Increase/(decrease) in stock of Finished goods and work-in-progress	19	0.00
TOTAL (A) :		**212,596,990.96**
EXPENDITURE		
Establishment Expenses	20	131,197,944.00
Other Administrative Expenses, etc.	21	33,159,820.38
Expenditure on Grants, Subsidies, etc.	22	27,129,434.31
Interest	23	0.00
TOTAL (B) :		**191,487,198.69**
Balance being excess of Income over Expenditure (A-B)		**21,109,792.27**
Transfer to Unutilised Grant		12,269,487.69
Transfer to Benevolent Fund		6,960.00
Transfer to / from General Reserve		0.00
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**8,833,344.58**
Significant Accounting Policies	24	
Contingent Liabilities and Notes to Accounts	25	

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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

Registrar
Institute of Advanced Study in Science & Technology
Paschim Boragaon, Guwahati-35

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी., पश्चिम बड़ागाव
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

CONSOLIDATED RECEIPTS & PAYMENTS ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2021

RECEIPTS		Amount (₹)	PAYMENTS		Amount (₹)
I Opening Balances :			**I EXPENSES :**		
a) Cash in hand	20,000.00		**a) Establishment Expenses**		
b) Bank Balances			Extramural Projects	25,653,772.00	
i) In current accounts	0.00		DST General Fund	128,540,218.00	
i) In deposit accounts	0.00		Miscellaneous & Others	0.00	154,193,990.00
i) Savings accounts	68,708,685.39	68,728,685.39	**b) Administrative Expenses/ Expenses on Grant**		
II Grants Received			Extramural Projects	12,896,991.92	
a) From Government of India			DST General Fund	58,168,909.00	
Capital Grant	153,702,434.00		Miscellaneous & Others	1,343,986.00	72,409,886.92
Revenue Grant	236,888,458.00		**II Payments made against funds for various projects**		0.00
(As per Annexure D)			**III Investments and deposits made**		
b) From State Government	0.00		a) Out of Earmarked/Endow. Funds		0.00
c) From other sources (det	0.00		b) Out of Own Funds		60,000,000.00
(Grants for capital & revenue exp. to be shown separately)		390,590,892.00	**IV Expenditure on Fixed Assets & Capital WIP**		
III Income from Investments from			**a) Purchase of Fixed Assets**		0.00
a) Earmarked/Endow. Funds)		0.00	Extramural Projects	30,311,551.18	
b) Own Funds (Oth. Investments)		0.00	DST General Fund	86,061,373.00	
IV Interest Received			Miscellaneous & Others	0.00	116,372,924.18
a) On Bank deposits	3,244,233.00		**b) Expenditure on Capital WIP**		0.00
b) Loans, Advances, etc.	394,921.00	3,639,154.00	**V Refund of Surplus money/Loans**		
V Other Income			a) To the Government of India		0.00
Contribution to Employee Benevolent Fund	6,960.00		b) To the State Government		0.00
Mess Dues	1,532,435.00		c) To other providers of Funds		0.00
Interest on LC	5,102.00		**VI Finance charges (Interest)**		
Other Income	7,976,556.96	9,521,053.96	**VII Other Payments**		
VI Amount Borrowed		0.00	" Bank Interest refund to GOI	786,513.00	
VII Any Other receipts			" FDR Interest (Last Year wron taken in receipt side not rectified)	1,186,518.00	
STDR Maturity		66,515,456.00	" Bank Charges	77,143.75	
			" Loans and Advances	385,262.00	2,435,436.75
			" **CLOSING BALANCE :**		
			a) Cash in hand	20,000.00	
			b) Bank Balances		
			i) In current accounts	0.00	
			i) In deposit accounts	0.00	
			i) Savings accounts	133,563,003.50	133,583,003.50
		538,995,241.35			538,995,241.35

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : Guwahati
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

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Finance & Accounts Officer
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

(Amount - Rs.)

SCHEDULE 1 - CORPUS/CAPITAL FUND	Current Year	
Balance as at the beginning of the year		833,976,338.28
Add : Contributions towards Corpus/Capital fund	142,355,745.18	
Add/(Deduct) : Balance of Net Income/ (Expenditure) transferred	8,833,344.58	
Less: Depreciation for the year	107,673,188.00	43,515,901.76
		877,492,240.04

SCHEDULE 2 - RESERVES AND SURPLUS		
1. Capital Reserve		
As per Last Account	0.00	
Addition during the year	0.00	
Less: Deductions during the year	0.00	
		0.00
2. Revaluation Reserve		
As per Last Account	0.00	
Addition during the year	0.00	
Less: Deductions during the year	0.00	
		0.00
3. Special Reserve -IASST Employees Benevolent Fund (664178)		
As per Last Account	4,572.00	
Addition during the year	6,960.00	
Less: Deductions during the year	0.00	11,532.00
4. General Reserve		
As per Last Account	0.00	
Addition during the year	0.00	
Less: Deductions during the year	0.00	
		0.00
Total		11,532.00

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U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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बड़ागाव
Boragaon
Guwahati-
Assam:India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

SCHEDULE - 3 : :: EARMARKED FUNDS ::

Particulars	Salary	Contingency	Travel	Consumables	Training	Overhead	Misc.	Bank Interest	Refund Against Advance (Receipt)	Refund	Total(₹)
a) **Opening Balance**	**38,416,596**	**4,624,676**	**3,051,285**	**18,693,764**	**820,917**	**7,659**	**2,065,076**	**6,208,741**	**0**	**0**	**73,888,715**
b) **Addition to the Funds**											
i) Grants	25,597,720	1,780,479	1,014,060	4,759,280	350,000	1,029,252	357,667	0	0	0	34,888,458
ii) Other Receipts	0	0	-	0	0	0	538,091	2,754,321	0	0	3,292,412
	25,597,720	**1,780,479**	**1,014,060**	**4,759,280**	**350,000**	**1,029,252**	**895,758**	**2,754,321**	**0**	**0**	**38,180,870**
TOTAL (a+b)	**64,014,316**	**6,405,155**	**4,065,345**	**23,453,044**	**1,170,917**	**1,036,911**	**2,960,834**	**8,963,062**	**0**	**0**	**112,069,585**
c) **Payment towards objectives of Funds**	25,653,772	2,499,519	468,408	5,857,481	-	2,812,841	183,988	13,293	0	-	37,489,302
d) **Advances**											
PY Advance Adjusted	0	74,000	32,000	0	0	0	0	0	0	0	**106,000**
CY Advance Given	0	60,028	37,040	0	0	0	0	0	0	0	**97,068**
Interst Refund	0	0	0	0	0	0	0	-1,062,255	0	0	-1,062,255
	0	**-13,972**	**5,040**	**0**	**0**	**0**	**0**	**-1,062,255**	**0**	**0**	**-1,071,187**
e) **Current Liabilities**											
PY Liability Adjusted	0	0	0	0	0	0	0	0	0	0	**0**
CY Liability Created	0	0	0	0	0	0	0	0	0	0	**0**
	0	**-0**	**-0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-0**
f) **Expenditure towards objectives of Funds (c-d+e)**	25,653,772	2,513,491	463,368	5,857,481	-0	2,812,841	183,988	1,075,548	0	0	**38,560,489**
g) **Adjustment of Refund**	0	0	0	0	0	0	0	0	0	0	0
h) **Net Balance as at the year end (a+b-f-g)**	**38360544.4**	**3891664.2**	**3601977.2**	**17595563.3**	**1170917.0**	**(1775930.0)**	**2776845.9**	**7887513.7**	**(0.0)**	**(0.0)**	**73509095.7**

निदेशक/Director
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOG'
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 7 - CURRENT LIABILITIES AND PROVISIONS:

		Current Year
A. CURRENT LIABILITIES		
1. Acceptances		0.00
2. Sundry Creditors:		
a). For Goods	0.00	
b). Others	0.00	0.00
3. Advance Received		0.00
4. Interest accrued but not due on:		
a). Secured Loans/Borrowings	0.00	
b). Unsecured Loans/Borrowings	0.00	0.00
5. Statutory Liabilities:		
a). Overdue	0.00	
b). Others	0.00	0.00
6. Other Current Liabilities:		
Unutilised Grant in Aid	117,543,949.21	
Earnest Money	1,305,498.00	
Security Deposit Payable	11,607,968.23	
Other Current Liabilities	6,821,334.96	137,278,750.40
Total (A)		137,278,750.40
B. PROVISIONS		
1. For Taxation	0.00	
2. Gratuity	0.00	
3. Superanuation/Pension	0.00	
4. Accumulated Leave Encashment	0.00	
5. Trade Warranties/Claims	0.00	
6. Others (Specify)	0.00	0.00
Total (B)		0.00
Total (A+B)		137,278,750.40

निदेशक/Director
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Finance & Accounts Officer
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IASST, Paschim Boragaon
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE - 8 : **:: 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 01/04/20	Additons/(Deletion) >180 days	Additons/(Deletion) <180 days	Total	Depreciation	W.D.V on 31/03/21
Block "A" : 0%						
Land	0.00	0.00	0.00	0.00	0.00	0.00
Block "B" : 10%						
Building & Site Development	531,904,086.66	31,716,578.00	31,489,902.00	595,110,566.66	57,936,561.00	537,174,005.66
Furniture & Fixtures	31,193,794.45	1,812,222.00	4,014,178.00	37,020,194.45	3,501,312.00	33,518,882.45
	-					
Block "C" : 15%	-					
Equipments	215,049,008.49	18,522,825.08	47,733,520.10	281,305,353.67	38,615,789.00	242,689,564.67
Air Conditioner	4,152,354.00	439,413.00	260,292.00	4,852,059.00	708,287.00	4,143,772.00
Refrigerator	7,801.00	0.00	0.00	7,801.00	1,170.00	6,631.00
Projector	56,917.00	0.00	0.00	56,917.00	8,538.00	48,379.00
Vehicles	5,212,958.00	0.00	0.00	5,212,958.00	781,944.00	4,431,014.00
Plant & Machinery	174,975.00	25,423.00	312,663.00	513,061.00	53,509.00	459,552.00
Block "D" : 40%						
Library	1,429,139.00	0.00	1,616,338.00	3,045,477.00	894,923.00	2,150,554.00
Computer	10,310,367.02	819,883.00	3,592,508.00	14,722,758.02	5,170,602.00	9,552,156.02
Printer & Xerox Machine	721.00	0.00	0.00	721.00	288.00	433.00
Computer Software	663.00	0.00	0.00	663.00	265.00	398.00
	799,492,784.62	53,336,344.08	89,019,401.10	941,848,529.80	107,673,188.00	834,175,341.80

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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

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

(Amount - Rs.)

SCHEDULE 10 - INVESTMENTS - OTHERS:		Current Year
1. In Government Securities		0.00
2. Other Approved Securities		0.00
3. Shares		0.00
4. Debentures and Bonds		0.00
5. Subsidiaries & Joint Ventures		0.00
6. Others - Investment in FDR		
Extramural Projects		
Opening Balance	35,530,329.56	
Add: Investment In FDR	60,000,000.00	
Add: Interest accrued	1,202,877.00	
Less: TDS	21,975.00	
Less: Maturity Value of STDR	66,515,456.00	30,195,775.56
Miscellaneous and Others		
Opening Balance	30,000,000.00	
Add: Last Year Interest	1,186,518.00	
Add: Current Year Interest	1,108,128.00	
Less: TDS	47,634.00	32,247,012.00
	Total	62,442,787.56

निदेशक/Director
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC.

(Amount - Rs.)

A. CURRENT ASSETS:	Current Year	
1 Inventories:		
a) Stores and Spares	0.00	
b) Loose Tools	0.00	
c) **Stock-in-trade:**		
Finished Goods	0.00	
Work-in-progress	0.00	
Raw Materials	0.00	0.00
2 Sundry Debtors:		
a) Debts Outstanding for a period exceeding six months	0.00	
b) Others	0.00	0.00
3 Cash Balances in Hand: (including cheques/drafts & imprest)		20,000.00
4 Bank Balances:		
a) With Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts		
SBI Khanapara Branch	38,752,397.06	
SBI Khanapara Branch - Workshop	345,606.83	
Bank of Baroda - Travel	392,454.39	
SBI Garchuk - International Conference	27,015.00	
SBI - IASST Corpus Fund	90,527.53	
SBI Garchuk Branch - Project	32,113,752.58	
SBI - Herbal Medicine N.C. Talukdar	1,016,115.91	
SBI - IASST Employees Benevolent Fund	17,243.00	
SBI - Students & Scientist Home (IASST)	517,825.64	
SBI G.U. Branch - Upgrading	67,304.86	
Bank of Baroda - Overhead/Miscellaneous	10,256,741.64	
SC/ST	49,111,334.00	
HDFC Bank- Project	854,685.06	133,563,003.50
b) With Non-Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts	0.00	0.00
5 Post Office Savings Accounts:		
Total (A)		133,583,003.50

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U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC. (Contd.)

B. LOANS, ADVANCES & OTHER ASSETS:

(Amount - Rs.)

	Current Year	
1 Loans:		
a) Staff	782,282.00	
b) Other entities engaged in activities/objectives similar to that of the entity	0.00	
c) Others	0.00	782,282.00
2 Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account	0.00	
b) Prepayments	0.00	
c) Others		
Crest Award	343,770.00	
TDS	195,924.00	
Inter Fund Transfer (IASST Fund to Herbal Medicine)	0.00	
Advances against Expenditure of Grants (Annexure "D"	21,350,069.28	
Advances against Fixed Assets (Annexure "E")	30,197,115.02	
Advance from Extramural Project to Overhead	4,877,495.00	
Advance from Core Fund (LC/TT,Misc. Account)	343,829.96	57,308,203.26
3 Income Accrued:		
a) On Investments from Earmarked/Endowment Funds	0.00	
b) On Investments - Others	0.00	
c) On Loans & Advances	0.00	
d) Others (includes income due unrealised - Rs._____)	0.00	0.00
4 Claims Receivable		0.00
Total (B)		58,090,485.26
Total (A+B)		191,673,488.76

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

	(Amount - Rs.) Current Year
SCHEDULE 13 - GRANTS/SUBSIDIES	
(Irrevocable Grants & Subsidies Received)	
1) Central Government (Revenue Grant)	202,000,000.00
2) State Government (s)	0.00
3) Government Agencies	0.00
4) Institutions/Welfare Bodies	0.00
5) International Organisations	0.00
6) Others	0.00
Total	202,000,000.00

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

SCHEDULE 17 - INTEREST EARNED

	(Amount - Rs.) Current Year
1) On Term Deposits:	
a) With Secheduled Banks	1,108,128.00
b) With Non-Secheduled Banks	0.00
c) With Institutions	0.00
d) Others	0.00
2) On Savings Accounts:	
a) With Secheduled Banks	184,281.00
b) With Non-Secheduled Banks	0.00
c) With Institutions	0.00
d) Others	0.00
3) On Loans:	
a) Employees/Staff	0.00
b) Others	0.00
4) Interest on Debtors and Other Receivables	0.00
Total	1,292,409.00

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

SCHEDULE 18 - OTHER INCOME

	(Amount - Rs.) Current Year
1) Profit on Sale/Disposal of Assets:	
a) Owned Assets	0.00
b) Assets acquired out of grants, or received free of cost	0.00
2) Export Incentives Realised	0.00
3) Fees for Miscellaneous Services	0.00
4) Miscellaneous Income	9,304,581.96
Total	9,304,581.96

SCHEDULE 20 - ESTABLISHMENT EXPENSES

a) Salaries & Wages	131,197,944.00
b) Allowances & Bonus	0.00
c) Contribution to Provident Fund	0.00
d) Contribution to Other Fund (Specify)	0.00
e) Staff Welfare Expenses	0.00
f) Expenses on Employees' Retirement and Terminal Benefits	0.00
g) Others	0.00
Total	131,197,944.00

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

SCHEDULE 21 - OTHER ADMINISTRATIVE EXPENSES ETC.

		(Amount - Rs.) Current Year
a)	Contingency Expenses	12,424,746.00
b)	Works and Services	13,673,045.00
c)	Training and Conference	516,214.00
d)	Travelling and Conveyance Expenses	505,065.00
e)	Honorarium	134,232.00
f)	Expenses on Fees (Consultancy Fees)	1,258,474.00
g)	Security Services	2,891,358.00
h)	Hospitality	1,729,248.00
i)	Bank charges	27,438.38
	Total	33,159,820.38

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

SCHEDULE 22 - EXPENDITURE ON GRANT, SUBSIDIES ETC.

			(Amount - Rs.) Current Year
a)	Grants given to Institutions/ Organisations		
	Contingency Expenses	1,388,019.31	
	Laboratory Consumables	17,500,901.00	
	Works and Services	7,829,717.00	
	Institutional Projects	410,797.00	27,129,434.31
b)	Subsidies given to Institutions/ Organisations		0.00
		Total	27,129,434.31

19/8/21

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SCHEDULE " 24 " : 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.

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SCHEDULE " 25 " : CONTINGENT LIABILITIES & NOTES TO 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 Fund accordingly.

(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.

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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Annexure "A" - Unutilised Grant

		Amount(`)
Opening Balance		93,927,772.70
Add : Capital Grant received during the year	153,702,434.00	
Add : Unutilised Revenue Grant for the year	12,269,487.69	165,971,921.69
		259,899,694.39
Less : Contribution towards Capital Fund (Addition to Fixed Assets)		142,355,745.18
Closing Balance		117,543,949.21

Annexure "B" - Security Deposit Payable

Earnest Money	400,000.00
Security Deposit (SSH)	19,392.23
Security Deposits (Works)	11,188,576.00
	11,607,968.23

Annexure "C" - Other Current Liabilities

	Amount(`)
Payable to Core Fund	3,821.00
Payable against Equipments	17,565.00
Advance from Extramural Project to Overhead	4,877,495.00
Advance from DST to Project	343,829.96
Bank Interest Refundable to DST, Govt. of India	1,513,610.00
Employee Provident Fund	43,200.00
Donation to PM Care	8,453.00
Labour Cess	13,211.00
Professional Tax	150.00
	6,821,334.96

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Annexure "D" - Advance against expenditure on grant : Amount(`)

Current year unadjusted advance :

	Project	DST General	Total	
Salary (Against House Building	0.00	782,282.00	782,282.00	
Salary (Other Advance)	0.00	251,000.00	251,000.00	
Empowerment of SC/ST	0.00	11,400.00	11,400.00	
Works and Services	0.00	568,385.00	568,385.00	
Contingency	60,028.00	72,108.00	132,136.00	
Travel	37,040.00	0.00	37,040.00	
Consumables	0.00	115,000.00	115,000.00	
Training & Conference	0.00	127,424.00	127,424.00	2,024,667.00

Earlier years unadjusted advance :

	Project	DST General	Total	
Salary	80,000.00	9,180,095.00	9,260,095.00	
Contingency	156,148.00	555,867.00	712,015.00	
Travel	185,992.00	34,180.00	220,172.00	
Consumables	102,068.00	1,875,741.28	1,977,809.28	
Empowerment of SC/ST	0.00	20,000.00	20,000.00	
Training & Conference	112,500.00	1,824,492.00	1,936,992.00	
Works and Services	0.00	6,099,138.96	6,099,138.96	
GST Receivable	0.00	49,372.00	49,372.00	
Advance to Extramural Project	0.00	171,920.00	171,920.00	
Outsourcing	4,000.00	0.00	4,000.00	
			20,451,514.24	
Less ; Advance from Core Fund (LC/TT,Misc. Account)			343,829.96	20,107,684.28
TOTAL :				**22,132,351.28**

Annexure "E" - Advance against Fixed Assets :

Current year unadjusted advance :

	Project	DST General	Total	
Building & Site Development	0.00	5,552,175.00	5,552,175.00	
Computer & Peripherials	0.00	25,000.00	25,000.00	
Plant & Mahinery	0.00	0.00	0.00	
Equipment	10,067,231.00	0.00	10,067,231.00	15,644,406.00

Earlier years unadjusted advance :

	Project	DST General	Total	
Equipment	0.00	11,676,209.02	11,676,209.02	
Building & Site	0.00	1,473,048.00	1,473,048.00	
Furniture & Fixtures	0.00	94,324.00	94,324.00	
Plant & Machinery	0.00	54,360.00	54,360.00	
Computer & Peripherial	0.00	1,254,768.00	1,254,768.00	14,552,709.02
				30,197,115.02

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ANNEXURE : "F"

DETAILS OF GRANT-IN-AID FOR THE FINANCIAL YEAR 2020-21

Sl.	Particulars	Capital Grant (₹)	Revenue Grant (₹)	Amount(₹)
1	DST General Fund	106,000,000.00	202,000,000.00	308,000,000.00
2	Engineered Bioremediation (Dr. R Devi)	346,500.00	0.00	346,500.00
3	PM10 and PM2.5 (Dr. R Devi)	0.00	600,000.00	600,000.00
4	A facile strategy towards Naphthalene (Dr. Anamik	245,000.00	2,003,000.00	2,248,000.00
5	Feasibility study of commercial scale (Prof. H Bailur	17,500.00	682,500.00	700,000.00
6	Setting up a Quality Control (QC) (Dr. Jagat)	0.00	5,626,540.00	5,626,540.00
7	Molecular mechanistic (Paramita Choudhury)	0.00	435,600.00	435,600.00
8	Climate resilient marker assisted generation (Kamal	0.00	353,540.00	353,540.00
9	Degradation of hydrocarbon(Bhaskar Das)	0.00	382,800.00	382,800.00
10	Chemical investigation and therapeutic (Dr. Jagat Bo	0.00	640,401.00	640,401.00
11	Generation of Plasma inside liquid(Palash jyoti Bor	0.00	563,847.00	563,847.00
12	Electronic and Optical properties of Metal(Purabjyo	0.00	562,880.00	562,880.00
13	In-situ production of nano particles(Bidyut Chutia)	0.00	575,275.00	575,275.00
14	Investigating the potential of probiotic bacteria(Aru	0.00	275,133.00	275,133.00
15	Study of Effect of rhamnolipid biosurfactant(Chand	0.00	295,720.00	295,720.00
16	Development of Low-loaded electrode catalyst (Ibn	0.00	576,973.00	576,973.00
17	Effect of dairy products on human (Tulsi Joishy)	0.00	501,231.00	501,231.00
18	Investigation on static and dynamic structure (Yoshi	0.00	506,071.00	506,071.00
19	Development and characterisation(Rakesh Ruchel K	0.00	516,247.00	516,247.00
20	Structure and Corresponding electrical (Subhankar I	0.00	556,250.00	556,250.00
21	Application of wetland macrophytes(Manisha Gosw	126,000.00	586,600.00	712,600.00
22	Plasma based synthesis of materials (Dr A.R Pal)	0.00	550,000.00	550,000.00
23	Assessment of diversity and pathogenicity(Ananya	0.00	86,188.00	86,188.00
24	Study of dynamical behaviour of nanodusty Plasma	0.00	1,475,000.00	1,475,000.00
25	Organic Thin Film Transistor (Sweety Biswasi)	0.00	507,200.00	507,200.00
26	Human Microbiome (Dr. Wahengbam Romi)	0.00	2,251,057.00	2,251,057.00
27	Phytopharmaceutical Development(Dr. Jagat Ch. Bo	0.00	824,652.00	824,652.00
28	Optimization of method(Dr. M.R Khan)	62,400.00	651,400.00	713,800.00
29	Phylogenetic and functional characterization of pest	0.00	700,000.00	700,000.00
30	Developing carbon based biopolymer(Sazzadur Rah	0.00	479,360.00	479,360.00
31	Development of Hybrid Electroactive(Dr.Rajiv Boral	473,000.00	1,775,000.00	2,248,000.00
32	Study of antidiabetic effects(Sanjib Sau)	0.00	451,520.00	451,520.00
33	Rheological Behavior (Gurumayum Shalini Devi)	0.00	449,910.00	449,910.00
34	Application of Dielectric Barrier (Dr. Kamatchi Sank	1,992,127.00	414,085.00	2,406,212.00
35	Solar Power Driven Plasmonic(Dr. Subir Biswas)	750,000.00	1,299,431.00	2,049,431.00
36	Development of layered double hydroxide (LDH)(M	0.00	451,520.00	451,520.00
37	ST/SC Community Development programme in IAS	1,183,799.00	936,520.00	2,120,319.00
38	Development of Pt based ternary(Dr.M.R Khan)	40,336,108.00	0.00	40,336,108.00
39	Molecular and Biological Characterization(Prof. Joy	20,000.00	716,000.00	736,000.00
40	Rahul Hepat-Molecular and Biological Characteriza	500,000.00	1,500,000.00	2,000,000.00
41	Rachita Newar-Rachita Newar, INSPIRE Fellow	0.00	451,520.00	451,520.00
42	Nasrin Sultana-Nasrin Sultana, INSPIRE Fellow	0.00	451,520.00	451,520.00
43	Suman Samanta	0.00	36,667.00	36,667.00
44	Shabiha N Hazarika	0.00	53,705.00	53,705.00
45	Assam state health Society	0.00	275,675.00	275,675.00
46	Rahul Hepat	1,650,000.00	1,359,920.00	3,009,920.00
47	Extramural Project Grant	0.00	500,000.00	500,000.00
		153,702,434.00	236,888,458.00	390,590,892.00

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BALANCE SHEET OF EXTRAMURAL PROJECTS AS ON 31ST MARCH, 2021

PARTICULARS	Schedule	Amount (`) 2020-21
CAPITAL FUND & LIABILITIES		
Capital Fund	1	91,062,408.94
Reserves & Surplus	2	0.00
Earmarked/ Endowment Funds	3	73,509,095.69
Secured Loans and Borrowings	4	0.00
Unsecured Loans and Borrowings	5	0.00
Deferred Credit Liabilities	6	0.00
Current Liabilities and Provisions	7	55,833,105.43
TOTAL :		**220,404,610.06**
ASSETS		
Fixed Assets	8	91,062,408.94
Investments - From Earmarked/Endowment Funds	9	0.00
Investments - Others	10	30,195,775.56
Current Assets, Loans and Advances	11	99,146,425.55
Miscellaneous Expenditure (To the extent not written off or adjusted)		0.00
TOTAL :		**220,404,610.06**
SIGNIFICANT ACCOUNTING POLICIES	24	
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25	

In terms of our report of even date annexed hereto.

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

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

Registrar
Institute of Advanced Study in Science & Technology
Paschim Boragaon, Guwahati-35

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 2021

RECEIPTS		Amount (₹)	PAYMENTS		Amount (₹)
I Opening Balances :			**I EXPENSES :**		
a) Cash in hand	0.00		**a) Establishment Expenses**		
b) Bank Balances			Salary	25,653,772.00	25,653,772.00
i) In current accounts	0.00				
i) In deposit accounts	0.00		**b) Administrative Expenses/ Expenses on Grant**		
i) Savings accounts	60,775,612.71	60,775,612.71	Consumables	5,857,481.00	
			Contingency	2,499,518.92	
II Grants Received			Travel	468,408.00	
a) From Government of India			Interest refund	1,062,255.00	
Capital Grant	47,702,434.00		Outsourcing	10,000.00	
Revenue Grant	34,888,458.00		Overhead	2,812,841.00	
(As per Annexure D)			Meeting/Training	173,988.00	
			EMD Refund	12,500.00	12,896,991.92
b) From State Government	0.00				
c) From other sources (deta	0.00		**II Payments made against funds for various projects**		0.00
(Grants for capital & revenue exp. to be shown separately)		82,590,892.00			
III Income from Investments from			**III Investments and deposits made**		
a) Earmarked/Endow. Funds)		0.00	a) Out of Earmarked/Endow. Funds		0.00
b) Own Funds (Oth. Investments)		0.00	b) Out of Own Funds		60,000,000.00
IV Interest Received			**IV Expenditure on Fixed Assets & Capital WIP**		
a) On Bank deposits	1,546,342.00		**a) Purchase of Fixed Assets**		0.00
b) Loans, Advances, etc.	0.00	1,546,342.00	Equipments	26,965,040.18	
			Furniture & Fixtures	3,346,511.00	
			b) Expenditure on Capital W	0.00	30,311,551.18
V Other Income			**V Refund of Surplus money/Loans**		
Other Receipts	538,091.00		a) To the Government of India		0.00
Interest on LC	5,102.00	543,193.00	b) To the State Government		0.00
			c) To other providers of Funds		0.00
VI Amount Borrowed		0.00	**VI Finance charges (Interest)**		0.00
VII Any Other receipts			**VII Other Payments**		0.00
STDR Maturity		66,515,456.00	Bank Charges		13,293.06
			CLOSING BALANCE :		
			a) Cash in hand	0.00	
			b) Bank Balances		
			i) In current accounts	0.00	
			i) In deposit accounts	0.00	
			i) Savings accounts	83,095,887.55	83,095,887.55
		211,971,495.71			211,971,495.71

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : Guwahati
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

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Guwahati-781035:Assam:India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

(Amount - Rs.)

SCHEDULE 1 - CORPUS/CAPITAL FUND		Current Year
Balance as at the beginning of the year		85,140,818.76
Add : Contributions towards Corpus/Capital fund	20,244,320.18	
Add/(Deduct) : Balance of Net Income/(Expenditure) transfe	0.00	
Less : Depreciation for the year	14,322,730.00	5,921,590.18
		91,062,408.94

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

निदेशक/Director
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गुवाहाटी-781035: Assam:भारत
Guwahati-781035: Assam:India

FINANCIAL STATEMENTS

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 and other Interest	Refund Against Advance (Receipt)	Refund (Payment)	Total(₹)
a)	**Opening Balance**	38,416,596	4,624,676	3,051,285	18,693,764	820,917	7,659	2,065,076	6,208,741	0	0	73,888,714.67
b)	**Addition to the Funds**											
	i) Grants	25,597,720	1,780,479	1,014,060	4,759,280	350,000	1,029,252	357,667	0	0	0	34,888,458
	ii) Other Receipts	0	0		0	0	0	538,091	2,754,321	0	0	3,292,412
		25,597,720	1,780,479	1,014,060	4,759,280	350,000	1,029,252	895,758	2,754,321	0	0	38,180,870
	TOTAL (a+b)	64,014,316	6,405,155	4,065,345	23,453,044	1,170,917	1,036,911	2,960,834	8,963,062	0	0	112,069,585
c)	**Payment towards objectives of Funds**	25,653,772	2,499,519	468,408	5,857,481	-	2,812,841	183,988	13,293	0		37,489,302
d)	**Advances**											
	PY Advance Adjusted	0	74,000	32,000	0	0	0	0	0	0	0	106,000
	CY Advance Given	0	60,028	37,040	0	0	0	0	0	0	0	97,068
	Interest Refund	0	0	0	0	0	0	0	-1,062,255	0	0	-1,062,255
		0	-13,972	5,040	0	0	0	0	-1,062,255	0	0	-1,071,187
e)	**Current Liabilities**											
	PY Liability Adjusted	0	0	0	0	0	0	0	0	0	0	0
	CY Liability Created	0	0	0	0	0	0	0	0	0	0	0
		0	-0	-0	0	0	0	0	0	0	0	-0
f)	**Expenditure towards objectives of Funds (c-d+e)**	25,653,772	2,513,491	463,368	5,857,481	-0	2,812,841	183,988	1,075,548	0	0	38,560,489
g)	**Adjustment of Refunc**	0	0	0	0	0	0	0	0	0	0	0
h)	**Net Balance as at the year end (a+b-f-g)**	38360544.4	3891664.2	3601977.2	17595563.3	1170917.0	(1775930.0)	2776845.9	7887513.7	(0.0)	(0.0)	73509095.7

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U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
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IASST, Paschim Boragaon
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 7 - CURRENT LIABILITIES AND PROVISIONS:

(Amount - Rs.)

		Current Year	
A. CURRENT LIABILITIES			
1. Acceptances			0.00
2. Sundry Creditors:			
a). For Goods		0.00	
b). Others		0.00	0.00
3. Advances Received			0.00
4. Interest accrued but not due on:			
a). Secured Loans/Borrowings		0.00	
b). Unsecured Loans/Borrowings		0.00	0.00
5. Statutory Liabilities:			
a). Overdue		0.00	
b). Others		0.00	0.00
6. Other Current Liabilities:			
Unutilised Grant in Aid	(As per Annexure "A	54,415,812.47	
Earnest Money		1,055,898.00	
Inter Fund Transfer (Herbal Medicine to IASST)		0.00	
Other Current Liabilities	(As per Annexure "B'	361,394.96	55,833,105.43
	Total (A)		55,833,105.43
B. PROVISIONS			
1. For Taxation			0.00
2. Gratuity			0.00
3. Superanuation/Pension			0.00
4. Accumulated Leave Encashment			0.00
5. Trade Warranties/Claims			0.00
6. Others			0.00
	Total (B)		0.00
	Total (A+B)		55,833,105.43

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निदेशक/Director
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Finance & Accounts Officer
Guwahati-7

FINANCIAL STATEMENTS

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 8 : **:: 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 01/04/20	Additons/(Deletion) >180 days	Additons/(Deletion) <180 days	Total	Depreciation	W.D.V on 31/03/21
Block "B" : 10%						
Furniture & Fixtures	0.00	18,201.00	3,328,310.00	3,346,511.00	168,236.00	3,178,275.00
Block "C" : 15%						
Equipments	85,140,818.76	1,547,150.08	15,350,659.10	102,038,627.94	14,154,494.00	87,884,133.94
	85,140,818.76	1,565,351.08	18,678,969.10	105,385,138.94	14,322,730.00	91,062,408.94

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35:3 :भारत
Guwahati-781035:Assam:India

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Paschim Boragaon,Guwahati-35

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी. पश्चिम बड़ागाव
IASST Paschim Boragaon
गुवाहाटी-3
Guwahati-781035 Assam India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

(Amount - Rs.)

	Current Year	
SCHEDULE 10 - INVESTMENTS - OTHERS:		
1. In Government Securities		0.00
2. Other Approved Securities		0.00
3. Shares		0.00
4. Debentures and Bonds		0.00
5. Subsidiaries & Joint Ventures		0.00
6. Investment in FDR		
Opening Balance	35,530,329.56	
Add: Investment In FDR	60,000,000.00	
Add: Interest accrued	1,202,877.00	
Less: TDS	21,975.00	
Less: Maturity Value of STDR	66,515,456.00	30,195,775.56
Total		30,195,775.56

निदेशक/Director
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गुवाहाटी-35:असम:भारत
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U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC.

(Amount - Rs.)

A. CURRENT ASSETS:	Current Year	
1 Inventories:		
a) Stores and Spares	0.00	
b) Loose Tools	0.00	
c) Stock-in-trade:		
Finished Goods	0.00	
Work-in-progress	0.00	
Raw Materials	0.00	0.00
2 Sundry Debtors:		
a) Debts Outstanding for a period exceeding six months	0.00	
b) Others	0.00	0.00
3 Cash Balances in Hand: (including cheques/drafts & imprest)		0.00
4 Bank Balances:		
a) With Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts		
SBI Garchuk Branch - Project	32,113,752.58	
SBI - Herbal Medicine N.C. Talukdar	1,016,115.91	
SC/ST	49,111,334.00	
HDFC Bank	854,685.06	83,095,887.55
b) With Non-Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts	0.00	0.00
5 Post Office Savings Accounts:		0.00
Total (A)		83,095,887.55

निदेशक/Director
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U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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Assam:India

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC. (Contd.)

B. LOANS, ADVANCES & OTHER ASSETS: (Amount - Rs.)

	Current Year	
1 Loans:		
a) Staff	0.00	
b) Other entities engaged in activities/objectives similar to that of the entity	0.00	
c) Others		
Advance to Overhead A/c	0.00	
Advances against Expenditure of Grants	0.00	0.00
2 Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account	0.00	
b) Prepayments	0.00	
c) Others		
Crest Award	343,770.00	
TDS	24,266.00	
Inter Fund Transfer (Herbal Medicine to IASST Fund)	0.00	
Advance to Overhead A/c	4,877,495.00	
Advances against Expenditure of Grants (Annexure "(	737,776.00	
Advances against Equipments	10,067,231.00	16,050,538.00
3 Income Accrued:		
a) On Investments from Earmarked/Endowment Funds	0.00	
b) On Investments - Others	0.00	
c) On Loans & Advances	0.00	
d) Others (includes income due unrealised - Rs._____)	0.00	0.00
4 Claims Receivable		0.00
Total (B)		16,050,538.00
Total (A+B)		**99,146,425.55**

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

SCHEDULE " 24 " : 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.

निदेशक/Director
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON,GUWAHATI- 781035

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON,GUWAHATI- 781035

SCHEDULE " 25 " : CONTINGENT LIABILITIES & NOTES TO 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.

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

Annexure "A" - Unutilised Grant

	Amount(₹)
Opening Balance	26,957,698.65
Add : Capital Grant received during the year	47,702,434.00
	74,660,132.65
Less : Contribution towards Capital Fund (Addition to Fixed Assets)	20,244,320.18
Closing Balance	54,415,812.47

Annexure "B" - Other Current Liabilities

		Amount(₹)
Payable against Equipment		17,565.00
DST General Fund		
Bank of Baroda - 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(₹)
Earlier years unadjusted advance :		
Contingency	156,148.00	
Travel	185,992.00	
Consumables	102,068.00	
Salary	80,000.00	
Training & Conference	112,500.00	
Outsourcing	4,000.00	640,708.00
Current year unadjusted advance :		
Contingency	60,028.00	
Travel	37,040.00	97,068.00
TOTAL :		**737,776.00**

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

U.K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

Registrar
Institute of Advanced
Study in Science & Technology
Paschim Boragaon, Guwahati-35

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

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

ANNEXURE : "D"

DETAILS OF GRANT-IN-AID OF EXTRAMURAL PROJECTS FOR THE FINANCIAL YEAR 2020-21

Sl.	Name of the Project	Capital Grant (₹	Revenue Grant (	Amount(₹)
1	Engineered Bioremediation (Dr. R Devi)	346,500.00	0.00	346,500.00
2	PM10 and PM2.5 (Dr. R Devi)	0.00	600,000.00	600,000.00
3	A facile strategy towards Naphthalene (Dr. Anamika Kalita)	245,000.00	2,003,000.00	2,248,000.00
4	Feasibility study of commercial scale (Prof. H Bailung)	17,500.00	682,500.00	700,000.00
5	Setting up a Quality Control (QC) (Dr. Jagat)	0.00	5,626,540.00	5,626,540.00
6	Molecular mechanistic (Paramita Choudhury)	0.00	435,600.00	435,600.00
7	Climate resilient marker assisted generation (Kamal Das)	0.00	353,540.00	353,540.00
8	Degradation of hydrocarbon(Bhaskar Das)	0.00	382,800.00	382,800.00
9	Chemical investigation and therapeutic (Dr. Jagat Borah)	0.00	640,401.00	640,401.00
10	Generation of Plasma inside liquid(Palash jyoti Borah)	0.00	563,847.00	563,847.00
11	Electronic and Optical properties of Metal(Purabjyoti Bhagowati)	0.00	562,880.00	562,880.00
12	In-situ production of nano particles(Bidyut Chutia)	0.00	575,275.00	575,275.00
13	Investigating the potential of probiotic bacteria(Arun Kumar)	0.00	275,133.00	275,133.00
14	Study of Effect of rhamnolipid biosurfactant(Chandana Malakar)	0.00	295,720.00	295,720.00
15	Development of Low-loaded electrode catalyst (Ibnul Farid)	0.00	576,973.00	576,973.00
16	Effect of dairy products on human (Tulsi Joishy)	0.00	501,231.00	501,231.00
17	Investigation on static and dynamic structure (Yoshiko Bailung)	0.00	506,071.00	506,071.00
18	Development and characterisation(Rakesh Ruchel Khanikar)	0.00	516,247.00	516,247.00
19	Structure and Corresponding electrical (Subhankar Pandit)	0.00	556,250.00	556,250.00
20	Application of wetland macrophytes(Manisha Goswami)	126,000.00	586,600.00	712,600.00
21	Plasma based synthesis of materials (Dr A.R Pal)	0.00	550,000.00	550,000.00
22	Assessment of diversity and pathogenicity(Ananya Barman)	0.00	86,188.00	86,188.00
23	Study of dynamical behaviour of nanodusty Plasma(Dr. Sumita Kumari Sh	0.00	1,475,000.00	1,475,000.00
24	Organic Thin Film Transistor (Sweety Biswasi)	0.00	507,200.00	507,200.00
25	Human Microbiome (Dr. Wahengbam Romi)	0.00	2,251,057.00	2,251,057.00
26	Phytopharmaceutical Development(Dr. Jagat Ch. Borah)	0.00	824,652.00	824,652.00
27	Optimization of method(Dr. M.R Khan)	62,400.00	651,400.00	713,800.00
28	Phylogenetic and functional characterization of pesticide(Ms. Rictika Das)	0.00	700,000.00	700,000.00
29	Developing carbon based biopolymer(Sazzadur Rahman)	0.00	479,360.00	479,360.00
30	Development of Hybrid Electroactive(Dr.Rajiv Borah)	473,000.00	1,775,000.00	2,248,000.00
31	Study of antidiabetic effects(Sanjib Sau)	0.00	451,520.00	451,520.00
32	Rheological Behavior (Gurumayum Shalini Devi)	0.00	449,910.00	449,910.00
33	Application of Dielectric Barrier (Dr. Kamatchi Sankaranarayanan)	1,992,127.00	414,085.00	2,406,212.00
34	Solar Power Driven Plasmonic(Dr. Subir Biswas)	750,000.00	1,299,431.00	2,049,431.00
35	Development of layered double hydroxide (LDH)(Manju Kumari Jasiswal)	0.00	451,520.00	451,520.00
36	ST/SC Community Development programme in IASST(Dr. Rajiv Borah)	1,183,799.00	936,520.00	2,120,319.00
37	Development of Pt based ternary(Dr.M.R Khan)	40,336,108.00	-	40,336,108.00
38	Molecular and Biological Characterization(Prof. Joyanti Chutia)	20,000.00	716,000.00	736,000.00
39	Rahul Hepat-Molecular and Biological Characterization	500,000.00	1,500,000.00	2,000,000.00
40	Rachita Newar-Rachita Newar, INSPIRE Fellow	0.00	451,520.00	451,520.00
41	Nasrin Sultana-Nasrin Sultana, INSPIRE Fellow	0.00	451,520.00	451,520.00
42	Suman Samanta	0.00	36,667.00	36,667.00
43	Shabiha N Hazarika	0.00	53,705.00	53,705.00
44	Assam state health Society	0.00	275,675.00	275,675.00
45	Rahul Hepat	1,650,000.00	1,359,920.00	3,009,920.00
46	Extramural Project Grant	0.00	500,000.00	500,000.00
		47,702,434.00	34,888,458.00	82,590,892.00

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FINANCIAL STATEMENTS

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

	Project Name	Opening Balance	Grant -in-Aid (a)	Interest (b)	Inter Transfer (c)	Other Receipts	STDR Principal	STDR Interest	Total Receipts (h) = (a+b+c+d+e+f+g)	Bank Charges	Consumable
1	A. Devi-Engineered Bioremediation Approaches For Onsite Tre	971142.00	346500.00		490.00				346,990.00		428272.00
2	Rosy Mondal-Early Detection and Comprehensive monitoring	710599.00							-		-86225.00
3	Munima B. Sahariah-Non Collinear Magnetism in Heusler Mate	1520500.00							-		
4	A. Devi-PM10 and PM2.5 Related Health Effects in North-East	181129.00	600000.00						600,000.00		
5	Anamika Kalita-A facile strategy towards Naphthalene Diimide	1497201.00	2248000.00						2,248,000.00		240910.00
6	H.Bailung-Feasibility study of commercial scale coating on cop	-187399.00	700000.00		239.00				700,239.00		156200.00
7	Soumyadeep Nandi-Development of an integrated multi-omic	1546142.00							-		49709.00
8	Jagat Ch Borah-Setting up a Quality Control (QC) and Quality	7161973.00	5626540.00		320830.00				5,947,370.00		648094.00
9	Paramita Choudhury-Molecular mechanistic insight of the bioa	3.00	435600.00						435,600.00		
10	Kamal Das-Climate resilient marker assisted generation of pros	37562.00	353540.00						353,540.00		
11	N. C. Talukdar- Integrating herbal medicine of NER with conten	2278725.91		50234.00					50,234.00		277051.00
12	Kaushik Bhattacharjee-Study on fungal inhabitants of resinous	250471.00							-		94562.00
13	Bhaskar Das-Degradation of hydrocarbon by cyanobacterial sp	77748.00	382800.00						382,800.00		
14	N. C. Talukdar-Chemical investigation and therapeutic evaluati	173674.00	640401.00						640,401.00		15000.00
15	Palasjyoti Boruah-Generation of Plasma inside liquid, its chara	214536.00	563847.00						563,847.00		
16	Archana Nath-Antimicrobial efficacy of the protected forest de	380930.00							-		
17	Purabjyoti Bhagowati-Electronic and Optical properties of Met	238404.00	562880.00						562,880.00		
18	Bidyut Chutia-In-situ production of nano particles by plasma p	215339.00	575275.00						575,275.00		
19	A. Devi-Effects of oil exploration activities on Soil and Air Quali	500460.00							-		
20	D. Chowdhury-Development of Nanoparticle or Microparticle A	274537.10							-		
21	D. Thakur-DBT-MRC Project Exploration and conservation of m	446831.00							-		108587.00
22	Arun Kumar-Investigating the potential of probiotic bacteria af	33077.00	275133.00						275,133.00		
23	Chandana Malakar-Study of Effect of rhamnolipid biosurfactan	10140.00	295720.00						295,720.00		22677.00
24	Ibnul Farid-Development of Low-loaded electrode catalyst for	48068.00	576973.00						576,973.00		
25	Parijat Saikia-Wetland of Assam, India: a look into the current	92706.00							-		90936.00
26	Rinku Moni Kalita-Comparative assessment of carbon sequestr	119982.00							-		
27	Robinson C Jose-Understanding and solving the problem of fal	25.00							-		
28	Seydur Rahman-Chemical Profiling and bioactive potential of p	16514.00							-		
29	Asim Kumar Dutta-Discovery of human cytosolic phospheenol	1822.00							-		
30	Abdul Barik-Fabrication of flexible organic field effect transisto	1770.00							-		
31	Sailendra Goyari-Augmentation of aromatic content of Agarwo	1419.00							-		
32	Biswajit Choudhury-Hybrid semiconductor nano-structure of n	1516064.00							-		161836.00
33	Tulsi Joishy-Effect of dairy products on human gut bacterial pr	8614.00	501231.00						501,231.00		
34	Yoshiko Bailung-Investigation on static and dynamic structure	-19873.00	506071.00						506,071.00		
35	Rakesh Ruchel Khanikar-Development and characterisation of	-5296.00	516247.00						516,247.00		
36	Subhankar Pandit-Structure and Corresponding electrical and	11621.00	556250.00						556,250.00		
37	Mohd. Shadab-Study of colonization of gut bacteria from mice	400.00							-		
38	Sagar Sarma-New n-type organic semi-conductors for optoelec	907642.00							-		
39	M.B Saharia-Electronic, magnetic and lattice dynamical proper	-5362.00							-		
40	IASST-IASST FUND	-20209798.06	866047.00	1312925.00		538091.00	65000000.00	1520558.00	69,237,621.00	13174.06	16000.00
41	Sarathi Kundu-Structure, Pattern & Elastic Behaviour of model	452.00							-		
42	Soumyadeep Nandi-Correlation study of the determinant of ge	6770.00							-		
43	Rosy Mondal-Cell Free nucleic acid as noninvesive biomarker f	467912.00							-		29414.00
44	Kangkana Bora-Development of Decision Support System for M	1288.00							-		
45	Manisha Goswami-Application of wetland macrophytes as a bi	0.00	712600.00						712,600.00		3025.00
46	Kaustavmoni Patowary-Biosurfactant Mediated Green Synthes	1172.00							-		
47	Rupamoni Thakur-Microbial Characterization and biochemical	52345.00							-		
48	A.R Pal-Plasma based synthesis of materials for plasmonic infra	447834.00	550000.00						550,000.00		76804.00
49	Ananya Barman-Assessment of diversity and pathogenicity of t	891.00	86188.00						86,188.00		
50	Sumita Kumari Sharma-Study of dynamical behaviour of nanoc	-73745.82	1475000.00						1,475,000.00		
51	Sweety Biswasi-Organic Thin Film Transistor (OTFT) through pla	-23481.00	507200.00						507,200.00		
52	Wahengbam Romi-Human Microbiome as a Therapeutic target	-112024.00	2251057.00						2,251,057.00		283797.00
53	Lipi B. Mahanta-On the development of an automated image a	-6194.00	0.00						-		
54	S. Deka-Biosurfactant Enhanced Bioremediation of PAHs Caont	13815.00	0.00						-		
55	S Deka-Application of Glycolipid Biosurfactant for general welf	352442.00	0.00						-		207817.00
56	D. Devi-Studies on Structure of Enzymes and their interaction v	9536.00	0.00						-		
57	D. Devi-Establishment of Bioinformatics Infrastructure Facility t	1621001.00							-		
58	Rajlakshmi Devi-Characterization of High Value Phytochemicals	700997.92							20743.00		444983.00
59	Rajlakshmi Devi-Chemical profiling of Joha and black rice of NE	-29405.20	0.00						-		13500.00

निदेशक/Director
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वित्त एवं ... अधिकारी
Finance & ... Officer
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For Institute of Advanced Study in Science & Technology
Paschim Boragaon Guwahati-35

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

	Project Name	Opening Balance	Grant -in-Aid (a)	Interest (b)	Inter Transfer (c)	Other Receipts	STDR Principal	STDR Interest	Total Receipts (h) = (a+b+c+d+e+f+g)	Bank Charges	Consumable
60	N.C Talukdar-Brain stomming 2	-50888.00	0.00						-		
61	N.C Talukdar-Brain stomming	-80259.00	0.00						-		
62	N.C Talukdar-Impact assesment of Jhumming on native plants	1720.00	0.00						-		
63	N.C Talukdar-Microbial roles in yield management of scented r	127055.30							-		-68900.00
64	M. R. Khan-Effect of traditional dietary habits on human gut m	95221.56	0.00						-		
65	M. R. Khan-Establishment of Institutional Level Biotech Hubs (	112345.00	0.00						-		34605.00
66	Subrata Kumar Pore-Development of Hsp90-regulating microR	707702.00	0.00						-		146991.00
67	Jagat Ch. Borah-Phytopharmaceutical Development of Ficus se	387552.00	824652.00		4352.00				829,004.00		98809.00
68	M. R. Khan-Optimization of method of red wine production us	-370814.00	713800.00						713,800.00		182584.00
69	Jagat Ch. Borah-Molecular and Biochemical studies on indigen	367365.00	0.00						-		530372.00
70	D. Thakur-Understanding the mechanisms of resistance to suc	795721.00			15234.00				15,234.00		118576.00
71	D. Thakur-Exploration and conservation of antimicrobial meta	4171950.00	0.00						-		34050.00
72	R.Devi-Evaluation of antioxidant and anti-hyperlipidemic prop	457160.00	0.00						-		164614.00
73	Devasish Chowdhury-Full spectrum Bio-Incubator for NER at IA	18726218.00							-		
74	Rictika Das-Phylogenetic and functional characterization of pe	654861.00	700000.00		9823.00				709,823.00		173461.00
75	Sazzadur Rahman-Developing carbon based biopolymer nanoc	2000.00	479360.00						479,360.00		
76	Rajiv Borah-Development of Hybrid Electroactive Biomaterials	1479838.00	2248000.00						2,248,000.00		29127.00
77	Sanjib Sau-Sanjib Sau	147600.00	451520.00						451,520.00		
78	D Choudhury-Investigating physico-chemical properties of new	130890.00	0.00						-		
79	Gurumayum Shalini Devi-Study of antidiabetic effects of follelc	230966.00	449910.00						449,910.00		238319.00
80	R. Devi-Empowerment of Tribal population of selected District	3353876.00	0.00						-		
81	Kamatchi Sankaranarayanan-Rheological Behavior of the Conc	0.00	2406212.00						2,406,212.00		
82	Subir Biswas-Application of Dielectric Barrier Discharged Cold A	0.00	2049431.00						2,049,431.00		
83	Manju Kumari Jasiswal-Solar Power Driven Plasmonic Photocat	451520.00	451520.00						451,520.00		
84	Rajiv Borah-Development of layered double hydroxide (LDH) n	0.00	2120319.00						2,120,319.00		
85	M.R. Khan-ST/SC Community Development programme in IASS	25611800.00	40336108.00						40,336,108.00	1.00	616483.00
86	M.R. Khan-ST/SC Community Development programme in IASS	0.00		183183.00	337900.00				521,083.00	118.00	275441.00
87	M.R. Khan-ST/SC Community Development programme in IASS	0.00	0.00						-		
88	IASST-Expert Committee Meeting	0.00	0.00						-		
89	IASST-Inspire fellow Review Meeting	-3448.00	0.00						-		
90	J. Chutia-Development of Plasma modified Bio-membrane and	226620.00	0.00						-		
91	J. Chutia-Development of Pt based ternary Oxygen Reduction F	0.00	736000.00						736,000.00		
92	Rahul Hepat-Molecular and Biological Characterization of Cypc	0.00	2000000.00						2,000,000.00		
93	Rachita Newar-Rachita Newar, INSPIRE Fellow	0.00	451520.00						451,520.00		
94	Nasrin Sultana-Nasrin Sultana, INSPIRE Fellow	0.00	451520.00						451,520.00		
95	L B Mahanta - Design of Software - PAP smear	0.00	0.00						-		
96	Androgen Kotoky	-25353.00							-		
97	Aqatic Biodiversity SCBordoloi	-17308.00							-		
98	Bharalu River Kotoky	-579338.00							-		
99	CSIR Dolly Gogoi	-73.00							-		
100	DBT_CREST Ddevi	-142289.00							-		
101	Education Assam	-33598.00							-		
102	Flora & Fauna SCBordoloi	-50567.00							-		
103	Food Color Kotoky	-1153.00							-		
104	Govt of Assam	-140113.00							-		
105	Intestinal Microbiota MRKhan	-48071.00							-		
106	J Medhi DST	-63015.00							-		
107	Oxidative Adevi	-171901.00							-		
108	Polymer based Sensor NSSarma	-568.00							-		
109	Proton Exchange Jchutia	-137261.00							-		
110	Quick Detection of CTV- Rahul Hepat		3009920.00						3,009,920.00		
	Total	60,775,612.71	82,590,892.00	1,546,342.00	709,611.00	538,091.00	65,000,000.00	1,520,558.00	151,905,494.00	13,293.06	5,857,481.00

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

	Project Name	Expenditure (i)						Outsourcing	Overhead	Salary	Transfer to Project	Other(lab furnishing)	Meeting/Training	Closing Balance
		Contingency	EMD	Travel	Equipments	Interest Refund to Bharatkosh	Investment							
1	A. Devi-Engineered Bioremediation Approaches For Onsite Tre	42943.00				490.00				657720.00				188,707.00
2	Rosy Mondal-Early Detection and Comprehensive monitoring	16000.00								210000.00				570,824.00
3	Munima B. Sahariah-Non Collinear Magnetism in Heusler Mate	2000.00			1000000.00				62240.00	254899.00				201,361.00
4	A. Devi-PM10 and PM2.5 Related Health Effects in North-East			23270.00					55000.00	293070.00				409,789.00
5	Anamika Kalita-A facile strategy towards Naphthalene Diimide	201302.00			327600.00				70000.00	1536180.00				1,369,209.00
6	H.Bailung-Feasibility study of commercial scale coating on cop	882.00		45194.00		239.00				300000.00				10,325.00
7	Soumyadeep Nandi-Development of an integrated multi-omic	1275.00												1,495,158.00
8	Jagat Ch Borah-Setting up a Quality Control (QC) and Quality	21145.00		13465.00	5410013.00	320830.00			100000.00	3202791.00			24730.00	3,368,275.00
9	Paramita Choudhury-Molecular mechanistic insight of the bioa									435600.00				3.00
10	Kamal Das-Climate resilient marker assisted generation of pros	46502.00								341040.00				3,560.00
11	N. C. Talukdar- Integrating herbal medicine of NER with conten				550793.00				485000.00					1,016,115.91
12	Kaushik Bhattacharjee-Study on fungal inhabitants of resinous									70400.00				85,509.00
13	Bhaskar Das-Degradation of hydrocarbon by cyanobacterial sp									386916.00				73,632.00
14	N. C. Talukdar-Chemical investigation and therapeutic evaluati	15000.00		2365.00						360000.00				421,710.00
15	Palasjyoti Boruah-Generation of Plasma inside liquid, its charac	10347.00								521461.00				246,575.00
16	Archana Nath-Antimicrobial efficacy of the protected forest de									0.00				380,930.00
17	Purabjyoti Bhagowati-Electronic and Optical properties of Met	14812.00								555640.00				230,832.00
18	Bidyut Chutia-In-situ production of nano particles by plasma p	12582.00								564277.00				213,755.00
19	A. Devi-Effects of oil exploration activities on Soil and Air Quali									0.00				500,460.00
20	D. Chowdhury-Development of Nanoparticle or Microparticle A	21761.00							20000.00	231006.00				1,770.10
21	D. Thakur-DBT-MRC Project Exploration and conservation of m	197887.00								131899.00				8,458.00
22	Arun Kumar-Investigating the potential of probiotic bacteria af	10002.00								260133.00				38,075.00
23	Chandana Malakar-Study of Effect of rhamnolipid biosurfactar	12529.00								321320.00				-50,666.00
24	Ibnul Farid-Development of Low-loaded electrode catalyst for									504773.00				120,268.00
25	Parijat Saikia-Wetland of Assam, India: a look into the current													1,770.00
26	Rinku Moni Kalita-Comparative assessment of carbon sequestr									0.00				119,982.00
27	Robinson C Jose-Understanding and solving the problem of fail									0.00				25.00
28	Seydur Rahman-Chemical Profiling and bioactive potential of p					14744.00								1,770.00
29	Asim Kumar Dutta-Discovery of human cytosolic phosphoenoly									0.00				1,822.00
30	Abdul Barik-Fabrication of flexible organic field effect transisto									0.00				1,770.00
31	Sailendra Goyari-Augmentation of aromatic content of Agarwo									0.00				1,419.00
32	Biswajit Choudhury-Hybrid semiconductor nano-structure of n	142524.00		5214.00						45096.00				1,161,394.00
33	Tulsi Joishy-Effect of dairy products on human gut bacterial pr									406000.00				103,845.00
34	Yoshiko Bailung-Investigation on static and dynamic structure	20000.00								316680.00				149,518.00
35	Rakesh Ruchel Khanikar-Development and characterisation of									512483.00				-1,532.00
36	Subhankar Pandit-Structure and Corresponding electrical and	25556.00								535363.00				6,952.00
37	Mohd. Shadab-Study of colonization of gut bacteria from mice									0.00				400.00
38	Sagar Sarma-New n-type organic semi-conductors for optoelec								8750.00					898,892.00
39	M.B Saharia-Electronic, magnetic and lattice dynamical proper									0.00				-5,362.00
40	IASST-IASST FUND	313599.92	12500.00			337900.00	60000000.00			331829.00	709611.00		149258.00	-12,856,049.04
41	Sarathi Kundu-Structure, Pattern & Elastic Behaviour of model									0.00				452.00
42	Soumyadeep Nandi-Correlation study of the determinant of ge									0.00				6,770.00
43	Rosy Mondal-Cell Free nucleic acid as noninvesive biomarker fo									61499.00				376,999.00
44	Kangkana Bora-Development of Decision Support System for N									0.00				1,288.00
45	Manisha Goswami-Application of wetland macrophytes as a bi	19631.00			125530.00				49000.00	179613.00				335,801.00
46	Kaustavmoni Patowary-Biosurfactant Mediated Green Synthes									0.00				1,172.00
47	Rupamoni Thakur-Microbial Characterization and biochemical									0.00				52,345.00
48	A.R Pal-Plasma based synthesis of materials for plasmonic infra			36054.00					369568.00	374941.00				140,467.00
49	Ananya Barman-Assessment of diversity and pathogenicity of			86188.00										891.00
50	Sumita Kumari Sharma-Study of dynamical behaviour of nanoc				522330.18				100000.00	911581.00				-132,657.00
51	Sweety Biswasi-Organic Thin Film Transistor (OTFT) through pla									468378.00				15,341.00
52	Wahengbam Romi-Human Microbiome as a Therapeutic target	652.00			1661.00					631400.00				1,221,523.00
53	Lipi B. Mahanta-On the development of an automated image a									0.00				-6,194.00
54	S. Deka-Biosurfactant Enhanced Bioremedation of PAHs Caont									0.00				13,815.00
55	S Deka-Application of Glycolipid Biosurfactant for general welf	56578.00		75008.00										13,039.00
56	D. Devi-Studies on Structure of Enzymes and their interaction									0.00				9,536.00
57	D. Devi-Establishment of Bioinformatics Infrastructure Facility	224027.00			916447.00					79200.00				401,327.00
58	Rajlakshmi Devi-Characterization of High Value Phytochemicals	18196.00				20743.00				172800.00				65,018.92
59	Rajlakshmi Devi-Chemical profiling of Joha and black rice of NE													-42,905.20

निदेशक/Director
आई ए एस एस टी, पश्चिम बरगाव

Registrar

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Finance & Accounts Officer
आई ए एस एस टी, पश्चिम बरगाव

Guwahati

Assam India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

	Project Name	Expenditure (i)												
		Contingency	EMD	Travel	Equipments	Interest Refund to Bharatkosh	Investment	Outsourcing	Overhead	Salary	Transfer to Project	Other(lab furnishing)	Meeting/Training	Closing Balance
60	N.C Talukdar-Brain stomming 2									0.00				-50,888.00
61	N.C Talukdar-Brain stomming									0.00				-80,259.00
62	N.C Talukdar-Impact assesment of Jhumming on native plants									0.00				1,720.00
63	N.C Talukdar-Microbial roles in yield management of scented r	4015.00							97000.00	92164.00				2,776.30
64	M. R. Khan-Effect of traditional dietary habits on human gut mi	0.00												95,221.56
65	M. R. Khan-Establishment of Institutional Level Biotech Hubs (I								135000.00					-22,655.00
66	Subrata Kumar Pore-Development of Hsp90-regulating microR	314057.00								355500.00				3,540.00
67	Jagat Ch. Borah-Phytopharmaceutical Development of Ficus se	59571.00		4640.00		4352.00				289457.00				711,545.00
68	M. R. Khan-Optimization of method of red wine production usi	19012.00						10000.00	-61500.00	955674.00				-580,200.00
69	Jagat Ch. Borah-Molecular and Biochemical studies on indigen								51000.00	206129.00				11,427.00
70	D. Thakur-Understanding the mechanisms of resistance to sucl	3000.00		12789.00	121578.00	15234.00				361920.00				113,850.00
71	D. Thakur-Exploration and conservation of antimicrobial metal			20000.00	2621144.00				100000.00	347326.00				553,108.00
72	R.Devi-Evaluation of antioxidant and anti-hyperlipidemic prop	6014.00								431520.00				-98,950.00
73	Devasish Chowdhury-Full spectrum Bio-Incubator for NER at IA	61455.00			4679970.00					386887.00				13,563,856.00
74	Rictika Das-Phylogenetic and functional characterization of pe	7030.00		664.00		9823.00			60000.00	360000.00				762,553.00
75	Sazzadur Rahman-Developing carbon based biopolymer nanoc	18460.00								448572.00				14,328.00
76	Rajiv Borah-Development of Hybrid Electroactive Biomaterials	386773.00			61600.00				70000.00	1535986.00				1,500,018.00
77	Sanjib Sau-Sanjib Sau	20000.00								408320.00				170,800.00
78	D Choudhury-Investigating physico-chemical properties of new								100000.00					1,763.00
79	Gurumayum Shalini Devi-Study of antidiabetic effects of follelc	17793.00								425720.00				237,363.00
80	R. Devi-Empowerment of Tribal population of selected District	22000.00		44000.00	158912.00				100000.00	476458.00				2,314,187.00
81	Kamatchi Sankaranarayanan-Rheological Behavior of the Conc								104085.00					2,302,127.00
82	Subir Biswas-Application of Dielectric Barrier Discharged Cold A								36391.00					2,013,040.00
83	Manju Kumari Jasiswal-Solar Power Driven Plasmonic Photocat	18230.00								435681.00				449,129.00
84	Rajiv Borah-Development of layered double hydroxide (LDH) n								50000.00					2,070,319.00
85	M.R. Khan-ST/SC Community Development programme in IASS	71404.00			421890.00	337900.00			500000.00	903976.00		809939.00		62,286,315.00
86	M.R. Khan-ST/SC Community Development programme in IASS	21422.00		99557.00	10045572.00					702960.00		2536572.00		-13,160,559.00
87	M.R. Khan-ST/SC Community Development programme in IASS									0.00				-
88	IASST-Expert Committee Meeting									0.00				-
89	IASST-Inspire fellow Review Meeting									0.00				-3,448.00
90	J. Chatia-Development of Plasma modified Bio-membrane and	1550.00							5774.00	139040.00				80,256.00
91	J. Chatia-Development of Pt based ternary Oxygen Reduction F								52533.00	125161.00				558,306.00
92	Rahul Hepat-Molecular and Biological Characterization of Cypc								93000.00					1,907,000.00
93	Rachita Newar-Rachita Newar, INSPIRE Fellow									0.00				451,520.00
94	Nasrin Sultana-Nasrin Sultana, INSPIRE Fellow									0.00				451,520.00
95	L B Mahanta - Design of Software - PAP smear									99333.00				-99,333.00
96	Androgen Kotoky													-25,353.00
97	Aqatic Biodiversity SCBordoloi													-17,308.00
98	Bharalu River Kotoky													-579,338.00
99	CSIR Dolly Gogoi													-73.00
100	DBT_CREST Ddevi													-142,289.00
101	Education Assam													-33,598.00
102	Flora & Fauna SCBordoloi													-50,567.00
103	Food Color Kotoky													-1,153.00
104	Govt of Assam													-140,113.00
105	Intestinal Microbiota MRKhan													-48,071.00
106	J Medhi DST													-63,015.00
107	Oxidative Adevi													-171,901.00
108	Polymer based Sensor NSSarma													-568.00
109	Proton Exchange Jchutia													-137,261.00
110	Quick Detection of CTV- Rahul Hepat													3,009,920.00
	Total	2,499,518.92	12,500.00	468,408.00	26,965,040.18	1,062,255.00	60,000,000.00	10,000.00	2,812,841.00	25,653,772.00	709,611.00	3,346,511.00	173,988.00	83,095,887.55
														-

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

Registrar
Institute of Advanced
Study in Science & Technology
Paschim Boragaon Guwahati 35

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

BALANCE SHEET OF DST GENERAL FUND AS ON 31ST MARCH, 2021

PARTICULARS	Schedule	Amount (₹) 2020-21
CAPITAL FUND & LIABILITIES		
Corpus/Capital Fund	1	699,617,556.74
Reserves & Surplus	2	0.00
Earmarked/ Endowment Funds	3	0.00
Secured Loans and Borrowings	4	0.00
Unsecured Loans and Borrowings	5	0.00
Deferred Credit Liabilities	6	0.00
Current Liabilities and Provisions	7	76,295,336.74
TOTAL :		775,912,893.48
ASSETS		
Fixed Assets	8	694,416,603.41
Investments - From Earmarked/Endowment Funds	9	0.00
Investments - Others	10	0.00
Current Assets, Loans and Advances	11	81,496,290.07
Miscellaneous Expenditure (To the extent not written off or adjusted)		0.00
TOTAL :		775,912,893.48
SIGNIFICANT ACCOUNTING POLICIES	24	
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25	

In terms of our report of even date annexed hereto.

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

U.K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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

INCOME AND EXPENDITURE ACCOUNT OF DST GENERAL FUND FOR THE YEAR ENDED 31ST MARCH 2021

PARTICULARS	Schedule	Amount (`) 2020-21
INCOME		
Income from Sales/Services	12	0.00
Grant/Subsidies	13	202,000,000.00
Fees/Subscriptions	14	0.00
Income from Investments (Income on Invest. From earmarked/endow. Funds transferred to Funds)	15	0.00
Income from Royalty, Publication, etc.	16	0.00
Interest earned	17	22,109.00
Other Income	18	1,381,358.00
Increase/(decrease) in stock of Finished goods and work-in-progress	19	0.00
TOTAL (A) :		**203,403,467.00**
EXPENDITURE		
Establishment Expenses	20	131,197,944.00
Other Administrative Expenses, etc.	21	31,403,134.00
Expenditure on Grants, Subsidies, etc.	22	27,129,434.31
Interest	23	0.00
TOTAL (B) :		**189,730,512.31**
Balance being excess of Income over Expenditure (A-B)		**13,672,954.69**
Transfer to Unutilised Grant		12,269,487.69
Transfer to / from General Reserve		0.00
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**1,403,467.00**
SIGNIFICANT ACCOUNTING POLICIES	24	
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25	

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
IASST, Paschim Boragaon
गुवाहाटी-35, असम,भारत
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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 2021

RECEIPTS		Amount (₹)	PAYMENTS		Amount (₹)
I Opening Balances :			**I Expenses :**		
a) Cash in hand	20,000.00		**a) Establishment Expenses**		
b) Bank Balances			Salary	92,029,752.00	
i) In current accounts	0.00		N.P.S Contribution	12,193,672.00	
i) In deposit accounts	0.00		Gratuity	13,340,202.00	
i) Savings accounts	2,284,349.12	2,304,349.12	Children Education Allowance	1,485,000.00	
			Medical Expenses	2,540,334.00	
II Grants Received			Non Productive Link Bonus	290,724.00	
a) From Government of India			Leave Travel Concession	1,688,462.00	
Capital Grant :			Leave Encashment	3,301,498.00	
AI/IASST/CAP/003/2020/	20,000,000.00		EPF Contribution	1,122,682.00	
AI/IASST/CAP/003/2020/	5,000,000.00		Warden Allowance	51,000.00	
AI/IASST/CAP/003/2020/	10,000,000.00		Telephone, Internet & Newspa	401,892.00	
AI/IASST/CAP/003/2020/	15,000,000.00		Uniform Allowances	95,000.00	128,540,218.00
AI/IASST/CAP/003/2020/	5,000,000.00				
AI/IASST/CAP/003/2020/	2,500,000.00		**b) Administrative Expenses/ Expenses on Grant**		
AI/IASST/CAP/003/2020/	48,500,000.00	106,000,000.00	Contingency	13,259,448.00	
			Consumables	17,273,226.00	
Revenue Grant :			Works and Services	22,147,205.00	
AI/IASST/GEN/003/2020/	7,800,000.00		Training & Conference	285,614.00	
AI/IASST/SAL/003/2020/	34,400,000.00		Travelling	463,987.00	
AI/IASST/SAL/003/2020/	30,200,000.00		Honorarium	89,420.00	
AI/IASST/GEN/003/2020/	5,000,000.00		Security Service	2,890,338.00	
AI/IASST/GEN/003/2020/	5,000,000.00		Consultancy Fees	1,258,474.00	
AI/IASST/SAL/003/2020/	3,500,000.00		Institutional Projects	501,197.00	58,168,909.00
AI/IASST/GEN/003/2020/	10,000,000.00				
AI/IASST/SAL/003/2020/	29,200,000.00		**II Payments made against funds for various projects**		0.00
AI/IASST/GEN/003/2020/	5,000,000.00				
AI/IASST/GEN/003/2020/	2,500,000.00				
AI/IASST/GEN/003/2020/	25,000,000.00		**III Investments and deposits made**		
AI/IASST/SAL/003/2020/	44,400,000.00	202,000,000.00	a) Out of Earmarked/Endow. Funds		0.00
			b) Out of Own Funds		0.00
b) From State Government		0.00			
c) From other sources (details)		0.00	**IV Expenditure on Fixed Assets & Capital WIP**		
(Grants for capital & revenue exp. to be shown separately)			**a) Purchase of Fixed Assets**		0.00
			Equipments	29,013,740.00	
			Library	1,641,338.00	
III Income from Investments from			Computer & Peripherals	4,202,391.00	
a) Earmarked/Endow. Funds)		0.00	Air Conditioner	699,705.00	
b) Own Funds (Oth. Investments)		0.00	Vehicles	0.00	
			Furniture & Fixtures	2,479,889.00	
IV Interest Received			Plant and Machinery	327,206.00	
a) On Bank deposits	1,535,719.00		Building & Site Development	47,697,104.00	86,061,373.00
b) Loans, Advances, etc.	394,921.00	1,930,640.00			
			b) Expenditure on Capital WIP		0.00
V Other Income		986,437.00	**V Refund of Surplus money/Loans**		
			a) To the Government of India		0.00
			b) To the State Government		0.00
			c) To other providers of Funds		0.00
VI Amount Borrowed		0.00	**VI Finance charges (Interest)**		0.00
VII Any Other receipts		0.00	**VII Other Payments**		
			Bank Interest refund to GOI		786,513.00
			Bank Charges		36,412.31
			CLOSING BALANCE :		
			a) Cash in hand	20,000.00	
			b) Bank Balances		
			i) In current accounts	0.00	
			i) In deposit accounts	0.00	
			i) Savings accounts	39,608,000.81	39,628,000.81
		313,221,426.12			313,221,426.12

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : Guwahati
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

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

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Annexure: II

HEADWISE EXPENDITURE DETAILS OF CORE BUDGET ACTIVITIES DURING THE FY 2020-21

Major Head	Subhead	Amount	Total
Salary & Allowances			128,540,218.00
	Salary	92,029,752.00	
	N.P.S Contribution	12,193,672.00	
	Gratuity	13,340,202.00	
	Children Education Allowances	1,485,000.00	
	Medical Expenses	2,540,334.00	
	Non Productive Link Bonus	290,724.00	
	Leave Travel Concession	1,688,462.00	
	Leave Encashment	3,301,498.00	
	EPF Contribution	1,122,682.00	
	Warden Allowance	51,000.00	
	Telephone, Internet & Newspap	401,892.00	
	Uniform Allowances	95,000.00	
GENERAL			58,168,909.00
	Contingency	13,259,448.00	
	Consumables	17,273,226.00	
	Works and Services	22,147,205.00	
	Training & Conference	285,614.00	
	Travelling	463,987.00	
	Honorarium	89,420.00	
	Security Service	2,890,338.00	
	Consultancy Fees	1,258,474.00	
	Institutional Projects	501,197.00	
CAPITAL	**CAPITAL EXPENDITURE :**		86,061,373.00
	Equipments	29,013,740.00	
	Library	1,641,338.00	
	Computer & Peripherals	4,202,391.00	
	Air Conditioner	699,705.00	
	Vehicles	0.00	
	Furniture & Fixtures	2,479,889.00	
	Plant and Machinery	327,206.00	
	Building & Site Development	47,697,104.00	
	Bank Charges		36,412.31
Grand Total			**272,806,912.31**

4

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

U. K. RATHI & CO. CHARTERED ACCOUNTANTS
Registered
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Paschim Boragaon, Guwahati-35

वित्त एवं लेखा अधिकारी
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Guwahati-781035: Assam:India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

(Amount - Rs.)

SCHEDULE 1 - CORPUS/CAPITAL FUND		**Current Year**
Balance as at the beginning of the year		663,617,042.74
Add : Contributions towards Corpus/Capital fund	122,111,425.00	
Add/(Deduct) : Balance of Net Income/(Expenditure) transferred	1,403,467.00	
Less : Depreciation for the year	87,514,378.00	36,000,514.00
		699,617,556.74

U.K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 7 - CURRENT LIABILITIES AND PROVISIONS: (Amount - Rs.)

	Current Year	
A. CURRENT LIABILITIES		
1. Acceptances		0.00
2. Sundry Creditors:		
a). For Goods	0.00	
b). Others	0.00	0.00
3. Advances Received		0.00
4. Interest accrued but not due on:		
a). Secured Loans/Borrowings	0.00	
b). Unsecured Loans/Borrowings	0.00	0.00
5. Statutory Liabilities:		
a). Overdue	0.00	
b). Others	0.00	0.00
6. Other Current Liabilities:		
Unutilised Grant in Aid	63,128,136.74	
Security Deposit Payable	11,588,576.00	
Other Current Liabilities	1,578,624.00	76,295,336.74
Total (A)		76,295,336.74
B. PROVISIONS		
1. For Taxation		0.00
2. Gratuity		0.00
3. Superanuation/Pension		0.00
4. Accumulated Leave Encashment		0.00
5. Trade Warranties/Claims		0.00
6. Others (Specify)		0.00
Total (B)		0.00
Total (A+B)		76,295,336.74

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SCHEDULE - 8 : **:: 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 01/04/20	Additons/(Deletion) >180 days	Additons/(Deletion) <180 days	Total	Depreciation	W.D.V on 31/03/21
Block "A" : 0%						
Land	0.00	0.00	0.00	0.00	0.00	0.00
Block "B" : 10%						
Building & Site Developmei	485,439,858.66	31,716,578.00	31,489,902.00	548,646,338.66	53,290,139.00	495,356,199.66
Furniture & Fixtures	30,782,380.00	1,794,021.00	685,868.00	33,262,269.00	3,291,934.00	29,970,335.00
Block "C" : 15%						
Equipments	125,762,205.73	16,975,675.00	32,382,861.00	175,120,741.73	23,839,397.00	151,281,344.73
Air Conditioner	4,152,354.00	439,413.00	260,292.00	4,852,059.00	708,287.00	4,143,772.00
Refrigerator	7,801.00	0.00	0.00	7,801.00	1,170.00	6,631.00
Projector	56,917.00	0.00	0.00	56,917.00	8,538.00	48,379.00
Vehicles	1,702,175.00	0.00	0.00	1,702,175.00	255,326.00	1,446,849.00
Plant and Machinery	174,975.00	25,423.00	312,663.00	513,061.00	53,509.00	459,552.00
Block "D" : 40%						
Library	1,429,139.00	0.00	1,616,338.00	3,045,477.00	894,923.00	2,150,554.00
Computer	10,310,367.02	819,883.00	3,592,508.00	14,722,758.02	5,170,602.00	9,552,156.02
Printer & Xerox Machine	721.00	0.00	0.00	721.00	288.00	433.00
Computer Software	663.00	0.00	0.00	663.00	265.00	398.00
	659,819,556.41	51,770,993.00	70,340,432.00	781,930,981.41	87,514,378.00	694,416,603.41

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC.

(Amount - Rs.)

A. CURRENT ASSETS:	Current Year	
1 Inventories:		
a) Stores and Spares	0.00	
b) Loose Tools	0.00	
c) Stock-in-trade:		
Finished Goods	0.00	
Work-in-progress	0.00	
Raw Materials	0.00	0.00
2 Sundry Debtors:		
a) Debts Outstanding for a period exceeding six months	0.00	
b) Others	0.00	0.00
3 Cash Balances in Hand: (including cheques/drafts & imprest)		20,000.00
4 Bank Balances:		
a) With Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts		
SBI Khanapara Branch	38,752,397.06	
SBI Khanapara Branch - Workshop	345,606.83	
Bank of Baroda - Travel	392,454.39	
SBI Garchuk - International Conference	27,015.00	
SBI - IASST Corpus Fund	90,527.53	39,608,000.81
b) With Non-Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts	0.00	0.00
5 Post Office Savings Accounts:		0.00
Total (A)		39,628,000.81

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC. (Contd.)

B. LOANS, ADVANCES & OTHER ASSETS:

(Amount - Rs.)

	Current Year	
1 Loans:		
a) Staff	782,282.00	
b) Other entities engaged in activities/objectives similar to that of the entity	0.00	
c) Others	0.00	782,282.00
2 Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account	0.00	
b) Prepayments	0.00	
c) Others		
Advance to Extramural Projects		
Bank of Baroda - Conference (000918)	107,090.00	
SBI Garchuk - Seminar (888433)	64,830.00	
HDFC Bank for LC/TT	171,909.96	
Advances against Expenditure of Grants	20,612,293.28	
Advances against Fixed Assets	20,129,884.02	41,086,007.26
3 Income Accrued:		
a) On Investments from Earmarked/Endowment Funds	0.00	
b) On Investments - Others	0.00	
c) On Loans & Advances	0.00	
d) Others (includes income due unrealised - Rs._____)	0.00	0.00
4 Claims Receivable		0.00
Total (B)		41,868,289.26
Total (A+B)		81,496,290.07

19/7/2021
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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

	(Amount - Rs.) Current Year
SCHEDULE 13 - GRANTS/SUBSIDIES	
(Irrevocable Grants & Subsidies Received)	
1) Central Government (Revenue Grant)	202,000,000.00
2) State Government (s)	0.00
3) Government Agencies	0.00
4) Institutions/Welfare Bodies	0.00
5) International Organisations	0.00
6) Others	0.00
Total	202,000,000.00

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

	(Amount - Rs.) Current Year
SCHEDULE 17 - INTEREST EARNED	
1) On Term Deposits:	
a) With Scheduled Banks	0.00
b) With Non-Scheduled Banks	0.00
c) With Institutions	0.00
d) Others	0.00
2) On Savings Accounts:	
a) With Scheduled Banks	22,109.00
b) With Non-Scheduled Banks	0.00
c) With Institutions	0.00
d) Others	0.00
3) On Loans:	
a) Employees/Staff	0.00
b) Others	0.00
4) Interest on Debtors and Other Receivables	0.00
Total	22,109.00

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

SCHEDULE 18 - OTHER INCOME

(Amount - Rs.)

	Current Year	
1) Profit on Sale/Disposal of Assets:		
a) Owned Assets	0.00	
b) Assets acquired out of grants, or received free of cost	0.00	
2) Export Incentives Realised	0.00	
3) Fees for Miscellaneous Services	0.00	
4) Miscellaneous Income		
Penal Interest	30,455.00	
Interest from Advance	61,569.00	
User charges	24,360.00	
Bus Fare	38,533.00	
Hostel Accomodation	869,291.00	
Interest earned from HBA	333,352.00	
Other	4,958.00	
Licence Fees	18,840.00	1,381,358.00
	Total	1,381,358.00

SCHEDULE 20 - ESTABLISHMENT EXPENSES

a) Salaries & Wages (Details as per Annexure '1')	131,197,944.00
b) Allowances & Bonus	0.00
c) Contribution to Provident Fund	0.00
d) Contribution to Other Fund (Specify)	0.00
e) Staff Welfare Expenses	0.00
f) Expenses on Employees' Retirement and Terminal Benefits	0.00
g) Others	0.00
Total	131,197,944.00

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

SCHEDULE 21 - OTHER ADMINISTRATIVE EXPENSES ETC.

		(Amount - Rs.) Current Year
a)	Contingency Expenses	12,424,746.00
b)	Works and Services	13,673,045.00
c)	Training and Conference	516,214.00
d)	Travelling and Conveyance Expenses	505,065.00
e)	Honorarium	134,232.00
f)	Expenses on Fees (Consultancy Fees)	1,258,474.00
g)	Security Services	2,891,358.00
	Total	31,403,134.00

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED 31ST MARCH 2021

SCHEDULE 22 - EXPENDITURE ON GRANT, SUBSIDIES ETC.

(Amount - Rs.)

	Current Year	
a) **Grants given to Institutions/ Organisations (DST)**		
Contingency Expenses	1,388,019.31	
Laboratory Consumables	17,500,901.00	
Works and Services	7,829,717.00	
Institutional Projects	410,797.00	27,129,434.31
b) **Subsidies given to Institutions/ Organisations :-**		0.00
Total		27,129,434.31

19/8/2021

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

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SCHEDULE " 24 " : 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.

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SCHEDULE " 25 " : CONTINGENT LIABILITIES & 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.

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PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Annexure "A" - Unutilised Grant

	Amount(₹)
Opening Balance	66,970,074.05
Add : Capital Grant received during the year	106,000,000.00
Add : Unutilised Revenue Grant for the year	12,269,487.69
	185,239,561.74
Less : Contribution towards Capital Fund (Addition to Fixed Assets)	122,111,425.00
Closing Balance	63,128,136.74

Annexure "B" - Security Deposit Payable

	Amount(₹)
Security Deposits (Works)	11,188,576.00
Earnest Money	400,000.00
	11,588,576.00

Annexure "C" - Other Current Liabilities

	Amount(₹)
Bank Interest Refundable to DST, Govt. of India	1,513,610.00
Employee Provident Fund	43,200.00
Donation to PM Care Fund	8,453.00
Labour Cess	13,211.00
Professional Tax	150.00
	1,578,624.00

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Annexure "D" - Advance against expenditure on grant :

		Amount(₹)
Current year unadjusted advance :		
Salary (Against House Building)	782,282.00	
Salary (Other Advance)	251,000.00	
Empowerment of SC/ST	11,400.00	
Contingency	72,108.00	
Works and Services	568,385.00	
Advance to Extramural Project	115,000.00	
Consumables	127,424.00	1,927,599.00
Earlier years unadjusted advance :		
Salary	9,180,095.00	
Contingency	555,867.00	
Training & Conference	1,824,492.00	
GST Receivables	49,372.00	
SC/ST	20,000.00	
Works and Services	6,099,138.96	
Travel	34,180.00	
Advace to Extramural Project	171,920.00	
Consumables	1,875,741.28	
	19,810,806.24	
Less ; Advance from Core Fund (LC/TT,Misc. Account)	343,829.96	19,466,976.28
TOTAL :		**21,394,575.28**

Annexure "E" - Advance against Fixed Assets :

		Amount(₹)
Current year unadjusted advance :		
Equipment	5,552,175.00	
Books & Journals	25,000.00	5,577,175.00
Earlier years unadjusted advance :		
Equipment	11,676,209.02	
Building & Site Development	1,473,048.00	
Furniture & Fixtures	94,324.00	
Plant & Machinery	54,360.00	
Computer & Peripherial	1,254,768.00	14,552,709.02
		20,129,884.02

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

Registrar
Institute of Advanced Study in Science & Technology
Paschim Boragaon,Guwahati-35

U. K. RATHI & CO. 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

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Details of Income & Expenditure

Details 1 : Salary and Allowances :	Amount(₹) 2020-21
General Fund :	
Benevolent Fund	0.00
Children Education	1,485,000.00
EPF Contribution	531,000.00
EPFO Service Charge	51,682.00
Fellowship	739,207.00
Gratuity Fund Premium	13,340,202.00
Labour and Wages	192,393.00
Leave Encashment	1,004,039.00
Leave Encashment (Retirement)	2,297,459.00
Leave Travel Concession	1,738,000.00
Medical Expenses	3,140,334.00
N.P.S Contribution	6,091,813.00
Non Productive Linked Bonus	290,724.00
NSDLS Service Charges	10,046.00
Salary	99,427,022.00
Telephone, Internet & Newspaper	401,892.00
Allowances and Bonus	
Overtime Allowances	284,054.00
Transport Allowance	27,077.00
Uniform Allowances	95,000.00
Warden Allowance	51,000.00
	131,197,944.00

Details 2 : Contingency Expenses :	Amount(₹) 2020-21
General Fund :	
Schedule - 21	
Advertisement	264,667.00
Postage	161,451.00
Electricity & Power	8,424,037.00
Audit Fee	41,300.00
Telephone Charges	31,936.00
Repairs & Maintenance - Vehicle	1,100,659.00
Printing & Stationery	985,442.00
Hospitality	1,357,430.00
Conveyance	57,824.00
	12,424,746.00
Schedule - 22	
Meeting Expenses	263,235.00
Computer Stationery	329,160.00
Legal Fees	496,918.00
Newspapers & Periodicals	19,794.00
Sitting Fees	242,500.00
Bank Charges	36,412.31
	1,388,019.31

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Details of Income & Expenditure

Details 3 : Laboratory Consumables :

	Amount(₹) 2020-21
General Fund :	
Schedule - 22	
Laboratory Gas Refilling	154,821.00
Chemicals & Glassware	11,131,064.00
Sample Analysis	972,590.00
Sample Collection	283,506.00
Renewal/Other Fee Payments	805,122.00
Experimental Animal Maintenance	178,760.00
Covid 19 Lab Consumables	3,975,038.00
	17,500,901.00

Details 4 : Works & Services :

	Amount(₹)
Schedule - 21	
Repairing & Maintenance (General)	13,673,045.00
	13,673,045.00

Schedule - 22	2020-21
General Fund :	
Repairing & Maintenance (Equipment)	6,892,818.00
Gardening & Landscaping	110,094.00
Repairing & Maintenance (Electrical)	697,651.00
Repairing & Maintenance (SSH)	129,154.00
	7,829,717.00

Details 5 : Institutional Projects :

	Amount(₹) 2020-21
General Fund :	
Schedule - 22	
Commercialisation of Research Output	
Empowerment of SC/ST People (Horticulture at Rani)	231,484.00
Empowerment of SC/ST (Silkworm Expenditure)	0.00
Institutional Projects Production of Candy	0.00
Protective & Decorative Coating on Bell Metal	0.00
Automated Classification of Gamochas	3,600.00
Development of Software for Field Test of Carvical	157,260.00
Institutional Contribution to BIONEST Project	18,453.00
	410,797.00

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

Grants-in-Aid received for the year 2020-21

Annexture: I

Sl. No.	Sanction Letter No.	Date	Amount (₹)
1	AI/IASST/CAP/003/2020/1	28/05/2020	20,000,000.00
2	AI/IASST/SAL/003/2020/1	24/04/2020	34,400,000.00
3	AI/IASST/GEN/003/2020/1	24/04/2020	7,800,000.00
4	AI/IASST/SAL/003/2020/2	30/06/2020	30,200,000.00
5	AI/IASST/CAP/003/2020/2	30/06/2020	5,000,000.00
6	AI/IASST/GEN/003/2020/2	30/06/2020	5,000,000.00
7	AI/IASST/GEN/003/2020/3	24/07/2020	5,000,000.00
8	AI/IASST/CAP/003/2020/3	24/07/2020	10,000,000.00
9	AI/IASST/GEN/003/2020/4	26/08/2020	10,000,000.00
10	AI/IASST/SAL/003/2020/4	23/10/2020	3,500,000.00
11	AI/IASST/CAP/003/2020/4	26/08/2020	15,000,000.00
12	AI/IASST/SAL/003/2020/5	25/09/2020	29,200,000.00
13	AI/IASST/CAP/003/2020/5	25/09/2020	5,000,000.00
14	AI/IASST/GEN/003/2020/5	25/09/2020	5,000,000.00
15	AI/IASST/CAP/003/2020/6	14/12/2020	2,500,000.00
16	AI/IASST/GEN/003/2020/6	14/12/2020	2,500,000.00
17	AI/IASST/CAP/003/2020/7	29/12/2020	48,500,000.00
18	AI/IASST/SAL/003/2020/7	29/12/2020	44,400,000.00
19	AI/IASST/GEN/003/2020/7	29/12/2020	25,000,000.00
	Total		308,000,000.00

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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Institute of Advanced Study in Science & Technology
Paschim Boragaon, Guwahati-35

Officer
बड़ागाव
gaon
भारत
Assam:India

U.K. RATHI & CO.
Chartered Accountants
FRN with ICAI: 326128E

Block-A, 1st Floor
House No 86, Prasad House
Near NE TV Complex
A. K. Azad Road
Rehabari, Guwahati – 781008

GFR 12 - A
[See Rule 238 (1)]

FORM OF UTILIZATION CERTIFICATE
FOR AUTONOMOUS BODIES OF THE GRANTEE ORGANIZATION

UTILIZATION CERTIFICATE FROM 1st APRIL, 2020 TO 31st March, 2021
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 : 23,04,349.12
   (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 Governmen t (Rs.)	Sanction Number	Sanction Date	Amount (Rs.)	Total Available funds (Rs.) (5= (1+2+4-3)	Expenditure incurred (Rs.)	Closing Balances (Rs.) 7=(5-6)
1	2	3			4	5	6	7
2,304,349.12	2,917,077.00	786,513.00	Annexure: I	Annexure: I	308,000,000.00	312,434,913.12	272,806,912.31	39,628,000.81

Grant-in-aid-General	Grant-in-aid-Salary	Grant-in-aid-Creation of Capital Assets	Total
58,205,321.31	128,540,218.00	86,061,373.00	272,806,912.31

5 Details of grants position as on : 31/03/2021

(i) Cash in Hand/Bank : 3,96,28,000.81
(ii) Unadjusted Advances : N/A
(iii) Total : Nil

Note:
(1) During the FY 2020-21 Institute has earned Rs.15,35,719.00 as Interest and Rs.13,81,358.00 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.

(2) Closing Balance includes 5nos. of bank balance which are SBI Khanapara Core fund A/c Rs.3,87,52,397.06/-, SBI Khanapara Workshop A/c Rs.3,45,606.83/-, Bank of Baroda Travel A/c Rs.3,92,454.39/-, SBI Garchuk International Conference A/c Rs.27,015/- and SBI Khanapara Corpus A/c Rs.90,527.53/- and Cash in Hand Rs.20,000/-

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.

19/8/2021

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

Finance & Accounts Officer
आई.ए.एम.एस.टी., पश्चिम बड़ागाव
IASST, Paschim Boragaon

Registrar
Institute of Advance
Study in Science & Tech
Paschim Boragaon,Guw

Landline: 0361-2626565 (O), Mobile: +91-9435701090 (M), e-mail: ukrathi1981@gmail.com

U.K. RATHI & CO.
Chartered Accountants
FRN with ICAI: 326128E

Block-A, 1st Floor
House No 86, Prasad House
Near NE TV Complex
A. K. Azad Road
Rehabari, Guwahati – 781008

(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 effectiveness.

(3) To the best of our knowledge and belief, no transactions have been entered that are in violation of relevant Act/ and scheme

(4) The responsibilities among the key functionaries for execution of the scheme have been assigned in clear terms and are not general in nature.

(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.

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719

UDIN : 21064719AAAAZB6496
Place : G u w a h a t i
Date : 07/08/2021

Chief Finance Officer
Head of the Finance

Head of the Organisation

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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

Registrar
Institute of Advanced Study in Science & Technology
Paschim Boragaon,Guwahati-35

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

Landline: 0361-2636565 (O), Mobile: +91-9435701090 (M), e-mail: ukrathi1981@gmail.com

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, 2021

PARTICULARS	Schedule	Amount (₹) 2020-21
CAPITAL FUND & LIABILITIES		
Corpus/Capital Fund	1	86,812,275.36
Reserves & Surplus	2	11,532.00
Earmarked/ Endowment Funds	3	0.00
Secured Loans and Borrowings	4	0.00
Unsecured Loans and Borrowings	5	0.00
Deferred Credit Liabilities	6	0.00
Current Liabilities and Provisions	7	5,150,308.23
TOTAL :		**91,974,115.59**
ASSETS		
Fixed Assets	8	48,696,330.45
Investments - From Earmarked/Endowment Funds	9	0.00
Investments - Others	10	32,247,012.00
Current Assets, Loans and Advances	11	11,030,773.14
Miscellaneous Expenditure (To the extent not written off or adjusted)		0.00
TOTAL :		**91,974,115.59**
SIGNIFICANT ACCOUNTING POLICIES	24	
CONTINGENT LIABILITIES AND NOTES ON ACCOUN	25	

In terms of our report of even date annexed hereto.

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

7/8/2021

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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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 2021

PARTICULARS	Schedule	Amount (`) 2020-21
INCOME		
Income from Sales/Services	12	0.00
Grant/Subsidies	13	0.00
Fees/Subscriptions	14	0.00
Income from Investments (Income on Invest. From earmarked/endow. Funds transferred to Funds)	15	0.00
Income from Royalty, Publication, etc.	16	0.00
Interest earned	17	1,270,300.00
Other Income	18	7,923,223.96
Increase/(decrease) in stock of Finished goods and work-in-progress	19	0.00
TOTAL (A) :		**9,193,523.96**
EXPENDITURE		
Establishment Expenses	20	0.00
Other Administrative Expenses, etc.	21	1,756,686.38
Expenditure on Grants, Subsidies, etc.	22	0.00
Interest	23	0.00
TOTAL (B) :		**1,756,686.38**
Balance being excess of Income over Expenditure (A-B)		**7,436,837.58**
Transfer to Benevolent Fund		6,960.00
Transfer to / from General Reserve		0.00
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**7,429,877.58**
SIGNIFICANT ACCOUNTING POLICIES	24	
CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS	25	

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

U.K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

वित्त एवं लेखा अधिकारी
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IASST, Paschim Boragaon
गुवाहाटी-781035/असम:भारत
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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 2021

RECEIPTS		Amount (₹)	PAYMENTS		Amount (₹)
I Opening Balances :			**I EXPENSES :**		
a) Cash in hand	0.00		a) Establishment Expenses		0.00
b) Bank Balances			b) Administrative Expenses/ Expenses on Gr		1,343,986.00
i) In current accounts	0.00				
i) In deposit accounts	0.00				
i) Savings accounts	5,648,723.56	5,648,723.56			
II Grants Received			**II Payments made against funds for various projects**		0.00
a) From Government of India		0.00			
b) From State Government		0.00			
c) From other sources (details) (Grants for capital & revenue exp. to be shown separately)		0.00			
III Income from Investments from			**III Investments and deposits made**		
a) Earmarked/Endow. Funds)		0.00	a) Out of Earmarked/Endow. Funds		0.00
b) Own Funds (Oth. Investments)		0.00	b) Out of Own Funds		0.00
IV Interest Received			**IV Expenditure on Fixed Assets & Capital WIP**		
a) On Bank deposits	162,172.00		a) Purchase of Fixed Assets		0.00
b) Loans, Advances, etc.	0.00	162,172.00	b) Expenditure on Capital WIP		0.00
V Other Income			**V Refund of Surplus money/Loans**		
Contribution to Employee Benevolent Fund	6,960.00		a) To the Government of India		0.00
Other Income	6,452,028.96		b) To the State Government		0.00
Mess Dues	1,532,435.00	7,991,423.96	c) To other providers of Funds		0.00
VI Amount Borrowed		0.00	**VI Finance charges (Interest)**		0.00
VII Any Other receipts		0.00	**VII Other Payments**		
			" FDR Interest (Last Year wrongly taken in receipt side not rectified)		1,186,518.00
			Bank Charges		27,438.38
			" Loans and Advances		385,262.00
			" **CLOSING BALANCE :**		
			a) Cash in hand	0.00	
			b) Bank Balances		
			i) In current account	0.00	
			i) In deposit account	0.00	
			i) Savings accounts	10,859,115.14	10,859,115.14
		13,802,319.52			13,802,319.52

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i
Date : 07/08/2021
UDIN : 21064719AAAAZA2524

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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Guwahati-781035: Assam:India

3

#REF!
#REF!

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

(Amount - Rs.)

		Current Year
SCHEDULE - 1 :	**:: CORPUS/CAPITAL FUND ::**	
Balance as at the beginning of the year	85,218,476.78	
Add : Contribution towards Corpus/Capital Fund	0.00	
Add : Balance of net income/(expenditure) transferred from the Inc	7,429,877.58	
Expenditure Account		
Less : Depreciation for the year	5,836,079.00	86,812,275.36
		86,812,275.36

		Current Year
SCHEDULE - 2 :	**:: RESERVES & SURPLUS ::**	
1. Capital Reserve		
As per Last Account	0.00	
Addition during the year	0.00	
Less: Deductions during the year	0.00	0.00
2. Revaluation Reserve		
As per Last Account	0.00	
Addition during the year	0.00	
Less: Deductions during the year	0.00	0.00
3. Special Reserve -IASST Employees Benevolent Fund (664178)		
As per Last Account	4,572.00	
Addition during the year	6,960.00	
Less: Deductions during the year	0.00	11,532.00
4. General Reserve		
As per Last Account	0.00	
Addition during the year	0.00	
Less: Deductions during the year	0.00	0.00
		11,532.00

निदेशक/Director
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U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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Registrar
Institute of Advanced Study in Science & Technology
Paschim Boragaon,Guwahati-35

वित्त एवं लेखा अधिकारी
Finance & Accounts Officer
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 7 - CURRENT LIABILITIES AND PROVISIONS: (Amount - Rs.)

	Current Year	
A. CURRENT LIABILITIES		
1. Acceptances		0.00
2. Sundry Creditors:		
a). For Goods	0.00	
b). Others	0.00	0.00
3. Advances from Extramural Projects	4,877,495.00	4,877,495.00
4. Interest accrued but not due on:		
a). Secured Loans/Borrowings	0.00	
b). Unsecured Loans/Borrowings	0.00	0.00
5. Statutory Liabilities:		
a). Overdue	0.00	
b). Others	0.00	0.00
6. Other Current Liabilities:		
a). Security Deposit (SSH)	19,392.23	
b). Earnest Money (Misc./Overhead)	249,600.00	
c). Payable to Core fund	3,821.00	272,813.23
Total (A)		5,150,308.23
B. PROVISIONS		
1. For Taxation		0.00
2. Gratuity		0.00
3. Superanuation/Pension		0.00
4. Accumulated Leave Encashment		0.00
5. Trade Warranties/Claims		0.00
6. Others		0.00
Total (B)		0.00
Total (A+B)		5,150,308.23

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Finance & Accounts Officer
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Guwahati-781035: Assam:India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULE - 8 : **:: 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 01/04/20	Additons/(Deletion >180 days	Additons/(Deletion <180 days	Total	Depreciation	W.D.V on 31/03/21
Block "A" : 10%						
Building & Site Developmer	46,464,228.00	0.00	0.00	46,464,228.00	4,646,423.00	41,817,805.00
Furniture & Fixtures	411,414.45	0.00	0.00	411,414.45	41,141.00	370,273.45
Block "C" : 15%						
Equipments	4,145,984.00	0.00	0.00	4,145,984.00	621,898.00	3,524,086.00
Vehicles	3,510,783.00	0.00	0.00	3,510,783.00	526,617.00	2,984,166.00
	54,532,409.45	0.00	0.00	54,532,409.45	5,836,079.00	48,696,330.45

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

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Boragaon
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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 10 - INVESTMENTS - OTHERS:		Current Year
1. In Government Securities		0.00
2. Other Approved Securities		0.00
3. Shares		0.00
4. Debentures and Bonds		0.00
5. Subsidiaries & Joint Ventures		0.00
6. Others - Investment in FDR		
Opening Balance	30,000,000.00	
Add: Last Year Interest	1,186,518.00	
Add: Current Year Interest	1,108,128.00	
Less: TDS (Current Year)	47,634.00	32,247,012.00
	Total	32,247,012.00

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U. K. RATHI & CO. CHARTERED ACCOUNTANTS

Paschim Boragaon, Guwahati-35

Guwahati-781035: Assam:India

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

SCHEDULE 11 - CURRENT ASSETS, LOANS, ADVANCES ETC.

A. CURRENT ASSETS:		(Amount - Rs.) Current Year
1 Inventories:		
a) Stores and Spares	0.00	
b) Loose Tools	0.00	
c) **Stock-in-trade:**		
Finished Goods	0.00	
Work-in-progress	0.00	
Raw Materials	0.00	0.00
2 Sundry Debtors:		
a) Debts Outstanding for a period exceeding six months	0.00	
b) Others	0.00	0.00
3 Cash Balances in Hand: (including cheques/drafts & imprest)		0.00
4 Bank Balances:		
a) With Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts		
SBI - IASST Employees Benevolent Fund	17,243.00	
SBI - Students & Scientist Home (IASST)	517,825.64	
SBI G.U. Branch - Upgrading	67,304.86	
Vijaya Bank - Overhead/Miscellaneous	10,256,741.64	10,859,115.14
b) With Non-Scheduled Banks:		
On Current Accounts	0.00	
On Deposit Accounts (including margin money)	0.00	
On Savings Accounts	0.00	0.00
5 Post Office Savings Accounts:		0.00
Total (A)		10,859,115.14

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31/03/2021

B. LOANS, ADVANCES & OTHER ASSETS:

	Current Year	
1 Loans:		
a) Staff	0.00	
b) Other entities engaged in activities/objectives similar to that of the entity	0.00	
c) Others (Specify)	0.00	0.00
2 Advances and other amounts recoverable in cash or in kind or for value to be received:		
a) On Capital Account	0.00	
b) Prepayments	0.00	
c) Others	171,658.00	171,658.00
3 Income Accrued:		
a) On Investments from Earmarked/Endowment Funds	0.00	
b) On Investments - Others	0.00	
c) On Loans & Advances	0.00	
d) Others (includes income due unrealised - Rs._____)	0.00	0.00
4 Claims Receivable		0.00
Total (B)		171,658.00
Total (A+B)		11,030,773.14

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED ON 31ST MARCH 2021

SCHEDULE 17 - INTEREST EARNED

	(Amount - Rs.) Current Year
1) On Term Deposits:	
a) With Scheduled Banks	1,108,128.00
b) With Non-Scheduled Banks	0.00
c) With Institutions	0.00
d) Others	0.00
2) On Savings Accounts:	
a) With Scheduled Banks	162,172.00
b) With Non-Scheduled Banks	0.00
c) With Institutions	0.00
d) Others	0.00
3) On Loans:	
a) Employees/Staff	0.00
b) Others	0.00
4) Interest on Debtors and Other Receivables	0.00
Total	1,270,300.00

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED ON 31ST MARCH 2021

SCHEDULE 18 - OTHER INCOME

	(Amount - Rs.) Current Year
1) Profit on Sale/Disposal of Assets:	
a) Owned Assets	0.00
b) Assets acquired out of grants, or received free of cost	0.00
2) Export Incentives Realised	0.00
3) Fees for Miscellaneous Services	0.00
4) Miscellaneous Income	7,923,223.96
Total	7,923,223.96

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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PASCHIM BORAGAON, GARCHUK, GUWAHATI- 781035

SCHEDULES FORMING PART OF INCOME & EXPENDITURE FOR THE PERIOD ENDED ON 31ST MARCH 2021

SCHEDULE 21 - OTHER ADMINISTRATIVE EXPENSES ETC.	(Amount - Rs.) Current Year
a) Hospitality Expenses	1,729,248.00
b) Bank charges	27,438.38
Total	1,756,686.38

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

निदेशक/Director
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Guwahati-781035: Assam:India

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Paschim Boragaon, Guwahati-35

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

RECEIPTS & PAYMENTS ACCOUNT OF OVERHEAD/MISCELLANEOUS FUND FOR THE YEAR ENDED 31ST MARCH 2021

RECEIPTS		Amount (₹)	PAYMENTS	Amount (₹)
To **OPENING BALANCE :**			By **PAYMENT :**	
Unspent as on 01/04/2020		4,869,498.22	FDR Interest of Last Year wrongly taken in Receipt & Payment now reversed	1,186,518.00
" **OTHER RECEIPTS :**				
Bank Interest	143,521.00		" Bank and POS Charges	21,788.54
Institute Facility	4,007,257.00			
Sales/Services	342,692.93			
SSH/Guest House	2,033,879.03	6,527,349.96	" **CLOSING BALANCE :**	
			Unspent as on 31/03/202	10,256,741.64
" Security Deposit				
Hostel Security	50,000.00			
ID Card Caution Mo	18,200.00	68,200.00		
		11,465,048.18		11,465,048.18

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i

U. K. RATHI & CO. CHARTERED ACCOUNTANTS GUWAHATI

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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Paschim Boragaon,Guwahati-35

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THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

RECEIPTS & PAYMENTS ACCOUNT OF STUDENT AND SCIENTIST HOME FUND FOR THE YEAR ENDED 31ST MARCH 2021

RECEIPTS		Amount (₹)	PAYMENTS		Amount (₹)
To **OPENING BALANCE :**			By **PAYMENTS :**		
Unspent as on 01/04/2020		703,997.48	Hospitality Expenditur	1,343,986.00	
			Bank Charges	5,649.84	1,349,635.84
" **OTHER RECEIPTS :**			" Current Assets		
Bank Interest	16,291.00		Loans and Advances(Assets)		
Mess Dues	1,532,435.00	1,548,726.00	Biswajit Choudhury		385,262.00
			" **CLOSING BALANCE :**		
			Unspent as on 31/03/2021		517,825.64
		2,252,723.48			2,252,723.48

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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अधिकारी (वि/c)
Officer
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Guwahati-781035: Assam:India

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RECEIPTS & PAYMENTS ACCOUNT OF UPGRADING FUND FOR THE YEAR ENDED 31ST MARCH 2021

RECEIPTS	Amount (₹)	PAYMENTS	Amount (₹)
To **OPENING BALANCE :**		By **EXPENDITURES :**	0.00
Unspent as on 01/04/2020	65,504.86		
" **OTHER RECEIPTS :**			
Bank Interest	1,800.00	" **CLOSING BALANCE :**	
		Unspent as on 31/03/2021	67,304.86
	67,304.86		67,304.86

For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

निदेशक/Director
आई.ए.एस.एस.टी, पश्चिम बड़ागाव
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RECEIPTS & PAYMENTS ACCOUNT OF EMPLOYEES BENEVOLENT FUND FOR THE YEAR ENDED 31ST MARCH 2021

RECEIPTS	Amount (₹)	PAYMENTS	Amount (₹)
To **OPENING BALANCE :**		By **EXPENDITURES :**	
Unspent as on 01/04/2020	9,723.00	Employees Benevolent Fund	0.00
" Contribution to Employee Benevolent Fund	6,960.00		
" Bank Interest	560.00	**CLOSING BALANCE :**	
		Unspent as on 31/03/2021	17,243.00
	17,243.00		17,243.00

निदेशक/Director
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U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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For U K Rathi & Co
Chartered Accountants
FRN : 326128E

(CA Umesh Rathi)
Partner
Membership No. 064719
Place : G u w a h a t i

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

PASCHIM BORAGAON,GUWAHATI- 781035

SCHEDULE " 24 " : 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.

U. K. RATHI & CO. CHARTERED ACCOUNTANTS

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

PASCHIM BORAGAON,GUWAHATI- 781035

SCHEDULE " 25 " : CONTINGENT LIABILITIES & 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.

U.K. RATHI & CO. CHARTERED ACCOUNTANTS

19/8/21

निदेशक/Director
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