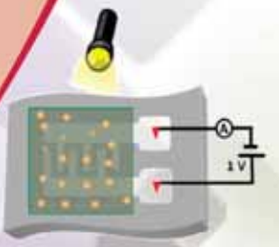
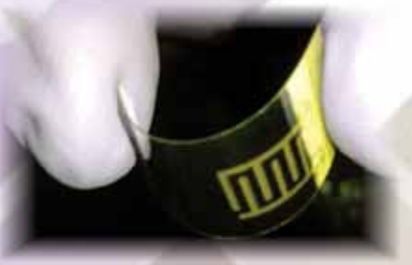
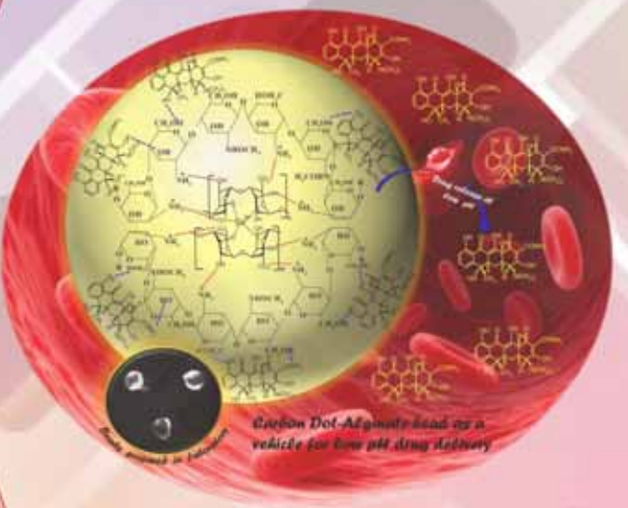
ANNUAL REPORT
2014-15







INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY (IASST)

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

Cover page design by : Dr. Sourav Kundu, IASST

CONTENTS

FOREWORD

It is a pleasure to place before the readers, the IASST Annual Report 2014-15. The Institute of Advanced Study in Science and Technology (IASST) was first conceived by Guwahati Science Society (GSS) in 1979. As I learn now from a member of the GSS, the intellectual curiosity on the limit of largeness and smallness of physical entities and what lies in the far reaches of space was very intense during that time. Few young professors of physics and mathematics started the institute by the name Institute of Advanced Study in Science (IASS) as a platform for young researchers of the North Eastern region of India (NERI) to engage in the emerging science of that time. However, it was not possible for GSS to sustain IASS as it had no resources of its own. On approaching the then Government of Assam for support, it was suggested to include "science for society" also as one of the mandates. Soon in the interest of science and common people's benefit the term "Technology" was added and IASST started receiving support from the Government. Even then, resource flow from the Government was not proportionate to the desired level of research and growth of the Institute.

With its taking over in 2009 by the Ministry of Science & Technology, Government of India as one of its autonomous R&D Institutes in the NERI, the Institute is gaining stability and making noticeable progress towards fulfilling the four objectives: (1) To create a centre of excellence for basic and applied scientific research in Physical and Life Sciences, (2) To strengthen scientific research in core areas by generating funds through extramural projects, (3) To attract and motivate the young talents towards scientific research and (4) Societal interventions for spreading awareness for growth of Science and Technology in the region.

Several state-of-the-art equipment and laboratories have strengthened the research infrastructure towards making it a true Centre of Excellence. These facilities are now utilized for research under five programmes of the Institute and also outsourced to researchers of other Institutes of the region. Under the guidance of Scientific Advisory Committee and Governing Council, the IASST's ongoing research and emerging areas have been reorganized into five major programmes. This effort is now beginning to bear fruits in terms of synergy between scientists across disciplines not only for resource rationalization and enhanced output but also for collective recognition of problems of regional relevance requiring scientific solution. The steady progress in this direction is evident from a five yearly cumulative outputs since 2008-09.

Indicators	2008-12	2009-13	2010-14	2011-15
Core Academic Staff	14	18	18	18
Publications	198	228	282	322
Impact Factor Aggregates	226	276	349	464
Patent applied	6	6	9	15
Citation Frequency	1634	2301	2987	3322
Extramural Projects	131	138	149	151
PhD degree Awarded	26	30	35	37

During the year, the IASST faculties have received two extramural grants from different funding agencies to strengthen its scientific research in core areas and cumulative 25 such projects were in operation during the year. Towards the goal of motivating the young talents to take up scientific research and building scientific

manpower, seventeen Ph. D. scholars were admitted raising the strength of the students in the Ph.D. programme to 70 during the year. Under the national programme to bring back researchers of Indian origin from abroad, one inspire and one Ramalingaswamy fellow joined IASST and this raised the combined strength of core national programme faculties to twenty two. As a part of capacity building activity, during the year, international (1) and national (4) seminars and workshops (3) consistent with the core research programmes were organized in the Institute. Twenty three distinguished scientists delivered invited lectures. A number of Ph. D. scholars and faculties visited abroad to participate in international conferences and training/workshops on specialized research areas. In the National Science Day, more than 1400 school and college students and also general public took part in different activities including popular science lectures by renowned scientists. We believe that it was a great and successful event in motivating young minds towards science as a career goal.

In the area of societal interventions, awareness and field testing of research outcomes of the institute, 20 tribal families, 10 in each of two villages were provided knowhow and materials for round the year rearing and production of 'eri' silk. The Institute's programme on traditional knowledge based drug discovery has been strengthened to contribute towards the Swasth Bharat Mission of the Govt. of India. The entire IASST family participated in the IASST campus and office building cleaning on the first Day of the Swash Brarat Abhijan, launched on the Oct 2nd, 2014 and this was followed up by setting up composting units in the campus for recycling of the biodegradable waste generated in the campus into manure which now meets the Institute's requirement.

During the year we accomplished several important works on infrastructure development including main building landscapes, laboratory renovation, orchid avenue, bioresources conservation hub, medicinal plant garden, the new dynamic and the interactive website of the institute. The new website of the Institute was inaugurated by Dr. Harsh Vardhan, the Hon'ble Minister of Science and Technology, Govt. of India. The staff members of the IASST were extremely delighted to have the rare honour of his visit which was in fact the first scheduled to a scientific institute of the country within the first week of his taking over the charge.

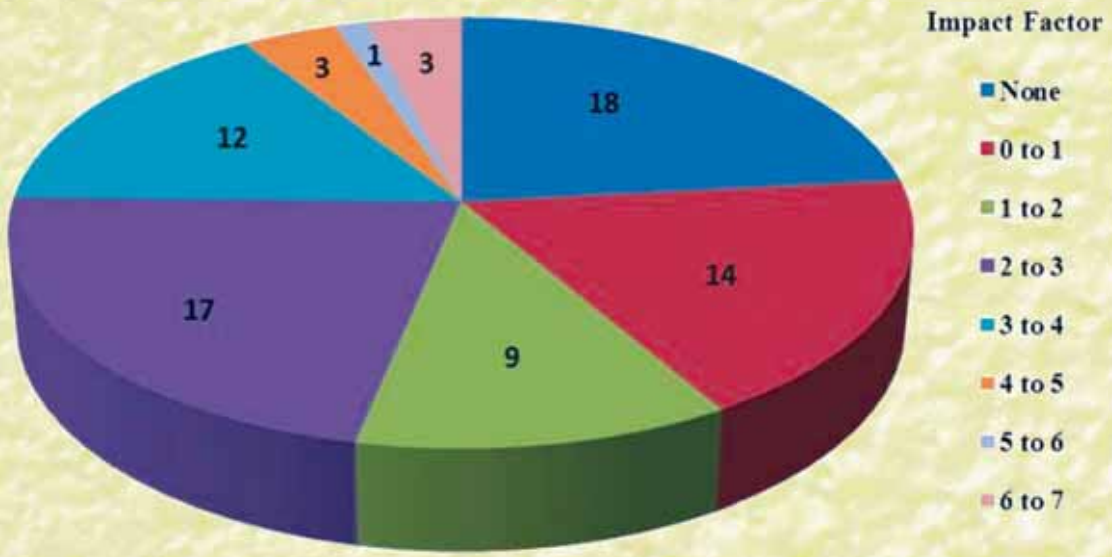
It is heartening to note that the entire IASST involved as members of a united force in organization and participation in different celebrations such as Foundation Day, Hindi Diwas, Vigilance week, World Environment Day, National Science Day, and Swachh Bharat Abhijan and also academic events such as IASST Colloquium, seminars and workshops. These celebrations of events in group have gone in a long way in ushering IASST into a new beginning to further strengthen collective goal and its societal commitment and also for need to get united by shared vision and enhanced output by complementary skills of faculties across disciplines for fulfilling the commitment.

It is a very good feeling in the heart to acknowledge the intellectual help and guidance received from the members of the Governing Council and Scientific Advisory Committee and a large number of well-wishers of IASST. I take this opportunity to acknowledge the best and meticulous efforts of the Annual Report Committee members in bringing out the IASST Annual Report 2014-15 to an excellent shape. Finally I also complement each and every members of IASST family for their determination, dedication and what they offer with best of their abilities towards making IASST as the best national Research and Development organization in the north eastern region of the country.

N. C. Talukdar

At a glance : Research output 2014-15

Number of Ph.D. awardees	:	**05**
Number of patents	:	**01 (Granted)** **07 (Published)** **01 (Provisional)**
Total No. of impact factor journal publication	:	**59**
Total impact factor	:	**149.239**
Impact factor publication pi chart	:	



Presentations in Conferences/ Seminar/ Workshops	:	**19 (Invited talks)** **100 (Contributory)**
Number of M.Sc/ B.Tech projects/ training guided	:	**08**

Few snapshots during the visit of Dr. Harsh Vardhan, Union Minister for Science and Technology, Govt. of India to IASST on 17 November, 2014

Highlights of the year 2014-15

- Dr Harsh Vardhan, Union Minister for Science and Technology, Govt. of India, visited IASST on 17 November, 2014. This was the second research institution visited by the Union Minister after assuming his office. Dr. Harsh Vardhan visited the laboratories of IASST hosting research in various fields of life sciences and physical sciences and interacted with the research scholars and scientists working in these laboratories. He later addressed a gathering and emphasized on the fact that scientific and technological self-reliance are closely linked to national sovereignty and the development of national character.
- On request from IASST family, the renowned singer of Assam, Mr. Joy Prakash Das (more popularly known as J P Da) took initiative in composing the IASST theme song. The lyrics were written by Mrs. Kalpana Bhuyan while Mr. J. P. Das gave life to the lyrics. The theme song was inaugurated on 05 December, 2014.
- Two documentaries, one of 5 minutes duration and the other of 12 minutes were made covering the life of IASST right from its birth to the present status highlighting its mission and vision.
- World's first comprehensive open database (CRDB) or portal on curcumin is developed by IASST and IIT Guwahati as a collaborative effort. With a built in search engine, the portal encompasses 1,186 curcumin analogs, 195 molecular targets, 9075 peer reveiwed publications, 489 patents and 176 variations of turmeric. This news has been covered in leading newspapers in USA, Australia and Asia Pacific countries. As of August 2015, it has generated nearly 23,000 hits.
- Total eight numbers of national/international conference/seminar/workshops were organized by IASST during the year 2014-15.
- Twenty three scientists from India and abroad visited IASST during last year to deliver lectures and to interact with the scientific community of IASST.
- National Science day, 2015 was celebrated at IASST on a large scale with the participation of 30 numbers of schools, colleges, institutions and organizations of this region. The event was jointly organized by IASST and Cotton College State University, Guwahati.
- Two faculties joined the scientific community of IASST under the national faculty programmes of DST, Govt. of India and DBT, Govt. of India.
- Tribal village programme : In two tribal villages of Nagaon and Kamrup rural, 20 households have been provided support round the year for rearing of eri silk and improved method of reeling.
- Substantial activity for campus and infrastructure improvements leading to completion of the Students and Scientists' Home, campus internal roads, entrance gate, landscape and plantation activity and an attractive look of the institute campus inherited under DST in 2009 from Govt. of Assam.

MANPOWER AND R&D FACILITIES

As you turn over....

- Manpower
  - *– Governing Council*
  - *– Scientific Advisory Council*
  - *– Finance Committee*
  - *– Building Works Committee*
  - *– Institutional Manpower*
- Laboratory Facilities at IASST
- R&D Centres
  - *– Bioinformatics Centre*
  - *– Institutional Biotech Hub*
  - *– Central Instrumentation Facility*
  - *– Knowledge Resource Center*
- Medicinal Plant Garden
- Animal House Facility

Manpower

GOVERNING COUNCIL

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Prof. Ashutosh Sharma (09-01-2015 onwards)
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Department of Science &Technology
Government of India, New Delhi

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Director
Bose Institute, Kolkata

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Vice- Chancellor
North-Eastern Hill University (NEHU), Shillong

Dr. Mridul Hazarika
Vice-Chancellor
Gauhati University, Guwahati

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

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Joint Secretary and Financial Advisor
Department of Science &Technology
Government of India, New Delhi

Ms. Ashutosh Agnihotri, IAS
Commissioner& Secretary,
Department of Science & Technology
Govt. of Assam, Guwahati

Member-Secretary:

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Director
IASST, Guwahati

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Director
Saha Institute of Nuclear Physics (SINP), Kolkata

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North-Eastern Hill University (NEHU), Shillong

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Director
Bose Institute, Kolkata

Prof. Rahul Mukherjee
Indian Institute of Management, Kolkata

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School of Life Sciences, Department of Zoology
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Director Grade Scientist
National Environmental Engineering
Research Institute (NEERI), Nagpur

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Head, Chemistry Department
IIT, Guwahati

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Director
North East Institute of Science& Technology (NEIST)
Jorhat, Assam

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Director, IASST, Guwahati

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Director, IASST, Guwahati

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Joint Secretary and Financial Advisor
Department of Science &Technology
Government of India, New Delhi

Dr. Praveer Asthana
Head AIs
Department of Science &Technology, New Delhi

Prof. B. C. Tripathy
IASST, Guwahati

Mr. U. C. Das
Registrar
IIT Guwahati

Member-Secretary

Mr. Pradyut Borkataki
FAO, IASST, Guwahati

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

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Chief Engineer CPWD Shillong or his nominee

Prof. Sudeep Talukdar
Department of Civil Engineering
IIT Guwahati

Prof. Heremba Bailung
IASST, Guwahati

Member- Secretary

Dr. Diganta Goswami
Registrar, IASST

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Vigilance Officer : Prof. (Mrs.) Sabitry Choudhury Bordoloi, IASST

RTI Officer : Dr. Diganta Goswami, IASST

Public Grievance Officer : Prof. Binod Chandra Tripathy, IASST

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DIRECTOR
Dr. N. C. Talukdar

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Dr. Sagar Sharma, M.Sc., Ph.D.	DST INSPIRE Faculty
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Priyanka Dutta, M.Sc.	SRF
Tapan Barman, M.Sc.	SRF
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Aziz Khan, M.Sc.	SRF
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Amreen Ara Hussain, M.Sc.	SRF
Bedanta Gogoi, M.Sc.	SRF
Sudesna Chakravarty, M. Sc.	SRF
Kaushik Das, M.Sc.	SRF
Upama Baruah, M.Sc.	SRF
Abhijit Barua, M. Sc.	SRF
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Binita Borgohain, M.Sc.	JRF
Hrishikesh Talukdar, M.Sc.	JRF
Krishna Kanta Swargiary	Technician
Bipul Kumar Das	Multi-Tasking Staff
Babul Ch. Deka	Multi-Tasking Staff

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Subrata Goswami, B.Sc.	Technical Assistant.
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Atlanta Borah, M.Sc.,	JRF
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Tarun Talukdar	Multi-Tasking Staff
Bolin Das	Multi-Tasking Staff
Sabin Kalita	Multi-Tasking Staff
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Gitartha Kaushik, M.Sc.	SRF
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Jafrin Farha Hussain, M.Sc.	JRF
Rupshikha Patowary, M.Sc.	JRF
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Vaswati Das, M.Sc.	JRF
Suravi Kalita, M.Sc.	JRF
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Bhuwan Bhaskar, M.Sc.	JRF
Rabiya Sultana, M.Sc	Technical Assistant
Manomohan Huzuri, B.Sc.	Technical Assistant
Madan Chandra Kalita	Multi-Tasking Staff
Srikanta Baishya	Multi-Tasking Staff

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Dr. Gautam Choudhury, M.Sc., Ph.D.	Associate Professor-II
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Dr. (Mrs.) Munima B. Sahariah, M.Sc., Ph.D.	Assistant Professor-II
Tabassum Yesmin Rahman,M.C.A.	DST Women Scientist
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Parijat Borgohain, M.Sc.	SRF
Santanu Acharjee, M.Sc.	JRF
Manas Jyoti Das, M.Sc.	JRF
Ajay Kr. Saw, M.Sc.	JRF

Ujjal Saikia, M.Sc.	JRF
Priyanka Kalita,, M.Sc.	JRF
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Krishma Sharavan, M.Sc.	JRF
Kangkana Bora, M.Tech.	Inspire Fellow
Balabhadra Pathak	Multi-Tasking Staff

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Kumud Baishya	Assistant-1
Sarala Deka	Multi-Tasking Staff

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Rajesh Sharma	PRO
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Suresh Ch. Sarma	Section Officer
Rabin Ch. Kalita	Superintendent
Ramen Mahanta	Superintendent
Saraswati Bora	Superintendent
Dwijendra Deka	Superintendent
Montu Deka	Junior Engineer
Lelin Gogoi	PS to Director
Diganta Das	Assistant
Prabhat Ch. Barma	Assistant
Gora Gupta	Assistant
Munindra Singh	Technical Assistant
Nimai Hazam	Driver
Phatik Baishya	Driver
Lakshmi Kanta Soud	Multi-Tasking Staff
Madhabi Das	Multi-Tasking Staff
Nripen Ch. Goswami	Multi-Tasking Staff
Satish Ch. Das	Multi-Tasking Staff
Niren Sarma	Multi-Tasking Staff
Ratul Baishya	Multi-Tasking Staff
Binoy Kr. Choudhury	Multi-Tasking Staff
Pradip Das	Multi-Tasking Staff
Madhu Ram Kalita	Multi-Tasking Staff
Munna Basfor	Sweeper

Laboratory facilities at IASST

Plasma physics laboratory

The plasma physics laboratory is equipped to carry out research on basic and applied plasma science. Experiments to explore various fundamental and novel phenomena occurring in different plasma environments such as electron-ion plasma, multicomponent plasma and complex (dusty) plasma are conducted. Research on development of plasma based proton exchange membrane and electrode assembly for fuel cell are also conducted.

Plasma nanotech laboratory

The plasma nanotech laboratory is equipped with PECVD/sputtering devices for organic-inorganic nanocomposite material synthesis for fabrication of optoelectronic devices and for thin film deposition as well as for growth of carbon nanotubes. The laboratory is also equipped with Atmospheric Pressure Glow Discharge (APGD) Plasma CVD System specially designed for carbon nanotube (CNT) synthesis at atmospheric pressure.

Plasma nanotech laboratory

Material nanochemistry laboratory

The material nanochemistry laboratory is equipped to carry out research on nanomaterials of metals, semiconductors, inorganic, organic, polymer, polymer composites and hybrid materials. The aim of the laboratory is to develop a comprehensive chemical methodology leading to a systematic bottom-up fabrication of nanoscale devices for various applications in food, health, energy, and diagnostics.

Material nanochemistry laboratory

Advanced polymer material laboratory

The advanced polymer material laboratory is equipped to carry out research work on liquid crystalline polymer, co-polymer gels and hydrogels for various applications such as fabrication of prototype sensor devices.

Advanced polymer material laboratory

Soft-nano laboratory

The soft-nano laboratory involved in preparing thin films of organic molecules and nanoparticles at air-water and air-solid interfaces by using Langmuir-Blodgett trough, Spin coater etc. Structures, patterns and related properties of such thin films are obtained to explore interesting physicochemical properties using scattering, microscopic and spectroscopic techniques.

Soft-nano laboratory

Central Computational and Numerical Laboratory

A Centeral Computational and Numerical laboratory has been established with the aim to provide an up-to-date facility to the students and faculty members of IASST on computer related research work. The laboratory

currently has 20 all-in-one PCs each configured for high class performance. Out of these, 10 number of PCs have LINUX operating system while rest run on WINWODS. The laboratory is also equipped with a blade server system presently populated with six number of blades operating on LINUX and specifically meant for doing cluster computations. The chassis of the blade server system is capable of accommodating up to fourteen numbers of blades to meet future requirements. The entire laboratory is networked internally through switches and is further connected to institute's networked server for external connectivity. The laboratory has some high end softwares like MATLAB-R2012a, Quentum Espresso, VASP, Gaussian 09 etc. appart from other common softwares for data analysis, graphics and documentation.

Seribiotechnology laboratory

The seribiotechnology laboratory is equipped to carry out research muga and eri silkworm, diseases, fiber processing and development of silk-based biomaterials.

Seribiotechnology laboratory

Animal cell culture laboratory

The self-contained animal cell culture laboratory is equipped for the growth, maintenance, and analysis of animal cells. Silk (muga & eri) based biomaterials are being tested for biocompatibility for use in tissue engineering.

Animal cell culture laboratory

Plant tissue culture laboratory

The plant tissue culture laboratory is equipped with a walk-in growth chamber with light, temperature and humidity control for research involving plant cells and tissues. The facility is being used to study fungal–Aquilaria malaccensis interactions for in vitro agarwood oil production and also for generating endophyte free plants for in-depth investigation on the endophytic bacteria-plant interaction.

Plant tissue culture chamber

Drug discovery laboratory

The drug discovery laboratory is equipped to carry out research on traditional knowledge based drug discovery. Main focus is on use of ethno-medicines on metabolic diseases.

Environmental biotechnology laboratory

The environmental biotechnology laboratory is equipped to carry out research on bacterial biosurfactant and its application in remediation of poly aromatic hydrocarbons (PAHs) in petroleum contaminated soil and control of fungal diseases of crops.

Environmental biotechnology laboratory

Environmental chemistry laboratory

The environmental chemistry laboratory is equipped to carry out study and monitoring of environmental chemistry of water, air and soil due to various industrial activities and designing appropriate remedial techniques.

Faunal Biodiversity laboratory

This laboratory conducts study on faunal biodiversity in the diverse habitats which are of major ecological importance. Study of taxonomic identification and detailed biology of amphibians, fishes, invertebrates etc. has been carried out in far-flung areas of the North Eastern region of India.

Biodiversity laboratory

Microbial biotechnology laboratories

The microbial biotechnology laboratories are equipped to conduct research on microbiology and molecular biology. Research in this lab is focused on metagenomics for cellulases, understanding fungi-agarwood plant interaction studies, gut microbes-human interaction studies, plant-microbial studies and microbial bioactive metabolites.

Microbial biotechnology laboratory 1

Microbial biotechnology laboratory 2

R & D Centers

Bioinformatics Centre

Bioinformatics center at Institute of Advanced study in Science and Technology came into existence in the year 2011 with full financial assistance from the Department of Biotechnology, Govt. of India under DBT-BIF scheme. It is the latest addition to the BTISNet and NEBINet network of DBT, Govt. of India to fulfil the requirements of Bioinformatics tools for research in the life sciences, molecular biology and biotechnology. The objective of the center is to provide training on bioinformatics both at basic and advanced level research in the field of Bioinformatics. The centre organized seminars, workshops and training programmes in order to spread latest knowledge on bioinformatics among the students, teachers and scientists of the entire northeast as a whole. The first activity of the DBT-BIF of IAAST was one workshop on Basics of Bioinformatics. The center has also organised two lectures on application of softwares (LeadIT FlexX Basis, LeadIT flex Pharm, LeadIT Corina_F). The DBT-BIF is well connected to 100MBPS NKN connectivity of the institute with 24hr high speed Internet connectivity, lecture hall and power backup with 5KV UPS.

The hardware facilities of the centre include HP High End Server, HP Desktop PCs, HP Laser Jet CM1415fn color MFP, Linux Enterprise Edition, MS Office 2010. Software facilities include LeadIT FlexX Basis, LeadIT flex Pharm and LeadIT Corina_F.

Institutional Biotech Hub

A Biotech hub has been set up in the Institute in 2012 with the financial support from Department of Biotechnology, Govt. of India. Research scholars of the life science division of IASST and undergraduate and postgraduate students of other institutes are trained on basic techniques of microbiology and molecular biology.

Central Instrumentation Facility (CIF)

Central Instrumentation Facility (CIF) of IASST includes sophisticated equipments to meet the need of scientists and students of physical, chemical and biological sciences of IASST. CIF also extends its facility to researchers from other scientific organizations and universities for analysis of samples on outsourced basis. Since the time of setting up of this facility a large number of researchers have been benefited by these equipments including the new additions of this year. The major instruments available in the CIF are Scanning Electron Microscope, *Carl Zeiss, Zigma VP;* X-Ray Diffractometer, *Bruker, D8-Advance;* FT-IR, *Bruker, Vector 22;* Gel Permeation Chromatography (GPC), *Waters 2414;* Differential Scanning Calorimetry (DSC), *Perkin Elmer DSC 6000;* Differential Scanning Calorimetry (DSC), *Perkin Elmer DSC 6000;* Thermogravemetric Analyzer (TGA), *Perkin Elmer TGA 4000;* Tensiometer, *Dataphysics DCAT-11;* Optical Emission Spectrometer, *Andor Technology, Shamrock SR303i;* Microwave digester, *Milstone, Ethos-900;* Ion Chromatograph, *Cecil;* UV-Vis Spectrophotometer, *Shimadzu-1800;* Atomic Absorption Spectrophotometer, *Shimadzu,AA-7000;* Flame Photometer, *Elico, CL-378;* Biochemical Analyzer, *Merck;* Contact Angle Analyzer, DSA 30E (KRÜSS); DNA-Sequencer, Backman Coulter; Scanning Probe Microscope-NTEFGR Prima,

DNA Sequencer

NT-MDT Company and LC-MS-MS, Thermo Fisher. GC-MS-MS is the latest addition to the facility which facilitates determination of known and unknown compounds in environmental samples, foods, beverages and microbial and plant metabolite samples.

Knowledge Resource Center

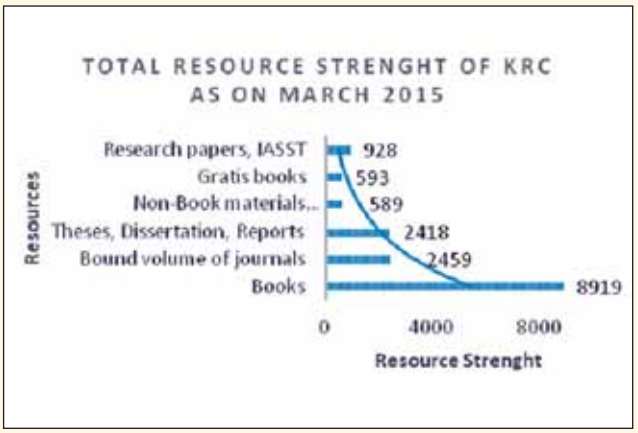
Being the knowledge & information hub of the institute, KRC has grown strength to strength along with the institute and continues to extend services and resources for the academic pursuit of the community. The KRC has been catering to the needs of nearly two hundred users comprising of faculty members, research scholars and staff members of the Institute. In addition, users of other academic institutions in the north-eastern region have also been availing the facilities of KRC. The KRC is equipped with modem facilities and resources (print and electronic) in the forms of online databases, books, journals, theses, reports, etc. It has also developed a Digital Library equipped with necessary modern equipment. Digital Library of the KRC has developed an institutional digital repository using open source software DSpace, which preserve the institute's intellectual output for campus wide access and digital preservation for the posterity.

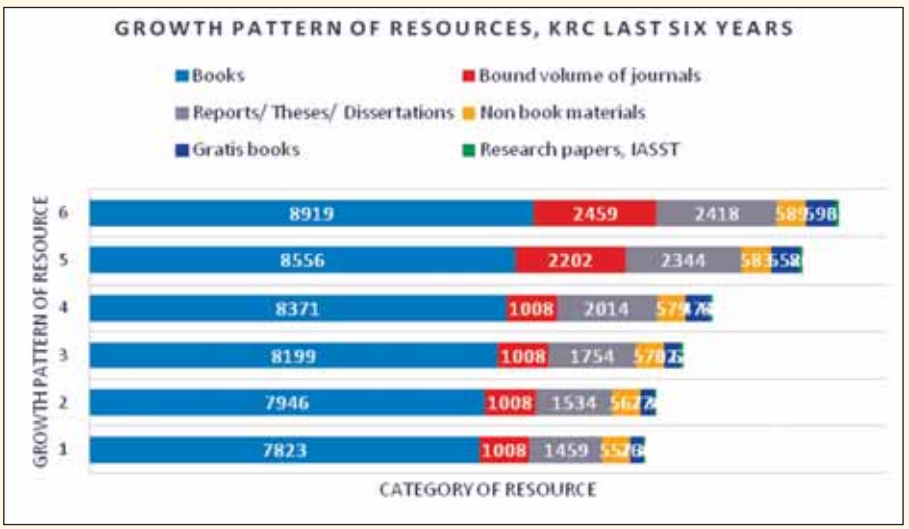
In the financial year 2014-15 the centre has added 324 books on the above disciplines. Being a member of National Knowledge Resource Consortium (NKRC), the KRC continues to get full text access to around 3500 e-journals and database services from 18 different impact factor rated publishers like Elsevier, ACS, AIP, APS, IOP, RSC, WoS, SciFinder etc.

The resource strength (printed and non-printed) of KRC as on March 2015 are as follows.

Table: Total resource strength of KRC as on March 2015

Resources	Strength
Books	8919
Bound volume of journals	2459
Theses,Dissertation, Reports	2418
Non-Book,materials (CD,DVD, etc.)	589
Gratis books	593
Research papers, IASST	928





Service and Activities:

A number of services and activities are achieved by the center during the financial year 2014-2015 as follows.

Table: Service and activities achieved by KRC during 2014-2015

Services	Number
Books newly added	324
Internal visitors	1575
External visitors	263
Circulation of book	542
Circulation of bound volume journal	145
Photocopy	112848
Annual report mailed	465
Internet applications uses unique visitors	245
Current Awareness Service	198
Selective Dissemination of Information Service	87
Referral service	267
Resource sharing (journal article/ chapter in book)	58
Paper published/ presentation by KRC staff	02
Seminar/ training/ workshop attended by KRC staff	04
Publishers training organized	03

Photograph of KRC

Medicinal Plant Garden

As one group of scientists of IASST is engaged in medicinal plant research based on traditional knowledge, IASST has taken up an initiative to develop a medicinal plant garden within its campus in order to conserve variety of plant species from this region in natural habitats and also to protect some endangered species. All the plant species were authentically identified by expert taxonomists, labeled and in many cases their therapeutic values in curing different diseases are also highlighted. Few of them are Ambellica officinalis, Citrus grandis, Citrus morella, Clerodendron colebrookianum, Clerodendron viscosum, Terminalia chebula, Vinca rosea, Eugenia jambolana, Punica granatum, Ocimum sanctum, Cuinamomum tamala, Murrya koenigii, Pepar longum, Rauwalfia serpentina, Terminalia arjuna etc.

Animal House facility

For pre clinical testing of different types of synthetic and natural products and also to test some effective molecules in in vivo condition, IASST has established an animal house within its campus. Numbers of different species of laboratory animals viz Albino rats (Wistar), Albino mice (Swiss) Guinea pigs (Duncan Hartley) and Rabbits (New Zealand white) ect. are available and it is maintained properly as per guideline of Purpose of Control and Supervision of Experiments on Animals (CPCSEA). This Animal House is registered with CPCSEA, Government of India, Animal Welfare Division.

Photograph of Animal House

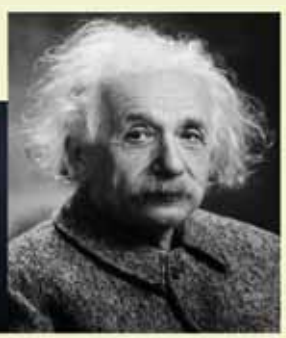
RESEARCH ACTIVITY

As you turn over....

- Technical Reports
  - Basic and Applied Plasma
  - Advanced Materials Science
  - Mathematical and Computational Sciences
  - Biodiversity and Ecosystem Reseach
  - Traditional Knowledge based Drug Development and Delivery
- Extramural Projects
- Publications
- Presentations in Conference/seminars
- Conference/seminar/meetings attended
- Lectures delivered at other institutes
- Other activities
- Awards/recognitions /achievements
- List of Ph.D. awardees
- Conference/seminar/workshops organized
- Visit of Scientists from other Institutes

If we knew what it was we were doing, it would not be called research, would it ?

-ALBERT EINSTEIN



A note on IASST's R&D on issues of relevance for North East India:

IASST has been a national R&D Institute in North East India since it was taken over from the Govt. of Assam by the DST, Govt. of India in 2009. Its research programmes have been reorganized to include research topics which match area of specialization of scientists and regional relevance. Few highlights are as follows:-

1. Applied Plasma Physics research group of IASST has developed a technique of plasma assisted coating on bell metal to prevent corrosion. Bell metal is a cottage industry of Assam. Through plasma process application on Muga silk, infection free Muga silk suture material has also been developed by IASST.
2. The Advanced Material research group developed a novel robust Chitosan-Carbon dots nanocomposite hydrogel using a new green source "tea" as precursor for carbon dots with increased hydrophobicity, soft but tough, superior UV/visible blocking, swelling, thermal and mechanical properties in comparison to chitosan hydrogel film and will have potential application in biomedical field and biodegradable packaging material.
3. The Advanced Material research group also developed sensor for the detection of organic and inorganic sulfur which can be utilized for making a low cost device as a measure against adulteration.
4. Sericulture is an old tradition of North East India and Muga silk is endemic to the region. The Institute has standardized technique for detecting adulteration of Muga silk and also played role in obtaining GI mark for this endemic resource. Muga silk worm is wild in nature and its rearing is an outdoor activity leading to vagaries of nature such as weather fluctuation and predators. The Institute is carrying out research to develop indoor rearing practice for Muga silk worm.
5. Seri silk production in the region is highest among the four types of silk. The Institute has started a programme in which 20 tribal families have been provided during the first year diseased free seeds and technical know-hows for year round production of Eri-cocoons/silk and also improvised technique of reeling. On completion of first year, each of these families will train two families in the neighbourhood along with their own Eri rearing activity in the 2nd year. IASST held discussion with NECTAR officials for promoting similar programme in Meghalaya.
6. North East India topography is unique with 65% of its mountainous landmass and rest comprising of Brahmaputra and Barak valley. Shifting agriculture in hills interferes with ecosystem stability including large scale erosion in hills and siltation of rivers in valley leading to perennial problem of flood. IASST research aims at understanding shifting agriculture dynamics and role of soil microbiota and its management for system stability.
7. More than 250 tribes of the region possess traditional knowledge on rich diversity of medicinal and aromatic plants and use of these plants and their formulations in their local health care system. IASST's research aims at validating selected formulations against diabetics and subsequently for promotion of these formulations through entrepreneurs. Microbial biotechnology group has characterized the gut microbiota of 15 tribes of NE India by molecules technique and compared with worldwide data of human gut microbiota. Gut microbiota is shaped by diet, geography and ethnicity and known to influence health condition.
8. North East region of India has been declared as a natural economic zone where agriculture and horticultural production will require organic inputs such as bacterial fertilizer. IASST has a strong research focus on research and development on bio-inputs for agriculture, horticulture and tea plantations.
9. IASST has discovered a number of new faunal species including frog, fish and mites.
10. A technique of remediation of hydrocarbon polluted soil around oil fields of upper Assam using consortium of efficient hydrocarbon degrading bacteria and sedge grass and it now requires large scale field testing.

Technical Reports

BASIC AND APPLIED PLASMA

....Research in nonlinear and complex phenomena encompasses variety of fundamental physical phenomena in nature like tsunami and rogue waves in ocean, cyclonic activities in the atmosphere, chaotic behavior in biological systems and in experiments like plasma confinement in fusion devices for energy creation to solitonic fibre optic communication devices. One classic example of nonlinear dynamic structure is the soliton which occurs in many nonlinear dispersive media including hydrodynamics, plasmas, fibre optics etc. Basic and applied plasma physics program of IASST is engaged in research work on nonlinear characteristics of ion-acoustic solitons in multicomponent plasma and in dusty plasma. Both multicomponent plasma and dusty plasma have been produced in the laboratory which give information about some new kind of waves and some interesting dynamical features such as shock and vortex formation, instabilities etc.

Proton Exchange Membrane Fuel Cell (PEMFC) is another front research area within Basic and Applied Plasma Physics program for generation of power to be used in portable devices such as cellular phones, laptops, etc. The main component of a fuel cell is a membrane which is used primarily to exchange protons by chemical reactions initiated by metal catalyst such as Pt, Au, Pd, Ir etc. Plasma polymerization is one of the convenient and powerful processes to develop this membrane. At IASST we have done extensive research to develop efficient fuel cell assembly by plasma process....

Prof. H. Bailung
Programme Head, Basic and Applied Plasma Physics

Dr. Sumita K. Sharma
Inspire Faculty

Basic Plasma Laboratory

Dust acoustic soliton, shock and dynamical structures; Ion acoustic wave and sheath in low temperature multicomponent plasma

The first report from basic plasma laboratory is on dust acoustic soliton, shock and their dynamical structures. Dust acoustic wave, which is a longitudinal wave involving very small dust particles is observed in laboratory dusty plasma. Because of its similarity with ordinary sound wave and possible visualization using laser light scattering and video imaging, dust acoustic wave is sometimes termed as "visible sound wave". Under certain special conditions, dust acoustic wave can transform into nonlinear structures like solitons and shocks. Study of dust acoustic wave and associated phenomena have significant contribution towards better understanding of some processes occurring in space dusty plasma such as spokes in Saturn's ring, interaction of solar wind with cometary tail, condensation of grains in dust molecular cloud etc.

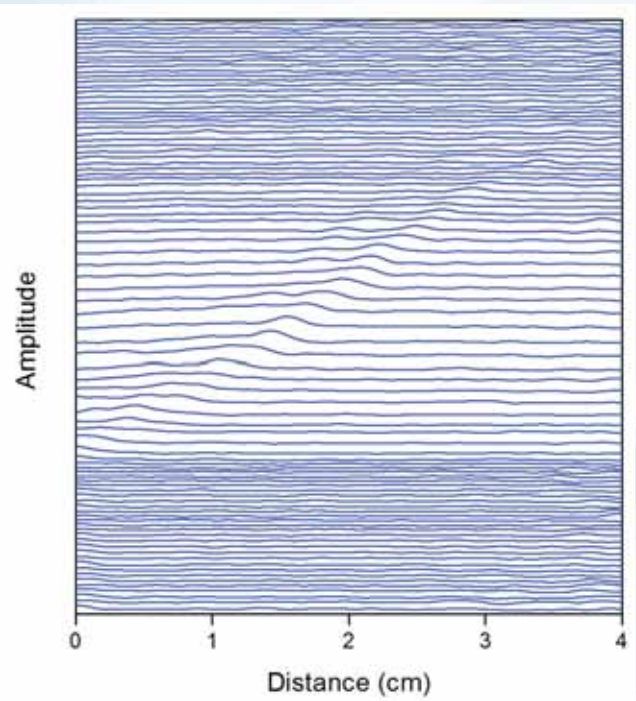


Figure 1: Graphical representation of propagating nonlinear dust acoustic wave (soliton) from left to right in strongly coupled dusty plasma. An experimental video shot is divided into 90 snapshots and density perturbation is calculated using an image analysis software (ImageJ).

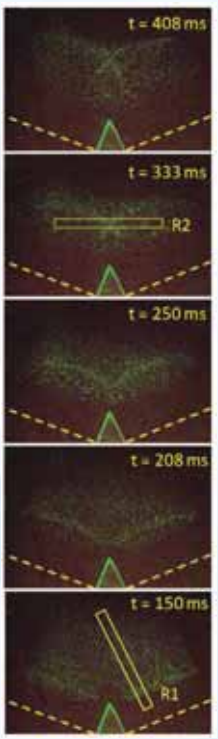


Figure 2: Image sequence showing oblique collision between two dust acoustic solitons at 44^0.

We have developed a novel technique for the efficient excitation of dust acoustic wave and associated solitons. Dust acoustic waves/solitons are excited by applying a sinusoidal signal (1 to 10 Hz)/short negative pulse to an exciter along with a small dc offset. For higher excitation level, the disturbance undergoes

nonlinear steepening balancing dispersion effect and eventually forms a dust acoustic soliton. A typical graphical profile of the dust acoustic soliton obtained from a recorded video is shown in figure 1. The characteristic features of the observed solitons agree with the theoretical results based on well known Korteweg-de Vries (KdV) equation. A sequence of images obtained from experiments done on oblique collision between two dust acoustic solitons is shown in figure 2. The maximum resultant wave formed during the collision is ~3 times the colliding soliton amplitude at collision angle (~44^{o}) indicating a resonance like interaction. On increment of excitation level, multiple dust acoustic solitons from a single excitation pulse is observed for the first time in our laboratory. Figure 3a and 3b plots the intensity profile showing the evolution of 2 solitons from a single excitation pulse and the numerical solution for multiple solitons respectively.

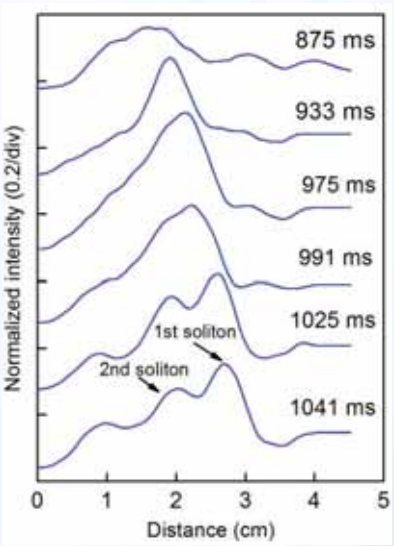


Figure 3a: Evolution of dust acoustic multisolitons in dusty plasma.

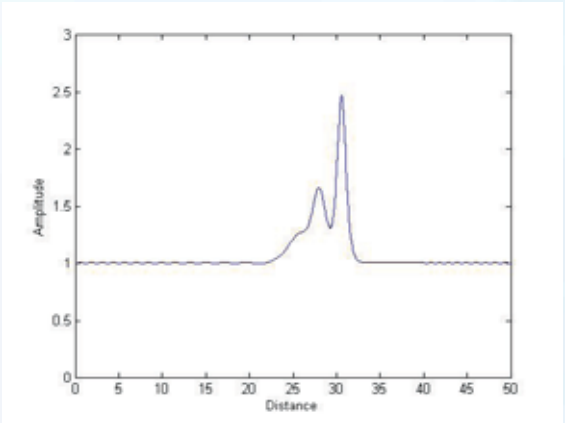


Figure 3b: Numerical solution of KdV equation showing generation of 2 solitons.

Other than solitons, dust acoustic shock waves are excited in laboratory dusty plasma by using the flowing charge dust particles from one section to a stationary dusty plasma sheet. Shock wave is a nonlinear structure which is formed in a nonlinear medium by balancing nonlinear and dissipative effects. Another interesting phenomenon to be studied in dusty plasma is the dynamical structure of dust particles. In real astrophysical context, dusty plasma is always composed of dust grains with wide range of charge distribution adding enormous complexity to the system. In our laboratory, we have been able to successfully produce dusty plasma with particle size ranging from few nanometer to micrometer and have also observed some important dynamical structures relevant to astrophysical observations. Some of these structures are shown in figure 4.

The basic plasma laboratory also focuses on ion acoustic wave and sheath in low temperature multicomponent plasma. Higher order Peregrine soliton, commonly known as super rogue wave in context of water waves in ocean, is observed in a multicomponent plasma with critical density of negative ions. Two distinguishing features of the observed soliton are (1) spatio-temporal localization and (2) wave amplitude ~ 5 times the carrier wave amplitude. An example of observed Peregrine soliton and theoretical solution of the nonlinear Schrödinger equation describing such high amplitude soliton are shown in figure 5a and figure 5b respectively. Peregrine solitons are considered as prototypes of rogue wave in ocean and observation of these prototypes in plasma medium has opened up new possibilities of studying these exotic water wave phenomena in laboratory.

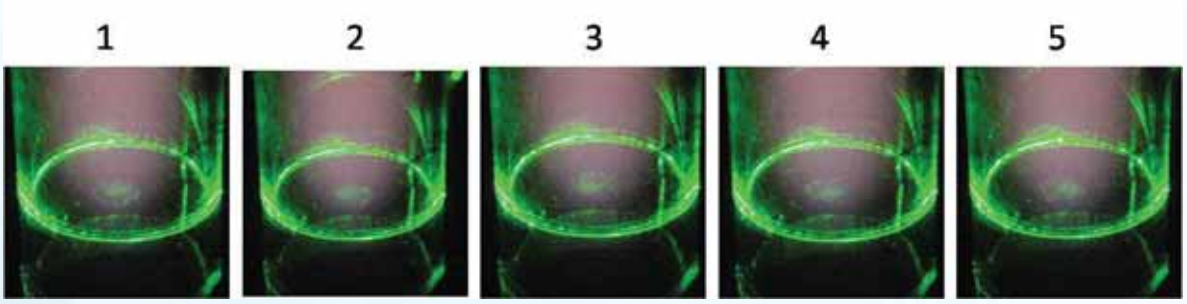


Figure 4: Sequence of images showing anti-clockwise rotation of nano dust cloud

In Low temperature plasma the sheath phenomena have also been studied. For this, low temperature and low density plasma is produced in the laboratory by using magnetic filter. The discharge is maintained in such a way that the plasma passing through the magnetic filter have the characteristics very close to the low earth orbit (ionosphere). The sheath structure formed in front of a metal plate in low temperature plasma is studied under different discharge conditions. Study of such low temperature –low density plasma is important for laboratory simulation of Lower Earth Orbit (LEO) plasma to understand the interaction of ionospheric plasma with spacecraft and satellites.

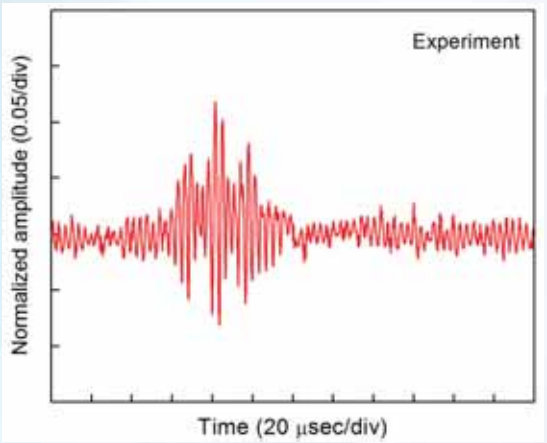


Figure 5a: Observed higher order Peregrine soliton in multicomponent plasma. The amplitude of the soliton is ~ 5 times the carrier wave amplitude.

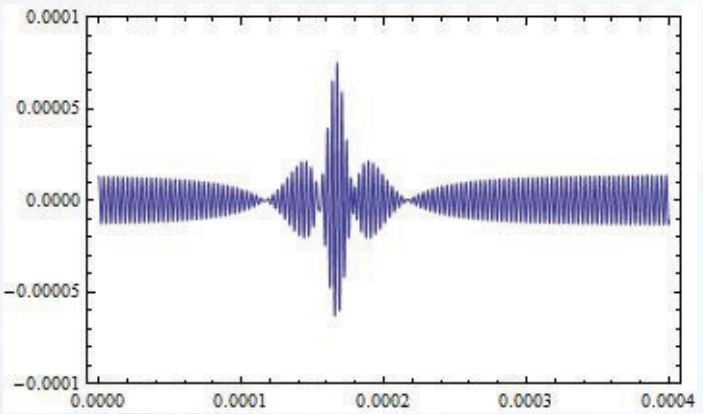


Figure 5b: Theoretical higher order Peregrine soliton solution (super rogue wave) of the nonlinear Schrödinger equation.

Prof. Joyanti Chutia

Emeritus Scientist
Applied Plasma Laboratory

Metal Oxide Deposition, Plasma Polymerization, Proton Exchange Membrane, Nanocomposite Solar Cell, Biomaterials, Magnetron Sputtering.

The major focus of Applied Plasma laboratory is to develop Proton Exchange Membrane Fuel Cell through plasma technique. Proton Exchange Membrane Fuel Cell (PEMFC) has recently received great attention for generation of power to be used in portable devices such as cellular phones, laptops, etc. and other devices driven by conventional batteries. Proton exchange membrane is the heart component of a fuel cell which is used primarily to exchange protons formed at the anode side by hydrogen oxidation reaction (HOR) to the cathode side where they take part in oxygen reduction reaction (ORR), the chemical reactions being initiated using metal catalyst such as Pt, Au, Pd, Ir etc. Plasma polymerization is one of the convenient and powerful processes of polymerization by which thin, uniform, highly cross-linked polymer film can be developed and served as an alternative to commercial Nafion membranes. The cost of Platinum (Pt) being a dominating factor which limits commercialization of PEMFC, researchers have focused to develop low Pt loaded electrodes with no compromise of cell performance. Over the years, extensive works have been dedicated to development of efficient yet low Pt catalyst loaded cathode for fuel cell operations.

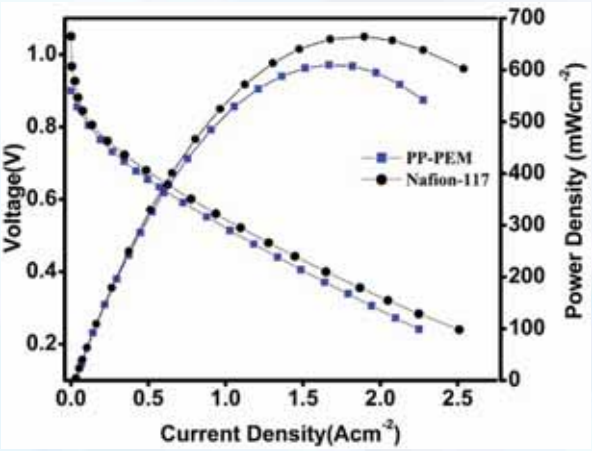


Figure 1: Polarization Curve of Nafion 117 and plasma prepared membrane

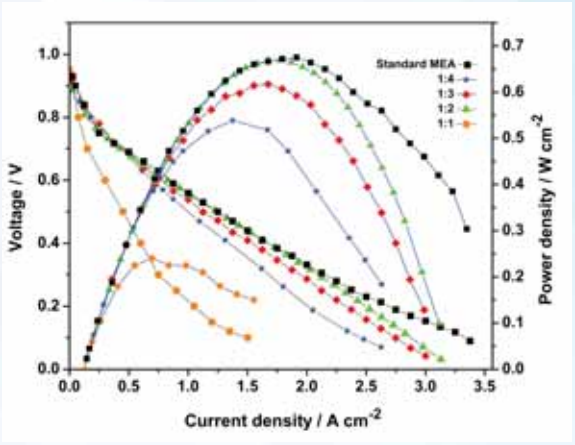


Figure 2: Polarization Curve of prepared MEAs

In the first set of works, proton conducting polystyrene based sulfonated membrane is synthesized by plasma polymerization of a styrene/trifluoromethane sulfonic acid monomers mixture in a continuous glow discharge process. This study shows that low discharge power density is required to preserve the monomer structure and SO_3H groups in the polymer matrix. The synthesized membranes are uniform with maximum thickness of 33µm. FTIR analyses reveal the similar structure with the conventional sulfonated polystyrene membrane prepared by chemical process. The conductivity achieved for the plasma membrane is 0.6 Scm^{-1} which is better than the commercially available Nafion-117 membrane. The membrane deposited at 50 W shows good cell performance in fuel cell.

In another work, carbon paper is used as gas diffusion layer (GDL) and Pt nanopillars are grown on it at high pressure of 0.5 mbar using dc sputtering process. Sputtering at 0.5 mbar results in the formation of uniform conical nanopillars with enhanced catalytic activity of Pt deposited on fuel cell electrodes. The ECSA of the electrodes depends on the shape and size of the nanopillars. Low loaded Pt nanopillars structured catalyst has been deposited on carbon papers to prepare the fuel cell electrodes. Taking Nafion 212 as the proton conducting membrane separating the two electrodes, MEA is fabricated and tested in a manual fuel cell testing station.The optimum condition for best performance of the electrodes is 0.05 mg cm^{-2} and 0.10 mg cm^{-2} Pt loading at anode and cathode respectively. The maximum power density of 670 mW cm^{-2} obtained with a total Pt loading of 0.15 mg cm^{-2} is comparable to 2 mg cm^{-2} loaded standard electrodes.

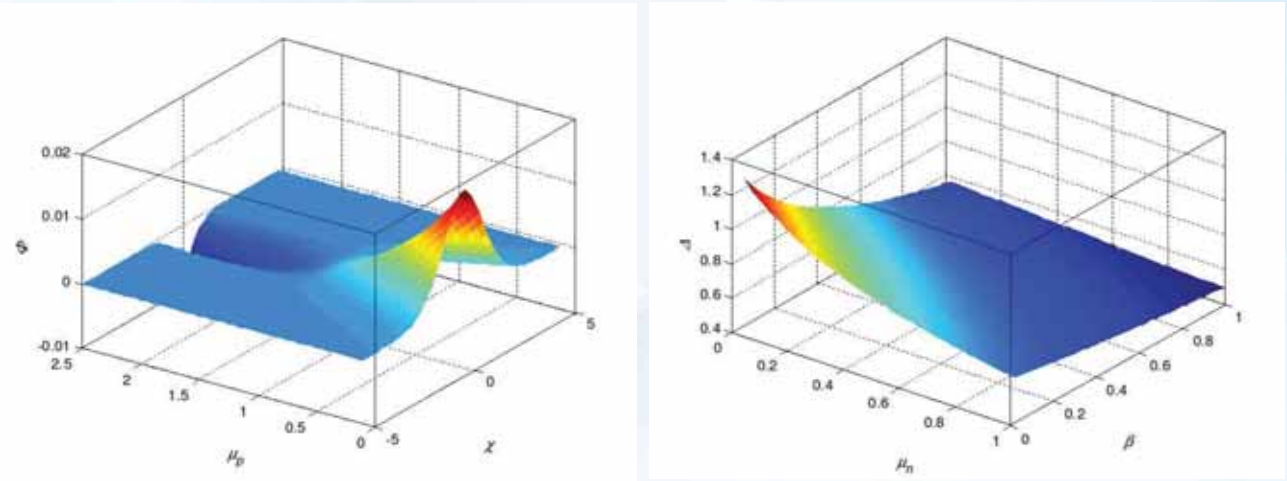
Dr. Nirab C. Adhikary

Plasma theory and Experiment, Nanomaterial

Waves and Instability in Plasma, Nanomaterial Applications.

Research activity of this group is divided into two parts. In one part we work on dust acoustic solitary wave propagation and dust-ion acoustic shock waves using basic plasma theory, while on the other part we focus on the nanomaterial based photonics and sensors applications.

The study of the properties of dust acoustic (DA) solitary wave propagation in an adiabatic dusty plasma includes the effect of the non-thermal ions and trapped electrons. The reductive perturbation method has been employed to derive the modified Korteweg–de Vries (mK-dV) equation for dust acoustic solitary waves in a homogeneous, unmagnetized and collisionless plasma whose constituents are electrons, singly charged positive ions, singly charged negative ions and massive charged dust particles. The stationary analytical solution of the mK-dV equation is numerically analyzed and the effect of various dusty plasma constituents DA solitary wave propagation is taken into account. It is observed that both the ions in dusty plasma play as a key role in the formation of both rarefactive as well as the compressive DA solitary waves and also the ion concentration controls the transformation of negative to positive potentials of the waves.



(a) (b)

Figure 1. (a) The spatial formation of the wave profile ϕ with positive ion to electron density ratio μ_p which shows the clear transition of positive to negative solitary wave potential with the variation of μ_p (b)Variation of solitary wave width Δ with respect to negative ion density ratio μ_n and ion temperature ratio β.

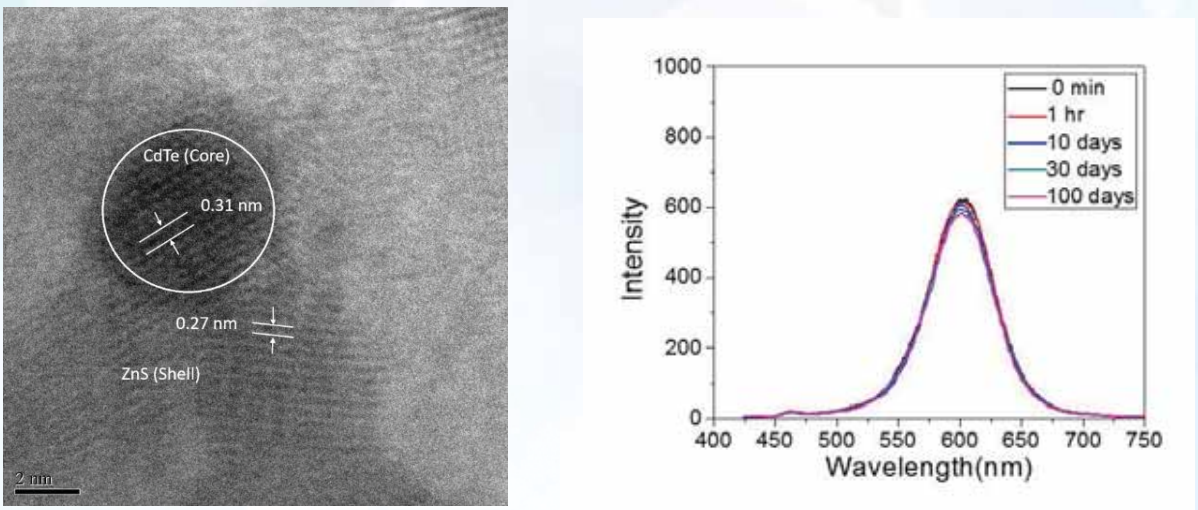
The nonlinear propagation of dust-ion acoustic (DIA) shock waves in an un-magnetized dusty plasma which consists of electrons, both positive and negative ions and negatively charged immobile dust grains has also been studied. Starting from a set of hydrodynamic equations with the ion thermal pressures and ion kinematic viscosities included, and using a standard reductive perturbation method, the Kadomtsev-Petviashvili-

Burgers (K-P-Burgers) equation is derived, which governs the evolution of DIA shocks. A stationary solution of the K-P-Burgers equation is obtained and its properties are analysed with different plasma number densities, ion temperatures and masses. It is found that a transition from shocks with negative potential to positive one occurs depending on the negative ion concentration in the plasma and the obliqueness of propagation of DIA waves.

The synthesis and characterization of highly photostable CdTe/ZnS (Cadmium Tellurite/Zinc sulphide) Core/Shell (CS) quantum dots (QD) is done in aqueous solution by a nearly greener route. The synthesized CdTe/ZnS CS QD are found to exhibit better photo stability even after 100 days of its preparation. In addition, the prepared CS samples also exhibit better Photoluminescence Quantum Yield (PLQY) of about 50% as compared to that of the CdTe QD which is nearly 12%. The synthesis and characterization of the CdTe/ZnS CS has been confirmed by HR-TEM, FTIR and XRD analysis. An interesting feature of our synthesized QD system is that it exhibits pure PL colour tunable property over a wide spectral range which is a characteristic of QD. Such works will contribute to the development of rapidly growing field of nanomaterial based photonics and sensors applications.

(a) (b)

Figure 2. Photographs of the prepared QD samples under (a) normal light and (b) UV light (365 nm) samples P1 to P6 having different size QDs grown at different refluxing time.



(a) (b)

Figure 3. (a) HRTEM image of QD lattice fringes (b) PL spectra of CdTe/ZnS core/shell QD for different time interval up to 100 days shows better photostability.

ADVANCED MATERIALS SCIENCE

....Inquisitiveness of human mind knows no bound. This led the scientific world to go beyond the first generation materials and quest for advanced materials with superior physical and chemical properties. High temperature superconductors, organic/inorganic hybrid sensors, smart devices, energy storage systems are few applications based on the present day advanced materials which have impacted significantly the growth of human civilization in the recent past.

The Advanced Materials Science group of IASST endeavours to contribute its bit to the world of science by doing research both in the basic and applied fields of advanced materials. In the near future, IASST plans to establish a centre of excellence on "Advanced materials for energy and environment" to provide state-of-the-art research facility to its inhouse researchers as well as researchers from various colleges, universities and institutions in the entire North Eastern region of India. Here is a glimpse of the year 2014-15 program of the ongoing work from Advanced Materials Science group of IASST....

Dr. Neelotpal Sen Sarma

Programme Head, Advanced Materials Science
Advanced Polymer Materials Laboratory

Solid State Ionics, Liquid Crystalline Polymers, Hydro and polymer gels,
Bio and chemosensors and synthesis of high value polymers.

In Advanced Polymer Materials Laboratory, research work on liquid crystalline polymer, co-polymer gels and hydrogels, polymer nanocomposites with special emphasis on fabrication of prototype sensor devices is being realized.

Explosive sensors are substances capable of detecting specific chemicals used in explosives and transform the detected chemical information into an analytically useful signal. Non-destructive detection of nitroaromatic explosives is very essential for criminal investigations and life protection, minefield remediation, military applications, ammunition remediation sites, homeland security applications. Nitroaromatic compounds viz. picric acid, TNT, DNT are regarded as explosive chemicals due to its very high volatility. These chemicals upon initiation undergo highly exothermic reactions yielding gaseous products. Besides, these chemicals also cause soil and water pollution. We have developed a layer by layer polymer detector for efficient detection of nitro-aromatic chemicals and picric acid which is considered as the model nitroaromatic chemical. To develop the sensor, two different polymers i.e. co-polysulfone of cholesterol methacrylate with 1-hexane (PCHMASH) and co-poly 2-vinyl pyridine with acrylonitrile (P2VP-Co-AN) were synthesized. The fabrication of the layer by layer detector was accomplished by placing P2VP-Co-AN in between two layers of PCHMASH and sandwiching in between the SS mesh. The detection process was based on very fast decrease in the impedance of the detector in presence of the vapor of picric acid. Fabrication of a trilayer detector is shown in Figure 1.

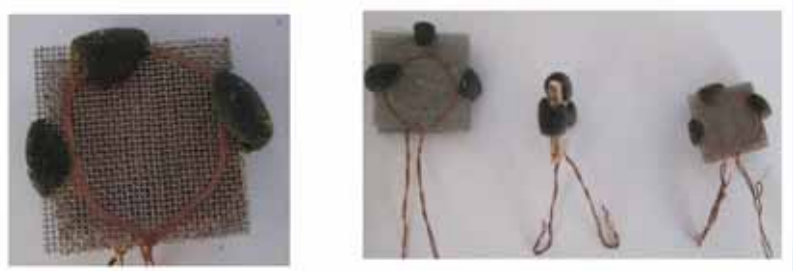


Figure 1: Fabrication of a trilayer detector

Field experiment was also conducted using the prototype developed in the laboratory. The bi-colored LED start blinking when it absorbs sufficient amount of nitro aromatic compounds (Figure 2).

We also synthesized a new hybrid fluorescent probe based on cationic curcumin–tryptophan complex and water soluble mercapto succinic acid (MSA) capped CdTe quantum dots (QDs) for detection of double stranded DNA (ds DNA) molecules isolated from actinobacterium, Streptomyces sanglieri. Cationic curcumin-tryptophan complex (CT) directly interacts with negatively charged MSA capped quantum dots by electrostatic coordination, resulting in Photoluminescence (PL) quenching of QDs via Photoinduced Electron Transfer (PET) process. Further addition of ds DNA results in restoration of PL, as CT would intercalate between DNA strands. Thus, this process can be utilized for selective sensing of ds DNA via fluorescence measurements.

Under optimized experimental conditions, the PL quenching efficiency of QDs is found to be 99.4% in presence of 0.31×10^{-9} M CT. Interestingly, the regain in PL intensity of QDs-CT is found to be 99.28% in presence of 1×10^{-8} M ds DNA. The detection limit for ds DNA with the sensing probe developed is 1.4×10^{-10} M. The probe is found to be highly sensitive towards bacterial DNA isolated from Streptomyces sanglieri with a detection limit of 1.7×10^{-6} M. The present work provides a new insight to preparation of bio inspired hybrid materials as efficient sensor for disease diagnosis and agricultural development. The schematic of this sensing strategy is shown in Figure 3.

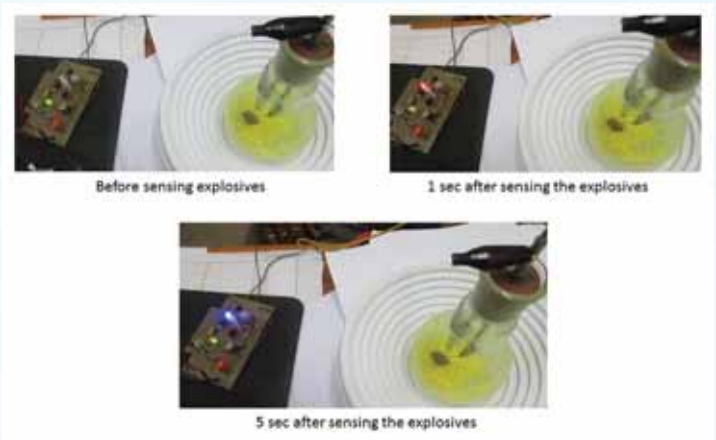


Figure 2: Sensing of picric acid (along with other nitro aromatic compound) using the prototype developed in the laboratory. Within a short while (5 sec) from the start of sensing process, the blinking (arrow) of bicoloured LED suggests absorption of sufficient amount of nitroaromatic compounds

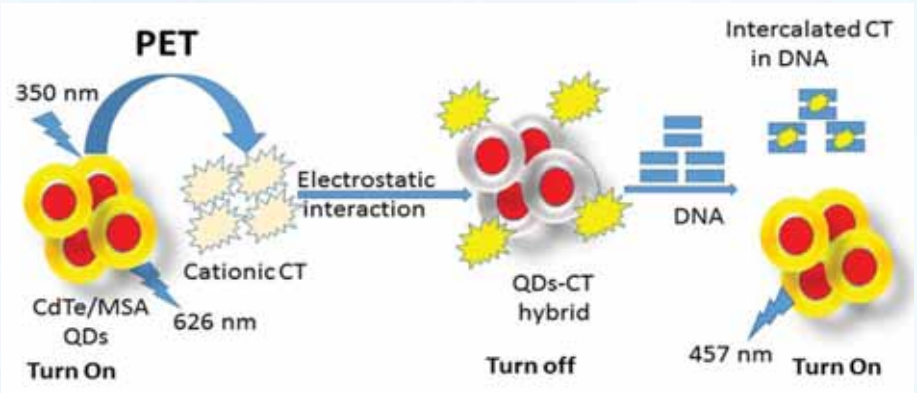


Figure 3: Sensing strategy of the synthesized fluorescent probe toward ds DNA

The sensing strategy is based on electronic switch- firstly fluorescence 'turn off' upon addition of cationic curcumin-tryptophan complex to MSA capped QDs followed by fluorescence 'turn on' upon addition of ds DNA to the nanohybrid so formed. The process starts with initial absorption of a photon by an electron in the ground state as a result of which the electron jumps to the excited state, which then moves to the excited state of curcumin-tryptophan complex forming a charge transfer exiplex (CT exiplex). The exiplex so formed ultimately jumps to the ground state with no emission, which is observed as fluorescence 'turn off'. Addition of ds DNA to the Charge Transfer complex leads to cleavage of the complex as curcumin-tryptophan hybrid gets intercalated between the two strands of DNA making the QD surface free leading to fluorescence 'turn on'. The mechanistic pathway of this process is presented in figure 4.

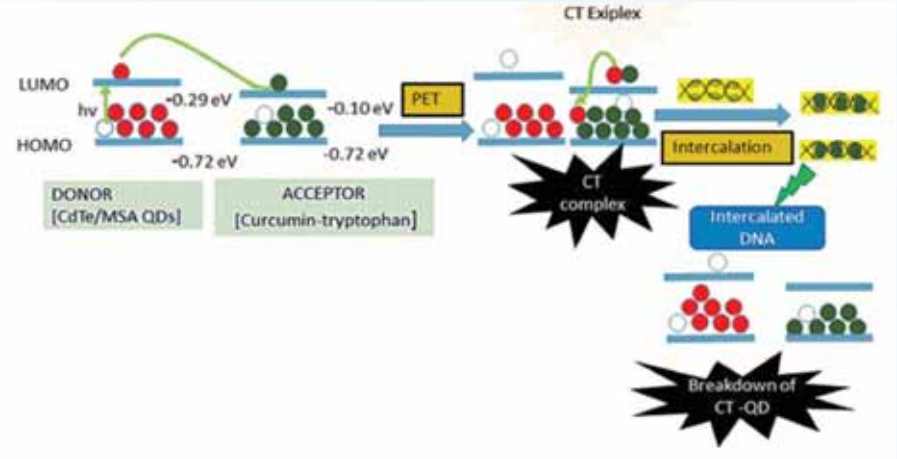


Figure 4: Mechanistic pathway of electron transfer between CdTe-MSA (donor), cationic CT (acceptor) and subsequent detachment of CdTe-MSA with the intercalation of cationic CT within hs DNA (ds DNA).

Synthesis, characterization and improvement in ionic conductivities of the salts of poly-(2-vinylpyridine) with crotonic acid (P-2VP-CrotA) and vinyl acetic acid (P-2VP-VAA) have been successfully accomplished in this study. The AC conductivity measurements were done within the temperature range of 30 to 90 ^{o}C and the frequency range of 1 Hz to 100 kHz in solid state. A two to three fold increase in conductivity was observed for vinyl acetic acid salt whereas one to two fold increase was observed for crotonic acid salt.

That the incorporation of weak acids also can increase the conductivities of such materials is the major significance of this work. The salts are thermally stable upto 110 ^{o}C and can be used as good polyelectrolytes in solid state. The total ionic transport number of P-2VP is found to be increased after formation of polyelectrolyte salts with the acids. Thus these salts may be used as intrinsic conducting polymers in solid state.

We want to carry forward this research for further improvement of the already designed devices and for developing new applications devices.

Dr. Devasish Chowdhury
Material Nanochemistry Laboratory

Nanomaterials, Surface self-assembly, Surface Nanochemistry,
Atomic Force Microscope mediated Nanolithography

Material Nanochemistry laboratory is fully devoted to the development of hybrid nanomaterials with useful properties. The objective of the laboratory is to develop comprehensive bottom-up synthetic strategy to fabricate variety of hybrid biomaterials, carbon based nanomaterials, polymer nanocomposites for device realization. Here we report on development of functionalized nanomaterial showing tunable optical properties, mechanically strong but soft nanocomposite film and solid optical sensor platform for detection of heavy metal ions.

A simple, facile, and reversible on/off fluorescence switching has been developed by functionalization of carbon dots (CDs) via esterification. Carbon dots (CDs) are carbon nanoparticles with sizes below 10 nm. The reason behind the much acquired interest in carbon dots stems from their unique and superior properties, such as high stability against photobleaching and photoblinking, biocompatibility, low toxicity, good stability, easy preparation, and environmental friendliness thereby popularizing their use as potential alternatives to the conventional metal based semiconductor quantum dots. We at IASST synthesized CDs from citric acid which show pH-dependent photoluminescence (PL), with higher PL intensity observed at pH 7 than at pH 1. The hydroxyl and carboxyl group-bearing CDs were also esterified with different alcohols, and their PL properties were studied. It is interesting to note that in all the cases, low PL intensity of CDs at pH 1 can be transformed into a high PL system by esterification of CDs as shown in figure 1. However, at neutral pH 7, the PL intensity was found to be lower after esterification of CDs. Moreover, at pH 1, the subsequent hydrolysis of esterified CDs again results in low PL intensity, thereby demonstrating the reversibility of the process. This on /off switching of fluorescence upto 3 cycles is demonstrated in figure 2. Thus we believe that such systems shall be ideal for application as fluorescence based optical switches.

Figure 1: Schematic Representation of the reversible esterification-hydrolysis process exhibited by carbon dots derived from citric acid.

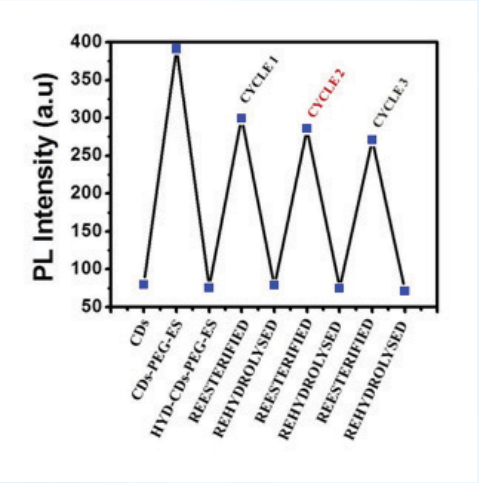


Figure 2: PL switching cycles from CDs (low PL) at pH 1 to esterification of CDs (high PL) followed by subsequent hydrolysis (low PL), re-esterification (high PL) and re-hydrolysis of ester (low PL).

During the year, we also carried out research on novel chitosan-carbon dots nanocomposite hydrogel films. A new green source "tea" was used as precursor for carbon dots (CDs). The electrostatic interaction of positive charge on chitosan and negative charge on CDs prepared from tea was used for the successful preparation of a stable and robust chitosan-carbon dots nanocomposite hydrogel film. The hydrogel films were characterized by UV-visible spectroscopy, X-ray diffraction (XRD), Fourier transformed infra-red spectroscopy (FTIR), scanning electron microscope (SEM), fluorescent microscope, thermogravimetric analysis (TGA) and contact angle analysis. XRD diffractogram indicates retention of crystalinity in all the hydrogel films. In the FTIR spectra, broadening of the peak at around 3400 cm-1 proves the increase in hydrogen bonding between the –OH groups of chitosan, glycerol and CDs. Fluorescent microscopic images clearly shows the distribution of CDs in the hydrogel matrix and aggregation of carbon dots in the polymeric matrix at higher concentration is reviled from the SEM images. In the TGA thermogram it was observed that on incorporation of tea CDs the first degradation temperature of the hydrogel nanocomposite films was increased to a maximum of 1000C along with the decrease in % weight loss in all the nanocomposite films. The Tensile strength (TS) of CH-CD1 nanocomposite film increased considerably to 18.6 MPa in comparison to CH hydrogel film (5.1 MPa). Moreover the toughness which is the measure of the area under the stress- strain curve was increased to a maximum of 285% in case of the chitosan-carbon dot nanocomposite film. Also, the contact angle values increased from 64.95° for chitosan films to 88.75° for chitosan-carbon dot nanocomposite film suggesting increase in hydrophobicity of the nanocomposite hydrogel films. It was observed that chitosan- carbon dots hydrogel films are soft but tough with superior UV/visible blocking, swelling, thermal and mechanical properties in comparison to chitosan hydrogel film. Figure 3 shows the improved properties of Chitosan-carbon dot nanocomposite film.

Research work is ongoing on the development of a robust solid sensing platform for an on-site operational and detection of heavy metal. We introduce chitosan based carbon dots rooted agarose hydrogel film as a hybrid solid sensing platform for detection of heavy metal ions. The fabrication of the solid sensing platform is centered on simple electrostatic interaction between NH^{3+} group present in carbon dots and OH- groups present in agarose. On simply dipping the hydrogel film strip into heavy metal ion solution, in particular Cr^{6+}, Cu^{2+}, Fe^{3+}, Pb^{2+}, Mn^{2+}, the strip displays color change, viz., Cr^{6+}→yellow, Cu^{2+}→blue, Fe^{3+}→brown, Pb^{2+}→white, Mn^{2+}→tan brown. Moreover, the hydrogel film finds applicability as an efficient filtration membrane for separation of these quintet heavy metal ions. The strategic fundamental feature of this sensing platform is the successful capability of chitosan to form colored chelates with transition metals. This proficient hybrid hydrogel solid sensing platform is thus the most suitable to employ as an on-site operational,

portable, cheap colorimetric-optical detector of heavy metal ion with potential skill in their separation. Figure 4 gives an idea about how the solid sensing film is fabricated.

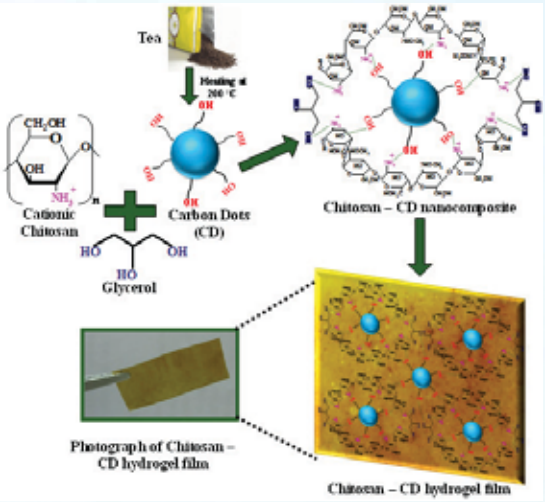


Figure 3. Graphical representation of the Chitosan-carbon dot nanocomposite film with improved properties.

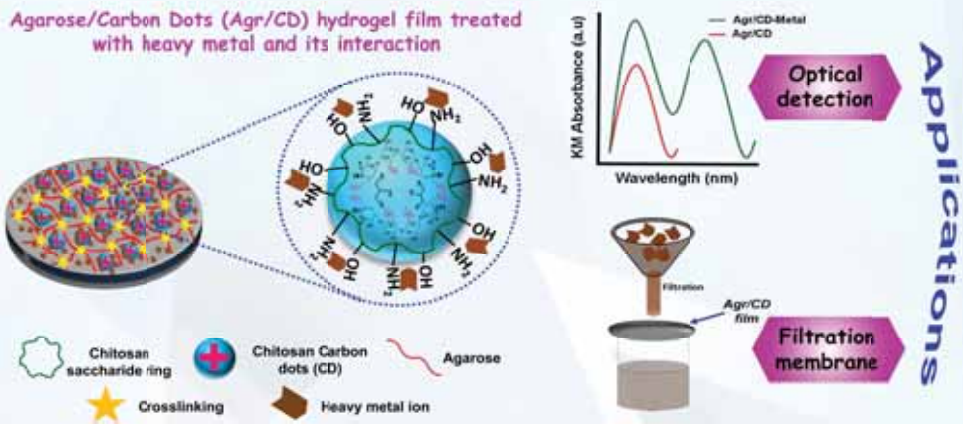


Figure 4: Schematic representation of the idea of fabricating solid sensing film as an efficient filteration membrane for separation of quintet heavy metal ions.

Material Nanochemistry Laboratory endeavors to develop a comprehensive chemical methodology leading to a systematic bottom-up fabrication of nanoscale devices for various applications in food, health, energy, and diagnostics.

Dr. Arup Ratan Pal

Plasma Nanotech laboratory

Plasma synthesis of nanomaterials for electronic, optoelectronic and bio-electronic devices

Our research at Plasma Nanotech laboratory is focused on the synthesis of nanomaterials by plasma based processes with the specific aim of material synthesis suitable for advanced electronic, optoelectronic and bio-electronic devices. We develop thin/ultrathin films of conducting polymer, nanocomposites of conducting polymers with metal/metal oxide nanoparticles and with some inorganic nanocrystals by solvent free as well as water free plasma based processes, in significantly less numbers of process steps. We are also working on preparing carbon nanomaterials e.g. nanofibers, nanotubes and graphene at low temperatures suitable for fabrication of electronic and optoelectronic devices. In the device development area we mainly work on fabrication of flexible Organic and Hybrid photodetectors and solar cells using the nanomaterials developed by plasma processes.

We accomplished development of a suite of versatile plasma based methods for direct growth of vertically aligned multi-walled carbon nanotubes (MWCNTs) and MWCNT based hybrid composites on transparent conducting oxide (TCO) substrates. By using a pulsed dc PECVD technique, short length vertically aligned MWCNTs are grown at 450 °C. The MWCNTs are uniformly distributed on TCO substrates with an average diameter and length of 49 ± 9 nm and 208 ± 26 nm, respectively. The growth parameters are carefully refined to balance the tube dimension and density. Efforts have been made to synthesize MWCNTs based hybrid composites. The as-fabricated MWCNT based hybrid composite is then utilized to show its applicability in a self-powered hybrid photodetector (Figure 1). The photodetector shows an enhanced photo-response at a very low incident power density of ~ 5.5 μWcm^{-2}. Utilization of a completely dry route for the synthesis and fabrication of MWCNT based hybrid composites emerge as a successful strategy suitable for hybrid nanocomposite material based advanced devices.

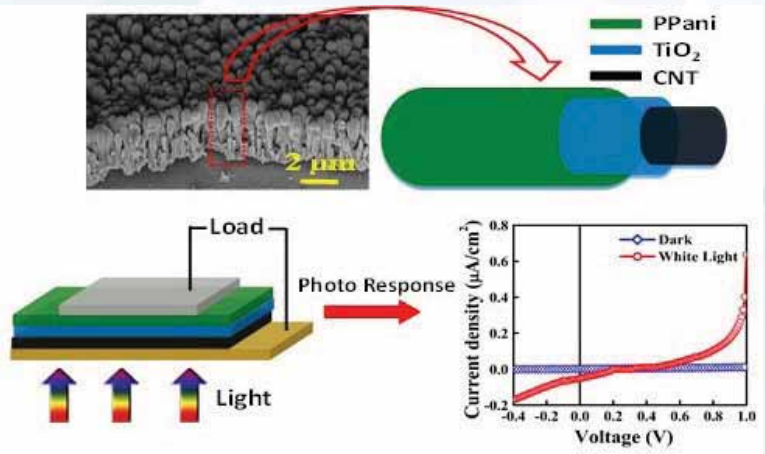


Figure 1: MWCNT based hybrid photodetector

Plasma Nanotech laboratory is also working on the synthesis of a polyaniline (PAni)-gold nanoparticle (AuNP) composite thin film in a single step plasma based process. A flexible high-performance visible

photodetector is fabricated using PAni−AuNP composite with low loading of AuNP, and optoelectronic properties of the photodetector device are evaluated. The photodetector shows high sensitivity to visible light (Figure 2) and exhibited short response and recovery times (180 ms and 193 ms, respectively), enhanced photosensitivity (1×10^2), high photoconductive gain (5.092×10^2), high responsivity ($2.547 \times 10^2\ AW^{-1}$), and very high detectivity (2.60×10^{14} Jones). The merits of the present processing and device are (i) less time-consuming single-step solvent-free and water-free fabrication process, (ii) polymer based plasmonic device with high stability in ambient conditions, (iii) flexible architecture, and (iv) good responsivity and speed, as well as very high detectivity. The present study demonstrates that a plasmonic hybrid nanocomposite prepared by a single-step novel plasma based dry process could solve the low lifetime and performance-related issues of organic optoelectronic devices.

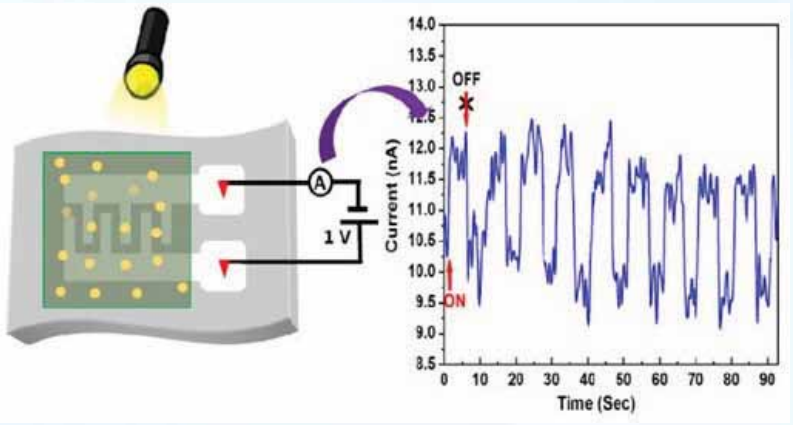


Figure 2: Plasmonic photodetector based on PAni-AuNP composite

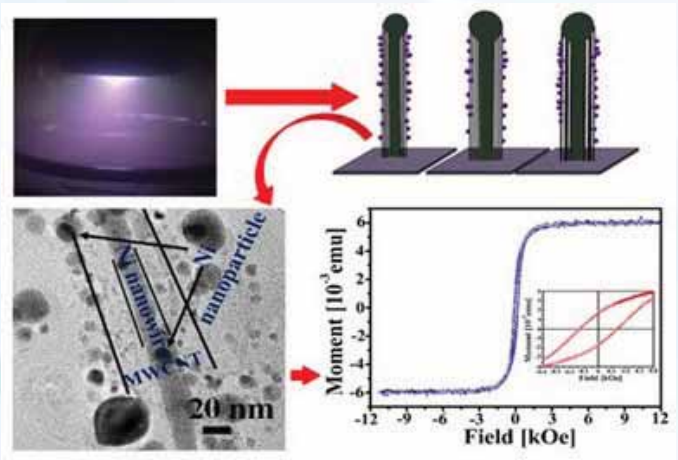


Figure 3: Graphical representation of Ni filled and decorated MWCNTs and their magnetic properties

Lastly we report a single step approach for synthesis of multi-walled carbon nanotubes filled with Ni nanowires (Ni-MWCNTs) and decorated with Ni nanoparticles as illustrated in figure 3. The MWCNTs are grown by a PECVD-sputtering hybrid process at low temperature of 450 °C having average diameter of 55 ± 6 nm and length of 1.35 ± 0.08 µm. Ni films of thickness 10 nm has been used, which acts as catalyst as well as source material for filling of MWCNTs with Ni nanowires, whereas sputtering of Ni is the source of

decorated Ni particles. This process facilitates the growth of aligned MWCNTs filled with Ni nanowires and also decorated with Ni nanoparticles onto the walls. Magnetic properties of the Ni filled and decorated MWCNTs are measured using vibrating sample magnetometer. Magnetic hysteresis study of Ni containing MWCNTs reveals ferromagnetic behavior of the nanotubes. These Ni-MWCNTs shows coercivity of 135 Oe, which is significantly greater than that of the bulk Ni at room temperature. The coercivity of as grown MWCNTs is found to be dependent on the size and content of Ni. Thus, a novel method has been demonstrated for the synthesis of ferromagnetic Ni-MWCNT. Carbon nanotubes thus obtained by this method are filled with short Ni nanowires (Diameter: 20.98 nm, Length: 213.21 nm) as well as decorated with Ni nanoparticles (which are enclosed within graphitic shells). This makes them a potential candidate for application in data storage, sensors of magnetic force microscopy, electromagnetic and microwave absorption, and biomedical applications e.g. medical diagnostics and targeted drug delivery.

Dr. Sarathi Kundu

Soft-Nano Laboratory

Experimental Soft Matter Physics including Nanomaterials and Biomaterials

Structures, patterns and related properties of organic molecules, biomolecules, polymers, nanoparticles, etc. at the air-water and air-solid interfaces have been studied to explore interesting physicochemical properties. Interactions among protein molecules in bulk have also been investigated. X-ray and neutron scattering techniques together with microscopic and spectroscopic methods are used to investigate such behaviours.

Adsorption and conformation variation of globular protein bovine serum albumin (BSA) on the surfaces of different sized gold nanoparticle Langmuir-Blodgett (LB) films have been studied by using atomic force microscopy, UV-Vis and FTIR spectroscopy. Films of Au nanoparticles of different sizes were prepared on the quartz substrates by the LB method. Our study reveals that the protein adsorption increases on the nanoparticle coverd quartz surfaces with the increase of the nanoparticle size. Moreover, modifications in the secondary conformations of the adsorbed protein occur on the surfaces of the nanoparticles in comparison with the bare quartz surface. Interparticle gap area and gap volume dependent protein adsorption and conformation variation have been proposed.

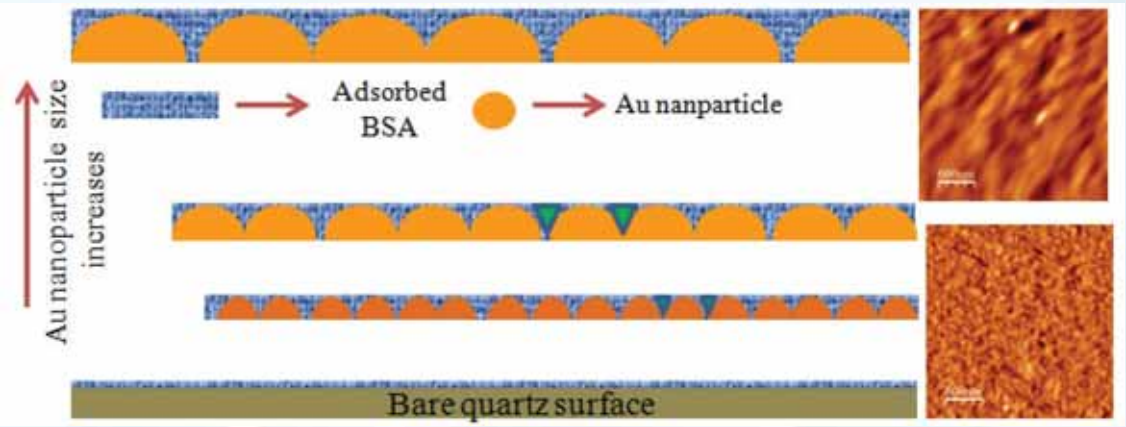


Figure 1: Cartoon shows the different amount of BSA adsorption on the bare and nanoparticle covered quartz surfaces. On the planer bare quartz surface, BSA adsorption (shown by blue region) is small, whereas on the Au nanoparticle covered surfaces (shown by yellow hemispheres) adsorption amounts are more. Right panel: AFM image of BSA covered nanoparticle film (top) and film of Au nanopaticle without BSA adsorption (bottom).

Bovine serum albumin shows a short-range attraction and a long-range electrostatic repulsion among them and these interactions are modified depending upon the solution pD and different dissolved counterions in the solution. Small angle neutron scattering study shows that for equal mono-valent (Na^{+}) and di-valent (Ni^{2+}) ion concentrations, both the attractive and repulsive interaction decreases with lowering the solution pD towards the protein isoelectric point, however for the tri-valent (Fe^{3+}) ion attractive interaction increases and repulsive interaction decreases. Interaction variation for the equal ionic strength of the three different valent ions

becomes prominent as the pD decreases towards the isoelectric point.

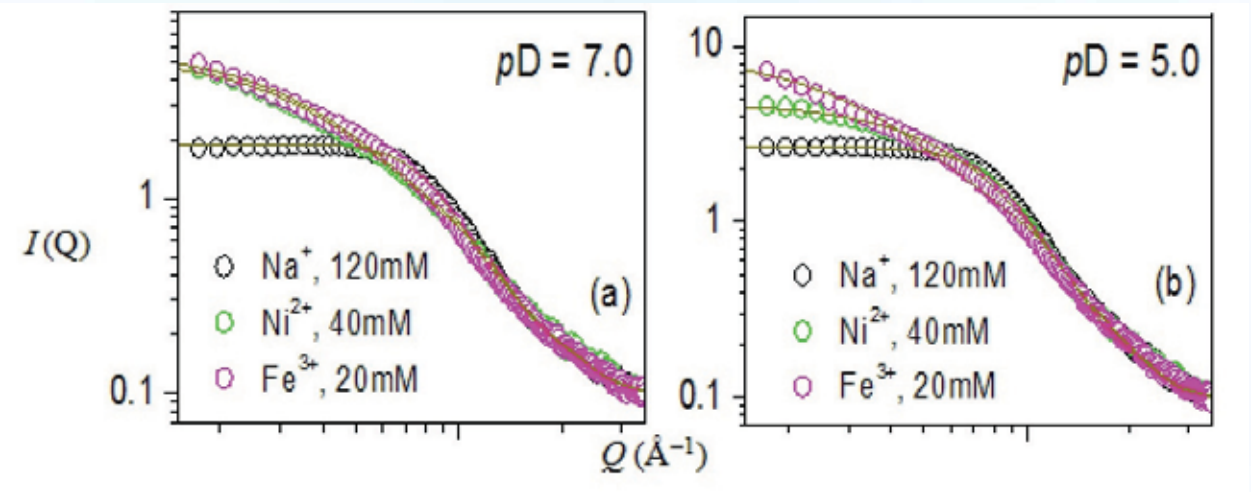


Figure 2: SANS data (open circle) and fitted curves (solid line) for 10 wt% BSA in aqueous solution in presence of salts having equal ionic strength, i.e., 120, 40 and 20 mM NaCl, $NiCl_2$ and $FeCl_3$ respectively at pD ≈ 7.0 and ≈ 5.0.

Interaction behaviors among lysozyme proteins in solution have also been identified using small angle neutron scattering technique which can be modified depending upon the protein concentration, solution pD, solution temperature etc. Presence of salt again modifies the attractive and repulsive interactions among both the heat treated and unheated lysozyme molecules.

Dr. Munima B Sahariah

Computational and Numerical Laboratory

functional properies of Heusler alloys and transport properties in low dimensional systems

One way of probing materials at the atomic and electronic level is to do mathematical modelling of the various interactions in the system and then solve the associated equations to simulate the properties of interest. If the system is large in terms of the number of molecules or atoms or electrons, the equations are solved numerically with the help of computers. Based on the specific problem, the modelling may be empirical, semi empirical or ab initio (i.e. from the definition of electronic structure). The computational materials science group at IASST is studying some basic properties and phenomena of condensed matter systems like alloys and low dimensional interfaces using empirical molecular dynamics as well as ab initio Density Functional Theory.

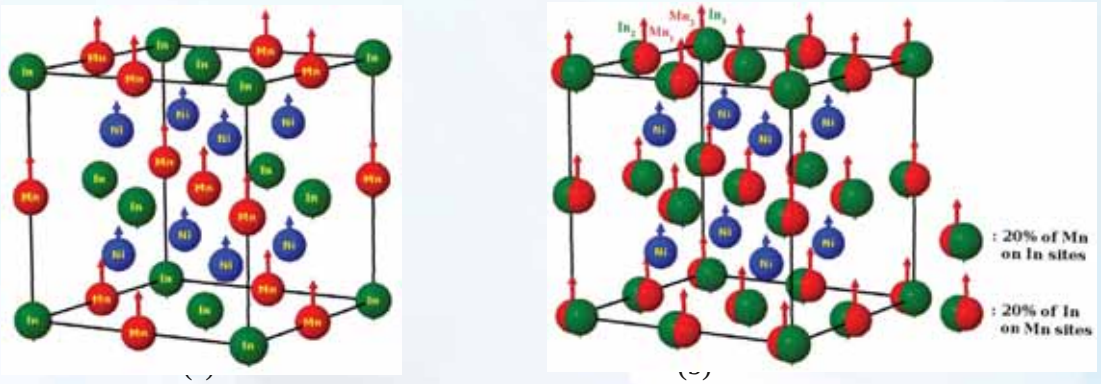
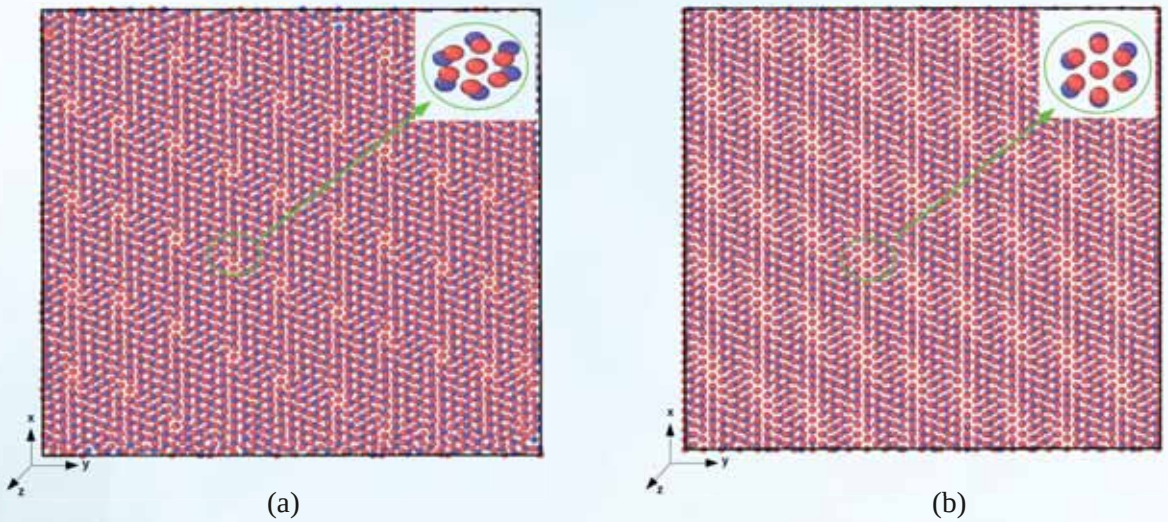


Figure 1: Structural representation of Ni-Mn-In in (a) ordered phase and (b) disordered phase with 20% of antisite disorder amongst Mn and In. The arrows represent calculated magnetic moments qualitatively.

One primary interest of this group is to understand the diversing properties of a particular class of alloys known as Heusler alloys. Depending on the composition and stoichiometry of the system, these alloy materials exhibit many interesting properties like magnetic shape memory effect, magnetocaloric effect, half metallicity etc. Out of these, we focus on the first two properties through two ongoing PhD programmes. In last one year, one promising magnetic shape memory alloy Ni2FeGa has been investigated to understand the electron-phonon coupling phenomenon in the system. This coupling was found to be significantly strong which further supports the observed one to one correlation between phonon softening (dynamical instability) and fermi nesting features in the system. Parallel to this work, another heusler alloy Ni2MnIn, which is well known for its high magnetocaloric effect was taken up for study to explore the variation of its electronic and magnetic properties with the variation of its disorder , both of chemical and ani-site type. Figure 1 shows the ordered as well as one representative disordered phase of the Ni-Mn-In system. Long term goal of this work is to dope the system with a fourth element and explore the possibility of enhancing the efficiency of the alloy as a magnetocaloric material to be used in cooling syetms.



(a) (b)

Figure 2: Topology of the interfacial Cu {111} plane & Nb {110} plane (a) before and (b) after relaxation. One can see the twisting of neighbouring interfacial atoms around coincident lattice points that occurs during relaxation. Inplane displacement of the interfacial Copper atoms are larger than the interfacial Niobiun atoms as indicated by this figure. (Atoms are Coloured as : salmon = Cu, blue = Nb).

During the last one year, we have also started working on low dimensional systems. This is an effort to contribute towards one of the institutional goals to build up a common project on low dimensional systems. One Ph.D programme has already started under this broader goal. The specific problem is to understand the role of interfaces in multilayer nanocomposites to annihilate radiation induced defects. Such layered structures with inherent 'self healing mechanism' has wide application in next generation nuclear reactors requiring materials with high level of stability even under extreme environmental conditions. Our system consists of Cu and Nb layers. Figure 2 shows a Cu-Nb interface which has been relaxed through atomistic modeling. This relaxed structure will be used for computing the mechanical stability and also the transport behaviour of defects in the vicinity of the interface.

Within the framework of the same institutional project, in last one year, a collaborative work has been built up with Dr. Arup Ratan pal from IASST and Prof. Ravindra Pandey from Michigan Tech University, USA. Dr. Pal's group at IASST is working on organic-inorganic hybrid flexible devices. One such hybrid device has been synthesized with the nanocomposite of Plasma polymerised polyaniline (P-PAni) and TiO2. Our approach was to understand the basic interaction of TiO2 molecules with PAni and observe the changes in the bandgap of the composite system when TiO2 is introduced at different sites of PAni. One PhD student Mr. C. Satyananda from our group visited Michigan Tech University(MTU) in last summer and initiated this work in MTU under the guidance of Prof. Pandey. We plan to carry forward this work for a stronger bonding between theory and experiment at IASST.

Dr. Sagar Sharma

DST-INSPIRE Faculty

Novel organic electronic materials, Conductive oligomers/polymers,
Main group organometallic compounds

The area of organic electronics has been one of the fast developing fields of material science. Organic semiconductors have the potential to offer smart technologies/electronics leading to low-cost, flexible and large area devices which is possible due to their mechanical flexibility and low temperature processing. Rational design and synthesis of new organic semiconductor materials has been an important facet for the evolution of next-generation optoelectronic devices.

Organic electronics group at IASST focusses on the advanced materials with special attention to organic semiconducting materials. Our research approach is utilization of modern computational chemistry tools as well as synthetic routes to design new class of organic semiconductors with desired properties. This approach will result in identifying novel electronic materials of both p-type (or hole-transporting) as well as n-type (or electron-transporting) nature.

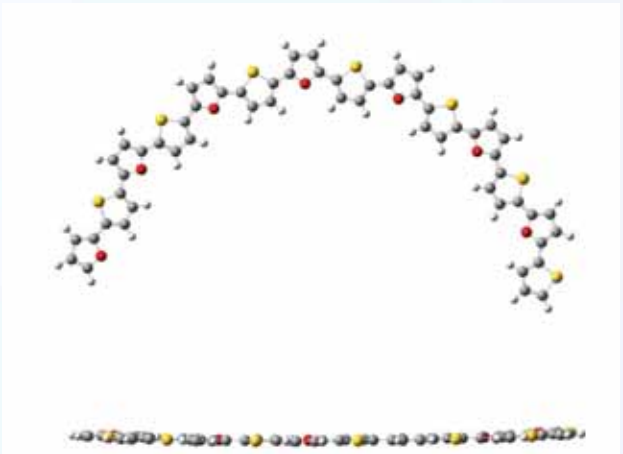


Figure 1: B3LYP/6-31G(d) optimized molecular geometry of $(FT)_7$. The top structure shows the normal view of $(FT)_7$ and the bottom structure shows the side view, depicting its planarity. (color code; C-black, O-red, S-yellow, H-ivory white)

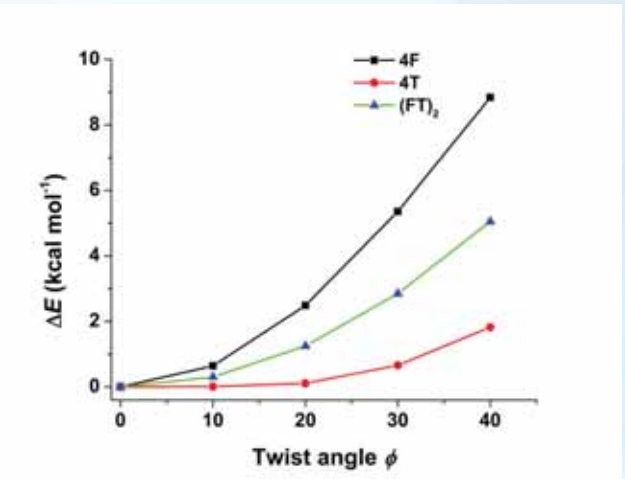


Figure 2: Total twisting energy versus inter-ring twist angle (φ) for 4F, 4T and $(FT)_2$.

Oligothiophenes (nT) which are primarily p-type materials have been the workhorse in the area of organic semiconductors, while the chemistry of their oligofurans (nF) congeners is still infancy. Both classes of compounds have their own advantages in terms of different properties, such as solubility, stability, structural rigidity etc. In the search of new class of compounds which can exhibit the best of desired properties and thus to gain insight into it, we explored mixed oligofuran-thiophene $(FT)_m$ (where m=n/2) counterparts of varied

chain lengths at B3LYP/6-31G(d) level of theory (Figure 1). They are found to exhibit planar geometry with intermediate band gaps between oligofurans and oligothiophenes. For instance, the band gap of 6F, 6T and $(FT)_3$ are 2.99 eV, 2.62 and 2.77 eV, respectively. An analysis of twisting potential of $(FT)_2$ unveiled their structural rigidity, that was much higher than that of thiophenes (Figure 2). Thus, these compounds in principle possess intermediate properties of nF and nT, including rigid and planar structure like nF, lower band gap similar to nT. The bent structure of higher analogs of these compounds (Figure 1) indicates their plausible suitability as precursors to get access to cyclic systems containing alternate furan and thiophenes. Further studies are being undertaken to delineate other important properties of these mixed systems.

Another system of our interest includes π-conjugated organic compounds that can act as n-type materials. We are currently exploring with computational studies different types of known acceptor moieties to synthetize new, better n-type acceptors. The goal of the current studies is to evaluate the charge mobility of these compounds for their applicability as n-type organic semiconductors which will be further complemented by the synthesis of the considered compounds to examine and study the proof of the concept of the proposed properties.

MATHEMATICAL AND COMPUTATIONAL SCIENCES

....Strong theoretical background is necessary for the formulation of an appropriate mathematical model. The earlier Mathematical Sciences Division was established with the objective to have some basic research as well as applied research, which includes database research related to the problems arising time to time in the North-East region of the country. The Mathematical and Computational Sciences programme aims not only on the modelling and computational aspects of the programmes but also introduces different new notions, techniques and methods. The focused area of investigation are functional analysis, topology, stochastic process, image processing of medical data, fuzzy set and its applications. ....

Prof. Binod Chandra Tripathy

Programme Head, Mathematical and Computational Sciences
Mathematical Sciences

Sequence Spaces, Functional Analysis, Summability Theory,
Fuzzy Set Theory, Topology, Soft Sets.

Research in our group encompasses topics like Sequence spaces, Series and Summability theory, Topology, Fuzzy Set Theory and its applications.

As for Sequence spaces, Series and Summability theory, difference triple sequences has been introduced and their different properties with respect to probabilistic norm have been investigated. In a probabilistic normed space (PN-space), the norm of vectors are represented by probability distribution functions rather than a positive number. The notion of convergent difference triple sequences in a PN-space with probabilistic norm N has been introduced as follows.

The difference triple sequence $x = (\Delta x_{nlk})$ is said to be convergent to $L \in X$ for every $\varepsilon > 0$ and $\lambda \in (0,1) > 0$, there is a positive integer k_o such that $N_{\Delta x_{nlk}-L}(\varepsilon) > 1-\lambda$ whenever $n \geq k_o$, $l \geq k_o$, $k \geq k_o$, where $\Delta x_{nlk} = x_{nlk} - x_{n,l+1,k} - x_{n,l,k+1} + x_{n,l+1,k+1} - x_{n+1,l,k} + x_{n+1,l+1,k} + x_{n+1,l,k+1} - x_{n+1,l+1,k+1}$, for all natural numbers n, k, l. The Decomposition theorem for statistically convergent and statistically Cauchy sequences in PN-space have been established.

In case of a chemical reaction, the catalysts are used either to accelerate the chemical reaction or to retard a chemical reaction. In sequence spaces, the multiplier sequences too play a similar role. The notion of paranormed ideal convergent double sequence spaces associated with multiplier sequences have been introduced. The multiplier problem has been established. It is shown that these sequence spaces are neither solid nor monotone nor symmetric nor sequence algebra in general. Cone metric space are getting popularity in different branches of science due to the situation, where the usual metric fails and its applications. The notion of statically convergent and statistically Cauchy sequences in a cone metric space have been introduced and their different algebraic and topological properties have been investigated.

The spectral theory is an important area of research due to its potential applications in different branches of science and technology. The spectra of different matrix operators transforming between two classes of sequences, not necessary same have been investigated. The matrices chosen are either lower triangular or upper triangular. In this context, the spectral properties of the bi-diagonal matrix operator $D(r,0,0,s)$ over the sequence spaces l_ρ and $b\nu_p$ and the Rhaly operator on the sequence space $\overline{b\nu_o} \cap l_\infty$ have been investigated.

In topology, after the introduction of point set topology, different topological concepts and properties have successfully been applied for investigations in almost all the branches of science and technology, whether it is physical science or life science. It is applied for studying the clustering of the atoms. The notion of ideals have successfully been applied in studying different properties of topological spaces. Sometimes it becomes essential to study some properties from the point of view of more than one aspect, for such situation, we require different methods of measurement, well known concept called as pairwise. Bitopological spaces includes and has developed such type of ideas and methods for investigation. The research group has

introduced the notion of the generalized b-closed sets in Ideal bitopological spaces and some of their properties have been studied. The notion of (γ, δ)-bitopological semi-closed set via topological ideal have been introduced and its different properties have been investigated.

Another focus of our research is on Fuzzy Set Theory and its applications. The notion of fuzzy set theory have successfully been applied for investigations in almost all the branches of science and technology. Lotfi A. Zadeh, who introduced fuzzy set theory felt that traditional system analysis techniques were too precise for many complex real life problems. The idea of grade of membership, which is the backbone of fuzzy set theory, struck to his mind. Below we discuss briefly the application of fuzzy set theory on fixed point theory, on sequence space and on fuzzy topology.

Fixed point theory is an interactive method of finding the solution of a problem. It is observed that all iterative methods may not converge to a point or element of the universal set. Under certain conditions, which is well known as the contraction mapping, this criteria is generally satisfied. When iterative methods are not deterministic, it becomes difficult to find the solution for such methods. The notion of fuzzy set has helped a lot in finding a solution of the iterative method which is not deterministic. During the course of our investigation, some results on fixed point theory in a generalized fuzzy metric space have been investigated.

The class of lacunary p-absolutely summable fuzzy real-valued double sequence spaces have been introduced and its properties have been studied. The notion of pointwise statistical convergence of order alpha of sequences of fuzzy mappings have been introduced and its different properties have been investigated. Statistically pre-Cauchy fuzzy real-valued sequences defined by Orlicz function and the class of fuzzy sequences related to the l_ρ -space defined by Orlicz function have been studied. Some classes of generalized difference sequences related to l_ρ-space in n-normed space have been introduced and their properties have been studied. In studying these classes of sequences, the elements have been chosen from the fuzzy sets but the metric used for studying the properties are of crisp set type metric. Some of the properties of the classes of convergent, bounded and null sequences of fuzzy real numbers have been investigated using fuzzy metric.

The concept of mixed convergence of sequences in a linear space X equipped with two norms can be extended to a linear space $X$with two topologies. Let (X, τ_1) and (X, τ_2) be two fuzzy topological spaces. Consider the collection of fuzzy sets$\tau_1(\tau_2)$ = {$A \in I^X$: for any fuzzy set B in X with A_qB , there exists τ_2-open set A_1 such that $A_{1q}B$ and τ_1-closure $\overline{A_1} \subseteq A$}. Then this family of fuzzy sets form a fuzzy topology on X and the space $(X, \tau_1(\tau_2))$ is called mixed fuzzy topological space. The notion of δ -continuity in mixed fuzzy topological spaces have been introduced and its different properties have been studied. The notion of weakly continuous functions on mixed fuzzy topological spaces have been studied and its properties have been examined.

Dr. Gautam Choudhury

Mathematical Sciences

Queues with Vacation Models, Retrial Queueing Models, Control of Queues related to Optimization Problems.

Queueing theory is a branch of Stochastic Modelling , which falls under the umbrella of Stochastic Process. In this context, some important investigations have been made on Retrial Queueing Models and Vacation models related Control operating policy. These models have potential applications to Industrial Engineering, Digital Communication Systems and Tale Communication Systems.

Retrial queues are characterized by the feature that a customer who finds the server busy upon arrival is obliged to leave the service area to repeat his demand after some random amount of time called retrial time. Between trials, the blocked customer joins a pool of unsatisfied group of customers called “orbit” or “retrial group”. The pioneering studies of retrial queues are to present the concept of retrial time as an alternative to the classical model of telephone systems. There are several retrial policies studied by various researchers all over the world. However we are concerned about constant retrial policy which arises naturally in problems where the server is required to search for customers in communication protocols of type Carrier Sense Multiple Access (CSMA). This retrial policy was introduced by G.Fayolle [#Teletraffic Analysis and Computer Performance Evaluation, , Elsevier, Amsterdam, (1986),pp 245–25328#], who investigated an $M/M/1$ retrial queue in which only the customers in the head of the orbit queue can request a service after an exponentially distributed retrial time with some parameter ε (say) i.e. retrial rate is $(1-\delta_{0,n})\,\varepsilon$ (where $\delta i,j$ denotes Kronecker’s delta), when number of units in the orbit is ‘n’. K.Farahmand [# Queueing Systems 6 (1990) 223–228. #] called this discipline a retrial queue with FCFS orbit. Later, A. Gomez-Corral [# Naval Research Logistic 46 (1999) 561–581 #] discussed extensively a $M/G/1$ retrial queue with FCFS discipline and general retrial times. In this context, we have made extensive study of a $M/G/1$ retrial queueing system with Bernoulli vacation schedule and general retrial times for unreliable server in which concept of delay period is also introduced. Our investigation includes joint distribution of number in the orbit and state of the server, system size distribution at the departure epoch, stochastic decomposition property and some system performance measures along with reliability indices. Finally a real world application with the cost effectiveness maximizing model is also discussed.

The second investigation is on control of queues related to vacation models. Control of queues related to vacation models, where server remains unavailable during some occasional interval of time is one of the most significant area of research. It is customary to classify models into two general categories: descriptive and prescriptive models. Descriptive models are models which describe some current real world situation, while prescriptive models are models which prescribe what real world situation should be, that is, optimal behavior at which to aim.

The determination of an optimal policy for a queueing system is an important issue. This is usually done by developing the total expected cost function per unit time for the system and then deriving the relevant optimal system parameters. In this context we have studied complete analysis including the optimization problem of an optimal policy for an unreliable service system. Most of the investigations have been done in collaboration with the scientists from other institutions viz. Prof. L.Tadj, Farleigh Dickinson University, Canada and Prof. J.C.Ke, National Taichung Institute ofTechnology, Taiwan, Republic of China.

Dr. Lipi B. Mahanta

Numerical Sciences

Image processing and pattern recognition

Use of computers for assessment of medical data pertaining to diagnosis of cancer is growing rapidly. Just as early and accurate detection of malignancy is important, so is the time and economic feasibility for diagnosis. The group aims to develop a Decision Support System (DSS) keeping in view all the said. Several areas and modalities are being studied. Two important aspects must stay in focus while designing any such model. Firstly, morphological and texture features extracted from an image are a base for this type of DSS and secondly, quantitative method will only be efficient if research is being done on indigenous data.

In the area of Ca.Cervix, Papsmear images were analysed. Two main types of studies, viz. Channel Identification and Segmentation were carried out. In segmentation techniques Otsu Thresholding, Entropy Thresholding, K-Mean Clustering and Fuzzy C – Mean were carried out (Figure 1). The accuracies achieved for 78.5%, 84% and 92.1% for Otsu Thresholding, Entropy Thresholding and Fuzzy C – Mean respectively. K-Mean Clustering was not found to be appropriate as along with the nucleus some cytoplasm portion will also appear in the segmented image.

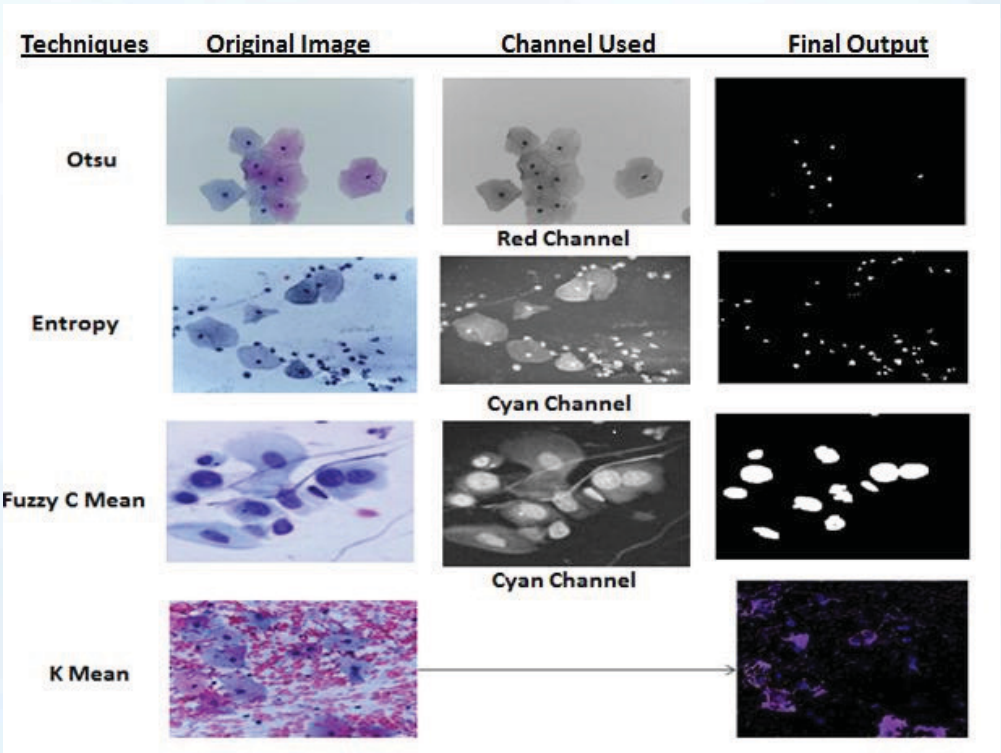
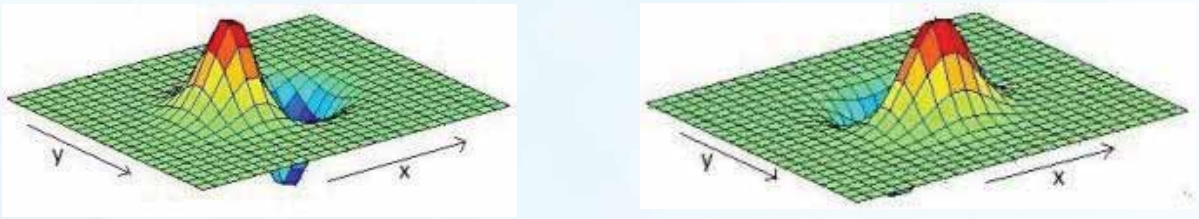


Figure 1. Segmentation by the 4 methods.

In Ca.lung, Computed tomography (CT) images were analysed. While handling lung cancer each type of lung cancer exhibits different kind of feature. Detection of these different features needs segmentation of different region of interests. This is done with the help of a technique commonly known as wavelet transform modulus

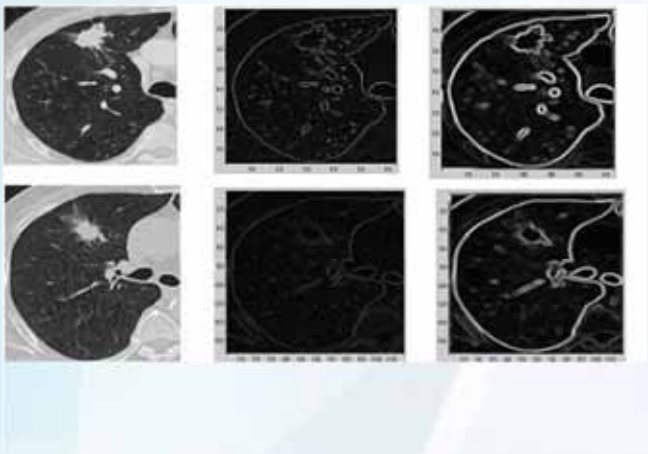
maxima (WTMM). Initially the image is smoothed with a convolution kernel θ(x). This kernel is calculated by taking derivatives convolution kernel with respect to x and y. Convolution kernel θ is well localized (x = y = 0) and is an isotropic function. In our analysis we are taking θ as Gaussian function. First-order analysing wavelet $\Psi^{1,2}$ obtained from Gaussian function are shown below in Figure 2.



(a) (b)

Figure 2 . First-order analysing wavelet obtained from Gaussian function (a) Ψ^1 *(b)* Ψ^2

We consider a function $(x, y) \in L^2(R)$. Its wavelet transform with respect to Ψ^1 and Ψ^2 can be expressed as: $T_\psi[f](b,a) = \nabla\{\Theta_{b,a^*} f\}$. The scale is given by b and translation value is given by a. The Modulus *M* and Argument *A* of the wavelet transform is given by $T_\Psi[f](b,a) = (M_\Psi[f](b,a), A_\Psi[f](b,a))$. By considering Modulus and arguments we get the following results (Figure 3) while segmenting out edges:



Original Image Fine scale edge Coarse Scale edge

Figure 3. Boundary segmentation at different scales

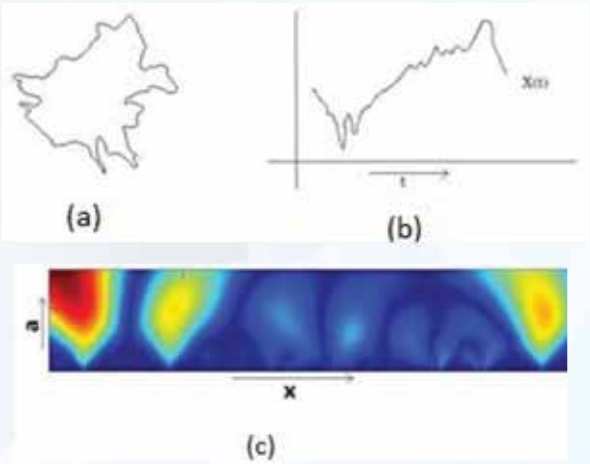


Figure 4: (a) Tumour (b) its representation (c) heat map of modulus at various scales

The malignant tumours have the property that their boundary is not smooth, they are spiculated and irregular. If we consider a tumour shown in figure-4(a) then its x-variation signature is shown in Figure 4(b). The analysis of heat map shows characteristic difference for smooth shapes, spiculated and ragged shapes as shown in Figure 4(c).

In Ca.Breast, mammogram images were analysed. An experiment was carried out to enhance the image quality so as to improve the detection accuracy of the pattern recognition phase to be used later in the system. Here two techniques, viz. Unsharp Masking and CLAHE have been used. Histogram Equalization and Adaptive Histogram Equalization was not tested as CLAHE is the enhanced version of these two. The images collected from Ayursundra was used for the test. Among the two techniques used, it was found that CLAHE

performed better than unsharp masking as shown in Figure 5.

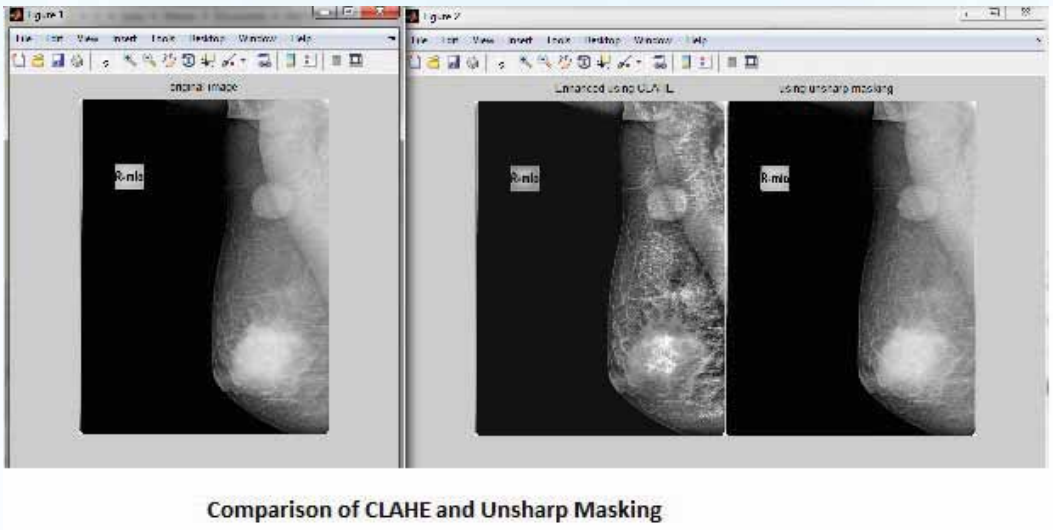


Figure 5. Snapshots from MATLAB of enhanced images using CLAHE and unsharp masking

Further, an experiment was carried out to segment out the regions of interest from the mammogram images. Thresholding technique has been used to perform this operation. First the image is thresholded using Otsu method. Then the resultant image was again thresholded globally using the maximum intensity value of the resultant image as the threshold. This test was performed on both the original image and the enhanced image (CLAHE), as shown in Figure 6. It was observed that for most of the images, segmentation result of enhanced images is better than the original images.

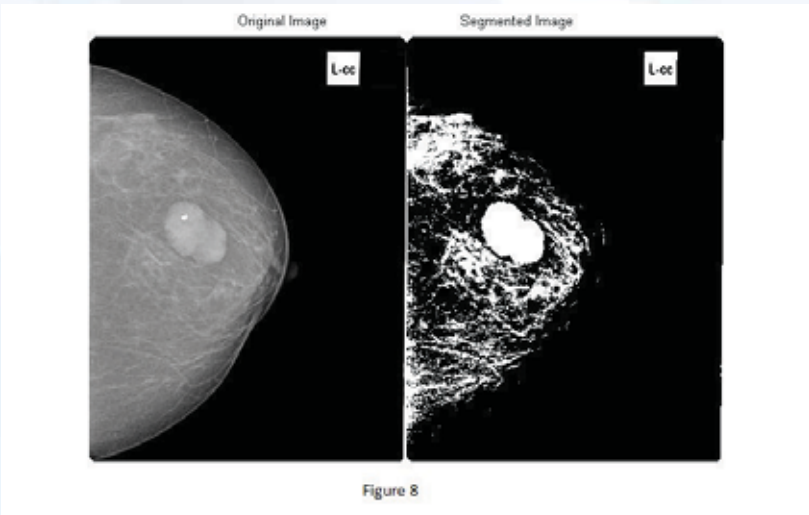


Figure 6. Snapshots from MATLAB of segmented ROI from original and enhanced image

BIO-DIVERSITY AND ECO-SYSTEM RESEARCH

.... An ecosystem is composed of diverse microscopic and macroscopic life forms which interact among themselves and with their environments. Research and development under this programme explore and characterize microbial and faunal diversity in rivers and wetlands, undisturbed forests, oil polluted soil, jhum agro ecosystem of North East India. Microbial consortia of whole cells and microbial bioactive metabolites/compounds are expected outcome of this programme for application in healthcare, production of bioethanol from biomass, fragrant industry through biotechnology, bioremediation of disturbed/polluted ecosystems and also for use as organic inputs.

Diversity and dynamics of microbiota in guts of individuals of ethnic community of the region and also in interiors of high value crops are important research component under this programme directed towards understanding role of microorganisms in human and plant health. .....

Dr. Dipali Devi

Silkworm diversity, silkworm disease, pesticides effects on silkworm, silk biomaterials.

Research areas of this laboratory include the diversity of silkworms from North East India, diseases in muga silkworm, effects of pesticides on Eri Silkworm and Non-mulberry silk biomaterial for tissue engineering and biomedical applications.

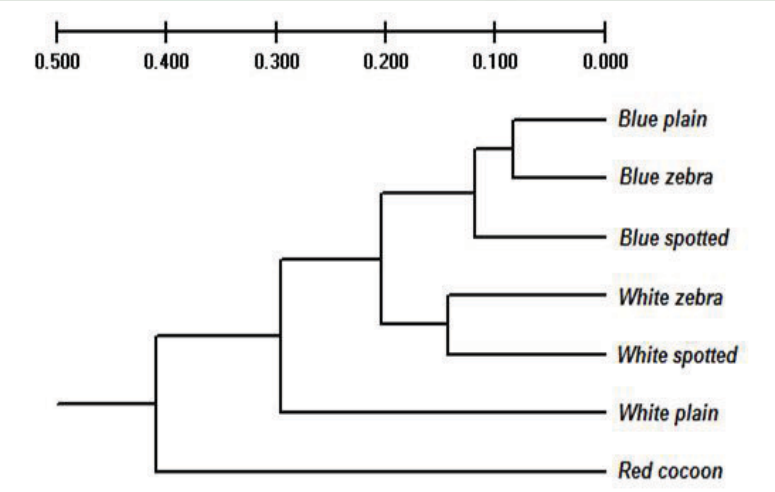


Figure 1: Dendrogram representing the phylogenetic relationships among seven morphs of eri silkworm based on RAPD markers generated by UPGMA analysis.

Earlier we reported diverse forms of muga silkworm *Antheraea assamensis* in Assam. During the year 2014-15 we explored the diversity of eri silk worm (*Philosamia ricini*) population. Seven morphs namely white plain, white zebra, white spotted, blue plain, blue zebra, blue spotted and red cocoon of eri silkworm have been obtained from the total population of our study. This grouping was based on phenotypic characters. The genetic variation and phylogenetic relationship of these morphs have been analyzed using RAPD and mitochondrial genes i.e 12S rRNA, Cyt b (Accession no. 12S rRNA- KM205044 – KM205050 and Cytb KM205051- KM205057). Genetic divergence was found to be low among the morphs of eri silkworm based on the UPGMA cluster analysis (Figure 1). The different morphs were found to form three groups, first group included blue plain, blue zebra and blue spotted morphs, the second group comprised of white spotted, white zebra and the white plain morphs and the red cocoon morph formed a separate cluster. Red cocoon morph appeared to be very distinct genetically and highly divergent from the other six morphs. The data provides information for designing breeding program for improvement and conservation of eri silkworm.

In another study we found that the Flacherie disease of insects including muga silkworm (*Antheraea assamensis*, Helfer) is associated with pathogenic bacteria. Bacteria from the gut of the diseased muga silkworm were isolated, characterized and assessed for their pathogenecity on muga silkworm. Five bacterial isolates of diseased silkworm gut were identified based on 16S rRNA gene sequencing as *Pseudomonas aeruginosa* strain DRK1, *Ornithinibacillus bavariensis* strain DRK2, *Achromobacter xylosoxidans* strain KH3, *Staphylococcus aureus* strain FLG1, *Bacillus thurengiensis* strain MK1 (Accession no.- KP688067, KR231663, KR231661, KR025521, KR069143 respectively). These bacterial strains were screened for pathogenecity based on survivality / mortality of the worm on inoculation with the culture of the above strains.

FLG1, DRK1 and MK1 were found to induce the disease. Lethal concentrations of these strains for pathogenecity were also recorded at various time intervals. Combined inoculation of the strain MK1 and DRK1 was found to be more lethal (Figure 2).

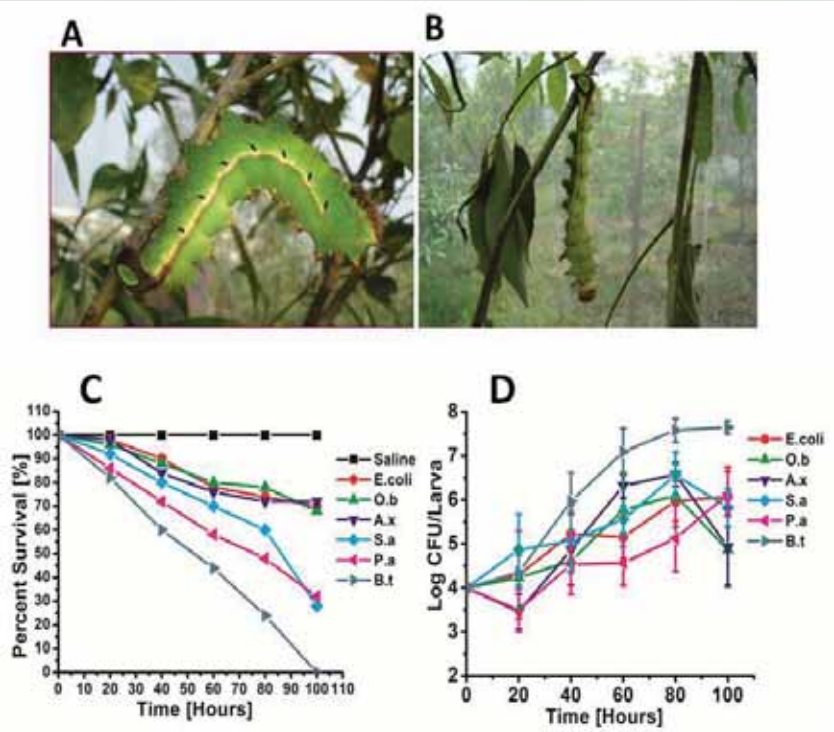
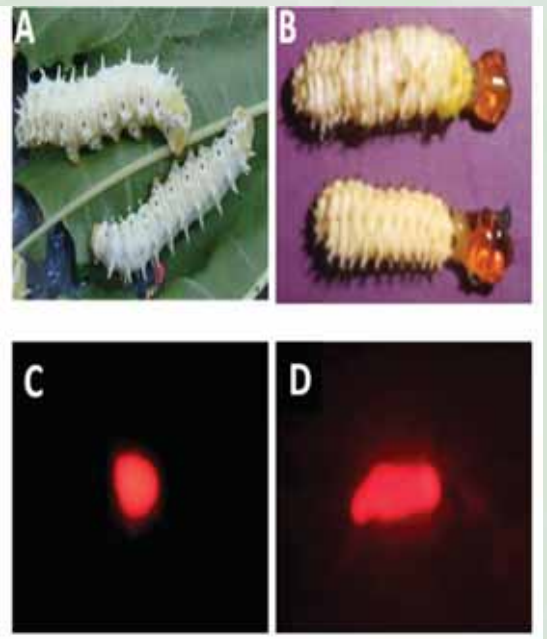


Figure 2: (A) 5th instar healthy Muga Silkworm (B) Flacherie diseased Muga Silkworm (C) Survival analysis of silkworm after inoculation of 104 cells in 1 ml of bacterial culture and (D) CFU/ml value of injected bacterial isolates was calculated in logarithmic scale at different time intervals.

Note:
O.b- Ornithinibacillus bavariensis
A.x- Achromobacter xylosoxidans
S.a- Staphylococcus aureus
B.t- Bacillus thurengiensis

Among different types of silk, eri silk production is highest in Assam (2812.5 Mt in 2012) and eri rearing is a peripheral activity of households scattered around the state. The host plant (Castor, *Ricinus communis*) quality and pesticide contamination is likely to affect eri silk production. Although, average pesticide use in North East India is less (21g/Ha) compared to national average (600 g/Ha), uses of heavy doses of pesticides such as chlorpyrifos and cypermethrin have been reported from the tea estates of Assam. These pesticides are likely to accumulate on non target organisms such as stray castor leaves due to wind drift. The eri silk rearer

Figure 3: Appearance of 5th insatr larva of eri silkworm fed with (A) normal and (B) pesticide contaminated leaf (oozing out of hemolypmh in pesticide exposed larva). Single cell gel electrophoresis images of pesticide treated hemocyte and control hemocyte in 5th instar larva: (C) Intact nucleus in control hemocye and (D) DNA damage in hemocyte after pesticide exposure.



households residing in the vicinity of tea garden use these leaves for eri silkworm rearing and therefore it is assumed that eri silkworms may be affected. We mimicked organophosphate pesticide drifting by air to non target castor leafs and estimated toxicity of the leaf on eri silk worm by bio chemical, histopathological and genotoxicity studies (Figure 3). Even sub lethal concentration of the pesticide caused significant decrease in protein, carbohydrate and lipid concentration along with digestive enzyme activity of the worm. Genotoxicity studies showed that the parameters such as head and tail DNA percentage and comet formation of degraded DNA were significantly different in pesticide contaminated leaf fed group than the control. In pesticide treated group, microvilli of gut lining were degenerated and ruptured, vacuolation detected and mucosa layer appeared thin as observed by histopathological studies.

Collaborative works are going on in Non-mulberry silk biomaterial for tissue engineering and biomedical applications. The non-mulberry silk fibroin of *A assamensis*, *A. mylitta*, *A. pernyi*, and *A. yamamai* are reported to contain cell binding motifs, RGD (arginine, glycine and aspartic acid) sequences, which felicitate better cell attachment and proliferation. (Accession No: KJ862544.1). This property is desirable as a biomaterial for tissue engineering and biomedical applications. The ongoing DBT-BioCARe programme involves 3D tissue constructs engineered from chondrocytes/non-mulberry silk fibroin for cartilage repair. Damaged adult articular cartilage exhibits a limited propensity for self-repair. In this study, 3D porous silk fibroin scaffolds derived from *Antheraea assamensis* and *Philosamia ricini* were fabricated and examined for its ability to support *in vitro* cartilage tissue engineering. The fabricated scaffolds showed porous structure with pore size in the range of 80-150 µm with good interconnectivity and high porosity. Furthermore, non-mulberry silk fibroin scaffolds of *A. assamensis* and *P. ricini* supported the better cell attachment and proliferation of porcine chondrocytes as indicated by fluorescence microscopy and metabolic activities. Alcian blue histochemistry and expression of collagen II indicated the maintenance of chondrogenic phenotype in the constructs after 2 weeks of culture. Glycosaminoglycans and collagen accumulate in all the scaffolds were highest in silk fibroin scaffolds of *A. assamensis* followed by *P. ricini*. Taken together, these results demonstrate the suitability of non-mulberry silk fibroin as suitable scaffold for chondrocytes based cartilage repair (Figure 4).

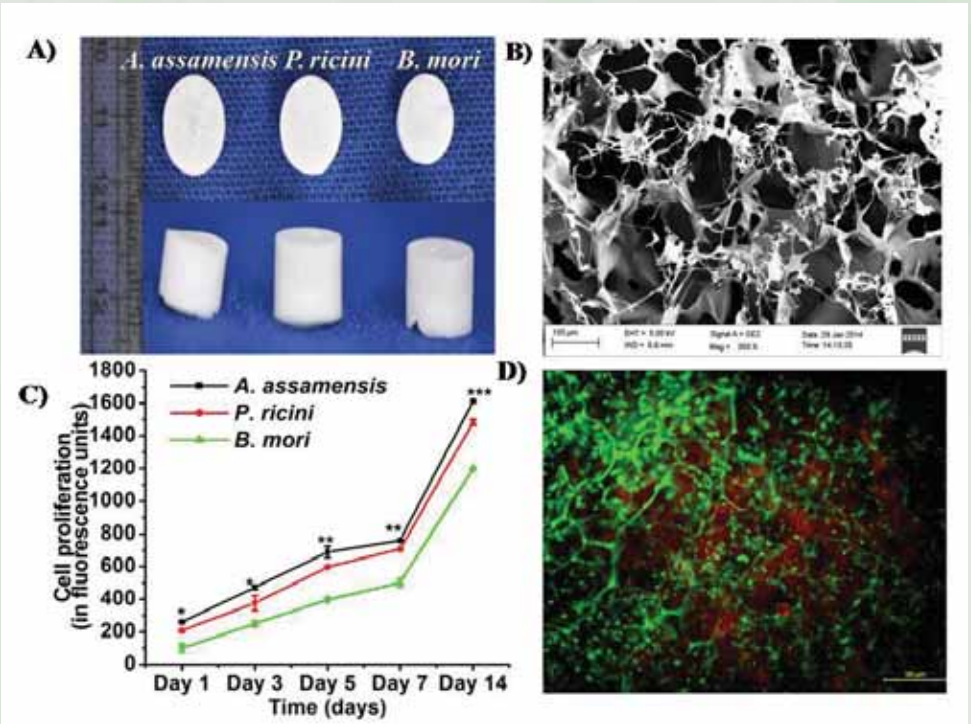


Figure 4: Three dimensional (3D) silk based scaffolds (A), scanning electron micrograph showing surface morphology (B), cell viability and proliferation (C), and chondrocytes growth and attachment (D) on A. assamensis (muga) silk fibroin 3D scaffolds after 2 weeks of culture.

Non-mulberry silk fibroin based microparticles are being studied as biomaterial for biomedical application in collaboration with Deakin University, Australia. Silk fibroin microparticles of non-mulberry silkworm species (*Antheraea assamensis*, *Antheraea mylitta* and *Philocimia ricini*) were fabricated via a top-down approach using a combination of wet-milling and spray drying techniques. The silk fibroin microparticles of all species were porous (~5 µm in size) and showed nearly spherical morphology with rough surface as revealed from dynamic light scattering and transmission electron microscopy studies. FTIR analysis showed the typical silk-II structure with β-sheet secondary conformation, which revealed retention of original structure of fibers. Additionally, non-mulberry silk fibroin microparticles showed higher thermal stability as compared to mulberry silk fibroin microparticles. Furthermore, non-mulberry silk fibroin microparticles supported enhanced cell adhesion, spreading and viability of mouse fibroblasts as compared to mulberry silk fibroin microparticles as evidenced from fluorescence microscopy and cytotoxicity studies (Figure 5). Taken together, this study demonstrates promising attributes from non-mulberry silk fibroin microparticles as a biomaterial for biomedical applications.

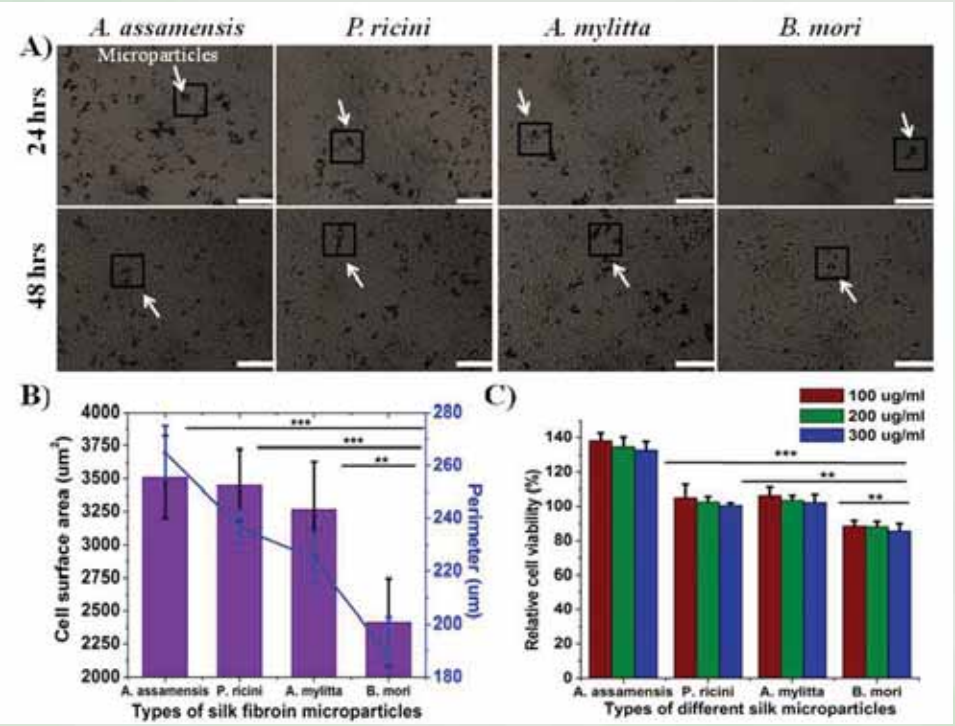


*Figure 5: A) Phase contrast microscopic images showing cell growth and attachment after 24 and 48 hrs of microparticle incubation (B) matrix surface area covered by cells represented as mean ± standard deviation of ten fields studied for each type of microparticles. (n = 10, * represent significant statistical difference, p < 0.001) and, (C) relative cell viability of mouse fibroblasts on different types of microparticles.*

In collaboration with Department of Biosciences and Bioengineering, IITG, we are also looking into the possibility of using non mulberry silk based nano particles for enzyme immobilization. *Antheraea assamensis* liquid silk fibroin based nanoparticles were fabricated using reverse desolvation procedure. Unlike the previous procedure adopted for fabrication of *A. assamensis* silk fibroin based nanoparticles for biomedical application, this method includes addition of fibroin droplets (25µl/drop) into an organic solvent i.e. in reverse way (Table 1). Enzyme lipase was selected for the present study in order to immobilize into the fibroin surface. Briefly, same concentrations (2%) of fibroin and lipase droplets were added into the organic solvent acetone in continuous stirring mode at room temperature. Gluteraldehyde (5%) was added slowly to crosslink the particles with lipase enzyme and allowed them to precipitate slowly under same set of conditions. Immobilization was successful as revealed by through FTIR analysis data. Size of the immobilized particles was found to be around 350 d/nm which were comparatively higher to the free silk fibroin nanoparticles showing effects after immobilization (Figure 6).

Table 1. Particle size and surface zeta potential of A. assamensis nanoparticles fabricated in different conditions.

Conditions	Particle size (d.nm) (average diameter)	Zeta potential (mV)
Acetone **(25µl/drop)** in silk fibroin solution	131.65 ± 2.33	-29.8 ± 0.34
Acetone **(50µl/drop)** in silk fibroin solution	135.5 ± 8.76	-27.1 ± 0.69
Silk fibroin **(25µl/drop)** in acetone	234.8 ± 0.75	-21 ± 6.3
Silk fibroin **(50µl/drop)** in acetone	152.6 ± 1.74	0.359 ± 0.24

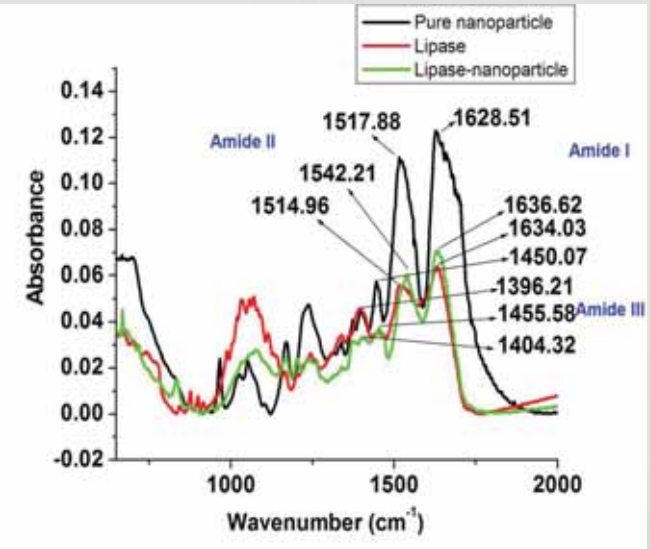


Figure 6: FTIR of silk fibroin nanoparticles, Lipase and Lipase - silk nano particles

Prof. Sabitry Choudhury Bordoloi

Exploration and documentation of fauna, Molecular taxonomy.

The broad area of our research is to study the aquatic biodiversity and biology of fishes of conservational importance. Following are the results of studies carried out in our laboratory during last one year.

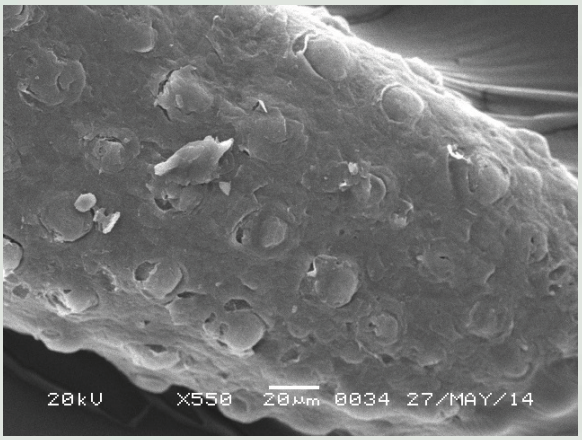
A total of 66 species belonging to 6 orders and 17 families were recorded from the lotic and lentic water bodies of Lakhimpur district, Assam. Out of these, 28 species were of true hill stream category as they showed adaptive modifications, typical of hill stream fishes and 33 were riverine fishes. Five species were migratory in nature. Fishes belonging to the family Cyprinidae were dominant as it comprised 40.98% of the total recorded species. Detailed biology of two hill stream species i.e. *Balitora brucei* and *Psilorhynchus balitora* indicated that they were single breeder and parameters like length-weight relationships showed their positive allometric growth. Analysis of condition factors showed that the habitat Ranganadi is conducive for the growth of these two fishes although anthropogenic stress due to overexploitation of fish, illegal removal of stones from river bed and indiscriminate use of piscicidal plant extracts for fishing in this habitat was evident during the survey of fish diversity (Figure 1).

Figure 1: Community fishing in the Ranganadi river, Assam using piscicidal plants

Figure 2: Collection of Plankton in the Basistha River, Guwahati, Assam.

Ichthyo-faunal diversity of the torrential river Basistha, flowing through the Basistha hills of Guwahati was recorded. The stretch under investigation is the intermediate zone that harbours a number of torrential, semi-torrential and riverine fishes. Altogether, a total of 26 species belonging to 4 orders and 9 families were recorded over a period of 2 years. Physico chemical characteristics of water, sediment and aquatic invertebrates in the river were also monitored (Figure 2). SEM based morphological features of a number of fishes showed that torrential species develop morphological adaptations to cope with fast flowing waters. Presence of external taste buds, excrescencies on lips and unculiferous structures are some of the adaptive modifications observed in these fishes (Figure 3) in SEM studies. A data deficient species as per IUCN *Badis*

assamensis Ahl, 1937 recorded from the river was selected for studying the detailed biology (Figure 4). Length-weight relationships indicated positive allometric growth for this species and analysis of condition factor indicated that the habitat is suitable for the existence of this species.



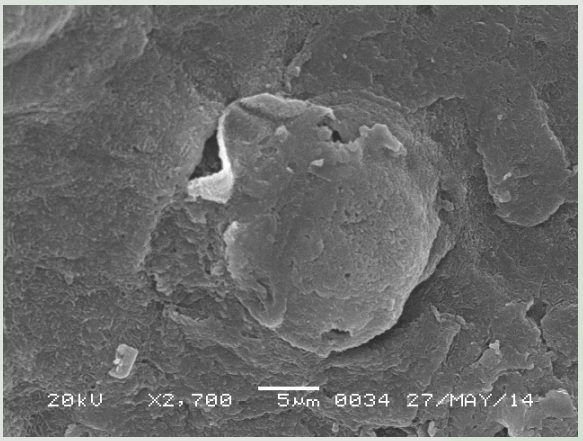


Figure 3: Scanning electron microscope (SEM) image of external taste buds observed in the barbels of a torrential fish Garra nasuta. These taste buds are chemo-sensory in nature.

Ichthyo-faunal diversity study was also carried out in lotic and lentic water bodies of the Majuli island, Assam. Majuli island (26° 45′ to 27° 12′ N; 93°39′ to 94° 35′ E) of Assam is one of the largest river islands in the world. Floodplain wetlands of the island fed by two rivers namely the Brahmaputra and the Subansiri were surveyed. Of the recorded fish species (82), 10 were torrential, 48 lotic and 24 were from lentic habitats. Two loach species were selected for detailed study. *Lepidocephalichthys goalparensis* was first described from Goalpara district of Assam by Pillai and Yazdani (1976) and no biological parameters were earlier known on this species. A viable population of this species enabled us to take up detailed biological study. Detailed biological parameters of Botia Dario were also studied. These data were uploaded in *http://www.fishbase.org*.

Figure 4: Badis assamensis Ahl, 1937 collected from Basistha river.

Figure 5: Collection of plankton samples from oil contaminated site

Water and sediment samples from a number of hydrocarbon polluted lentic ecosystems were collected near oil installations of Duliajan, Digboi and Naharkatia and their Total Petrolium Hydrocarbon (TPH) and heavy metal contents were determined. TPH concentration in water ranged from 30 mg l^{-1} to 50 mg l^{-1} and in sediments from 5000 mg kg^{-1} to 20,000 mg kg^{-1}. Simpson et al. (2010) proposed a TPH threshold

concentration range in sediments from 275 mg kg^{-1} to 960 mg kg^{-1}. Compared to TPH range reported in the available literature, TPH range in hydrocarbon polluted sediments of this study was several fold higher than the threshold values. Trace elements such as Mn, Cu, Cd, Ni and Pb in water were found to be above the MPL (Maximum Permissible Limit) specified by Bureau of Indian Standards (BIS, 2012) in a number of sites. The effect of contamination on floral and faunal diversity in these ecosystems is in progress.

Prof. Suresh Deka

Hydrocarbon degrading bacterial diversity, bioremediation, biosurfactant and plant disease biocontrol.

Isolation of hydrocarbon degrading (HCD) bacteria from hydrocarbon contaminated ecosystem (HCE) and their utilization in bioremediation was the focus of our research during last one year. A total of twenty three bacteria were isolated from hydrocarbon contaminated oilfield soil using enrichment technique and appropriate culture media. The HCD ability of the isolates was evaluated on the basis of their growth (optical density) in the medium supplemented with 2% (v/v) crude oil as substrate to provide carbon and energy for growth. Five isolates were found to be promising (Figure 1) and subsequently three of them showed biosurfactant production ability. Biosurfactant production ability might have evolved in these organisms as the binding of the biosurfactant to the hydrophobic hydrocarbons (HC) would facilitate HC absorption inside the cell for utilization as carbon substrate. Ten different bacterial consortia based on three different combinations, i.e. i) Biosurfactant producer and non-producers strains; ii) Only biosurfactant producer strains; and iii) Only biosurfactant non-producer strains were used in an *in vitro* screening experiment to select the best consortium for degradation of crude oil. The consortium of *Bacillus pumilus* KS2 and *Bacillus cereus* R2 (Consortium 8) was found to be most efficient and further experiments revealed that it could degrade 84.15% of total petroleum hydrocarbons (TPH) of the crude oil in five weeks time (Figure 2 & 3). GCMS analysis showed that there was drastic reduction in the total amount of aliphatic and aromatic fractions of crude oil. Among the six different PAHs present in the crude oil, the consortium was able to degrade Anthracene, 3.beta.-Myristoylolean-12-en-1 and 1H-Indene, 2,3-dihydro-1. The other three PAHs, Naphthalene, Fluorene and Phenanthrene along with their various derivatives were also reduced significantly, but not completely. Based on this result, experiments are being designed currently to test their degradation ability in hydrocarbon contaminated field soil.

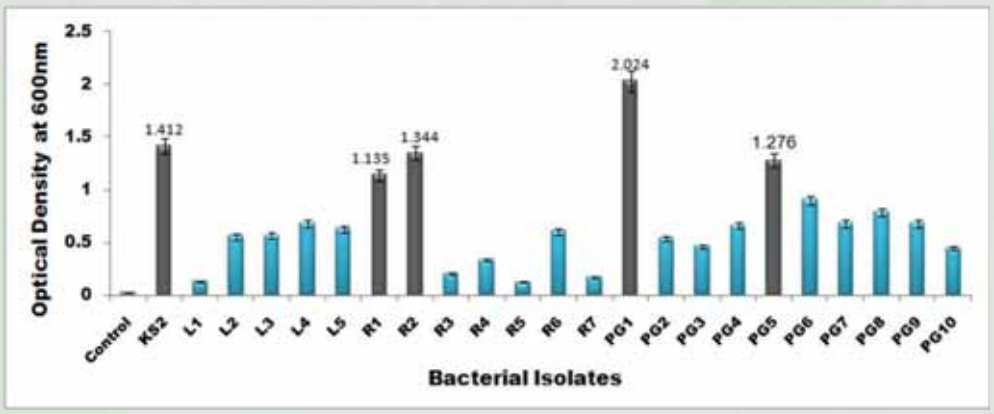


Figure 1: Growth (optical density) of 23 hydrocarbon contaminated soil bacterial isolates on 7th day after incubation in mineral salt media supplemented with 2% (v/v) crude oil. Error bars represent ± standard deviation (± SD).

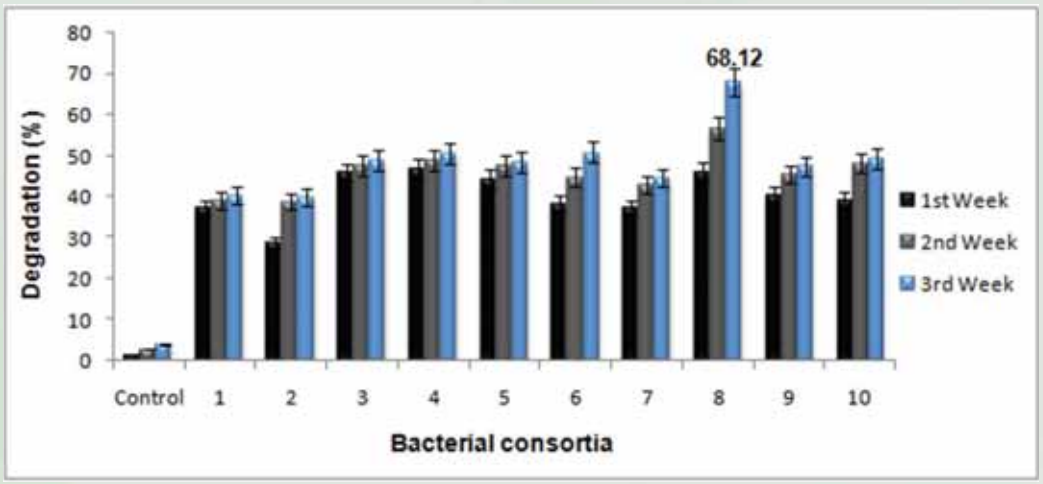


Figure 2: Quantity of petroleum hydrocarbon degraded (%) by the test consortia after 1st, 2nd and 3rd week of incubation. Error bars represent ± standard deviation (± SD).

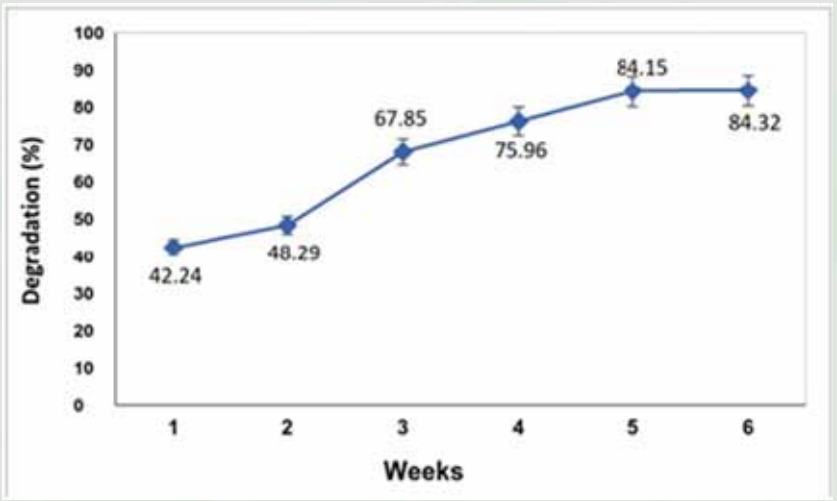


Figure 3: Quantity of TPH degraded (%) by selected consortium at weekly intervals upto 6th week of incubation. Bars represent the ± standard deviation (± SD).

We also determined polycyclic aromatic hydrocarbon (PAH) in soil of 10 strategically selected sites in Guwahati city and isolated PAH degrading bacteria from those soils. PAHs concentration ranged from 0.07-21.4 (µg/g). A total of 23 PAHs degrading bacteria were obtained. Three isolates were found to exhibit high PAHs degrading ability. Based on 16S r RNA gene sequencing, two of the isolates were identified and sequence submitted in NCBI as Bacillus cereus JMG-01 (GenBank accession number KP984767) and Sporosarcina koreensis JMG-02 (GenBank accession number KR028013). Cells of these strains were observed before and after treating with the hydrocarbons using SEM and AFM and marked changes in the cell morphology and cell disintegration were noticed (Figure 6 & 7). **This work was carried out under the guidance of Dr. Jibon Kotoky, programme Head, Traditional Knowledge bades Drug Development and Delivery.**

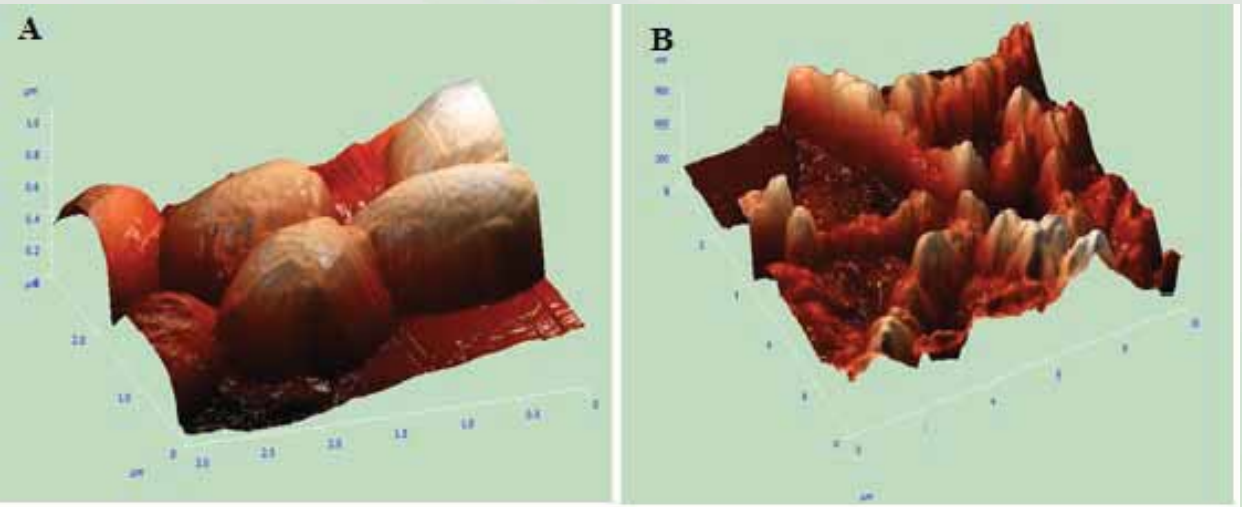


Figure 4: AFM 3D image showing topography of Bacillus cereus strain JMG-01 (A) before and (B) after treatment with hydrocarbon.

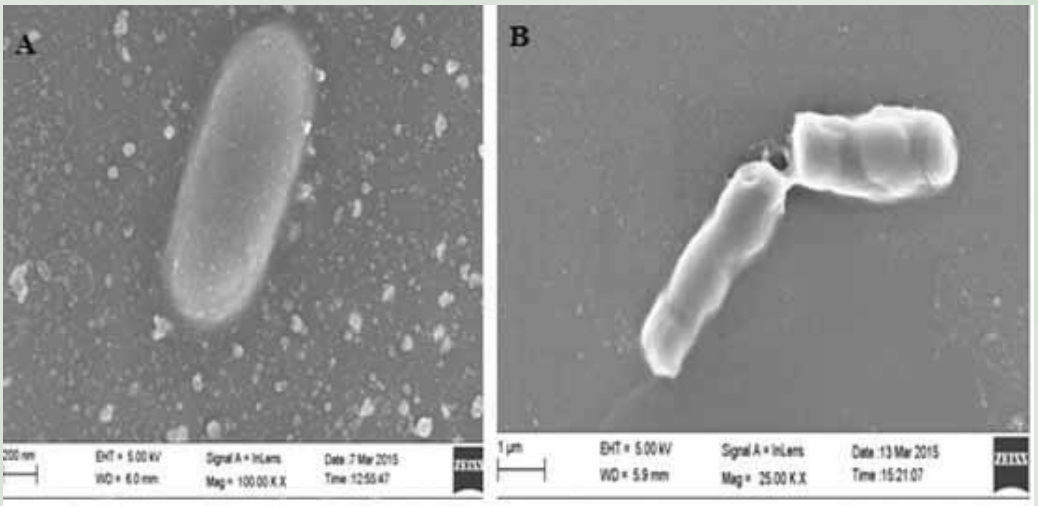


Figure 5: SEM images of Bacillus cereus strain JMG-01 (A) before and (B) after treatment with hydrocarbon.

We have also investigated the antifungal properties of Rhamnolipid Biosurfactant of bacteria of hydrocarbon contaminated soil origin. Biosurfactants are versatile compounds of mostly microbial origin and possess efficient antimicrobial /biopesticidal activity. As biopesticide, biosurfactants have several advantages over their chemical counterparts due to their easy biodegradability and non-toxicity in environment, high selectivity in mode of action and activity even at high pH, temperature and salinity.

We tested the antifungal properties of biosurfactant produced by the bacteria *Pseudomonas aeruginosa* SS14 against the fungal pathogen *Fusarium verticillioides* which causes stalk and ear rot of maize. Treatment of maize seeds @ 50 mg l^{-1} crude biosurfactant resulted in complete suppression of the disease caused by the pathogen. The biosurfactant had no adverse effect on seed germination of treated maize seeds in comparison with the control.

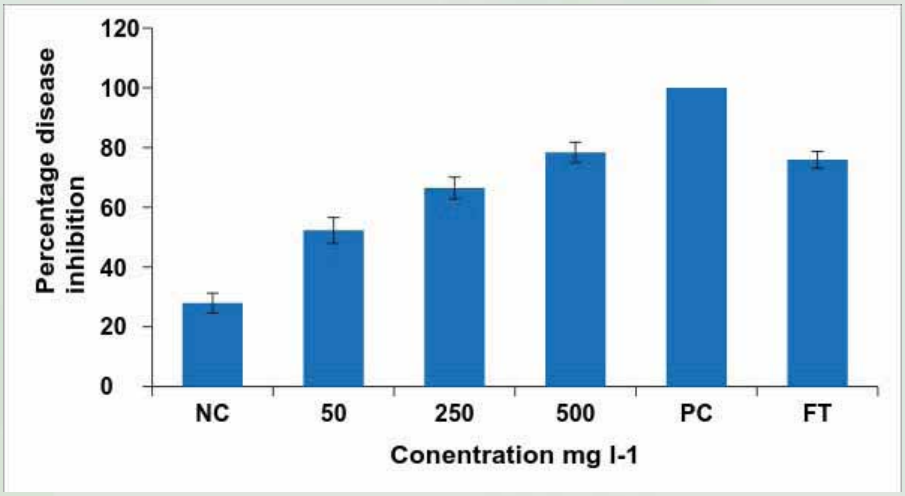


Figure 6: Inhibition (%) of the anthracnose disease (Colletotrichum capsici) of chilli by different concentrations of crude biosurfactant of Pseudomonas aeruginosa JS29 and chemical fungicide (FT, Bavistin 75 % WP carbendazim) recorded on 21st day post spore inoculation. Negative control (NC) treatment received only the fungal pathogen spore inoculum, positive control (PC) were not inoculated with the fungal pathogen. The other treatment plants were inoculated with the fungal pathogen spore and sprayed with crude biosurfactant @ concentrations of 50, 250 and 500 mg l-1. The error bars represent ±SD.

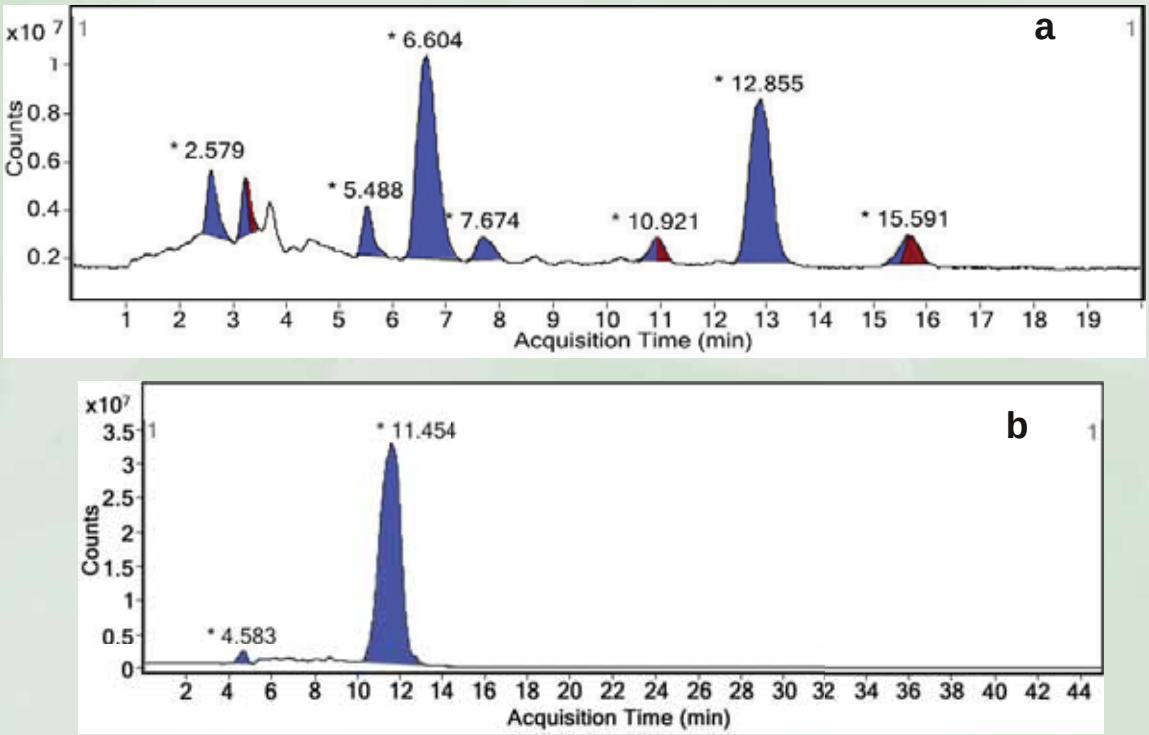


Figure 7: LC total ion chromatograms (TICs) of (a) reference rhamnolipid (RL) R-95, a mixture of 11 mono (shaded blue) and 4 di-RLs (shaded red, partial blue shading indicates co-elution of mono-RLs) and (b) purified RL produced by Pseudomonas aeruginosa SS14 using glucose as sole carbon source comprising of only 2 mono-RLs (shaded blue).

The antifungal efficacy of the biosurfactant produced by another strain *Pseudomonas aeruginosa* JS29 was tested against the fungus *Colletotrichum capsici*, which causes anthracnose in chilli. Single spray of crude biosurfactant at a concentration of 500 mg l^{-1} to 4 months old plant prior to fungal inoculation reduced disease incidence by 78.38 % compared to the control plant which was inoculated with only the pathogen (Figure 6). The crude biosurfactant when sprayed on the fruits at concentration of 500 mg l^{-1} before storage, could reduce the disease by 91% during storage.

Effect of the biosurfactants was found to be different on the two pathogens on *in-vitro* assays. The biosurfactants produced by both the bacterial strains (SS14 and JS29) have been identified as rhamnolipid using Liquid Chromatography Mass Spectrometry (LCMS) and the congeners present in rhamnolipids of the two strains were different. The bacterial strain SS14 produced only mono-rhamnolipid, whereas the strain JS29 produced both mono and di rhamnolipid (Figure 7). The difference in activity of the rhamnolipids may be attributed to the difference in their constitutive congeners.

Dr. Arundhuti Devi

Remediation and Reclamation of crude oil contaminated soil,
Removal of heavy metals, Air Pollution

Hydrocarbon Polluted Ecosystem (HPE) of Assam has been our prime research interest during last one year. Process of oil exploration results in contamination of surrounding fields and soil due to leakage and seepage. Huge amount of formation water is a burden to the environment as it contains petroleum hydrocarbons and heavy metal pollutants. The research on HPE aims at (i) assessment of the effect of hydrocarbon contamination and recovery of water from oil-field formation water and (ii) isolation and selection of efficient hydrocarbon degrading bacteria (HDB) and their uses for bioremediation of formation water through the process of bioflocculation.

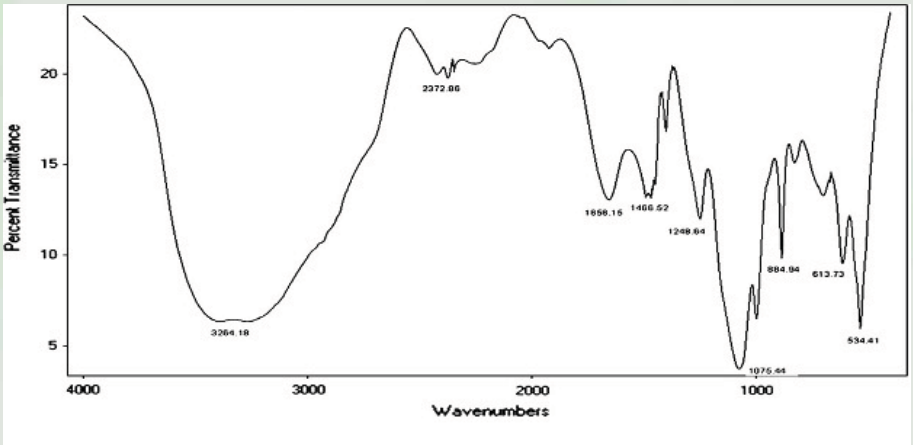


Figure 1: FT-IR spectra of purified bioflocculant from Achromobacter sp. TERI-IASST N strain.

A bioflocculant-producing bacterium designated as 'TERI-IASST N' was isolated from activated sludge samples collected from an oil refinery. This isolate showed highest bioflocculation activity (74%) in glucose amended medium among 15 different bioflocculant-producing bacterial strains obtained from the sludge samples. Based on 16S rRNA gene sequence it was identified as *Achromobacter* sp. Parameters such as pH, nitrogen and carbon source of the culture medium were optimized for maximum flocculation activity (90%) of the strain TERI-IASST N. Calcium chloride was found to be suitable divalent cation source for maximum bioflocculation activity of the bacterium. Interestingly, this isolate showed extensive bioflocculation activity (75%) in presence of multiple heavy metals such as zinc, lead, nickel, copper and cadmium in the medium. The strain revealed considerable biosorption of Zn(II) [430 mg L^{-1}] and Pb(II) [30 mg L^{-1}]. These results demonstrate that *Achromobacter* sp. TERI-IASST N can serve as a potential candidate for bioremediation of heavy metal contaminated waste water and hydrocarbon contaminated environment. Fourier transform infrared spectrum of the bioflocculant indicated that the presence of functional groups such as carboxyl, hydroxyl, and amino groups are responsible for the bioflocculation process (Figure 1). Nuclear magnetic resonance analysis showed that the bioflocculant was glycoprotein in nature (Figure 2).

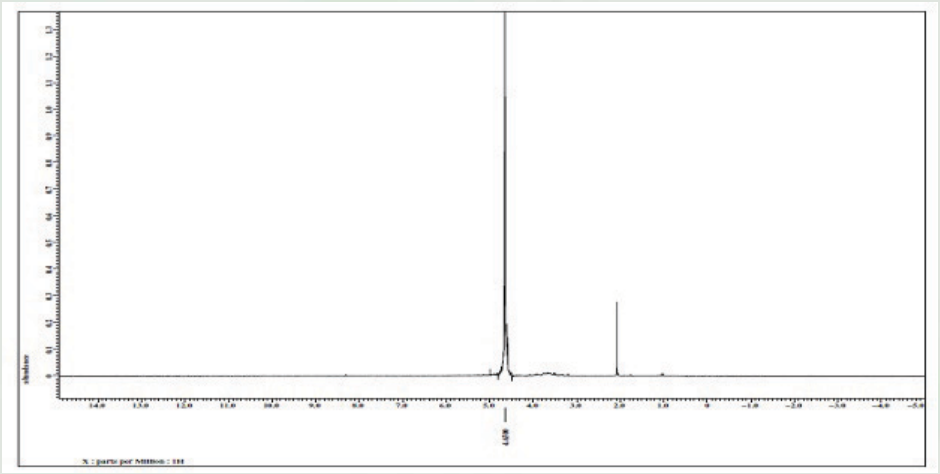


Figure 2. 1H NMR spectra of the purified bioflocculant from Achromobacter sp. TERI-IASST N strain Achromobacter sp. TERI-IASST N strain.

In another experiment, *Pseudomonas aeruginosa* strain IASST201 was found to be most effective among 37 bacterial isolates obtained in both flocculation of oil-field formation water and degradation of petroleum hydrocarbons in crude oil. The activity of crude bioflocculant produced by this strain in the optimized broth culture was found to be 86.2% and its purified bioflocculant's activity was found to be enhanced up to 89.1%. During the course of the bioflocculant production in the optimized medium, the bacterium could utilize about 77% of the petroleum hydrocarbons confirmed at 168 h after inoculation when the activity was found to be the highest. The degradation of crude oil hydrocarbons was confirmed by GC/MS analysis of the samples (Figure 3).

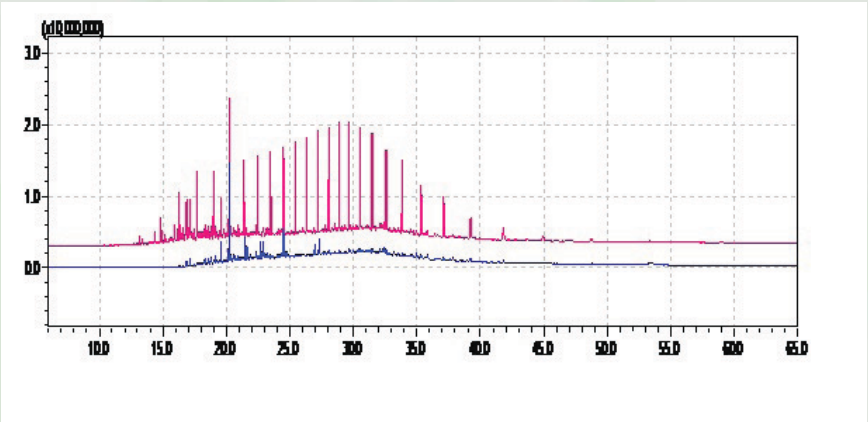


Figure 3: A comparative GC chromatogram of the DCM extracted portion of control crude oil (Red plot) and the degraded crude oil (blue plot) at when the bioflocculating was found highest.

To conclude, our study has discovered two potential bacterial strains for flocculation of formation water and degradation of petroleum hydrocarbons in *in-vitro*. Currently, their performance in field condition is being evaluated.

Dr. Narayan C. Talukdar

Programme Head, Biodiversity and Ecosystem Research

Microbial diversity and interaction in agroecosystems,
Bioenergy and Bioinputs

Current research focus has been mycorrhizal and rhizobacterial diversity in jhum agroecosystems, exploration of the endophytic bacteria, search for efficient cellulolytic microbes and enzymes system.

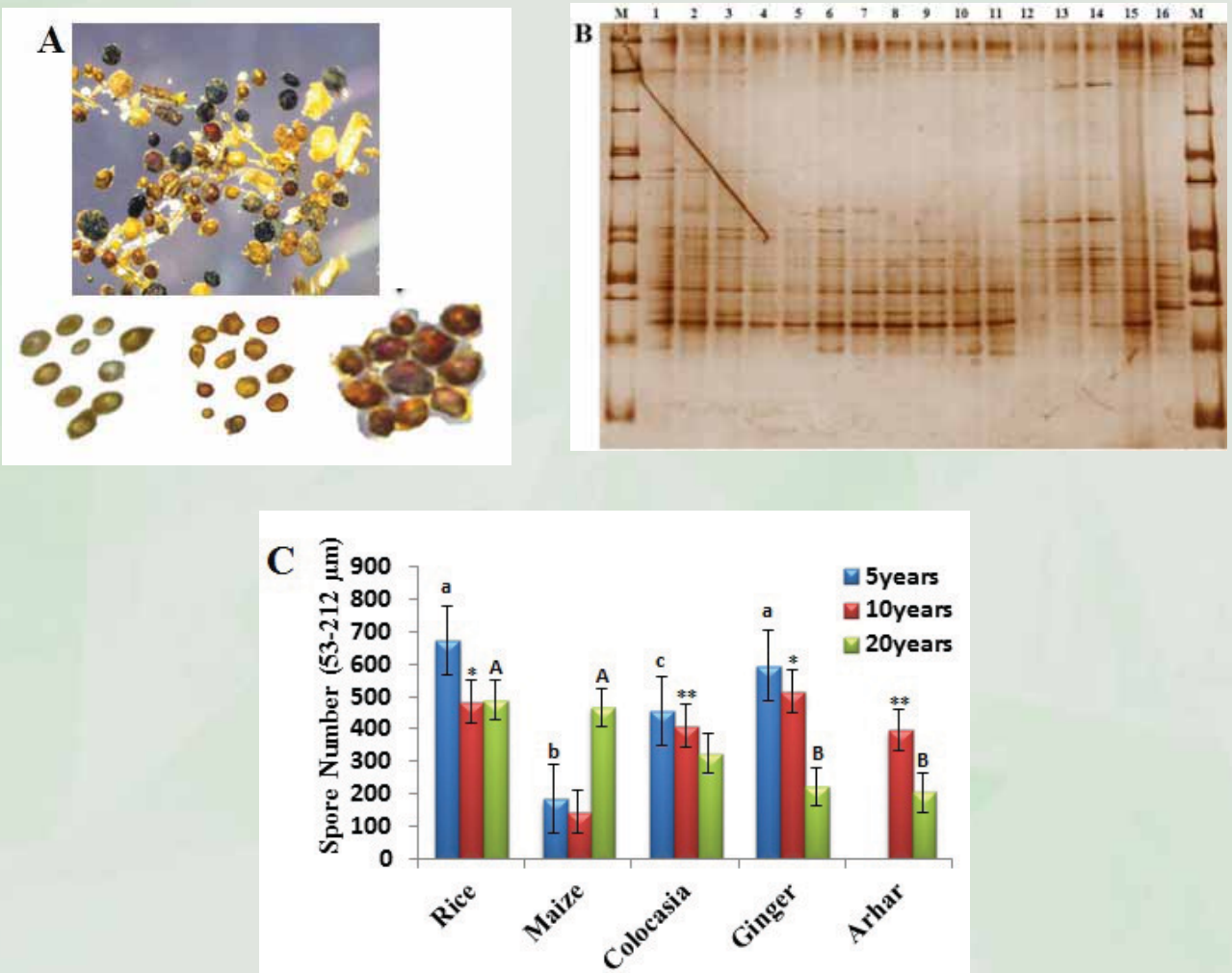


Figure 1: Diversity of arbuscular mycorrhizal fungi (AMF) based on spore morphology (A) and 18s rRNA gene sequence, (B) and the AMF colonization (%) in roots (C) of 2nd year crops of three jhum cycles. B. Lane 1, 2, 3 – maize 20 Year Jhum Cycle (YJC), 4 – Rice 10 YJC; 5 – Rice 20RJC, 6 – Rice 5 YJC, 7,8 – Maize 10 YJC; 9, 10 – Maize 5YJC; 11- Arahar 20YJC; 12, 13 14 - Arahar5YJC; 15, 16 - A10YJC, M=Ladder – to – bp.

Jhumming or Slash & burn agriculture (SAB) is a practice of farming in hills carried out by cutting all

vegetation of an area, then burning during Jan-April and growing crop for successive two years. First year crop harvest in Oct-Nov is followed by a fallow period until next year Feb-March during which operation for 2nd year cropping begins. After 2nd year crop harvest, the *jhum* field is fallowed to allow natural revegetation for varying period of 3 to 20 years. Shorter fallow cycle leads to mountain ecosystem instability, soil erosion and siltation of rivers and frequent flood in valleys, but yet this agro-ecosystem maintains a rich agrobiodiversity base and is intricately linked with socio-cultural fabric of inhabitants of hills of NE India. Scientific research to improve the system has been limited. Our research objectives are to understand the dynamics of (1) soil microbial components, [2] above ground vegetation biomass of crop and weeds and [3] soil physico-chemical property changes during cropping and fallow phase of different fallow cycles. Research data might help develop model to predict the optimal *jhum* cycle in relation to slope intensity, appropriate crop density for maximum uptake of soil nutrient during the first year cropping. Development of low cost organic input package inclusive of plant growth promoting (PGP) bacterial consortia, especially for crops of second/third year cropping phase is also part of this project.

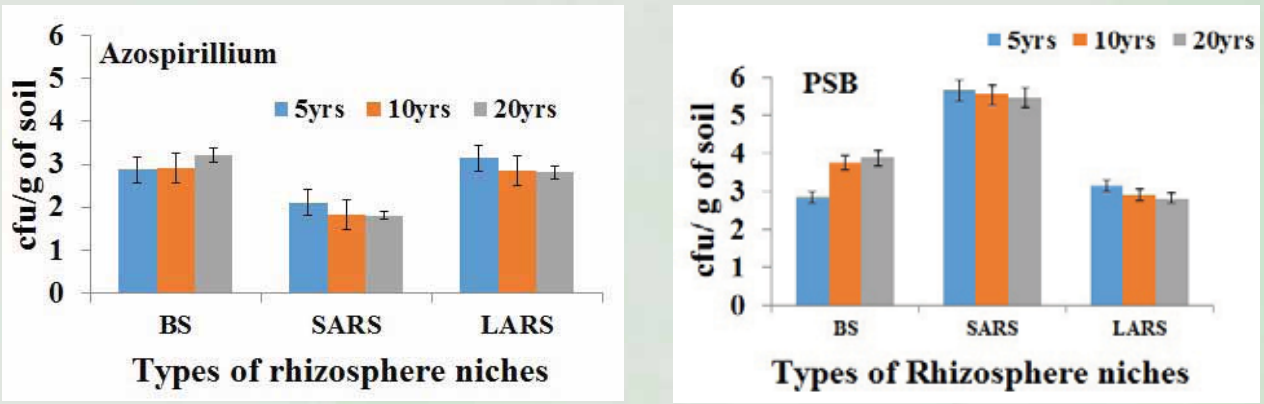


Figure 2. Log colony forming unit (CFU) of Azopisrillum and phosphate solubilizing bacteria (PSB) per g of dry bulk soil, strongly adhered rhizosphere soil (SARS) and loosely adhered rhizosphere soil (LARS) of rice

Arbuscular Mycorrhizal Fungi (AMF) spore diversity and population in loosely adhered rhizosphere soil (LARS) by classical and PCR-DGGE based method, AMF colonization in roots of five crops (rice, maize, ginger, arahar and colocasia) of second year cropping phase of Nagaland and Mizoram *jhum* fields of three *jhum* cycles were determined. Bacterial population was estimated in the four crop rhzosphere niches by culture based method. In general, AMF spore density (53-212 µm size range) and arbuscular colonization in roots decreased with the increase in the length of *jhum* cycles (Figure 1). Based on spore morphology, three dominant types of AMF spore were found in *jhum* field soils. However, DGGE profile of AMF primer based PCR amplification of root DNA suggested greater diversity (Figure 1B). The general trend of bacterial population (cfu/g dry material) irrespective of crops of *jhum* cycle was: strongly adhered rhizosphere soil (SARS)> loosely adhered rhizosphere soil (LARS)> bulk soil (BS)> root interior (RI) (Figure 1C). The population of phosphate solubilizing bacteria, fluorescent pseudomonads and *Azospirillum* in SARS of different crop rhizosphere was found to decrease with age of *jhum* cycle (Figure 2). These data suggest that with increase in *jhum* cycle, the system improves and rhizosphere of crops grown in it require less support from bacteria as reflected in their population in the LARS. Analysis of more samples in future will provide insight into ecological implication of the observed pattern of AMF and bacterial diversity in *jhum* agroecosystem.

Selective growth medium	LOG cfu/g in rice seeds of different cultivars			
	Rnjit	Kalajoha	Kekua bao	Ido
JA	4.66	3.83	4.49	6.86
R2A/CMC	3.91	4.08	2.00	7.03
PA	4.69	2.00	4.44	3.74

Table 1: Log CFU of endophytic bacteria in surface sterilized seeds of cultivars of hill (Fanai, TK and Ido), deep water fields (Kekoa bao and Maguri), fragrant rice (Kolajoha) and high yielding variety (Ranjit) of puddled fields of north east India obtained by plating serial dilution in three selected media.

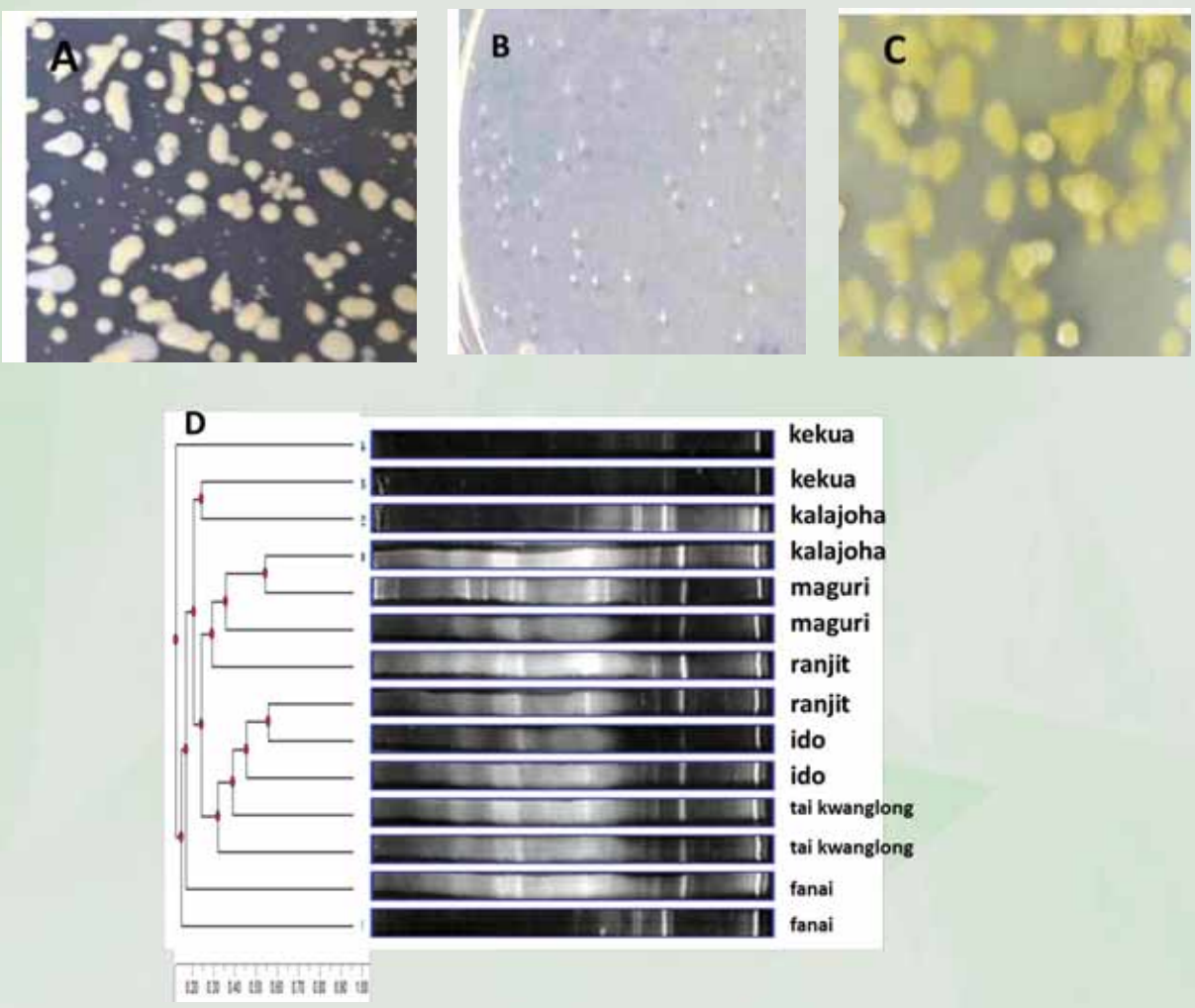


Figure 3: Culturable endopytic bacteria based on growth in selective culture medium: A. N2 fixers, B. Cellulose degrader C. P-solubilizers. Hierarchical tree of total bacterial endophytic communities from surface sterilized seeds of seven rice cultivars of north-east region according to 16s rRNA DGGE profiles (D).

In the study on endophytic bacteria of crops, we explored the diversity of endophytic bacteria in seeds, roots and shoots of crops grown in diverse ecosystems, localization of the bacteria in seeds, roots and shoots,

metabolic changes in plants due to the endophytic bacteria. Generation of endophyte free plants as a model system for evaluation of endopyte effect is another target of this work. Preliminary works on endophytic bacterial diversity in seeds of upland, puddled field and deep water rice with distinct genotypic differences showed that upland rice genotype contain higher population of nitrogen fixing and cellulose degrading bacteria (based on selective media) compared to the other genotypes (Table 1). Diversity of endophytic bacteria was also found to be different (Figure 3).

The research on seedling growth of mandarin orange evaluated whether plant growth promoting rhizobacteria (PGPR) of mandarin orange (MO) rhizosphere can enter roots, increase MO seedling growth and influence bacterial community diversity in rhizosphere soils and root interior. Four host-specific PGPR viz. *Enterobacter hormaechei* RCE1, *Enterobacter asburiae* RCE2, *Enterobacter ludwigii* RCE5 and *Klebsiella pneumonia* RCE7) were detected inside and on root surface of two months old axenic MO seedlings obtained by growing the PGPR inoculated surface sterilized seeds in sterilized semi-solid Murashige and Skoog medium (Figure 4). Root inoculation of MO seedlings (90 days old) with RCE1, RCE2, RCE5 and RCE7 either individually or in consortium mode and their cultivation in natural soil enhanced plant biomass yield from 27.3 to 53.5% over the uninoculated control at 90th, 180th and 360th days of post inoculation (dpi) (Figure 5). The combined results of SEM and TEM images and denaturing gradient gel electrophoresis (DGGE) fingerprints showed that PGPR inoculants (RCE1, RCE2, RCE5 and RCE7) successfully colonised on surface and within root tissues of axenically grown MO seedlings. The incidence of faint bands and their patterns along with marker bands of PGPR inoculants suggested that PGPR inoculation exerts influence on the composition of indigenous root endophyte community originated from the surface sterilized seeds of MO.

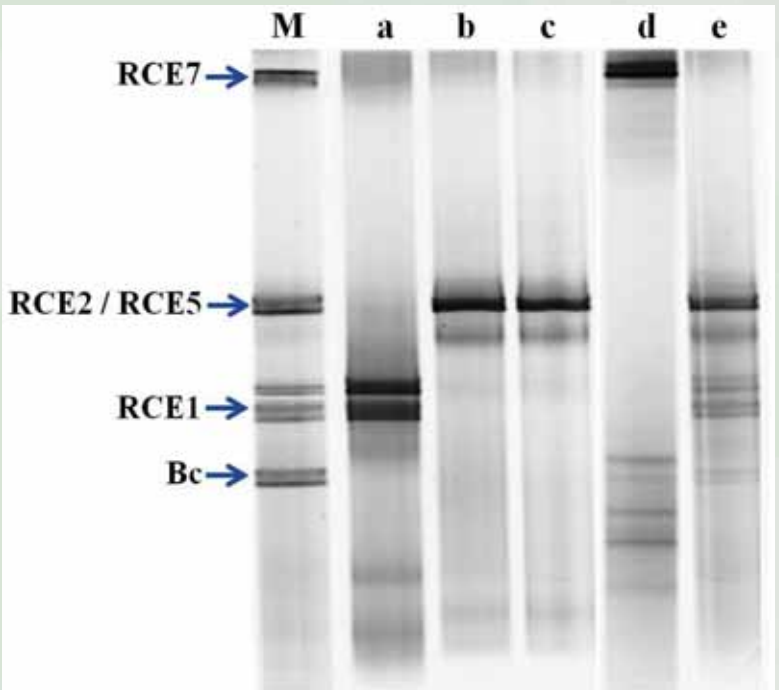


Figure 4: Bacterial communities of root tissues obtained from axenically grown Mandarin Orange (Citrus reticulata Blanco) plant as determined by PCR-DGGE fingerprint. Lanes: a through e: in-vitro plants from axenic MS media inoculated with RCE1 (a), RCE2 (b), RCE5 (c), RCE7 (d) and consortia of all strains CT (e). M = marker (from top to bottom, amplicons of Klebsiella pneumonia RCE7, Enterobacter asburiae RCE2, Enterobacter ludwigii RCE5, Enterobacter hormaechei RCE1, and a positive control Burkholderia cepacia MTCC4684 bands indicated.

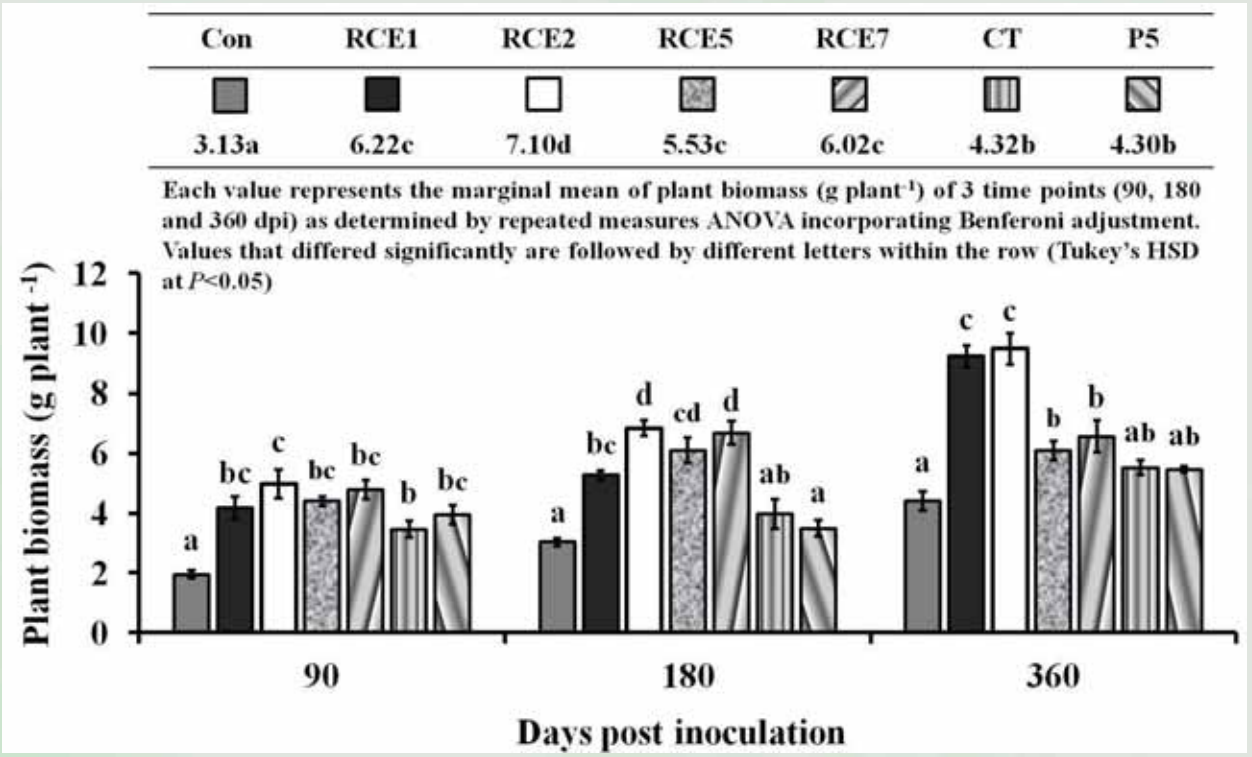


Figure 5: Total plant biomass of Mandarin orange as influenced by rhizobacterial inoculation {Control, RCE1, RCE2, RCE5, RCE7, Consortium (CT), P5} at 90th, 180th and 360th days post inoculation. Within each dpi, values (bars) followed by different letters indicate a significant difference (P < 0.05) between treatment means as determined one-way ANOVA incorporating Duncan's Multiple Range Test for pair-wise comparisons.

Results of NMDS plots and hierarchical clusters performed on bacterial DGGE fingerprints produced 4 distinct clusters for root tissue or rhizosphere soils (Figure 6). Out of 4, 3 clusters represented bacterial communities of inoculated plants at 3 growth stages separately and the other one cluster represented bacterial communities of uninoculated treatments of 3 growth stages together. These findings were clear indication of the combined influence of PGPR inoculation and plant age on shifts of indigenous bacterial communities of root tissues and rhizosphere soils. Some common and a few unique DGGE bands within root endophyte and rhizosphere soil bacterial communities were members of Gamma-Proteobacteria, Firmicutes and Deinococcus-Thermus with majority bands affiliated to Gamma-Proteobacteria. Indigenous bacterial community shift in root tissue and rhizosphere soils of MO plants indicates combined influence of PGPR inoculation and plant age in fitness benefits to host plant through modulation of rhizosphere interactions. **These results are of Ph.D. research scholar's work in IBSD, Imphal, planned and supervised by Dr. N.C. Talukdar.**

In another work high cellulolytic activity was observed in the secretary enzymes of an efficient fungi, *Talaromyces verruculosus* SGMNPf3 (GenBank accession no. KC937053). This fungi was isolated from Manas National Park, Assam and its culture in rice straw supplemented medium resulted in high cellulase production and the culture extracts contained high individual cellulase activities. A continuous increase in cellulase activity at different time points indicated no apparent end product inhibition. This was attributed to the high individual cellulases, notably b-glucosidase (316.1 µmol g^{-1}) production. Zymogram of extracellular

crude proteins showed two dominant extracellular protein bands of molecular weight 72.3 and 61.4 kDa, indicating their cellulolytic nature (Figure 7 & 8). MALDI-TOF and LC-MS/MS analysis of the 2DE spots also identified several enzymes including b-glucosidase involved in the process of cellulose degradation. Based on these characteristics, *T. verruculosus* SGMNPf3 appears to be an ideal organisms for harvesting naturally endowed energy in cellulosic biomass.

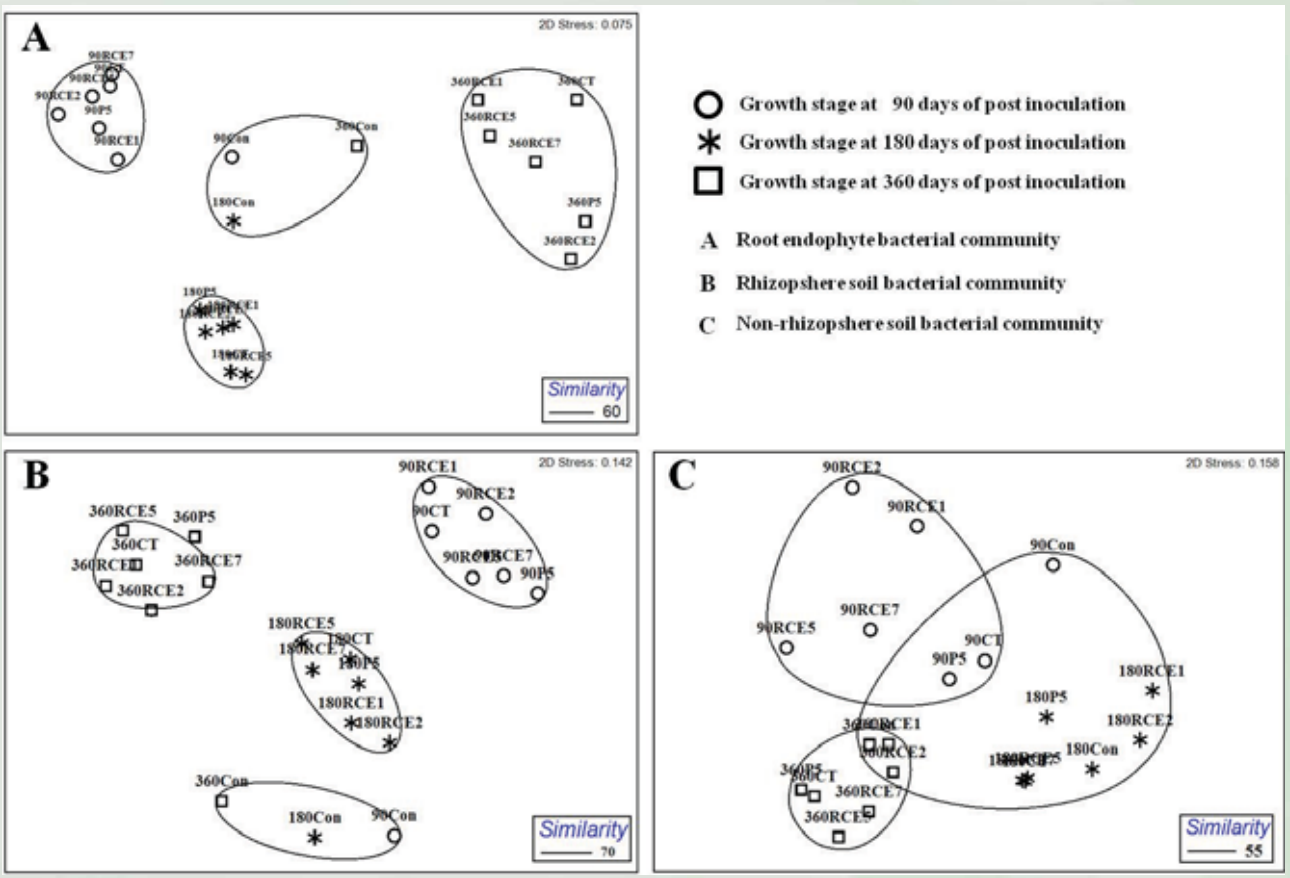


Figure 6: Variability of the bacterial community composition associated with root tissue, rhizosphere and non-rhizosphere soils of mandarin orange at 90th, 180th and 360th days post inoculation. Non-metric multidimensional scaling ordination plot was derived using a Bray-Curtis resemblance matrix generated on PCR-DGGE fingerprint based abundance data. Ellipses represent superimposed hierarchical clusters, deduced using group-average linking based on the Bray-Curtis resemblance matrix. The significance test between hierarchical clusters was performed using SIMPROF test (incorporating 1000 permutations for mean profile at 5% probability level).

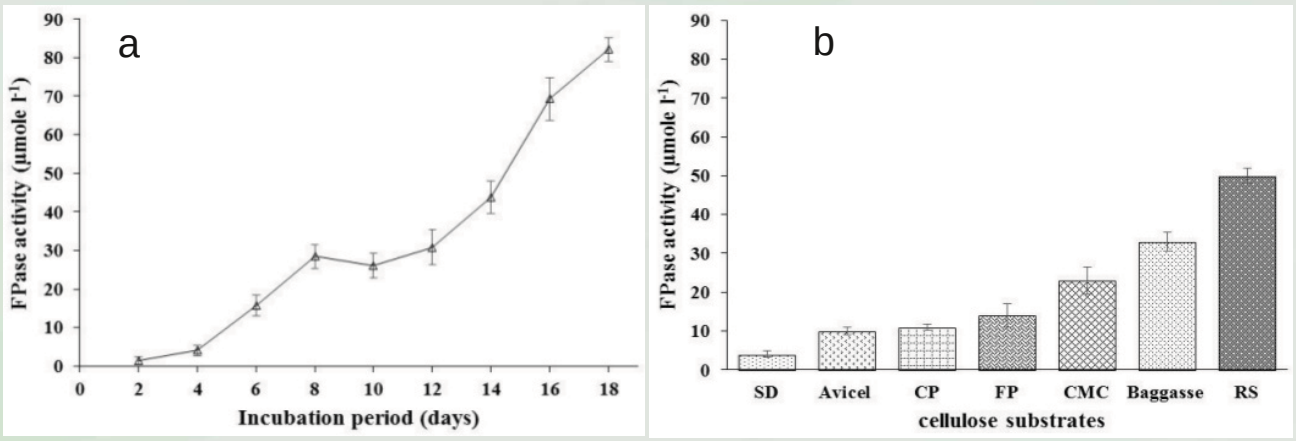


Figure 7. (a) Time course profile of 571 enzyme production. (b) Cellulase production on different substrates: Saw Dust (SD); Cellulose 572 Powder (CP); Filter Paper (FP); Carboxy methyl cellulose (CMC); Rice Straw (RS).

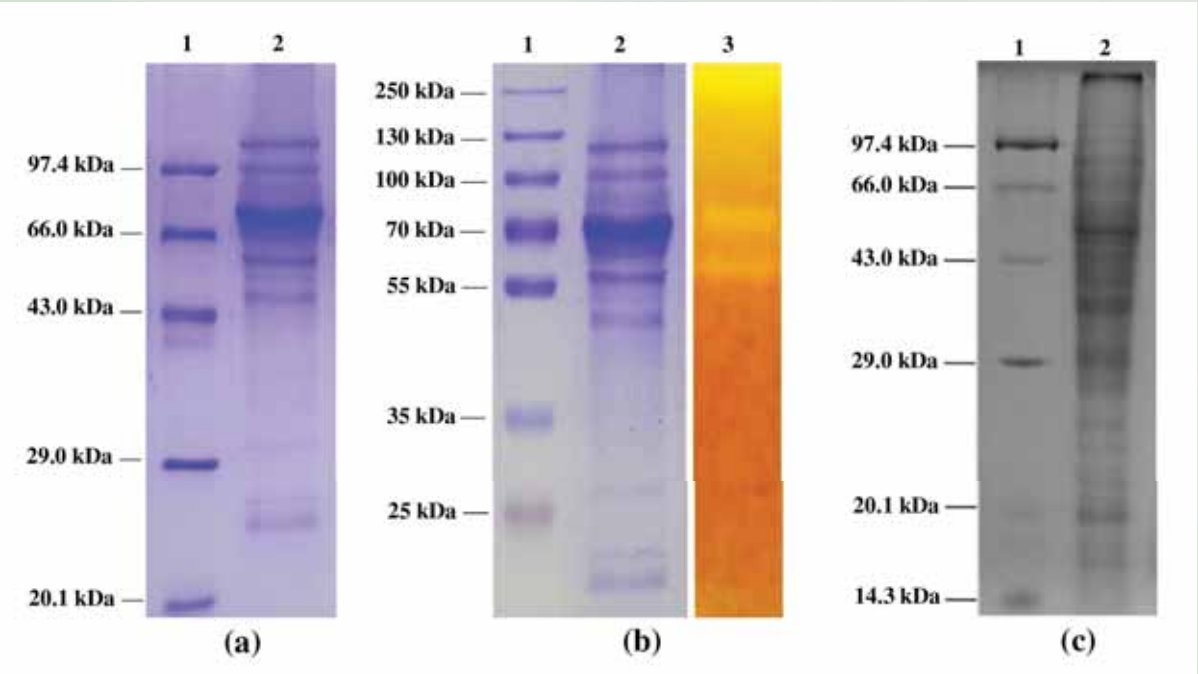


Figure 8: Extracellular crude protein profile (a): Molecular Weight Marker (lane 1), extracellular 580 protein from (lane 2); zymogram of extracellular protein (b): Molecular Weight Marker (lane 581 1), extracellular protein from (lane 2), zymogram (lane 3); Intracellular proteins profile (c): 582 Molecular Weight Marker (lane 1) and proteins from homogenized fungal hyphae (lane 2)

Dr. Debajit Thakur

Actinobacterial diversity, Microbial Bioactive Metabolites and Plant Microbe Interactions.

The research work mainly includes exploration of Actinobacterial diversity from protected forest ecosystems of Assam, 'Nigrospora Leaf Blight (NLB)' study on tea caused by *Nigrospora sphaerica* in India and population genetic structure of a medicinal herb *Houttuynia cordata* in North East India.

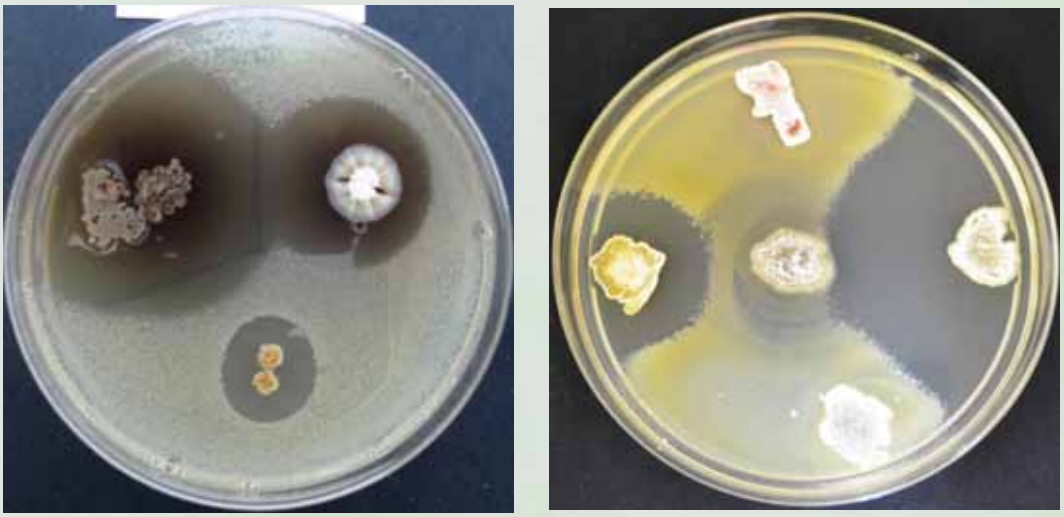


Figure 1: Extracellular antimicrobial metabolites produced by actinomycetes isolates in agar medium. A: antagonistic activity against Methicillin Resistant Staphylococcus aureus (ATCC 43300); B: antagonistic activity against Micrococcus luteus (MTCC 1538).

Six protected forest ecological niches of Assam namely, Kaziranga National Park, Nameri National Park, Pobitora Wildlife Sanctuary, Nambor Wildlife Sanctuary, Panidehing and Gibbon Wildlife Sanctuary were explored for the culturable Actinobacterial strains with potential for the production of antagonistic metabolites against drug resistant bacterial pathogens. So far 392 actinobacterial strains have been isolated using different selective media specific for the growth of actinobacteria and screened against test pathogenic microorganisms for determined their antimicrobial metabolites production potential in subsequent experiments (Figure 1A & 1B). The antimicrobial metabolites producing strains were selected for the screening of antibiotic biosynthetic gene cluster by PCR screening. Based on polyketide synthases (PKS) and nonribosomal peptide synthetases (NRPS) gene-targeted PCR amplification, variation in the occurrence of these biosynthetic pathways was observed among the actinobacterial strains (Figure 2). These findings indicate that protected forest soils of Assam are a lucrative source in the search for novel secondary metabolite producers with biotechnological applications. PCR amplified products of PKS and NRPS gene were sequenced for the presence of novelty. Based on broad spectrum antimicrobial activity and other important characteristics, a total of 12 actinomycetes isolates were identified by 16S rRNA gene sequence and the sequences have been deposited in the GenBank database under the accession numbers KM244742, KR610333, KM406384- KM406393.

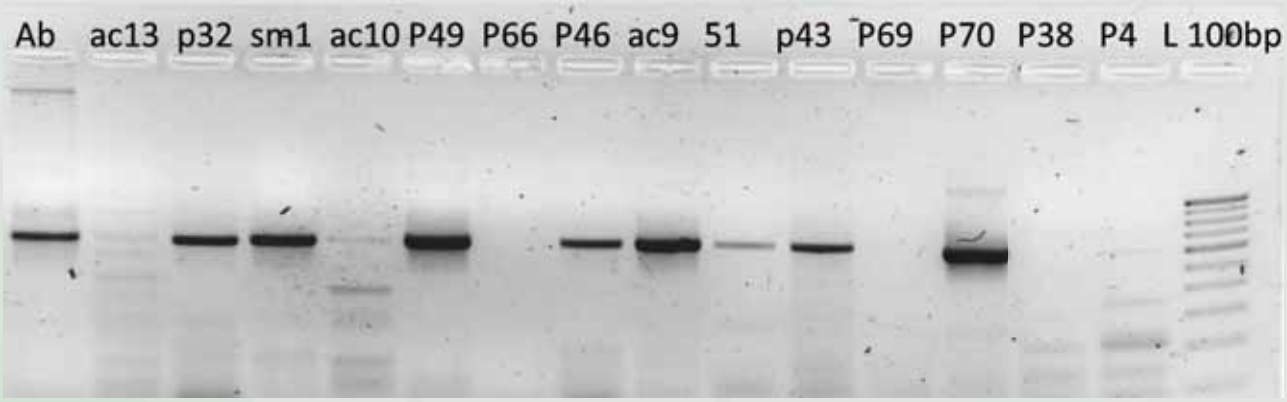


Figure 2: Detection of type II polyketide synthase biosynthetic genes in different strains of actinomycetes strains isolated from protected forest ecosystems of Assam.

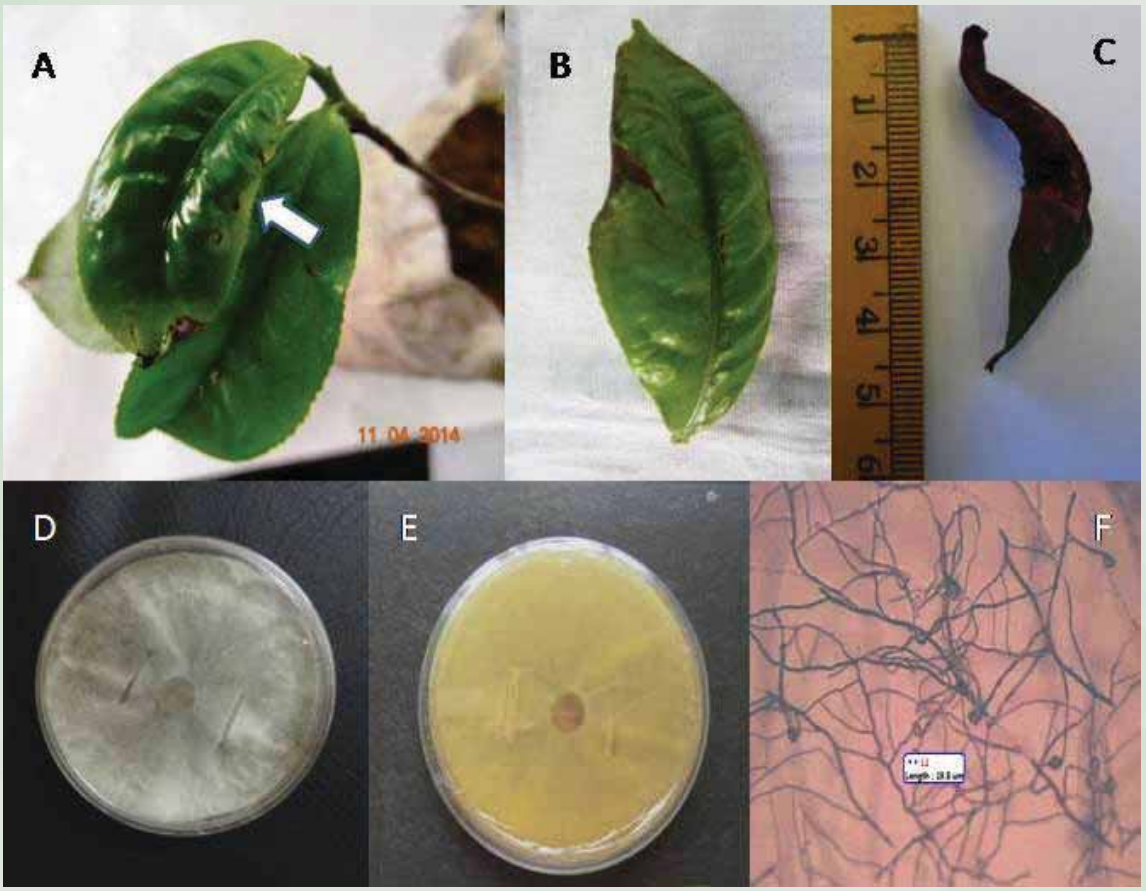


Figure 3: A and B, initial stage of infection in Tea leaf by Nigrosopra sphaerica. C, later stage of infected Tea leaf. D and E, 5-day-old N. sphaerica colony on PDA medium. F, mycelia and conidia morphology of N. sphaerica under the microscope.

"Nigrospora Leaf Blight" (NLB) on Tea Caused by Nigrospora sphaerica in India has been reported for the first time from our laboratory. NLB reduces yield and quality of leaves of commercial tea estates of

Darjeeling district, West Bengal. For the first time, we isolated the fungal pathogen, characterized and established as causal agent of NLB by Koch's postulates. Based on morphological characteristics and amplification of the internal transcribed spacer (ITS) region of the ribosomal RNA by using primers ITS1 and ITS4, the fungal pathogen was identified as *Nigrospora sphaerica* (GeneBank accession no. KJ767520) (Figure 3). This research data will be useful in easy detection of the disease symptoms of "Nigrospora leaf blight" in field condition and also its control.

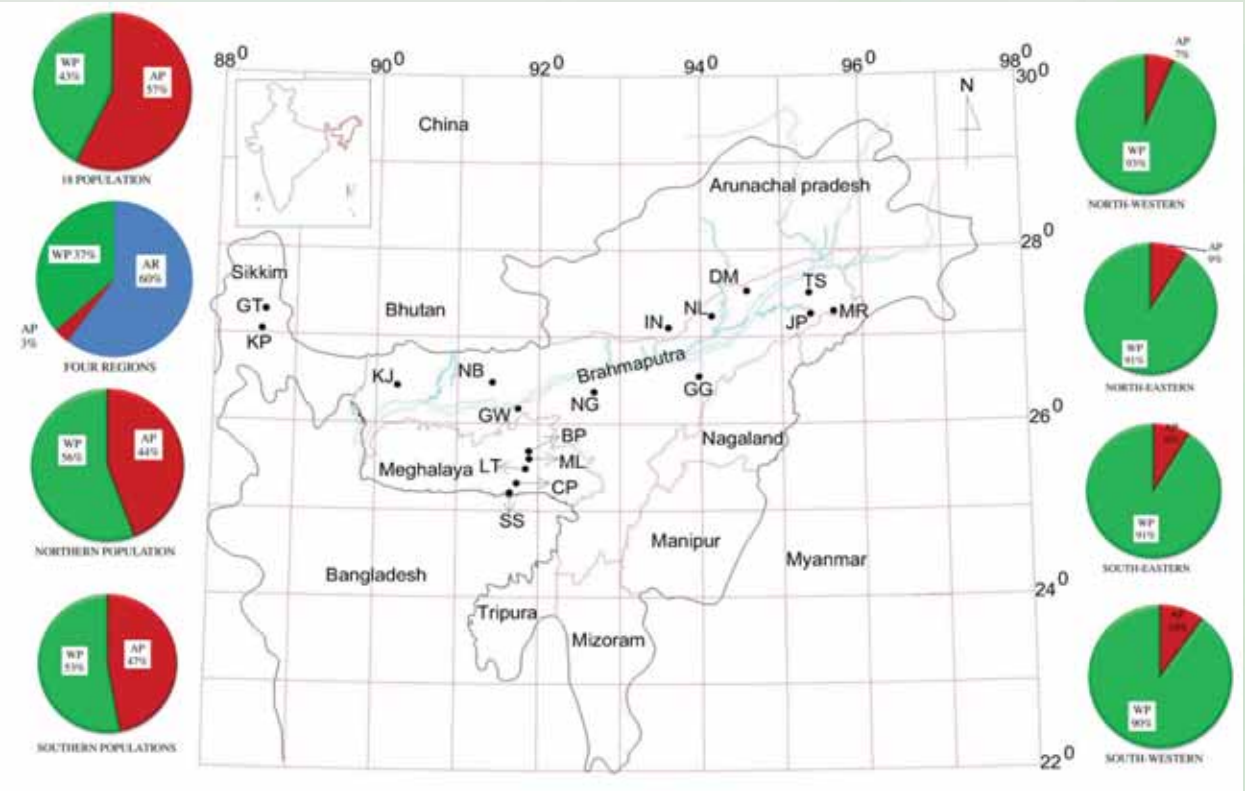


Figure 4: Distribution of the field sampling sites in North East India. Sampling area was divided into four regions : NW = north western; NW = north eastern; SW= south western, SE = south eastern, with respect to river Brahmaputra. The pie diagram shows the results of AMOVA where AP = among populations, WP = within populations, AR = among regions. Five localities each, were selected in the north-east [Nalbari (NB), Dhemaji (DM), Itanagar (IN), Kaziranga (KJ), Nalbari (NL)] and the south-west region [Cherapunji (CP), Shora Sella (SS), Mawlai (ML), Barapani (BP), Laitryngew (LG)] of Brahmaputra valley. Six localities were selected in the south-east region [Nagaon (NG), Margherita (MR), Golaghat (GG), Tinsukia (TS), Guwahati (GW), Jeypore (JP)] and two in north-west region [Kalimpong (KP), Gangtock (GT) of the Brahmaputra valley.

Population genetic structure were studied for a medicinal herb *Houttuynia cordata* from North East India *Houttuynia cordata* Thunb(a). is one of the important plant of the family Saururaceae. The herb is used in folk medicine for its antiviral, antibacterial, immune-stimulant, diuretic, anti-cancer and anti-inflammatory effects. However, the genetic diversity of this important medicinal plant in North-East India is not assessed yet. Using ISSR molecular marker, we analyzed genetic diversity and structure of isolated populations of *H. cordata* collected from different regions of North East India. The total genetic diversity of *H. cordata* is high

with higher genetic differentiation between populations of different regions compared to population of the same region. The populations (18) could be grouped into four distinct clusters based on the region of sampling of the genotypes (Figure 4 & 5). The geographical distribution of the populations and their genetic relationships were consistent and most likely due to natural geographic fragmentation of this species. A significant isolation-by-distance pattern was found in the sampled geographical range and significant genetic differentiation and restricted gene flow were observed among populations. This study generated insight that will be useful for management of *H. cordata* germplasm as well as genetic selection programs related to adaptive traits.

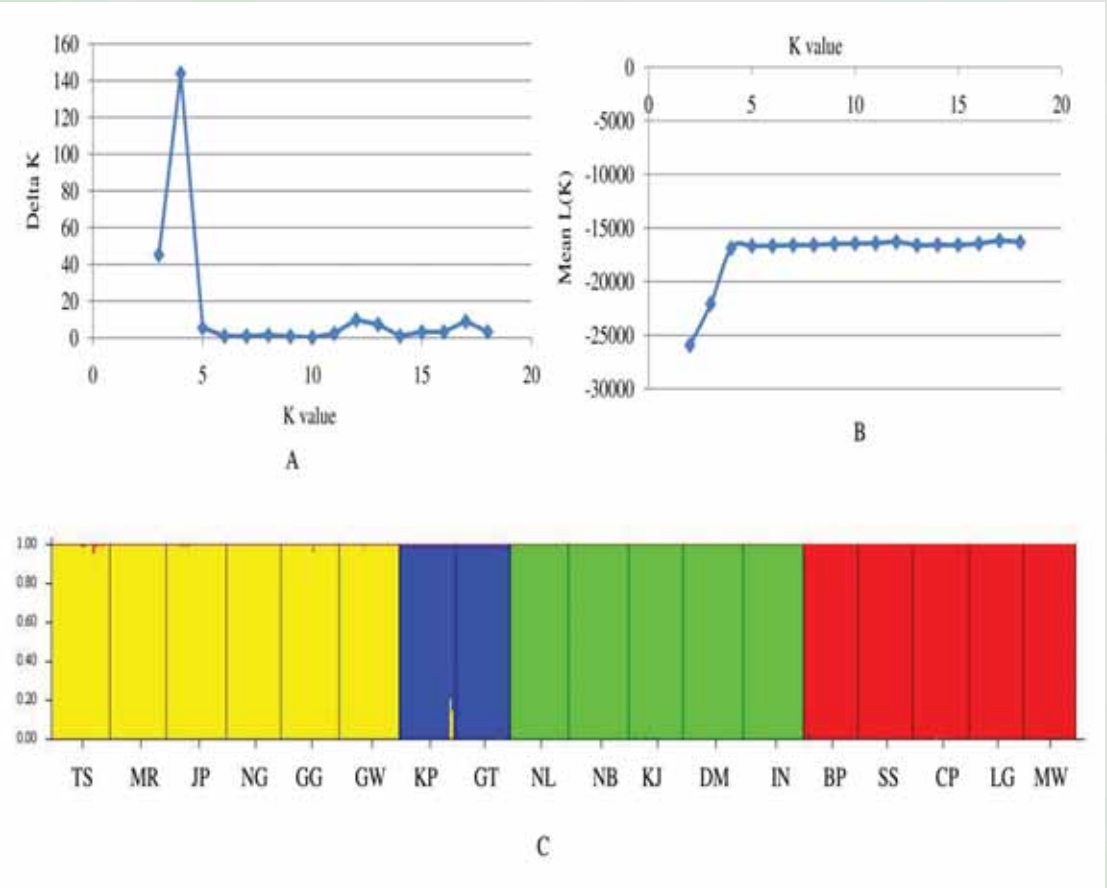


Figure 5: Structure analysis of Houttuynia cordata populations based on ISSR data [A: the relationship between K and mean L (K); B: the relationship between K and ΔK; C: the grouping when K = 4]. Without prior information about the populations and under an admixed model, STRUCTURE calculated the estimate of the likelihood of the data (LnP(D)) was greatest when K = 4. For K > 4, LnP(D) increased slightly but more or less plateaued (A), i.e., ΔK reached its maximum at K = 4 (B), suggesting that all the populations fell into one of the four clusters. These four genetically distinct clusters primarily correspond to the geographic distribution of these populations.

Dr. Mojibur R. Khan

Diversity of human gut microbes, Metagenomics approach for novel cellulases, Agarwood oil biotechnology

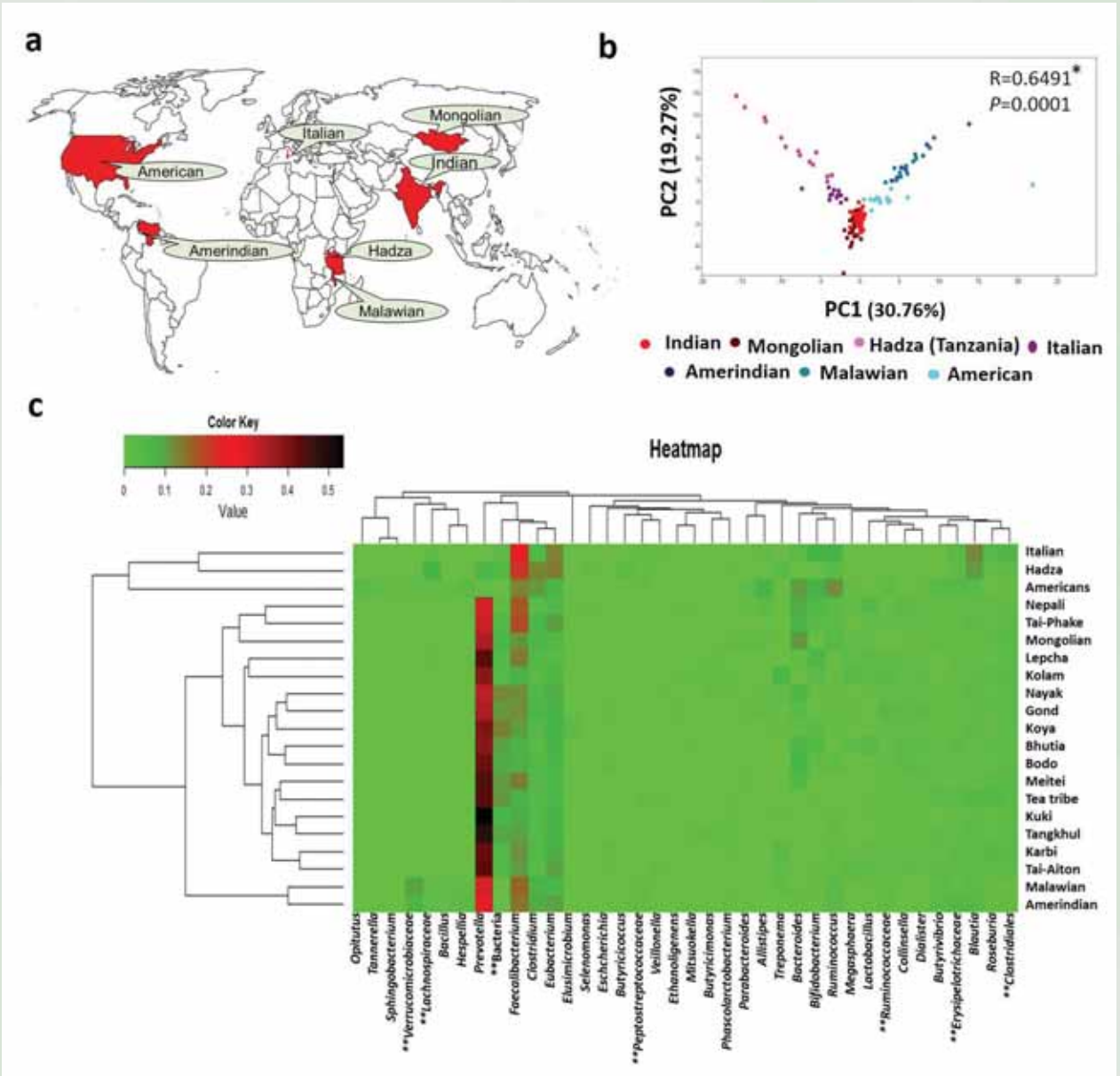


*Figure 1 : Comparison of gut bacterial profile of Indian tribes with the rest of the world. The gut bacterial profile of the Indian tribes were compared with the hunter gatherer group- Hadza, rural Malawians, Amerindians and Mongolians, also with urban population from Italy and USA (a). A PCA analysis was carried out based on the bacterial relative abundance (%) data (b). A heatmap was constructed based on the gut bacterial profile of the 15 Indian tribes along with the Mongolian, Italian, Hadza, Amerindians, Malawian and Americans (c). {*Analysis of similarity (ANOSIM); ** Unclassified bacteria}.*

The gastro intestinal tract of humans is inhabited by trillions of bacteria of diverse nature, composition of which varies among individuals within and between communities. The initial inoculum is acquired maternally during birth and subsequent colonization of the gut depends upon diet, age, diseases etc. Understanding the dynamic nature of the microbiota and its relation to physiology will lead to targeted modulation for better health. North-east of India is home to more than 200 distinct tribes with distinct genetic background and diverse food habits. This group has undertaken research to determine the gut bacterial profile (GBP) of the tribal population of north-east of India to understand the genetic, dietary or environmental factors involved in shaping the gut bacterial profile.

Our recent data show the effect of ethnicity and geography on gut bacterial profile of Mongoloid and Proto-Australoid tribes of India. Fecal bacterial diversity was studied in fifteen tribal population representing four geographic regions (Assam, Manipur, Sikkim and Telangana) by DGGE followed by NGS analysis on Illumina MiSeq platform. Geography and diet had significant effect on GBP of the Indian tribes and was dominated by *Prevotella*. The effects were more prominent with lower taxonomic levels indicating probable functional redundancy of the core GBP. A comparison with the worldwide data revealed that GBP of the Indian population was similar to the Mongolian population (Mongolia) (Figure 1). The bacterial genera *Faecalibacterium*, *Eubacterium*, *Clostridium*, *Blautia*, *Ruminococcus* and *Roseburia* were found to be core genera in the representative population of the world (Figure 2).

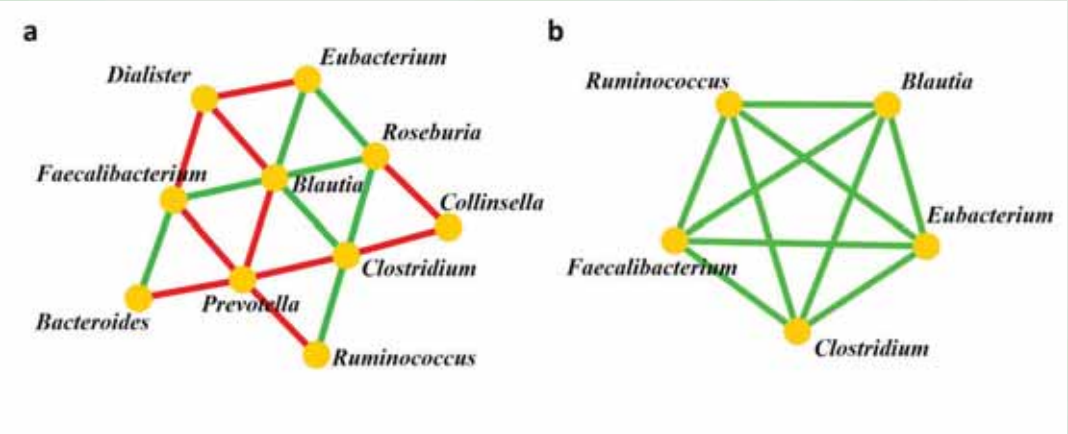


Figure 2: Network of co-occurring genera of the core gut bacteria. Network of co-occurring genera were constructed in cytoscape using correlation data of core gut bacteria of Indian tribes (a) and the representative population of the world (b). The nodes and edges represent bacterial genera and the type of correlation, respectively (Green: positive; red: negative).

This group has also undertaken research to isolate novel cellulase genes from metagenomic DNA samples from the forests of north-east of India. A novel endo-glucanase gene from Tawang reserve forest has been cloned.

Our research area also includes Agarwood fragrant production by fungi in agarwood callus. Fragrant agarwood oil produced in the plant *Aquilaria malaccensis* found in the north-east of India is well known for its quality. An *in vitro* method has been developed for production of fragrant agarwood compounds by treating agarwood callus with a fungus. Indian patent has been filed for this technique (Patent application number:1277/KOL/2014). Fragrant agarwood oil has a global market of $6 billion. Therefore, this technique has potential for commercialization.

TRADITIONAL KNOWLEDGE BASED DRUG DEVELOPMENT AND DELIVERY

....Traditional health care practices are common to all cultures and civilization. According to the World Health Organization (WHO), currently as many as 80% of the world's populations depend on traditional medicine for their primary health care needs. These traditional health care practices are collectively termed as complementary and alternative medicine (CAM) and in recent years, many of the traditional practices have gained renewed popularity in the urban areas of the countries of its origin and also in different western societies where use of allopathic drugs have been widespread. Complementary therapies can be used alongside conventional health care whereas alternative therapies are used instead of conventional health care. There is huge scope of research for exploiting right blends of CAM and conventional health care in dealing with metabolic disorders such as diabetic neuropathy and cancer in more effective manner. IASST has developed this program with a view to validate claim of traditional healers on several medicinal herbs and herbal formulations as effective cure agent and also to identify the bioactive principles in these and to collaborate with institutions and industries in developing standardized products through humane trials. ....

Prof. Jibon Kotoky

Programme Head, Traditional Knowledge Based Drug Development and Delivery

Medicinal Plants, Diabetes, Prostate Cancer, Breast Cancer,

The investigations carried out in the laboratory during the year 2014-15 include wound healing property of *Cymbopogon nardus* essential oil on Candida albicans infected diabetic wounds, androgen receptor mediated drug development to treat prostate cancer, anti-oxidant and hepatoprotective activity of methanolic leaf and bark extracts of *Randia dumetorum*, *in vitro* and *in vivo* antiproliferative and apoptogenic effect of *Garcinia morella* on T cell lymphoma, and Chloramphenicol encapsulated Poly-ε-Caprolactone-pluronic composite Nanoparticles for treatment of MRSA infected burn wound.

Healing of diabetic wounds is as such difficult and infection of wounds by opportunist fungus such as candida delay wound healing. A mouse model to mimic diabetic wound infections was developed for evaluation of wound healing property of essential oil obtained by hydro distillation from C. nardus (EO-CN). GC-MS analysis of the essential oil was done for identification of different molecules and *in vitro* plate assay was performed to determine the minimum inhibitory concentration (MIC). Azulene, β-Patchoulene, α-Patchoulene and Patchouli alcohol were main constituents of EO-CN and concentration of EO-CN to inhibit the fungus was found to be 25µg v/v. Histopathology of wounded tissue suggested that EO-CN treatment hastened wound healing (Figure 1) and showed less candida load on the wound of treated animal compared to the untreated animals.

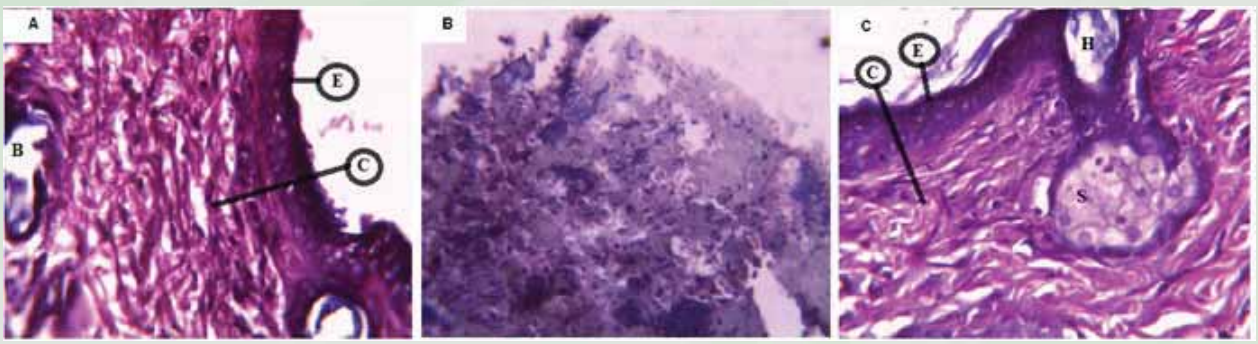


Figure 1: Histopathological evaluation of Candida albicans infected diabetic wounds in mice due to treatment of essential oil from Cymbopogon nardus (EO-CN). (A) Healing of normal diabetic wounds. (B) No healing of C. albicans infected diabetic wounds and (C) Acceleration in wound healing in C. albicans infected diabetic wounds after application of EO-CN. E: Epidermis; C: Collagenase tissue; B: Blood vessel; H: Hair follicles; S: Sweat glands.

Androgen Receptor (AR), the member of nuclear receptor subfamily, plays an important role in the development, growth, function and homeostasis of the prostate. In receptor-ligand docking studies (Figure 2),

we designed a series of oxobenzimidazoles using molecular docking and subsequently, the best fit molecules were synthesized and characterized through ^{1}H-NMR, ^{13}C-NMR and HRMS analyses. The viability of two prostate cancer cell lines (PC-3, LNCaP) and two breast cancer cell lines (MCF-7 and MDA-MB-231) due to the application of different form of the synthesized compounds was determined by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay and inhibitory concentration (IC_{50}) values calculated. The ADME/T properties were also determined to rationalize the inhibitory properties of these compounds. The IC_{50} value (10μM) of DDL-003 confirmed that this was highly potent against PC-3 & LNCaP cell lines. Further, the structure of DDL-003 was confirmed by single crystal X-ray diffraction (XRD) analysis.

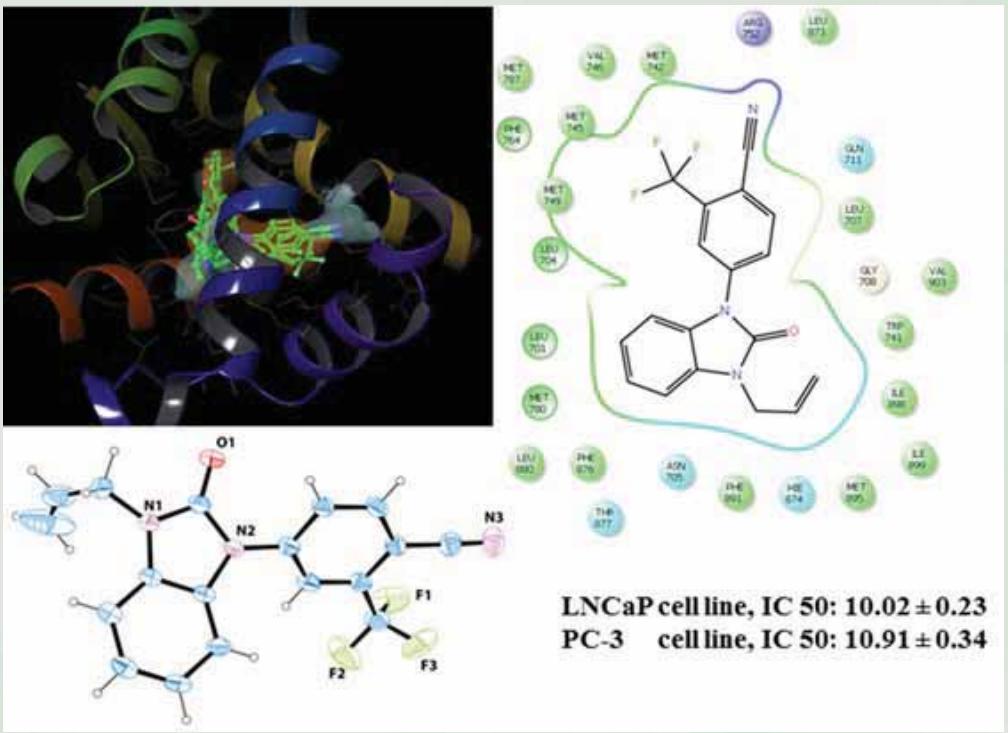


Figure 2: Graphical representation of oxobenzimidazole derivatives

There are large number of medicinal plants, the antioxidants and phytochemicals which are effective in treating liver disorders. Search for new medicinal plants with such function is continuous. We evaluated methanolic extract of *R. dumetorum* leaf and bark for *in vitro* anti-oxidant and hepato protective activity. Anti oxidant activity of the extracts were evaluated by 1, 1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging method and reducing power assays. In an *in-vivo* study, we induced intoxication in rats by injecting CCl4, and subsequently treatment with *R. dumetorum* leaf and bark at 200 and 400 mg/kg concentration followed by examination of the levels of thiobarbituric acid reacting substances (TBARS), antioxidant enzymes including superoxide dismutase (SOD), catalase (CAT), and glutathione reductase (GSH) and serum biochemical parameters such as AST, ALT, ALP, LDH, albumin, total protein, total and direct. Histopathology of liver (Figure 3) was also carried out to see whether the test results are consistent with biochemical results. The methanolic extracts showed good anti-oxidant and hepatoprotective activity in *in-vitro* & *in-vivo* conditions and we attribute this effect to free radical scavenging activity (Figure 4&5) and reduction of lipid peroxidation. Our results support the traditional use of *R. dumetorum* leaf and bark against liver diseases. This plant might provide promising herbal formulations, useful for the patients with liver ailments.

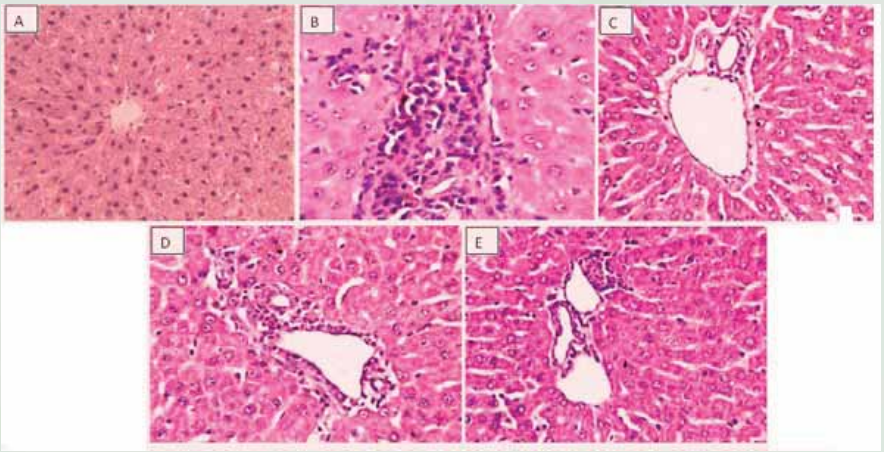


Figure 3: A) Liver of control rat showing normal hepatocytes; x 100 B) Liver of rat treated with CCl4 showing dense periportal inflammation; x 400. C) Liver of rat treated with CCl4 and 100mg/kg Silymarin showing complete absence of periportal inflammation or necrosis; x 400. D) Liver of rat treated with CCl4 and 400 mg/kg of R. dumetorum methanolic leaf extract showing mild periportal inflammation; x 400. E) Liver of rat treated with CCl4 and 400mg/kg R. dumetorum methanolic bark extract showing reversal of changes with absence of periportal inflammation or necrosis; x 400.

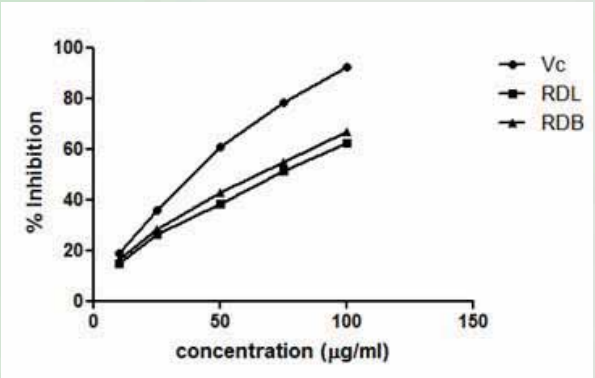


Figure 4: DPPH radicle scavenging assay of methanolic extract of Randia dumetorum leaf (RDL), bark (RDB) and ascorbic acid (V_c).

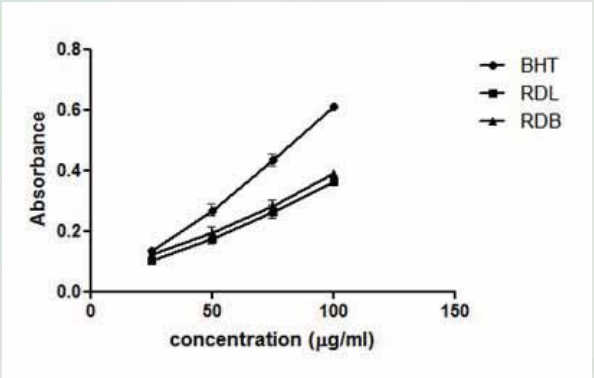


Figure 5: Reducing power activity of methanolic extract of Randia dumetorum leaf (RDL), bark (RDB) and butylated hydroxytoluene (BHT).

Garcinia morella (GM), endemic to the north eastern India is used by the local people for treating bowel problems, boils and inflammatory diseases. We tested the effect of the methanolic extract of GM leaf, bark and fruit on Dalton's lymphoma induced ascites tumour. The GM fruit extract (GMFE) was found to be highly cytotoxic to the DLA cells in both *in vitro* (Figure 7A & 7B) and *in vivo* experiments. Treatment of DLA cells with extracts for 3 hours and then staining with Acridine orange and Ethidium bromide indicated effect of GMFE on nuclear materials. It was evident from formation of apoptotic bodies (Fig. 6). The GMFE could also significantly increase the level of apoptotic marker enzyme Caspase3 in DLA cells upon treatment for 3 hours in *in vitro* condition. (Figure 7C). In *in vivo* experiments, GMFE (200mg/kg) increased the mean survival time of DLA induced mice in comparison to the control group of mice which were inoculated with DLA cells but not fed with GMFE. On treatment with GMFE, inhibition of neovascularisation in the peritoneum of DLA induced mice was also observed (Figure 8). The fruit extract has thus showed very remarkable activity against Dalton's lymphoma in both *in vitro* and *in vivo* condition.

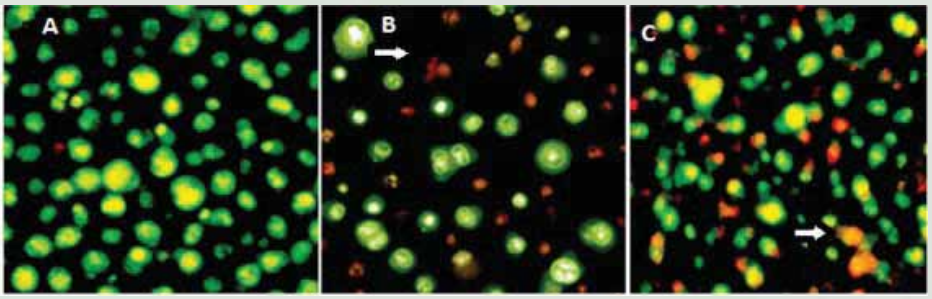


Figure 6: Morphology of Dalton's lymphoba (DLA) cells after staining with Acridine orange and Ethidium bromide. A) Untreated DLA cells where all cells are alive (Green) B) DLA cells treated with 150µg/ml Garcinia morella fruit extract (GMFE). C) DLA cells treated with 250µg/ml GMFE. White arrows indicate apoptotic and dead DLA cells. Note the red color of dead cells.

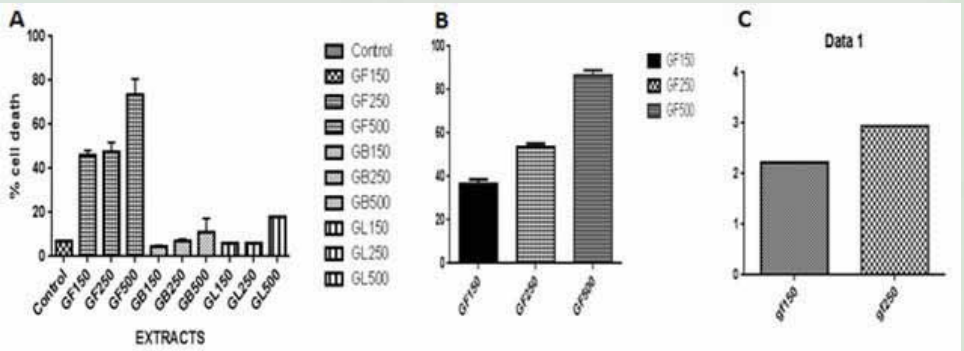


Figure 7: In vitro cytotoxicity of Garcinia morella fruit extract (GMFE) on DLA cells. A) In vitro cytotoxicity of different doses of the extracts on DLA cells as observed in FACS by staining the cells with propidium iodide. B) Dose dependent cytotoxicity of GMFE extract on DLA cells by tryphan blue dye exclusion method. C) Fold change in level of Caspase 3 enzyme which is a apoptotic enzyme on treatment of DLA cells with 150 and 250 µg /ml of GMFE. Fold change was calculated on the basis of activity in the control treatment.

Figure 8: Effect of Garcinia Morella fruit extract (GMFE) (200mg/kg) on neovascularization in the peritoneum of DLA induced mice. When mice are induced with DLA cells in the peritoneum, the DLA cells multiply constantly and hence new blood vessels arise to supply blood to this cancer cells. Thus the control animals which were induced with DLA but did not receive any treatment after 10 days showed angiogenesis in the peritoneum. But peritoneum of the DLA induced animals treated with GMFE 200 mg/kg for 10days did not show any marked sign of neovascularization which can be compared with the standard cyclophosphamide (10mg/kg) treated animals.

Despite the alarming epidemic of multidrug-resistant bacteria, antibiotic drug discovery and development seem to have greatly deccelerated in recent years which have forced clinicians to reintroduce forgotten antibiotics into their practices. Methicillin-resistant Staphylococcus aureus (MRSA) infections in the context of burn wounds lead to invasive disease conditions that could potentially cause mortality. Chloramphenicol is a well-known broad-spectrum bacteriostatic antibiotic that has been used since 1949, but due to its toxicity, poor dermal penetration, fast degradation and hydrophobicity, its application has been hindered. Due to its low-level use in the past, Chloramphenicol remained effective against a large number of currently prevalent resistant bacteria. To reintroduce chloramphenicol as a potent, user friendly topical antibiotic, Chloramphenicol was encapsulated in PCL-pluronic composite nanoparticles (CAM-PCL-P NPs) (Figure 9).

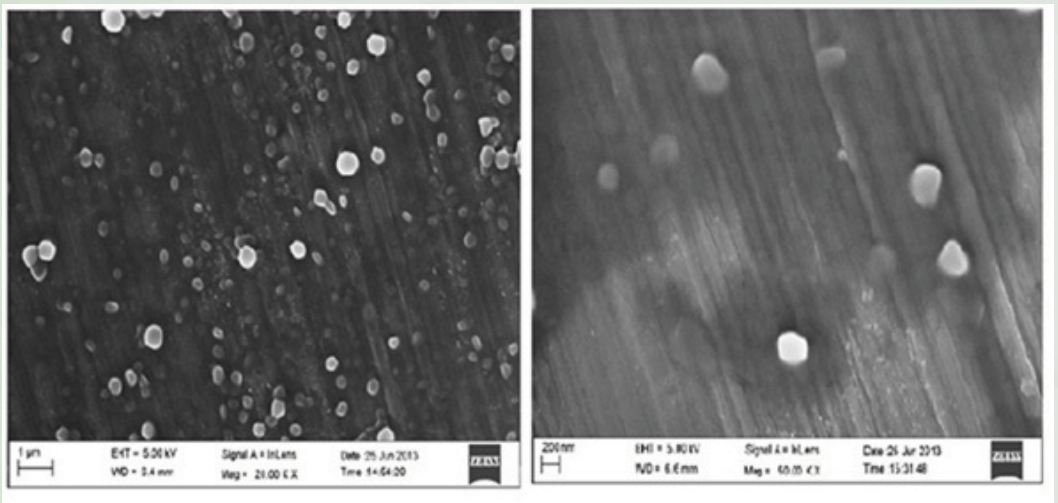


Figure 9: Images of CAM-PCL-P NPs viewed under field emission scanning electron microscopy.
Notes: (A) CAM-PCL-P NPs at 20.00 KX magnification; (B) CAM-PCL-P NPs at 50.00 KX magnification.

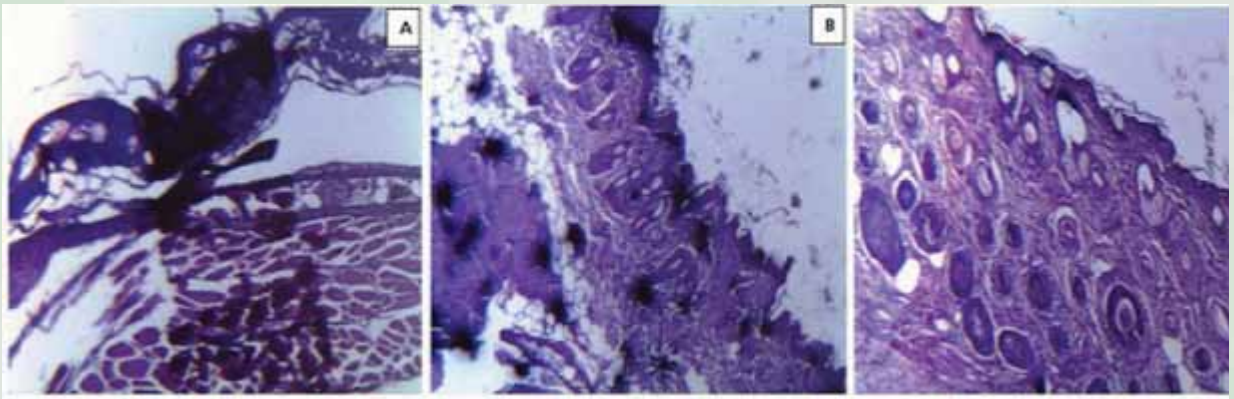


Figure 10: Histopathological analysis of MRSA-infected burn wound from Swiss albino mice. Notes: (A) Control burn on day 3 showing complete disruption, necrosis, and disorganized inflammation of epidermis, subepidermis, and dermis layers, and only some kind of bulbous elements were observed. (B) Treated with free CAM, as of day 7 showing epidermis was ulcerated with a sign of little epidermal reepithelialization and presence of inflammatory granulation (C) Treated with CAM-PCL-P NPs, as of day 14 showing pronounced re epithelialization with intact maturing subepidermis and dermis, along with normal skin adnexal structures.. Slides were subjected to hematoxylin and eosin staining.

Significant toxicity reduction was observed for CAM-PCL-P NPs than that of free drug as confirmed from hemolytic activity against human blood erythrocytes and cytotoxicity assay against MCF-7 breast cancer cell line. Zone of Inhibition, MIC, MBC and time kill assays showed that CAM-PCL-P NPs exhibited significantly enhanced anti-MRSA activity against ten clinical isolates of MRSA. The enhanced activity of CAM-PCL-P NPs further evaluated on MRSA infected burn wound animal model. Efficacy in MRSA clearance and improving the survival rate in CAM-PCL-p-NPs treatment was better compared to that of free-chloramphenicol treatment (Figure 10).

Dr. Rajlakshmi Devi

Medicinal Plant, Lipidemia, Antioxident, Oxidative stress,
Metabolic Disorder.

The thrust areas of research in this laboratory are to study the role of *Musa balbisiana* Colla in the treatment of metabolic syndrome related disorders, survey the Ethnopharmacological use of *Garcinia Pedunculata* Roxb. fruit in six different districts of Assam and probe the protective effects of a mix formulation of *Clerodendron colebrookianum* and *Allium sativum* on metabolic syndrome associated risk factors.

Musa balbsiana (MB), an indigenous species of Northeast region (NER) of India, is a versatile medicinal plant. Every part of this particular plant is used for curing different types of diseases (Tribal Health care Research Programmers, April 2008 - March 2012). MB juice is prescribed for its hypoglycemic effect. Our previous study showed that root juice (RJ) of MB impart potential hypoglycemic effect on *in vitro* condition and in acute animal experiment (for 21 days). The present study has been designed to observe the effect of chronic treatment of RJ against metabolic syndrome and associated complications including diabetes and hyperlipidemia. Metabolic syndrome was developed in rats by feeding high fat high carbohydrate (HFHC) diet for 90 days (as per the standard protocol.) and rats were fed with RJ for subsequent 30 days. During the experimental period of 120 days, different parameters were assessed to investigate the effect of RJ against metabolic syndrome.

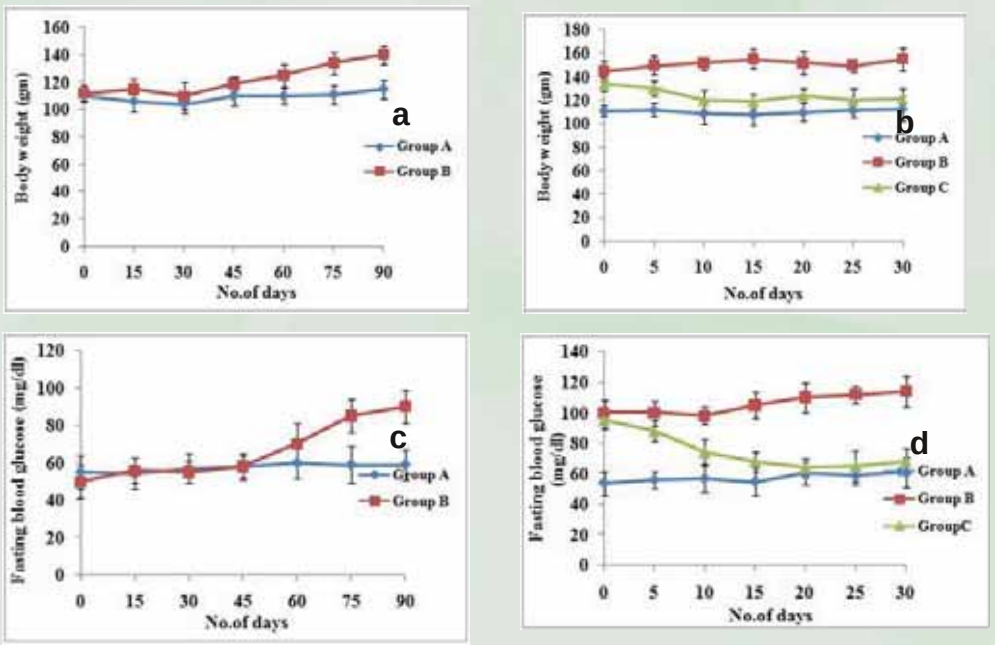


Figure 1: Body weight (a) and fasting blood glucose (c) were determined at 15 days interval up to 90 days and at 5 days interval up to 120 days (b, d) in three groups of rat (Group A: Control, Group B: high fat and high carbohydrate (HFHC) diet, Group C: HFHC+ Root juice).

Animals which were fed HCHF diet, gained substantial body weight (Figure 1a) and showed very high rate of fasting blood glucose (FBG) level up to 90 days (Figure 1c). On the other hand body weight (Figure 1b) and

FBG (Figure 1d) levels decreased during the subsequent 30 days following RJ treatment. Furthermore, HCHF diet fed rats exhibited decreased ability to clear glucose from the circulation as compared with normal diet fed and RJ treated rats during OGTT (Figure 2a). Normal diet fed rats showed normal response to insulin as compared to HCHF fed rats, which showed a lower response. This response (Figure 2b) was slightly improved in RJ treated rats as compared to HCHF fed rats.

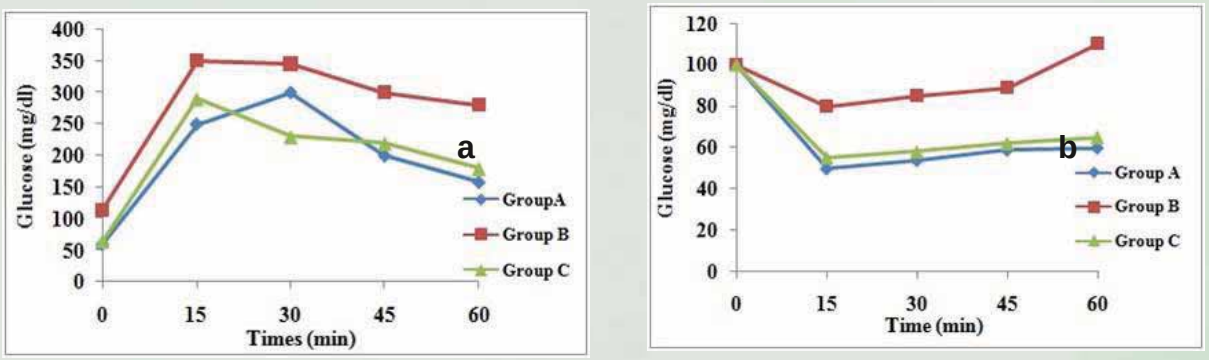


Figure 2: Glucose tolerance test (a) and insulin tolerance test (b) were carried out at 15 minutes interval at the end of 120 days in three groups of rat (Group A: Control, Group B: high fat and high carbohydrate (HFHC) diet, Group C: HFHC+ Root juice.

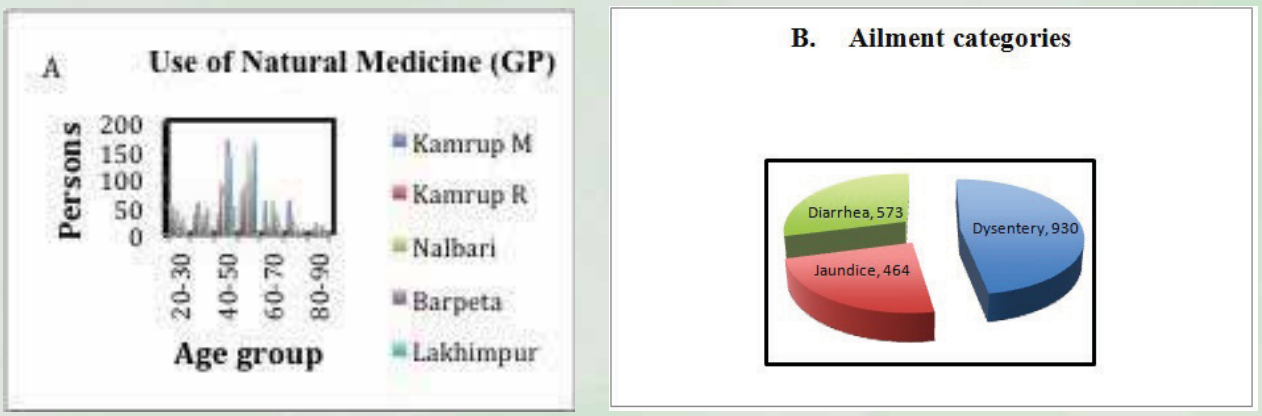


Figure 3: The number of people of seven age group in six districts of Assam who depends on natural medicine for health care (A) and the number of people within seven groups respondents who depend on GP for curing the respective three diseases (B).

Gastrointestinal diseases (GDs) have been a cause of concern mostly in the rural parts of developing countries worldwide. The rural people in Assam have been traditionally using natural medicine for curing different diseases. We recorded ethnomedicinal use of *Garcinia pedunculata* Roxb. (Family: Clusiaceae) (GP) fruit in six different districts of Assam of Northeast region (NER) of India. Open-ended and semi structured questionnaire were prepared and distributed among different sections of people. Total 2,600 responded at random were selected from the six districts of Assam and out of them 1,967 people (75%) were found to use GP fruit out of beliefs that it is a healer of dysentery, diarrhea and jaundice. Another interesting findings of this study was that out of 2,600, only 633 people used allopathic medicine for healing different stomach related diseases. This result shows that rural people use GP fruit as a primary treatment for curing

different types of stomach related diseases (Figure 3). Research on scientific validation of this ethnic knowledge is under way.

The study on the mix formulation of *Clerodendron colebrookianum* and *Allium sativum* is based on the folklore practice of the Tangsa tribe of NE India who are known to consume a decoction of *Clerodendron colebrookianum* (CC) with cloves of *Allium sativum* (AS), as a home remedy to treat hypertension. Taking this as a base, an appropriate formulation of CC and AS (namely R4) was designed and investigated for its protective effects on metabolic syndrome associated risk factors in rats. *In-vitro* and *in-vivo* analysis of the formulation revealed high antioxidant and anti-hyperlipidemic activity (Figure 4 and 5). It may, thus, serve as the starting point for further research and development of commercial herbal drug for use against metabolic syndrome associated risk factors.

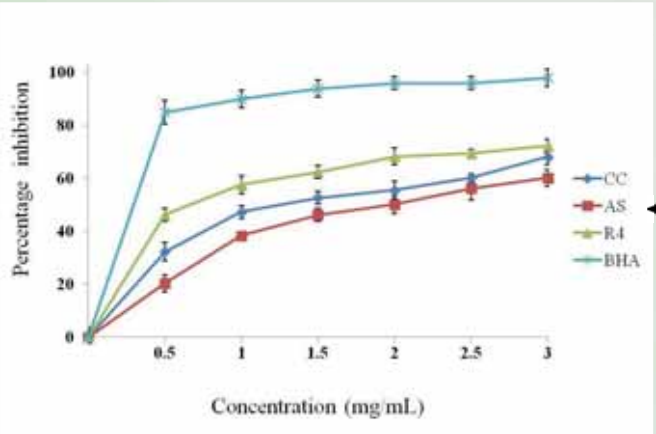
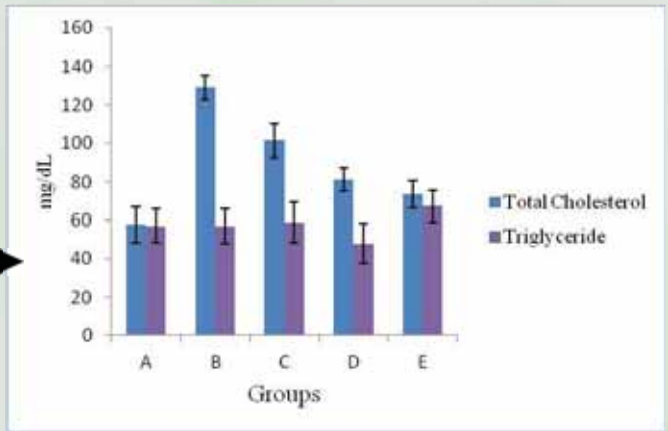


Figure 4: Effect of Clerodendron colebrookianum (CC), Allium sativum (AS), Formulation of CC and AS in appropriate ratio (R4) and Butylated hydroxyanisole (BHA) on DPPH radical scavenging activity. Values are mean ± S.E.M.

Figure 5: Effect of the formulation of CC and AS in appropriate ratio (R4) and Fenofibrate on total cholesterol and triglyceride level of rats, induced with hyper-lipidemia by feeding high cholesterol diet. Group A, fed on basal diet; Group B, fed on high cholesterol diet; Group C, fed on high cholesterol diet + Treatment with R4 (Dose 1); Group D, fed on high cholesterol diet + Treatment with R4 (Dose 2); Group E, fed on high cholesterol diet + Treatment with Fenofibrate (60mg/kg body weight of rat). Values are mean ± S.E.M from 6 animals.



Extramural Projects

Completed Projects

Title of the project	Funding Agency	Duration	PI/Mentor
Study of single step synthesis of magnetic material containing aligned carbon nanotubes by plasma based chemical vapour deposition process and effect of externally applied magnetic field during growth on the alignment and properties of the nanotubes	CSIR, Govt. of India	2011-2014	Dr. A. R. Pal
Self-assembly in Nanomaterials and Biomaterials: An SANS and SAXS Study	UGC-DAE CSR	2012-2015	Dr. S. Kundu
Development of Proton exchange membrane for fuel cell by plasma process	MNRE, Govt. of India	2010-2014	Prof. J. Chutia
Stimuli Responsive Polymeric surfaces	CSIR, Govt. of India	2011-2014	Dr. D. Chowdhury
Development of Polymer Based Sensors	MCIT, Dept. of IT, DeitY, Govt. of India	2011-2015	Dr. N. S. Sarma
Biotechnology led organic farming in the North Eastern Region	DBT, Govt. of India	2010- 2015	Dr. N. C. Talukdar Co-PI : Dr. S. I. Devi BSD, Imphal
Study on intestinal microbiota of ethnically diverse tribal population of Inida: Enhancing our understanding on effect of host genotypes, diet and ecology	DBT, Govt. of India	2010- 2015	Dr. N. C. Talukdar Co-PI : Dr. S. I. Devi IBSD, Imphal
Exploration of Actinomycetes in soil of protected forest areas of Assam for antioxidant activity and its potential application against bacterial and fungal pathogens.	ICMR, Govt. of India	2013-2015	Dr. D. Thakur
Molecular Genetic Diversity of *Houttuynia* Thunb. germplasms prevalent in North East India and Screening for Antioxidant along with antimicrobial activity.	DBT, Govt. of India (DBT-RA Scheme)	2012-2014	Dr. D. Thakur Research Associate: Dr. S. Gupta

Ongoing Projects

Title of the project	Funding Agency	Duration	PI/Mentor
Development of atmospheric pressure glow discharge plasma system for growth of vertically aligned carbon nanotubes	BRNS-DAE, Govt. of India	2013-2016	Dr. A. R. Pal
Polymer and polymer nanocomposites: structure and property correlation	DAE-BRNS, Govt. of India	2014-2017	Dr. S. Kundu
Structure, pattern and elastic behaviour of model membranes in presence of nanomaterials	DST, Nano Mission, Govt. of India	2015-2018	Dr. S. Kundu
Treatment of oil field formation water with *in situ* generated bioflocculant	DBT, Govt. of India	2011-2015	Dr. A. Devi
Exploration of microbial diversity (culturable) associated with Tea Rhizosphere Soil of Assam and Darjeeling (WB), and utilization for biocontrol of fungal diseases and the production of plant growth promoting substances.	DBT, Govt. of India	2012-2015	Dr. D. Thakur
Comparative study of whole plant microbiome from drought affected and normal tea plantations and their utilization for improvement of tea productivity.	DBT, Govt. of India (DBT-BioCARE Scheme)	2014-2017	Dr. D. Thakur Woman Scientist: Dr. S. Gupta
Assessment of chemical inputs on soil biochemical and microbiological parameters and tea field workers health: Environmental awareness among tea labors of Sonitpur district , Assam towards chemical inputs in tea plantations.	DST, Govt. of India (DST SoRF Women Scientists Scheme)	2015-2016	Dr. D. Thakur Woman Scientist: Ms. R. Das
Study on intestinal microbiota of ethnically diverse tribal population of India: enhancing our understanding on effect of host genotype, diet and ecology.	DBT, Govt. of India	2011-2015	Dr. M. R. Khan
Institutional biotech hub.	DBT, Govt. of India	2011-2016	Dr. M. R. Khan
Agrawood production from *Aquilaria agallocha*- studies from a biotechnological perspective on an ancient and important plant based industry of north east India.	DBT, Govt. of India	2012-2015	Dr. M. R. Khan Research Associate : Dr. S. Sen
Exploration of microbial resources of north-east India: generation of metagenomic DNA bank, construction of metagenomic libraries and screening for genes of interest.	DBT under Ramalingaswami Fellowship	2011-2016	Dr. M. R. Khan
A study on hydrocarbon pollution in lentic ecosystems in and around oil field areas and effect of hydrocarbon contamination on flora and fauna	NEC, Ministry of DONER, Govt. of India	2013-2015	Dr. S. C. Bordoloi

Antifungal properties of biosurfactants produced by the native bacterial strains and their application to control certain fungal diseases of field crops of Assam	Department of Biotechnology, Govt. of India, New Delhi (DBT Twining Project)	2012-2015	Dr. S. Deka & Dr. S. S. Comeotra IMTECH, Chandigarh
Biosurfactant Enhanced Bioremediation of PAHs Contaminated Soil of oil field situated at upper Assam	Department of Biotechnology, Govt. of India, New Delhi	2013-2016	Dr. S. Deka
Investigation on rogue waves in multicomponent plasma with negative ions	DST, Govt. of India	2013 - 2016	Prof. H. Bailung
Pharmacological evaluation of some indigenous variety of citrus fruits of Northeastern region of India – a biomolecular approach	ICMR New Delhi	2012-2015	Dr. R. Devi
Identification and characterization of bio-active molecules from some indigenous medicinal plants of NE region of India with special reference to antioxidant and hypolipidemic properties.	DBT, New Delhi, Govt of India	2013-2016	Dr. R. Devi
Androgen receptor mediated drug development to treat Prostate Cancer	DBT, New Delhi	2012-2015	Prof. J. Kotoky
Development and elucidation of mechanism of action of herbs to treat diabetic neuropathic pain	DBT, New Delhi	2014-2017	Prof. J. Kotoky
Electronic, magnetic and lattice dynamical properties of magnetic shape memory alloys	DST, Govt. of India	2013-2016	Dr. M. B. Sahariah
Investigating physico-chemical properties of new hybrid carbon nanomaterials and its applications as sensors	DST, Govt. of India	2013-2016	Dr. D. Chowdhury
Physico-chemical study of carbon dots and its applications as sensors	BRNS-DAE, Govt.of India	2014-2017	Dr. D. Chowdhury
Impact assessment of *Jhuming* on native plants and soil microbiota and restoration of sustainable *jhum* agro-ecosystem in North-East India	DBT, Govt. of India	2012 - 2016	Dr. N. C. Talukdar Research Associate: Dr. R. K. Sarma
Evaluation of role of arbuscular mycorrhizal fungi and PGPRs from diverse ecosystem of North East India for organic production of citrus and chili	DBT, Govt. of India	2012 - 2015	Dr. N. C. Talukdar Co-PI: Dr. L. S. Singh IBSD, Sikkim
Endophyte diversity in wild versus cultivated rice across the environmental gradients in North East India	DBT, Govt. of India	2013-2016	Dr. N. C. Talukdar Co-PI: Dr. S. Indira Devi BSD, Imphal

Publications

In Cited Journals

Name of Author(s)	Title of Paper	Name of journal	Vol. & Issue No./ Page No.	Month/ Year of Publication
A. Khan, B. K. Nath, J. Chutia	Nanopillar structured Platinum with enhanced catalytic utilization for electrochemical reactions in PEMFC	Electrochimica Acta	146/171–177	Nov/ 2014
B. K. Nath, A. Khan, J. Chutia, A. Ratan Pal, H. Bailung, N. SenSarma, D. Chowdhury, N. C. Adhikary	Enhancement of proton conductivity of sulfonated polystyrene membrane prepared by plasma polymerization process	Bulletin of Materials Science	37/1613-1624	Dec/2014
T. Barman, A. R. Pal	Plasmonic photosensitization of polyaniline prepared by a novel process for high-performance flexible photodetector	ACS Applied Materials and Interfaces	7(4)/2166-2170	Feb/2015
A. A. Hussain, A. R. Pal, D. S. Patil	High photosensitivity with enhanced photoelectrical contribution in hybrid nanocomposite flexible UV photodetector	Organic Electronics	15/2107-2115	Sept/2014
A. A. Hussain, A. R. Pal, D. S. Patil	An efficient fast response and high-gain solar-blind flexible ultraviolet photodetector employing hybrid geometry	Applied Physics Letters	104/193301	May/2014
M. Baro, A. A. Hussain, A. R. Pal	Enhanced light sensing performance of a hybrid device developed using as-grown vertically aligned multiwalled carbon nanotubes on TCO substrates	RSC Advances	4 /46970-46975	Sept/2014
A. A. Hussain, A. R. Pal, R. Kar, H. Bailung, J. Chutia, D. S. Patil	Comparative study of nanocomposites prepared by pulsed and dc sputtering combined with plasma polymerization suitable for photovoltaic device applications	Materials Chemistry and Physics	148(3)/540-547	Dec/2014
D. Gogoi, T. Barman, B. Choudhury, M. R. Khan, Y. Chaudhuri, M. Dehingia, A. R. Pal, H. Bailung, J. Chutia	Immobilization of trypsin on plasma prepared Ag/PPAni nanocomposite film for efficient digestion of protein	Materials Science and Engineering	C, 43/237-242	Oct/2014
T. Barman, A. R. Pal, J. Chutia	Comparative study of structural and optical properties of pulsed and RF plasma polymerized aniline films	Applied Surface Science	313/286-292	Sept/2014

M. Baro, A. R. Pal	Pulsed Plasma Assisted Growth of Vertically Aligned Carbon Nanotubes at Low Temperature on Mo Substrate	Plasma Chemistry and Plasma Processing	35/247-257	Oct/2014
N. C. Adhikary, M. K. Deka, A. N. Dev and J. Sarmah	Modified Korteweg–de Vries equation in a negative ion rich hot adiabatic dusty plasma with non-thermal ion and trapped electron	Physics of Plasmas	21 (8)/ 083703	Aug/2014
A. N. Dev, J. Sarma, M. K. Deka, A. P. Misra and N. C. Adhikary	Kadomtsev-Petviashvili (KP) Burgers equation in dusty negative ion plasmas': Evolution of dust-ion acoustic shocks	Communication in Theoretical Physics	62/875	Nov/2014
M. Baro, D. Gogoi, A. R. Pal, N. C. Adhikary, H. Bailung and J. Chutia	Pulsed PECVD for Low-temperature Growth of Vertically Aligned Carbon Nanotubes	Chemical Vapor Deposition	20(4-5-6)/ 161	April/2014
N. Gogoi, M. Barooah, G. Majumdar and D. Chowdhury	Carbon Dots rooted Agarose hydrogel hybrid platform for optical detection and separation of heavy metal ions	Applied Material & Interface	7(5)/3058-3067	Jan/2015
U. Baruah, N. Gogoi, A. Konwar, M. Jyoti Deka, D. Chowdhury and G. Majumdar	Carbon Dot based sensing of dopamine and ascorbic acid	Journal of Nanoparticles	2014/178518	Dec/2014
U. Baruah, N. Gogoi, G. Majumdar and D. Chowdhury	β-cyclodextrin and calix[4]arene-25,26,27,28-tetrol capped Carbon Dots for selective and sensitive detection of fluoride	Carbohydrate Polymers	117/377-383	March/2015
A. Konwar, N. Gogoi, G. Majumdar and D. Chowdhury	Green Chitosan-Carbon dots nanocomposite Hydrogel Film with superior properties	Carbohydrate Polymers	115/238-245	Jan/2015
U. Baruah, M. J. Deka and D. Chowdhury	Reversible on/off switching of fluorescence via esterification of carbon dots	RSC Adv.	4/36917	Aug/2014
N. Gogoi and D. Chowdhury	Novel carbon dot coated alginate beads with superior stability, swelling and pH responsive drug Delivery	J. Mater. Chem. B	2/4089-4099	April/2014
S. Chakravarty, D. Saikia, P. Sharma, N. C. Adhikary, D. Thakur and N. Sen Sarma	Supramolecular nanobiological hybrid as a PET sensor for bacterial DNA isolated from Streptomyces sanglieri	Analyst	139(24)/6502 - 6510	Oct/2014
S. Kundu, S. Mehan, V. K. Aswal, P. Callow	Studies on Interactions among Lysozyme Proteins in Solution: Effects of Concentration, pD, Temperature and Monovalent ions	Chemical Physics Letters	622/23-27	Feb/2015
K. Das, S. Kundu	Adsorption and conformation variation of BSA protein with the size variation of the metallic nanoparticles in LB film	Colloids and Surfaces A: Physicochem. Eng. Aspects	468/56-61	March/2015

K. Das, S. Kundu	Variation in surface plasmonic response due to the reorganization of Au nanoparticles in Langmuir-Blodgett film	J. Appl. Phys	116/024316	July/2014
K. Das, S. Kundu, S. Mehan, V. K. Aswal	Modification of interactions among proteins with the lowering of solution pD toward the isoelectric point in presence of different valent ions	Chemical Physics Letters	610-611/405-410	Aug/2014
B.C. Tripathy and R. Goswami	On triple difference sequences of real numbers in probabilistic normed spaces	Proyecciones Jour. Math.	33(2)/157-174	June/2014
B.C. Tripathy and M. Sen	Paranormed I-convergent double sequence spaces associated with multiplier sequences	Kyungpook Math. Journal	54(2)/321-332	June/2014
B.C. Tripathy and D.J. Sarma	Generalized b-closed sets in Ideal bitopological spaces	Proyecciones J. Math.	33(3)/315-324	Sept/2014
A. Dutta, A. Esi and B.C. Tripathy	On lacunary p-absolutely summable fuzzy real-valued double sequence space	Demonstratio Mathematica	47(3)/652-661	Sept/2014
B.C. Tripathy and S. Acharjee	On (γ, δ)-Bitopological semi-closed set via topological ideal	Proyecciones J. Math.	33(3)/345-357	Sept/2014
B.C. Tripathy and G.C. Ray	On δ-continuity in mixed fuzzy topological spaces	Boletim da Sociedade Paranaense de Matemática	32(2)/175-187	Sept/2014
M. Et, B. C. Tripathy and A. J. Dutta	On pointwise statistical convergence of order alpha of sequences of fuzzy mappings	Kuwait Journal of Science	41 (3)/17-30	Sept/2014
B.C. Tripathy and S. Borgohain	Sequence spaces of fuzzy real numbers using fuzzy metric	Kyungpook Math. Journal	54 (1)/11-22	2014
B.C. Tripathy and A.J. Dutta	Statistically pre-Cauchy fuzzy real-valued sequences defined by Orlicz function	Proyecciones Journal of Mathematics	33(3)/235-243	Sept/2014
B.C. Tripathy and G.C. Ray	Weakly continuous functions on mixed fuzzy topological spaces	Acta Scientiarum. Technology	36(2)/331-335	April/2014
B.C. Tripathy, S. Paul and N.R. Das	A fixed point theorem in a generalized fuzzy metric space	Boletim da Sociedade Paranaense de Matemática	32(2)/221-227	2014
B.C. Tripathy and A. Paul	The spectrum of the operator D(r,0,0,s) over the sequence spaces $_p$ and bv_p	Hacettepe Journal of Mathematics and Statistics	43(3)/425-434	June/2014
B.C. Tripathy and R. Das	Spectra of the Rhaly operator on the sequence space $\overline{bv_o} \cap l_\infty$	Boletim da Sociedade Paranaense de Matemática	32 (1)/263-275	2014
B.C. Tripathy, N.L. Braha and A.J. Dutta	A new class of fuzzy sequences related to the l_p space defined by Orlicz function	Journal of Intelligent and Fuzzy Systems	26(3)/1273-1278	May/2014
B.C. Tripathy, R. Dey and N.R. Das	Difference sequence spaces in cone metric space	Proyecciones Journal of Mathematics	33(4)/437-446	Dec/2014

B.C. Tripathy, R. Dey and N.R. Das	Statistically convergent and statistically Cauchy sequence in a cone metric space	TWMS Journal of Pure and Applied Mathematics	5 (1)/59-65	Jan/2014
B.C. Tripathy, S. Borgohain and I.K. Rana	On some classes of n-normed generalized difference sequences related to I_p-space	Analysis in Theory and Applications	*30/214-223*	*April/2014*
B.C. Tripathy, S. Paul and N.R. Das	Fixed point and periodic pint theorems in fuzzy metric space	Songklanakarin Journal of Science and Technology	37(1)/ 89-92	Feb/2015
B.C. Tripathy and S. Debnath	On fuzzy *b*-locally open sets in bitopological spaces	Songklanakarin Journal of Science and Technology	37(1)/93-96	Feb/2015
G.Choudhury, and J.C.Ke	An unreliable retrial queue with delaying repair and general retrial times under Bernoulli vacation schedule	Applied mathematics and Computations	230/436 - 450	2014
S. Dhar, K. K. Das, L. B. Mahanta	Comparative Study of Waiting and Service Costs of Single and Multiple Server System: A Case Study on an Outpatient Department	International Journal of Scientific Footprints	2(3)/ 18-30	July/2014
G. Kaushik, M. K. Das, J. F. Hussain and S. Bordoloi	Length-weight relationships of five fish species collected from Ranganadi River (Brahmaputra River tributary) in Assam, India	Journal of Applied Ichthyology	31(2)/433-434	Jan/2015
M.K.Das and S. Bordoloi	Length-weight relationship and reproductive parameters of *Botia dario* (Hamilton, 1822) in Assam , India	Journal of Applied Ichthyology	31(3)/571-573	March/2015
P. Baruah, R. R. Saikia, P. P. Baruah and S. Deka	Effect of crude oil contamination on the chlorophyll content and morpho-anatomy of *Cyperus brevifolius* (Rottb) Hassk	Environ Sci Pollut Res.	21/12530-12538	Nov/2014
Borah S N, Goswami D, Lahkar J, H. K. Sarma , M.R. Khan, S. Deka	Rhamnolipid produced by Pseudomonas aeruginosa SS14 causes complete suppression of wilt by *Fusarium oxysporum* f. sp. pisi in *Pisum sativum*	BioControl.	60/375-385	Dec/2014
J. Lahkar, S. N. Borah, S. Deka, G. Ahmed	Biosurfactant of *Pseudomonas aeruginosa* JS29 against *Alternaria solani*: the causal organism of early blight of tomato	BioControl.	60/401-411	Jan/2015
M. Pathak, A. Devi, H. K. Sarma, B. Lal	Application of bioflocculating property of *Pseudomonas aeruginosa* strain IASST201 in treatment of oil-field formation water	Journal of Basic Microbiology	54(7)/658-659	July/2014
S. Subudhi, N. Batta, M. Pathak, V. Bisht, A. Devi, B. Lal, Bader Al Khulifah	Bioflocculant production and biosorption of Zn and Pb by a novel bacterial species, *Achromobacter* sp. TERI-IASST N, isolated from oil refinery waste	Chemosphere	113/116-124	Oct/2014

P. Tamuly and A. Devi.	Heavy metal contamination of roadside topsoil in some areas of Golaghat and Jorhat district along national highway-37, upper Assam, India	International Journal of Environmental Sciences	5/472-481	Sep/2014
J. Dutta, S. Gupta, P. J. Handique, D. Thakur	First Report of Nigrospora Leaf Blight on Tea Caused by *Nigrospora sphaerica* in India	Plant Disease	99/417	March/2015
S. Walter, A. Kahla, C. Arunachalam, A. Perochon, M. Khan, S. Scofield, and F. Doohan	A wheat ABC transporter contributes to both grain formation and mycotoxin tolerance	Journal of Experimental Botany	doi: 10.1093/jxb/erv048	March/2015
Y.B. Chaudhari, N.C. Talukdar, N.C. Adhikary, M.C. Kalita, and M.R. Khan	Rice straw based evaluation of lignolytic and cellulolytic capabilities of novel strains of saprophytic fungi from Indo-Burma biodiversity hotspot	Energy and Fuels	29 (2)/784-792	Jan/2015
S. Sen, N.C. Talukdar and M.R. Khan	A simple metabolite profiling approach reveals critical bio-molecular linkages in fragrant agarwood oil production from *Aquilaria malaccensis* - a traditional agro-based industry in the north east of India	Current Science	108(1)/63-71	Jan/2015
S.N. Borah, D. Goswami, J. Lahkar, H.K. Sarma, M.R. Khan and S. Deka	Rhamnolipid produced by Pseudomonas aeruginosa SS14 causes complete suppression of wilt by *Fusarium oxysporum* f. sp. pisi in Pisum sativum	Bio Control	60/375-385	Dec/2014
S.S. Ali, L.R. Gunupuru, G.B.S. Kumar, M.R. Khan, S. Scofield, P. Nicholson and F.M. Doohan	Plant disease resistance is augmented in uzu barley lines modified in the brassinosteroid receptor BRI1	BMC Plant Biology	14/227	Aug/2014
S. Kalita, B. Devi, R. Kandimalla, K.K. Sharma, A. Sharma, K. Kalita, A. Kotoki, J. Kotoky	Chloramphenicol encapsulated in Poly-ε-Caprolactone-pluronic composite Nanoparticles for treatment of MRSA infected burn wound	International Journal of Nanomedicine	10/2971-2984	April/2015
D. Boruah, J. Choudhury, R. Kandimalla, J. Kotoky	A study on the traditional practices of some herbal medicine in the rural health care system of Assam	Punarnav	2(3)/1-10	May/2014
R. Kandimalla, S. Kalita, B. Choudhury, J. Kotoky	A review on anti-diabetic potential of genus *Solanum* (Solanaceae)	Journal of Drug Delivery and Therapeutics	5(1)/24-27	Jan/2015
S. Jothivel, J. Kotoky, Kabilan	S. Crystal structure of 1(2-chloroacetyl)-3,3-dimethyl-2,6-di-p-tolylpiperidin-4-one	Acta Crystallographica Section E: Crystallographic Communications	71(3)/0173-0174	March/2015

Khwairakpam, A. Devi, Shyamananda, M. Singh, Sailo, B. Lalduhsaki, Rathnakaram, S. Raju; Padmavathi, Ganesan; J. Kotoky, Kunnumakkara, B. Ajaikumar B	ATP Citrate Lyase (ACLY): A Promising Target for Cancer Prevention and Treatment	Current Drug Targets	16(2)/156-163	Feb/2015
N. Bhardwaj, WT Sow, Ng KW, BB Mandal, D. Devi, NJ Cho	Silk fibroin–keratin based 3D scaffolds as a dermal substitute for skin tissue engineering	Integrative Biology	7/53-63	Jan/2015
N. Bhardwaj, D. Devi, BB Mandal	Tissue Engineered Cartilage: the crossroads of biomaterials, cells and stimulating factors	Macromolecular Bioscience	15/153-182	Feb/2015
M. Deori, D. Devi & R. Devi	Nutrient composition and antioxidant activities of muga and eri silkworm pupae	International J of Science and Nature	5(4)/636-640	Dec/2014
Ramakrishnan Elancheran V.L Maruthanila, M Ramanathan, S Kabilan, R Devi, A Kunnumakara and J. Kotoky	Recent discoveries and developments of Androgen Receptor based therapy for Prostate Cancer	Med. Chem. Commun.	6/746-768	Jan/2015
R. Sarma, R. Devi	Ethnopharmacological Survey of *Garcinia Pedunculata* Roxb. Fruit in Six Different Districts of Assam, India	India International Journal of Pharmaceutical Science Invention	4(1)/20-28	Jan/2015
D. Singh Moirangthem, J. C. Borah, S. Laishram, M. C. Kalita, N. C. Talukdar	HPLC analysis of harringtonine and homoharringtonine in the needles of *Cephalotaxus griffithii* alkaloid fraction and cytotoxic activity on chronic myelogenous leukaemia K562 cell	Natural Product Research: Formerly Natural Product Letters	28(18)/ 1-4	April/2014
B. Louis, S. D. Waikhom, W. M. Singh, N. C. Talukdar	Diversity of Ascomycetes at the potato interface: New devastating fungal pathogen posing threat to potato farming	Plant Pathology Journal	13(1)/18-27	June/2014
B. Louis, S. Devi Waikhom, P. Roy, P. K. Bhardwaj, M. W. Singh, K. C. Sharma & N. C. Talukdar	Invasion of *Solanum tuberosum* L. by Aspergillus terreus: a microscopic and proteomics insight on pathogenicity	BMC Research Notes	7/350	June/2014

S. D. Moirangthem, S. Laishram, J. C. Borah, N. C. Talukdar	*Cephalotaxus griffithii* Hook.f. needle extract induces cell cycle arrest, apoptosis and suppression of hTERT and hTR expression on human breast cancer cells	BMC Complementary and Alternative Medicine	14(305)/ 1-10	Aug/ 2014
L. S. Singh, H. Sharma and N. C. Talukdar	Production of potent antimicrobial agent by actinomycete, Streptomyces sannanensis strain SU118 isolated from phoomdi in Loktak Lake of Manipur, India	BMC Microbiology	14/278	Nov/2014
S. Laishram, Y. Sheikh, D. S. Moirangthem, L. Deb, B.C. Pal, N.C.Talukdar	Anti-diabetic molecules from Cycaspectinata Griff. traditionally used by the Maiba-Maibi	Phytomedicine	22/23-26	Jan/2015
L. Deb, L. Surbala, K. Nongalleima, N. Dhaneshwor, N. Surrjit Singh, A. Dey, M. Dinesh Singh, N. C. Talukdar	Past, present and perspectives of Manipur Traditional Medicine: A major health care system Available for rural population in the North –East India	J. Ethnopharmacology	169/387-400	Feb/2015

Conference proceedings

Name of Author(s)	Title of Paper	Name of journal	Vol. & Issue No. & Page No.	Month/ Year of Publication
G. Devi and A. Devi	Characterization of PM2.5 Particulate Matter in the Ambient air of Oil Field Area of Upper Assam, India	International Conference "Harnessing Natural Resources for Sustainable Development: Global Trends", held at Cotton College, Guwahati	Vol. 9 pp.171-176 (ISSN No. 0972-7922)	Jan/2015
C. Kalita, A. Devi, M. Ganguly	In vitro antioxidant activity of two species of bambusae and a comparison of their phytochemical profile	International Conference "Harnessing Natural Resources for Sustainable Development: Global Trends", held at Cotton College, Guwahati	Vol. 9 pp. 83-87 (ISSN No. 0972-7922)	Jan/2015

Book Chapters

Name of Author(s)	Details of book chapters
Sabitry Bordoloi and Budhadev Basumatary	*"Phytoremediation of Hydrocarbon-Contaminated Soil Using Sedge Species" in book* "Phytoremediation: Management of Environmental Contaminants," *Volume 1, A. A. Ansari et al. (Eds.), DOI 10.1007/978-3-319-10395-2_19, © Springer International Publishing Switzerland 2015*
H. Deka, S. Deka and C. K. Baruah	"*Plant Growth Promoting Rhizobacteria for Value Addition: Mechanism of Action*," in book "Plant – Growth Promoting Rhizobacteria (PGPR) and Medicinal Plants" (*Eds. Dilfuza Egamberdieva, Smriti Shrivastava and Ajit Varma*), *Soil Biology Series* 42: 305-321(Springer)
Neelam Gogoi and Devasish Chowdhury	"*An Introduction to Electron Microscopy*" in the book named "Biotechnology and Bioinformatics: Tools, Techniques and Applications" ISBN no. 978-81-925698-6-4.
G.Choudhury and L.Tadj	*"Optimal policy for unreliable service system"* in the book named "Encyclopedia of Business Aanlytics and Optimation" IGI-Globle publication/1711- 1724

Patents granted/filed

Name of the inventor	Details of patent			
	Title	File no. for enrollment	Provisional/ Final patent grant no.	Issue no. of Patent office
J. Chutia, D. S. Patil, A. J. Choudhury and A. R. Pal	A process for depositing hard, hydrophobic, mechanically, thermally and chemically stable polymer films on bell metal		Granted Patent No.268130 (13131KOL12010)	No. 01/2011
A. J. Choudhury, D. Gogoi, J. Chutia, S. Kalita, R. Kandimalla and J. Kotoky	Antibiotic-loaded muga (*Antheraea assama*) silk fibroin (AASF) as suture biomaterial	726/KOL/2014 A	Final	No. 32/2014
M. R. Khan, S. Sen and N. C. Talukdar	A method for production of fragrant compounds from *Aquilaria malaccensis*	1277/KOL/2014	Final	No. 04/2015 dated : 23/01/2015
R. Kandimalla, S. Kalita, B. Choudhury, M. Das, R. Elancheran, N.C. Talukdar, and J. Kotoky.	*Cymbopogon nardus* essential oil extract to cure fungal infected diabetic wounds and a method of extracting the same.	287/KOL/2015	Final	No. 16/2015

AJ Choudhury, D Gogoi, R Kandimalla, S Kalita, J Kotoky, J Chutiya	Antibiotic-loaded Muga (*Antheraea assama*) silk fibroin (AASF) as suture biomaterial	726/KOL/2014	Final	No. 32/2014 dated :08/08/2014
R. Kandimalla, S. Kalita, D. Kalita, D. Devi, J. Kotoky.	Ramie plant fiber-A novel suture biomaterial	778/KOL/2015	Final	No. 32/2015
S. Deka & J. Lahkar	Method for controlling phytopathogen in tomato	898/KOL/2014	Final	No. 37/2014 dated : 12/09/2014
S. Deka & S. N. Borah	A new method for controlling fusarium wilt of pea	899/KOL/2014	Final	No. 37/2014 dated: 12/09/2014
S. Kalita, R. Kandimalla, N. C. Talukdar, J. Kotoky.	Poly- herbal ointment formulation for dermatophytic infections	SP-518.001	Provisional	-NA-
S. Kalita, R. Kandimalla, N. C. Talukdar, J. Kotoky.	Polymeric nano-capsulated delivery system of a "hydrophobic drug in essential oil" for enhanced antimicrobial activity as well as drug resistant strains	SP-519.001	Provisional	-NA-
R. Kandimalla, S. Kalita, B. Choudhury, N. C. Talukdar, J. Kotoky.	Poly-herbal formulation for treatment of diabetic neuropathic pain	SP-521.001	Provisional	-NA-

Contribution to World Database

Elancheran R, Das B, Kotoky J	CCDC 1042893: Experimental Crystal Structure Determination	DOI: 10.5517/cc1406q2		2015

Presentation in Conference/ Seminars

Invited Talks

Faculty	Title	Programme Name	Duration and Venue
Dr. Devasish Chowdhury	Advanced instrumentation techniques	AICTE-NEQIP programme on "Fundamentals and Advances in Analytical Techniques in Applied Sciences"	March 3-4, 2015 at Chemical Science Section of Department of Applied Sciences, Gauhati University IST
Dr. Devasish Chowdhury	Future of nanotechnology	Imagine NANO-2014 - A one week National workshop on Nanotechnology	December 15-20, 2014 at Assam Don Bosco University, Guwahati

Neelotpal Sen Sarma	Effect of nanoparticles on the swelling properties of polymer gels and Polymer based sensor for the detection of Nitro-aromatic pollutants	QIP Short Term Course On Advances in Environmental Health organized by Centre for Environment, IIT Guwahati	February 9-13, 2015 at IIT Guwahati
Neelotpal Sen Sarma	Polymer based sensor for the detection of Nitro-aromatic Compounds	International Symposium on Polymer Science and Technology	January 23-26, 2015 at Indian Association for the Cultivation of Science (IACS), Jadavpur, Kolkata, India
Neelotpal Sen Sarma	Effect of nanoparticles on the swelling properties of polymer gels	North East Regional Seminar on Trends in Colloid and Interface Science (NERSTCIS – 2014)	November 27-28, 2014 at Centre for Advanced Study in Chemistry, Department of Chemistry, North-Eastern Hill University, Shillong
Dr. Debajit Thakur	Genetic diversity of antagonistic metabolites producing Actinobacteria prevalent in protected forest soil of Assam	Training cum Workshop on Basic tools of Biotechnology	March 27-April 2, 2014 at Deptt. of Biotechnology, Bodoland University, Kokrajhar, BTC, Assam
Dr. Debajit Thakur	Biologically active secondary metabolite/s produced by Actinobacteria and their utilization	Workshop on "Advanced Techniques in Life Science Research"	April 28-May 4, 2014 at Institutional Biotech Hub, Deptt. Of Biotechnology, Gauhati University, Guwahati, Assam
Dr. Debajit Thakur	Exploration of microbial diversity for the production of biologically secondary metabolites	National seminar on "Metabolomics - A new frontier in Natural Products Research" organized by	May 23-24, 2014 at Department of Biotechnology & Bioinformatics, North-Eastern Hill University, Shillong, Meghalaya
Dr. Debajit Thakur	Current Status and major research areas of Microbial Biotechnology R&D work at IASST, Guwahati	Workshop on "Biotechnology Research in North East India: Present & Future" organized by the	September 18-20, 2014 at Assam Agricultural University, Jorhat, Assam
Dr. Debajit Thakur	Application of microbes in agriculture and industry	Seminar talks for the UG and PG students of the Deptt. Of Applied Biology on "Application of microbiology in agriculture and industry"	March 14, 2015 at School of Biological Sciences, University of Science and Technology, Meghalaya.
Dr. Mojibur R. Khan	Metagenomics	Workshop on 'Advanced Techniques in Life Science Research'	April 3, 2014 at Gauhati University, Guwahati, Assam

Prof. Sabitry Choudhury Bordoloi	Environmental and anthropogenic stress on wetlands: a case study in Gorjan beel, Hajo, Kamrup, Assam	Workshop on "Integrated Environment Management of Aquatic Resources of N. E. region"	February 9-13, 2015 at College of veterinary Science
Prof. Suresh Deka	Impact of oil pollution on rice field soil of upper Assam and its control"	Quality improvement programme (short term course work) on "Advances in Environmental Health"	February 9-13, 2015 at Indian Institute of Technology, Guwahati
Prof Heremba Bailung	Nonlinear waves and structures in strongly coupled dusty plasm	29th National Symposium on Plasma Science and Technology (PLASMA-2014)	December 8–11, 2014 at M G University, Kottayam
Dr. Binod C. Tripathy	On Double Sequence Spaces	International Conference on Mathematics and Computing	January 5-10, 2015 at Haldia Institute of Technology, West Bengal
Dr. Binod C. Tripathy	Different Types of Topological Spaces	Research Scholars Day	March 13-14, 2015 at IIT Kharagpur
Dr. Narayan C. Talukdar	Rhizospheric and endophytic bacteria of mandarin orange (Citrus raticulata Blanco) and King Chilli (Capsicum chinense) and their inoculant for plant growth	International conference on emerging trends in biotechnology (ICTEB-2014) & 11th convention on the Biotech Research Society, India	November 6-8, 2014 in JNU, New Delhi
Dr. Narayan C. Talukdar	Management of wetlands of NE region	Integrated environment management of the aquatic resources of the NE region	26th July, 2014 in the College of Veterinary Science, AAU, Khanapara
Dr. Narayan C. Talukdar	Microbial diversity and biofertilizer applications in the North Eastern Hill region of India	Group meeting of AINP on soil & biodiversity –biofertilizers	December 6-8, 2014 in Groundnut Research Centre, ICAR, Junagadh, Gujarat

Contributory

Name of Author(s)	Title	Conference Name	Oral/ Poster	Duration and Venue
A. Gogoi and N. Sen Sarma	Study of Conductivity of Poly 2-VP-Co-AN and its Hydroiodide Salts in Solid State	National Seminar of 60th Annual Technical session, Assam Science Society, Assam	Oral	March 21, 2015 at Agricultural University, Jorhat
S. Chakravarty and N. Sen Sarma	Highly luminescent and photostable near infrared CdTe/ZnS core shell quantum dots as a bioimaging agent for E. Coli cells	Third International Conference on Nanotechnology (NANOCON 2014)	Oral	October 14-15, 2014 at BVU, Pune

A. A. Hussain, A. R. Pal, D. S Patil	Improved charge photogeneration and transport in efficient flexible hybrid ultraviolet photodetector	National Conference on National Conference on TransLES-2014	Oral	December 11-13, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam, India
T. Barman, A. R. Pal	Enhanced Carrier generation in Polyaniline due to incorporation of Plasmonic AuNPs by a Novel Process	National Conference on National Conference on TransLES-2014	Poster	December 11-13, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam, India
M. Baro, A. R. Pal	CNT based hybrid composite material for enhanced charge transport in optoelectronic devices	National Conference on National Conference on TransLES-2014	Poster	December 11-13, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam, India
M. Baro, A. A. Hussain, A. R. Pal	Enhanced light sensing performance of hybrid devices developed using plasma technologies	National Conference on New Advances and Horizons in Nanoscience and Nanotechnology (NanoSci-2014)	Poster	December 20-21, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam, India
B. Sharma, A. R. Pal, D. S Patil	Field Emission Properties of vertically aligned Carbon Nanotubes produced by Pulsed PECVD	National Conference on National Conference on TransLES-2014	Poster	December 11-13, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam, India
B. Sharma, A. R. Pal, D. S Patil	Growth of aligned Carbon Nanotubes by Pulsed PECVD process at a pressure of 40 Torr	National Conference on New Advances and Horizons in Nanoscience and Nanotechnology (NanoSci-2014)	Poster	December 20-21, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam, India
B. Sharma, A. R. Pal, D. S Patil	Field Emission Studies of Aligned Carbon Nanotubes Synthesized by Pulsed PECVD Process	Nano India	Poster	January 29-30, 2015 at SASTRA University, Thanjavur, Tamil Nadu, India
T. Barman, A. R. Pal	Photoinduced charge transfer in polyaniline-Au nanocomposite for high performance self-powered photodetectors	Nano India	Poster	January 29-30, 2015 at SASTRA University, Thanjavur, Tamil Nadu, India
J. F. Hussain	Study of fish assemblage as a measure of ecological changes in a torrential stream, Basistha, Guwahati, Assam	National Conference on Sustainable Development of Environmental Systems	Poster	June 20-21, 2014 at IIT, Guwahati

P. Dutta and N. Sen Sarma	Conducting Nanocomposite Hydrogels of Glycerol Methacrylate as promising candidates for Biomedical and Environmental applications	Fourth International Conference on Multifunctional, Hybrid and Nanomaterials	Poster	March 9-13, 2015 at Sitges, Near Barcelona, Spain
P. Dutta and N. Sen Sarma	Switching of non-ionic hydrophobic gel to ionic hydrophilic gel by incorporating Au nanoparticles	Fourth International Conference on Multifunctional, Hybrid and Nanomaterials	Poster	March 9-13, 2015 at Sitges, Near Barcelona, Spain
S. Chakravarty and N. Sen Sarma	Supramolecular nano-biohybrid as a PET sensor for bacterial DNA	Fourth International Conference on Multifunctional, Hybrid and Nanomaterials	Oral	March 9-13, 2015 at Sitges, Near Barcelona, Spain
S. Chakravarty, D. Saikia and N. Sen Sarma	Highly Luminescent near Infrared core shell Quantum dots as a Bio-imaging agent for E.coli cells	Fourth International Conference on Multifunctional, Hybrid and Nanomaterials	Oral	March 9-13, 2015 at Sitges, Near Barcelona, Spain
A. Gogoi and N. Sen Sarma	Solid Polyelectrolytes Based on 2-VP-AN copolymer: Their conductivity measurements	Advances in Polymer Science and Technology (APST-2015)	Poster	March 13, 2015 at IASST, Guwahati
B. Gogoi and N. Sen Sarma	Curcumin polymers: nitroaromatic explosive sensor to biosensor	Advances in Polymer Science and Technology (APST-2015)	Poster	March 13, 2015 at IASST, Guwahati
P. Dutta and N. Sen Sarma	Polymer nanocomposites with Carbon and Silver nanoparticles as efficient sensing materials for Nitroaromatic explosives	International Symposium on Polymer Science and Technology (MACRO 2015)	Poster	January 23-26, 2015 at Indian Association for the Cultivation of Science, Kolkata
B. Gogoi and N. Sen Sarma	Polycurcumin acrylate and polycurcumin methacrylate: Novel bio-based polymers for nitroaromatic chemical sensor	International Symposium on Polymer Science and Technology (MACRO 2015)	Poster	January 23-26, 2015 at Indian Association for the Cultivation of Science, Kolkata
S. Chakravarty and N. Sen Sarma	Polymeric nanocomposites and Nano-biohybrids with CdTe quantum dots as efficient bio-sensing materials	International Symposium on Polymer Science and Technology (MACRO 2015)	Poster	January 23-26, 2015 at Indian Association for the Cultivation of Science, Kolkata
P. Dutta and N. Sen Sarma	Effect of Carbon, Silver and Nickel nanopowders on the improved electrical properties of PVA-g-polythiophene	National conference on New Advances and Horizons on Nanoscience and Nanotechnology (NanoSci 2014)	Poster	December 20-21, 2014 at IASST Guwahati

S. Chakravarty and N. Sen Sarma	Bacterial DNA sensor: Gift of nanobiotechnology	National conference on New Advances and Horizons on Nanoscience and Nanotechnology (NanoSci 2014)	Poster	December 20-21, 2014 at IASST Guwahati
J. F. Hussain	A study on Arsenic concentration in soil in different sites of Titabar, Jorhat district, Assam, India	International Conference on Disease Biology and Therapeutics (ICDBT)	Poster	December 3-5, 2014 at IASST Guwahati
P. Dutta and N. Sen Sarma	Polymer-Carbon nanocomposites with excellent electrical properties as precursors for Microelectronics	Third International Conference on Nanotechnology (NANOCON 2014)	Poster	October 14-15, 2014 at BVU, Pune
S. Kundu, K. Das, and V. K. Aswal	Interaction among protein molecules in solution: Effect of Solution pH and Dissolved Ions	5th Conference on neutron scattering	Oral	February 2-4, 2015 at Homi Bhaba Centre for Science Education, Mumbai, India
K. Das, S. Kundu and V. K. Aswal	Protein-Protein Interactions at pH Below Isoelectric Point: A Small Angle Neutron Scattering Study	5th Conference on neutron scattering	Poster	February 2-4, 2015 at Homi Bhaba Centre for Science Education, Mumbai, India
M. Pathak, H. K. Sarma, A. Devi	Application of a Pseudomonas species producing bioflocculant utilizing oil-field formation water hydrocarbon from Assam, India	National Seminar on Sustainable Development of environmental Systems	Oral	June 20-21, 2014 at Indian Institute of Technology, Guwahati
G. Devi, A. Devi	Concentration and Source Origin of Trace Metals associated in PM2.5 Collected at Selected site of oil field area of upper Assam, India and its effect on Machilus bombycina leaves	National Seminar on Sustainable Development of environmental Systems	Poster	June 20-21, 2014 *at Indian Institute of Technology, Guwahati*
M. Pathak, A. Devi, H. K. Sarma, K.G. Bhattacharyya	Utilization of bacterial bioflocculant in treating oil-field formation water collected from Assam, India	International Conference on Emerging Trends in Biotechnology, held	Poster	November 6-9, 2014 at Jawaharlal Nehru University, New Delhi
G. Devi, A. Devi	Temporal Distribution of Fine Particulates (PM2.5), Potentially Toxic Metals and metal –bound Carcinogenic risk in the Aerosol of oil field area of Northeastern India	International Conference on Emerging Trends in Biotechnology	Poster	November 6-9, 2014 at Jawaharlal Nehru University, New Delhi

G. Devi, A. Devi	Effect of Particulate Matter (PM2.5) and its Associated Toxic Metals on Living Beings	International Conference on Disease Biology and Therapeutics	Poster	December 3-5, 2014 at Institute of Advanced Study in Science & Technology" , Guwahati
C. Kalita, M. Ganguly, A. Devi	Screening of Antioxidant Activity, Total Phenolics and antimicrobial activity of Bambuseae species.	International Conference on Emerging Trends in Biotechnology.	Poster	November 6-9, 2014 at Jawaharlal Nehru University, New Delhi.
C. Kalita, M. Ganguly, A. Devi	Quantitative phytochemical estimation and evaluation of antioxidant properties of some Bambuseae species of Assam,India.	International Conference on Disease Biology and Therapeutics.	Poster	December 3-5, 2014 at Institute of Advanced Study in Science & Technology", Guwahati
J. Dutta, S. Gupta, A. Borah, D. Thakur	Biocontrol potentiality of actinobacteria against Tea [Camellia sinensis (L.) O. Kuntze] fungal pathogens	International Conference on Disease Biology and Therapeutics	Poster	December 3-5, 2014 at IASST, Guwahati
P. Sharma, R. Das and D. Thakur	Culturable actinomycetes prevalent in protected forest ecosystems of Assam, India as promising source of antimicrobial metabolites and industrial enzymes	International Conference on Disease Biology and Therapeutics	Poster	December 3-5, 2014 at IASST, Guwahati
R. Das, U. Baruah, D. Chowdhury and D. Thakur	A biological approach to the synthesis of silver nanoparticles using Streptomyces sp. P34 and evaluating its antimicrobial activity	International Conference on Disease Biology and Therapeutics	Poster	December 3-5, 2014 at IASST, Guwahati
S. N. Borah, H. K. Sarma and S. Deka	Rhamnolipid biosurfactant produced by Pseudomonas aeruginosa SS14 against Fusarium oxysporum f. sp. pisi	International Conference on Emerging Trends in Biotechnology (ICETB 2014)	Poster	November 6-9, 2014 at Jawaharlal Nehru University (JNU), New Delhi
J. Lahkar, S. Deka and G. Ahmed	Suppression of Colletotrichum capsici- the causal organism of red-rot of chili fruit using rhamnolipid biosurfactant	International Conference on Emerging Trends in Biotechnology (ICETB 2014)	Poster	November 6-9, 2014 at Jawaharlal Nehru University (JNU), New Delhi
D. Goswami, P. J. Handique and S. Deka	Rhamnolipid biosurfactant against Colletotrichum falcatum – the causal organism of red rot of sugarcane	International Conference on Emerging Trends in Biotechnology (ICETB 2014)	Poster	November 6-9, 2014 at Jawaharlal Nehru University (JNU), New Delhi

K. Patowary, M. C. Kalita and S. Deka	Degradation of polycyclic aromatic hydrocarbons (PAHs) employing biosurfactant producing Pseudomonas aeruginosa KS3	International Conference on Emerging Trends in Biotechnology (ICETB 2014)	Poster	November 6-9, 2014 at Jawaharlal Nehru University (JNU), New Delhi
S. Deka, P. Baruah and H. Deka	Screening of a potent plant species from hydrocarbon contaminated soil of oil field situated at Lakowa, Sibsagar district of Assam for phytoremediation	2nd International conference on frontiers in biological sciences	Oral	January 22-24, 2015 at National Institute of Technology, Rourkela, India
P. Baruah and S. Deka	Phytoremediation of crude oil contaminated soil employing Crotolaria pallida (Aiton)	5th International conference on Plants and Environment	Poster	February 24-27, 2015 at CSIR-National Botanical Research Institute, Lucknow, India
D. Goswami and Suresh Deka	Antifungal activity of rhamnolipid biosurfactant against Colletotrichum falcatum – the causal organism of red rot of sugarcane	5th International conference on Plants and Environment	Oral	February 24-27, 2015 at CSIR-National Botanical Research Institute, Lucknow, India
A Boruah, S K Sharma and H Bailung	Oblique collision of dust acoustic solitons in a strongly coupled dusty plasma	29th National Symposium on Plasma Science and Technology (PLASMA-2014)	Poster	December 8–11, 2014 at M G University, Kottayam
P Pathak, S K Sharma and H Bailung	Observation of high amplitude ion-acoustic Peregrine soliton in multicomponent plasma with negative ions	29th National Symposium on Plasma Science and Technology (PLASMA-2014)	Poster	December 8–11, 2014 at M G University, Kottayam
H Bailung	Nonlinear waves and structures in strongly coupled dusty plasma	29th National Symposium on Plasma Science and Technology (PLASMA-2014)	Oral	December 8–11, 2014 at M G University, Kottayam
H Bailung	Experiments on nonlinear phenomena at IASST	2nd National Symposium on Nonlinear and Complex Phenomena	Oral	March 26–28, 2015 at IASST, Guwahati
S K Sharma, A Boruah and H Bailung	Dust acoustic solitons and shocks in a strongly coupled dusty plasma	2nd National Symposium on Nonlinear and Complex Phenomena	Oral	March 26–28, 2015 at IASST, Guwahati

A Boruah, S K Sharma and H Bailung	Observation of dust acoustic multisolitons in strongly coupled dusty plasma	2nd National Symposium on Nonlinear and Complex Phenomena	Poster	March 26–28, 2015 at IASST, Guwahati
P Pathak, S K Sharma and H Bailung	Characteristics of high amplitude ion acoustic Peregrine soliton	2nd National Symposium on Nonlinear and Complex Phenomena	Poster	March 26–28, 2015 at IASST, Guwahati
Tonuj Deka, A Boruah, S K Sharma and H Bailung	Investigation on nano dusty plasma	2nd National Symposium on Nonlinear and Complex Phenomena	Poster	March 26–28, 2015 at IASST, Guwahati
B. Borgohain and H Bailung	Studies on characteristics in low temperature plasma produced using magnetic filter	2nd National Symposium on Nonlinear and Complex Phenomena	Poster	March 26-28, 2015 at IASST, Guwahati
S. Chabungbam Singh and M. B. Sahariah	Evolution of Fermi Surface Nesting Features from Austenite to Martensite Phase in Ferromagnetic Ni-Fe-Ga	ICMAGMA-2014	Oral	September 15-17, 2014 at Pondicherry University, Pondicherry, India
S. Chabungbam, G. C. Loh, M. B. Sahariah, A. Ratan Pal, R. Pandey	Site dependent tunable band gap in Polyaniline/TiO2 hybrid	National Conference on TransLES-2014	Poster	December11-13, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, India
P. Borgohain and M. B. Sahariah	A systematic study on the composition dependent electronic and magnetic properties of Ni-Mn-In Heusler alloy	International Conference on Magnetic Materials (ICMAGMA-2014)	Poster	December11-13, 2014 at Pondicherry University, Pondicherry, India
P. Borgohain and M. B. Sahariah	First-principles investigation of disorder effects in Ni-Mn-In Heusler alloy	National Conference on TransLES-2014	Poster	December11-13, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, India
U. Saikia M. B. Sahariah	Ab initio calculation of vacancy formation energy for a slab of Cu (111) plane	National Conference on TransLES-2014	Poster	December11-13, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, India
H. Kalita and R. Devi	In vitro activities of root juice of Musa balbisiana relevant to treatment of diabetes	21st ISCB International Conference (ISCBS-2015)	Poster	February 25-28, 2015 at Lucknow, India

A. Hazarika, M. C. Kalita and R. Devi	Protective effect of a Di-Herbal Formulation of Clerodendron colebrookianum and Allium sativum on lipid peroxidation and antioxidant status in Hypercholesterolemic rats	21st ISCB International Conference (ISCBS-2015)	Poster	February 25-28, 2015at Lucknow, India
A. Hazarika, M. C. Kalita and R. Devi	Antiatherogenic effect of a di-herbal formulation of Clerodendron colebrookianum and Allium sativum in high cholesterol diet induced hypercholesterolemia in rat	7th International conference of Environmental Research	Poster	December 26-28, 2014 at Bangalore, India
S. Kumari and R. Devi	Comparative analysis of the in vitro antioxidant activities of three medicinal plants of North Eastern region of India	21st ISCB International Conference 2015 on Current trends in Drug discovery and development	Oral	February 25-28, 2015 at Lucknow (CDRI), India
R. Sarma	Antioxidant and phytochemical screening of different extracts of dried pulp of Garcinia pedunculata and Garcinia morella	7th International Congress of Environmental Research (ICER-14)	Oral	December 27, 2014 at Bangalore
R. Sarma and R. Devi	Screening of Antioxidant and Phytochemical Properties of Dried Pulp Of Garcinia pedunculata	International Conference on Disease Biology and Therapeutics (ICDBT-14)	Poster	December3-5, 2014 at IASST, Guwahati
N. Gogoi	Carbon dots rooted agarose hydrogel film for heavy metal ions detection and separation	National conference on Nano- and Functional Material (NFM-2014) held	Oral	November7-8, 2014 at BITS Pilani, Rajasthan
N. Gogoi and D. Chowdhury	Chitosan gel based Fluorescent Carbon dots as a protective coat over Alginate beads for effective low pH Drug delivery	International Conference on New Advances in Carbon based Nanomaterials held	Poster	September1-3, 2014 at Royal Society of Chemistry, London
U. Baruah	Ester functionalized Carbon Dots as a reversible On/ Off fluorescence switching material	National Conference on Nano- and Functional Materials (NFM-2014)	Oral	November 7-8, 2014 at BITS Pilani, Rajasthan
U. Baruah, M. J. Deka and D. Chowdhury	Esterification of Carbon dots for application as a reversible On/Off fluorescence switching material	National Conference on New Advances and Horizons in Nanoscience and Nanotechnology (NanoSci-2014)	Poster	December 20-21, 2014 at IASST Guwahati

U. Baruah, N. Gogoi, G. Majumdar and D. Chowdhury	Chitosan hydrogel derived Carbon dots capped with β-Cyclodextrin and calix[4] arene-25,26,27,28-tetrol for selective and sensitive detection of fluoride ions	International Symposium on Polymer Science and Technology (Macro-2015)	Poster	January, 23-26 2015 at Indian Association for the Cultivation of Science, Kolkata
M. J. Deka and D. Chowdhury	Electrical conductivity of graphene and functionalized graphene: role of lateral dimension of graphene	National Conference on New Advances and Horizons in Nanoscience and Nanotechnology (NanoSci-2014)	Poster	December 20-21, 2014 at IASST Guwahati
M. J. Deka and D. Chowdhury	Electrical conductivity of graphene and functionalized graphene using chitosan as cationic binder in layer by layer assembly	International Symposium on Polymer Science and Technology (Macro-2015)	Poster	January, 23-26 2015 at Indian Association for the Cultivation of Science, Kolkata
A. Konwar, G. Majumdar and D. Chowdhury	Carbon Dots prepared from tea: a multipurpose additive for Biopolymers	National Conference on New Advances and Horizons in Nanoscience and Nanotechnology (NanoSci-2014)	Poster	December 20-21, 2014 at IASST Guwahati
A. Konwar, G. Majumdar and D. Chowdhury	Improvement of Physico-mechanical properties of Biopolymers by Novel Carbon Dots prepared from tea	International Symposium on Polymer Science and Technology (Macro-2015)	Poster	January 23-26, 2015 at Indian Association for the Cultivation of Science, Kolkata
A. Konwar, G. Majumdar and D. Chowdhury	Tea Polyphenolic Nanoclusters: An Excellent Green Multipurpose Additive for Biopolymers	International conference PlastIndia-2015	Poster	February 6-7, 2015 at Gandhinagar, Gujrat
A. Konwar, G. Majumdar and D. Chowdhury	Improvement of Physico-mechanical properties of Biopolymers by Novel Carbon Dots prepared from tea	National Conference on Advances In Polymer Science and Technology	Poster	March 13, 2015 at IASST, Guwahati
M. Kalita and D. Devi	Genotoxicity of organophosphate pesticide: A study on model non target lepidopteran insect, Philosamia ricini	International Conference on Disease biology and Therapeutics	Poster	December 3-5, 2014 at Institute of Adavanced Study in Science and Technology, Guwahati, Assam
M. Kalita and D. Devi	Threats to sericigenous insects with special reference to organophosphate pesticide pollution	International Symposium on Biodiversity: Status, Utilization and Impact of Challenging Climatic Conditions	Poster	October 30-31, 2014 at Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh

M. Kalita and D. Devi	Dimeneralization of Muga Silk cocoons for effective reeling of silk fiber	'International Conference on Disease Biology and Therapeutics'	Poster	December 3-5, 2014 at Institute of Advanced Study in Science and Technology, Assam
M. Kalita and D. Devi	Effect of Casein and BSA on Graft Copolymerization of Muga Silk Fiber	International Conference on 'Biodiversity: status utilization and impact of challenging climatic conditions'	Poster	October 30-31, 2014 at Babasaheb Bhimrao Ambedkar University, Lucknow, UP
M Saikia and D Devi	Sequence analysis of mitochondrial cytochrome b gene fragment from the morphs of Philosamia ricini Donovan	International Conference on Disease biology and Therapeutics	Poster	December 3-5, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam
K. Haloi and D. Devi	Immunity development in Antheraea assamensis Helfer: Evidence for the group facilitation of disease resistance	International Conference on Disease biology and Therapeutics	Poster	December 3-5, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam
K. Haloi and D. Devi	Regulation of digestive enzymes secretion and its activity in the digestive tract of muga silkworm, Antheraea assamensis Helfer	Conference on Exploitation of Seribiodiversity for Novel Product Development organized by Unit of Excellence on Seribiotechnology	Oral	November29-30, 2014 at Indian Institute of Technology Guwahati
K. Haloi and D. Devi	Characterization of carbohydrate digestive enzymes in the gut of muga silkworm, Antheraea assamensis Helfer	International Symposium on Biodiversity: status utilization and impact of challenging climatic conditions	Oral	October 30-31, 2014 at Babasaheb Bhimrao Ambedkar University, Lucknow, UP
S. Acharjee and B.C. Tripathy	Yes, equilibrium is possible between the strategies of consumers and Govt.	International Conference on Current Developments in Mathematics and Mathematical Sciences	Oral	December19-21, 2014 at Calcutta Mathematical Society, University of Kolkata, India
S. Acharjee and B.C. Tripathy	Soft set, soft bitopology and application in prostate cancer risk	International Conference Mathematical and Computational Biology	Oral	February 28–March 3, 2015 at Department of Mathematics, Indian Institute of Technology, Kanpur

S. Acharjee and B.C. Tripathy	Fixed point theorem in Fuzzy metric space with structures	International Conference on Frontiers of Mathematics	Oral	March 26-28, 2015, at Department of Mathematics, Gauhati University, Guwahati, India
L. B. Mahanta and K. Bora	Cervical Cancer: Facts of early diagnosis, cytological changes and impact of technology	International conference on disease biology and therapeutics	Poster	December 3-5, 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam
G. Choudhury	A batch arrival queueing model with unreliable server and general retrial time under Bernoulli vacation schedule	International Conference on Statistics and Information Technology for A growing Nation	Oral	November 30– December 2, 2014 at Sri Venkateswae University, Tirupati
P. Kalita and G. Choudhury	An M/G/1 vacation queueing model with randomized vacation policy	International Conference on Statistics and Information Technology for A growing Nation was organized Department of Statistics	Oral	November 30– December 2, 2014 at Sri Venkateswae University, Tirupati
Dr. D. Chowdhury	Hybrid Bio-materials for varied applications	National Conference on New Advances and Horizons in Nanoscience and Nanotechnology (NanoSci-2014)	Oral	December 20-21 2014 at Institute of Advanced Study in Science and Technology, Guwahati, Assam, India
Dr. D. Chowdhury	Hybrid hydrogel based polymer nanocomposites for varied applications	International Symposium on Polymer Science and Technology (Macro-2015)	Oral	January 23-26 2015 at Indian Association for the Cultivation of Science, Kolkata
P. kalita and Dr. G. Choudhury	Some Aspect of Poisson input queueing model under randomised vacation policy	International conference on Frontiers in Mathematics	Oral	March 26-28, 2015 at Department of Mathematics, Gauhati University, Guwahati, Assam
A. Gogoi	Solid State Ionic Conductivities of Hydroiodic and Hydrofluoric acid Salts of 2-VP-AN copolymer	Frontiers in Chemical sciences (FICS)	Oral	December 4-6, 2014 at IIT Guwahati
N.C. Adhikary	A study on dust ion acoustic waves: from theory to laboratory experiments	41st IEEE International Conference on Plasma Science (ICOPS) and the 20th International Conference on High-Power Particle Beams	Poster	May 25 - 29, 2014 Marriott Wardman Park, Washington DC, USA

R. Kandimalla, J. Kotoky, S. Kalita, B.Choudhury	Development of ply herbal formulation for the treatment of diabetic neuropathic pain	ICDBT-2014	Poster	December 3-5, 2014 at Institute of Advanced study in Science and Technology, Guwahati, Assam
M. Das, S. Banu, J. Kotoky	Isolation and Characterization of polyaromatic hydrocarbon degrading bacteria from contaminate soil of Guwahati city	ICDBT-2014	Poster	December 3-5, 2014 at Institute of Advanced study in Science and Technology, Guwahati, Assam
S. Kalita, B. Devi, R. Kandimalla, K. K. Sharma, A. Kataki, J. Kotoky	Chloramphenicol encapsulated in Poly-ε-Caprolactone-pluronic composite Nanoparticles for treatment of MRSA infected burn wound	ICDBT-2014	Poster	December 3-5, 2014 at Institute of Advanced study in Science and Technology, Guwahati, Assam
R. Elancheran, K. Saravanan, S. Diwagar, S. Kabilan, M.Ramanathan, A. Kunnumakara, J. Kotoky	In silico molecular docking, synthesis and biological evaluation of oxobenzimidazoles as novel androgen receptor antagonists	ICDBT-2014	Poster	December 3-5, 2014 at Institute of Advanced study in Science and Technology, Guwahati, Assam
B. Choudhury, R. Kandimalla, J. Kotoky	Evaulation of anticancer activity of Garcinia morella fruit against Dalton's lymphoma in swiss albino mice	ICDBT-2014	Poster	December 3-5, 2014 at Institute of Advanced study in Science and Technology, Guwahati, Assam
E. Thokchom & N C Talukdar	Rhizobacterial diversity and surface colonization of roots of Mandarin orange (Citrus reticulate Blanco) inoculated with 4 efficient strains of plant growth promoting rhizobacteria	National Symposium on Himalayan Biodiversity: Prospects and Challenges	Poster	April 20 - 21, 2014 Advanced Studies in Botany, Dept. Of Botany, NEHU, Shillong
H. Surnalata & N. C. Talukdar	Diversity of cellulose degrading microorganisms in gut of five earthworm	National Symposium on Himalayan Biodiversity: Prospects and Challenges	Poster	April 20 - 21, 2014 Advanced Studies in Botany, Dept. Of Botany, NEHU, Shillong

Conferences / Workshops / Meetings attended

Faculty/Research scholar	Conference/ Workshops/ Exhibitions	Duration and Venue
Dr. Mojibur R. Khan	"4th Ramalingaswami fellows' conclave" organized by Institute of Life Sciences, Bhubaneswar	January 30-February 1, 2015
Dr. Sumita K. Sharma	"Networking-cum-Discussion" meeting (Eastern & North-Eastern Zone)" held at Tezpur University, Assam	March 20 -21, 2015
Bhabesh Kumar Nath	National Conference on Transport Properties in Low Dimensional System: Experiments and Simulations (TransLES 2014)" held at IASST	December 11-13, 2015
Manasee Choudhury	"Statistical Data Analysis" in the North East Training Programme, conducted by the Applied Statistical Unit of "Indian Statistical Institute" Kolkata	September 1-12, 2014
Kishor Haloi	"Statistical Data Analysis" in the North East Training Programme, conducted by the Applied Statistical Unit of "Indian Statistical Institute" Kolkata	September 1-12, 2014
Satyananda Chabungbam Singh	"Materials and Processes for Applications in Energy and Environment" at Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore	January 15-18, 2015
Parijat Borgohain	"Materials and Processes for Applications in Energy and Environment" at Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore	January 15-18, 2015
Kishor Haloi	"Next Generation Sequencing (NGS) Techniques of DNA, jointly organized by "The institutional Biotech Hub" and Bioinformatics centre of IASST, Guwahati	October 20-22, 2014
Ujjal Saikia	"International E-Workshop/Conference on Computational CondensedMatter Physics and Materials Science (IWCCMP-2014)" at ABV-Indian Institute of Information Technology and Management, Gwalior	November 25-30, 2014
Mousumi Saikia	"Next Generation Sequencing (NGS) Techniques of DNA," jointly organized by The Institutional Biotech Hub and Bioinformatics Centre of IASST, Guwahati	October 20-22, 2014
Santanu Acharjee	"Stochastic Modeling in Physical and Biological Sciences" held at Institute of Advanced Study in Science and Technology, Guwahati	February 5-7, 2015
Ajay Kumar	ATM Workshop on "Topological Combinatorics" organized by Harish Chandra Research Institute (HRI), Allahabad	October 6- 11, 2014

Ajay Kumar Saw	"Next Generation Sequencing Techniques of DNA" jointly organized by The Institutional Biotech Hub and Bioinformatics Center Institute of Advanced Study in Science and Technology, Guwahati	October 20-22, 2014
Ajay Kumar Saw	"New Advances and Horizons in Nanoscience and Nanotechnology" held at Institute of Advanced Study in Science and Technology, Guwahati	December 20- 21, 2014
Ajay Kumar Saw	"Pattern Analysis and Application (PAA)", organized by Indian Statistical Institute, Kolkata and Nagaland University	February 09-13,2015
Karishma Shravan	"Stochastic Modeling in Physical and Biological Sciences" held at Institute of Advanced Study in Science and Technology, Guwahati	February 5-7, 2015
Mihirjyoti Pathak	"Sophisticated Instruments in Interdisciplinary Research" at Central Instruments facility, IIT-Guwahati	November 24-27, 2014
Gitumani Devi	"Sophisticated Instruments in Interdisciplinary Research" at Central Instruments facility, IIT-Guwahati	November 24-27, 2014
Chandrawali Kalita	"Sophisticated Instruments in Interdisciplinary Research" at Central Instruments facility, IIT-Guwahati	November 24-27, 2014
Gitartha Kaushik	"Advanced methods in Field Biology and Statistical Application in Life Science Research" organised by the Zoological Society, Kolkata	October 16-21, 2014
Jafrin Farha Hussain	"Advanced Techniques in Cell and Molecular Biology," held at IIT Guwahati	June 24-26, 2014
Jafrin Farha Hussain	International Workshop on "Electron Microscopy" at New Delhi	July 7-8, 2014
Mrinal Kr. Das, Gitartha Kaushik, Jafrin Farha Hussain and Santana Baishya	Capacity Building for Conservation of Biodiversity and Ecosystem Services of Wetlands in Relation to Climate Change, organized by National Institute of Ecology, Guwahati	February 23-25, 2015
Jafrin Farha Hussain and Santana Baishya	Ecological Issues and Concern, jointly organized by ISI Kolkata and Assam University, Silchar	March 23-24, 2015
A Boruah, P Pathak, Tonuj Deka and Binita Borgohain	Exhibition at National Science Day, 2015, IASST, Guwahati	February 28 -March 1, 2015
Monikankana Kalita	"Next Generation Sequencing (NGS) Techniques of DNA," jointly organized by The institutional Biotech Hub and Bioinformatics centre of IASST, Guwahati	October 20-22, 2014

Rahul Sarma	Research Methodology and Biomaterials at NEIGRIHMS, Shillong, Meghalaya	March 20-21, 2015
Suravi Kalita	Capacity Building for Conservation of Biodiversity and Ecosystem Services of Wetlands in Relation to Global Change, CIFRI , Guwahati	February 23-25, 2015

Lectures delivered at other institutes

Faculty	Topic	Duration and Venue
Dr. B. C. Tripathy	On I-convergent Sequences	November 14, 2014 at Department of Mathematics, Devi Ahailya University, Indore
Dr. N. C. Talukdar **Dr. M. R. Khan**	History of microbiology and molecular biology	November 15 and 29, 2014 at Cotton College State University, Assam

Other activities

Visits to other National/ International institutes/ Laboratories

Faculty/Research Scholar	National/International institutes/ Laboratories	Duration
Satyananda Chabungbam Singh	Michigan Technologiocal University, USA	May-August, 2014
Kangkana Bora	Indian Statistical Institute , Kolkata, India	March 1-31, 2015
Kishor Haloi	IMTECH (Institute of microbial technology), Chandigarh, Punjab	July 2-17, 2014
Dr. Sarathi Kundu	BARC, Mumbai	Feb 5-9, 2015

M.Sc. / B. Tech Projects / Training Courses offered at IASST

Name of Trainee	Programme and Supervisor	Title of work	Duration
Yoshiko Bailung, M. Sc. student of Dept. of Physics, Gauhati University	4th semester dissertation under Dr. A. R. Pal	Synthesis of PPani-TiO_2 nanocomposite films by pulsed DC magnetron sputtering combined with RF plasma polymerization process	January-June, 2014
Dibyajyoti Kalita, B. S. student of Physical Science, IST, Gauhati University	8th semester dissertation under Dr. A. R. Pal	Role of frequency variation on the properties of pulsed plasma prepared aniline films	January-June, 2014

Rahul Deb, M. Sc. student of Dept. of Physics, Cotton College State University	Summer internship under Dr. A. R. Pal	Thin film deposition of aluminium by magnetron sputtering	June-July, 2014
DhrubaJyotiNath, M. Sc. student of Dept. of Physics, Cotton College State University	Summer internship under Dr. A. R. Pal	Deposition of silver thin film by magnetron sputtering	June-July, 2014
Bhargab Borah, M. Sc. student of Dept. of Physics, Cotton College State University	Summer internship under Dr. Munima B Sahariah	An overview of Tight Binding Model and its simple application	June-July, 2014
Sonam Chanda, a student of 4th Semester, B. Tech. Bioengineering and Technology, Gauhati University Institute of Science and Technology, Guwahati	Summer Training under Dr. Suresh Deka	Basic Experimental Tools in Microbiology	June 2014
Anuradha Gautam, M. Sc student of Department of Molecular Biology and Biotechnology, Tezpur University, Napaam, Tezpur	Summer Training under Dr. R Devi	Evaluation of antioxidant property of medicinal plants"	July 1-July 31, 2014
Shikha Mishra, B. Tech student of Department of Bioengineering and Technology, Gauhati University, Guwahati, Assam	Summer Training under Dr. R Devi	Evaluation of antioxidant activity of medicinal plants	July 1-July 31, 2014
Ms. Snigdha Buragohain, M.Sc. Student of Dept. of Phys, G.U.	Summer Training under Prof. H. Bailung and Dr. Sumita K. Sharma	Basic Plasma diagnostics of capacitively coupled rf dusty Plasma	July , 2014
Ms. Abhilasha Bora, M.Sc. Student of Dept. of Phys, G.U.	Summer Training under Prof. H. Bailung and Dr. Sumita K. Sharma	Electrical characterization and diagnostics of radio frequency discharge Plasma	July , 2014

Awards /Recognitions/Achievements

Name	Particulars
Prof. Heremba Bailung	Elected as vice president of Physics Association of North East (PANE)
Dr. Depali Devi	1. Research work "Silk fibroin-keratin based 3D scaffolds as a dermal substitute for skin tissue engineering" published in Journal "Integrative Biology" was selected as "FRONT COVER PAGE ARTICLE" 2. Research work "Silk fibroin-keratin based 3D scaffolds as a dermal substitute for skin tissue engineering" received high rating in Peer-Review and included in "Integrative Biology (RSC) HOT Articles 2014".
Prof. Sabitry Choudhury Bordoloi	Felicitated by the advisory committee of the Department of Environmental Science, the University of BurdwanGolapbag, Burdwan-713104, West Bengal, India in the"International conference On mother earth: save it to achieve a sustainable future for all"held during December 10 – 12, 2014 in the University of Burdwan.

Prof. G. Choudhury	1. Editorial Board Member of " *Applied Mathematical Modelling*" (Elsevier Journal) working as Subject editor 2. Editorial Board Member of " *Journal of Assam Academy of Mathematics*" (Assam Academy of Mathematics publication, Guwahati) 3. Reviewer of "*Mathematical Reviews*" (*American Mathematical Society ,USA*).
Prof. Binod C. Tripathy	1. The first scientist of IASST to have H-index 25 as per SCOPUS database. 2. Membership of the American Mathematical Society, USA. 3. Vice-President of the Indian Academy of Mathematics, Indore. 4. Elected Editorial Board member of the periodical "*Journal of Advanced Research in Pure Mathematics*" USA. 5. Elected Editorial Board member of the periodical "*Journal of Advanced Research in Fuzzy and Uncertain Systems*" USA. 6. Elected Editorial Board member of the periodical "*Frontier in Science*" Scientific and Academic Publishing, USA. 7. Elected Editorial Board Member of the journal "*Journal of Analysis and Applications*", KOSOVO. 8. Elcted Editorial Advisory Board Member of the journal "*Turkish Journal of Science and Technology"*, Firat University, TURKEY. 9. Elected Editorial Board member of the periodical "*Far East Journal of Mathematical Sciences*" (Pushpa Publishing House), Allahabad. 10. Elected Editorial Board member of the periodical "*Surveys in Mathematics andMathematical Sciences*" (Pushpa Publishing House), Allahabad. 11. Elected Editorial Board member of the periodical "*Journal of Indian Academy of Mathematics*" Indore. 12. Elected Editorial Board member of the periodical "*Computational Research*": Horizon Research Publications Corp., USA. 13. Elected Editorial Board member of the periodical "*Computational Research*": Horizon Research Publications Corp., USA. 14. Elected Editorial Board member of the periodical "Journal of Analysis and Number Theory" natural Science Publications, USA. 15. Elected Reviewer of "*Zentralblatt Math*", GERMANY. 16. Elected Reviewer for "Mathematical Reviews", USA. 17. Acted as external examiner for conducting the PhD Viva-voce Examination of Mr. Naresh Berwal of Devi Ahailya University, Indore held on Nov. 14, 2014. 18. Acted as external examiner for conducting the PhD Viva-voce Examination of Ms. Kavitha N. of Anna University, held on May 07, 2014 at Sri Angalamman College of Engineering & Technology, Siruganor; Tiruchirappalli, Tamil Nadu. 19. Was an external expert for the Research Scholars Day of the Department of Mathematics, IIT Kharagpur held during March 13-14, 2015. 20. Acted as external examiner for conducting the PhD Viva-voce Examination of Mr. P. Baliarsingh of Utkal University held on July 19, 2014.
Dr. Narayan C. Talukdar	1. Member, Scientific Advisory Committee, Institute of Bioresources and Sustainable Development, Department of Biotechnology, Imphal. 2. Member, Research Task Force, Tea Board, Govt. of India, Kolkata. 3. Governor's Nominee for Selection Committees of Academic Positions of Cotton College State University, Guwahati. 4. Member, Task Force for Unit of Excellence, DBT NEBRPMC, New Delhi. 5. Senate Member, National Institute of Technology, Govt. of India, Imphal.
Mr. Tapan Barman, SRF, Basic and Applied Plasma	Second Best Poster Presentation Award in the National Conference on Transport Properties in Low Dimensional Systems: Experiment and Simulation (TransLES-2014) sponsored by Nature Publishing Group.

Ms. Upama Baruah, SRF, Advanced material sciences	First Prize for the best oral presentation at the National Conference on Nano- and Functional Materials (NFM-2014) organized by Department of Chemistry, BITS Pilani, Pilani, Rajasthan held on 7-8th November 2014
Ms. Neelam Gogoi, SRF, Advanced material sciences	Best Oral talk (second) in National conference on Nano- and Functional Material (NFM-2014) held on 7-8th November, 2014 at BITS Pilani, Rajasthan
Ms. Neelam Gogoi, Advanced material sciences	SRF, Material Nanochemistry Laboratory, Physical Sciences Divion obtained a DST International travel grant for attending International Conference on New Advances in Carbon based Nanomaterials held on 1-3rd September, 2014 at Royal Society of Chemistry, London
Mr. Kishor Haloi, research scholar, Bio-Diversity & Eco-system research	Awarded the best oral presentation in male category with certificate and gold medal in the International Symposium on "Biodiversity: status utilization and impact of challenging climatic conditions" entitled "Characterization of carbohydrate digestive enzymes in the gut of muga silkworm, *Antheraea assamensis* Helfer" organized by Babasaheb Bhimrao Ambedkar University, Lucknow, UP from 30-30th October, 2014
Ms. Mousumi Saikia, Research Scholar, Bio-Diversity & Eco-system research	Awarded the Second Best Poster Presentation award for the paper Analysis of genetic variation and phylogeny of the morphs of *Antheraea assamensis* and *Philosamia ricini* based on mitochondrial 12S ribosomal RNA gene"; in the International Symposium on "Biodiversity: Status, Utilization and Impact of Challenging Climatic Conditions" held at Babasaheb Bhimrao Ambedkar University, Lucknow, Uttar Pradesh during October 30-31, 2014.
Mr. Abhijit Boruah, SRF, Basic and Applied Plasma	3rd best oral presentation in the 2nd IASST Colloquium at IASST, Guwahati during October 31 to November 1, 2014.
Ms. Pallabi Pathak, JRF, Basic and Applied Plasma	3rd best poster presentation in the 2nd National Symposium on Nonlinear and Complex Phenomena" held at IASST, Guwahati during March 26 – 28, 2015

List of Ph.D awardees

Name of Student	Name of Supervisor	Title of the thesis	Award giving University
Mr. Samiul Hoque	Dr. N. S. Sharma	Development of Liquid Crystalline Polymer: Cholesteryl Esters and Their Characterization	Gauhati University
Mr. Ujjyanta Das	Prof. S. Bordoloi	A study on the effect of paper mill effluent on fish and earthworm	Gauhati University
Mr. Avinoy Paul	Prof. B. C. Tripathy	Spectra of B(r, s, t) type operator on some sequence spaces	Gauhati University
Mr. Gautam Chandra Ray	Prof. B. C. Tripathy	Studies on Different Types of δ-Continuity and Mixed Fuzzy Topological Spaces	Gauhati University
Mr. Soumitra Nath	Prof. B. C. Tripathy	A Study on Probabilistic Normed Spaces	NIT, Silchar

Conference/seminar/workshops organized

Regional Workshop on Wetlands of Assam in the light of Climate change

This workshop was held on 26th of September, 2014 at IASST under the convenorship of Prof. S. C. Bordoloi. Wetlands are the most productive ecosystems and repositories of diverse species of flora and fauna which is declining at a faster rate due to various anthropogenic stresses. Degradation of wetlands is affecting the livelihood pattern of the depending population. Six invited speakers in the workshop discussed at length the present scenario of wetlands of Assam and possible effect on flora and fauna due to gradual changes in the climate of the region. Total 50 students of IASST attended the workshop.

National Workshop on Next Generation Sequencing (NGS) techniques of DNA

This workshop was held on 20th to 22nd Oct, 2014 with an aim to provide basic knowledge of NGS techniques to scientists and college teachers. Several lectures on various NGS platforms and their applications in various research fields including human and livestock research, plant translational research and microbial ecology were delivered by invited experts. Hands on training on NGS data analysis was also conducted. Five invited speakers and 71 participants attended the workshop. Dr. Mojibur R. Khan & Dr. Dipali Devi were the conveners of the workshop.

International Conference on Disease Biology and Therapeutics (ICDBT-2014)

International conference on Disease Biology and Therapeutics was successfully organized by IASST during 3rd-5th December 2014 under the convenorship of Prof. Jibon Kotoky from IASST and Dr. U. Bora, IITG. More than 400 delegates from India and abroad participated in the conference. The two Key note addresses were delivered Dr. B. B. Aggarwal, the distinguished Scientist and a world rewound researcher on cancer therapeutics from USA and Padmashree Dr. V. Prakash, distinguished Scientist of CSIR. Main theme of the conference was to focus on different diseases, therapies, pathology, progression and treatment strategies. Special sessions on various diseases – human diseases, veterinary diseases were organized and mostly Doctors and veterinarian presented scientific papers.

National Conference on Transport Properties in Low Dimensional Systems: Experiments and Simulation (TransLES-2014)

This conference was held from 11th to 13th Dec, 2014. Nanostructured materials are the heart of numerous present day advanced devices. Modern electronic, optoelectronic devices and sensors use functional nanostructured materials made of organic molecules, graphene, carbon nanotubes, polymers, polymer composites etc. to control the device performance. Transport behaviour in these nanostructured materials assumes importance both from basic science and application point of view. For proper understanding of the transport mechanism, experiment as well as simulation approaches are essential. Total 24 invited speakers from five different countries and 40 participants from india attended the conference. Dr. Arup Ratan Pal, Dr. Munima B. Sahariah & Dr. Sarathi Kundu were the conveners of the conference.

National Conference on New Advances and Horizons in Nanoscience and Nanotechnology (NanoSci-2014)

NanoSci-2014, a National Conference on "New Advances and Horizons in Nanoscience and Nanotechnology" was jointly organized by the Institute of Advanced Study in Science and Technology (IASST), Guwahati & Indian Institute of Technology (IIT) Indore from 20th – 21th Dec, 2014. The conference witnessed stimulating discussions on new advances taking place in the field of Nanoscience and Nanotechnology. The main aim was to provide an opportunity for young researchers to interact with eminent scientists in the field. Total 22 invited speakers and 38 participants attended the conference. Dr. Devasish Chowdhury & Dr. Tridib Sarma (Co-Convener) were the conveners of the conference.

National Workshop on Stochastic Modelling and Application in Physical and Biological Sciences

The theme of the workshop was to introduce the fundamental concepts in key topics of Stochastic Processes and to model the emerging phenomenon involving uncertainity but having application to biological, physical and allied subjects. The workshop aimed to introduce new interdisciplinary topics in the frontier research areas. The outcome of the workshop was expected to initiate new collaborative environment for research groups in our country. Seven invited speakers and 50 participants attended the workshop. Dr. Gautam Choudhury was the convener of the workshop which was held on 5-7th February, 2015.

National Conference on Advances in Polymer Science and Technology (APST-2015)

APST-2015, a National Conference on "Advances in Polymer Science and Technology" was organized under the banner of Asian Polymer Association: North-East Forum (APA-NEF). The meeting was organised with a view to discuss the recent advances taking place in the field of Polymer Science and Technology. This conference aims to provide a platform to bring together eminent scientists including those from the North-Eastern Region thereby providing an opportunity for young researchers working in the field of polymer science and technology to interact with them and to enhance and enlighten their knowledge in the field. The conference was held on the 13th of March, 2015 with 6 invited speakers and 16 participants. Dr. Devasish Chowdhury & Dr. Jutika Goswami (Co- convener) were the conveners of the workshop.

2nd National Symposium on Nonlinear and Complex Phenomena

The study of nonlinear and complex systems is essentially an interdisciplinary field of research involving mathematics, physics, chemistry, biology, ecology, medicine, economics and social sciences. The theme of the conference held from 26th to 28th March, 2015 was interdisciplinary in nature connected to the future development for sustainable world and the life support systems. The symposium was aimed to provide intense deliberations on the current advances by the experts as well as young researchers. Seventeen invited speakers and 60 participants attended the conference. Prof. H. Bailung was the convener of the workshop.

IASST Students' Colloquium

The Colloquium was held for two days, 31st october & 1st November, 2014. Dr. Shekhar Mande, Director, National Centre for Cell Sciences, DBT, Pune, delivered the keynote address on system biology which was followed by presentations of the Ph.D. students. The Ph.D. students in group of 3/4 members were encouraged to choose topics of presentations which provided scope to incorporate informations in the area of their specialization. Scientists and professors from IITG and Gauhati University judged the best presentations for awards.

Visit of Scientists from other Institutes

Date	Name of the visitor and Affiliation		Title of Delivered Talk/ Lecture
28/04/2014		Mr. Sumanta Basu, Senior Program Manager, United States-India Educational Foundation (USIEF), American Center, Kolkata	Glimpses of Fulbright-Nehru and other Fulbright fellowships with a prime objective to encourage Ph.D. students and faculty members to apply for Fulbright- Nehru fellowships
02/05/2014		Dr. Bengyella Louis, DBT-TWAS Fellow, Department of Biotechnology, University of Burdwan, West Bengal	Plant pathogenic fungus interaction by classical and molecular approach

06/05/2014		Prof. Partha P. Majumder, Director, National Institute of Biomedical Genomics, Netaji Subhas Sanatorium (T B Hospital), Kalyani, West Bengal	In search of the drivers: Excavating the oral cancer genome
22/05/2014		Dr. Andrew Michael Lynn, Jawaharlal Nehru University, Delhi	Sequence Analysis using Bioinformatics tools
12/06/2014		Dr. Amit Ghosh, Former Director of the Institute of Microbial Technology, Chandigarh & Emeritus Scientist, National Institute of Cholera and Enteric Diseases (ICMR)	Creativity and life in science
27/06/2014		Prof. Bhuvanesh Gupta, Bioengineering Laboratory, Dept. Of Textile Technology, Delhi	Designing of polymers as scaffold for tissue engineering
10/07/2014		Dr. Sharmila Mande, Head - Bio-sciences R&D Division, TCS Innovation Labs, Tata Consultancy Services Limited, Pune	Gut microbes and human health : Insights from Metagenomics studies
07/08/2014		Dr. Kanury V.S. Rao, International Centre for Genetic Engineering and Biotechnology (ICGEB), Delhi	Systems Biology and its application for drug discovery
03/09/2014		Prof. V. Thangaraj, Retired Director, Ramanujan Institute for Advanced Study in Mathematics, University of Madras	Joy of learning mathematics

09/09/2014		Dr. Gopal C. Kundu, Scientist-G, Laboratory of Tumor Biology, Angiogenesis and Nanomedicine Research, National Center for Cell Science, Pune University Campus, Pune	Therapeutic and diagnostic significance of osteopontin and associated genes in cancer
15/09/2014		Dr. Priyadarshi Satpati, Dept. of Cell and Molecular Biology, Uppsala University, Sweden	Ribosome and faithful decoding: structures, thermodynamics and kinetics
29/09/2014		Dr. Amal Medhi, Assistant Professor, IISER Thiruvananthapuram	Introduction to topological insulators
01/12/2014		Dr. Isao Kobayashi & Dr. Keiro Uchino, National Institute of Agrobiological Sciences, Tsukuba, Japan	Development of a product from silk using principles of physics and chemistry
13/01/2015		Dr. Yukihiro Shimoi, Nano system Research Institute, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan	Organic Electronics
21/01/2015		Mr. Peter Laser, GM, IKA, Germany	Impact of globalization on research and development with economic conclusion
23/01/2015		Prof. Richard Catlow, FRS, University College London	Computer modeling of catalytic and energy material

12/02/2015		Prof. Rajavashisth Tripathi, Molecular Biology Unit, Institute of Medical Sciences, Banaras Hindu University, Varanasi 221005	Wonders of gene technologies
13/02/2015		Prof. G. Mohan Rao, Dept. of Instrumentation and Applied Physics, Indian Institute of Science, Bangalore	Thin film micro batteries - power sources for next generation devices
13/02/2015		Dr. S.P. Ghosh, Former Deputy Director General (Horticulture Department), ICAR, New Delhi	Prospects in medicinal plant research
16/02/2015		Dr. Abhijit Dan, Chemical and Biological Engineering University of Wisconsin – Madison, USA	Analytical methodology based on soft material interfaces for biomolecular sensing
13/02/2015		Dr. Bengyella Louis, School of Molecular biology, University of Witwatersrand, Johannesburg, South Africa	Reverse genetics and artificial micro RNA silencing tools for mining gene functions
16/03/2015		Dr. Rosy Mondal, Assam University, Silchar, Assam	Genomics on cancer
16/03/2015		Dr. Soumyadeep Nandi, Ramalingaswami Fellow	Biomedical processes

OTHER ACTIVITIES

As you turn over....

- Outreach Programmes
  - Instrumentation facility
  - Social outreach programme
  - Visit of IASST laboratories by school/ college students
- Celebrations
  - Foundation day
  - National Science day 2015
  - Hindi Diwas
  - Vigilance week
- ‘Swachh Bharat Mission’ at IASST
- Recreation

Outreach Program

Instrumentation facilities

Like every year, facilities at central Instrumentation facilities (CIF) were utilized by research scholar's of different educational institutes of the region, national research institutes on payment basis. The instruments facilities used include Scanning Electron Microscope (SEM), X-ray Diffraction (XRD), Zeta sizer, Spectrofluorimeter, Thermogravimetric Analysis (TGA) etc. The following organizations availed the facilities at IASST Gauhati University, IIT Guwahati, Cotton College, Centre for plasma physics-Institute for plasma research, Gauhati Biotech Park, Karimganj College, Assam Down Town University, NIT Silchar, North-East Institute of science and technology, Jorhat, GIMT, Guwahati etc.

Social outreach program

Project Title: Empowerment of ST people through demonstration and follow up action for *Eri* silkworm (*Samia ricini*, Donovan) rearing and spinning in two districts of Assam .

M*uga* (endemic silk of Assam) and *eri*-culture provide occupation to nearly two lakh families of Assam, where involvement of weaker section of the society is about 52.4 % (SC=40.9% & ST= 11.5%) and more precisely, the *eri*-culture provides employment to the women folk which comprises about 65%. Research on muga and eri silkworm is being carried out at Seribiotech laboratory of IASST focusing on areas of basic and applied research .

Nagaon district and Boko area of south Kamrup district of Assam are traditionally known for eri rearing where Schedule tribe (ST) population is about 89,394 and 96,056 respectively (*Census 2001 and Provisional Census data 2011*). As per our findings, till date, they are using the age-old traditional methods for silkworm rearing as well as silk processing. Keeping this in mind, IASST has taken up the present scheme for ST population of these two districts to get them acquainted with scientific methods for improved eri silk worm rearing technology, host plant cultivation and advanced spinning technology. It is expected that the scheme will be helpful for income generation of the targeted beneficiary through sustainable eri rearing and silk spinning technique.

Visit of IASST laboratories by School/College students

Date of visit	Name of the inst.	No. of visitors		Department Visited
		Teachers	Students	
15-05-2014	Pandu College, Guwahati-12	4	16	**Life Science Division** **Presenter**: Rahul Sarma, Raghu, Yogesh, Monikangkna, Julie Bordoloi, Elancharan, Juri Pathak, Mihir Pathak, Gitartha Kausik, Sushmita Gupta, Jafrin Ahmed.
16-06-2014	Barama College	1	2	**Life Science Division** **Presenter**: Rahul Sarma, Raghu, Yogesh, Monikangkna, Juri Pathak, Mihir Pathak, Gitartha Kausik, Sushmita Gupta, Jafrin Ahmed.
27-06-2014	Gauhati University, USIC	3	25	**Material Sc. Division** **Presenter**: Mahananda Boro, Kaushik
12-11-2014	Rangia College	2	12	**Life Science Division** **Presenter**: Rahul Sarma, Raghu, Sushmita Gupta, Priyanka Sarkar, Monikangkna, Julie Bordoloi, Juri Pathak.
10/02/2015	Mangaldoi College	3	16	**CCNS and Material Sc. Division** **Presenter**: Parijat Borgohain, Satyanand, Kangkana, Manash, Dr. A. R. Pal Bhabesh, Aziz
20/03/2015	Arya Bidyapith College	2	23	**Life Science Division** **Presenter:** Rahul Sarma, Raghu, Sushmita Gupta, Priyanka Sarkar, Monikangkna, Juri Pathak
26/03/2015	College of Veterinary Science	1	3	**Life Science Division** **Presenter:** Dr. A. Devi, Dr. D. Thakur, Dr. D. Devi
31-3-2015	Dakhin Kamrup College Mirja	2	29	**Life Science Division** **Presenter:** Dr. D. Thakur, Rahul Sarma, Raghu, Bhuban, Mrinal, Juri Pathak

Celebrations

Foundation day

The 36th Foundation day of IASST was celebrated in its campus on 3rd Nov., 2014. Dr. Mridul Hazarika, Vice Chancellor, Gauhati University presided over the meeting. Prof. Mihir Kanti Choudhury, Vice Chancellor, Tezpur University was the guest of honor in the function and highlighted his association with IASST and views on research focus in a competitive world during his speech. Dr. T. Ramasami, former Secretary DST, delivered the foundation day lecture with a fascinating title "Joy of doing science in way of nature". Prof. Kamal Baruah, Retd. Professor, Dept. of Physics, Dibrugarh University and former Director, IASST, and renowned taxonomist of this region Dr. Padmeswar Gogoi, Retd. Professor, Golaghat college were felicitated for their contribution to the science and society. Eminent scientists, researchers, well wishers of IASST from different academic institutes of the state and alumni of the institute also graced the occasion. Commemorating foundation day, the annual sports competitions were held from 15th Oct.-2nd Nov., 2014. An essay competition was also held on the topic "MOR SAPONAR IASST ARU MOR ARIHANA" ("My dream IASST and my contribution"). The employees of IASST with their families participated in the competition. The day came to an end after a colourful cultural event in the evening which witnessed display of hidden talents, spontaneity and joy of IASST family.

Dr. Ramasami delivering his foundation day lecture

Hoisting of flags by Director, IASST and a moment from the sports event on the occasion of foundation day

National Science day

Science Fair 2015 commemorating the National Science day, was celebrated at IASST during 28th February and 1st March, 2015. The event was organised jointly by Institute of Advanced Study in Science Technology (IASST) and Cotton College State University, Guwahati.

The first day of the programme was highly successful with very good response from various schools, colleges and institutions from Guwahati and outside. The programme was inaugurated with a short reflection on the life of Sir C. V. Raman. This was followed by lectures from two eminent scientists of our country, Dr. Prasanta Goswami, Director, CSIR-MMACS, Bangalore and Dr. P. V. S. Anand from CR Rao Advanced Institute of Mathematics, Statistics & Computer Science (AIMSCS). Dr. Goswami spoke on " Climate, Civilization and Nation". He pointed out that to whatever extent science and technology might have progressed, it is undeniable that the fate of a civilization rests on climatic changes. Dr. Anand started his lecture with a nice introduction on the "Theory of Relativity" of the great scientist Albert Einstein and showed the application of this theory in terms of modern technology.

The popular science lecture in Assamese titled "Vigyanar pragati aru vaigyanik manasikota" was

delivered by Dr. Dinesh Chandra Goswami, former scientist G and Adviser, NEIST, Jorhat on the second day of the event. He spoke on the gradual transformation in science with some examples from his own life emphasizing on the fact that the advancements in science has become very rapid over a period of 100 years. Mr. Uddhab Bharali, famous leading innovator of Assam demonstrated some of his recent innovations and technologies. He encouraged the students to be self-sufficient and confident.

One of the major programmes of the science day was the science exhibition which was inaugurated by Dr. Anil Goswami, former president of the Assam science society. More than 30 schools and colleges, institutions like IIT Guwahati, Assam Agricultural University, Jorhat Engineering College and organizations like WWF, Archeaological survey of India, Regional Science Centre, APRO took part in the exhibition displaying their models and findings. Three young innovators of Assam, Mr. Saurovjyoti Bordoloi from Bokakhat, Mr. Bhagaban Baruah from Assam Agricultural University and Mr. Swapnanil Talukdar, also took part in the event. Mr. Saurovjyoti Bordoloi displayed "reactionless electric generator", Mr. Bhagaban Baruah displayed "Bhim kal products", and Mr. Swapnanil Talukdar displayed "foot operated manual page turning machine". Other attractions of the event were Speech competition, Quiz competition, Puzzles, Documentary show etc. The chief guest of the valedictory function was Forest man of India, Padmashree Jadab Payeng. He expressed his experience of struggle in converting sandy land to a green forest. The winners of various competitions were awarded with token money and certificates.

Hindi Diwas

Hindi Diwas was celebrated on 14th Sept., 2014. Mr. Sanjay Singh , Rajbhasa officer , SBI Regional office Dispur graced the occasion as chief guest. During his speech he explained the significance of celebration of Hindi Diwas. He stressed upon the constitutional limitation and the practical aspects of using Hindi as a common language in India. An essay completion in Hindi was arranged on the topic "Usage of plastic and water logging problem in Guwahati city". The competition was open for research scholars and employees and their families. A cultural program was also organized with the participation of IASST members.

Vigilance week

As in previous years, the celebration of Vigilance awareness week started off at the Institute of Advanced Study in Science and Technology (IASST), Paschim Boragaon, Guwahati on 27th of October, 2014. Professor Binode Chandra Tripathy led the pledge taking ceremony at 11a.m. Vigilance day meeting was held at 3pm. Prof. Narayan Chandra Talukdar, Director IASST welcomed the gathering.

Prof,B.C.Tripathy Chairman, Academic Committee lead the Pledge taking at 11 AM in the morning

Dr. Prem Saran, IAS (retd.), former Commissioner to the Government of Assam, Education department was the invited speaker for the occasion. Prof. Sabitry Choudhury Bordoloi, Vigilance Officer of IASST introduced Dr. Saran to the audience. The guest speaker enthralled the audience with a thought provoking topic entitled "Contribution to Society and Peak Performance". He elaborated how through proper training people can improve control over their minds and contribute positively to the development of the society. Dr. Nilotpal Sen Sarma offered the vote of thanks. The event was given good coverage by print media.

'Swachh Bharat Mission' at IASST

Inaugural day activity of Swach Bharst Abhijan on October 2nd, 2014 and follow-up activity during the year:

IASST family joined the nation on Oct 2nd, 2014 in the Swach Bharat Abhijan on the occasion of the birth anniversary of Mohatma Gandhi, the Father of the Nation and cleaned the campus premises and the office building. This was followed up by a year round activity of remaining vigilant for a clean and plastic free campus. For its location being in the sub-tropical regions, IASST campus generates abundant quantity of vegetation biomass and as a part of the keeping the campus clean and generating resource, composting units have been set up in the campus for conversion of this biomass to manure. This manure meets the nutritional requirement of the campus flowers, different plantations, fruits and medicinal plant plots.

Staff and Students cleaning the IASST campus on Gandhi Joyanti




Luxuriant vegetation biomass of IASST campus is regularly cleaned and converted to manure in the composting units inside the campus

Recreational Activities

The Institute of Advanced Study in Science and Technology has a Recreation Committee to oversee the cultural, health and motivational activities. The Committee has a Chairman and three members who belong both to the academic and student community. As a part of activity outside the lab research, the Committee organizes seminars on stress management and healthy living for better research output. Many eminent personalities from these field were invited to IASST over the year. Amongst them were Ms. Sunita Bhuyan, wellness consultant for Syntel Incorporation, Dr. B.N.Shanta and Dr. B. U. Muni from Sri Chaitanya Saraswat Institute of Spiritual Culture and Science, Bangalore and Borghild Bo, Consulting Clinical Psychologist, Falck Nutec Bergen, Norway. The Committee

Students playing volleyball in leisure time.

also arranges for projection of movies which are of substance and moral and at the same time entertaining, once every month. Health camps and yoga camps are also held at intervals to maintain the physical and moral spirit of the employees and scholars. The Institute has a Yoga club which has members from both the communities. The Institute also houses facilities for many outdoor and indoor sports. It also arranges different sports activities. Indoor sports facilities like table tennis, carom and chess are available in the indoor sports room while two badminton courts, and a volley ball court are available as outdoor game facilities.

Ms. Sunita Bhuyan playing violin at IASST auditorium.

REPORT FROM ADMINISTRATION

As you turn over....

- Major administrative Activity
- Major civil and electrical works completed
- Ongoing civil and electrical works
- Staff walfare measures
- Revenue generation
- Audited statement of accounts

Administrative Staff of IASST

Technical Staff of IASST

Major Administrative Activity

The year 2014-15 is significant for IASST for some major administrative activities. A brief account is given below:

Drafting of Academic Rules and Recruitment Rules of IASST

The Academic Rules of the IASST has been drafted and placed in the Scientific Advisory Council of IASST for kind comment of the Chairman and members. After obtaining their valuable comments, necessary modifications have been made and it is ready pending approval of the competent authority.

The Recruitment rules of the IASST have been drafted and after necessary modification if required it will be placed in the next Governing Council meeting for approval.

Appointment of National Project Faculties and Research Scholars

One DST INSPIRE Fellow working in the field of Organic electronics and a Ramalingaswami Fellow working in the field of computational Biology and Bioinformatics have joined at IASST.
Seventeen numbers of research Scholars have also been recruited under the Ph. D. programme of IASST.

Development of Interactive Dynamic Website

To convert the existing IASST website from static to interactive, dynamic the work was allotted to a Noida based Company M/S E-Media Solutions at a total cost of ` **2,80,000/-.** The company developed the website.

Catering service of SSH Mess and IASST Canteen

To provide quality food for the boarders and guests in the Students and Scientists' Home (SSH) and also for IASST canteen the service has been outsourced and allotted to M/S Amarendra Phukan. The firm is now providing quality food as per fixed menu. The service started from 16-09-2014.

Surveillance System for main building and SSH

Eleven (11) nos. of camera have been installed in the administrative and Academic building for surveillance of the whole building and entrance gate. Twenty (20) nos. of camera have also been installed in the SSH to keep vigilance of movement of students, guests and outsiders.

Lab coat for scientists and research scholars and uniform for workers

Lab coats have been pvrovided to all the Scientists and research scholars to wear while working in the laboratory. Likewise, all the supporting staff including casual workers have been provided uniforms.

Rate Contract for Chemicals, Small Equipment and ACs

The institute has come into rate contract agreement with companies and firms at discounted price for supply of Chemicals, small equipment costing up to ` **1,00,000/-** and Air Conditioners.

Major Civil and Electrical Works Completed

Students and Scientists' Home (SSH)

The project was started on 16-04-2012 and completed on 30-09-2014.The work was allotted to M/S Buildrite Constructions. The building consists of five VIP suits, nine Scientists' room and forty five Students' room.

Total work value is ` **79, 50,346/-.** All the students' rooms are now occupied by research scholars. The suits and Scientist's rooms also remain occupied most of the days by visiting Scientists' and guests from within and outside the country. These guest room facilities are also being extended to family members of the students of IASST.

Making of Bronze Statue of C.V. Raman

The project was started on 25-04-2014 and completed on 15-09-2014. The work was allotted to M/S Artists Guild, Guwahati. The height of the standing statue of C.V. Raman is seven feet. The work value of the project is ` **12, 92,700/-.**

Development of Bio-resource Hub

To develop the bio-resource hub at the low lying areas of the institute measuring 20 bighas of land, one embankment was made. The work was started on 25-02-2014 and completed on 08-07-2014. The work was allotted to the contractor Mr. Hari Das**.** Total cost of the project was ` 22, 44,889/-. All along the embankment various horticultural and forest plant species were planted. In the pond, good nos. of local and table fish varieties are cultivated.

Construction of Entrance Gate cum Security office

A project for construction of entrance gate cum security office started on 05-01-2014 and completed on 25-11-2014. The work was allotted to M/S Nirupama Associates. The total cost involved was ` 29, 19,936/-. There are separate entry and exit gates for entering and leaving the Institute. Beautiful landscape has been developed near the entrance gate. In the middle portion there is security office.

Development of Landscape in front of Administrative and Academic Building

Landscape has been developed in front of Administrative and Academic Building with the help of the **honorary** consultancy service taken from **an expert (Name ??)** from Assam Agricultural University, Jorhat. The carpet grasses and fragrant flower plants have been planted and regular maintenance is carried out by workers of the institute. This landscaping is giving beautiful aesthetic look of the institute complex.


IASST

Installation of 1000 KVA servo controlled voltage Stabilizer

A Servo Controlled Voltage Stabilizer IS2016 having capacity of 1000KVA is installed at IASST to overcome the fluctuation in the main power line voltage.

Name of the Contractor:

M/S Elecrodynamics
Electrical Engineers & Contractors,
Dr. B. Barua Road, Ulubari Chariali, Guwahati-781007.

Price:

1. `. 17,16,300.00 (for the Servo System)
   Vide Order No: IASST/1063/2014-15/840 date 25-04-2014

2. `. 2,94,522.00 (for the by Pass system)
   Vide Order No: IASST/1063/2014-15/7485 date 18-09-2014

Date of Completion: 29-12-2014

Gypboard ceiling, partition etc at server room, paver block at approach road and RCC pile with boundary wall at Bio-resource hub of IASST

The work was started on 05-06-2014 and completed on 15-02-2015. Total work value ` 33,47779/-.

Making RCC cores slab at old hostel, civil work, orchid house, paver block in front of main building IASST

The work was started on 05-06-2014 and completed on 01-01-2015. The total work value ` 1887556. Name of the contractor: M/s AIC Construction and Consultant.

Repairing of Internal Road

The work was started on 25-09-2014. Total work value ` 27, 94,461.
Name of the Contractor:- Mr. J.K Choudhury

Ongoing Civil and Electrical Works

Main Gate Beautification

Name of the Contractor: Mr. J.K Choudhury
Work value ` 8, 84,431/-

Supply and fixing of glow sign board

Name of the Contractor: New Maa Kamakhay Art
Total no. of Signboards,
Total Cost -` 5, 11,372/-

Upgradation of Silk rearing House

Name of the Contractor: M/s Buildrite Construction
Total work value:- ` 6, 01,552/-

Modernization of lift

Name of the Contractors: Rhino Elevators
Total work value ` 5, 50, 000/-

Cattle trap drain

Name of the Contractor: Mr. J.K Choudhury
Total work value ` 5, 29,300

Staff Welfare Measures

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 dependent family members are reimbursed as per CGHS rates. One allopathic doctor has been appointed by the IASST who pays visit to the institute thrice a week. He provides free consultation in the institute as well as in his consulting room. Facilities like rest bed, pressure monitoring machine, first aid box etc. are readily available in the doctor's chamber. The institute has agreement with few renowned hospitals of Guwahati to provide medical facilities to employees and their dependent family members as per central government/CGHS rates.

Canteen Facility

The institute is having a canteen run by a private party. In the canteen meals, snacks and beverages are prepared in hygienic condition and are served to employees, students and guests at subsidized rates.

Benevolent Fund

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

Group Insurance

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

Reservation Policy

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

Official Language Policy

The institute is paying emphasis on implementation of provisions of Official Language Act and the rules made and instructions issued thereunder. All the Letter heads of the Institute are in bilingual format. Annual Report of the Institute is published both in English and Hindi. The institute is also celebrating Hindi Diwas in great zeal.

Revenue Generation

Statement Showing Income Generated from Internal Sources during the year 2014-15

Sl. No.	Source of Income	Amount (in Rupees)
1	Labortory Instrument uses charge	223378
2	Sale Proceeds	14420
3	Other Receipts (KRC Life Membership Fee,etc.)	2279
4	SSH Rent Recover (JRF)	296826
5	SSH Rent Recover (Guests)	111790
6	Institutional Charge for extramural projects	1184368
7	Tender Fee	142200
	Total	**1975261**

Audited Statement of accounts

GFR 19.A
[See Rule 212(1)]

Form of Utilization Certificate

Sl. No	Sanction Letter No. and Date	Amount (Rs.)
1.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/CAP/003/2014/1 dated 05.05.2014	18,000,000.00
2.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SAL/003/2011/3 dated 21.01.2015	19,557,000.00
3.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SC/003/2014/2 dated 01.09.2014	3,000,000.00
4.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SAL/003/2011/1 dated 24.04.2014	18,300,000.00
5	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/ST/003/2014/1 dated 05.05.2014	333,000.00
6.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/GEN/003/2011/1 dated 05.05.2014	15,500,000.00
7.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SC/003/2011/1 dated 05.05.2014	1,200,000.00
8.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide AI/IASST/ST/GEN/003/1 dated 01.09.2014	4,000,000.00
9.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SAL/003/2014/2 dated 25.08.2014	31,000,000.00
10.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/CAP/003/2014/2 dated 01.09.2014	24,000,000.00
11.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/GEN/003/2014/2 dated 01.09.2014	20,400,000.00
12.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/ST/003/2014/2 dated 01.09.2014	1,500,000.00
13.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/ST/003/2014/3 dated 21.01.2015	34,000.00
14.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/GEN/003/2014/3 dated 21.01.2015	15,000,000.00
	Total Rs.	**17,18,24,000.00**

1. Certified that out of Rs. **17,18,24,000.00** of grant-in aid sanctioned during the year 2014-15 in favour of The Institute Of Advanced Study in Science and Technology under this Ministry/Department letter No. given in the margin and Interest from Bank **Rs. 20,34,451.00** and opening deficit of **Rs. 15,26,145.12** (being Cash & bank Balance of Rs.35,25,278.00 plus advance given Rs.48,000.00 less other receipts Rs.1,59,538.00 and liabilities to be paid Rs.50,00,000.00 plus adjustment of unspent balances of Workshop Bank A/c amounting to Rs.60,114.88) as on 31.03.2014, a sum of Rs. **Rs. 17,19,33,987.71** have been utilized for the purpose for which it was sanctioned (total expenditure of Rs. 17,38,16,352.71 less other receipts of Rs. 17,22,827.00 of current year and Rs. 1,59,538.00 of previous year) and a surplus balance of **Rs. 3,96,734.17** (being Cash & Bank Balance of Rs. 10,62,110.17 plus advance given Rs.48,000.00 during previous year less earnest money refundable Rs. 7,13,376.00) ~~has been surrendered to Government (vide No..... dated.....)~~/ will be adjusted towards the grants-in-aid payable during the next year 2015-16.

2. Certified that I have satisfied myself that the conditions on which the grant-in-aid was sanctioned have been duly fulfilled/are being fulfilled and that I have exercised the following checks to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of checks exercised

1. Verification of Cash Book
2. Checking of Vouchers and Bank Statements.
3. Verification of compliance to terms of Sanction of Grants.

For P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P. GAGGAR)
PARTNER (M.NO.040259)

PLACE: GUWAHATI
DATE : 18.08.2015

P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

AASTHA TOWER, 2ND FLOOR, C.K.ROAD,
PANBAZAR, GUWAHATI - 781 001
TEL : (0361) 2543046, 2519683
FAX : (0361) 2545558
e-mail : gaggarp@gmail.com

UTILISATION CERTIFICATE

Certified that out of a sum of **Rs. 17,18,24,000.00** (Rupees Seventeen Crores Eighteen Lacs Twenty-Four Thousand only) received as Grant-in-Aid from **Government of India, Ministry of Science & Technology** received during the FY 2014-15 vide letter mentioned hereunder and Interest from Bank **Rs. 20,34,451.00** and opening deficit of **Rs. 14,86,281.26** (being Cash & bank Balance of Rs.35,25,278.00 plus advance given Rs.48,000.00 less other receipts Rs.1,59,538.00 and liabilities to be paid Rs.50,00,000.00 plus adjustment of unspent balances of Workshop & Upgrading Bank A/c amounting to Rs.99,978.74) as on 31.03.2014, a sum of **Rs. 17,03,25,369.71** have been utilized for the purpose for which it was sanctioned (total expenditure of Rs. 17,42,71,434.71 less other receipts of Rs. 37,86,527.00 of current year and Rs. 1,59,538.00 of previous year) and a surplus balance of **Rs. 20,46,800.03** (being Cash & Bank Balance of Rs. 27,12,176.03 plus advance given Rs.48,000.00 during previous year less earnest money refundable Rs. 7,13,376.00) stands unutilized as on 31.03.2015.

Sl. No	Sanction Letter No.	Amount (Rs.)
1.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/CAP/003/2014/1 dated 05.05.2014	18,000,000.00
2.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SAL/003/2011/3 dated 21.01.2015	19,557,000.00
3.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SC/003/2014/2 dated 01.09.2014	3,000,000.00
4.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SAL/003/2011/1 dated 24.04.2014	18,300,000.00
5	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/ST/003/2014/1 dated 05.05.2014	333,000.00
6.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/GEN/003/2011/1 dated 05.05.2014	15,500,000.00
7.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SC/003/2011/1 dated 05.05.2014	1,200,000.00
8.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide AI/IASST/ST/GEN/003/1 dated 01.09.2014	4,000,000.00
9.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/SAL/003/2014/2 dated 25.08.2014	31,000,000.00

Contd.....P/2.

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10.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/CAP/003/2014/2 dated 01.09.2014	24,000,000.00
11.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/GEN/003/2014/2 dated 01.09.2014	20,400,000.00
12.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/ST/003/2014/2 dated 01.09.2014	1,500,000.00
13.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/ST/003/2014/3 dated 21.01.2015	34,000.00
14.	Government of India, Ministry of Science & Technology, Department of Science & Technology, New Delhi vide Letter No. AI/IASST/GEN/003/2014/3 dated 21.01.2015	15,000,000.00
	Total Rs.	**17,18,24,000.00**

We have verified the records eg- bills, vouchers etc to see that the money was actually utilized for the purpose for which it was sanctioned.

Kinds of check exercised:

1. Verification of Cash Book
2. Checking of Vouchers
3. Verification of compliance to terms of Sanction of Grants.

For P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

PLACE: GUWAHATI
DATE : 18.08.2015

Director
IASST, Paschim Boragaon
Guwahati-781 035

(P. GAGGAR)
PARTNER (M.NO.040259)

PGA/CERT/453

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

STATEMENT OF RECEIPTS AND PAYMENTS ACCOUNT FOR THE PERIOD FROM 01.04.2014 TO 31.03.2015

RECEIPTS		Amount (Rs.)	PAYMENTS		Amount (Rs.)
Opening Balance b/d			**SALARY**		
: Cash at Bank - DST Core		34,75,278.00	Salary & Allowances		
: Cash in hand		50,000.00	Salary & Other Allowances	5,61,09,316.00	
Brought Forward Balances of other Banks			P.F Contribution	40,26,578.00	
			Gratuity Premium	22,88,482.00	
: Cash at Bank - Workshop A/c		60,114.88	Children Education	12,63,840.00	
			Medical/LTC	15,96,051.00	
GRANT-IN-AIDS			Telephone Charges	1,40,935.00	
			Newspaper & Periodicals	65,400.00	
From Ministry of Science and Technology			Uniform Allowance	70,751.00	
Department of Science & Technology, New Delhi			Loans and advances	10,74,000.00	
			Emiritus Scientist		
Letter No.			Scientist	4,80,000.00	
AI/IASST/CAP/003/2014/1	1,80,00,000.00		RA	86,400.00	6,72,01,753.00
AI/IASST/SAL/003/2011/3	1,95,57,000.00				
AI/IASST/SC/003/2014/2	30,00,000.00		**GENERAL**		
AI/IASST/SAL/003/2011/1	1,83,00,000.00		Contingency	1,11,89,267.00	
AI/IASST/ST/003/2014/1	3,33,000.00		Bank Charges	11,049.00	
AI/IASST/GEN/003/2011/1	1,55,00,000.00		Emiratus Scientist Exp.	42,405.00	
AI/IASST/SC/003/2011/1	12,00,000.00		Consumables	67,50,602.00	
AI/IASST/ST/GEN/003/1	40,00,000.00		Training & Conference	74,43,317.00	
AI/IASST/SAL/003/2014/2	3,10,00,000.00		Travelling	18,33,166.71	
AI/IASST/CAP/003/2014/2	2,40,00,000.00		Honararium	8,33,982.00	
AI/IASST/GEN/003/2014/2	2,04,00,000.00		Security Service	11,07,910.00	
AI/IASST/ST/003/2014/2	15,00,000.00		Works & Services	1,05,77,554.00	3,97,89,252.71
A1/IASST/ST/003/2014/3	34,000.00				
A1/IASST/GEN/003/2014/3	1,50,00,000.00	17,18,24,000.00	**CAPITAL**		
			Equipments	1,13,82,151.00	
INTEREST FROM BANK			Library		
Bank Interest on SB A/c		8,60,132.00	Books & Journal	34,25,780.00	
Interest on Fixed Deposit		11,72,735.00	Newspaper & Periodicals	34,835.00	
			Computer	14,34,271.00	
OTHER RECEIPTS			A.C.	9,47,357.00	
Contributions from NPS etc.		1,46,922.00	Furniture & Fixture	84,19,067.00	
		5,50,000.00	Land & Building	4,11,26,886.00	6,67,70,347.00
Grants for Conference/Workshop/Seminar Etc.					
Registration Fees Receipts of Conferences		7,74,245.00	Advance out of Institutional Charges Receipts		
Miscellaneous Receipts		2,51,660.00	Advance :		
			Engineering Cell		50,000.00
REFUNDABLE DEPOSITS			SSH		5,000.00
Earnest Money		7,13,376.00			
					50,00,000.00
			Temporary Loan refunded to Extramural Projects		
			Unspent Balance c/d -		
			Cash at Bank		9,91,301.17
			Cash in hand		70,809.00
	Total Rs.	17,98,78,462.88		Total Rs.	17,98,78,462.88

We have verified the above statement of Receipts & Payments Account of Institute of Advanced Study in Science & Technology, Paschim Boragaon, Guwahati - 781 035, Account - Plan for the period from 1st April,2014 to 31st March, 2015 from the Books of Accounts and vouchers produced before us.

For P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P.GAGGAR)
PARTNER (M.NO. 040259)

PLACE : GUWAHATI
DATE : 18.08.2015

P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

AASTHA TOWER, 2ND FLOOR, C.K.ROAD,
PANBAZAR, GUWAHATI - 781 001
TEL : (0361) 2543046, 2519683
FAX : (0361) 2545558
e-mail : gaggarp@gmail.com

INDEPENDENT AUDITOR'S REPORT

TO
THE MEMBERS OF
THE INSTITUTE OF ADVANCED STUDY IN SCIENCE & 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 Balance Sheet as at March 31, 2015, the Receipts & Payments Account and the Income & Expenditure Account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the 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 material misstatement, whether due to fraud or error.

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 plan 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 judgement, 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.

Contd.....P/2

P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

AASTHA TOWER, 2ND FLOOR, C.K.ROAD,
PANBAZAR, GUWAHATI - 781 001
TEL : (0361) 2543046, 2519683
FAX : (0361) 2545558
e-mail : gaggarp@gmail.com

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 at March 31, 2015;

b) In case of the Income & Expenditure Account of the Income/Expenditure of Society for the year ended 31st March, 2015.

c) In case of the Receipts & Payment Account of the Receipts/Payments of Society for the year ended 31st March, 2015.

We further report that:

a) we have obtained all the information and explanations which 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 & Payments Account and the Income & Expenditure Account dealt with by this Report are in agreement with the books of account.

For P.GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

PLACE: GUWAHATI
DATE : 18.08.2015

(P. GAGGAR)
PARTNER (M.NO.040259)

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

BALANCE SHEET AS AT 31ST MARCH, 2015

PARTICULARS	Schedule	2014-15	2013-14
		(Rs.)	(Rs.)
CAPITAL FUND & LIABILITIES			
Capital Fund	1	43,78,36,771.96	35,10,62,588.96
Current Liabilities and Provisions	2	3,78,14,343.07	6,28,56,926.78
TOTAL		**47,56,51,115.03**	**41,39,19,515.74**
ASSETS			
Fixed Assets	3	44,18,18,945.00	35,50,44,762.00
Fixed Assets - Commited		-	34,843.00
Investments	4	45,47,274.00	42,67,000.00
Current Assets, Loans and Advances	5	2,92,84,896.03	5,45,72,910.74
TOTAL		**47,56,51,115.03**	**41,39,19,515.74**

NOTES ON ACCOUNT - SCHEDULE "13"

In terms of our REPORT of even date annexed hereto.

For P.GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P. GAGGAR)
PARTNER (M.NO.040259)

Director
IASST, Paschim Boragaon
Guwahati-781 035

PLACE : GUWAHATI
DATE : 18.08.2015

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

RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH,2015

PARTICULARS	Schedule	2014-15 (Rs.)	2013-14 (Rs.)
RECEIPT			
Grant-in-Aid	6	19,80,06,448.00	19,19,40,239.00
Bank Interest Received		13,94,120.00	21,58,173.00
Fixed Deposit Interest		14,11,032.00	22,65,609.00
Other Income	7	33,54,639.00	10,77,945.00
Earnest Money (Details 6)		7,64,976.00	18,68,245.00
Recovery of Loans & Advances		-	
TOTAL		**20,49,31,215.00**	**19,93,10,211.00**
PAYMENT			
Payment on Grants	8	12,07,69,751.71	9,39,91,446.86
Aquisition of Fixed Assets	9	7,25,95,823.00	6,22,41,698.00
Advances for Fixed Assets	10	25,41,748.00	3,39,63,209.00
Advances against Expenditures of Grants	11	19,36,314.00	-
Advance to Staff		10,74,000.00	21,66,449.00
Investment in Fixed Deposits with SBI		-	9,17,392.00
Earnest Money (Details 7)		13,09,583.00	23,63,630.00
Crest Award		-	16,33,770.00
Refund of Unlitilised Grant		2,956.00	6,24,027.00
Outstanding Liabilities of PY Paid (Details 1)		6,50,311.00	1,32,697.00
TOTAL		**20,08,80,486.71**	**19,80,34,318.86**
OPENING BALANCE		**1,75,25,496.74**	**1,62,49,604.60**
EXCESS OF RECEIPT OVER PAYMENT		**40,50,728.29**	**12,75,892.14**
CLOSING BALANCE		**2,15,76,225.03**	**1,75,25,496.74**

NOTES ON ACCOUNT - SCHEDULE "14"

In terms of our REPORT of even date annexed hereto.

For P.GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P. GAGGAR)
PARTNER (M.NO.040259)

PLACE : GUWAHATI
DATE : 18.08.2015

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

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2015

PARTICULARS	Schedule	2014-15 (Rs.)	2013-14 (Rs.)
INCOME			
Grants	12	11,52,57,282.71	9,01,81,033.86
Interest		31,96,500.00	44,23,782.00
Other Income	7	33,55,239.00	10,77,945.00
TOTAL		**12,18,09,021.71**	**9,56,82,760.86**
EXPENDITURE			
Expenditure on Grants	13	12,18,09,021.71	9,56,82,760.86
TOTAL		**12,18,09,021.71**	**9,56,82,760.86**

NOTES ON ACCOUNT - SCHEDULE "14"

In terms of our REPORT of even date annexed hereto.

For P.GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P. GAGGAR)
PARTNER (M.NO.040259)

PLACE : GUWAHATI
DATE : 18.08.2015

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

INCOME & EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH 2015

PARTICULARS	Schedule	2014-15 (Rs.)	2013-14 (Rs.)
INCOME			
Grants	12	11,52,57,282.71	9,01,81,033.86
Interest		29,16,226.00	44,23,782.00
Other Income	7	36,35,513.00	10,77,945.00
TOTAL		**12,18,09,021.71**	**9,56,82,760.86**
EXPENDITURE			
Expenditure on Grants	13	12,18,09,021.71	9,56,82,760.86
TOTAL		**12,18,09,021.71**	**9,56,82,760.86**

NOTES ON ACCOUNT - SCHEDULE "14"

In terms of our REPORT of even date annexed hereto.

For P.GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P. GAGGAR)
PARTNER (M.NO.040259)

PLACE : GUWAHATI
DATE : 18.08.2015

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

SCHEDULE 1 - CAPITAL FUND

	2014-15	2013-14
	(Rs.)	(Rs.)
Opening Balance	35,10,62,588.96	25,62,94,235.96
Add: Contribution towards Capital Fund (Addition to Fixed Assets)	10,65,93,875.00	11,02,62,867.00
	45,76,56,463.96	36,65,57,102.96
Less: Depreciation for the year	1,98,19,692.00	1,54,94,514.00
TOTAL	**43,78,36,771.96**	**35,10,62,588.96**

SCHEDULE 2 - CURRENT LIABILITIES AND PROVISIONS

	2014-15	2013-14
A. CURRENT LIABILITIES	(Rs.)	(Rs.)
Unutilised Grant in Aid	3,47,91,964.07	5,86,39,629.78
Other Current Liabilities (Details 1)	17,19,334.00	23,69,645.00
Earnest Money	13,03,045.00	18,47,652.00
B. PROVISIONS	-	-
TOTAL	**3,78,14,343.07**	**6,28,56,926.78**

SCHEDULE 4 - INVESTMENTS

	2014-15	2013-14
	(Rs.)	(Rs.)
Term Deposits	45,47,274.00	42,67,000.00
TOTAL	**45,47,274.00**	**42,67,000.00**

SCHEDULE 5 - CURRENT ASSETS, LOANS AND ADVANCES

		2014-15	2013-14
CURRENT ASSETS		(Rs.)	(Rs.)
Cash in Hand		70,909.00	50,100.00
Balance with Banks			
SBI Khanapara Branch	(A/c 943972)	6,94,327.00	34,75,278.00
SBI Khanapara Branch- Workshop	(A/c 943723)	11,299.88	60,114.88
SBI Garchuk Branch- Project	(A/c 260721)	1,88,63,949.00	1,39,00,140.00
SBI G.U Branch- Upgrading	(A/c 131613)	41,447.86	39,863.86
SBI Garchuk - Seminar	(A/c 888433)	66,741.00	-
Vijaya Bank- Overhead/Misc	(A/c 000466)	16,08,618.00	-
Vijaya Bank- Travel	(A/c 000441)	1,73,902.29	-
Vijaya Bank- Conference	(A/c 000918)	36,078.00	-
SBI Khanapara - International Conf.	(A/c 635294)	8,953.00	-
LOANS, ADVANCES AND OTHER ASSETS			
Crest Award		3,43,770.00	3,43,770.00
TDS Receivable (AY 2015-16)		1,11,674.00	
Loans to Staff (Details 2)		27,75,165.00	27,40,435.00
Advances:			
Advances against Expenditure of Grants		19,36,314.00	-
Advances for Equipments		8,71,666.00	2,34,10,311.00
Advances for Vehicles		4,55,082.00	-
Advances for Books		2,15,000.00	-
Advances for Furniture & Fixtures		-	11,04,691.00
Advances for Building & Site Development		10,00,000.00	94,48,207.00
TOTAL		**2,92,84,896.03**	**5,45,72,910.74**

P. GAGGAR & ASSOCIATES

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

SCHEDULE - 3 FIXED ASSETS

DESCRIPTION	GROSS BLOCK				DEPRECIATION			NET BLOCK	
	As on 01.04.2014	Addition	Deductions	As on 31.03.2015	As on 01.04.2014	For the year	As on 31.03.2015	As on 31.03.2015	As on 31.03.2014
	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Building & Site Development	18,59,74,786.00	4,96,09,936.00		23,55,84,722.00	73,89,458.00	38,40,031.00	1,12,29,489.00	22,43,55,233.00	17,85,85,328.00
Equipments	17,92,93,267.00	4,18,32,938.00		22,11,26,205.00	2,18,85,845.00	1,05,03,495.00	3,23,89,340.00	18,87,36,865.00	15,74,07,422.00
Air Conditioner	17,80,124.00	9,47,357.00		27,27,481.00	1,71,744.00	1,29,555.00	3,01,299.00	24,26,182.00	16,08,380.00
Refrigerator	19,600.00	-		19,600.00	2,793.00	931.00	3,724.00	15,876.00	16,807.00
Projector	1,42,995.00	-		1,42,995.00	20,376.00	6,792.00	27,168.00	1,15,827.00	1,22,619.00
Vehicles	10,88,194.00	-		10,88,194.00	4,13,512.00	1,03,378.00	5,16,890.00	5,71,304.00	6,74,682.00
Furniture & Fixtures	95,07,662.00	95,23,758.00		1,90,31,420.00	14,54,093.00	12,04,689.00	26,58,782.00	1,63,72,638.00	80,53,569.00
Library	1,31,99,812.00	32,45,615.00		1,64,45,427.00	69,17,705.00	32,89,085.00	1,02,06,790.00	62,38,637.00	62,82,107.00
Computer	30,56,983.00	14,34,271.00		44,91,254.00	8,06,564.00	7,28,032.00	15,34,596.00	29,56,658.00	22,50,419.00
Printer & Xerox Machine	44,041.00	-		44,041.00	21,417.00	7,139.00	28,556.00	15,485.00	22,624.00
Computer Software	40,500.00	-		40,500.00	19,695.00	6,565.00	26,260.00	14,240.00	20,805.00
TOTAL	**39,41,47,964.00**	**10,65,93,875.00**	**-**	**50,07,41,839.00**	**3,91,03,202.00**	**1,98,19,692.00**	**5,89,22,894.00**	**44,18,18,945.00**	**35,50,44,762.00**
PREVIOUS YEAR	**28,38,85,097.00**	**11,02,62,867.00**	**-**	**39,41,47,964.00**	**2,36,08,688.00**	**1,54,94,514.00**	**3,91,03,202.00**	**35,50,44,762.00**	**26,02,76,409.00**

P. GAGGAR & ASSOCIATES Guwahati-1 Chartered Accountants

Director
IASST, Paschim Boragaon
Guwahati-781 035

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

SCHEDULE - 6:
GRANT-IN-AID

Sl.No.	Name of the Project/General fund	2014-15	2013-14
		(Rs.)	(Rs.)
1	Androgen	4,93,000.00	75,000.00
2	Atmospheric	2,27,920.00	14,97,000.00
3	Assessment of Chemical Inputs	3,41,971.00	
4	Bio Informatics	-	13,32,000.00
5	Bio Surfactant Soil for Oil	4,63,359.00	10,60,400.00
6	Bio Surfactants	-	-
7	Bio tech Hubs	-	14,98,000.00
8	Chemical Study of Carbon dots	13,43,250.00	
9	Citrus Fruits	3,65,837.00	3,76,960.00
10	Crops of Assam	18,90,000.00	-
11	CSIR	2,45,400.00	
12	CSIR - Dolly Gogoi	-	2,83,100.00
13	CSIR Hemen Deka	-	1,33,087.00
14	Data Bank	-	50,365.00
15	DBT RA - Suprio Sen	3,95,600.00	3,97,385.00
16	DBT- RA Sushmita Gupta	-	3,81,200.00
17	DST Inspire	14,05,214.00	
18	Department of Science and Technology - General	17,18,24,000.00	15,96,00,000.00
19	Development of Polymer Sensors	-	10,24,000.00
20	Electronic Alloys Magnetic	3,50,000.00	18,30,000.00
21	Elucidation	-	18,50,000.00
22	Exploration - Ramalingam Swamy	16,30,667.00	14,85,000.00
23	Exploration of Actimycetes	3,25,112.00	2,46,656.00
24	Exploration of microbial	6,20,400.00	-
25	Govt. of Assam	10,00,000.00	50,00,000.00
26	Higher Educatuion	-	1,99,400.00
27	Identification	5,15,000.00	-
28	Image Processing (LB Mahanta)	3,75,000.00	
29	Image Processing (Tabassum)	48,422.00	
30	Inspire	19,00,000.00	16,91,680.00
31	Intestinal Microbiodata	10,76,000.00	8,80,000.00
32	Investigating Physio Sensors	2,87,981.00	38,00,000.00
33	Investigation of Rogue	2,00,000.00	19,35,400.00
34	Jhumming	17,96,992.00	
35	Nano Materials	46,07,365.00	
36	Normal Tea Plant	10,20,000.00	
37	Polymer & Polymer Nano	7,63,150.00	
38	Proton Exchange	8,47,000.00	
39	SANS	55,795.00	-
40	Silk Protien Based	-	8,98,000.00
41	Single Step Recovery	31,513.00	2,17,005.00
42	Spectra and Pseudo Spectra	-	4,16,449.00
43	Statistical Methods	-	4,83,000.00
44	Stimulus Responsive	88,500.00	2,57,152.00
45	Structure of Enzymes	5,22,000.00	-
46	Suitable Plant	4,00,000.00	7,00,000.00
47	Tissue Repairs	-	10,20,000.00
48	Treatment of Oil Field	-	6,22,000.00
49	Virulence Factors	-	7,00,000.00
50	Grants toward Training & Conference	5,50,000.00	
		19,80,06,448.00	**19,19,40,239.00**

P. GAGGAR & ASSOCIATES Guwahati

Director
IASST Paschim Boragaon
Guwahati-781 035

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

SCHEDULE - 7:

OTHER INCOME

Sl.No.	Particulars	2014-15 (Rs.)	2013-14 (Rs.)
1	Financial Assistance	43,917.00	1,58,637.00
2	Other receipts	3,25,855.00	9,19,308.00
3	Institutional Charges Receipts	20,63,700.00	-
4	Registration Fees Receipts of Conferences	7,74,245.00	-
5	Contributions from NPS	1,46,922.00	-
		33,54,639.00	**10,77,945.00**

SCHEDULE - 8:

PAYMENT ON GRANTS

Sl.No.	Particulars	2014-15 (Rs.)	2013-14 (Rs.)
1	Bank Charges	11,049.00	6,608.00
2	Contingency - Emiratus Scientist	39,205.00	1,32,783.00
3	Contingency (Refer Details 3)	1,18,54,182.00	99,00,081.00
4	Contributory Provident Fund	40,26,578.00	33,61,350.00
5	Honorarium	8,33,982.00	5,64,612.00
6	Laboratory Consumables (Refer Details 4)	1,05,60,087.00	55,20,319.00
7	Miscellaneous Expenses	-	25,513.00
8	Overhead expenses	8,93,754.00	7,94,517.00
9	Salary	7,07,82,743.00	6,08,55,748.00
10	Salary - Emiratus Scientist	4,80,000.00	4,80,000.00
11	Salary - RA	86,400.00	3,45,600.00
12	Security Services	11,07,910.00	10,08,406.00
13	Technical Assistance	32,575.00	41,276.00
14	Training & Conference expenses	70,13,903.00	18,94,969.00
15	Travelling Expenses	24,99,405.71	20,44,674.86
16	Works & Services (Refer Details 5)	1,05,47,978.00	70,14,990.00
	Total Rs.	**12,07,69,751.71**	**9,39,91,446.86**

P. GAGGAR & ASSOCIATES Guwahati-1 Chartered Accountants

Director
IASST, Paschim Boragaon
Guwahati-781 035

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

SCHEDULE - 9:

ACQUISITION OF FIXED ASSETS

Sl.No.	Particulars	2014-15	2013-14
		(Rs.)	(Rs.)
1	Building & Site Development	4,01,26,886.00	3,22,88,645.00
2	Machinery and Equipments	1,84,22,627.00	2,31,54,178.00
3	Furniture and Fixtures	84,19,067.00	29,69,437.00
4	Library books	32,45,615.00	19,10,303.00
5	Computer	14,34,271.00	14,34,364.00
6	Air Conditioner	9,47,357.00	4,84,771.00
	Total Rs.	**7,25,95,823.00**	**6,22,41,698.00**

SCHEDULE - 10:

ADVANCES FOR FIXED ASSETS

Sl.No.	Name of Fixed Assets	Date	2014-15
			(Rs.)
A)	**GENERAL**		
	a) EQUIPMENT		
1	Deep Freeze 80.C	13.01.2015	4,77,338.00
2	Zetasizer Nano ZS90	10.02.2015	3,94,328.00
	Sub Total Rs.		**8,71,666.00**
	b) VEHICLES		
1	Bus	07.03.2015	4,55,082.00
	Sub Total Rs.		**4,55,082.00**
	c) BOOKS AND JOURNAL		
1	Books	13.01.2015	2,00,000.00
		13.01.2015	15,000.00
	Sub Total Rs.		**2,15,000.00**
	d) BUILDING AND SITE DEVELOPMENT		
1	Student & Scientist Home	02.07.2014	5,00,000.00
2	Other Construction	03.12.2014	5,00,000.00
	Sub Total Rs.		**10,00,000.00**
	Grand Total Rs. (a+b+c+d)		**25,41,748.00**

P. BAGGAR & ASSOCIATES Guwahati Chartered Accountants

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

SCHEDULE - 11:

ADVANCES AGAINST EXPENDITURE OF GRANTS

Sl.No.	Particulars	Amount (Rs.)
	A) GENERAL FUND	
1	Consumables	70,112.00
2	Contingency	8,14,984.00
3	Emiratus Scientist	3,200.00
4	Salary	1,27,800.00
5	Training & Conference	5,71,614.00
6	Travel	42,800.00
7	Advance Vijaya Bank	2,00,000.00
8	Works & Services	96,576.00
	TOTAL (A) in Rs.	19,27,086.00
	B) EXTRAMURAL PROJECT FUND	
1	Consumables (Jhumming)	9,228.00
	TOTAL (B) in Rs.	9,228.00
	TOTAL (A+B) in Rs.	**19,36,314.00**

SCHEDULE - 12:

GRANTS

PARTICULARS	2014-15 (Rs.)	2013-14 (Rs.)
Grants	19,80,06,448.00	19,19,40,239.00
Add: Unutilised Grant brought forward from Previous Year	5,86,39,629.78	6,77,67,318.64
	25,66,46,077.78	25,97,07,557.64
Less: Transferred to Capital Fund	10,65,93,875.00	11,02,62,867.00
	15,00,52,202.78	14,94,44,690.64
Less: Refund of Unutilised Grant	2,956.00	6,24,027.00
	15,00,49,246.78	14,88,20,663.64
Less: Untilised Grant Carried forward	3,47,91,964.07	5,86,39,629.78
Total Rs.	**11,52,57,282.71**	**9,01,81,033.86**

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

SCHEDULE - 13 :

EXPENDITURE ON GRANTS

Sl. No.	Particulars	Current Year			Previous Year
		Extramural Projects	General Fund		
		Payment	Payment	Total expenditure	
		(Rs.)	(Rs.)	(Rs.)	(Rs.)
1	Training expenses	1,42,200.00	68,71,703.00	70,13,903.00	18,94,969.00
2	Technical Assistance	32,575.00	-	32,575.00	41,276.00
3	Salary	93,75,768.00	6,24,46,245.00	7,18,22,013.00	6,23,29,033.00
4	Salary - Emiratus Scientist		4,80,000.00	4,80,000.00	4,80,000.00
5	Salary - RA		86,400.00	86,400.00	3,45,600.00
6	Honorarium		8,33,982.00	8,33,982.00	5,64,612.00
7	Travelling Expenses	9,09,039.00	15,90,366.71	24,99,405.71	20,44,674.86
8	Contingency	14,79,899.00	1,03,74,283.00	1,18,54,182.00	99,08,504.00
9	Contingency - Emiratus Scientist		39,205.00	39,205.00	1,32,783.00
10	Laboratory Consumables	38,79,597.00	66,80,490.00	1,05,60,087.00	56,93,820.00
11	Overhead expenses	8,93,754.00		8,93,754.00	8,30,622.00
12	Financial Assistance (project)	-		-	-
13	Contributory Provident Fund		40,26,578.00	40,26,578.00	33,61,350.00
14	Works & Services	12,000.00	1,05,35,978.00	1,05,47,978.00	70,14,990.00
16	Bank Charges		11,049.00	11,049.00	6,608.00
17	Security Services		11,07,910.00	11,07,910.00	10,08,406.00
18	Miscellaneous Expenses			-	25,513.00
19	International Conference			-	-
	Total Rs.	1,67,24,832.00	10,50,84,189.71	12,18,09,021.71	9,56,82,760.86

P. GAGGAR & ASSOCIATES Guwahati-1 Chartered Accountants

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
PASCHIM BORAGAON, GARCHUK
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Details 1 - Other Current Liabilties
a. Movement during the year

Particulars	2014-15	2013-14
	(Rs.)	(Rs.)
Opening Balance	23,69,645.00	21,12,831.00
Add: commited for expenses	-	4,82,650.00
Add: Provision for Staff Welfare	-	1,36,639.00
Add: commited for equipments	-	34,843.00
	23,69,645.00	27,66,963.00
Less: Last year liabilities paid off	6,50,311.00	1,32,697.00
Less : Last Year Liabilities written back	-	2,64,621.00
TOTAL	**17,19,334.00**	**23,69,645.00**

b. Detailed break up of Closing Balance of Other Current Liablities

Sl. No.	Project Name	Head	2014-15	2013-14
			(Rs.)	(Rs.)
1	Upgrading	Earth Filling	17,15,513.00	17,15,513.00
2	Ramalingaswami	Medical Contri - Salary	-	3,900.00
3	Ramalingaswami	Bonus Fund - Salary	-	120.00
4	Ramalingaswami	NPS- Salary	-	38,594.00
5	Actinomy	HRA - Salary	-	14,400.00
6	Biotech Hubs	Medical Contri - Salary	-	3,900.00
7	Treatment of oil field	Medical Contri - Salary	-	3,900.00
8	Oxidative degradation	Medical Contri - Salary	-	3,250.00
9	Helferfibers	Medical Contri - Salary	-	3,900.00
10	Silk protin based	Medical Contri - Salary	-	3,900.00
11	Structure of enzymes	Medical Contri - Salary	-	650.00
12	Androgen	Medical Contri - Salary	-	3,900.00
13	Peste in tea (Microbial)	Medical Contri - Salary	-	325.00
14	Actinomy	Medical Contri - Salary	-	325.00
15	Citrus fruits	Medical Contri - Salary	-	3,900.00
16	Indentification	Medical Contri - Salary	-	3,900.00
17	Crops of Assam	Medical Contri - Salary	-	650.00
18	Biosurfactance	Medical Contri - Salary	-	1,625.00
19	Proton Exchange	Medical Contri - Salary	-	7,800.00
20	Single Step	Medical Contri - Salary	-	3,900.00
21	Atmospheric	Medical Contri - Salary	-	1,950.00
22	Physico Sensor	Medical Contri - Salary	-	1,950.00
23	Stimuli	Medical Contri - Salary	-	3,900.00
24	Polimar based sensor	Medical Contri - Salary	-	7,800.00
25	Flora & Fonna	Medical Contri - Salary	-	7,150.00
26	Elotronic magnetic	Medical Contri - Salary	-	3,250.00
27	Investigation of rogue	Medical Contri - Salary	-	2,275.00

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
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Sl. No.	Project Name	Head	2014-15 (Rs.)	2013-14 (Rs.)
28	Inspare faculty	Medical Contri - Salary	-	3,900.00
29	CSIR RA	Medical Contri - Salary	-	1,625.00
30	Citrus fruits	Overhead	-	9,376.00
31	Proton Exchange	Salary	-	208.00
32	Flora & Fonna	Overhead	-	1,66,667.00
33	DST (Suitable Plant)	Overhead	-	1,00,000.00
34	CSIR RA	Overhead	-	171.00
35	DST Govt. of Assam	Grants-in-Aid	3,821.00	3,821.00
36	Citrus Fruits	Contingency	-	14,857.00
37	Identification	Consumables	-	1,87,550.00
38	Identification	Equipments	-	34,843.00
TOTAL			**17,19,334.00**	**23,69,645.00**

Details 2 - Loans to Staff

Particulars	2014-15 (Rs.)	2013-14 (Rs.)
Opening Balance	27,40,435.00	19,10,632.00
Add: Advances for the year	10,74,000.00	21,66,449.00
	38,14,435.00	40,77,081.00
Less: Recovered during the year	10,39,270.00	13,36,646.00
TOTAL	**27,75,165.00**	**27,40,435.00**

Details 3 - Contingency expenses

Particulars	2014-15 (Rs.)	2013-14 (Rs.)
General Fund		
Meeting Expenses	3,50,968.00	10,41,849.00
Advertisement	5,45,664.00	8,41,000.00
Postage	1,19,320.00	1,41,318.00
Electricity & Power	53,12,223.00	40,03,061.00
Audit Fee	23,596.00	28,090.00
Telephone Charges	53,510.00	82,036.00
Repairing & Maintenance - Vehicle	7,03,478.00	4,39,247.00
Printing & Stationery	18,66,483.00	4,01,456.00
Computer Stationery	1,09,606.00	2,46,824.00
Hospitality	11,34,390.00	3,95,264.00
Conveyance	53,620.00	28,133.00
Hostel Rent & Electricity	1,01,425.00	64,066.00
Project Fund	14,79,899.00	21,87,737.00
Total Rs.	**1,18,54,182.00**	**99,00,081.00**

P. GAGGAR & ASSOCIATES Guwahati Chartered Accountants

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

Details 4 - Laboratory Consumables

Particulars	2014-15 (Rs.)	2013-14 (Rs.)
General Fund		
Laboratory Gas Refilling	1,22,058.00	1,08,932.00
Chemicals & Glassware	59,78,529.00	27,34,610.00
Sample Collection	2,27,245.00	1,08,308.00
Renewal/Other Fee Payments	1,72,902.00	1,68,600.00
Experimental Animal Maintenance	1,79,756.00	
Project Fund	38,79,597.00	23,99,869.00
Total Rs.	**1,05,60,087.00**	**55,20,319.00**

Details 5 - Works & Services

Particulars	2014-15 (Rs.)	2013-14 (Rs.)
General Fund		
Repairing & Maintenance (Equipment)	8,59,196.00	55,19,852.00
Gardening & Landscaping	5,28,363.00	5,43,276.00
Repairing & Maintenance (Electrical)	10,12,696.00	8,86,106.00
Repairing & Maintenance (General)	80,88,930.00	
Repairing & Maintenance (SSH)	46,793.00	
Project Fund	12,000.00	65,756.00
Total Rs.	**1,05,47,978.00**	**70,14,990.00**

Details 6 - Earnest Money Receipts

Name of the Firms	Details of Works	2014-15 (Rs.)
Mr. Nizzamuddin Ahmed	Gypboard Ceiling, Partition work etc. at Server Room, Civil work for laying cement conrete paver block at internal approach road gate to office, garage front,	51,600.00
Mr. Hari Das	Loby and Porch	2,80,711.00
Mr. Nirupama Associate	Entrance Gate and Security Office	2,38,932.00
Mr. Hari Das	Embankment and Pathway	1,93,733.00
	Total Rs.	**7,64,976.00**

THE INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY
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Details 7 - Earnest Money Payments

Name of the Firms	Details of Works	2014-15
		(Rs.)
Bruker Axs Analytical Instruments	X-Ray Reflectivity	73,900.00
MDS Bio-Analytical Pvt. Ltd.		20,000.00
Septech Marketing India Pvt. Ltd.		38,118.00
Search Sales & Services		54,600.00
AIM		7,000.00
Metos Instruments India Pvt. Ltd.		4,000.00
DHR Holding India Pvt. Ltd.	Trinocular Cempond Research Microscope	10,000.00
Thermofisher Scientific India Pvt. Ltd.	GCMS-MS	2,25,000.00
Inkarp Instruments Pvt. Ltd.		15,067.00
Analytical Instruments Sales &Services Pvt. Ltd.		21,090.00
North East Chemicals Corporation		40,490.00
Thermofisher Scientific India Pvt. Ltd.	Gradient PCR Shaking Incubator Centrifuge	40,000.00
Modern Lab Interio	Fume Hood	3,500.00
Denovo Life Science (P) Ltd.	UV Transilluminator & BOD Incubator	18,800.00
Agilent Technologies Pvt. Ltd.	GCMS-MS	1,20,000.00
Pelican Equipment	Nitrogen Analyzer	21,000.00
North East Project	100 KVA Stabilizer	40,000.00
Edison International	100 KVA Stabilizer	50,000.00
Electro-Mart	100 KVA Stabilizer	60,000.00
BMG Informatics	IP Surveillance System	19,883.00
Pathway Communication	IP Surveillance System	10,000.00
Techno Reach		17,000.00
Indomech Industries	50 KVA DG Set	12,730.00
Thermofisher Scientific India Pvt. Ltd.	LCMS MS	3,50,000.00
Senith	IP Surveillance	2,405.00
Mansap Services Pvt. Ltd.	Digital Water	12,000.00
Blue Moon Associate	White Washing & Painting of Boundary Walls	13,000.00
NeoFam Instruments	Stereo Zoom Microscope	10,000.00
	Total Rs.	**13,09,583.00**

P. GAGGAR & ASSOCIATES Guwahati Chartered Accountants

Director
IASST, Paschim Boragaon
Guwahati-781 035

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

STATEMENT OF RECEIPTS AND PAYMENTS ACCOUNT OF EXTRAMURAL PROJECTS FOR THE YEAR ENDED 31ST MARCH 2015

RECEIPTS	Amount (Rs.)	PAYMENTS		Amount (Rs.)
Opening Balance b/d	1,39,00,140.00	**PAYMENT ON GRANTS**		
		Contingency	14,79,899.00	
GRANT-IN-AIDS (As per Annexure A)	2,56,32,448.00	Consumables	38,29,525.00	
		Equipments	79,12,142.00	
OTHER RECEIPTS		Lab Work	59,300.00	
Savings Bank Interest	5,33,988.00	Overheads	8,93,754.00	
Fixed Deposit Interest	2,36,713.00	Salary	93,75,768.00	
Earnest Money Deposit	51,600.00	Technical Assistance	32,575.00	
Financial Assistance	43,917.00	Travel	9,09,039.00	
Misc Receipts	74,295.00	Training	1,42,200.00	
		Works & Services	12,000.00	2,46,46,202.00
Loan Refund from DST Core Fund	50,00,000.00			
		Outstanding Liabilities of Previous Years Paid		6,50,311.00
		Earnest Money Refund Payments		13,09,583.00
		Refund of Unutilised Grant- RF Plasma		2,956.00
		Unspent Balance c/d -		
		Cash at Bank		1,88,63,949.00
		Cash in hand		100.00
Total Rs.	**4,54,73,101.00**		**Total Rs.**	**4,54,73,101.00**

Ve have verified the above statement of Receipts & Payments Account of Extramural Projects of Institute of Advanced Study in Science & Technology, Paschim Boragaon, Guwahati - 781 035, Account - Plan for the period from 1st April,2014 to 31st March, 2015 from the Books of Accounts and vouchers produced before us.

P. GAGGAR & ASSOCIATES Guwahati

PLACE : GUWAHATI
DATE : 18.08.2015

Director
IASST, Paschim Boragaon
Guwahati-781 035

For P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P.GAGGAR)
PARTNER (M.NO. 040259)

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

INCOME & EXPENDITURE ACCOUNT OF EXTRAMURAL PROJECTS FOR THE YEAR ENDED 31ST MARCH 2015

INCOME	Amount (Rs.)	EXPENDITURE		Amount (Rs.)
Grants	1,58,09,618.00	Expenditure on Grants		
Savings Bank Interest	5,33,988.00	Salary	93,75,768.00	
Fixed Deposit Interest	2,63,014.00	Consumables	38,20,297.00	
Other Income	1,18,212.00	Technical Assistance	32,575.00	
		Travel	9,09,039.00	
		Contingency	14,79,899.00	
		Training	1,42,200.00	
		Lab Work	59,300.00	
		Labour Charges	12,000.00	
		Overheads	8,93,754.00	1,67,24,832.00
Total Rs.	1,67,24,832.00		Total Rs.	1,67,24,832.00

NOTES ON ACCOUNT - SCHEDULE "14"

In terms of our REPORT of even date annexed hereto.

For P.GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P. GAGGAR)
PARTNER (M.NO.040259)

PLACE : GUWAHATI
DATE : 18.08.2015

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

ANNEXURE A

DETAILS OF GRANTS- IN- AIDS OF EXTRAMURAL PROJECTS FOR THE FY 2014-15

Sl.No.	Name of the Project	Amount (Rs.)
1	Androgen	4,93,000.00
2	Assessment of Chemical Inputs	2,27,920.00
3	Atmospheric	3,41,971.00
4	Bio Surfactant Soil for Oil	4,63,359.00
5	Chemical Study of Carbon dots	13,43,250.00
6	Citrus Fruits	3,65,837.00
7	Crops of Assam	18,90,000.00
8	CSIR	2,45,400.00
9	DBT RA - Suprio Sen	3,95,600.00
10	DST Inspire	14,05,214.00
11	Electronic Alloys Magnetic	3,50,000.00
12	Exploration - Ramalingam Swamy	16,30,667.00
13	Exploration of Actimycetes	3,25,112.00
14	Exploration of microbial	6,20,400.00
15	Flora & Fauna	10,00,000.00
16	Identification	5,15,000.00
17	Image Processing (LB Mahanta)	3,75,000.00
18	Image Processing (Tabassum)	48,422.00
19	Inspire Faculty	19,00,000.00
20	Intestinal Microbiodata	10,76,000.00
21	Investigating Physio Sensors	2,87,981.00
22	Investigation of Rogue	2,00,000.00
23	Jhumming	17,96,992.00
24	Nano Materials	46,07,365.00
25	Normal Tea Plant	10,20,000.00
26	Polymer & Polymer Nano	7,63,150.00
27	Proton Exchange	8,47,000.00
28	SANS	55,795.00
29	Single Step Recovery	31,513.00
30	Stimulus Responsive	88,500.00
31	Structure of Enzymes	5,22,000.00
32	Suitable Plant	4,00,000.00
	Total Rs.	**2,56,32,448.00**

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

DETAILS OF EXTRAMURAL PROJECTS FOR THE PERIOD ENDED 31ST MARCH 2015

Project Name	Balance as on 01/04/2014	Grant in Aid	Total Grant Available during the year	TOTAL EXPENDITURE ON GRANTS												Total Payments	Balance as on 31.03.2015
				Salary	Consumables	Equipment	Technical Assistance	Travel	Contingency	Training	Lab work	Labour	Earnest Money	Overhead	Refunds		
Androgen	-91,345.00	4,93,000.00	4,01,655.00	1,72,800.00	63,767.00	4,36,420.00										6,72,987.00	-2,71,332.00
Aquatic Bio	-17,308.00	-	-17,308.00													-	-17,308.00
Artificial Colour	-1,153.00	-	-1,153.00													-	-1,153.00
Assessment of Chemical Inputs on Soil	-	2,27,920.00	2,27,920.00	47,032.00				5,560.00	5,000.00					14,800.00		72,392.00	1,55,528.00
Atmospheric	1,74,802.00	3,41,971.00	5,16,773.00	2,30,400.00	6,395.00	1,04,776.00	32,575.00	34,934.00	1,124.00					25,508.00		4,35,712.00	81,061.00
Bharalu River	-5,79,338.00	-	-5,79,338.00													-	-5,79,338.00
Bio Informatics	13,32,000.00	-	13,32,000.00	2,01,942.00				1,06,435.00	2,65,193.00	23,200.00						5,96,770.00	7,35,230.00
Bio surfactant soil of oil	9,88,400.00	4,63,359.00	14,51,759.00	1,72,800.00	2,56,896.00	3,88,500.00		39,253.00	5,390.00					50,000.00		9,12,839.00	5,38,920.00
Biotech Hub	9,01,254.00	-	9,01,254.00	2,30,400.00		7,300.00		52,827.00	1,22,931.00	49,000.00						4,62,458.00	4,38,796.00
Citrus Fruits	823.00	3,65,837.00	3,66,660.00	2,50,699.00	78,553.00			12,050.00	14,024.00							3,55,326.00	11,334.00
Crops of Assam	-2,47,246.00	18,90,000.00	16,42,754.00	4,60,800.00	3,70,466.00	1,58,887.00		90,507.00	10,401.00					11,329.00		11,02,390.00	5,40,364.00
CSIR	-	2,45,400.00	2,45,400.00	89,280.00												89,280.00	1,56,120.00
CSIR RA - Dolly Gogoi	-73.00	-	-73.00													-	-73.00
DBT crest (D. Devi)	-3,43,770.00	-	-3,43,770.00													-	-3,43,770.00
DBT RA (Supriyo sen)	2,88,188.00	3,95,600.00	6,83,788.00	3,49,200.00	4,835.00				17,916.00							3,71,951.00	3,11,837.00
DST Inspire (Sumita sarma)	7,90,097.00	14,05,214.00	21,95,311.00	10,24,404.00	3,00,510.00	1,73,388.00		7,430.00	36,559.00					52,458.00		15,94,749.00	6,00,562.00
Education	-33,598.00	-	-33,598.00													-	-33,598.00
electronic alloys magnetic	1,26,723.00	3,50,000.00	4,76,723.00	1,72,800.00	-			13,140.00	27,030.00					234.00		2,13,204.00	2,63,519.00
Elucidation(Development of Diabetic Neuro Pathetic Plan)	18,50,000.00	-	18,50,000.00	2,04,388.00	2,70,250.00	9,59,625.00		39,164.00	18,090.00					50,000.00		15,41,517.00	3,08,483.00
exploration of actinomytes	66,146.00	3,25,112.00	3,91,258.00	1,64,826.00	1,65,293.00				52,459.00					8,612.00		3,91,190.00	68.00
Exploration of microbial	-34,053.00	6,20,400.00	5,86,347.00	1,84,839.00	2,64,479.00			20,000.00	21,276.00					39,077.00		5,29,671.00	56,676.00
Flora & Fauna	26,072.00	10,00,000.00	10,26,072.00	5,02,653.00				22,390.00	19,353.00		59,300.00	12,000.00		1,66,667.00		7,82,363.00	2,43,709.00
Govt. of Assam	10,88,722.00	-	10,88,722.00			12,24,210.00										12,24,210.00	-1,35,488.00
Helfer Fibre/ biodegumming	-2,18,252.00	-	-2,18,252.00	28,800.00					1,124.00							29,924.00	-2,48,176.00
Identification	-8,001.00	5,15,000.00	5,06,999.00	1,36,567.00	6,593.00			8,000.00	16,107.00					50,000.00		2,17,267.00	2,89,732.00
Image Processing (Tabassum)	-	3,75,000.00	3,75,000.00	1,43,871.00	-	73,800.00			9,900.00					30,000.00		2,57,571.00	1,17,429.00
image processing (L B Mahanta)	-21,615.00	48,422.00	26,807.00	-					24,478.00							24,478.00	2,329.00
Inspire Faculty (SAGAR SARMA)	-	19,00,000.00	19,00,000.00	4,20,645.00												4,20,645.00	14,79,355.00
Intestinal Microbiodata	-4,69,467.00	10,76,000.00	6,06,533.00	1,72,800.00	4,24,721.00			44,048.00						13,035.00		6,54,604.00	-48,071.00
investigating physio sensors	30,44,293.00	2,87,981.00	33,32,274.00	1,72,800.00	1,46,606.00	27,83,868.00		82,455.00	29,740.00					1,00,000.00		33,15,469.00	16,805.00
Investigation of Rogue	6,07,162.00	2,00,000.00	8,07,162.00	1,87,200.00	60,990.00	94,153.00		55,666.00	1,124.00					91,808.00		4,90,941.00	3,16,221.00
Jhumming	-3,49,241.00	17,96,992.00	14,47,751.00	3,96,781.00	7,14,837.00			45,954.00	38,510.00	70,000.00						12,66,082.00	1,81,669.00
Molecular Genetic Diversity (DBT RA)	1,57,793.00	-	1,57,793.00	1,06,800.00					4,023.00							1,10,823.00	46,970.00
Nabard	29,255.00	-	29,255.00													-	29,255.00
Normal Tea Plant	-	10,20,000.00	10,20,000.00	2,36,833.00		42,200.00		19,192.00								2,98,225.00	7,21,775.00
Oxidative (A devi)	-1,71,901.00	-	-1,71,901.00													-	-1,71,901.00
Polymer & Polymer Nano	-	7,63,150.00	7,63,150.00	1,08,267.00	1,48,204.00	2,99,327.00		32,449.00	21,635.00					51,150.00		6,61,032.00	1,02,118.00
Polymer based sensor	7,71,850.00	-	7,71,850.00	2,71,458.00	69,800.00	53,367.00		76,925.00	2,98,707.00					2,171.00		7,72,418.00	-568.00
Proton Exchange	-8,69,301.00	8,47,000.00	-22,301.00	1,11,600.00					3,360.00							1,14,960.00	-1,37,261.00
Ramalingaswamy	3,97,582.00	16,30,667.00	20,28,249.00	11,10,000.00					2,71,466.00							13,81,466.00	6,46,783.00
RF Plasma	2,956.00	-	2,956.00												2,956.00	2,956.00	-
SANS (s KUNDU)	-1,470.00	55,795.00	54,325.00		53,100.00											53,100.00	1,225.00
Silk Protein based	1,15,347.00	-	1,15,347.00	12,078.00	31,928.00				16,000.00					23,268.00		83,274.00	32,073.00
Single Step	1,987.00	31,513.00	33,500.00	36,867.00					1,161.00					739.00		38,767.00	-5,267.00
Spectra	26,561.00	-	26,561.00													-	26,561.00
Statistics methods	1,57,182.00	-	1,57,182.00	1,70,000.00				30,000.00	17,672.00					2,525.00		2,20,197.00	-63,015.00
Stimuli	-41,320.00	88,500.00	47,180.00	42,000.00				3,765.00								45,765.00	1,415.00
Structure of enzymes	-1,92,390.00	5,22,000.00	3,29,610.00	1,33,781.00												1,33,781.00	1,95,829.00
Suitable plant	2,16,800.00	4,00,000.00	6,16,800.00	4,23,387.00	54,443.00			33,705.00	45,611.00					60,000.00		6,17,146.00	-346.00
Tissue Repairs	3,91,174.00	-	3,91,174.00	2,10,000.00	49,064.00	79,227.00		10,267.00	36,118.00							3,84,676.00	6,498.00
Treatment of oil field	4,80,233.00	-	4,80,233.00	1,72,800.00	2,86,942.00			17,885.00	7,900.00					373.00		4,85,900.00	-5,667.00
Chemical Study of Carbon Dots	-	13,43,250.00	13,43,250.00	1,04,000.00	853.00	10,33,104.00			16,332.00					50,000.00		12,04,289.00	1,38,961.00
Nano Materials : S Kundu	-	46,07,365.00	46,07,365.00													-	46,07,365.00
Other Misc Fund - Uncertified	28,62,028.00	9,40,482.00	38,02,510.00	7,170.00				5,038.00	2,154.00				13,09,583.00			13,23,945.00	24,78,565.00
Loan Refund General Fund		50,00,000.00	50,00,000.00													-	50,00,000.00
Loan from General Fund	45,241.00	-	45,241.00													-	45,241.00
	1,32,04,588.00	2,65,72,930.00	3,97,77,518.00	93,75,768.00	38,29,525.00	79,12,142.00	32,575.00	9,09,039.00	14,79,868.00	1,42,200.00	59,300.00	12,000.00	13,09,583.00	8,93,754.00	2,956.00	2,59,58,710.00	1,88,64,049.00

P. GAGGAR & ASSOCIATES

Director

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

STATEMENT OF RECEIPTS AND PAYMENTS ACCOUNT FOR THE PERIOD FROM 01.04.2014 TO 31.03.2015

RECEIPTS		Amount (Rs.)	PAYMENTS		Amount (Rs.)
Opening Balance b/d			**SALARY**		
: Cash at Bank - DST Core		34,75,278.00	Salary & Allowances		
: Cash in hand		50,000.00	Salary & Other Allowances	5,61,09,316.00	
Brought Forward Balances of other Banks			P.F Contribution	40,26,578.00	
			Gratuity Premium	22,88,482.00	
: Cash at Bank - Workshop A/c		60,114.88	Children Education	12,63,840.00	
			Medical/LTC	15,96,051.00	
GRANT-IN-AIDS			Telephone Charges	1,40,935.00	
			Newspaper & Periodicals	65,400.00	
From Ministry of Science and Technology			Uniform Allowance	70,751.00	
Department of Science & Technology, New Delhi			Loans and advances	10,74,000.00	
			Emiritus Scientist		
Letter No.			Scientist	4,80,000.00	
AI/IASST/CAP/003/2014/1	1,80,00,000.00		RA	86,400.00	6,72,01,753.00
AI/IASST/SAL/003/2011/3	1,95,57,000.00				
AI/IASST/SC/003/2014/2	30,00,000.00		**GENERAL**		
AI/IASST/SAL/003/2011/1	1,83,00,000.00		Contingency	1,11,89,267.00	
AI/IASST/ST/003/2014/1	3,33,000.00		Bank Charges	11,049.00	
AI/IASST/GEN/003/2011/1	1,55,00,000.00		Emiratus Scientist Exp.	42,405.00	
AI/IASST/SC/003/2011/1	12,00,000.00		Consumables	67,50,602.00	
AI/IASST/ST/GEN/003/1	40,00,000.00		Training & Conference	74,43,317.00	
AI/IASST/SAL/003/2014/2	3,10,00,000.00		Travelling	18,33,166.71	
AI/IASST/CAP/003/2014/2	2,40,00,000.00		Honararium	8,33,982.00	
AI/IASST/GEN/003/2014/2	2,04,00,000.00		Security Service	11,07,910.00	
AI/IASST/ST/003/2014/2	15,00,000.00		Works & Services	1,05,77,554.00	3,97,89,252.71
A1/IASST/ST/003/2014/3	34,000.00				
A1/IASST/GEN/003/2014/3	1,50,00,000.00	17,18,24,000.00	**CAPITAL**		
			Equipments	1,13,82,151.00	
INTEREST FROM BANK			Library		
Bank Interest on SB A/c		8,60,132.00	Books & Journal	34,25,780.00	
Interest on Fixed Deposit		11,72,735.00	Newspaper & Periodicals	34,835.00	
			Computer	14,34,271.00	
OTHER RECEIPTS			A.C.	9,47,357.00	
Contributions from NPS etc.		1,46,922.00	Furniture & Fixture	84,19,067.00	
		5,50,000.00	Land & Building	4,11,26,886.00	6,67,70,347.00
Grants for Conference/Workshop/Seminar Etc.					
Registration Fees Receipts of Conferences		7,74,245.00	Advance out of Institutional Charges Receipts		
Miscellaneous Receipts		2,51,660.00	Advance :		
			Engineering Cell		50,000.00
REFUNDABLE DEPOSITS			SSH		5,000.00
Earnest Money		7,13,376.00			
					50,00,000.00
			Temporary Loan refunded to Extramural Projects		
			Unspent Balance c/d -		
			Cash at Bank		9,91,301.17
			Cash in hand		70,809.00
	Total Rs.	17,98,78,462.88		Total Rs.	17,98,78,462.88

We have verified the above statement of Receipts & Payments Account of Institute of Advanced Study in Science & Technology, Paschim Boragaon, Guwahati - 781 035, Account - Plan for the period from 1st April,2014 to 31st March, 2015 from the Books of Accounts and vouchers produced before us.

Director
IASST, Paschim Boragaon
Guwahati-781 035

P. GAGGAR & ASSOCIATES Guwahati-1 Chartered Accountants

For P. GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P.GAGGAR)
PARTNER (M.NO. 040259)

PLACE : GUWAHATI
DATE : 18.08.2015

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

INCOME & EXPENDITURE ACCOUNT OF DST GENERAL FUND FOR THE YEAR ENDED 31ST MARCH 2015

INCOME	Amount (Rs.)	EXPENDITURE	Amount (Rs.)
Grants	10,05,34,447.71	**Expenditure on Grants**	
Savings Bank Interest	8,60,132.00	Salary	6,59,99,953.00
Fixed Deposit Interest	15,37,782.00	Contingency	1,03,85,332.00
Other Income	11,12,558.00	Contingency - Emiratus Scientist	39,205.00
		Consumables	66,80,490.00
		Training & Conference	68,71,703.00
		Travelling Expenses	15,90,366.71
		Honorarium	8,33,982.00
		Security Services	11,07,910.00
		Works & Services	1,05,35,978.00
Total Rs.	10,40,44,919.71	Total Rs.	10,40,44,919.71

NOTES ON ACCOUNT - SCHEDULE "14"

In terms of our REPORT of even date annexed hereto.

For P.GAGGAR & ASSOCIATES
CHARTERED ACCOUNTANTS

(P. GAGGAR)
PARTNER (M.NO.040259)

PLACE : GUWAHATI
DATE : 18.08.2015

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

BREAK UP OF UNUTILIZED GRANTS AS ON 31.03.2015

Particulars		Amount (In Rs.)
Unutilised Grants (as a whole) as on 31.03.2015		3,47,91,964.07
Unutilised fund Lying in Project Fund (as per "Details- A")	1,88,64,049.00	
Balance in General Fund (as per "Details - B")	1,59,27,915.07	
		3,47,91,964.07
	Total Rs.	-

P. GAGGAR & ASSOCIATES

Director
IASST, Paschim Boragaon
Guwahati-781 035

"DETAILS - A"

Break up of Project Fund as on 31.03.2015

Sl. No.	Name of project	Balance (In Rs.)
A)		
1	Androgen	(2,71,332.00)
2	Aquatic Bio	(17,308.00)
3	Artificial Colour	(1,153.00)
4	Assessment of Chemical Inputs on Soil	1,55,528.00
5	Atmospheric	81,061.00
6	Bharalu River	(5,79,338.00)
7	Bio Informatics	7,35,230.00
8	Bio surfactant soil of oil	5,38,920.00
9	Biotech Hub	4,38,796.00
10	Citrus Fruits	11,334.00
11	Crops of Assam	5,40,364.00
12	CSIR	1,56,120.00
13	CSIR RA - Dolly Gogoi	(73.00)
14	DBT crest (D. Devi)	(3,43,770.00)
15	DBT RA (Supriyo sen)	3,11,837.00
16	DST Inspire (Sumita sarma)	6,00,562.00
17	Education	(33,598.00)
18	electronic alloys magnetic	2,63,519.00
19	Elucidation(Development of Diabetic Neuro Pathetic Plan)	3,08,483.00
20	exploration of actinomytes	68.00
21	Exploration of microbial	56,676.00
22	Flora & Fauna	2,43,709.00
23	Govt. of Assam	(1,35,488.00)
24	Helfer Fibre/ biodegumming	(2,48,176.00)
25	Identification	2,89,732.00
26	Image Processing (Tabassum)	1,17,429.00
27	image processing (L B Mahanta)	2,329.00
28	Inspire Faculty (SAGAR SARMA)	14,79,355.00
29	Intestinal Microbiodata	(48,071.00)
30	investigating physio sensors	16,805.00
31	Investigation of Rogue	3,16,221.00
32	Jhumming	1,81,669.00
33	Molecular Genetic Diversity (DBT RA)	46,970.00
34	Nabard	29,255.00
35	Normal Tea Plant	7,21,775.00
36	Oxidative (A devi)	(1,71,901.00)
37	Polymer & Polymer Nano	1,02,118.00
38	Polymer based sensor	(568.00)
39	Proton Exchange	(1,37,261.00)
40	Ramalingaswamy	6,46,783.00
41	SANS (s KUNDU)	1,225.00
42	Silk Protein based	32,073.00
43	Single Step	(5,267.00)
44	Spectra	26,561.00
45	Statistics methods	(63,015.00)
46	Stimuli	1,415.00
47	Structure of enzymes	1,95,829.00
48	Suitable plant	(346.00)
49	Tissue Repairs	6,498.00
50	Treatment of oil field	(5,667.00)
51	Chemical Study of Carbon Dots	1,38,961.00
52	Nano Materials : S Kundu	46,07,365.00
53	IASST	24,78,565.00
54	Loan Refund General Fund	50,00,000.00
55	Loan from General Fund	45,241.00
		1,88,64,049.00

P. GAGGAR & ASSOCIATES

Director
IASST, Paschim Boragaon
Guwahati-781 035

"DETAILS - B"

Break up of General Fund as on 31/03/2015

Sl. No.	Particulars		Balance (In Rs.)
1	**BALANCE IN CASH AND BANK**		
	Cash in Hand		70,809.00
	Balance with Banks		6,94,327.00
	SBI Khanapara Branch		11,299.88
	SBI G.U Branch- Upgrading A/C		41,447.86
	SBI Garchuk - Seminar A/c 34215888433		66,741.00
	Vijaya Bank- Overhead/Misc A/c No. 1000466		16,08,618.00
	Vijaya Bank- Travel A/c No. 1000441		1,73,902.29
	Vijaya Bank- Conference A/c No. 1000918		36,078.00
	SBI Khanapara - International Conf. A/c No. 635294		8,953.00
2	**LOANS, ADVANCES AND OTHER ASSETS**		
	Crest Award	3,43,770.00	
	TDS Receivable	1,11,674.00	
	Loans to Staff	27,75,165.00	
	Advances:		
	Advances against Expenditure of Grants	19,36,314.00	
	Advances for Equipments	8,71,666.00	
	Advances for Vehicles	4,55,082.00	
	Advances for Books	2,15,000.00	
	Advances for Furniture & Fixtures	-	
	Advances for Building & Site Development	10,00,000.00	
	Term Deposits	45,47,274.00	
	Fixed Assets Purchased but the same was not transferred to Capital Fund (the difference is from FY 2010-2011)	39,82,173.04	
		1,62,38,118.04	
	Less :		
	Other Current Liabilities (Details 1)	(17,19,334.00)	
	Earnest Money	(13,03,045.00)	
		(30,22,379.00)	1,32,15,739.04
		Total (In Rs.)	**1,59,27,915.07**

P. GAGGAR & ASSOCIATES Chartered Accountants

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

SCHEDULE FORMING PART OF THE ACCOUNTS FOR THE YEAR ENDED ON 31ST MARCH, 2015

SCHEDULE – '14': SIGNIFICANT ACCOUNTING POLICIES:

1) ACCOUNTING CONVENTION :

The financial statements are prepared on the basis of historical cost convention, unless otherwise stated and on the Cash method of accounting.

2) REVENUE RECOGNITION

Income on interest bearing securities and term deposits is recognized on accrual basis as and when these are realized.

3) INVESTMENTS

Term deposits with Banks are taken as investments & valued at accrual basis.

4) FIXED ASSETS

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

5) DEPRECIATION

- Depreciation on fixed assets purchased / acquired / constructed out of Government Grants is charged on Straight Line Method as per the rates specified under the Companies Act, 1956 except in case of library books where depreciation is charged @ 20% as no specific rate of depreciation on library books is given in Companies Act, 1956. Also, Depreciation is charged for entire year on additions made to fixed assets during the year.
- Depreciation is charged to Capital Fund by way of reducing the net value of fixed assets.
- No depreciation is charged on assets sold/discarded/ demolished or destroyed during the year.
- Depreciation is charged only to the extent of 95% of the book value and thereafter, the residual value of 5 % is shown in the books as balance against that asset.

P. GAGGAR & ASSOCIATES Chartered Accountants

Director
IASST, Paschim Boragaon
Guwahati 781 035

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6) GOVERNMENT GRANTS / SUBSIDIES

- Grants are shown as income on realization basis and expenditure thereof is charged to appropriate revenue heads. In the case of expenditure of capital nature out of such grants, the respective fixed assets are debited and credit to the same extent is taken to the Capital Fund.
- Grants utilized during the year towards acquisition of fixed assets are credited to Capital Fund.

NOTES ON ACCOUNTS

i) Interest earned / accrued on terms deposits on renewal, if any are accounted for.

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 realization equal or at least to the aggregate amount shown in the Balance Sheet.

v) Balances under Current Liabilities, Loans and Advances are subject to confirmation / reconciliation / adjustments, if any.

vi) No provision is made for any contingent liability except for cases where provision needs to be made based on expert opinion.

vii) Previous years figure have been re-arranged and regrouped wherever considered necessary to facilitate comparison.

NEWLY COMPOSED THEME SONG OF IASST IN 'ASSAMESE' LANGUAGE.
TRANSLATION TO 'HINDI' IS IN PROCESS

মুখৰিত বিজ্ঞানৰ দেউল আজি
চৌপাশে বন্দিত জ্ঞানৰ আৰতি
দৃষ্টিত আমাৰ নতুন জ্যোতি
সৃষ্টিত কদাপি নপৰে যতি ।।

অনাগত দিনৰ প্ৰভাকৰে
পোহৰাব তমসাৰ বাট
যুগৰ প্ৰযুক্তি সহযাত্ৰী
মানৱৰ সাথিম বিকাশ ।।

সত্য সন্ধানী জ্ঞানৰ সেনানী
অবিৰাম যাত্ৰা আমাৰ
লক্ষ্য আৰু পণ দুয়োটি পাখি
ত্ৰিলোকম ধৰা মহাকাশ ।।

সাধনা সংগ্ৰাম প্ৰতীক আমাৰ
ন ইতিহাস ৰচি যাম
পূবৰ সোণালী আমিয়ে সুৰুয়
মহাবিশ্বক উজ্জ্বলাম

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