ANNUAL REPORT
Department of Biosciences and Bioengineering
(PERIOD: 1st APRIL 2021 – 31st MARCH 2022)

1. **Year of Establishment of the Department /Centre:** 2002
2. **Academic Programmes Offered:** B. Tech., M. Tech., Ph.D.
3. **No. of Laboratories with brief introduction: (Total No: 39)**

i. **MAB (Mechanistic Approcaches to Biology) Lab (Dr. B. Anand):** The current focus of our vibrant research group is directed towards addressing fundamental and important questions in the area of RNA biology by employing an eclectic mix of modus operandi that is drawn from biochemical, biophysical, computational and molecular genetics approaches. Our immediate obsession is to resolve the mechanistic questions pertaining to CRISPR Biology and Ribosome Biogenesis.

ii. **BERL (Bioengineering Research Laborotory) (Prof. Utpal Bora):** The research interests of this laboratory include Biomedical Engineering, Seri-biodiversity, Seri-bioinformatics and Bio-entrepreneurship.

iii. **Molecular Networks and Recombinant Therapeutics (Dr. Biplab Bose):** The lab is interested in understanding the inter-connected cellular communication systems. Particularly, the lab is interested to know the effect of architecture, kinetics and integration of the molecular pathways on vital cellular processes. The lab uses experimental as well as theoretical tools to understand how information is carried and processed in such signaling networks. The lab is also involved in developing molecules that can target particular signal transduction pathway. Such a molecule can be used to modulate an aberrant pathway involved in a particular disease.

iv. **Plant Tissue Culture & Secondary Metabolite Production Lab (Prof. Rakhi Chaturvedi):** The tree species with long generation cycle are mostly highly heterozygous in nature due to strict cross pollination and are considered to be recalcitrant (difficult to regenerate in vitro). The genetic improvement of these plants and development of homozygous lines (pure) is either very challenging or impossible using the conventional methods, because the cross pollination is a rule. This limitation has completely been overcome by the research group of Dr Chaturvedi while working on two complex tree species, Neem (*Azadirachta indica*) and Tea (*Camellia species*). Prof. Chaturvedi's laboratory has also involved in developing Plant Cell Culture Technology as an alternative to whole plant extraction for the production of secondary metabolites of medicinal and commercial values. Although these compounds can also be isolated from naturally grown whole plants, continued destruction of plants for the purpose may pose a major threat to species getting extinct. Her research group is able to identify, purify and isolate three main categories of bioactive metabolites: essential oils, coumarins and alkylamides, from in vitro elite cell lines of medicinal plants. Some of these compounds are complex triterpenoids which are difficult to synthesize chemically. The focused research work in the laboratory are: (i) Mass multiplication by micropropagation/clonal propagation of medicinally and economically valuable plants, (ii) In vitro haploid and doubled haploid plant production to generate homozygous (pure) lines to produce hybrid vigour for improved plant yield, (iii) Triploid plant production to develop seedless variety, (iv) Somatic embryogenesis for synthetic seed production, (v) Protoplast isolation and regeneration for single cell cloning and isolation of mutants, (vi) Cytological and Histological studies of in vitro raised cultures to understand their ploidy, development and origin (vii) Cell biomass production in shake-flask for screening, characterization and quantification of medicinally and commercially useful plant metabolites and their scale-up in photo-bioreactors

v. **Biophysical Chemistry Lab (Dr. Nitin Chaudhary):** The laboratory focuses on understanding the molecular self-assembly and amyloid diseases, protein/peptide membrane interactions, and developing peptide based antibiotics.

vi. **Bioprocess Development Lab (Dr. Debasish Das):** Bioprocess Development Lab majorly focuses on developing and demonstrating sustainable technologies towards renewable fuels. We are currently working on developing sustainable technologies towards biocrude production from microalgal isolates, butanol production from *Clostridium* sp, ethanol fermentation from adapted *Z. mobilis* strains. We have ventured towards plant tissue culture and demonstration on a pilot scale facility with industrial collaboration.

vii. **Prof. V. V. Dasu lab:** The laboratory focuses on Bioprocess development (upstream to downstream), metabolic engineering, and bioenergy.

viii. **Prof. Siddhartha Sankar Ghosh lab:** The laboratory focuses on development of new generation gene therapy vectors. This mainly includes development of suicide gene therapy for cancer. The lab has also set up infrastructure facilities for interdisciplinary collaborative research in the field of nanoscience and nanotechnology supported by extramural funding at the Centre for Nanotechnology, IIT Guwahati. The major area is to develop new nanoparticles, nanocomposites and nanocarriers and evaluate their antimicrobial and anticancer activities. The lab is perusing research to understand molecular mechanisms of nanoparticle mediated cell cytotoxicity. Other areas, such as, bioimaging using C-dots, metal nanoclusters, gene delivery using quantum dot embedded nanocarriers are also being persued. The lab is also interested in understanding the molecular pathways involving drug resistance.

ix. **Biosensor and Biofuel Cell Research Lab (Prof. Pranab Goswami):** The lab is involved in the development of novel bio-recognition system and their applications for developing biosensors and biofuel cells. DNA aptamers, catalytic as well as non-catalytic proteins have been investigated as biorecognition elements for some clinical applications targeting to operate in point-of-care and resource limited environments. Focus has been given on the rapid detection of acute myocardial infarction (AMI), cholesterol, alcohol, bilirubin and malaria due to their obvious importance in diagnostic sector.

x. **Prof. Arun Goyal Lab:** The lab research interests include Molecular Biology, Protein Engineering, Rational Enzyme Engineering, 3-Dimensional Structure (In silico, crystal and solution) and Function analysis of enzymes and their industrial (Biorefinery, therapeutic, food, Pulp and paper) applications.

xi. **Neural Engineering Lab (Dr. Cota Navin Gupta):** Broadly the research lab's current focus is in the areas of brain computer interfaces, imaging genetics for psychiatric disorders, multimodal/multivariate algorithm development and designing wearable medical solutions for patient mobility.

xii. **Stem Cell and Cancer Biology Group (Dr. Bithiah Grace Jaganathan):** The current focus of the research group is to understand the role of mechanotransduction in stem cell differentiation and cancer metastasis. The group also studies various signaling pathways and microenvironment mediated chemoresistance in leukemia and breast cancer.

xiii. **Structural and Computational Biology Laboratory (Dr. Shankar Prasad Kanaujia):** The lab uses the knowledge of various techniques such as molecular biology, structural biology (X-ray Crystallography) and biophysical and biochemical studies to understand the mechanism of different biological functions. In addition, the lab applies the molecular dynamics simulations to further corroborate the results obtained from various experiments. Currently, the lab is focusing on investigating into the mechanisms involved in protein translation initiation, ABC transporters and their role in multidrug resistance.

xiv. **Molecular Microbiology Laboratory (Prof. Manish Kumar):** The research interests of the lab include (i) Molecular interaction of host-pathogen-vector of infectious diseases, (ii) Gene expression analysis of Spirochete, *Leptospira interrogans* and *Borrelia burgdorferi*, (iii) Development of a vaccine against outer membrane proteins of *Leptospira interrogans* and *Borrelia burgdorferi*, and (iv) Vector-borne diseases of Zoonotic importance.

xv. **Viral Immunology lab (Dr. Sachin Kumar):** The paramyxoviruses include viruses that are isolated from many species of terrestrial, avian and aquatic animals. The group includes many important pathogens of

humans such as measles virus, human respiratory syncytial virus, human parainfluenza viruses, Nipah virus and Hendra virus and animals such as canine distemper virus and Newcastle disease virus. Newcastle disease virus (NDV) is the prototype member of this family and is a leading cause of respiratory disease in avian species. It leads to huge economic losses to the poultry industry in India. The laboratory focuses mainly on understanding the biology of avian paramyxovirus and development of vaccine against them using reverse genetics system.

xvi. **Cancer Biology Laboratory (Prof. Ajaikumar B. Kunnumakkara):** The research interests of the lab include (i) Role of inflammatory pathways in cancer development, (ii) Identification of novel biomarkers for cancer diagnosis and prognosis, (iii) Cancer drug discovery, and (iv) Development of transgenic and gene knockout mouse models for biomedical research

xvii. **The Molecular Endocrinology lab (Dr. Anil Mukund Limaye):** The laboratory focuses on the following research themes: (i) Hormone regulation of gene expression, (ii) Role of estrogen in breast tumor invasion and metastasis, (iii) Regulation of cystatin A expression and its role in breast cancer, (iv) HoxB2 in breast cancer, (v) GPR30/GPER-1 biology, (vi)Mechanisms of anticancer activity of EGCG, (vii) Karanjin and its biological effects

xviii. **Dr. Soumen Kumar Maiti Laboratory:** The research interests of the lab include Biochemical Engineering, Biofuel, Bioprocess modeling, control, optimization, Metabolic engineering, Downstream processing, Membrane separation, Bioremediation

xix. **Biomaterials and Tissue Engineering Laboratory (A DBT Unit of Excellence) (Prof. Biman B. Mandal):** Tissue engineering has emerged as a potential way to regenerate/treat tissue damage or organ failure as a result of injury and/or disease. Our laboratory majorly focusses on using silk biomaterials for developing affordable and functional lab grown tissue/organ replacements for human transplantation. The lab research is directed towards the following areas of importance i.e. Tissue Engineering of Grafts and Implants, Stem Cell Based Regenerative Medicine, Biomaterials, 3D Bioprinting, Drug Delivery Systems, 3D In Vitro Disease Models for high throughput drug screening applications. More than 160 research articles have been published with very high impact and citations, 23 patents, 03 technology licensed, 01 product launched in market.

xx. **Organelle Biology and Cellular Ageing Lab (Dr. Shirisha Nagotu):** The lab focusses on understanding the biogenesis of organelles and the inter-organelle communication within a cell. The lab tries to understand the effect of ageing on organelle biology and the role of organelles in cellular ageing.

xxi. **Prof. Kannan Pakshirajan's laboratory:** The research interests of the lab are Environmental Biotechnology, Biological removal and recovery of inorganic compounds from wastewaters, Biofuels and other Biotechnological Products: production, process design, kinetics and environmental applications.

xxii. **Bio-interface & Environmental Engineering Lab (Dr. Lalit Mohan Pandey):** The laboratory focuses on the following research aspects: (i) Surface and interfacial science particularly in the area of Bio-interfaces and Biomaterials (Design of Biocompatible surfaces): The surfaces are modified using various Self-Assembled Monolayers (SAMs) and their interactions with water, bio macromolecules i.e. polymers, proteins and cells are studied, (ii) Protein's adsorption and aggregation: The lab investigates the adsorption behavior and properties of various adsorbed proteins on surfaces with different wettabilities by forming mono, mixed and hybrid SAMs. The role of surface chemistry at the nanometer scale on aggregation of various therapeutic proteins is studied, (iii) Environmental Biotechnology: The lab focuses on 3Rs. Reduce waste generation, recycle the treated waste and reuse waste as by-product or recover energy from the waste.

xxiii. **Enzyme and Microbial Technology Laboratory (Prof. Sanjukta Patra):** The EMT research group studies the microbes and their applications in different spectrums of Metagenomics, Industrial Microbiology, Extremophiles, Environmental Biotechnology, Disease Therapeutics and diagnosis

xxiv. **Prof. Aiyagari Ramesh laboratory:** Biocompatible hydroxyapatite-based nanocomposites have been generated using secreted proteins of probiotic lactic acid bacteria (LAB) as biomineralization scaffolds. The antibiotic loaded nanocomposites exhibited bactericidal activity against *Pseudomonas aeruginosa* biofilm. A gastric fluid tolerant bacteriocin-loaded nanocomposite was generated as an antiadhesion agent to reduce *in vitro* colonization of intestinal cells by pathogenic bacteria and support adhesion of beneficial probiotic LAB. In another research endeavor, low molecular weight synthetic amphiphiles having multimodal chemistry have been rationally designed to promote interaction with staphylococcal lipoteichoic acid and facilitate metal sequestration. The amphiphile could render a profound effect on cell growth and metallophore gene expression in methicillin-resistant *Staphylococcus aureus* (MRSA).

xxv. **Molecular Informatics and Design Group (Prof. Vibin Ramakrishnan):** Molecular Informatics and Design Group integrates diverse disciplines of science and engineering in the design and development of advanced materials. The lab's approach to a research problem is 'idea centric' with a clear emphasis on the design phase, adopting modeling and informatics tools. The lab experiments a reductionist approach in understanding the interaction between molecules resulting in assembled architectures at nano and micro scale, and further employ it in the design of future materials. An information based modeling approach has been employed in the design and generation of tumor homing and cell penetrating molecules to test their efficacy as future drug delivery vehicles.

xxvi. **Applied Biodiversity Laboratory (Prof. Latha Rangan):** The group tries to address the research questions in areas of Applied Biodiversity with special reference to bioresources of Northeast India using an integrative approach. .

xxvii. **Translational Crop Research Laboratory (Prof. Lingaraj Sahoo):** Pathogens, insects and abiotic stresses cause major losses in yield and quality of crops. The discoveries in basic plant research play a vital role in meeting these challenges by developing technologies to improve agriculture by introducing important traits to crop of interest. The lab employs integrated approaches to identify genes with significant agronomic impact in both model (Arabidopsis) and crops (grain legumes and oil seeds), understand the mechanism by which they function and using this knowledge, develop designer crops for diverse plant abiotic (drought, salinity and nutrient deficiency or toxicity) and biotic (viral and insect) stress conditions, useful for growers, industry and consumers. Besides, the lab is working on biofortification in Asiatic grain legumes for healthcare applications and manipulation of key oil biosynthesis genes yield in Jatropha, a tropical perennial biofuel crop to improve oil quality and oil.

xxviii. **Prof. Gurvinder Kaur Saini laboratory:** The laboratory works in fungal biotechnology. The various aspects that are studied include (i) secondary metabolite production, (ii) development of hyper virulent strains of Metarhizium anisopliae and Beauveria bassiana using scorpion and spider neurotoxins, (iii) gene stacking in entomopathogenic fungi.

xxix. **Computational Structural Biology laboratory (Dr. Priyadarshi Satpati):** Working in the area of biomolecular interactions using computational methods (e.g, Molecular Dynamics, Electronic Structure Calculations). We are mainly interested in understanding accuracy in biological processes, including ligand binding (MTB selective drug design), protein-protein (DJ-1 dimerization and Parkinson's disease), protein-DNA (DNA recognition by spo0A during transcription) and Protein-RNA (release factor binding to mRNA), RNA-RNA (Group II introns) interactions, viral RNA recognition by RIG-I etc.

xxx. **Bio Process Analytical Technology (BioPAT) Laboratory (Dr. Senthilkumar Sivaprakasam):** Our research area is in line with Process Analytical Technology (PAT), an US FDA initiative emphasizing "Building Quality into Products with Innovative Process Design." PAT is an emerging area of research with the biopharmaceutical industry employing it at different stages such as raw material characterization, in-process monitoring, and final product analysis. Due to the complex and nonlinear characteristics of any bioprocess, monitoring, measuring, modelling, and controlling (M3C) are critical in bioprocess development.

We, as a crew, study the robust manufacturing of bio-therapeutics, biopolymers, and nutraceuticals. Based on the notion of revamping the microbial cells as factories by manipulating their metabolic pathway, optimizing the process conditions, real-time monitoring, and controlling the critical process parameters (CPPs) to boost productivity and achieve consistent product quality. In our BioPAT lab facility, bioprocess development of a product is facilitated via M3C technique. Employing PAT tools such as fermentation calorimeter, dielectric spectroscopy, exhaust gas analyzer, and optical density probe provides real-time metabolic insights into a bioprocess. These tools aid in identifying critical process parameters of the processes. Combining real-time measurements obtained from PAT tools with robust control strategies such as inferential control, adaptive control, model predictive control, and data-driven control ensures a consistent quality of the final product.

xxxi. **RNA Binding Proteins Laboratory:** The laboratory focuses on the RNA-binding proteins that are involved in the splicing machinery. During splicing of premature mRNA, the spliceosome deposits a multiprotein complex termed exon-junction complex (EJC) onto the mRNAs. The subunits that form the core EJC are eukaryotic translation initiation factor 4A3 (eIF4A3), Y14, MAGOH and barentsz (BTZ, CASC3, and MLN51). Many proteins interact with the core EJC and our focus of study is a protein complex termed as Apoptosis- and Splicing-Associated Protein (ASAP). Components of both ASAP and EJC have been found to function in a wide range of activities pertaining to RNA metabolism including splicing, translation, nonsense-mediated mRNA decay (NMD) and apoptosis. We are currently focusing on the following research areas: Understanding the functions of ASAP with respect to EJC in mRNA metabolism. Elucidating the molecular involvement of RNA-binding proteins (RBPs) in various human diseases such as cancers, neurodevelopmental disorders. Exploring the post-transcriptional gene regulations of different RBPs.

xxxii. **Protein Biophysics Lab (Prof. R. Swaminathan)**: The main research focus in this lab is to investigate the structure, function and dynamics of proteins using spectroscopic techniques like UV-Visible spectroscopy and Fluorescence spectroscopy. Intrinsic electronic absorption and luminescence spectra in proteins originating from photoinduced electron transfer and charge recombination, respectively are actively studied. These novel spectra discovered in our lab are employed to monitor events like protein folding or aggregation in a label-free approach.

xxxiii. **Calcium signaling laboratory (Dr. Ranjan Tamuli):** We are interested to understand the molecular mechanism of calcium signaling pathway using the model filamentous fungus Neurospora crassa. Calcium ion is a universal second messenger molecule that impacts almost all cell processes in eukaryotes. We hope to extend our research to understand the role of calcium signaling in memory, learning, and other related areas in future

xxxiv. **Laboratory for Stem Cell Engineering and Regenerative Medicine (Dr. Rajkumar P. Thummer):** Autologous cell-based therapy is a promising alternative to achieve repair or regenerate damaged cells and/or tissue without any immune rejection. Our laboratory "Stem Cell Engineering and Regenerative Medicine", mainly focuses on generation of human cells using safe, integration-free reprogramming approaches to derive clinical-grade cells for transplantation. The outcome of our research will bring patient-specific cell therapy closer to clinic for treatment of various debilitating.

xxxv. **Malaria Research Group (Prof. Vishal Trivedi):** The research interests of the lab include Anti-malarial Drug Discovery, Immunotoxcity studies in Macrophages, Regulation of Innate Immune Response, Endothelial Cells-RBC cytoadherence during Cerebral Malaria, Designing immunostimulatory and Anticancer agents.

xxxvi. **Dr. Selvaraju Narayanasamy Lab:** The research interest of the lab include Environmental Biotechnology, Bioprocess Engineering, and Biochemical Engineering.

xxxvii. **Biomechanics and Simulations lab (Dr. Souptick Chanda)**: The Lab is primarily engaged in design and optimization of various orthopaedic implants based on in vitro and in silico biomechanical testing/validations. Simulations for surgery and patient examinations training are also being envisaged at this laboratory.

xxxviii. **Computational lab:** The computational lab is used for carrying out the Bioinformatics and Computational Biology Lab, a lab courses of the B. Tech. curriculum.

xxxix. **Experimental Teaching laboratory:** The laboratory is used to conduct the experimental course of the B. Tech. and M.Tech. curriculam.

4. **Major Equipment and Facilities acquired during 1st April 2021 – 31st March 2022:**

Sl. No.	Equipment Name
1.	Dynamic Light Scattering System (DLS) Make: Anton Paar GmbH- Austria , Model: LITESIZER 500
2.	Rheometer Make: Anton Paar GmbH- Austria, Model: MCR 102e
3.	Autoclave (113 L) Make: Equitron, Model: No: #7441 SLEFA
4.	Inverted Fluorescence Microscope Make: Olympus, Model: CKX53SF + DP23M
5.	Multi function Printers Make: hp, Model: M226dw
6.	Analytical Balance Make: A&D Model: HR-250 AZ
7.	Laminar Hood Make: Icon Instruments Company, Model: IIC 124-1A

Dr. Arun Goyal: Thermal cyclers for PCR, FPLC, Robotics for automated crystal formation, Crystal incubator and FTIR

Dr. Sachin Kumar: Biorad 2D gel electrophoresis, Biorad Real Time PCR, Beckman Cytoflex, Beckman Ultracentrifuge

Dr. Manish Kumar: NGC Quest 10 plus chromatography system

5. **Major Areas of Research and Development:**

Cell signaling, Systems Biology, Plant Tissue Culture & Secondary Metabolites Production, Protein Biochemistry, Molecular Biology, Immuno Prasitology, Biofuel, Biochemical Engineering, Tissue Engineering and Biomaterials, Stem Cell Biology, Cell Therapy & Regenerative Medicine, Organelle Biology, Inter-organelle Communications, Cellular Ageing, Bio-interfaces and Biomaterials, Environmental Biotechnology, Nanobiotechnology, Chemistry-Biology Interface for Developing Antibacterials and Sensors, Stem cell engineering and regenerative medicine, Molecular Parasitology, Computational Biology, Plant Biotechnology, RNA Biology, Structural Biology, Fungal Biotechnology, Molecular Endocrinology, Enzyme and Microbial Technology, Metagenomics, Environmental Biotechnology, Applied Biodiversity, Biosensors,Systems Biology, Bioprocess Engineering, Cancer Biology, Bio/Physio Sensors and Nanobioengineering, Biosensors and bio-fuel cells, Neural Engineering. Network medicine, Bio-Nano catalysis, Drug delivery vehicles, Preparation of

polypyrrole embedded nanocellulose and surfactant (CTAB) modified carbon adsorbent for efficient elimination of azo-anionic dyes. Elimination of pharmaceutical wastes viz. antibiotics using carbon and grass based nanocellulose adsorbents. Phyto, microbial and fish toxicity studies for ecotoxicological assessment of the prepared adsorbents to understand its significance in eliminating pollutants from aqueous bodies, Biomechanics, Soft computing, Artificial intelligence, Machine learning, Implant design.

Initiatives of DBT programme Support: Prof Ghosh as a PI along with other faculty members, involved in DBT Program Support Phase –II project at IIT Guwahati, received project support from the DBT India on "Translation Research Programme for Developing Diagnostics and Nano-based Sensors". This multidisciplinary programme was formulated based on the major leads of the existing DBT Programme Support project. Besides manpower training and basic research, this new project is aimed to develop sensors and Transfer of Technology (ToT) to the Start-Up companies. Prof. Ghosh has also received a multi-institutional grant on "mechanistic Investigation for EMT targeted nanotherapeutics".

6. **Major initiatives and breakthrough in Research and Development during 1st April 2021 – 31st March 2022:**

1. Dr. A Ramesh: A biomineralization-based approach was deployed to generate biocompatible nanoscale hydroxyapatite, which could support growth and differentiation of bone cells. A urea-based ligand was developed as an efflux pump inhibitor that could potentiate the activity of ciprofloxacin in combinatorial treatment and hinder adhesion of Methicillin-resistant *Staphylococcus aureus* (MRSA) onto collagen.

2. Dr. L Rangan:

1. Complete chloroplast genome of potential biofuel crop *Pongamia* undertaken and was successfully completed. Genome sequence was deposited to NCBI GenBank (Pongamia_pinnata_IITG Contig1 MW752444; 152940 bp).
2. Design and construction of a customizable model for evaporation and recovery of organic solvents using simple labwares was done. This is on the construction of an easy-to-assemble model for evaporation and recovery of organic solvents using simple laboratory materials and glassware, working on the principle of evaporation under reduced pressure.

3. Dr. Manish Kumar:

1. Developed diagnostic antigen for *Theileria annulata* infection in bovines.
2. Demonstrated novel role of trigger factor of *Leptospira* in modulating caseinolytic protease.
3. Deciphered the processing of CRISPR array transcript of *Leptospira* by Cas6 to form mature crRNA

4. Dr. Arun Goyal:

- Computational and SAXS based structure insights of pectin acetyl esterase (*Ct*Pae12B) of family 12 carbohydrate esterase from *Clostridium thermocellum* ATCC 27405.
- Cloning, expression and molecular structure analysis by computational modeling and SAXS based structure development of an endoglucanase, *Ct*GH9C from *Clostridium thermocellum.*
- Established the multifunctionality and processivity of an endoglucanase, *Rf*GH5_4 from *Ruminococcus flavefaciens* by TLC and MALDI-TOF MS.
- Structure and dynamics analysis of multi-domain putative β-1,4-glucosidase of Family 3 Glycoside Hydrolase (*Ps*GH3) from *Pseudopedobacter saltans.*

***5.* Dr. Navin Gupta:**

1. A team from Neural Engineering Lab, Dept of BSBE, IIT Guwahati was placed in the top ten teams of the world in an international brain computer interfaces competition
   https://www.neuroergonomicsconference.um.ifi.lmu.de/pbci/-
   Above Link Accessed last on 6th April 2022

6. **Dr. Senthil Kumar:**
   1. Successfully completed a MHRD-UAY project, which involves process optimization of Ranibizumab production from recombinant *E.coli*. It is a multi-institutional project involving M/s Biocon as Industrial partner.
   2. THREE doctoral students successfully graduated. TWO got placed in Industry R&D and ONE secured post-doctoral position at UCL, London.

7. **Dr. Souptick Chanda:** The Double Oblique Device for Osteosynthesis (DODO) of hip, a novel femur fracture plate, was developed in collaboration with NEIGRIHMS Shillong, considering the regional morphometry of the indigenous Northeast (NE) population of India. A design patent (Indian) application is currently under review.

8. **Prof. S. S Ghosh:** Our group has been working on understanding signaling events in co-targeting triple negative breast cancer cells, movement of hydrogel in constricted microchannel and drug resistant behavior of EMT cells during deformation. In device front, our collaborative work on development of FET-based POC devices for detection of biomarkers and nanotheranostics are being progressed. Our group was actively involved in Transfer of Technology of a sensor device.

9. **Dr. L M Pandey:**
   - Physicochemical factors of bioprocessing impact the stability of therapeutic proteins
   - Antibacterial nano-biocomposite scaffolds for bone tissue engineering
   - Hydrophobic Surface Induced Biosorption and Microbial Ex Situ Remediation of Oil-Contaminated Sites

   Microbial Enhanced Oil Recovery

10. **Dr. S Nagotu:**
    - A role for peroxisomes in replicative ageing of yeast cells was deciphered.
    - Post-translational modification of the peroxisomal protein Pex30 was identified and its role in organelle biogenesis was elucidated.

11. **Dr. K K Singh:**

Recent Research development:

- Generated CRISPR-Cas9 mediated KO of UPF3B gene.
- Elucidated the functional role of UPF3B in NMD and neuron-related pathways.
- Estimated the strengths of the donor and acceptor splice sites of UPF3B minigene construct.
- Elucidated miRNA-mediated regulation of RNPS1 protein.
- Investigated the functional role of RNPS1 deregulation in cervical cancer.
- Reported multiple novel isoforms of MAGOH paralogs.

12. **Dr. Biman B. Mandal: Biomaterials and Tissue Engineering Laboratory (A DBT Unit of Excellence):** The lab research is directed towards the following areas of importance i.e. Tissue Engineering of Grafts and Implants, Stem Cell Based Regenerative Medicine, Biomaterials, 3D Bioprinting, Drug Delivery Systems, 3D In Vitro Disease Models for high throughput drug screening applications. More than 160 research articles have been published with very high impact and citations, 23 patents, 03 technology licensed, 01 product launched in market.

7. Conferences/Workshops/Symposia Attended: International, National

Sl. No.	Name of Faculty	Name of Conf./Workshop	Place	Date	International/ National
1.	Prof. Latha Rangan	BREEECH 2021	IITR, Dehradun	02/12/2021	International
2.	Prof. Latha Rangan	BASEH 2021	NIT Jaipur	06/04/2021	International
3.	Prof. Manish Kumar	International Conference on Biotechnology for Resource Efficiency, Energy, Environment, Chemicals and Health	Online mode, CSIR Dehradun	1-4th Dec 2021	International
4.	Prof. Manish Kumar	Serine Proteases in Pericellular Proteolysis and Signaling	Online mode, Rockville, Maryland	28-30th Oct 2021	International
5.	Prof. Manish Kumar	National Bioengineering Conference- 2022	Online mode, NIT Rourkela	6-7th Jan 2022	National
6.	Prof. Rajaram Swaminathan	BPS2022 66th Biophysical Society Meeting (participated ONLINE only)	San Francisco, USA	19— 23/2/2022	International
7.	Prof. Rakhi Chaturvedi	42nd Annual Meeting of Plant Tissue Culture Association – INDIA (PTCA-I) & International Symposium on "Advances in Plant Biotechnology and Genome Editing" (APBGE-2021)	ICAR-Indian Institute of Agricultural Biotechnology, Ranchi, Jharkhand, INDIA	April 8-10, 2021	International
8.	Prof. Rakhi Chaturvedi	International Conference on Plant Physiology and Biotechnology (ICPPB-2021)	Lovely Professional University, Phagwara, Punjab, INDIA	September 10-12, 2021	International
9.	Prof. Rakhi Chaturvedi	International Symposium on Plant Biotechnology Towards Improving Agri-Food Industry and Healthcare Products" (ISPB-2021)	Birla Institute of Technology, Mesra Ranchi, Jharkhand, INDIA	October 27-30, 2021	International
10.	Prof. Rakhi Chaturvedi	International training program on plant tissue culture for entrepreneurship and sustainable development	SAGE School of Agriculture Sciences, SAGE University, Bhopal, INDIA	November 10-23, 2021	International
11.	Prof. Rakhi Chaturvedi	International Conference on Advances and Innovations in Biotechnology and Allied Sciences-2022 (IC-AIBAS-2022)	University Institute of Biotechnology, Chandigarh University, INDIA	March 24-25, 2021	International
12.	Prof. Sachin Kumar	Ethics in the age of synthetic biology	AICTE ATAL	FDP on Computational Synthetic and Systems Biology	26 -30/07/ 2021
13.	Prof. Shankar Prasad Kanaujia	National Conference on Computational and	I-DAPT HUB FOUNDATION IIT (BHU),	September 11-12, 2021	National

		Biochemical Drug Discovery [NCCBDD-2021]	VARANASI and Bioinformatics and Drug Discovery Society, India		
14.	Dr. Selvaraju Narayanasamy	International Conference on Biotechnology for Resource Efficiency, Energy, Environment, Chemicals and Health (BRE3CH-2021). (Ajit Kumar, Chandi Patra, Selvaraju Narayanasamy) "Effect of magnetization on activated carbon for the remediation of antibiotics from aqueous solution"	CSIR-Indian Institute of Petroleum Dehradun (Uttarakhand), India	01-04 December, 2021	International
15.	Dr. Selvaraju Narayanasamy	International Conference on Biotechnology for Resource Efficiency, Energy, Environment, Chemicals and Health (BRE3CH-2021). (Chandi Patra, Ajit Kumar, Selvaraju Narayanasamy) "Polypyrrole doped acid activated carbon for efficient removal of emerging antibiotic contaminant from simulated wastewater setups"	CSIR-Indian Institute of Petroleum Dehradun (Uttarakhand), India	01-04 December, 2021	International
16.	Dr. Selvaraju Narayanasamy	1st International Virtual Conference on Sustainable Water 2022 (ICSW-2022) (Vishnu Priyan V and Selvaraju Narayanasamy) "Elimination of pharmaceutical drug Ibuprofen by Polypyrrole modified Carboxymethylcellulose (CMC/PPY): Evaluation and Toxicological assessment"	Department of chemical Engineering, KPR Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India.	22-23 March, 2022	International
17.	Dr. Selvaraju Narayanasamy	Research & Industrial Conclave 2022 (RIC-2022) (Nirvesh, Ajit Kumar, Selvaraju Narayanasamy) "Removal of dye from aqueous solution by CMC/CH beads"	Indian Institute of Technology Guwahati, Assam, India	20-23 January, 2022	National
18.	Souptick Chanda	Double Oblique Device for Osteosynthesis (DODO) of Hip: an indigenous implant for the northeast (NE) population of India. 66th Annual Conference of Indian Orthopaedic Association (IOACON 2021)	Goa, India	21-25th, December 2021 National	National
19.	Prof. Vibin Ramakrishnan	ATAL FDP Faculty Development Program	NIT Surathkal	12/07/2022	National
20.	Prof. Vibin Ramakrishnan	National Workshop on Research Methodology	CARI Guwahati	23/03/2022	National

21.	Prof. Ranjan Tamuli	Molecular Intricacies of Plant Associated Microorganisms (MIPAM-2022)	Hyderabad	17-20 February, 2022	International
22.	Dr. Lalit M Pandey	International Conference on Colloid and Interface Chemistry (CIC 2021),	Xi'an, China	23-25 April, 2021	International
23.	Dr. Lalit M Pandey	International Conference on Biotechnology for Resource Efficiency, Energy, Environment, Chemicals and Health	Dehradun, India	01-04 Dec, 2021	International
24.	Dr. Lalit M Pandey	Chemcon-2021	Bhubaneswar, India	26-30-Dec, 2021	International
25.	Dr. Kusum Singh	RNA Binding Proteins: From RNA binding to condensation and aggregation	National Centre For Cell Science (Virtual mode)	07-11th February 2022	International
26.	Dr. Kusum Singh	The Non-coding Genome	University of Rome, Italy (Virtual mode)	13-15th October 2022	International
27.	Dr. Kusum Singh	Systems Biology-Global regulation of gene expression	Cold Spring Harbor, NY, USA (Virtual mode)	09-12th March 2022	International

8. Invited Lectures of Faculty: In India, Abroad (Please do not repeat entries from Sl. No. 10)

Sl.No.	Name of Faculty	Name of Lecture	Name of Inst./Org.	Place	Date
1.	Prof. B. ANAND	Molecular Mechanism of CRISPR Adaptation	iCRISPR-2021, SRM-AP	Virtual mode	26/11/2021
2.	Prof. Kannan Pakshirajan	Syngas fermentation	Shiksha 'O' Anusandhan Deemed to be University, Bhubaneswar, Odisha	Online	07/01/2022
3.	Prof. Kannan Pakshirajan	Wastewater biorefinery: Future green industry	Rajiv Gandhi University of Knowledge Technologies, Nuzvid, Andhra Pradesh	Online	18/09/2021
4.	Prof. Kannan Pakshirajan	A biorefinery approach toward biofuels and other value added products from biomass gasification waste	National Institute of Technology Andhra Pradesh	Online	13/09/2021
5.	Prof. Latha Rangan	Introduction to IPR and its various domains	Dept of Applied Biology, USTM	Online Webinar	22/03/2022/
6.	Prof. Latha Rangan	Rendezvous with Zingibereceae- Mining Plastome	NASI Allahabad	Online Webinar on occasion of International Women's Day	08/03/2022
7.	Prof. Latha Rangan	Molecular phylogeney of Zingiberodeace	Department of Botany, Jamal Mohamed College, Tirchi TN	National level Webinar,	17/02/2022

8.	Prof. Latha Rangan	Genome size determination of woody tree species: A flow-cytometric approach		Online plant flow cytometry workshop:	18/12/2021
9.	Prof. Latha Rangan	Flow cytometric studies on non-edible oil crops	IIPR, Dehradun	BREEECH 2021 Dehradun	03/12/2021
10.	Prof. Latha Rangan	Design Registration- A Marketing Tool	Dept. of Botany, USTM	Online Webinar	12/11/2021
11.	Prof. Latha Rangan	Repeat element analysis in Karanj for marker development	Lovely Professional University, Patiala	Online Conference, Punjab	07/10/2021
12.	Prof. Latha Rangan	Flow mining and in karanj and other biofuel crops	Sysmex Academy	Online Webinar, Sysmex	23/07/2021
13.	Prof. Latha Rangan	Karanjin- Molecule of Interest	NIT Jaipur	BASEH-BRSI Annual Convention	06/04/2021
14.	Prof. Rajaram Swaminathan	Charged non-aromatic Amino Acids in a Protein as Intrinsic Spectral Probes to Track Protein Unfolding and Aggregation	FCS2021 conference organized by IISER and RGCB	Thiruvananthapuram (participated ONLINE only)	4/12/2021
15.	Prof. Rakhi Chaturvedi	Plant Tissue Culture and Bioresource Conservation	Department of Biotechnology, GSFC University, Vadodara, Gujarat, INDIA	live, (virtual event)	June 18-19, 2021
16.	Prof. Rakhi Chaturvedi	Plant biotechnology intervention in biodiversity conservations	Mariano Marcos State University, City of Batac, 2906 Ilocos Norte, Philippines	live, (virtual event)	June 22, 2021
17.	Prof. Rakhi Chaturvedi	Sustainability of Bioresources using Plant Tissue Culture Techniques	Guru Ghasidas University, Koni, Bilaspur, Chhattisgarh, INDIA	live, (virtual event)	August 03, 2021
18.	Prof. Rakhi Chaturvedi	Sustainable Production of Plant Secondary Metabolites by the Application of Cellular Totipotency	Banda university of Agriculture and Technology, Banda, Uttar Pradesh, INDIA	live, (virtual event)	August 05, 2021
19.	Prof. Rakhi Chaturvedi	Sustainable Production of Plant Secondary Metabolites by the Application of Cellular Totipotency	Guru Ghasidas University, Koni, Bilaspur, Chhattisgarh, INDIA	live, (virtual event)	August 09, 2021
20.	Prof. Rakhi Chaturvedi	Plant Tissue Culture: A promising approach to biodiversity conservation, afforestation and plant secondary metabolite production	Amity University, Lucknow, Uttar Pradesh, INDIA	live, (virtual event)	September 30, 2021
21.	Prof. Biman B. Mandal	Plenary talk at "BioSangam 2022"	Motilal Nehru National Institute of Technology (MNIT) Allahabad	Allahabad	11/3/2022
22.	Prof. Biman B. Mandal	Invited Talk at Biomaterials Online Conclave 2022	National center for Nanoscience and Nanotechnology, University of Madras	Chennai	8/3/2022

23.	Prof. Biman B. Mandal	Invited talk at Indian Nanoelectronics Users' Program (INUP-i2i)	IIT Guwahati.	Guwahati	1/3/2022
24.	Prof. Biman B. Mandal	Invited talk at webinar titled "Emerging trends in translational application of Stem Cell Research"	AIIMS New Delhi	Delhi	25-27/2/2022
25.	Prof. Biman B. Mandal	*Invited talk at "one-day webinar on* aging and age-associated CNS disorders"	*NIPER Hajipur*	Bihar	25/2/022
26.	Prof. Biman B. Mandal	Keynote Lecture at APA NANOFORUM-2022, an International conference of Nanomaterials and Nanoengineering.	IIT Delhi	Delhi	24-26/2/2022
27.	Prof. Biman B. Mandal	Invited Talk at Ph.D. Orientation Program for 2022 batch	University of Science & Technology Meghalaya (USTM).	Meghalaya	17/2/2022
28.	Prof. Biman B. Mandal	Invited talk at IIT Gandhinagar on seminar series	IIT Gandhinagar	Gandhinagar	2/2/2022
29.	Prof. Biman B. Mandal	Invited talk at Centre for Predictive Model Systems (CPHMS) at, June 26, 2021 organized by	Atal Incubation Centre-CCMB	Hyderabad	26/6/2021
30.	Prof. Sachin Kumar	GENETICALLY ENGINEERED VACCINES: Modern Era of Vaccines	Don Bosco University	Assam	17/03/2022
31.	Prof. Sachin Kumar	Drug design and discovery	Don Bosco University	Assam	17/03/2022
32.	Prof. Sachin Kumar	Newcastle disease virus as a tool for developing animal vaccines and diagnostics	ADAMAS University	Kolkata	22/04/22
33.	Prof. Shankar Prasad Kanaujia	Sugar ABC importers in bacteria: potential drug targets and delivery systems	Centre of Biotechnology, University of Allahabad	Allahabad	January 10-24, 2022
34.	Prof. Shankar Prasad Kanaujia	Sugar ABC importers as potential drug targets and delivery systems.	I-DAPT HUB FOUNDATION IIT (BHU), VARANASI and Bioinformatics and Drug Discovery Society, India	Varanasi	September 11-12, 2021
35.	Prof. Utpal Bora	Research Advisory Committee (RAC) meeting	Fakhruddin Ali Ahmed Medical College, Barpeta	Barpeta, Assam	25.03.2022.
36.	Prof. Utpal Bora	Lecture entitled "Bio-medical Research: Ideas, Inspirations and Challenges" in Science Lecture organized by Multidisciplinary Research Unit	Fakhruddin Ali Ahmed Medical College, Barpeta	Barpeta, Assam	25.03.2022
37.	Prof. Utpal Bora	National Seminar on "Emerging Priorities in Science and Technology with Special Focus	B. Borooah College, Guwahati, Assam-781007	Guwahati, Assam-781007	24.03.2022

		on Rural and Green Technology"			
38.	Prof. Utpal Bora	Lecture entitled "Sustainable food Security" in National Seminar on Advances in Basic and Translational Research in Biology (ABTRiB)	Department of Molecular Biology and Biotechnology (MBBT), Tezpur University	Tezpur, Assam	12.03. 2022
39.	Prof. Utpal Bora	Lecture entitled "Data in Food Security" in International Workshop on Skill Development through Impact Analysis of Emerging Data with Agricultural Technology in Population Sciences	Department of Agricultural Statistics and Department of Agricultural Engineering, Assam Agricultural University, Jorhat, Assam and Indian Agricultural Statistics Research Institute (IASRI), ICAR, Pusa, New Delhi	Assam Agricultural University, Jorhat, Assam (Online)	12.03. 2022
40.	Prof. Utpal Bora	Meeting of Institutional Biosafety Committee	College of Veterinary Science, Assam Agricultural University, Khanapara	Khanapara, Assam	07.12.2021
41.	Prof. Utpal Bora	4th meeting of DBT-NER Technical Expert Committee (TEC) on Medicinal & Aromatic Plants, Bioresources & Secondary Agriculture and Silk Biotechnology	DBT, Govt. of India		02.09.2021.
42.	Prof. Utpal Bora	Invited as an Expert and Resource Person for Brainstorming Session	Directorate of Sericulture, Govt. of Assam	Guwahati, Assam	07.08.2021
43.	Dr. Selvaraju Narayanasamy	Challenges and Practices on Wastewater and Solid waste Management for Sustainable Environment (CPWSMSE'22)	Department of Civil Engineering Annamalai University	Chidambaram, Tamil Nadu, India	23 March, 2022
44.	Prof. Vibin Ramakrishnan	"Charges & Shapes". Alumni lecture series, Golden Jubilee celebrations, Cochin University	Cochin University of Science and Technology, Kochi-22	Kochi	14/03/2022
45.	Dr.Cota Navin Gupta	National Bioengineering Conference (From lab to End User) https://www.bioengineeringconf.com/guest-speakers	Department of Biotechnology and Medical Engineering, NIT Rourkela	Rourkela,Orissa	6th Jan 2022
46.	Dr.Cota Navin Gupta	SNCI virtual meeting on Cognitive and Neurodevelopmental disorders	NEHU, Shillong, Meghalaya	Online	30th Nov 2021
47.	Prof. Senthilkumar Sivaprakasam	AICTE-ATAL Sponsored Online Faculty Development Programme on Fermentation Technology and Biochemical Engineering	Madras Institute of Technology	Chennai	02/02/2022
48.	Prof. Senthilkumar Sivaprakasam	International Conference on Recent Advances in Biosciences and	SRM Institute of Science and Technology	Chennai	25/02/2022

		Bioengineering (ICRABB) – 2022			
49.	Prof. Senthilkumar Sivaprakasam	Special Invited Lecture	Dept. of Biotechnology, CBIT, Hyderabad	Hyderabad	05/04/2022
50.	Dr. Rajkumar P. Thummer	Reprogramming Somatic Cells to Induced Pluripotent Stem Cells: Challenges and Opportunities	D. Y. Patil Education Society, Kolhapur, Maharashtra, India	Zoom Platform	20/08/2021
51.	Dr. Souptick Chanda	Surgeon & Scientist Interface in Optimization of Body Biomechanics.	Gujarat Orthopaedic Association Conference (GOACON 2022)	Silvassa	06/03/2022
52.	Dr. Souptick Chanda	Real-Time Monitoring of Hip Stem Micromotion: A Potential Field of Application of Antenna Based Imaging	Indian Conference on Antennas and Propagation (InCAP 2021) Malaviya National Institute of Technology (MNIT) – virtual mode	Jaipur	16/12/2021
53.	Prof. Siddhartha Sankar Ghosh	Applications of Scanning Electron Microscope in Biological Sciences and Biotechnology	IIT Guwahati	IITG	16/06/2022
54.	Prof. Siddhartha Sankar Ghosh	Imminent Prospects of Nano Technology in Cancer Theranostics	ACCLMPCON 2022	NEDFi Convention Centre, Guwahati	09/01/2022
55.	Prof. Siddhartha Sankar Ghosh	Imminent Prospects of Cancer Nanotheranostic Devices	INUP-i2i 2022 Workshop	IITG	01/03/2022
56.	Dr. Lalit M Pandey	Surface engineering of Ti6Al4V by forming hybrid self-assembled monolayers and its effect on collagen-I adsorption, osteoblast adhesion and integrin expression	Conference on Colloid and Interface Chemistry (CIC 2021)	Virtual	23-25 April, 2021
57.	Dr. Lalit M Pandey	Hydrophobic surface induced biosorption and microbial ex-situ remediation of oil-contaminated sites	International Conference on Biotechnology for Resource Efficiency, Energy, Environment, Chemicals and Health (BREEECH 2021)	Virtual	01-0 Dec, 2021
58.	Dr. Lalit M Pandey	Surface Modification" in the AICTE Training and Learning Academy sponsored Faculty Development Program (ATAL-FDP) on "Advanced manufacturing of Biomedical Devices for Health Technologies	Department of Mechanical Engineering, IIT Tirupati	Virtual	13-17 Dec, 2021
59.	Dr. Lalit M Pandey	Microbial Production of Biosurfactants	A Five-day Virtual Workshop on Basic Techniques involved in Industrial	Virtual	16-21 Dec, 2021

			Microbiology for Product Development organized by CSIR-IIIM, Jammu		
60.	Dr. Lalit M Pandey	Nano-Hydroxyapatite for Biomedical Applications	Department of Mechanical Engineering, IIT Tirupati	Virtual	24-28 Jan, 2021
61.	Dr. Lalit M Pandey	Nano Hydroxyapatite: A Potential Bioceramic for Biomedical Applications	NIT Nagaland	Virtual	27-29 Jan, 2022

9. Visitors from Other Institutes / Universities / Organisations / Invited Lectures

Sl. No.	Name	Name of Inst./Univ./Org.	Purpose/ Name of Lecture	Date	Remarks
1.	Prof. Krishnaveni Mishra	University of Hyderabad	Staying in shape:lessons from budding yeast	11/05/21	
2.	Mr. Sushanth Banerjee	CEO, Orthotech	Institute and Industry Interphase	04/06/21	
3.	Dr. Swagata Halder	Institute for Research in Biomedicine Università della Svizzera italiana, Switzerland	SPRTN-mediated DNA-protein crosslink repair and its causal relationship with cancer and ageing	23/07/21	
4.	Prof. Umesh Varshney	IISc Bangalore, JN Tata Chair Professor	Translation initiation and its regulation by one-carbon metabolism in bacteria	31/07/21	
5.	Prof. Shaji Velayudhan	Department of Haematology, CMC Vellore	Disease modelling of haematological diseases using iPSCs	10/09/21	
6.	Dr. Ganesh Kadasoor	Olympus Medical Systems India Pvt Ltd	High resolution and High-speed 3D imaging and Artificial Intelligence based Quantitative Data Analysis	29/10/21	
7.	Dr. Varun Aggarwala	Icahn School of Medicine of Mount Sinai hospital	Precise quantification of bacterial strains after fecal microbiota transplantation explains outcome	9/12/21	

10. Seminars/Workshops/Conferences/Short-Term Courses Organised

Sl. No.	Name of Faculty (Convener/ Co-ordinator, etc.)	Name of Sem./Wor./Con.	Funded By	Date	International/ National	No. of participants
1.	Prof. Sachin Kumar Symposium	Emerging Viral Diseases of Animals in India	Indian Institute of	26/06/21	National	

			Technology Guwahati			
2.	Prof. Sachin Kumar	Workshop on Biosafety and Biosecurity Procedures	Indian Institute of Technology Guwahati	11/06/21	National	
3.	Prof. Sachin Kumar	Technologies for Sustainable Development Goals	Indian Institute of Technology Guwahati	11/05/21	National	
4.	Dr. Biplab Bose	AICTE ATAL Academy Online FDP on Computational Synthetic and Systems Biology	AICTE	26/07/2021 – 30/07/2021	National	200
5.	Dr.Cota Navin Gupta	Artificial Intelligence Augmented Robotic Neurorehabilitation Session @ INDICON 2021	IEEE	19/12/2021	National (https://www.ewh.ieee.org/r10/calcutta/indicon2021/tutorial_detail.html)	Online (around 200 participants)
6.	Prof. Siddhartha Sankar Ghosh and Prof. P.K Iyer (joint convener)	7th International Conference on Advanced Nanomaterials and Nanotechnology (ICANN2021)	Meity	14-17/12/2022	International	250

A brief report on the major NATIONAL and INTERNATIONAL events with photographs may also be given separately in addition to the format given above.

11. Patents:

No. of Patents Applied with details: 12

No. of Patents Granted with details: 03

Sl. No.	Name of Faculty and co researcher	Name	Date Applied/Granted	Application No.	Remarks
1.	Aritra Das, Muktashree Saha,	Cost effective composition of wound	Applied on 18/12/21	202131059065	

	Manish Kumar Gupta, Prof Latha Rangan, Prof. Ramgopal V. S. Uppaluri, Prof. Chandan Das	dressing compatible polymer hydrogel composite films.			
2.	Sanjana Senthilkumar, Sadokpam Shreekant, Manish Kumar Gupta, Heeramoni Boro, Prof. Rajaram Swaminathan, Prof. Latha Rangan	Device for evaporation and recovery of organic solvents using simple labwares.	Published on 04/03/2022	202131005168 A	
3.	Biman B Mandal and Jadi Praveen Kumar.	Silk sericin for skin care application and its process of preparation	18/7/2018.	201831026915 (Patent no: 392521)	Granted
4.	Biman B Mandal and Bibrita Bhar.	Silk Aloe composite for wound healing.	01/07/2021	202131029685	Applied
5.	Biman B Mandal, Yogendra P. Singh, Joseph Christakiran Moses and Ashutosh Bandyopadhyay	3D bioprinted osteochondral in vitro osteoarthritis model construct and applications thereof	18/6/2021	202131027358	Applied
6.	Biman B Mandal and G Janani.	3D bioprinted Vascularized Liver Lobule Model as Drug Screening Platform	03/11/2021	202131050671	Applied
7.	Biman B Mandal, Joseph Christakiran Moses and Sayanti Shome.	An in-vitro bone marrow construct mimicking the trabecular endosteum and its use thereof.	16/11/2021	202131052636	Applied
8.	Biman B Mandal and Chitra Jaiswal.	Silk hydrogel and a scaffold thereof for cancer therapy and modeling.	05/10/2021	202131045088	Applied
9.	Biman B Mandal and Joseph Christakiran Moses.	Silk bioactive nano-composite metal coating and its use thereof.	27/12/2021	202131061074	Applied
10.	Prof. Sachin Kumar	A process of preparing an antiviral nanofabric and an antiviral nanofabric thereof		202131013654	xxx
11.	Dr. Selvaraju Narayanasamy and Tasrin Shahnaz	Cyperus rotundus as a new cellulose source for remediation of Basic fuchsine dye: A static and flow adsorptive approach	22 March, 2022 (Applied)	202203222000010 1	Indian Patent
12.	Dr. Bhaskar Das, Prof. Sanjukta Patra	An environmentally sustainable algal process for remediation of phenol pollution coupled to bioenergy production	Date of Grant: 27/12/2021	Patent No: 385194	

13.	Dr. Souptick Chanda Mr. Pratik Nag, Dr. Bhaskar Borgohain	The Double Oblique Device for Osteosynthesis (DODO) of hip	03/09/2021	348843-001	Under review
14.	Prof. Siddhartha Sankar Ghosh and Arun Chattopadhyay	DEVICE WITH INTEGRATED METHODS FOR REVERSE TRANSCRIPTION POLYMERASE CHAIN REACTION (RT - PCR) AND / OR DNA / PROTEIN ARRAY BASED ANALYSES	04/01/2022 (granted)	US Patent Certificate No.11, 213, 827 of US Pat Appl.No.15778145	US Patent
15.	Prof. Siddhartha Sankar Ghosh and Prof. Roy Paily Palathinkal	GLUTATHIONE-S-TRANSFERASE – NANOCONJUGATE BASED FET SENSOR FOR DETECTION OF GLUTATHIONE/CANCER CELL	25/08/2018 (Issuance of First Examination Report for Patent Application 2018310031884)	Patent Application No. 201831031884 dated 25.08.2018	Indian

12. Awards and honours (Only awards/honours at national/international level from reputed organisations)

Sl. No.	Name of Faculty	Name of Award	Name of Institute/ Organization/ Foundation bestowing the award	Reason for award	Form of Award (Citation/ Medal/ Cash etc)
1.	Prof. B. ANAND	Merck Young Scientist Award-2021 (Runners-up)	Merck Life Sciences	Excellence in Research	Citation + Trophy + Cash
2.	Prof. Latha Rangan	Dr. P. Sheel Memorial (Young Women Scientist) Lecture Award 2021	National Academy of Sciences, India (NASI)	Contribution in the field of Biological Sciences (Plant Biotechnology)	Citation and Cash
3.	Prof. Rakhi Chaturvedi	Prof. F.C. Steward Memorial Lecture Award	Plant Tissue Culture Association (India)	Outstanding achievements in the field of plant tissue culture and in vitro biology	Medal
4.	Prof. Rakhi Chaturvedi	To commemorate India's 75th year of Independence, the Office of the Principal Scientific Advisor, Government of India and British High Commission, New Delhi, has recognised and	Office of the Principal Scientific Advisor, Government of India and British High Commission, New Delhi	For the contribution in the field of science	Citation

		honoured Prof. Rakhi Chaturvedi among top 75 women in STEAM. She will be featured in the Second edition of the book "She Is" series - 'She Is – 75 Indian Women in STEAM', 2022.			
5.	Prof. Biman B. Mandal	Chosen one amongst "75 under 50 Scientists Shaping Today's India"	DST/Vigyan Prasar in a book released by Hon. Science and Technology Minister, Govt of India.	Scientific Excellence and contribution	Citation
6.	Prof. Biman B. Mandal	SWARNAJAYANTI Fellowship in Life Science	Department of Science and Technology, Govt of India	Scientific Excellence and contribution	Citation, project grant and cash award.
7.	Prof. Biman B. Mandal	S. Ramachandran NATIONAL BIOSCIENCE AWARD for Career Development	Department of Biotechnology, Govt of India	Scientific Excellence and contribution	Citation, project grant and cash award.
8.	Prof. Sachin Kumar	F.M. Burnett Award	Indian Society for Veterinary Immunology and Biotechnology		Certificate
9.	Prof. Shankar Prasad Kanaujia	Adjunct Faculty	Centre of Biotechnology, University of Allahabad	Adjunct Faculty	Adjunct Faculty
10.	Prof.Utpal Bora	Appointed as Chairman, Research Advisory Committee, Gauhati Medical College and Hospital for the period of 2021-22 to 2025-26	Gauhati Medical College and Hospital	xxx	xxx
11.	Prof.Utpal Bora	Appointed as Member of Screening Committee for TIFAC academic partners under TIFAC-MSE program, attended a meeting on 13.04.2021.	Technology Information Forecasting and Assessment Council (Department of Science and Technology, Govt. of India), New Delhi	xxx	Xxx

12.	Prof.Utpal Bora	Appointed as External Member in Institutional Biosafety Committee 14.12.2021	College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati	xxx	Xxx
13.	Prof.Utpal Bora	Appointed as a Member of Augmenting Writing Skills for Articulating Research (AWSAR)	Department of Science and Technology (DST), Govt. of India, New Delhi	xxx	Xxx
14.	Dr. Selvaraju Narayanasamy	Research Concept Grand Challenge Award (RCGCA) 2022	Indian Institute of Technology Guwahati (IITG)	to conduct various meetings and other contingency expenditures towards execution of Project proposal	Rs 2 lakhs
15.	Dr. Lalit M Pandey	Malaviya Memorial Award	Biotech Research Society (BRSI), India	Research Contribution	Certificate, citation and a cash prize of Rs 10,000

13. Students' Achievements:

Sl. No.	Name of Student	Name of Award	Name of Institute/ Organization/ Foundation bestowing the award	Reason for award	Form of Award (Citation/ Medal/ Cash etc)
1.	Neha Mariam Unnoony	Prime Minister Research Fellowship	Ministry of Education	Excellence in Research	Research Fellowship
2.	Sunanda Chhetry	Oral Presentation Award	Research and Industrial Conclave-2022, IIT Guwahati	1st position in oral presentation	Cash
3.	Alok Senapati	NEWGEN-IEDC Project	IIT Guwahati	Prototype development	Cash
4.	Manish Kumar Gupta	NEWGEN-IEDC Project	IIT Guwahati	Development of a Cosmeceutical as a Skin Care Product from Plant Source.	Cash
5.	Tania Sarkar	Prestigious Samsung Fellowship Award, 2021	Industrial Interactions and Special Initiatives, IIT Guwahati	Master's Research project	Fellowship
6.	Madhurima Chaudhary	Best Thesis Award, 2021	Department of BSBE, IIT Guwahati	Selected as Master's best thesis 2021	Citation

7.	Parmeshwar Gavande	RIC 2022	Feb 2022	2nd prize in Best oral presentation organized by Indian Institute of Technology Guwahati jointly with IIT Guwahati Research Park.	Parmeshwar Gavande
8.	Ms. Vartika Srivastava	Hope E. Hopps Student award	Society for In Vitro Biology 2021: In Vitro Online!	Achievements in the field of in vitro biology	Cash
9.	Ms. Vartika Srivastava	Three min. Thesis presentation **(IInd prize)**	Research and Industrial conclave, IIT Guwahati	Thesis presentation	Cash
10.	Mr Vinod Kumar	Best Poster presentation award (**Ist prize**)	International Conference on Advances and Innovations in Biotechnology and Allied Sciences-2022 (IC-AIBAS-2022), University Institute of Biotechnology, Chandigarh University, India	Poster presentation in the conference	Citation
11.	Mr Krishna Kant Pachauri	Best Oral presentation award in allied sciences category (**Ist prize**)	International Conference on Advances and Innovations in Biotechnology and Allied Sciences-2022 (IC-AIBAS-2022), University Institute of Biotechnology, Chandigarh University, India	Oral presentation in the conference	Citation
12.	Ms. Anjali Gupta	Advances in Basic and Translational Research in Biology (ABTRiB) 2nd Best Oral presentation	Department of Molecular Biology and Biotechnology, Tezpur University	xxx	Certificate
13.	Mr. Kamal Shokeen	Deepika Phukan Oncology Research	Dr. B. Borooah Cancer Institute		Grant Award
14.	Dr. Suraj Kumar Mandal	Best Oral Presentation Award	IIT Roorkee, Uttarakhand, India	Best Oral Presentation	Certificate
15.	Angshu Dutta	Best Oral Presentation Award	IIT Roorkee, Uttarakhand, India	Best Oral Presentation	Certificate

16.	Angshu Dutta	Best Poster Award	PDBj and Institute for Protein Research, Osaka University, Japan	Best Poster	Certificate
17.	Chandi Patra, Tasrin Shehnaz and Harish Kumar	A project by IIT Guwahati-DST NEGWEN-IEDC (2022)	IIT Guwahati-DST	Cleaner production of porous carbon using Surgical/N95 masks for wastewater treatment: A circular economy approach	Rs 2.5 lakhs
18.	Chandi Patra	Best rapid presentation & poster award	International Conference on Biotechnology for Resource Efficiency, Energy, Environment, Chemicals and Health (BRE3CH-2021), organized by CSIR-INDIA, CSIR-Indian Institute of Petroleum Dehradun and The Biotech Research Society-India (BRSI)	Best Presentation	Certificate and a journal book
19.	Chandi Patra	Second-best poster award	Research and Industrial Conclave (RIC 2022) held at the Indian Institute of Technology Guwahati, Guwahati, Assam, India	Best Presentation	Cash Prize of Rs. 1500
20.	Ms. Satakshi Hazra	Best oral presentation	Indian Consortium for Research & Innovation in Biology (ICRIB)	Best oral presentation	Certificate/Cash
21.	Ms. Satakshi Hazra	First Place	IIT Guwahati	Poster presentation: Scientifique	Certificate/Cash
22.	Ms. Sandhya S	New Generation Ideation Contest	Hindustan Petroleum Green R&D centre	Innovative ideas for the problem stated by the company	All India THIRD Prize Cash (₹ 25,000)
23.	Mr. Aravind R.	Samsung Fellowship Award for M. Tech. students	Samsung	For M. Tech project	Cash
24.	Mr. H Krishna Kumar	Augmenting Writing Skills for Articulating Research (AWSAR) Award	Department of Science and Technology, Government of India	Popular Science Article	Cash Prize of ₹10,000/- along with a Certificate of Appreciation
25.	Mr. Pratik Nag	Hridayantra Fellowship	IIT Kanpur	To develop advance artificial heart	Fellowship

26.	Ms. Rachayeeta Deb	Poster Prize	Research conclave, IITG	Poster presentation	Certificate and Cash
27.	Mr. Nayan Moni Deori	Oral Prize	Research conclave, IITG	Oral Presentation	Certificate and Cash
28.	Mr. Pratap Chandra	Best Poster Award in the Original Research Category. National Conference on CRISPR/Cas: From Biology to Technology	Institute of Bioinformatics and Applied Biology (IBAB) and SRM University	3rd Prize in Best Poster Award	Citation

14. Any Other (Special Mention)

1. Prof. Latha Rangan:

- Inducted as Member for The Inter Academy Panel for Women in STEMM 2021-2025
- Inducted as Council Board Member in Biotech Research Society of India 2021-2023
- Subject Expert Member in the Govt. of Assam, Secondary Education Department 2021-2022

2. Prof. Arun Goyal:

- **BHU Centenial Award 2020** for outstanding contributions to Microbial Biotechnology, by Biotech Research Society, India. Dec 2021
- Invited as Expert member of Initial Screening Committee (ISC) for Project Evaluation by Technology Development Board (TDB), Department of Science and Technology (DST) March 9, 2022.
- Invited as a subject expert to evaluate the application for Associate Professor at Department of Biosciences and Bioengineering at IIT Kanpur, Jan 27, 2022.
- Invited as Distinguished Technical Expert Member, for Project Evaluation Committee (PEC) by Technology Development Board (TDB), Department of Science and Technology (DST), Jan 27, 2022.
- Invited as Member, Technical Expert Committee for DBT-NER by DBT in the area of Energy, Environment and Biodiversity to review new proposals and project progress, July 6, 2021.
- Nominated as Board member, Environmental Biotechnology Division, Asian Federation of Biotechnology (AFOB). April 2021.
- Invited as member of Assessment Committee Meeting at Center of Innovative and Applied Bioprocessing, CIAB, Mohali for regularization of Scientist, April 6, 2021.

3. Prof. R. Swaminathan:

Mr. Shah E. Alom, a Ph.D. student of BSBE Department delivered an ORAL PRESENTATION (online mode) titled "Tracking the early events of aggregation in Abeta Switch peptides employing Protein Charge-Transfer Spectra" at the conference titled 'Light-matter Interactions from scratch: Theory and Experiments at the Border with Biology in Dynamical processes: electron and energy transfers, quantum biology' organised by The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy on 23 Nov 2021.

4. Prof. Biman B Mandal:

- Inducted as "Associate Editor" for ACS Biomaterials Science and Engineering 2022 onwards.

- Elected as President STERMI (Society for Tissue Engineering and Regenerative Medicine India) 2021 onwards for a 03-year period.

5. Dr. L M Pandey:

- Story on the development of low-cost sterilization box using a combination of heat and ultraviolet light irradiation for the prevention of COVID-19 in Media (Media Coverage) June 2021
- NPTEL course on "Biointerface Engineering" from 24 Jan to 18 March 2022

15. Faculty Members (In alphabetical order according to surnames)

Sl. No.	Name	Name of the University/Institute/Org PhD degree received from	Designation	Areas of Interest
1.	B. Anand	Indian Institute of Technology Kanpur, Kanpur	Professor	RNA Biology, CRISPR Biology, Ribosome Biogenesis
2.	Bora Utpal	Institute of Genomics and Integrative Biology, Delhi	Professor	Biomedical Engineering, Biodiversity and Bio-entrepreneurship
3.	Bose Biplab	All India Institute of Medical Sciences	Associate Professor	Systems Biology, Cell signaling, Recombinant therapeutics
4.	Chanda Souptick	Indian Institute of Technology Kharagpur, India	Assistant Professor	Biomechanics, implant design & optimization, surgical simulation, biomedical image processing
5.	Chaturvedi Rakhi	University of Delhi, India	Professor	Plant Tissue Culture & Secondary Metabolites Production
6.	Chaudhary Nitin	CSIR-Centre for the cellular and Molecular Biology, Hyderabad	Professor	Peptide self-assembly and amyloid aggregates, Peptide-membrane interactions Curvature inducing proteins
7.	Das Debasish	Indian Institute of Technology Bombay	Professor	Metabolic engineering, Biochemical engineering, Modelling of fermentation process, Biofuel
8.	Dasu V. Venkata	Indian Institute of Technology Madras	Professor	Bioprocess Development, Metabolic Engineering
9.	Ghosh Siddhartha S.	Indian Institute of Chemical Biology (IICB), Kolkata	Professor	Cancer Gene Therapy, Nanobiotechnology, Molecular Pathways Involving Drug Resistance
10	Goswami Pranab	Gauhati University	Professor (HAG)	Biosensors and Biofuel cells
11	Goyal Arun	Indian Institute of Technology Kanpur, Kanpur, India.	Professor	Molecular Biology, Protein Engineering, Rational Enzyme Engineering, 3-Dimensional Structure (In silico, crystal and solution) and Function analysis of enzymes and their industrial (Biorefinery, therapeutic, food, Pulp and paper) applications
12	Gupta Navin	Brain Computer Interfaces and	Assistant Professor	Imaging Genetics, Biomedical Signal/Image Processing, Multimodal

		Neural Engineering (BCI-NE) Group, University of Essex		Analysis,Computer Aided Diagnosis, Biomedical Instrumentation
13	Jaganathan Bithiah G.	Johann Wolfgang Goethe University, Frankfurt, Germany	Professor	Stem Cell Biology, Cancer signaling
14	Kanaujia Shankar Prasad	Indian Institute of Science Bangalore	Professor	Structural Biology and Bioinformatics Studies
15	Kumar Manish	University of Maryland, College Park, USA	Professor	Molecular interaction of host-pathogen-vector of infectious diseases
16	Kumar Sachin	University of Maryland, College Park, USA	Professor	Molecular biology of paramyxoviruses, flaviviruses
17	Kunnumakkara A. B.	University of Calicut, Kerala	Professor	Role of inflammatory pathways in cancer development, Identification of novel biomarkers for cancer diagnosis and prognosis, Cancer drug discovery.
18	Limaye Anil Mukund	Indian Institute of Science Bangalore	Associate Professor	Hormonal regulation of gene expression
19	Maiti Soumen Kumar	Indian Institute of Technology Bombay	Associate Professor	Bioprocess Engg, Biofuel
20	Mandal Biman B	Indian Institute of Technology Kharagpur	Professor	Regenerative Medicine, Biomaterials, Tissue Engineering, Stem Cells
21	Nagotu Shirisha	University of Groningen, Groningen, The Netherlands	Assistant Professor	Organelle biology and Cellular Ageing
22	Pakshirajan Kannan	Indian Institute of Technology Madras	Professor	Environmental Biotechnology
23	Pandey Lalit Mohan	Indian Institute of Technology Delhi	Associate Professor	Bio-interfaces and Biomaterials, Protein's adsorption and aggregation, Nanomaterials and composites for Biomedical applications, Environmental Chemical Engineering
24	Patra Sanjukta	Central Food Technological Research Institute, Mysore	Professor	Enzyme and Microbial Technology; Biosensors; Metagenomics; Environmental Biotechnology
25	Ramesh Aiyagari	CSIR-CFTRI, Mysuru (Degree awarded by University of Mysore)	Professor	Antibacterials, Nanobiotechnology

26	Ramakrishnan Vibin	Indian Institute of Technology Bombay	Professor	Network medicine, Bio-Nano catalysis, Drug delivery vehicles
27	Rangan Latha	University of Madras	Senior Professor	Applied Biodiversity
28	Sahoo Lingaraj	Maharshi Dayanand University, Rohtak, India	Professor	Genetic engineering and functional genomics of plants
29	Saini Gurvinder Kaur	Andhra University, Visakhapatnam	Professor	Fungal Biotechnology, Engineering entomopathogenic fungi
30	Satpati Priyadarshi	Indian Institute of Science Bangalore	Associate Professor	Classical molecular dynamics (MD) free energy simulation, Electronic Structure calculations that predict the structure, properties, reactivity, bonding etc. of small molecules
31	Selvaraju Narayanasamy	Indian Institute of Technology Madras, India	Associate Professor	Environmental Biotechnology, Bioprocess Engineering, Biochemical Engineering
32	Senthilkumar S	Central Leather Research Institute, Chennai	Associate Professor	Bioprocess Analytical Technology (BioPAT), Metabolic Engineering
33	Singh Kusum K	Institute of Molecular Medicine, Heinrich-Heine University of Duesseldorf, Germany	Assistant Professor	Posttranscriptional gene regulations
34	Swaminathan Rajaram	Tata Institute of Fundamental Research	Professor	Proteins, Spectroscopy and Biochemistry
35	Tamuli Ranjan	Centre for Cellular and Molecular Biology (CCMB), Hyderabad (Degree awarded by the Jawaharlal Nehru University, New Delhi)	Professor	Calcium signaling, Neurospora genetics, DNA repair
36	Thummer Rajkumar P	University of Groningen, Groningen, The Netherlands	Assistant Professor	Stem Cell Engineering and Regenerative Medicine
37	Trivedi Vishal	Central Drug Research Institute, Lucknow	Professor	Intracellular Signaling in Plasmodium falciparum