Annual Report 2022 | 2023

BCSIR DHAKA LABORATORIES

BCSIR Dhaka Laboratories
Bangladesh Council of Scientific and Industrial Research (BCSIR)
Dr. Qudrat-i-Khuda Road, Dhanmondi, Dhaka-1205
Website: www.dhakalabs.bcsir.gov.bd

Citizen Charter of BCSIR Dhaka Laboratories

- The research achievements are published in the reputed national and international journals that are necessary for the students engaged in higher education and scientists as well
- The experienced scientists of different disciplines co-supervise the research works of the MPhil and PhD students of the universities as co-supervisor
- The process developed by the scientists are offered to the entrepreneurs' as leased out process for production
- Molecular detection and quantification of different elements and contaminants of food, feed and other samples by real time PCR, protein analyzer, LC MS AAS, FTIR and other different analytical services
- The scientists of these laboratories visit different factories and industries every year to chalk out their problems and try their best to mitigate those.
- GMO testing, bird-flu detection and other microbiological services are provided.
- Different products and goods imported from abroad are analyzed. As a result appropriate measurement about the quality of the product can be ascertained which helps government getting revenue.
- In order to set the tube-wells of the projects at right place, water and sand samples of deep and shallow tube-well were analyzed in this laboratory which played vital role for the success of the project.
- Different types of fertilizers supplied by different sugar mills are analyzed in these laboratories. As a result, it has become possible to produce improved quality sugar cane for which growers are benefited much.
- Different goods and products supplied by different private agencies and entrepreneurs are analyzed in these laboratories which help them to produce quality goods and products.
- Dissemination of knowledge and information about technological achievements of the scientists through exhibition, seminar and workshop
- Arrangement of science fair each and every year as part of implementation of BCSIR Act -2013 in order to flourish the intelligence of young scientists of school and college level

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Message from the Chairman of BCSIR

I am delighted to learn that the largest research unit of Bangladesh Council of Scientific and Industrial Research (BCSIR), 'BCSIR Dhaka Laboratories' is unveiling its annual report for the fiscal year 2022-2023. The purpose of this report is to reflect the research and development (R&D) activities and achievements of this multidisciplinary institute.

With deep reverence, I wish to commemorate the iconic leader of all time, Bangabandhu Sheikh Mujibur Rahman, whose far-sighted leadership paved the way for Bangladesh's independence in 1971. He is a symbol of courage and resilience. His vision and dedication have inspired millions of people, and his legacy will continue to live on. His beloved daughter our Honorable Prime Minister H.E. Sheikh Hasina is firmly committed to building a knowledge-based "SMART Bangladesh" that's why she has prioritized and facilitated scientific research and development. In alignment with the government's visionary agenda to develop a technologically advanced smart Bangladesh, BCSIR is also operating in a coordinating manner.

As the foremost research organization within BCSIR, this research unit has expanded its areas of research to encompass a wide range of fields which include genomics, bioequivalence and pharmaceutical sciences, applied zoology and botany, natural products chemistry, chemical synthesis, chemical engineering, fibers and polymers, industrial physics, pulp and paper, physical instrumentation, soil water and environment.

It is with great satisfaction, I am happy to highlight here the development of an exceptionally effective COVID-19 detection kit for the first time in Bangladesh by the scientists of BCSIR Dhaka Laboratories. A state-of-the-art bioequivalence laboratory has been set up at this institute for drug development and pharmaceutical research. Moreover, an Applied Botany Laboratory has renovated during this fiscal year to facilitate advanced research and development activities. The scientists of BCSIR Dhaka Laboratories are currently sequencing the genomes of newly discovered Corona virus variants and dengue viruses. In addition, they are trying to develop a low-cost, high-efficiency kit for detecting dengue viruses.

It is noteworthy that this Laboratory is involved in collaboration with various public universities and research organizations as well as in assessing the environmental impacts of government megaprojects. Among the initiatives taken by this unit are scientific seminars, symposiums, workshops, and training programs designed to facilitate the development of skills among scientists and associates. Additionally, scientists are participating in national and international conferences to present their research. Scientists of this institute also supervise MS, M.Phil, and PhD students from different universities on their research projects.

I extend my heartiest gratitude to our Honorable Minister, Ministry of Science and Technology, Architect Yeafesh Osman for his enthusiastic support to us.

My appreciation goes to the Director and scientists of BCSIR Dhaka Laboratories for their dedication and contributions.

(Professor Dr. Md. Aftab Ali Shaikh)

Message from the Director of BCSIR Dhaka Laboratories

It is a great pleasure for me to present the Annual Report of BCSIR Dhaka Laboratories for the fiscal year 2022-2023. This report represents an overview of the research and development activities, process and product development endeavors, skill enhancement training programs of scientists, and services rendered to the nation through various pragmatic initiatives of the seven important research divisions of the institute for the overall growth of the unit. BCSIR Dhaka Laboratories ensures top-notch research activities through the engagement with cutting-edge research fields, identifying opportunities for advanced research, continuous monitoring of the R&D works, weekly seminars to present progress of the projects as well as supporting research works of MS, MPhil, and PhD students of different universities. It is mentionable that scientists from the Genomic Research Laboratory of this institute have wholeheartedly performed the genome sequencing of several variants of the coronavirus and developed the 'BCSIR-COVID Kit'. Moreover, the same group is conducting research on Dengue virus and working on developing a low-cost and efficient detection kit.

BCSIR Dhaka Laboratories is one of the major and renowned institutes of BCSIR. This unit helps the industrial sectors in many ways, like, developing new products, improving the quality of the existing products and testing services for export and import items. Recently a state-of-the-art pharmaceutical research laboratory has been established under annual development project of the Government of Bangladesh on bioequivalence studies and new drug discovery.

I express my deepest gratitude to the chairman of BCSIR for his kind support to improve the research quality of this institute. I want to thank the committee members for their hard work and dedication in publishing this Annual Report. I also acknowledge all scientists and staff for their sincere effort in making this year significant with their research work.

I am excited about the upcoming years and the laboratories' continuous research progress.

Dr. Md. Sarwar Jahan

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BCSIR Dhaka Laboratories

BCSIR Dhaka Laboratories commenced its magnificent journey as the 'East Regional Laboratories' of the Pakistan Council of Scientific and Industrial Research (PCSIR) in 1955. Dr. Muhammad Qudrat-i-Khuda, the eminent scientist and educationist, conceived the idea and took initiative for establishing such a laboratory in this part of the continent. Later, it expanded its domain to several full-fledged multi-disciplinary regional laboratories and institutes. BCSIR Dhaka Laboratories focuses its research and development in the arenas of Biology, Chemistry, Fibre and Polymer, Genomics, Industrial Physics, Pulp and Paper, Physical Instrumentation, Pharmaceutical Sciences etc. In addition with R&D activities, this laboratories renders analytical and testing services to various public and private bodies, entrepreneurs and individuals. Our scientists also supervise a significant number of students of post-graduate, doctoral and post-doctoral level from different universities every year and give them scientific and technical support for their thesis work. BCSIR Laboratories, Dhaka is serving the nation dedicatedly for achieving our mandate of scientific and technological advancement, addressing national priorities and thus contributing to the economic vibrancy of the country.

Mission of BCSIR Dhaka Laboratories

To carry out, promote and guide scientific, industrial and technological research on various fields of pure and applied sciences that optimizes the economic, environmental and societal benefits for the people of Bangladesh.

Vision of BCSIR

To be a center of excellence in science and technology

BCSIR Dhaka Laboratories at a Glance

Establishment : 1955
Present director : Dr. Md. Sarwar Jahan
Total number of research Divisions : 07

Projects

Total ongoing R&Ds : 38
Number of ongoing ADPs : 01

Achievements

Number of published papers : 95
Number of accepted processes : 07
Number of patents : 03 (submitted)

Services

Analytical services : 2139
Student supervision : 27

Manpower (Active)

Number of scientists : 91
Number of officers : 11
Number of staff : 42

Organizational Chart of BCSIR Dhaka Laboratories

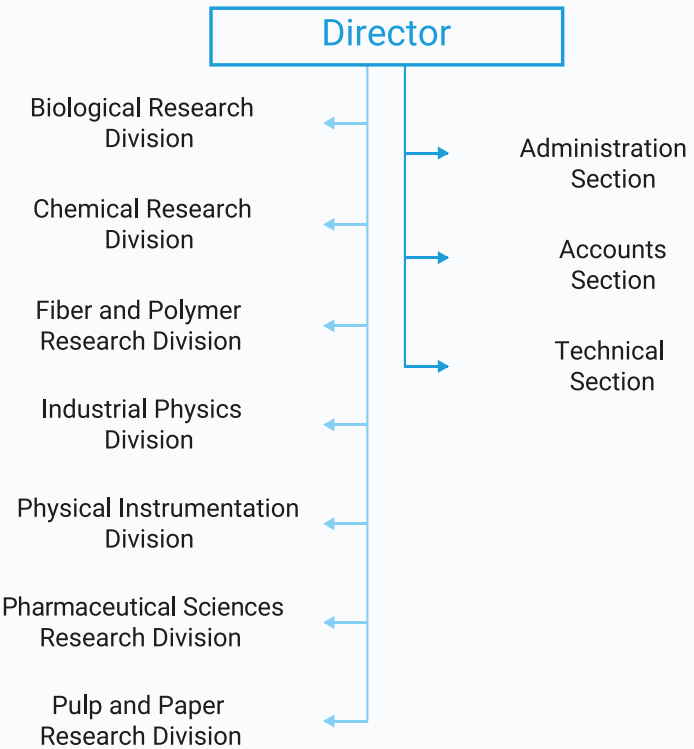


Table & Contents

Biological Research Division (BRD)

Biology, A Way of Green Life

Biological research division is the largest division in BCSIR laboratories, Dhaka which conducts research and development activities in six (06) different sections:

- ✔ Number of scientists : 28
- ✔ Total ongoing R&D : 17
- ✔ Analytical services : 1173

- ♦ Tissue Culture: Biotechnological research along with whole genome sequencing of human, bacteria and viruses as well as metagenomic study using next generation sequencing technique
- ♦ Soil, Agronomy and Environment: Conduct research on soil pollution remediation, soil health improvement, air pollution monitoring, air pollution remediation
- ♦ Applied Botany: research on economically important algae, medicinal, horticultural and flowering plants culture and producing and marketing Spirulina
- ♦ Plant Pathology: Conducts research on plant fungus, bacteria, algae etc. and isolation, identification and characterization of plant fungi, bioactive metabolites from endophytic fungi and to findout the plant diseases caused by fungus and bacteria and their remedy by biological means
- ♦ Zoology: contriving socio-economic and industrial need base projects through applied zoology and molecular biology
- ♦ Plant Physiology: Study on the expression and application of plant metabolites, development of stress tolerant plants

R & D Project:

01. Integrated genomic analysis of ovarian cancer related gene in human

Dr. Salim Khan (PL), Dr. Ahashan Habib, Dr. Shahina Akter, Dr. Tanjina Akhtar Banu, Dr. Md. Murshed Hasan Sarkar, Barna Goswami, Iffat Jahan, Mohammad Mohi Uddin

Introduction:

Ovarian cancer represents the leading cause of cancer deaths among gynecological malignancies, accounting worldwide for about 225.000 new cancer cases and about 140,000 deaths every year. The annual mortality rate per 100,000 people from ovarian cancer in Bangladesh has increased by 40.3% since 1990, an average of 1.8% a year. Next-generation-sequencing which is currently providing new

and exciting results will be very potential in case of precision medicine. In this project the DNA sequences of exons from coding genes in ovarian cancer of some patients will be analyzed.

Objectives:
- Whole genome sequencing of ovarian cancer patient's sample.
- Mapping, germline variant calling analysis and annotation of sequence data.
- Find out various pathogenic variants of ovarian cancer genes (Hereditary mutant genes as well as GWAS risk gene) using whole genome sequencing (NGS) data.

Work Progress:
- Data analysis is going on

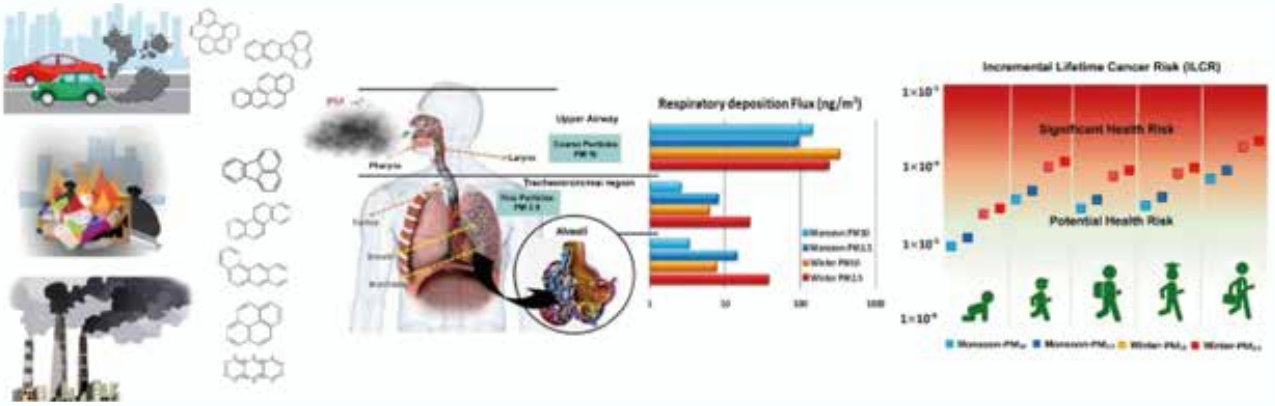
02. Airborne multipollutants in and around Dhaka city: Source apportionment and health risk assessment

Dr. Mohammad Moniruzzaman (PL), Professor Dr. Aftab Ali Shaikh (Advisor), Dr. Md. Kamal Hossain, Dr. Md. Ahedul Akbor, Badhan Saha, Afroza Parvin, Afsana Parvin, Priyanka Dey Suchi

Introduction:
Air pollution remains one of the most acute problems in metropolitan city like Dhaka. Air pollution with multi-pollutants has become an important issue of urban air quality due to the adverse health effects of these compounds on human. The ever-increasing rate of air pollutants sources such as vehicles, industrial units, and urbanization lead to a significant decline in ambient air quality. The particulate bound different multi-pollutants like heavy metals (chromium, lead, cadmium, mercury, nickel etc.) and organic compounds - polycyclic aromatic hydrocarbons (PAHs), dioxin, furan, BTEX, PFAS are transferred by these fine particles and can enter into respiratory system through breathing. These pollutant compounds were produced by incomplete combustion of fossil fuels and biomass. These pollutants are ubiquitous and not only pollute the close area to the resources but also can travel long distances and pollute receptor sites that are far from their sources.

Objectives:
- Evaluate the dispersion and deposition pattern of air borne multi pollutants (trace metals, PAH, PCBs,
  BTEX, PFAS, Dioxin, Furans, Micro plastic and bioaerosols) in ambient air
- Determine the source apportionment of these pollutants
- Investigate the airway deposition of pollutants in respiratory system and Risk assessment for different age group of people
- Develop community multi scale air quality modeling system (CMAQ) for Dhaka city
- Propose mitigation strategies for specific pollutant using source apportionment and air mass trajectory

Work Progress:
- Moniruzzaman, M., Shaikh, M. A. A., Saha, B., Shahrukh, S., Jawaa, Z. T., & Khan, M. F. (2022). Seasonal changes and respiratory deposition flux of PM2. 5 and PM10 bound metals in Dhaka, Bangladesh. Chemosphere, 309, 136794. (Published)
- Air Pollution Tolerance, Anticipated Performance, and Metal Accumulation Indices of Four Evergreen Tree Species in Dhaka, Bangladesh. Current Cell Biology. Accepted
- Traffic influenced respiratory deposition of particle-bound polycyclic aromatic hydrocarbons over Dhaka, Bangladesh: regional transport, source apportionment and risk assessment. Air Quality, Atmosphere and Health (Final Review)
- Seasonal Circulation and Transboundary Air Pollution in South Asia: Implications for Air Quality and Civilization in Bangladesh. Submitted to Journal of the National Academy of Sciences.



03. Metal contamination and ecological risk of major estuary in Bangladesh: A Base Line Study

Dr. Md Kamal Hossain (PL), Dr. Mohammad Moniruzzaman, Badhan Saha, Afsana Parvin, Afroza Parvin, Priyanka Dey Suchi

Introduction:
One of the major estuary in Bangladesh (Moheskhali, Chattogram) Ensure long term water and food security, economic growth and environmental sustainability while effectively reducing vulnerability to natural disasters and building resilience to climate change and other delta challenges through robust, adaptive and integrated strategies, and equitable water governance to aim a prosperous Bangladesh.

Objective:
- Assess the degree of contamination level of the ecosystem as a reference site, and to determine the possible sources of pollutants of the major Estuary

Work Progress:
- Sample collection has been done of the major 3 estuary of the southern and western part of the Bangladesh and Laboratory analysis almost 70% has completed

One of the major estuary in Bangladesh (Moheskhali, Chattogram)

04. A metagenomic approach to evaluate water and airborne microbiome in Dhaka city

Dr. Tanjina Akhtar Banu (PL), Dr. Md. Salim Khan, Dr. Md Mohammad Moniruzzam, Badhon Saha, Dr. Murshed Hasan Sarkar, Barna Goswami

Introduction:
A comprehensive metagenomic study has been conducted to understand the microbial community structure and their role in different seasons on different sites of water bodies as well as airborne microbial communities in Dhaka city. In this study, we also analyzed the extensive physicochemical analysis of different water bodies of Dhaka city so that we can make a comparative association study between microbiomes and physicochemical parameters in different seasons.

Objectives:
- To evaluate the potential water and airborne microbiome in different seasons in Dhaka city
- To identify pathogenic bacteria in the aquatic ecosystem of Dhaka city to precede the seasonal waterborne disease outbreaks
- To make a comparative association study between microbiome and physicochemical parameters in different seasons.

Work Progress:
- To estimate the microbiome population size, water samples were randomly collected from four rivers namely Turag, Buriganga, Shitalakshya, and Balu; four lakes such as Dhanmondi, Hatirjhil, Gulshan, and Uttara lakes in premonsoon (January- March) and monsoon (July-September) season
- Genomic DNA has been extracted from the water samples of different locations of rivers and lakes in two seasons
- Physicochemical parameters in different seasons have been measured

05. Enhancement of secondary metabolites in in vitro culture of *Withania somnifera* (L) dunal with methyl jasmonate elicitor

Barna Goswami (PL), Dr. Md. Ahashan Habib, Dr. Shahina Akter, Dr. Tanjina Akhtar Banu, Dr. Humayn Kabir, Md. Mohi Uddin.

Introduction:
Withania somnifera (L.) Dunal (Solanaceae), commonly known as 'Ashwagandha' is a highly valued medicinal plant. Pharmacological investigations revealed that the curative properties have been associated with withanolides that are present in the plant leaves and roots. Abiotic elicitors like methyl jasmonate (MeJ) have been confirmed as effective elicitors for the induction of secondary metabolites in plant cell/organ cultures. Therefore, this investigation has been attempted involving various factors such as in vitro culture of W. somnifera, and elicitor's (MeJ) exposure time and their concentrations for an optimized production of withanolides (withanolide A, withaferin A and withanone) in culture.

Objectives

- Establishment of suitable protocol for *in vitro* plant regeneration and callus culture from various explants like leaf, node and root
- Optimization of Elicitation conditions to improve the productivity of Withanolides in *in vitro* culture of *W. somnifera*
- Determination of Withanolides contents from field grown plants, in vitro grown plants, callus tissues and cultured roots elicited with Methyl Jasmonate

Work Progress:
- An efficient in vitro regeneration system was developed for *Withania somnifera* (L.) Dunal through direct and indirect organogenesis from nodal and leaf segment explants
- Optimization of elicitor conditions for hairy root culture were completed

Fig.: Different stages of direct and indirect shoot regeneration of *W. somnifera* L.

06. Analyzing the Impact of Wnt Signaling System as Molecular Diagnostic Method and Therapeutic Target for Cancer

Iffat Jahan (PL), Dr. Md. Salim Khan, Dr. Md. Ahashan Habib, Dr. Shahina Akter, Dr. Tanjina Akhtar Banu, Dr. Murshed Hasan Sarkar, Barna Goswami, Md Saddam Hossain, Md. Mohi Uddin.

Introduction:

Wnt pathway plays a vital role in regulating different physiological processes. WNTs and their downstream effectors involve in various processes that are important for cancer progression, including tumor initiation, tumor growth, cell senescence, and metastasis. Breast cancer represents one of the most significant disease burdens of any cancer worldwide. However, breast cancer is a complex, heterogeneous disease characterized by a great multitude of aberrations at the genomic and molecular level, which can manifest in deregulated signaling pathways. A hallmark of many cancers is aberrant regulation of the Wnt signaling pathway, and breast cancer is no exception.

Objectives:

- Analyzing the activity of Wnt signaling pathway in different breast cancer patients
- Demonstrating the co-relation between Wnt signaling and metastatic tumorogenesis
- Establishing the interconnection between Wnt signaling and tumor repressor oncogenes

Work Progress:

- Whole genome sequencing of 24 human samples has been performed
- Genome analysis and differential gene expression analysis is going on

07. Effect of insect in formation of agar within agarwood tree

Nahid Sultana (PL) Md. Rakibul Hasan, Shanzida Islam, and Amena Kibria

Introduction:

Aquilaria malaccensis commonly known as agar wood has aromatic aneed-base nd medicinal values. Generally, it takes 4 or 5 years to accumulate resin as agar. The quality of nailing agar does not match with the naturally infested product which is mainly caused due to the infection of some biological objects such as insect, fungus etc. The present research is to study the natural phenomena associated with the production of high-quality agar.

Objectives:

- Collection of insects from Agar plants and their taxonomic identification
- Studying the Life-cycle of insects in laboratory scale
- Identifying other biological agents incorporating agar formation within agar wood tree

Work Progress:

- Crude compound (Mixture of secondary metabolites) was extracted from about two hundred cultured plates of Fusarium solani
- A column was prepared with silica bed (silica mesh size 230-400nm), n-Hexane, Chloroform and Methanol was used as a solvent to isolate the compounds in simplified fraction
- After isolation the compounds would be characterized to observe the efficacy of the fungus in agar formation

A   B

Fig.: A. Preparation of Column in Laboratory B. Collection of isolated compounds in beakers through column chromatography.

08. Developing a sustainable technology for Tubifex worm

Nahid Sultana, (PL), Mahmuda Begum, Shanzida Islam

Introduction:

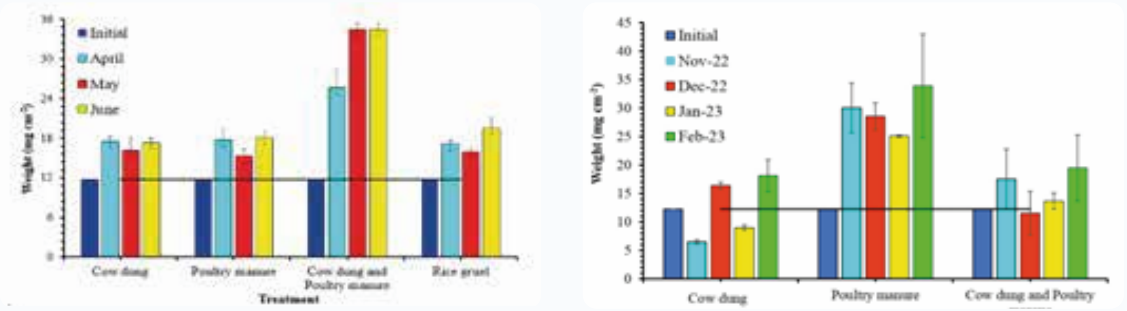
Tubifex tubifex (Tubificid) commonly known as sludge worm is one of the cosmopolitan freshwater oligochaeta that plays an important role as supplementary food (live or freeze dried) in aquaculture. In Bangladesh fish farming is now expanding tremendously. But still now we are not self-independent for fish feed especially for juvenile & ornamental fish. Aquarium culturists are collecting tubifex other than natural resource mostly from India. So, an initiative has been taken to develop a suitable technique for this high protein live feed for fishes.

Objectives:

- To develop an ecofriendly appropriate culture media for Tubifex worm culture
- Providing a reliable supply of live food & assuring human and aquaculture health through commercialization

Work Progress:

- Two cultures set up of tubifex worm was continued using different organic media such as cow dung, poultry manure, rice gruel, rice polish and mustard oil cake
- Cow dung and mixture of cow dung and poultry manure showed highest growth among these media



A B

Fig.: A. Weight gain, (mg/cm-2) of Tubifex in different culture media during pre-monsoon B. Weight gain, (mg/cm-2) of Tubifex in different culture media during post-monsoon.

09. Effect of sodium tungstate on bioenergy production using poultry waste

Dr. Chapol Kumar Roy (PL), Natasha Nafisa Haque, Dr. Mahmuda Begum, Dr. Md. Ahedul Akbor, Dr. Monarul Islam, Dr. Md. Zamilur Rahman, Dr. Md. Morshad Hasan Sarkar

Introduction:

Developed countries are beginning to explore the idea of a "circular economy" in order to minimize poultry waste (PW) and emissions and ensure the long-term viability of the planet. The key goals of this model are to recycle PW, improve the efficiency of anaerobic digestion process and replace the world's depleted fossil fuels. In particular, anaerobic digestion of PW will be important to extract bioenergy; therefore, there is still a strong need to improve anaerobic digestion using PW as a raw material with carbon neutral properties. Therefore, in this study, hydrolysis, acidogenesis, and methanogenesis steps were examined in the presence of sodium tungstate.

Objectives:

- Enhance bioenergy production from poultry waste
- Protect climate change from greenhouse gas generated by poultry waste

Work Progress:
- Sample collection and all other experiments are ongoing
- Protein and protease activity protocols are established
- Bioenergy (methane) analysis protocol already developed


Gel-run


qRT-PCR run

10. Integrated Biocontrol of Mosquito

Dr. Md. Zamilur Rahman, Dr. Md. Ahashan Habib, Dr. Nahid Sultana, Dr. Md. Murshed Hasan Sarkar, Nasim Ahmed, Natasha Nafisa Haque

Introduction:
Mosquitoes are ranked as the deadliest creature of the planet killing more than 7,25,000 humans per year. Mosquito control program is largely based on spraying commercial chemical insecticides which mainly aims to kill adult mosquitoes. Beside killing mosquitoes, they can also be toxic to other organisms including birds, fish and beneficial insects. Moreover, mosquitoes tend to grow resistance against these commercial insecticides. The R&D project aims at the development of an effective strategy for ecofriendly mosquito control using a combined approach through plant extract and microorganism.

Objectives:
The goal of this study is to develop an effective integrated biocontrol strategy for mosquito population control. This aim will be achieved by meeting the following objectives:
- Investigate the compatibility of different biocontrol agents with each other
- Investigate if immobilized biocontrol agents have increased efficacy against mosquito population

Work Progress:
- Compatibility test between Bti and Plant extracts has been completed
- Compatibility test between Bti and larvivorous fish has been completed
- Compatibility test between Plant extracts and larvivorous fish has been completed

11. Development of molecular biomarkers for antibiotic and heavy metal pollution in fish and their microbes

Dr. Mahmuda Begum, (PL), Dr. Mohammad Moniruzzaman , Dr. Nahid Sultana, Dr. Md. Humayun Kabir, Dr. Md. Murshed Hasan Sarkar, Shanzida Islam

Introduction:
The contamination of heavy-metals and antibiotics in aquaculture could impose a threat to microbial

flora by developing resistant bacterial strain which could have negative impact on the therapy of fish and human diseases. To date, only a few studies have focused on the impact of heavy-metal and antibiotic resistance development in the bacterial flora and fish of aquaculture. This study therefore, sets out to fill this gap by investigating the occurrence of metal and antibiotic resistance activity in fish. This project will provide a fundamental basis of antimicrobial drug surveillance system and residue monitoring of heavy-metal and antibiotics in fish.

Objectives:

- Analysis of heavy metals and antibiotic residue concentration in contaminated and exposed water, soil and fish body
- Determination of correlation of metal and antibiotic resistance genes expression levels and SNPs variation with metal-antibiotic residue
- Genetic analysis of metal and antibiotic resistance genes of those fish and their microbes to develop molecular biomarkers

Work Progress:

- In natural condition, water, soil and fish samples (gills, liver and muscle) were analyzed by using ICP-MS and found contamination of Cr, Cd, Pb etc. in higher concentration than the recommended dose of WHO
- Under experimental condition, Koi fish (Anabas testudineus) was exposed with three different doses of Cr mixed feed for 90 days period
- Another experiment has been completed on Tengra (Mystus bleekeri) for 90 days period to observe the residue of selective antibiotic (Tetracycline)

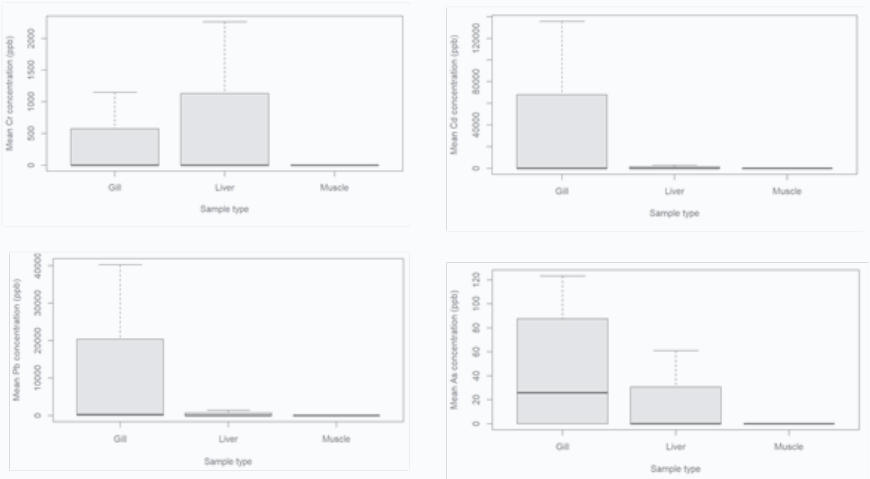


Fig.: Heavy metals (Cr, Cd, Pb and As) concentration (ppb) in different organs of fish samples collected from Turag and Dhaleshwari rivers as a natural source of contaminations.

12. Bio -remediation of fungi responsible for infestation of finished leather

Mst. Elina Akther Zenat (PL), Natasha Nafisa Haque, Mst. Nadira Begum, Dr. Md. Zamilur Rahman, John Liton Munshi, Kanish Fatema, Dr. Md. Abdulla-Al-Mamun, (Assistant Professor) ILET, DU

Introduction:

Leather is utilized in making a large number of trading commodities and it has gained one of the topmost foreign exchange earners. Bio-deterioration of leather by fungi is common during leather manufacture, finishing, storage, in use. Different microorganisms on leather vary according to storage conditions and presence of spores in the air of storage places. Fungi as spores and hyphae have become leading cause for bio-deterioration of leather products. The proteins, fats in the form of glycerides that are present in the leather is an ideal source of nutrients having a pH value around 4 that is required for fungal growth. Different species are growing on various leathers and the benefits of various fungicides and their ability to control mold species.

Objectives:
• Biological remediation of finished leather growing fungi using different bio-control agents

Work Progress:
• Different species of fungi isolated, Purified and identified maintaining suitable techniques from leather sample
• Crude extract has been done using by Methanol, n-Hexane, and Ethanol solvent
• The role of different plant extract in the removal of fungi evaluated in the laboratory conditions

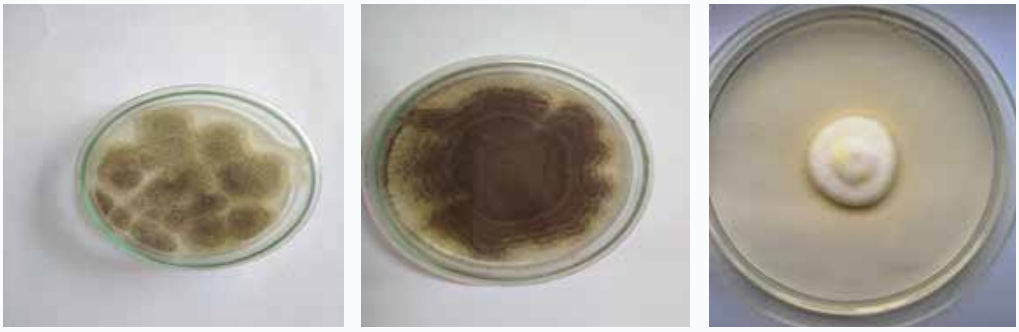


Fig.1: Isolated Fungi from Leather products

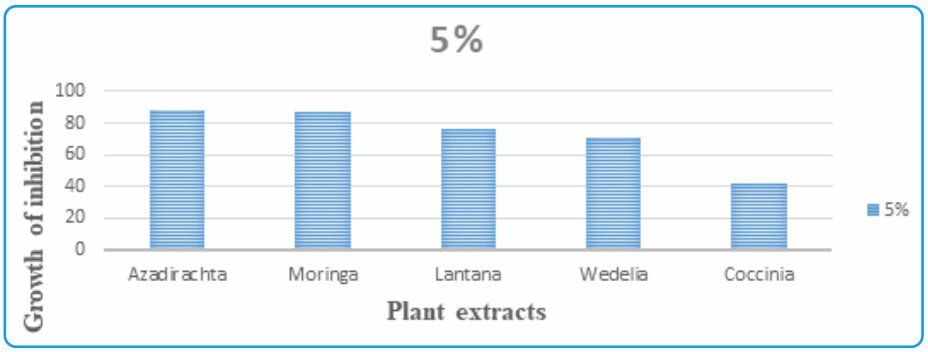


Fig. 2: Percent of growth inhibition of Aspergillus sp. by plant extracts at 5% concentration.

13. Assesing the effect of allantoin to improve the salt tolerance of *Oryza sativa and Solanun tuberosum*

Nasima Momtaz (PL), Amena Kibria, Dr. Md. Humayun Kabir, Dr. Tanjina Akhtar Banu, Dr. Md. Salim Khan, John Liton Munshi

Introduction:
Salinity is a major abiotic stress affecting plant growth and yield worldwide (Munns and Tester, 2008). Allantoin (5-ureidohydantoin or 5-ureidoacetolactam), a heterocyclic nitrogenous compound, is one of the intermediates of ureide metabolism in plants. Ureide compounds are generated from catabolism of purines and play an important role in plant nitrogen metabolism (Werner and Witte, 2011). These studies have shown that allantoin may be related to stress tolerance, but we still know very little about exogenous allantoin that helps plants cope with abiotic stresses.
In this research we want to study the effect of allantoin on plant growth and plants physiological changes.

Objectives:
• To reduce the impact of salinity on vegetable crop production
• To measure the yield and yield attributes of vegetative growth of crop under salt stress
• To quantify the effect of Allantoin on plant growth under saline soil

Work Progress:

- Stress tolerance level of potato plant on saline has been observed and optimized
- Application of Allantoin on MS media on potato plant has been successfully completed
- Observed germination, shoot and root growth of potato plants in MS media with different concentrated NaCl as well as Allantoin (Treatment)

Table 1 ; Shoot regeneration of potato in different treatments

Treatment	No. of explants inoculated	% of responsive explants	Days required of initiation	No. of Branches (After 21 days) Mean±SD	Length of Shoots (cm) (After 21 days) Mean±SD
S1	45	100	5-7	2.8±0.54	3.8±0.47
S1A1	45	100	5-7	5.5±1.31	5.995±0.58
S1A2	45	99	5-7	6.5±1.54	4.466±1.09
S1A3	45	100	5-7	5.184±1.3	4.44±1.15

Means containing the same letter do not differ significantly at 5% level of significance

Effects of Allantoin on 21 days Potato plants in MS media with NaCl , Here, S1 = 100 Mm NaCl ,S1A1 = 100 Mm NaCl+0.001 Mm Allantoin, ST-2 = 100 Mm NaCl+0.01 Mm Allantoin , ST-3 = 100 Mm NaCl+0.1 Mm Allantoin

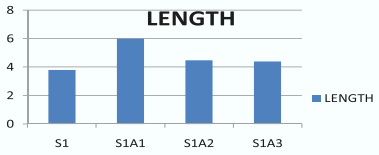


Fig 1 : Length of shoots (potato seedlings in different treatment

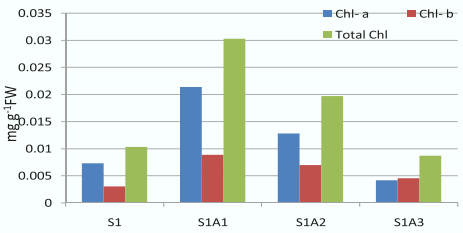


Fig 2 : Chlorophyll contents (potato seedlings) in different treatment

14. Microplastics contamination in agricultural soil and its adjacent environment in and around Dhaka city

Priyanka Dey Suchi (PL), Dr. Mohammad Moniruzzaman, Badhan Saha, Muhammad Saiful Islam, Afroza Parvin, Afsana Parvin

Introduction:

The term "micro plastics" was introduced in 2004 by Professor Richard Thompson, a marine biologist at the University of Plymouth in the United Kingdom. Plastics are commonly used in our daily life, and majority of the plastic products (approximately 99%) are discharged into the terrestrial environment following their usage. A recent study showed that the global plastic emissions could reach 53 Mt./year by 2030 of which around 79% would be landfilled or abandoned in the natural environment. In Bangladesh, the widespread use of single-use plastics and their indiscriminate disposal in residential areas, as well as poorly maintained landfills without waste separation methods, have been identified as primary and secondary sources of MPs in agricultural soil.

Objectives:

- To assess the presence of microplastics in some agricultural soils in and around Dhaka city
- To quantify the amount of microplastics in some agricultural soils in and around Dhaka city
- To determine the size, shape and types of microplastics with their distribution characteristics in soils.
- To visualize a comparative scenario of MP pollution among agricultural soils in and around Dhaka city.
- To find out the contamination level of microplastic in soil and its adjacent environment.

Work Progress:

- Samples collection and preparation have been completed
- Extraction of microplastics from soil and water has been accomplished
- Data collection and data interpretation are going on

Fig. 1: Sample collection from amin bazar landfill area

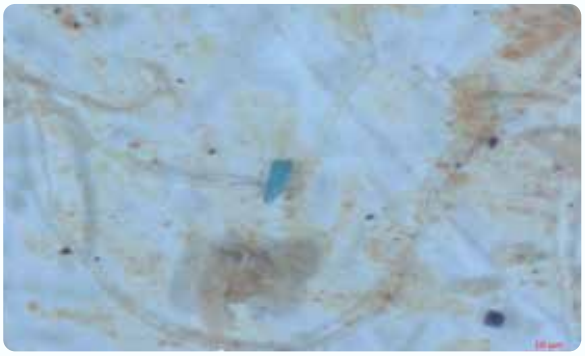


Fig. 2: Microscopic view of microplastics

15. Microbial Community and Differential Gene Expression Analysis of Chronic Obstructive Pulmonary Disease (COPD) in Bangladesh

Sanjana Fatema Chowdhury (PL), Dr. Md. Salim Khan, Dr. Shahina Akter, Dr. Md. Murshed Hasan Sarkar, Iffat Jahan, Showti Raheel Naser, Prof. Dr. Mohammed Atiqur Rahman, Md. Ibrahim Miah

Introduction:

Chronic obstructive pulmonary disease (COPD) is an irreversible airflow condition influenced by genes and the environment. It's a major cause of illness and death in low-income countries like Bangladesh. Understanding the respiratory microbiome's role in COPD could improve diagnosis and prediction. Microbiome analysis involves metagenomic sequencing to identify microorganisms and their genes. Studying the microbial community and COPD-related genes in our country is vital for diagnosis and treatment. We'll analyze COPD patients' sputum using NGS to find upregulated/downregulated genes and assess respiratory tract microbes. Blood samples will also be taken to study genetic mutations.

Objectives:

- To elucidate the microbial diversity and functional profiling of respiratory microbiota in healthy and diseased individuals
- To evaluate the correlation between differential gene expression with disease severity
- To identify the prevalent genetic mutations of COPD in Bangladeshi population

Work Progress:

- Laboratory experiment method has optimized by undergoing trial and error process
- Sputum and Blood sample collection of COPD and healthy individuals is done
- DNA and RNA extraction is completed of collected samples

16. Genomic and Transcriptomic Analysis of Pelvi-Ureteric Junction Obstruction (PUJO) in Children with Hydronephrosis in Bangladesh

Showti Raheel Naser (PL), Dr. Md. Salim Khan, Dr. Tanjina Akhtar Banu, Dr. Md. Murshed Hasan Sarkar, Barna Goswami, Sanjana Fatema Chowdhury, Prof. Dr. Mohammed Shadrul Alam, Dr. ABMM Khademul Islam

Introduction:

Pelvic ureteric junction obstruction (PUJO) is a congenital pediatric deformation that causes blockage of the kidney which decreases flow of urine down the ureter and swells it up leading to hydronephrosis. The lack of reliable biomarkers to differentiate PUJO from kidney dilation types limits the ability to predict corrective surgery and the development of specific therapeutic strategies. Again, PUJO is a frequent condition in Bangladesh where more than 1000 children are diagnosed with hydronephrosis annually. So, the aim of this project is to perform both RNA and whole genome sequencing of PUJO patients to identify biomarkers responsible for this deformation.

Objectives:

- To elucidate the differential gene expression profile of normal and diseased tissue of pelvi-ureteric junction obstruction (PUJO) patients
- To identify genetic variation (intron and exon) between healthy and diseased individuals
- To establish a relationship between the genomic and transcriptomic variation of pelvi-ureteric junction obstruction (PUJO) in Bangladeshi population

Work Progress:

- Sample collection and preparation have been completed
- DNA and RNA extraction were completed
- RNA sequencing has been completed
- Differential gene expression analysis is in progress

17. Bioremediation of Heavy metals in Industrial wastewater by using different species of microalgae and hydrophytes

Natasha Nafisa Haque (PL), Mst. Elina Akther Zenat, Dr. Md. Zamilur Rahman, Dr. Md Kamal Hossain, John Liton Munshi

Introduction:

Heavy metal discharge into the environment has become a rapid practice in technology and industrial processes. Heavy metal containing waste water are regarded as toxic to the aquatic environment. There are a number of agents used for bioremediation, among them, microalgae and hydrophytes present heavy metal ion binding. Both living and non-living microalgae are capable in the accumulation, elimination and biosorption of heavy metals. Alginate polymer in particular, has been extensively used for the removal of heavy metal from contaminated solutions. Immobilized algal biomass has been used in the removal of Chromium and Copper from textile wastewater. Aim is to use different types of microalgae and hydrophyte in bioremediation process of heavy metals resides in industrial wastewater.

Objectives:

- Collection and culture microalgae and hydrophytes.
- Collection of waste water sample and Wastewater treatment by consortium of microalgae and hydrophytes
- Minimization of waste water containing heavy metals by bioremediation process
- Analysis of heavy metal concentration

Work Progress:

- Sample collection from two rivers as natural source has been completed and related all other experiment has been done
- Wastewater treatment has been done by consortium of microalgae and hydrophytes.
- Some Physiochemical analysis of waste water samples has been done and some of them are still in progress

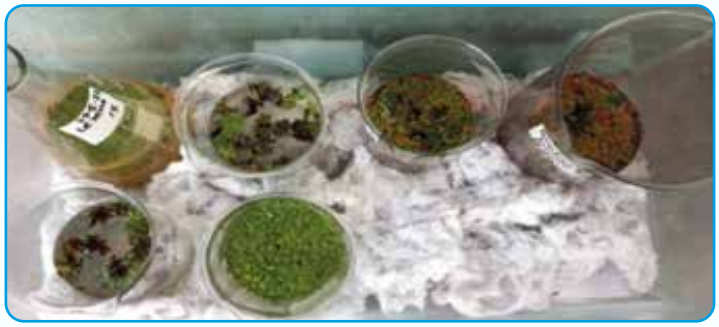
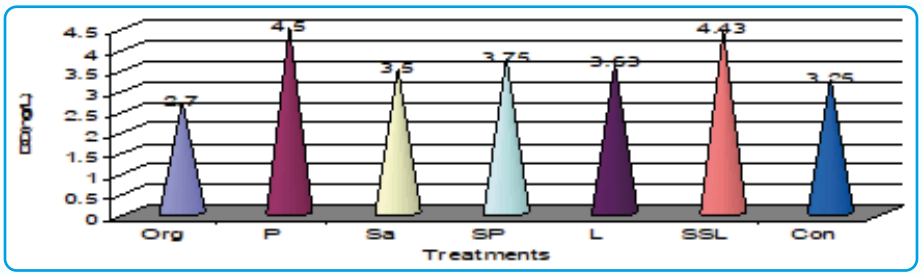


Fig. : Experimental setup



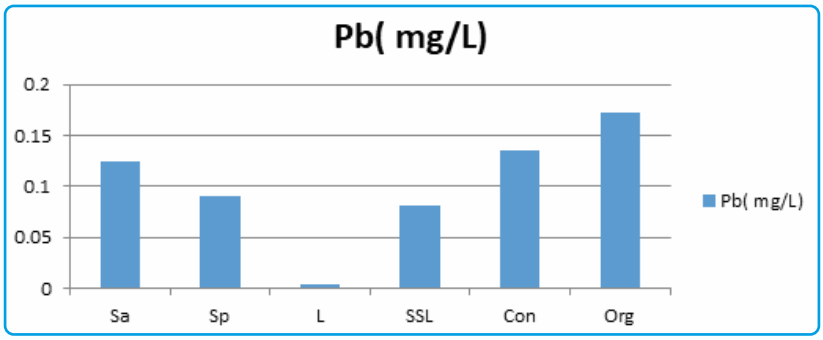


Fig. : Pb concentration in the wastewater after treatment with hydrophytes and cyanobacteria.

Special Allocation Projects:

01. Isolation and characterization of microbiome and their impact in agar formation within agarwood tree

Nahid Sultana (PL) and Nasima Momtaz

Introduction:

Agarwood is a primary source of agar. A. malaccensis is known to be one of the most important species of commerce and valued for its production of impregnated resinous heart wood that gives fragrance. In this study, about 14 fungi were isolated from the naturally infested agarwood tree and identified using taxonomic and molecular tools. A specific fungus Fusarium solani was induced within a branch of the tree. After four months of induction growth the fungus was grown within the tree and sweet fragrance and brown clouration was noticed after cutting into small pieces. It is proved that the characterization of fungus associated with agarwood tree is an important phenomenon to understand the technique of agar formation within the tree.

Objectives:

- To isolate and identify the microbes (bacteria, fungi) associated with agarwood tree
- To determine which factor is responsible for agar formation comparing the naturally infested tree with that of the tree where nailing was done
- To analyze the chemical components of agar oil extracted from the tree and strengthens the agar industry in Bangladesh ensuring good quality agar

Work Progress:

- Total 12 fungi were isolated from insect infested agarwood tree
- One specific fungi Fusarium solani supposed to be responsible for agar formation was induced within the tree to observe the infection intensity as well as resin formation
- After 4 months of inoculation the injected fungi were spread within the tree and a sweet fragrance was noticed with brown coloration.

02. Effect of sodium molybdate on bioenergy production using household waste through anaerobic digestion

Dr. Chapol Kumar Roy (PI), Mst. Nadira Begum

Introduction:

The project is designed to develop a bioenergy production technique from household waste for alternative energy compared to fossil fuels. Bangladesh is very rich in household waste. With 70% organic solid waste, the urban areas generate 23,688 tonnes of waste per day (Mostakim et al., 2021). Besides, waste production is growing rapidly, and the World Energy Council has projected that more than 6 million tonnes of waste will be produced every day by 2025 (WEC, 2016). Considering the present situation and future need the government takes various measures to solve these problems of extinction of bioenergy production as well as environmental protection.

Objectives:

- Development of an efficient method for the bioenergy production from household waste
- Protect environment through efficient management of household waste
- Industrialization of this project in large scale bio-energy will generate that can fulfill our energy demand which will be contribute in our economy

Work Progress:

- Sample collection and all other experiments are ongoing.
- Hydrolysis and acidogenesis stage analysis protocols are established.
- Bioenergy (methane, hydrogen) analysis protocol already developed.

Protein and protease analysis

Data analysis

03. Eco-friendly and sustainable mosquitocide from *Lysinibacillus* spp bacteria (MOST-SAFST 2022-23)

Dr. Md. Zamilur Rahman (PI) and Dr. Md. Ahashan Habib

Introduction:

Lysinibacillus is a gram-positive bacterium and have been widely used as a bio-agent in mosquito control programs for decades. It produces parasporal crystal proteins (Cry). Studies have demonstrated that, it can be used as environmentally-safe, effective and target specific biocide against mosquito. However, sensitivity of these biotoxins to external climate and ecological conditions such as sunshine, temperature as well as rainwater results in a short duration of efficacy. The special allocation project aimed at the development of an effective strategy for ecofriendly mosquito control using Immobilized Lysinibacillus spp. In polymeric matrices.

Objectives:

The goal of this study was to investigate if immobilized ***Lysinibacillus*** spp. Was effective for the mosquito population control.

Work progress:

The project is successfully completed and a completion report has been submitted to the Ministry of Science and Technology.

04. Development of molecular biomarker through identification of heavy metal resistance genes in fish for environmental bio-monitoring

Dr. Mahmuda Begum (PL) and Dr. Mohammad Moniruzzaman

Introduction:

Heavy metal is well-known pollutants due to their toxicity, persistence in the environment and bio-accumulative nature. Its accumulation in the heart, liver, gill bones and muscle not only damage the organ but also change the smell and taste of fish. There is a need to identify the specific gene such as metallothionein (MT) as metal resistance genes in fishes in different environmental condition. The development of a successful biomarker primarily based on RNA expression analysis to identify candidate genes in fish for metal pollution could be a sensitive tool for bio-monitoring purposes to assess the ecological risk for fish.

Objectives:

- Detection of heavy metal residue in contaminated water, soil and fish of Turag and Dhaleshwari rivers.
- Detection of putative heavy metal resistance genes from total RNA sequences in fish [Anabas testudineus (Koi)]
- Comparative analysis of heavy metal residue concentration in contaminated water, soil and fish to determine their correlation with metal resistance genes expression levels in gills, liver and tissue of fish

Work Progress:

- Sample collection from two polluted rivers as natural source of contamination has been completed
- Experimental exposure for Cr deposition has been done in Koi fish
- Chemical analysis of natural and experimental samples by using ICP-MS has been done
- RNA extraction (gill, liver and muscle) and primer design for selected candidate gene have been completed and are underway for RNA expression analysis

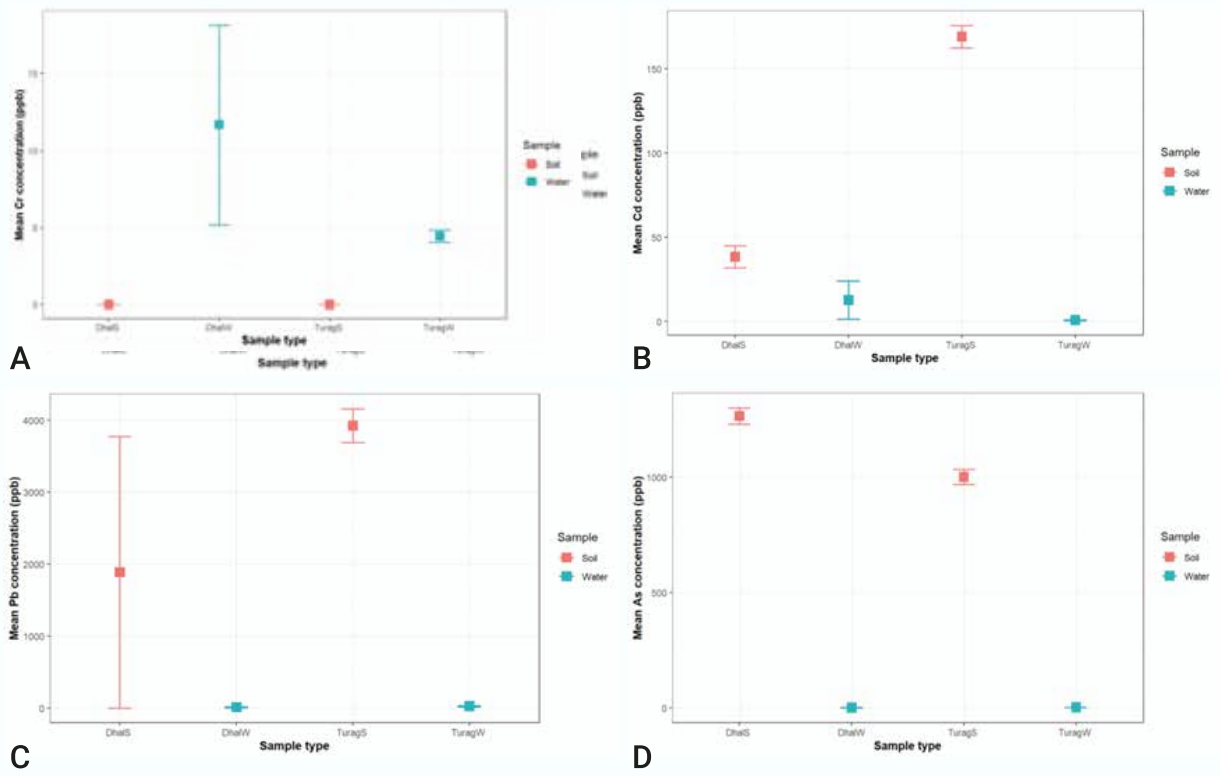


Fig.: Heavy metals (Cr, Cd, Pb and As) concentration (ppb) in soil and water samples of Turag and Dhaleshwari rivers as a natural source of contaminations.

05. Random amplified polymorphic DNA analysis of bacteria isolated from different drainage system

Dr. Shahina Akter and Showti Raheel Naser

Introduction

Drains serve as hubs for various microorganisms, including bacteria, viruses, protozoa, and sometimes fungi and algae. The bacterial composition in drain water can vary due to the use of different chemicals and laboratory materials. Autoclaving may not eliminate spore-forming and hyperthermophilic microorganisms, while UV radiation and chemicals can induce mutations. Comparing bacteria in laboratory and household drains, this research aims to uncover potential mutations resulting from chemical exposure. If mutant strains with drug resistance are identified, subsequent investigations will focus on developing new drugs to combat them, bridging the gap between laboratory and household drainage bacteria.

Objectives

- Isolation and identification of bacteria from different drainage systems
- Comparison of mutation in bacteria isolated from household and laboratory drainage system
- Mutation analysis by using bioinformatics tools
- Protein profiling of these bacteria
- Antibiotic resistance capability determination

Work progress:

- The study highlights the importance of monitoring and addressing mutations in laboratory drainage systems
- Mutations in laboratory drainage bacteria can lead to antibiotic resistance, increased virulence, and altered metabolic pathways

- Such mutations compromise antimicrobial treatment efficacy, posing risks to laboratory personnel and the community
- Recommend exploring the impact of mutations on other microorganisms and real-time monitoring technologies
- Continuous improvement ensures the long-term integrity and safety of laboratory drainage systems

06. Metagenomic Analysis to Understand the Microbial Diversity of Surface Water Quality in Dhaka City

Dr. Tanjina Akhtar Banu and Barna Goswami

Introduction

A surface water metagenomic study is a type of environmental metagenomics study that focuses on the microbial communities in surface water. This can help to improve water quality monitoring and surveillance, and to prevent the spread of waterborne diseases. Antibiotic resistance genes in surface water can be tracked by metagenomic studies. In the present study, a comprehensive metagenomic study has been conducted to understand the microbial community structure of two water bodies in Dhaka city namely Guriganga and Turag river. To the best of our knowledge, this is the first comparative microbiome study with a metagenomic approach to evaluating the taxonomic and functional potential two rivers of the Dhaka city.

Objectives

- To evaluate the structural microbiome of two river Buriganga and Turag at Dhaka city
- To analyze pathogenic bacteria
- To make a comparative association study between microbiome and physicochemical parameters of water in different seasons

Work progress:

- Water sample and genomic DNA has been extracted from the water samples of two season
- Physicochemical parameters in different seasons have been measured
- Sequencing of two water has been performed and metagenomic data analysis is going on

07. Phylodynamics and transcriptomic signature of Dengue viral infection in Bangladesh

Dr. Md. Murshed Hasan Sarkar, Mohammad Mohi Uddin

Introduction

The next-generation sequencing (NGS) technology facilitates in-depth study of host-pathogen metatranscriptome. The lack of a dengue disease animal model and the complex immune interaction in dengue infection hinders the study of host response and immunopathogenesis

Objectives

- To implicated phylodynamic and transcriptomic approaches through NGS technology to know/understand the dengue virus (DENV) origin and host response with dengue fever

Work progress:

- RNA was extracted from the serum samples of 3 healthy, and 21 dengue patients. The NGS data were custom performed at phylogenetic, phylodynamic, differential express gene (DEG), and gene ontology (GO) using respective bioinformatics tools
- Phylogenetic and phylodynamic analysis showed that the 2021 epidemic isolates were DENV-3 genotype-I and maintained as a new clade in compared to 2019 epidemic

Achievements and Activities

Published Paper

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31. Shamima Akhter Eti, Mohammad Saiful Islam, Jahid Hasan Shourove, Badhan Saha, Swapan Kumer Ray, Shahin Sultana, Md Aftab Ali Shaikh, Mohammad Mahbubur Rahman, "Assessment of heavy metals migrated from food contact plastic packaging: Bangladesh perspective", Heliyon, 2023.

Patent Submitted

1. Dr. Md. Aftab Ali Shaikh, Dr. Md. Murshed Hasan Sarkar, Dr. Md. Salim Khan, Dr. Md. Ahashan Habib, Dr. Shahina Akter, Dr. Tanjina Akhtar Banu, Barna Goswami, Iffat Jahan, Sanjana Fatema Chowdhury, Showti Raheel Naser, Dr. Chowdhury Rafiqul Ahsan, Md. Ibrahim Miah, Dr. Afzalun Nessa, Dr. Mohammed Atiqur Rahman and Dr. Sharfuddin Ahmed, " A process of Glycogen based Viral RNA extractionfor q-RT PCR submitted by the office of the Patents and Design and Trademarks, Motijheel, Dhaka. Date 02/03/2023
2. Md Kamal Hossain, Afroza Parvin, Afsana Parvin, Priyanka Dey Suchi, Badhan Saha, Mohammad Moniruzzaman, Samina Ahmed, Md Aftab Ali Shaikh, "Sulphanilic Acid Based on Spot Indicator for Detection of Arsenic in Water" submitted by the office of the Patents and Design and Trademarks, Motijheel, Dhaka. Date: 08.08.2022

Process Accepted

1. Md Kamal Hossain, Afsana Parvin, Priyanka Dey Suchi, Badhan Saha, Afroza Parvin, Mohammad Moniruzzaman, "Development of rapid and highly sensitive Iron detection kit in contaminated water before feeding to reverse osmosis membrane" accepted by Bangladesh Council of Scientific and Industrial Research. Date: 30.05.2023, Ref no-39.02.0000.043.37.928.22/351 dated 30.5. 2023

Scientist pursuing M.S/ M.Phil/ Ph.D courses in home or abroad:

1. Ruhul Amin, Senior Scientific Officer, Biological Research Division, Pursuing PhD degree from Charite, Germany.
2. Badhan Saha, Senior Scientific Officer, pursuing PhD at University of Dhaka, Bangladesh.
3. Mst. Nadira Begum, Senior Scientific Officer, Pursuing PhD in University of Dhaka.
4. Iffat Jahan, pursuing Ph.D University in Texas, USA

Industrial Tours/ Dissemination:

Industrial Tours:

Name of the Scientists and Designation	Place	Date
Dr. Mohammad Moniruzzaman, PSO Badhan Saha, SSO	PRAN Dairy Ltd. (PIP-I) and PRAN Dairy Ltd. (PIP-II)	24 May, 2023
Dr. Mohammad Moniruzzaman, PSO Badhan Saha, SSO	Mymensingh Agro Ltd.	25 May, 2023
Dr. Mohammad Moniruzzaman, PSO Badhan Saha, SSO	Agricultural Marketing Co. Ltd.	26 May, 2023
Dr. Mohammad Moniruzzaman, PSO Badhan Saha, SSO	PRAN Agro Ltd. (NAL) PRAN Agro Ltd. (PABL Unit 2)	27 May, 2023
Dr. Mohammad Moniruzzaman, PSO Badhan Saha, SSO	Rahimafrooz Batteries Limited	13 Sep, 2022

Dissemination:

Name and Designation	Name of the Institute	Date
Dr. Md. Zamilur Rahman, SSO	Tangail, Sakhipur	27-28November, 2022
John Liton Munshi, CSO	Rowangchori, Bandarban	22-23 December, 2022
Dr. Chapol Kumar Roy, SSO	Gagipur, Kaliyakoir	26-27 December, 2022
Dr. Md. Zamilur Rahman, SSO	Cumilla, Chouddogram	26-27 December, 2022
Dr. Md. Zamilur Rahman, SSO	Naogaon, Atrai	29-30 December, 2022
Dr. Chapol Kumar Roy, SSO	Noyakhali, Senbag	05-06 January, 2023
John Liton Munshi, CSO	Rangamati, Naniarchot	12-13 January, 2023
Dr. Chapol Kumar Roy, SSO	Pirojpur, Vandaria	12-13 January, 2023
Dr. Chapol Kumar Roy, SSO	Khagrachari, Mahalchari	15-16 January, 2023
Dr. Chapol Kumar Roy, SSO	Cox's Bazar, Pekuya	19-20 January, 2023
John Liton Munshi, CSO	Pabna, Vangura	02-03 February, 2023
John Liton Munshi, CSO	Raigonj, Serajgonj	09-10 February, 2023
Dr. Chapol Kumar Roy, SSO	Narial, Sadar	11-12 May, 2023
Dr. Md. Zamilur Rahman, SSO	Hobiganj, Baniachong	18-19 May 2023
Dr. Chapol Kumar Roy, SSO	Rangpur (Shador)	25-26 May, 2023
Natasha Nafisa Haque, RC	Dhaka, Nababjong	01-02 June, 2023
Dr. Md. Zamilur Rahman, SSO	Laxmipur, Raipur	4-5 June, 2023
Natasha Nafisa Haque, RC	Gopaljong, Kashiany	15-16 June, 2023
Dr. Chapol Kumar Roy, SSO	Narayangong, Rupjong	18-19 June, 2023
Dr. Chapol Kumar Roy, SSO	Kishorjong, Methamoin	22-23 June, 2023

Guidance to Research Work (PhD/M.Phill /M.S/NCST & BCSIR Fellow):

Sl. No.	Title of Research	Research Catagory	Name of Student	University / Institute	Supervisors in BCSIR
01.	Impact of Fine and ultra-fine Particulate Matter and Toxic gases on Public Health at Urban Park Area in Dhaka City	M.S	Sunnyraaz Paul	Department of Environmental Science and Technology, JUST	Dr. Mohammad Moniruzzaman, PSO
02.	Characterization and assessment of silica and heavy metal pollution in the ambient air of Dhaka city: implications for human health	M.S	Md. Nazmul Islam Nahin	Department of Chemistry, University of Dhaka	Dr. Mohammad Moniruzzaman, PSO
03.	Assessing the implications of heavy metal pollution and microplastic contamination from plastic recycling factories on environment and human exposure in Kamrangirchar, Dhaka	M.S	Zubayer Islam	Department of Chemistry, University of Dhaka	Dr. Mohammad Moniruzzaman, PSO
04.	Assessment of heavy metals, water soluble inorganic ions and levoglucosan emissions from burning of municipal solid waste in Dhaka and their associated health risks	M.S	Nafiz Iftekhar	Department of Chemistry, University of Dhaka	Dr. Mohammad Moniruzzaman, PSO
05.	Occurrence, distribution, ecological and human health risk of trace metals in Prawn (Macrobrachium rosenbergii) aquaculture in Bangladesh	M.S	Bulbul Ahmed	Department of Fisheries, University of Dhaka	Dr. Mohammad Moniruzzaman, PSO
06.	Nutritional profiling of alien Suckermouth catfish (Pterygoplichthys pardalis) and the assessment of water quality parameters: Insights from Buriganga river, Bangladesh	M.S	Taslim Ahmed	Department of Fisheries, University of Dhaka	Dr. Mohammad Moniruzzaman, PSO
07.	Nutritional profiling of alien Suckermouth catfish (Pterygoplichthys pardalis) and the assessment of water quality parameters: Insights from Buriganga river, Bangladesh	M.S	Md. Imran Hossain	Department of Oceanography, University of Dhaka	Dr. Mohammad Moniruzzaman, PSO

08.	Assessing molecular diversity of sediment-dwelling macroinvertebrates and their responses to heavy metal deposition in a river ecosystem of Bangladesh	M.S	Sadia Islam	Department of Zoology, University of Dhaka	Dr. Mohammad Moniruzzaman, PSO Dr. Mahmuda Begum. SSO
09.	Metal Contamination of major estuary in Bangladesh: A base line study and mitigation	Research Fellow	Fahima Islam	BCSIR Labs Dhaka	Dr Md Kamal Hossain, PSO
10.	Source Identification and abortion of metals near Pharmaceuticals Industry	M Phil	Sharmin Lisa	Bangladesh University of Engineering and Technology (BUET)/ IFST	Dr Md Kamal Hossain, PSO
11.	Ecological and health Risk assessment of fishes in industrial Contaminated Water in Bangladesh	MS	Md. Mahamudul Hasan Khan	Bangladesh University of Engineering and Technology (BUET)	Dr Md Kamal Hossain, PSO
12.	Bioaccumulation of heavy metals toxicity in fruits in Industrial Areas	MS	Farzana Yesmin	Bangladesh University of Engineering and Technology (BUET)	Dr Md Kamal Hossain, PSO Afroza Parvin, SSO
13.	Heavy metal accumulation in water, sediment, and bivalves in Saint Martin Island in Bangladesh	MS	Kaushik Das Karmakar	Dhaka University	Dr Md Kamal Hossain, PSO
14.	Nutrient Profile of Small Indigenous Species with and without Bone: Amino acid, fatty acid, and micronutrients.	MS	Rafikul Islam	Noakhali Science and Technological University	Dr Md Kamal Hossain,PSO
15.	Antibiotic Resistant Profiling of some Bacteria isolated from Different Laboratory Drainage System	MS	Saidul Islam	Jagannath University	Dr. Shahina Akter, PSO
16.	Immunoinformatics Approach for PspA Epitope-Based Vaccine Design and Confirmation of Predicted Epitopes in a Plasmid Vector	MS	Lincon Mozumder	Jagannath University	Dr. Shahina Akter, PSO
17.	Metagenomic analysis and physico-chemical parameters as well as antimicrobial resistance study in different water reservoirs in Dhaka division: Comparison between dry and rainy seasons	MS	Murshida	Jagannath University	Dr. Tanjina Akhtar Banu, PSO

18.	Assessment of Physico-chemical Properties & Pollution Indices of Some Agricultural Soils of Pirgacha Upazila, Rangpur, Bangladesh	M.S	Md. Amir Hossain	University of Dhaka	Badhan Saha, SSO
19.	Developing a sustainable technology for Tubifex worm culture	Professor Nurul Afsar Post Graduate Fellowship	Ismat Jahan	University of Dhaka	Dr. Nahid Sultana, SSO
20.	Effects of environmental toxicity on cultured shrimp, fish, and poultry collected from different regions of Bangladesh	Research Fellow	Anika Tabassum	BCSIR	Dr. Chapol Kumar Roy, SSO
21.	Effects of ZnO Nanoparticles on the growth of microalgae Spirulina platensis and Chlorella vulgaris	M.S	Nasrin Sultana	Jahangirnagar University	Dr. Chapol Kumar Roy, SSO
22.	Experimental evaluation of hydrocarbon degradation of diesel oil by using Chlorella vulgaris and Spirulina platensis	MS	Sabikun Naher	Bangladesh University of Professionals	Dr. Chapol Kumar Roy, SSO
23.	Efficiency of microalgae in removing heavy metals (Pb, Cr) and nutrients (P, N) from red-category industrial effluents	MS	Era Juliet Das	Bangladesh University of Professionals	Dr. Chapol Kumar Roy, SSO
24.	Development of molecular biomarker for heavy metal pollution targeting metallothionein gene in selected four fishes from different environmental condition	Professor Nurul Afsar Post Graduate Fellowship	Ishrat Jahan	University of Dhaka	Dr. Mahmuda Begum, SSO
25.	Development of molecular biomarker for antibiotic in selected fish and their microbes	Research Fellow	Atia Shanjida Shormi	University of Dhaka	Dr. Mahmuda Begum, SSO
26.	Ass Assessing molecular diversity of sediment-dwelling macro-invertebrates and their responses to heavy metal deposition in a river ecosystem of Bangladesh	MS (NCS Fellow)	Sadia Islam	University of Dhaka	Dr. Mahmuda Begum. SSO Dr. Mohammad Moniruzzaman, PSO

27.	Assessing biochemical, microbial and genetic changes in fish in response to antibiotic exposure	M.S	Kaniz Fatema Barsha	University of Dhaka	Dr. Mahmuda Begum, SSO
28.	Assessment to biochemical, microbial and genetic changes in fish in response to heavy metal exposure	M.S	Salahun Amira	University of Dhaka	Dr. Mahmuda Begum, SSO Dr. Mohammad Moniruzzaman PSO
29.	Screening for potential probiotic properties of isolated Entercoccus sp. From healthy human gut and their whole genome analysis	M.S	Fariha Jannat	NSTU	Dr. Md. Murshed Hasan Sarker, SSO
30.	Metatranscriptomic profiling of Sputum microbiome in Bangladeshi COPD patients with varying disease severity	M.S	Abu Hasib Lipu	University of Dhaka	Sanjana Fatema Chowdhury, SO
31.	Isolation and characterization of a Biosurfactant-producing and Hydrocarbon-degrading Pseudomonas aeruginosa from suckermouth catfish	M.S	Md. Rakibul Hasan	Jagannath University	Showti Raheel Naser, SO

Participation in Training /Conference:

Training:

1. Mohammad Moniruzzaman (PSO), participated in the training program as a trainer on "Inductively Coupled Plasma Mass Spectrometry (ICPMS)" held on 12-16 February, 2023 at Bangladesh Council of Scientific and Industrial Research.
2. Badhan Saha (SSO), participated in the training program as a trainer on "Inductively CoupledPlasma Mass Spectrometry (ICPMS)" held on 12-16 February, 2023 at Bangladesh Council of Scientific and Industrial Research.
3. Badhan Saha (SSO), participated in the training program on "Different techniques of R&D dataanalysis and their applications" held on 26 June, 2023 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
4. Badhan Saha (SSO), participated in the training program on "Operation and maintenance of FT-MIR-NIR spectrometer" held on 14-18 May, 2023 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
5. Badhan Saha (SSO), participated in the training program on "Different Techniques of R&D DataAnalysis and their Applications" held on 26 June, 2023 at Bangladesh Council of Scientific and Industrial Research (BCSIR).
6. Dr. Nahid Sultana (SSO), participated in a training program on "Different Techniques of R&D Data Analysis and their Applications" held on 26 June, 2023 at BCSIR Laboratories, Dhaka.
7. Dr. Nahid Sultana (SSO), participated in a training program on "Learning Session on Patent drafting & Industrial Process" held on 24 May, 2023 at BCSIR Laboratories, Dhaka.

8. Dr. Mahmuda Begum (SSO), participated in a Training program on "Liquid Chromatography with Tandem Mass Spectrometry (LC-MS/MS)" held in CARF, BCSIR, Dhaka from 09-13th April, 2023.
9. Dr. Mahmuda Begum (SSO), participated in a Training program on "Basic Principle, Application and maintenance of Raman Spectroscopy" held in Dhaka Laboratories, BCSIR, Dhaka on 14th December, 2022.
10. Afroza Parvin (SSO), participated in the training program on "Operation and maintenance of Gas Chromatography" held on 30 October, 2022 - 03 November, 2022 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
11. Barna Goswami (SSO), participated in training on "Different Techniques of R&D Data analysis and their applications", held on 26 June, 2023.
12. Barna Goswami (SSO), participated in training on "Ethics in conducting research &developing Activates", held on 07 November, 2022.
13. Afsana Parvin (SO), participated in the training program on "Basic principle, application and maintenance of XRD" held on 15 December, 2022 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
14. Afsana Parvin (SO), participated in the training program on "Inductively Coupled Plasma Mass Spectrometry (ICPMS)" held on 12-16 February, 2023 at Bangladesh Council of Scientific and Industrial Research.
15. Afsana Parvin (SO), participated in the training program on "Operation and maintenance of FT-MIR-NIR spectrometer" held on 14-18 May, 2023 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
16. Shanzida Islam (SO), participated in a training program on "Learning Session on Patent drafting & Industrial Process" held on 24 May, 2023 at BCSIR Laboratories, Dhaka.
17. Priyanka De Suchi (SO), participated in the training program on "Different Techniques of R&D Data Analysis and their Applications" held on 26 June, 2023 at Bangladesh Council of Scientific and Industrial Research (BCSIR).
18. Priyanka De Suchi (SO), participated in the training program on "Operation and Maintenance of FT-MIR-NIR Spectrometer" held on 14-18 May, 2023 at Bangladesh Council of Scientific and Industrial Research (BCSIR).
19. Priyanka De Suchi (SO), participated in the training program on "Operation and Maintenance of Gas Chromatography-Mass Spectrometry (GC-MS)" held on 15-19 January, 2023 at Bangladesh Council of Scientific and Industrial Research (BCSIR).
20. Sanjana Fatema Chowdhury (SO), participated in "Special Foundation Training Course for Non-Cadre Officers", held on 24 July – 21 September 2022.
21. Sanjana Fatema Chowdhury (SO), participated in "Global Training Course – Antimicrobial Resistance in Bacterial Pathogens (Asia), Bangkok", held on 19 - 24 February 2023.
22. Sanjana Fatema Chowdhury (SO), participated in training on "Operation and maintenance of High-Performance Liquid Chromatography (HPLC)", held on 07 – 11 May 2023.
23. Showti Raheel Naser (SO), participated in a training program on "R for Data Analytics" organized by the Institute of Statistical Research and Training (ISRT), University of Dhaka, 02-27 August, 2022.
24. Showti Raheel Naser (SO), participated in a training program on "Learning Session on Patent drafting" held on 26 September, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

Conference:

1. Mohammad Moniruzzaman (PSO), participated in "International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022)" organized by the Forest and Environment Affairs sub-committee of the Bangladesh Awami League at University of Dhaka held on 02-04 September, 2022 as an an invited lecturer and presented lecture on "Seasonal Variation of PM2.5 and PM10 Bound Polycyclic Aromatic Hydrocarbons in Urban Roadsides of Dhaka, Bangladesh: Source Apportionment and Health Risk Assessment".
2. Mohammad Moniruzzaman (PSO), participated in "BCSIR Congress-2022" organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) from 01-03 December, 2022 as an invited

lecturer and presented lecture on "Traffic influenced the respiratory deposition of particle bound metals and polycyclic aromatic hydrocarbons over Dhaka, Bangladesh: Source apportionment and risk assessment".

3. Dr. Shahina Akter (PSO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment Affairs Sub-Committee Bangladesh Awami League 2-4 September 2022 and presented an oral presentation entitled "In Silico Designing of an Epitope based Vaccine against SARS-CoV-2 Reverse Vaccinology and 'Imnunoinformatics."
4. Dr. Shahina Akter (PSO), participated in BCSIR Congress -2022 organized by BCSIR 01-03 December 2022 and presented an invited lecture entitled Reverse vaccinology: "An immunoinformatics approach to epitope-based vaccine design against SARS-CoV-2 in Bangladeshi patients".
5. Dr. Tanjina Akhtar Banu (PSO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment Affairs Sub-Committee Bangladesh Awami League 2-4 september 2022 and presented an oral presentation entitled "CRISPR –CAS System Regulated Antibiotic Resistance of Acinetobacter baumanni "
6. Dr. Tanjina Akhtar Banu (PSO), participated in BCSIR Congress -2022 organized by BCSIR 01-03 December 2022 and presented an oral presentation entitled "Isolation and identification of Xanthomonas bacteria from various plant source for the production of Xanthum gum"
7. Badhan Saha (SSO), participated in "BCSIR Congress-2022" organized by Bangladesh Council ofScientific and Industrial Research (BCSIR) from 01-03 December, 2022 and presented an oral presentation on "Relevance of selenium content in soil, water and edible plant to arsenicosis disease in some arsenic affected areas of Bangladesh".
8. Badhan Saha (SSO), participated in "International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022)" organized by the Forest and Environment Affairs sub-committee of the Bangladesh Awami League at University of Dhaka held on 02-04 September, 2022 and presented an oral presentation entitled "Relevance of selenium content to arsenicosis disease in some arsenic affected areas of Bangladesh".
9. Badhan Saha (SSO), participated in "The 1st International Conference on Nano-bio and Advance Materials Engineering (NAME-2023)" organized by Jashore University of Science and Technology, Bangladesh, held in Cox's Bazar, Bangladesh held on 07-08 January, 2023 and presented a poster presentation entitled "Arsenic and Selenium content in some arsenic-affected areas of Bangladesh and their possible relevance with arsenicosis disease".
10. Dr. Chapol Kumar Roy (SSO), Attended and delivered oral presentation in the International Conference on Environmental Protection for Sustainable Development (ICEPSD)-2022, held on 2-4 September 2022.
11. Dr. Chapol Kumar Roy (SSO), Attended and delivered oral presentation in the 1st International Conference on Nano-bio and Advanced Materials Engineering (NAME-2023), held on 7th -8th January 2023.
12. Dr. Md. Zamilur Rahman (SSO), Participated in International Conference on Environment Protection for Sustainable Development organized by Forest and Environment Affairs Sub-Committee, Bangladesh Awami League on 01-03 December 2022 and presented a paper entitled 'Immobilization of microbial cells: A promising tool for eco-friendly bio-control of mosquito'.
13. Dr. Md. Zamilur Rahman (SSO), Participated in BCSIR Congress-2022 organized by Bangladesh Council of Scientific and Industrial Research on 01-03 December 2022 and presented a poster entitled 'Evaluation of Larvicidal Efficacy of Some Botanicals Against Aedes aegypti (L.)'
14. Dr. Nahid Sultana (SSO), participated in "BCSIR Congress-2022" organized by Bangladesh Council of Scientific and Industrial Research held on 01-03 December, 2022 and presented a poster entitled "Isolation of Fungus from Insect Infested Agarwood Tree and Their Identification".
15. Dr. Nahid Sultana (SSO), participated in the "International Conference on Environmental Protection for Sustainable Development (ICEPSD)-2022" organized by Forest and Environment Affairs Sub-Committee of Bangladesh Awami League held on 2-4 September 2022 and delivered an oral presentation entitled "Microplastics in Some Freshwater Wild and Farmed Fish Species of Bangladesh".
17. Dr. Mahmuda Begum (SSO), participated in the "International Conference on Environmental

Protection for Sustainable Development (ICEPSD)-2022" organized by Forest and Environment Affairs Sub-Committee of Bangladesh Awami League held on 2-4 September 2022 and delivered an oral presentation entitled "Water chemistry variation promotes adaptive radiation in three-Spined stickleback (G. aculeatus)"

18. Dr. Mahmuda Begum (SSO), participated in the "5th Young Scientist Congress-2022" organized by Bangladesh Academy of Science (BAS) held on 25-27 November 2022 and delivered an oral presentation entitled "Association of genetic markers with parasitic infection in fish".
19. Dr. Mahmuda Begum (SSO), participated in "BCSIR Congress-2022" organized by Bangladesh Council of Scientific and Industrial Research held on 01-03 December, 2022 and delivered an oral presentation entitled "Effects of water chemistry on the skin microbiome of Three-Spined stickleback fish".
20. Dr. Md Murshed Hasan Sarkar (SSO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment Affairs Sub-Committee Bangladesh Awami League 2-4 september 2022 and presented an oral presentation entitled "IfnY Inhibits Th2 cell Proliferation through Down Regulation of GF11 gene Expression"
21. Dr. Mousona Islam (SSO), participated in BCSIR Congress -2022 organized by BCSIR 01-03 December 2022 and presented an poster presentation entitled "Positive and negative control of abscisic acid signaling by Raf-like protein kinase and group A PP2C"
22. Afroza Parvin (SSO), participated in "International Conferences on Environmental Protection for Sustainable Development (ICEPSD-2022)" organized by Forest and Environment Sub-committee of Bangladesh Awami League at the University of Dhaka held on 2-4 September 2022 and presented an oral presentation entitled "Trace Metal Removal from Industrial Wastewater by the Application of Indigenous Humic Substance".
23. Afroza Parvin (SSO), participated in "BCSIR Congress-2022" organized by Bangladesh Council of Scientific and Industrial Research held on 01-03 December, 2022 and presented an oral presentation entitled "Effect of Humic Substance for the Reduction of Heavy Metal Uptake in Herbaceous Plant".
24. Afroza Parvin (SSO), participated in "The 1st International Conference on Nano-bio and Advance Materials Engineering (NAME-2023)" organized by Jashore University of Science and Technology, Bangladesh, held in Cox's Bazar, Bangladesh held on 07-08 January, 2023 and presented a poster presentation entitled "Zinc Removal from Waste water by using Humic Substance Extracted from Khulna Peat".
25. Barna Goswami (SSO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment Affairs Sub-Committee Bangladesh Awami League 2-4 september 2022 and presented an poster presentation entitled "Emergance of SARS- CoV-2 variant of Interest B.1.525 (Eta) in Bangladesh"
26. Barna Goswami (SSO), participated in BCSIR Congress -2022 organized by BCSIR 01-03 December 2022 and presented an oral presentation entitled "Detection of germline variants of BRCA1/BRCA2 genes in Bangladeshi breast cancer patients"
27. Afsana Parvin (SO), participated in "BCSIR Congress-2022" organized by Bangladesh Council of Scientific and Industrial Research held on 01-03 December, 2022 and presented an oral presentation entitled "Adsorptive Removal of Lead from Aqueous Solutions Using Chemically Modified Green Coconut Shell Powder".
28. Afsana Parvin (SO), participated in "International Conferences on Environmental Protection for Sustainable Development (ICEPSD-2022)" organized by Forest and Environment Sub-committee of Bangladesh Awami League at the University of Dhaka held on 2-4 September 2022 and presented an oral presentation entitled "Speciation of Heavy Metals as Influenced by Organic Matter Application in Contaminated Agricultural Soils".
29. Afsana Parvin (SO), participated in "The 1st International Conference on Nano-bio and Advance Materials Engineering (NAME-2023)" organized by Jashore University of Science and Technology, Bangladesh, held in Cox's Bazar, Bangladesh held on 07-08 January, 2023 and presented a poster presentation entitled "Effect of applied organic matter on the chemical speciation and potential mobility of heavy metals in contaminated agricultural soils"

30. Priyanka Dey Suchi (SO), participated in "BCSIR Congress-2022" organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) from 01-03 December, 2022 and presented an oral presentation on "Alleviation of Arsenic in Soil Using Selected Indigenous Sources of Biochar Produced at High Temperature".
31. Priyanka Dey Suchi (SO), participated in "International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022)" organized by the Forest and Environment Affairs sub-committee of the Bangladesh Awami League at University of Dhaka held on 02-04 September, 2022 and presented an oral presentation entitled "Soil arsenic mitigation using selected indigenous biochar sources produced at different pyrolysis temperatures".
32. Priyanka Dey Suchi (SO), participated in "The 1st International Conference on Nano-bio and Advance Materials Engineering (NAME-2023)" organized by Jashore University of Science and Technology, Bangladesh, held in Cox's Bazar, Bangladesh held on 07-08 January, 2023 and presented a poster presentation entitled "Arsenic Reduction in Soil Using Selected Indigenous Biochar Sources Produced at Different Pyrolysis Temperatures".
33. Sanjana Fatema Chowdhury (SO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment Affairs Sub-Committee Bangladesh Awami League 2-4 september 2022 and presented an oral presentation entitled "Host Pathogen interaction of different cohorts of Bangladeshi COVID-19 patients:an unbiased Metatranscriptomic apparoach".
34. Sanjana Fatema Chowdhury (SO), participated in BCSIR Congress -2022 organized by BCSIR 01-03 December 2022 and presented an oral presentation entitled "Differential gene expression and immune signaling of different cohorts of Bangladeshi COVID-19 patients"
35. Showti Raheel Naser (SO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment Affairs Sub-Committee Bangladesh Awami League 2-4 september 2022 and presented an oral presentation entitled "Identification of Biosynthetic Gene Cluster for Secondary Metabolites through Genome Mining of Different Bacillus Species"
36. Showti Raheel Naser (SO), participated in BCSIR Congress -2022 organized by BCSIR 01-03 December 2022 and presented an oral presentation entitled "Bacillus: A source of novel secondary metabolies".

Awards:

1. Dr. Tanjina Akhtar Banu (PSO), got best presenter award in gCEPSD-2022 Conference.
2. Barna Goswami (SSO), got best poster award in gCEPSD-2022 Conference.

Number of Analytical (Ad-Hoc) Problem Solved:

Name of the Division	Routine Type	Research Type	Total
Biological Research Division	1145	28	1173

Special contribution to Nations

1) BCSIR-COVID Kit

The COVID-19 detection kit used in Bangladesh for the detection of SARS-CoV-2 virus is completely import dependent. To reduce import dependency, Genomic Research Laboratory of BCSIR has developed the BCSIR-COVID Kit for the first time in the country using its own technology and expertise. It has received manufacturing approval from the Directorate General of Drug Administration (DGDA). BCSIR-COVID Kit is at par with other kits available in the market and cost-effective as well. As a result, COVID-19 detection costs will be reduced to a great extent and it will be possible to provide service at approximately 250 BDT. BSMMU has already started to use BCSIR-COVID Kit for the COVID-19 detection among the Bangladeshi patients.

BCSIR-COVID Kit

Inaugural ceremony for the use of BCSIR-COVID Kit by BSMMU

Press briefing of BCSIR-COVID Kit

2) Environment monitoring activities on metro-rail (DMRT) and other projects

Soil and Environment Research section is under the Biological Research Division, established in 2010 through the ADB Projects. This is comparatively very new but highly potential section in BCSIR Laboratories Dhaka. From the very beginning this section is closely work with Government mega projects. This section is always very conscious to full-fill the dream of government election manifesto. This section assesses the in-situ air quality as an independent monitoring team (IMG) of Dhaka Mass Rapid Transport (DMRT) projects and another preferential mega project of Government extension of 3rd Terminal of Dhaka International airport. This section also assesses the indoor air quality of various multinational factories like Rahim Afroz, Globatt, Pran RFL, Titas Gas field and various cement factories.

Air quality monitoring at different construction sites of Dhaka Mass Rapid Transit

Photo Gallery

Major Instruments

NGS Machine room (NovaSeq6000, NextSeq500, MiniSeq, Microarray Iscan, hybridization station)

Atomic Absorption Spectrophotometer (AAS)

Technology Dissemination

Rowangchori, Bandarban

Rowangchori, Bandarban

Vangura, Pabna

Raigonj, Serajgonj

Short Biography of BRD Scientists

John Liton Munshi (February, 1997 - Present)

Office	Biological Research Division	Blood Group	A (+Ve)
Position	Chief Scientific Officer	Degree Obtained	M.S. (1988)
Contact	john_liton@yahoo.com	Mobile	01711 933465
Paper	25 Process 03	Patent	01

John Liton Munshiearned his both BSc and MS degree in Botany from the University of Dhaka. He is specialized in Bio-technology, Industrial algae farming & its bi-products. He has authored or coauthored 25 publications. He is a life member of BAS, BAAS, and NITUB. Now, he is scientists in charge of Biological Research Division since 2016.

Dr. Md. Salim Khan (June, 1997- present)

Office	Biological Research Division	Blood Group	B+
Position	Chief Scientific Officer	Degree obtained	PhD (2006)
Contact	k2salim@yahoo.com	Mobile	01712201504

Dr. Md. Salim Khan completed MSc in Genetics 1989 from Rajshahi University and he completed his M.Phil degree from the University of Dhaka in 1996. Dr. Khan working in BCSIR, as a Scientific Officer since 1997 till present as Cheif Scientific Officer. His research areas are Biotechnology, Genomics and Molecular Biotechnology. He achieved Ph.D degree in Biotechnology specially on Tissue Culture and Virus and viriod detection in 2006, Dhaka University under DAAD Sandwich Program, Hamburg University, Germany. He has been working on in vitro regeneration, potato virus dectetion, molecular biology and genome sequencing for more than 25 years.

Dr. Mohammad Moniruzzaman (June, 2006 - present)

Office	Soil and Environment Research Section, Biological Research Division	Blood Group	B+
Position	Principal Scientific Officer	Degree Obtained	PhD (Environment, 2018)
Contact	monirbcsir@gmail.com monir-swe@bcsir.gov.bd	Mobile	01816702021
Citation 752	25 h index 13	i10 index 20	

Dr. Mohammad Moniruzzaman awarded Ph.D. degree from University of Dhaka in 2018. He got Bangabandhu Fellowship on Science & ICT for his doctorate research. He worked as a Program Director of Annual Development Program (ADP) funded by Ministry of Science and Technology in 2010. Dr. Moniruzzaman worked as a consultant for Clean Air and Sustainable Environment (CASE) Project, Department of Environment, funded by World Bank from 2017 to 2019. He is now working as a Head of Independent Monitoring Group for Environment monitoring and mitigation measure of Dhaka Mass Rapid Transit Development Project (DMRT) and Hazrat Shahjalal International Airport Expansion Project. His current research mainly focused on the GIS, Air Quality Modeling, Microplastic pollution and Environmental Impact Assessment (EIA). His credit to publish more than 52 papers in internationally reputed journal.

Dr. Md Kamal Hossain (June, 2006 - Present)

Office	Biological Research Division	Blood Group	A+
Position	Principal Scientific Officer	Degree obtained	Ph.D. (Chemistry, 2015)
Contact	kamalbcsir@gmail.com	Mobile	01799590184
Citation 340	H - index 12	i10 - index 13	

Md. Kamal Hossain earned his Bachelor of Science (Hons) and a Master of Science (MS) degree in Soil, Water, and Environment from the University of Dhaka and his Ph.D. in Chemistry from Sogang University in Seoul, South Korea, with professor Kyung Byung Yoon (KB Yoon). Dr. Hossain's Ph.D. dissertation is titled "Order Uniformly Crystalline Mesoporous TiO2 Polymorphs and Periodic Mesoporous Organosilicas (PMOs): Novel Synthesis, Characterization, and Photocatalytic Activity. He is credited with publishing more than 38 peer-reviewed papers, four patents, and four industrial processes, serving as a reviewer for the prestigious journals Nature Scientific Report, Environmental Science and Pollution Research, Environmental Geochemistry and Health, and MDPI (Biology, Land, and Sustainability), as well as completing some prestigious training courses on ISO/IEC 17025:2017: Understanding the Course of Lab Accreditation for ISO/IEC 17025:2017. His credits go to the operation and maintenance of AAS, BET, XRD, UV-VIS, NIR, AQMS, FESEM, WD-XRF, PL, and HR-TEM. From August 2019 to November 2019, he had been working as a visiting scientist at CSIRO, Melbourne, Australia, with Prof. Miao Chen (a professor at RMIT University and principal investigator at CSIRO, Melbourne, Australia). He has been working in the Bangladesh Council of Scientific and Industrial Research since June 2006 as a Scientific Officer; in August 2011, he was promoted to Senior Scientific Officer; and in 2019, he was promoted to Principal Scientific Officer. His research interests are in material chemistry, climate change, the blue economy, solar cells, wastewater treatment, homogeneous catalysis, lithium-ion batteries, nanomaterials, and pollution. Dr. Hossain is also a member of the environmental air pollution control independent monitoring group (IMG) of the Dhaka Mass Rapid Transport Authority (DMRTA) and Hazarat Shajalal International Airport extension projects, and he has completed four special grant projects from the Ministry of Science and Technology, Government of Bangladesh. Dr. Hossain is also a professional member of the American Chemical Society (3224699), the Dhaka University Alumni Association (LM-15578), a life member of the Dhaka University registered graduate (LM-2017033595), EDAPHOS, LM-313, the Chinese Chemical Society, INGSA, the BCSIR Scientist Association, the Bangladesh Crystallographic Association, and the Bangladesh Academy of Science.

Dr. Ahashan Habib (June, 2006 - Present)

Office	Biological Research Division	Blood Group	O+
Position	Principal Scientific Officer	Degree obtained	PhD (2014)
Contact	ahashan73@yahoo.com	Mobile	01711206709

Dr. Md. Ahashan Habib has completed his BSc and MS degree from Department of Botany, University of Dhaka. He obtained his PhD degree from Department of Botany, University of Dhaka in 2014. Dr. Habib working in BCSIR, as a Scientific Officer since 2006 to present as Principal Scientific Officer. His research areas are Biotechnology, Genomics and Molecular cytogenetics. He is skilled in molecular techniques like PCR, Real Time PCR, Cloning, chromosome karyotype analysis etc. Till now he has supervised 4 MS thesis student and has published 38 scientific articles in many national and international journals.

Dr. Shahina Akter (June 2006 - Present)

Office	Biological Research Division	Blood Group	O+
Position	Principal Scientific Officer	Degree Obtained	PhD (2018)
Contact	shupty2010@gmail.com	Mobile	01724096941

Dr. Shahina Akter has passed his BSc and MS degree from Department of Botany, University of Dhaka. She obtained her PhD degree from Department of Microbiology, University of Dhaka. She had the opportunity to work at Plant Biotechnology in UAS Bangalore, Karnataka, India. She has attended on many training program national and internationally. She got a training program on "Bioinformatics Training Course" at Senate Building, University of London, UK. She attended a training program on Molecular Biotechnology, jointly organized by University of Texas at Austin and the City University of New York, USA and Department of Botany, University of Dhaka. She has achieved RTFDCS fellowship, given by CCSTDS, Chennai, India and Bangabandhu Fellowship on Science and Technology. Dr. Shahina has more than 17 years research experience on Biotechnology, Genomics and Bioinformatics (Human Whole Genome, Metagenomics, Covid 19 whole genome sequencing), Microbiology, Molecular Biology, and Cytogenetics. Till now she has supervised 8 MS thesis research and has published 47 scientific articles in many national and international journal of repute.

Dr. Tanjina Akhtar Banu (2006-Present)

Office	Biological Research Division	Blood Group	B+
Position	Principal Scientific Officer	Degree Obtained	PhD (2018)
Contact	tanzinabcsir@yahoo.com	Mobile	01847161626

Dr. Tanjina Akhtar Banu has completed her BSc and MS degree from Department of Botany, University of Dhaka. She obtained her PhD degree from Department of Botany, University of Dhaka in 2018. She has several years of experience in plant biotechnology especially on recombinant DNA technology and genetic transformation, Genomics and Bioinformatics. She had opportunity to attend a training program on "Bioinformatics Training Course" at Senate Building, University of London, UK. She has joined in BCSIR in 2006 as Scientific officer. Now she is working in Genomics Research Laboratories, BCSIR as a Principal Scientific Officer. Till now she has supervised 8 MS thesis student and has published 32 scientific articles in many national and international journals.

Badhan Saha (December, 2009 - present)

Office	Biological Research Division	Blood Group	
Position	Senior Scientific Officer	Degree Obtained	B+
Contact	badhan_swe@yahoo.com	Mobile	MS, PhD (On going)
			01911102565

Badhan Saha earned his BSc and MS degree in Soil, Water & Environment from the University of Dhaka. He worked as a research assistant at Bangladesh-Australia Centre for Environmental Research (BACER-DU) from 2006 to March 2008 and worked as a Program associate of an Annual Development Program (ADP) from July 2009 to June 2010. Now he is doing his PhD program at the University of Dhaka. The main research interest is the assessment and mitigation process of contaminants in the environment (soil, water, and air) as well as in the food chain. He has authored or co-authored 42 publications and gets 558 citations (h-index: 11, i10-index: 12). He has three accepted processes and one submitted patent. He is a life member of EDAPHOS, NITUB, BAAS, SSSB, and NAPD.

Dr. Nahid Sultana (December, 2009 -present)

Office	Zoology Section, Biological Research Division	Blood Group	A+
Position	Senior Scientific Officer	Degree obtained	PhD (2021)
Contact	nahid.bcsir@gmail.com	Mobile	01847235694
Paper	19	Process	1

Dr. Nahid Sultana earned her both BSc and MS degree in Zoology from the Department of Zoology, University of Dhaka. She obtained PhD Degree on "Relationship between plankton population and the survival of epidemic Vibrio cholerae in Bangladesh" from the Department of Zoology, University of Dhaka. She was awarded Bangabandhu Fellowship on Science and Technology for conducting her PhD work. She had experiences for working in Infectious Disease Division, ICDDR'B with a joint program of Maryland University, USA and University of Dhaka. She had published 19 research articles in different National and International Journals. Her research interest on Applied Zoology, Molecular Ecology and Environmental Biology. She is a life member of Bangladesh Association for the Advancement of Sciences (BAAS) and Zoological Society of Bangladesh (ZSB).

Dr. Chapol Kumar Roy (2009-Present)

Office	Biological Research Division	Blood Group	O+
Position	Senior Scientific Officer	Degree obtained	PhD (2022)
Contact	chapolbcsir2012@gmail.com	Mobile	01714219710

Dr. Chapol Kumar Roy passed his BSc and MS degree in botany (Plant biotechnology) from the University of Rajshahi. He obtained his PhD degree from Department of Biological Functions and Engineering, Graduate School of Life Science and Systems Engineering, Kyushu Institute of Technology, Japan under the supervision of professor Dr. Toshinari MAEDA. His research is mainly focused on bio-energy production from bio-solid, analysis of microbial community and function. He had the opportunity to work at microbial community analysis in KIT, Fukuoka, Japan. He has attended on many trainings program national and internationally. He has achieved Bangabandhu Fellowship on Science and Technology. Dr. Roy has more than 12 years research experience on Biotechnology, Microbiology, Growth analysis of Microalgae and Fungi, and Molecular Biology. Till now he has supervised 2 MS thesis research and has published 13 scientific articles in many national and international repute journals.

Mst. Nadira Begum (2006-Present)

Office	Biological Research Division			Blood Group	O+
Position	Senior Scientific Officer			Degree obtained	M.S. (2002)
Contact	nbegum470@gmail.com			Mobile	01679259177
Paper	22	Process	02	Patent	–

Mst. Nadira Begum earned her both BSc and MS degree in from Department of Botany, University of Dhaka. Currently she is pursuing her PhD in Department of Botany, University of Dhaka. She is specialized in Mycology, Plant Pathology ,Microbiology and Algae culture. She has authored and coauthored 22 publications.

Dr. Md. Zamilur Rahman (July, 2006 -present)

Office	Biological Research Division		Blood Group	O+	
Position	Senior Scientific Officer		Degree obtained	PhD (2018)	
Contact	jewel.haidar@gmail.com		Mobile	01913465003	
Paper	15	Process no.	03	Patent nos.	-

Dr. Md. Zamilur Rahman earned his PhD in Biological Sciences from University of Rajshahi. His research is mainly focused on Industrial Micropropagation & Bioprocessing. He is a life member of Bangladesh Botanical Society, BAPTC and BAS. At present, he is working in Applied Botany Section of Biological Research Division.

Dr. Mahmuda Begum (June, 2011- present)

Office	Zoology Section, Biological Research Division		Blood Group	A+
Position	Senior Scientific Officer		Degree obtained	PhD (2021)
Contact	mahmudabegum.bcsir@gmail.com		Mobile	01721313869
Paper	18 + 2 book chapters	Process	0	

Dr. Mahmuda Begum is currently working as a Senior Scientific Officer at the Zoology Section, BCSIR Laboratories, Dhaka. She obtained her BSc (Hons.) and MS degree in Zoology (Fisheries) from the University of Dhaka. She received her PhD in Life Science from the University of Nottingham, UK in 2021. She was awarded the Vice-Chancellor's Scholarship for Research Excellence, UN, UK and Bangabandhu S & T Fellowship, Bangladesh to accomplish her PhD degree. Dr. Mahmuda's research interest mainly focuses on evolutionary genetics, molecular ecology, genotoxicity, developmental biology (Zebra fish) and biotechnology as well as aquaculture, fish microbiology and nutrition. Her current research projects concern the DNA barcoding, breeding line development of a model fish, development of molecular biomarker in fish and their microbes for different environmental pollutants. She is an active member of FSBI, BSP, BAAS and ZSB.

Dr. Md. Murshed Hasan Sarker (2011-Present)

Office	Biological Research Division		Blood Group	A+
Position	Senior Scientific Officer		Degree obtained	PhD (2017)
Contact	murshedhasan-raj@bcsir.gov.bd		Mobile	01715717691
Paper	18 + 2 book chapters	Process	0	

I have completed my B.Sc. and M.S from Department of Microbiology, University of Dhaka. I also did my Ph.D. from Chiba University, Japan. I was a visiting student in late William E. Paul labs, National Institute of Allergy and Infectious. Diseases (NIAID) lab, National Institute of Health, Bethesda, Maryland from Date 22 October 2013 to 21 November. I am serving as a Scientific Officer at Bangladesh Council for Science and Industrial Research (BCSIR) Laboratories, Rajshahi from 1 July 2011 to till date. I have been promoted as a Senior Scientific Officer Bangladesh Council for Science and Industrial Research (BCSIR). I had served as Research Officer at International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR,B) from October 05, 2010 to June 30, 2011 in the Enteric & Food Microbiology under the Laboratory Sciences Division.

Dr. Mousona Islam (2011-Present)

Office	Biological Research Division	Blood Group	A+
Position	Senior Scientific Officer	Degree obtained	PhD (on going)
Contact	mousonaislam@yahoo.com	Mobile	-

Mousona Islam completed her BSc and MS degree from Department of Botany, University of Dhaka. She obtained her PhD from Saitama University, Japan specialization on Plant Stress Physiology. She has several years of experience in plant biotechnology especially on recombinant DNA technology and genetic transformation, cytogenetics and bioinformatics. She had an opportunity to attend a training program on "Bioinformatics Training Course" at Senate Building, University of London, UK. She joined at BCSIR in 2011 as Scientific officer. She has co-supervised many MS thesis students and has published 18 scientific articles in many national and international journals.

Mst. Elina Akther Zenat (February,2013- present)

Office	Biological Research Division		Blood Group		O+
Position	Senior Scientific Officer		Degree obtained		M.S. (2011)
Contact	elinazenat@gmail.com		Mobile		01710181071
Paper	07	Process	-	Patent	-

Mst. Elina Akther Zenat earned her both BSc and MS degree in Botany from the National University. She is specialized in Michology and Algae Culture. She has coauthored 07 publications.

Afroza Parvin (July, 2015- present)

Office	Biological Research Division	Blood Group	B+
Position	Senior Scientific Officer	Degree obtained	MS
Contact	afrozaparvinbcsir@gmail.com	Mobile	01727270015

Afroza Parvin earned her BSc and MS degree in Soil, Water and Environment from the University of Dhaka. She has joined in BCSIR in 2015 as Scientific officer and promoted to Senior Scientific officer in 2020. Her research interest is mainly focused on environmental chemistry, environmental remediation technologies, waste management and mitigation, air pollution monitoring and mitigation measure, environmental impact assessment etc. She has authored or coauthored 12 (ten) research articles in peer reviewed journals, two accepted process and one submitted patent. She is a life member of Registered Graduate University of Dhaka (Reg No. 2022041889), EDAPHOS.

Barna Goswami (2015-Present)

Office	Biological Research Division	Blood Group	A+
Position	Senior Scientific Officer	Degree obtained	M.S.
Contact	barnagdu@gmail.com	Mobile	01725577063

Barna Goswami has passed her BSc and MS degree from Department of Botany, University of Dhaka (Plant Biotechnology group). She has joined in BCSIR in 2015 as Scientific officer. Her research interest is focused on Genomics, Bioinformatics, Plant Genetic Transformation (biotic stress tolerant crop), Molecular Biology and Plant Tissue Culture (specially rare and endangered plant). She got a training program on "Bioinformatics Training Course" at Senate Building, University of London, UK. She has attended on many training program national and internationally. She has experience on various molecular techniques like PCR, Real Time PCR and Next generation sequencing (NGS). Till now she has published 37 scientific articles in many national and international journal of repute.

Iffat Jahan(2015-Present)

Office	Biological Research Division	Blood Group	AB+
Position	Senior Scientific Officer	Degree obtained	M.S.
Contact	iffatjahan.ifst@bcsir.gov.bd	Mobile	+88056810752

Iffat Jahan has earned both BSc and MS degree in Biochemistry and Molecular Biology from the University of Dhaka. She has works as Research Assistant (2013) in Molecular Biology Lab of University of Dhaka under Prof. Haseena Khan. She has also worked as Research fellow (2014-2015) in Centre for Advanced Research in Sciences (CARS), University of Dhaka. She has joined in BCSIR in 2015 as Scientific officer of regarding field. She has research experience in molecular biology and skilled in basic molecular techniques like Sanger's sequencing, Real Time PCR, Cloning and Next generation sequencing (NGS). Her research focus is understanding the molecular mechanism of tumorigenesis. She has authored or coauthored 8 publications. She is a life time member of BSBMB (Bangladesh Society of Biochemistry and Molecular Biology), National Young Academy of Bangladesh (NYAB).

Afsana Parvin (October, 2018 - Present)

Office	Biological Research Division	Blood Group	A+
Position	Scientific Officer	Degree obtained	MS
Contact	afsanajamy@gmail.com	Mobile	01521203840

Afsana Parvin earned her BSc and MS degree in Soil, Water and Environment from the University of Dhaka. Throughout her academic life, she achieved several awards and scholarships e.g., Dean's Award-2012, Abdus Salam Memorial Gold Medal-2012, The Gold Medal Award-2014, etc. Her research is mainly focused on environmental remediation technologies, air pollution monitoring, and mitigation measures, environmental impact assessment, waste management approaches, etc. Currently, she is working on three R & D projects. She has submitted one patent. She has authored or co-authored 2 publications in scopus indexed international journals. She has one accepted industrial process. She is a life member of EDAPHOS.

Shanzida Islam (December, 2018 - Present)

Office	Zoology Section, Biological Research Division	Blood Group	A+
Position	Scientific Officer	Degree obtained	MS
Contact	shanzida.shanzi@gmail.com	Mobile	01815005733
Paper	09	Process	0

Shanzida Islam earned her both BSc and MS degree in Zoology from the Jagannath University. She is specialized in Fisheries. She has authored or co-authored 9 publications in different National and International Journals. Her research interest on Fish Biology. She is a life member of NITUB, Zoological Society of Bangladesh.

Nasima Momtaz (October, 2016 - Present)

Office	Biological Research Division	Blood Group	O+
Position	Research Chemist	Degree obtained	M.S. (2016)
Contact	nmlucky05@gmail.com	Mobile	01922920642

Nasima Momtaz earned his both BSc and MS degree in Botany from National University. She has 5+ years of experience assisting and overseeing research project involving plant physiology & biochemistry, Mycology and Biotechnology. She has authored or coauthored of 04 publications. She is a life member of Bangladesh Botanical Society (BBS).

Priyanka Dey Suchi (March, 2021 - Present)

Office	Biological Research Division	Blood Group	A+
Position	Scientific Officer	Degree obtained	MS
Contact	Priyanka_suchi@yahoo.com	Mobile	01865018673

Priyanka Dey Suchi earned BSc and MS degree in Soil, Water & Environment from University of Dhaka. She worked as a Research Fellow in Soil and Environment section at BCSIR from the year of 2015 to 2019. During this tenure she worked under two R&D projects. Currently she is working on microplastic contamination in soil, water along with airborne microplastics. Her research interests are Microplastic contamination/plastic pollution, Arsenic mitigation, Heavy metals remediation, Air Pollution mitigation, Environmental Impact Assessment. She authored or coauthored 5 publications. She has submitted one patent. She has one process. She is life time member of EDAPHOS.

Sanjana Fatema Chowdhuray (2021 - Present)

Office	Biological Research Division	Blood Group	B+
Position	Scientific Officer	Degree obtained	M.S.
Contact	sanjanafatema18@gmail.com	Mobile	01517162172

I hold a B.Sc. and an MS degree in Genetic Engineering and Biotechnology, complemented by a concurrent second major in CSE from Shahjalal University of Science and Technology. My academic journey also includes serving as a RA on a UGC-funded project within my department. Currently, I lead as the president of the ISCB RSG-Bangladesh and hold memberships in International Society for Computational Biology (ISCB) and American Society of Microbiology. My skill set encompasses bioinformatics, microbial genomics, molecular biology techniques, etc. I've enriched my knowledge through offline and online training programs, covering programming languages, drug design, and AMR. Moreover, I've contributed to seven publications in esteemed international and national journals.

Showti Raheel Naser (2021-Present)

Office	Biological Research Division	Blood Group	B+
Position	Scientific Officer	Degree obtained	M.S.
Contact	showtirnaser@gmail.com	Mobile	01914207437

I have completed my BS and MS degree from Department of Genetic Engineering and Biotechnology, University of Dhaka. I have started my journey in Bangladesh Council of scientific and Industrial Research (BCSIR) as Scientific Officer from 15th November, 2021. I have research experience in molecular biology, genetics, microbial techniques and skilled in several basic molecular techniques. I also have working experiences with animal model.

Nizam Uddin (January, 2023- Present)

Office	Biological Research Division	Blood Group	O+
Position	Scientific Officer	Degree obtained	M.S.
Contact	nijam1997@gmail.com	Mobile	01818796087

I am Nizam Uddin, completed a BSc and an MS degree from Department of Microbiology, University of Dhaka. In 2023, I joined in BCSIR as Scientific officer. My research exposure was commenced in M.Sc thesis & especially on the entitled topic 'Characterization of Oil Degrading Bacteria Isolated from Oil Contaminated Soil, Dhaka city, Bangladesh'. Alongside with that, I gathered a bit of experience on conventional PCR, growth optimization, biofilm, biosurfactant study & WGS library preparation.

Natasha Nafisa Haque (November, 2018 - Present)

Office	Biological Research Division			Blood Group	O+
Position	Research Chemist			Degree obtained	M.S. (2014)
Contact	Natashahaque86@gmail.com			Mobile	01768442798
Paper	1	Process	-	Patent	-

Natasha Nafisa Haque earned his both BSc and MS degree in Botany from the National University. She is specialized in Industrial algae farming & its bi-products. She has coauthored 01 publication.

Mohammad Mohi Uddin (2019 - Present)

Office	Biological Research Division	Blood Group	B+
Position	Research Chemist	Degree obtained	M.S.
Contact	mohiuddin.bcsir48@gmai.com	Mobile	01812330948

Mohammad Mohi Uddin has completed both BSc and MS degree in Botany from the Nation University. He has joined in BCSIR in 2019 as Research Chemist of regarding field. He has research experience in Biotechnology like tissue culture and skilled in molecular techniques like PCR. He has attended on some conference program national and internationally. He has authored or coauthored 3 publications.

Chemical Research Division (CRD) is one of the major research divisions of BCSIR Dhaka Laboratories. The main purposes of this division are to explore the natural resources of the country. Production of chemicals, both organic & inorganic, synthesis (organic & inorganic), herbs processing's & herbal products, waste management from chemicals and other industries as well as development of processes of products from industrial wastes, production of different kinds of gum and adhesives from indigenous sources raw materials are also the objectives of this division. A Synthesis Laboratory is started in this division. Synthesis is creating new substances with diverse biological applications, such as anti-bacterial and anti-fungal activities, anti-tumor, anti-cancer, anti-oxidant, anti-inflammatory activities and other therapeutic and medicinal properties. Chemical research division is now focusing on synthesis of different types compounds for industrial uses.

- Number of Scientists: 12
- Total ongoing R&D: Ten (09), MOST Special allocation: One (01)
- Analytical Services: 410

Research Areas & Short Description on R&D:

The R&D activities of CRD are being carried out on production of chemicals from indigenous natural sources, industrial chemicals, gum and adhesives, production of sugars from various natural resources, production of various industry essentials (OLED materials and API synthesis) through organic synthesis. Important methods development from this category such as: Phosphate and carbonate-based fire extinguishing powder, production of chitin and chitosan from shrimp waste shell, production of curcumin from turmeric, methyl and ethyl salicylate, liquid detergent, liquid hand wash, Ultrasound gel, Zinc Acetate, Lead Acetate etc.

R&D project:

1. Synthesis of biological active chitosan-derivatives as natural preservatives (Phase-1)

Md. Monarul Islam, Shyama Prosad Moulick, Rashedul Islam, Fajilatun Nesa, Md. Hemayet Hossain, Mohammad Mahbubur Rahman, Abhijit Chowdhury and Trisha Paul

Introduction:

Chitosan of β (1→ 4) linked 2-amino-2-deoxy-β-Dglucopyranose (N-acetylglucosamine) (Figure 1), is a

second a bundant polysaccharide obtained by alkaline deacetylation of chitin. Chitosan has gained much attention because of its satisfying properties as non-toxic, biocompatible and biodegradable. Schiff bases of chitosan can be easily obtained by the reactions of the free amino groups of chitosan with an active carbonyl compound such as aldehyde or ketone. Chitosan-Schiff bases (CSB) provide several possible applications, such as protection of chitosan C-2 amino groups, enhancing the adsorption/complexation properties of the biopolymer yielding a material with potential analytical and environmental applications.

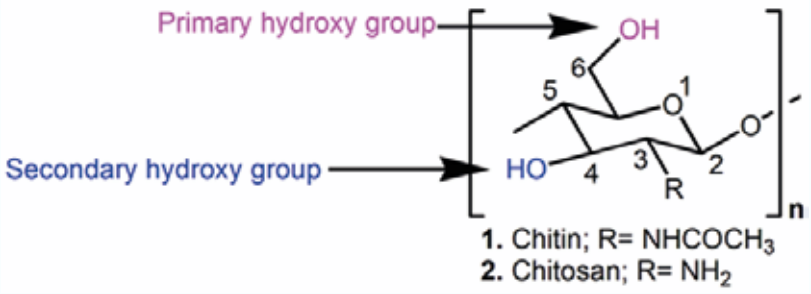

Fig.: General structure of chitin and Chitosan.

Objectives:

- Production chitosan based derivatives from local shrimp processing waste
- To study the antimicrobial and anti-oxidant activity of the prepared chitin and chitosan based derivatives against specific microbs or fungi
- Study the effect of chitosan based derivatives on the Shelf Life of fruits, vegetables and fish

Work Progress:

- Ortho-hydroxy and para-hydroxy based Schiff-base derivatives of chitosan are prepared and confirmed by FTIR
- Carboxymethyl-based chitin and chitosan derivatives were synthesized and published one paper

2. Synthesis, molecular docking and DFT computational studies of diamine and pyrimidine-based Schiff-base derivatives

Md. Monarul Islam, Shyama Prosad Moulick, Mohammad Mahbubur Rahman, A. H. M. Shofiul Islam Molla Jamal, Abhijit Chowdhury, Dipa Islam

Introduction:

Schiff-bases are important class of organic compounds which have wide applications in many biological aspects. Schiff-bases have been reported to play very important role in many biological and chemical reactions, due to the presence of the imine linkage. Schiff bases are of significant attention because of their chemistry and potentially of assistance biological activity, such as antitumor, anticancer, antifungal, and antimicrobial activity. As an electrophile, the Schiff-bases group is widely used in many types of organic reactions such as reduction, addition, condensation, and cycloaddition and also in multicomponent reactions.

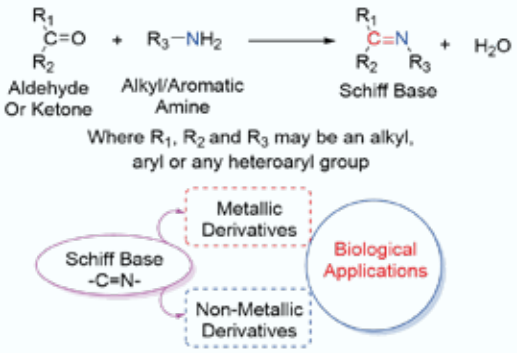

Fig.: Schematic illustration of the formation of Schiff-bases

DFT computational studies are carried out to investigate the HOMO-LUMO and optimized energy, structure using Gaussian 09 program package.

Objectives:

- Synthesis and optimization of Schiff-base derivatives
- To study the antimicrobial and anti-oxidant activity of the synthesized Schiff-base derivatives
- DFT computational study and molecular docking

Work Progress:

- Six acetophenone-based chalcones were synthesized
- Pyrimidines derivatives were synthesized
- DFT computational studies are going-on

03. Current status of macro- and microplastic pollution in Bangladesh: Impact and recycling

Muhammad Saiful Islam (PL), Md. Rashed Hasan, Zahidul Islam, Swapan Kumer Ray, Shahin Sultana, A.H.M. Shofiul Islam Molla Jamal

Brief Description:

The uses of plastic materials are increasing exponentially in every aspects of our life. Due to a number of superior thermo-mechanical properties, plastics have found their all-around applications. The uses of plastic-items have given us an easy sourcing of materials and a comfortable life-style. However, they have created a new problem due their non-biodegradable nature as well as for improper management. The waste plastics are detrimental for soil fertility, flora and fauna of the rivers as well of the seas. They cause deadlock into the sewerage lines, make piles of wastes on river bed, and exist in the nature for years. Microplastics (MPs) are another emerging contaminant of concern. They entered into the environment as microbeads, microfibers and pellets. They also formed in the environment from macroplastic items by the action of UV radiation, weathering effects, wear & tear, and microbes.

Objectives:

- To evaluate macro- and microplastics in different environmental compartments
- To investigate mechanical and chemical recycling of plastic waste
- To study the conversion of waste plastics into their respective monomers/basic chemicals

Work Progress:

- Investigation of microplastics in surface water and sediment of the Buriganga River, Sea salts from the Cox's Bazar coastal area, soils in a flood prone area, and the three largest drinking water treatment plants in Bangladesh have been completed
- Evaluation of the effects on quality of terephthalic acid prepared by depolymerization of post-consumer recycled polyethylene terephthalate (PET) through the repeated use of sulfuric acid hydrolysis liquor has been completed
- Conversion of waste poly (bisphenol A) carbonate to its monomer(s) by acid catalyzed hydrolysis is ongoing

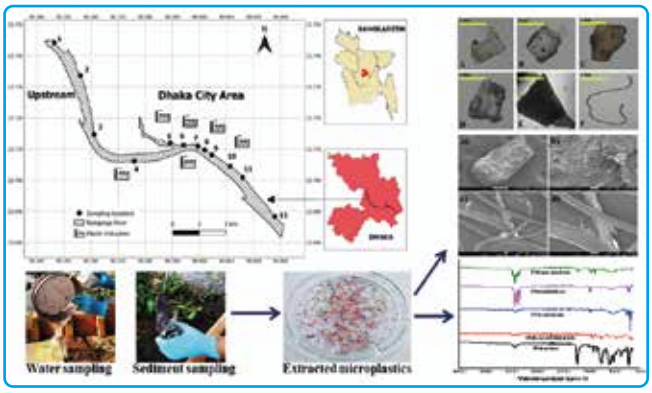

Fig.: Evaluation of microplastics (MPs) in the surface water and sediment of the Buriganga River

04. Preparation of natural antioxidants from indigenous sources (*Phyllanthus emblica, Moringa oleifera, Ficus racemosa, Ceriops decandra*) for use in food & cosmetic industries

Khondoker Shahin Ahmed (PL), Md. Hemayet Hossain, Ferdoushi Jahan, Nushrat Jahan Ethane, Mahmuda Hakim, Mohammad Mahbubur Rahman, Dr. Md. Murshed Hasan Sarkar, Muhammad Abdullah Al-Mansur

Introduction:

Antioxidant is a new type in naturopathy and at present it has huge demand in food supplementation, cosmetic and pharmacological industry. It reduces cell damages caused by free-radical which are responsible for various ailments like ageing, cancer, coronary heart disease, diabetes mellitus, atherosclerosis, cataracts, neurodegenerative disorders and inflammation. Natural antioxidants are mainly found in plants as Polyphenols. Polyphenols especially, flavonoids and other phenolic compounds are widely distributed in plants.

Objectives:

- Characterization of natural antioxidants from indigenous plant sources
- Standardization of natural antioxidants for use in food & cosmetic industries

Work Progress:

- Profiling of polyphenolic compounds in *Moringa oleifera, Ficus racemose, Phyllanthus emblica* & *Ceriops decandra* and determination in vitro antioxidant activities were done
- *Moringa oleifera, Ficus racemose, Phyllanthus emblica* and *Ceriops decandra* contain several polyphenolic compounds
- On the basis of our results, *Moringa oleifera, Ficus racemose, Phyllanthus emblica* and *Ceriops decandra* shows good antioxidant activities

05. Cow dung and chitosan coated fertilizer for control release of NPK.

Fatema Tuz Zohora (PL), Dr. Md. Monarul Islam, Dr. Shahin Aziz, Sharkar Md. Mahamudul Hassan, Badhan Saha

Introduction:

Due to the heavy use of traditional chemical fertilizers and the recurrent use of the same land for crop production, Bangladesh's latent soil fertility has drastically decreased over time. Our farmers employ traditional quick release fertilizer (QRF) to increase and maintain crop yields. Due to QRF's high solubility in water and limited nutrient absorption efficiency, it poses a significant problem to the agricultural industry Control Release Fertilizer (CRF) has drawn the attention of scientists as it release nutrients to plant for a long period of time and reduces fertilizer loss. In this project CRFs has been prepared using biodegradable materials for coating NPK fertilizer and observed its release property in soil.

Objectives:

- Characterization of natural antioxidants from indigenous plant sources
- Standardization of natural antioxidants for use in food & cosmetic industries

Work Progress:

- Double coated CRF has been prepared
- Release kinetics of double coated CRF in soil has been observed
- SEM, XRD, FTIR, Mechanical strength test have been done
- Paper draft is ready to submit

Fig.: Image of release test of CRFs in soil

Achievements and Activities

Paper Published

1. Shahin Aziz*, Md. Sajal Sorowar, Sahana Parveen, Mohammad A Satter Miah, Shahriar Siddique and Most. Hosney Ara Begum, "Antibacterial Activities of Cassia sophera L.extract." *Bangladesh J. Sci. Ind. Res.* 58(1), 45-52, 2023.
2. Md. Abdus Satter Miah, Shariful Islam, Nusrat Abedin, Md. Nazmul Hasan, Md. Faridul Islam, Khurshida Jahan Tisa, Anik Kumar Saha, Shahin Aziz," Physicochemical and functional properties of banana starch and its derivatives." Current Research in Nutrition and Food Sciences, vol.11(2), 2023.
3. Mehedi Hassan, Atish *Bhathacharjee*, Md. Sadequl Azam, Shahin Aziz, Aftab Ali Shaikh and Md. Saidul Islam*,"A Smart Device of data acquisition with emergency safety features for laboratory furnaces. 19(2023), 101357, Research in engineering.
4. Afrina Sharmin, Syed Shafkat Mahmood, Munira Sultana, Shahin Aziz, Md. Aftab Ali Shaikh, Shahin Aziz, M.S. Bashar*, Effects of argon pressure on physical characterization of cadmium telluride thin films fabricated by close -spaced sublimation techniques. Journal of Materials Science: Mater Electron (2023) 34:344.
5. Ayesha Siddika, Munira Sultana, MS Bashar, Samia Tabassum, Shahin Aziz, Md. Aftab Ali Shaikh, Improved performence of dye sensitized solar cell by exploration of ohotoanode and ruthenium based dye. Optical Materials, 2022, 125, 112042.
6. Sharika Farhana, Shahin Aziz, Sharjana Rahman, Sadia Afrin, Mohammad Nazrul Islam Bhuiyan, Sharif Al-Reza, "Chemical Composition of Fixed Oil and in vitro Antimicrobial Activity of Andrographis paniculata Root, Journal: Journal of King Saud University – Science, 2022, 34, 101921.
7. Muntasir Rahman, Fariha Chowdhury, Kamal Uddin, Khondoker Shahin Ahmed, Hemayet Hossain, Preeti Jain, Hasan Mahmud Reza, Kyueui Lee, Shazid Md Sharker (2023), Nanostructured chitosan-polyphenolic patch for remote NIR-photothermal controlled dermal drug delivery, *International Journal of Biological Macromolecules* 241: 124701.
8. Anirban Biswas, M Rabiul Islam, M Zakir Hosen, Khondoker Shahin Ahmed, Hemayet Hossain and Sheikh Julfikar Hossain (2023), Analgesic and anthelmintic activities in common fruits of the Sundarbans mangrove forest, *Bangladesh, Bangladesh J. Bot.* 52(1): 79-86
9. Md. Naiemur Rahman, Khondoker Shahin Ahmed, Shakhawat Ahmed, Hemayet Hossain, AFM Shahid Ud Daula (2023), Integrating in vivo and in silico approaches to investigate the potential of Zingiber roseum rhizome extract against pyrexia, inflammation and pain, *Saudi Journal of Biological Sciences* 30 (2023) 103624.
10. Tanoy Mazumder, Tarek Hasan, Khondoker Shahin Ahmed, Hemayet Hossain, Tushar Debnath, Esrat Jahan, Naiemur Rahman, Md. Sadikur Rahman Shuvo and A F M Shahid Ud Daula (2022), Phenolic compounds and extracts from *Crotalaria calycina* Schrank potentially alleviate pain and inflammation through inhibition of cyclooxygenase-2: An in vivo and molecular dynamics studies, *Heliyon* 8(12): e12368. DOI: 10.1016/j.heliyon.2022.e12368
11. Saduddin Talukder, Khondoker Shahin Ahmed, Hemayet Hossain, Tarek Hasan, Israt Jahan Liya, Muhammed Amanat, Nurun Nahar, Md. Sadikur Rahman Shuvo and A. F. M. Shahid Ud Daula (2022), *Fimbristylis aestivalis* Vahl: a potential source of cyclooxygenase 2 (COX 2) inhibitors, *Infammopharmacology* 30(1): 2301-2315. DOI:10.1007/s10787-022-01057-0
12. A. M. Swaraz, Fariha Sultana, Khondoker Shahin Ahmed, Mohammed A. Satter, Hemayet

Hossain, Obayed Raihan, Afrina Brishti, Ibrahim Khalil and Siew Hua Gan (2022), Polyphenols Profile and Enzyme Inhibitory Properties of Blumea lacera (Burm. f.) DC.: A Potential Candidate against Obesity, Aging, and Skin Disorder, *Chem. Biodiversity* 19 (9): e202200282

13. Rabindra Nath Acharyya, Shuvra Mithila, Suborna Rani, Md. Arman Islam, Mimi Golder, Khondoker Shahin Ahmed, Hemayet Hossain, Shrabanti Dev and Asish Kumar Das (2022), Anti-allergic and Anti-hyperglycemic Potentials of Lumnitzera racemose Leaves: In vivo and In silico Studies, Proc. *Natl. Acad. Sci., India, Sect. B Biol. Sci.* DOI: 10.1007/s40011-022-01399-3
14. Md Abdul Halim, Kawser Alam Kanan, Towrin Nahar, Md Jiaur Rahman, Khondoker Shahin Ahmed, Hemayet Hossain, N.H.M. Rubel Mozumder and Maruf Ahmed (2022), Metabolic profiling of phenolics of the extracts from the various parts of blackberry plant *(Syzygium cumini L.)* and their antioxidant activities, *LWT - Food Science and Technology* 167 (2022) 113813
15. Md. Monarul Islam, Rashedul Islam, S M Mahmudul Hassan, Md. Rezaul Karim, Mohammad Mahbubur Rahman, Shofiur Rahman, Md. Nur Hossain, Dipa Islam, Md. Aftab Ali Shaikh and Paris E. Georghiou "Carboxymethyl chitin and chitosan derivatives: synthesis, characterization and antibacterial activity" *Carbohydrate Polymer Technologies and Applications,* 2023, 5, 100283.
16. Md. Monarul Islam, Khondoker Shahin Ahmed, Rezaul Karim, Bikash Dev Nath, Shyama Prosad Moulick, Rashedul Islam, Sharkar Md. Mahmudul Hassan, Hemayet Hossain, Mohammad Moniruzzaman, M. Sarwar Jahan, Aftab Ali Shaikh and Paris E. Georghiou, "Alcohol-based Hand Sanitizers amid COVID-19: *Chemical Formulation, Analysis, Safety" ChemistrySelect,* 2022,7, e202203290.
17. Rezaul Karim, Kamrun Nahar, Fatema Tuz Zohora, Md. Monarul Islam, Riyadh Hossen Bhuiyan a, M Sarwar Jahan and Md. Aftab Ali Shaikh, "Pectin from lemon and mango peel: Extraction, characterisation and application in biodegradable film" *Carbohydrate Polymer Technologies and Applications*, 2022, 4, 100258.
18. Yiwei Liu, Xinyi Song, Hongxi Guo, Shuning, Yu, Md. Monarul Islam, Qing Chen and Xing Feng, "Arylethynyl Substituents at Plane Node of Pyrene: Synthesis, Crystal Structures, and Photophysical Properties" *ChemistrySelect,* 2022,7, e202203245.
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20. Khondoker Shahin Ahmed, Maisha Farzana, Shaikh Emdadur Rahman, Ismet Ara Jahan, Tanzir Ahmed Khan, Muhammad Abdullah Al-Mansur, Nadia Sultana & Hemayet Hossain (2023), *Viscum monoicum*: A New Source of Polyphenolic Compounds Responsible for Antioxidant and Anti-Inflammatory Activities, *Journal of Herbs, Spices & Medicinal Plants*, 29:4, 336-355.
21. Md Arman Islam, Md Samiul Huq Atanu, Md Afjalus Siraj, Rabindra Nath Acharyya, Khondoker Shahin Ahmed, Shrabanti Dev, Shaikh Jamal Uddin, Asish Kumar Das (2023), Supplementation of syringic acid-rich *Phrynium pubinerve* leaves imparts protection against allergic inflammatory responses by downregulating iNOS, COX-2, and NF-κB expressions, Heliyon 9 (2023) e13343
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23. Ethnographic survey on cereal and pseudocereal in Bangladesh perspective Rupa, A.Z. and Rahim, A.T.M.A., Food Research 7 (2): 222 - 229 (April 2023)
24. Farhana Jahan, Md Nurul Huda Bhuiyan, Md. Jahidul Islam, Sabbir Ahmed, Md. Sabbir Hasan, Mahci Al Bashera, Md. Waliullah, Arfatun Nahar Chowdhury, Md. Badrul Islam, Barun Kanti Saha, Shyama Prosad Moulick, "Amaranthus tricolor (red amaranth), an indigenous source of nutrients, minerals, amino acids, phytochemicals, and assessment of its antibacterial activity". *Journal of*

Agriculture and Food Research, 2022, 10, 100419

25. Md. Zia Uddin Al Mamun, Shyama Prosad Moulick, Mohajira Begum, Farhana Jahan, Mohammed A. Satter, Md. Nazim Uddin, Rahima Akter Sathee, Md. Waliullah, and Faridul Islam, "Nutritional analysis of indigenous sources: An approach to explore its potential application as alternative feedstuffs for Thai Koi *(Anabas testudineus)" Journal of Agriculture and Food Research,* 2023,12,100558
26. Farhana Jahan, Md. Badrul Islam, Shyama Prosad Moulick, Mahci Al Bashera, Md. Sabbir Hasan, Nishat Tasnim, Trissa Saha, Farhana Boby, Md. Waliullah, Anik Kumar Saha, Amin Hossain, Lailatul Ferdousi, Md. Mahmudur Rahman, Barun Kanti Saha, Md Nurul Huda Bhuiyan, "Nutritional characterization and antioxidant properties of various edible portions of Cucurbita maxima: A potential source of nutraceuticals." *Heliyon.* 2023.

Process Accepted

1 Dr. Shahin Aziz, Dr. Most. Hosney Ara Begum, Dr. Sahana Parveen, Fatema Tuz Zohora "A Process for the Production of Octyl Acetate" accepted on dated 29.09.2022, ref. no., 39/02/0000/043/37/895.22/1012.

2. "Formulation of vanilla flavor" accepted on dated 30.10.2022, ref. no., 39/02/0000/043/37/873. 21/1408.
3. "Production of cereal-based nutritive instant weaning food" accepted on dated 29.12.2022, ref. no., 39/02/0000/043/37/867.21/895.
4. S.M. Mahmudul Hasan (PSO), Ferdoushi Jahan (SSO), Md. Monarul Islam, (SSO), Md. Abdul Momen (RC), Hemayet Hossain (PSO), Md. Badrul Islam (PSO),." A process for the production of Herbal Powder Mouth wash" accepted by the office, Member Development, BCSIR, Dhaka. Ref. No. 39.02.0000.043.37.799.20/515 Date: 27.09.2022
5. Nushrat Jahan Ethane, Md. Hemayet Hossain, Khondoker Shahin Ahmed, Dr. Pizush Kanti Biswas "Production of Calcium Acetate hydrate from Calcium Carbonate" accepted by the office, Member Development, BCSIR,Dhaka.; Ref No. :39.02.0000.043.37.843.21/1409 Date: 31.10.2022
6. Nushrat Jahan Ethane, Md. Hemayet Hossain, Khondoker Shahin Ahmed, Dr. Pizush Kanti Biswas "Production of Ammonium Oxalate (Monohydrate) from Ammonium Carbonate" accepted by the office, Member Development, BCSIR,Dhaka.; Ref No. :39.02.0000.043.37. 822. 20/1014 Date: 29.09.2022
7. Ferdoushi Jahan (SSO), Md. Abdul Momen (RC), Sahana Parveen (CSO), S.M. Mahmudul Hasan (PSO), Evana Parvin Lipy (SSO), "Formulation of Moisturizing Hand Wash" accepted by the office, Member Development, BCSIR, Dhaka. Ref. No. 39.02.0000.043.37.879.21/1273 Date: 25.01.2023.
8. Ferdoushi Jahan (SSO), Md. Abdul Momen (RC), Sahana Parveen (CSO), S.M. Mahmudul Hasan (PSO), Evana Parvin Lipy (SSO), "Formulation of Skin Care Gel" accepted by the office, Member Development, BCSIR, Dhaka. Ref. No. 39.02.0000.043.37.814.20/1330 Date: 07.05.2023.

Method development:

1. "Analytical Method Validation Protocol for Assay of Anthracene by Uv_Vis Spectroscopy" Rashedul Islam, Shyama Prosad Moulick, Fatema Tuz Zohora, Dr. Md. Monarul Islam (April, 2023).

Guidance to research work (PhD/M.Phill/ M.Phill/ M.S/ NCST & BCSIR Fellow)

Sl. No.	Title of Research	Research Catagory	Name of Student	University / Institute	Supervisors in BCSIR
01.	Chemical and biological investigation of *Bredilla stipularies* (leaf, root, stem , fruit)	Research Fellow	Sarjana Rahman	Brac University	Dr. Shahin Aziz, PSO
02.	Chemical and Biological Investigation on different Plant parts of Eclipta Alba (Linn.) Hassk	Ph.D Research	Shirin Akhter Banu	Islamic University, Kushtia	Dr. Shahin Aziz, PSO
03.	Chemical and Biological Investigation on different Plant parts of Abroma agusta	Ph.D Research	Tahmina Khondokar Mitu	Khulna University	Dr. Shahin Aziz, PSO ,
04.	Chemical and Biological Investigation on different Plant parts of Andrographis Paniculata (Burm. F.) Wall. Ex Nees	Ph.D Research	Sharika Farhana	Islamic University, Kushtia	Dr. Shahin Aziz, PSO
05.	Synthesis and biological studies of pyrimidine based Schiff bases derivatives	Postdoc Fellow	Dr. Md. Wahidul Islam Ratul	BCSIR	Dr. Md Monarul Islam
06.	Theoretical study on chalcone & chitin derivatives based on DFT calculation	Postgraduate Fellow	Rabeya Akter	BCSIR	Dr. Md Monarul Islam
07.	Preparation and Characterization of Carboxymethyl Chitosan Based Edible Film and Study of its Applications as a Food Preservative	Postgraduate Fellow	Md. Elius Hosen PK.	BCSIR	Dr. Md Monarul Islam

Participation in training/ symposium/ workshop/ Conference

Conference:

1. Khondoker Shahin Ahmed, Ismet Ara Jahan and Md. Hemayet Hossain, Moringa oleifera grown in Bangladesh: Profiling of polyphenolic content by HPLC-DAD and determination of antioxidant activities & antinociceptive activity, BCSIR Congress-2022, Organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), on 1-3 December, 2022. Serial number: OP-K18, Page-177-178.
2. Khondoker Shahin Ahmed, Nushrat Jahan Ethane, Akash M. Sarkar, Badhan Saha and Md. Hemayet Hossain, Dhaleshwari River: Qualitative Evalution of Water and Sediment in Saver, Dhaka, Bangladesh, International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) Organized by Forest and Environment Affairs Sub-Committee, Bangladesh Awami League, on 2-4 September, 2022. Serial number: OP-D22, Page-155-156.
3. Sharker Md. Mahmudul Hassan, presented Poster presentation on " Phytochemical and Bioactivity Studies on the Leaves, Stem Barks and Roots of Crataeva nurvala Buch.-Ham." in BCSIR Congress-2022, organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) at 01-03 December, 2022
4. Nushrat Jahan Ethane, Md. Hemayet Hossain, Khondoker Shahin ahmed and Pizush Kanti Biswas, Production of ammonium oxalate monohydrate from ammonium carbonate, BCSIR Congress-2022, Organized by Bangladsh Council of Scientific and Industrial Research (BCSIR), on 1-3 December, 2022, Serial number:PP119, Page-363,
5. Dr. Md. Monarul Islam participated in a BCSIR, Bangladesh–CSIR, India joint symposium organized by BCSIR at Dhaka, Bangladesh, 30-31 May, 2023 and delivered an Invited talk on "Chitosan–A Promising Biomaterial for Biological Application".
6. Dr. Md. Monarul Islam, participated in BCSIR Congress-2022 organized by BCSIR, Bangladesh, 01-03 December, 2022 and delivered an Invited Lecture on "Schiff-base Derivatives: Synthesis and Application".
7. Anjum Zerin Rupa, Abu torab M.A. Rahim, Md. Hemayet Hossain and Khondoker Shahin ahmed, BCSIR Congress-2022, Organized by Bangladsh Council of Scientific and Industrial Research (BCSIR), on 1-3 December, 2022, Serial number:PP119, Page-363
8. Khondoker Shahin Ahmed, Nushrat Jahan Ethane, Akash M. Sarkar, Badhan Saha and Md. Hemayet Hossain, Dhaleshwari River : Qualitative Evaluation of Water and Sediment in Savar, Dhaka, International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) Organized by Forest and Environment Affairs Sub-Committee, Bangladesh Awami League, on 2-4 September, 2022, Serial number:OP-D22, Page-155-156
9. Shyama Prosad Moulick participated in an "International Conference on Environmental Protection for Sustainable Development' held on 2-4 September 2022.
10. Shyama Prosad Moulick participated in BCSIR CONGRESS-2022 on 'Integrated Approach for Adapting 4IR' held on 1-3 December 2022.
11. Fatema Tuz Zohora, participated in 'BCSIR Congress-2022' organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) 01-03 December, 2022 and presented a poster presentation entitled "Formulation and Properties Evaluation of Double Coated Controlled Release Fertilizer".
12. Fatema Tuz Zohora, participated in 'International Conference on Environmental Protection for Sustainable Development (ICEPSD – 2022)' organized by Forest and environmental affairs Sub-Committee, Bangladesh Awami League 02-04 September, 2022 and presented an oral presentation entitled "Cow dung and Chitosan Coated Fertilizer for Controlled Release of NPK
13. Rashedul Islam presented an oral presentation on the topic "Effects of salinity on the mobility of phosphate and iron at the soil water interface" at an international conference held on 12 July 2023 by GOLDSCHMIDT Conference 2023, Lyon, France.
14. Rashedul Islam participated in BCSIR Congress 2022 on Integrated Approach for adapting 4IR held on 1-3 December 2022. An oral presentation on topics "Synthesis, characterization, and antimicrobial study of water-soluble chitosan derivatives".

15. Rashedul Islam participated in ICEPSD 2022 on September (1-4) An oral presentation on "Iron cycling in coastal agricultural soil: effects of salinity and redox conditions".
16. Fajilatun Nesa presented oral presentation on "Study of Organochlorine Pesticides, Fatty Acids and Microbiological Quality of Some Dry Fish Samples" in BCSIR Congress-2022, organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) at 01-03 December, 2022.

Training:

1. Dr. Shahin Aziz, conducted in house training programme on "Laboratory Safety and Improved Cook Stove" on 06-09 February, 2022 as a resource person at IFRD, BCSIR Dhaka.
2. Md. Hemayet Hossain participated in training program on "e-Government Procurement (e-GP)" as a Trainer at BCSIR Chittagong Laboratories, BCSIR, Bangladesh, on 22 June, 2023.
3. Md. Hemayet Hossain participated in training program on "Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)" as a Trainer at CARF, BCSIR, Dhaka, Bangladesh, from 09 April – 13 April, 2023.
4. Sharker Md. Mahmudul Hassan, attended a training program on "Different Techniques of R&D Data Analysis and their Applications" held on 26 June, 2023 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR).
5. Sharker Md. Mahmudul Hassan, participated a training program on "PPR in Scientific Procurement" held on 01 February, 2023 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR).
6. Nushrat Jahan Ethane participated in Training Program on "Different Techniques of R & D Data Analysis and their application" held on 26 June, 2023 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR
7. Nushrat Jahan Ethane participated in Training Program on "Citizen Charter " held on 23 May, 2023 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
8. Nushrat Jahan Ethane participated in Training Program on "Basic Principle, Application and Maintenance of Raman Spectroscopy" held on 14 December, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
9. Nushrat Jahan Ethane participated in Training Program on "Basic Principle, Application and Maintenance of FTIR" held on 13 December, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
10. Nushrat Jahan Ethane participated in Training Program on "Techno Economical and Feasibility Study" held on 23 October, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
11. Nushrat Jahan Ethane participated in Training Program on "Public Awareness of Right to Infomation" held on 27 September, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
12. Dr. Md. Monarul Islam participated in workshop on "Creating an ironic innovation ecosystem in the context of intellectual property policies and determining potential strategies to encourage innovation" organized by Department of Patents, Designs & Trademarks (DPDT), Bangladesh held on 07 June 2023.
13. Dr. Md. Monarul Islam participated in Training on "Basic Application and Maintenance of XRD" organized by BCSIR Dhaka Laboratories held on 15 December, 2022.
14. Dr. Md. Monarul Islam participated in Training on "Basic Principle, Application and Maintenance of Raman Spectroscopy" organized by BCSIR Dhaka Laboratories held on 14 December, 2022.
15. Dr. Md. Monarul Islam performed as a trainer on Gas Chromatography (GC) organized by Planning & Development (P&D) Division, Dhaka held from 30 October to 03 November, 2022.
16. Anjum Zerin Rupa participated in Training Program on "Different Techniques of R & D Data Analysis and their applications" held on 26 June, 2023 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
17. Anjum Zerin Rupa participated in Training Program on "National Integrity Strategy" held on 22 May, 2023 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research

(BCSIR)

18. Anjum Zerin Rupa participated in Training Program on "Learning Session on Patent drafting & Industrial process" held on 24 May, 2023 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
19. Anjum Zerin Rupa participated in Training Program on "Basic Principle, Application and Maintenance of XRD" held on 15 December, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
20. Anjum Zerin Rupa participated in Training Program on "Basic Principle, Application and Maintenance of FTIR" held on 13 December, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR)
21. Khondoker Shahin Ahmed participated in training program on Operation and maintenance of "Gas Chromatography (GC)" as a Trainer at BCSIR, Dhaka, Bangladesh, from 30 October – 03 November, 2022
22. Shyama Prosad Moulick participated in Training on 'Basic Principle, Applications, and Maintenance of FTIR" held on 13 December 2022 at BCSIR Laboratories, Dhaka
23. Shyama Prosad Moulick participated in Training on 'Basic Principle, Applications, and Maintenance of FTIR" held on 13 December 2022 at BCSIR Laboratories, Dhaka
24. Fatema Tuz Zohora (SO), participated in training on "Different Techniques of R&D Data Analysis and their Applications" held on 26 June, 2023 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
25. Fatema Tuz Zohora (SO), participated in training on "PPR in Scientific Procurement", held on 01 February, 2023 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
26. Fatema Tuz Zohora (SO), participated in training on "Basic Principle, Application and Maintenance of Raman Spectroscopy" held on 14th December, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
27. Fatema Tuz Zohora (SO), participated in training on "Basic Principle, Application and Maintenance of FTIR" held on 13th December, 2022 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).Rashedul Islam participated in Training on 'Basic Principle, Applications, and Maintenance of FTIR" held on 13 December 2022 at BCSIR Laboratories, Dhaka.
28. Rashedul Islam (RC), participated in Training Program on 'Integrity strategy and good governance" held on 22 September 2022 at BCSIR Laboratories, Dhaka.
29. Fajilatun Nesa (RC), attended a training program on "Different Techniques of R&D Data Analysis and their Applications" held on 26 June, 2023 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR).
30. Fajilatun Nesa (RC), attended a training program on "Grievance Redress System" held on 19 June, 2023 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR)
31. Fajilatun Nesa (SO), attended a training program on "National Integrity Strategy" held on 22 May, 2023 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR)

Product Photo:

Moisturizing Hand Wash

Skin Care Gel

Octyl Acetate

Short Biography of CRD Scientists

Dr. Barun Kanti Saha (September, 1994- Present)

Office	Chemical Research Division	Blood Group	O+
Position	Chief Scientific Officer	Degree obtained	Ph.D (2000)
Contact	bksbcsirgmail.com	Mobile	01712946310

Dr. Barun Kanti Saha his both B.Sc.(Hons), M.Sc degree in Biochemistry from Dhaka University and Ph.D in Nutritional Science from Jadavpur University India. He Recipient of "Dean Honour Medal" from Dean, faculty of Biological Science, Dhaka University during graduation courses in Biochemistry in 1985-1988. His Research expertise on the Conduct research on Nutritional Analysis of various Fruits and their products, Food processing and preservation Technology and Storage. Thesis Guidance of M.Sc., M.Phill,Ph.D . He has authored or coauthored 57 International and National publications. He has 16 accepted processes and three submitted Patent. He guided M.Sc. , one M.Phill and one Ph. D. Student .He has been participated various national and Inter National conference. He is a member of BSTI Sectional and Divisional committee (Agricultural Food product). He is also life member Bangladesh Nutrition Society (BNS). LM-319, Bangladesh Association for the Advancement of Science (BAAS) LM-298, Bangladesh Association of Scientist and Scientific Profession (BASSP) , Bangladesh Chemical Society (BCS).LM-922, Registered Graduates of Dhaka University, Registration No.-2017029823 Voter No.-5236. At present he is working as Chief scientific officer, Chemical Research Division, BCSIR, Dhaka.

Dr. Shahin Aziz (1998- Present)

Office	Chemical Research Division	Blood Group	B+
Job Title	Principal Scientific Officer	Degree Obtained	Ph. D in chemistry
Contact	shaziz2408@yahoo.com	Mobile	01713005011

Dr. Shahin Aziz received the BSc and MSc in Chemistry in 1992 (held in 1995) and 1993 (held in 1997) respectively from the Department of Chemistry, University of Dhaka. Dr. Shahin Aziz was awarded Ph.D. in Natural Product Chemistry. It was a joint collaborative program with the Department of Chemistry of Jahangir Nagar University and the Bangladesh Council of Scientific and Industrial Research, Dhaka, Bangladesh. She supervised 35 research fellows/ M.Sc. students/ M. Phill students and 3 Ph.D students. She has about 75 scientific papers published in peer-reviewed/ SCIE/Scopus Indexed journals at home and abroad and one book chapter. She is the inventor of 18 industrial (Process) . Among the accepted intellectual properties 3 are leased out. Dr. Shahin Aziz ,Principal Scientific Officer in Chemical Research division and also joined the position of the Director (Addl. Charge) of the Institute of Fuel Research & Development in February-2021. She is a Principal Scientific Officer. Since joining BCSIR in 1998, she served various positions in different laboratories & Institutes. She held the position of Section-In-Charge of Industrial Chemical Section in Chemical Research Division of BCSIR Laboratories-Dhaka, Division-In-Charge of Chemical Research Division of BCSIR Laboratories-Dhaka, Officer in charge of Chemical Store, BCSIR earlier. She also worked as an attachment to the office of the Research Coordinator.

Md. Hemayet Hossain (June, 2006 - Present)

Office	Chemical Research Division	Blood Group	B+
Job Title	Principal Scientific Officer	Degree Obtained	M.Pharm.
Contact	hemayet.hossain02@gmail.com	Mobile	01728805884

Md. Hemayet Hossain earned his both B. Pharm. and M. Pharm. degree from Khulna University and University of Development Alternative, Dhaka. His research is mainly focused on the phytochemical and pharmacological activities of medicinal plants. He also works on structure elucidation of pure compounds. He has authored or coauthored 160 publications and gets 2074 citation (h-index: 22) and one book chapter according to ResearchGate database. He has 7 accepted processes. He is a 'A' grade Pharmacist having registration number: A-2625 (Bangladesh Pharmacy Council) and life member of Bangladesh Pharmaceutical Society (BPS) & Bangladesh Academy of Science (BAS).

Sharkar Mohammad Mahamudul Hassan (June, 2006 - Present)

Office	Chemical Research Division	Blood Group	O+
Job Title	Principal Scientific Officer	Degree Obtained	M.Sc. (2002)
Contact	mahmud311279@yahoo.com	Mobile	01711027714

Sharkar Mohammad Mahamudul Hassan earned his both B.Sc and M.Sc degree in Chemistry (Organic Chemistry) from the National University. His research is mainly focused on the Conduct research on Chemical investigation, Natural product Chemistry, Waste management, Synthesis Chemistry. He has authored or coauthored 12 publications. He has 14 accepted processes. He is a member of BCS and BSTI (Chemical). Working as senior scientific officer, Chemical Research Division, BCSIR, Dhaka.

Dr. Md. Monarul Islam (December, 2009 - Present)

Office	Chemical Research Division	Blood Group	B+
Job Title	Senior Scientific Officer	Degree Obtained	Ph.D (2015)
Contact	mmipavel@yahoo.com	Mobile	01730599827

Dr. Md. Monarul Islam earned his both BSc and MS degree in Chemistry (Organic Synthesis) from the University of Dhaka. He obtained Ph.D in Chemistry (Advanced Organic Materials) from Saga University, Japan under the supervision of Professor Takehiko Yamato. His research is mainly focused on the design, synthesis and development of new functional organic molecules for optoelectronics uses and pharmaceutical industries (API). He also worked as a Post. Doc Fellow of Talented Young Scientist Program (TYSP) at GDUT, Guangzhou, P R China (2018–2019). He has over 39 research articles in peer-reviewed journals and three review articles in a wide range of chemistry and get 825 citation (h-index: 11). He has two accepted processes. He is a life member of BCS, BAAS, NITUB, DUCCA; and Founding Member of National Young Academy of Bangladesh (NYAB). He is now working as a Treasurer of NYAB.

Ferdoushi Jahan (June, 2006 - Present)

Office	Chemical Research Division	Blood Group	A+
Job Title	Senior Scientific Officer	Degree Obtained	M.S. (2004)
Contact	ferdoushi.bcsir@gmail.com	Mobile	01913071452

Ferdoushi Jahan completed her B.Sc. (Hon's) and M.S. degree in Applied Chemistry and Chemical Engineering from University of Dhaka. Her research is mainly focused on Essential Oil, Cosmetics and Toiletries. She has authored or coauthored 14 publications and one book chapter. She has 22 accepted processes and 19 leased out process. She is a member of Cosmetics and Toiletries Products Committee of BSTI and BCS (Bangladesh Chemical Society). Currently she is pursuing her Ph.D. from Jahangirnagar University.

Nushrat Jahan Ethane (June, 2006 - Present)

Office	Chemical Research Division			Blood Group	O-
Job Title	Senior Scientific Officer			Degree Obtained	M.Sc. (2000)
Contact	nushrat_je@yahoo.com			Mobile	01552338938
Paper nos.	04	Process no.	14	Patent nos.	0

Nushrat Jahan Ethane completed her both B.Sc. and M.S. degree in Chemistry from National University. Her research is mainly focused on Inorganic synthesis and natural product research. She has participated in 02 international conferences.

Muhammad Saiful Islam (June, 2011 - Present)

Office	Chemical Research Division	Blood Group	B+
Job Title	Senior Scientific Officer (SSO)	Degree Obtained	MS
Contact	saifulacctdu@yahoo.com	Mobile	01721911715

Muhammad Saiful Islam has earned his both BSc and MS degrees in Applied Chemistry and Chemical Engineering from the University of Dhaka. His research interests are in the fields of plastic processing technology, plastic pollution including microplastics and plastic recycling. He has authored/coauthored more than 30 publications. Currently, he is working in the field of plastic pollution, microplastics and their effects. Mechanical recycling; thermo-chemical and chemical recycling of waste plastics for the production of monomer(s), are other important focus of his present researches. He is a proficient user of FT-IR/Raman, TGA, DSC, Rheo- and Micro-viscometer, Extruder, Zetasizer, GPC, GC-MS, HS-GC-FID/ECD, HPLC, and LC-MS/MS.

Anjum Zerin Rupa (February, 2013 - Present)

Office	Chemical Research Division	Blood Group	B+
Job Title	Senior Scientific Officer	Degree Obtained	M.Sc. (2009)
Contact	anjumifst@gmail.com	Mobile	01674741004

Anjum Zerin Rupa completed her both B.Sc. and M.S. degree in Food Science & Nutrition from (College of Home Economics, University of Dhaka). Her research is mainly focused on Food Science & Nutrition and natural product research. She is perusing her Ph.D in Institute of Nutrition and Food Science, University of Dhaka. She has participated in 01 international conference (2022).

Shyama Prosad Moulick (October 2018 - Present)

Office	Chemical Research Division	Blood Group	AB+
Job Title	Scientific Officer	Degree Obtained	M.S. (2014)
Contact	moulik.shyama @gmail.com	Mobile	01923722052
Published Paper No.	09	Submitted Patent No.	02

Shyama Prosad Moulick completed his B.S. (Hon's) and M.S. degree in Chemistry from the University of Dhaka. His research is mainly focused on Synthesis, Natural and Environmental Chemistry.

Fatema Tuz Zohora (November, 2018 - Present)

Office	Chemical Research Division	Blood Group	A+
Job Title	Scientific Officer	Degree Obtained	MS (2014)
Contact	zohoapopy.acce@gmail.com	Mobile	01318639225

Fatema Tuz Zohora earned her both BSc and MS degree from the dept. of 'Applied Chemistry and Chemical Engineering (ACCE)', University of Dhaka. Her research is mainly focused on formulation of composite material and environmental chemistry. She has authored 02 publications. She has two accepted process and participated in 03 international conferences.

Md. Abdul Momen (May, 2019 - Present)

Office	Chemical Research Division	Blood Group	A+
Job Title	Research Chemist	Degree Obtained	M.S. (2018)
Contact	mdabdulmomen1994@gmail.com	Mobile	01521219122

Md. Abdul Momen completed his B.S. (Hon's) and M.S. degree in Chemistry (Physical Chemistry) from University of Dhaka. His research is mainly focused on Essential Oil, Cosmetics and Toiletries. He has authored or coauthored 02 publications. He has 08 accepted processes and 05 leased out process. He is a member of BCS (Bangladesh Chemical Society).

Fajilatun Nesa (February, 2023 - Present)

Office	Chemical Research Division	Blood Group	B+
Job Title	Research Chemist	Degree Obtained	M.S (2020)
Contact	fajilatunnesa07@gmail.com	Mobile	01744280823

Fajilatun Nesa earned her both BSc and MS degree in Chemistry (Organic) from the University of Dhaka. Her research is mainly focused on synthesis chemistry and application of the products in pharmaceutical sector. She is also working on Gas Chromatography to develop a rapid analytical procedure to carry out routine analysis of pesticides, solvents etc.

Award:

2nd prize of poster presentation in BCSIR Congress-2022

Photo Gallery

Employees of Chemical Research Division

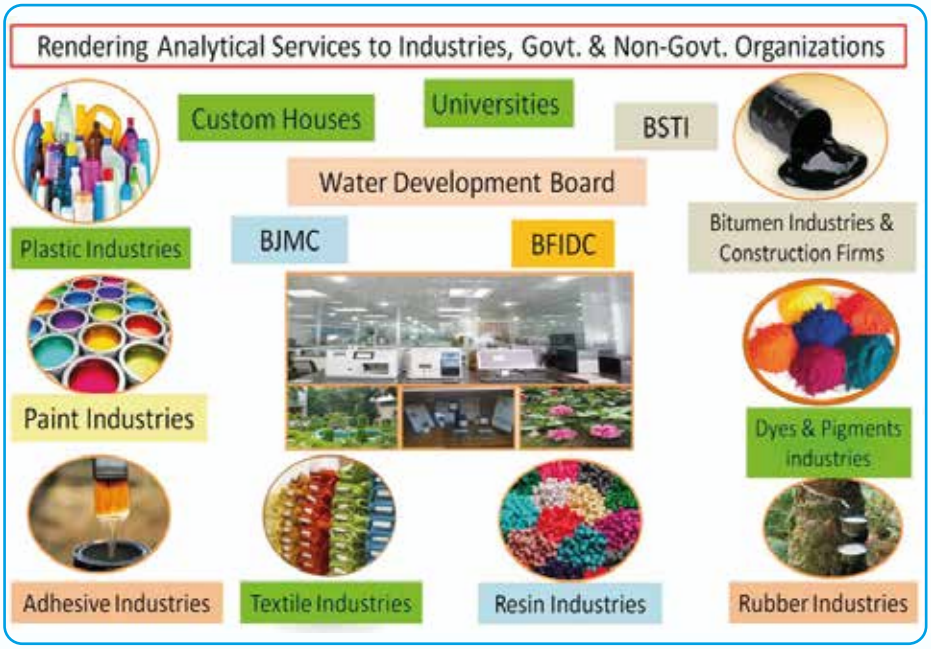
FIBRE & POLYMER RESEARCH DIVISION (F&PRD)

Scientists of F&PRD

FIBRE & POLYMER RESEARCH DIVISION (F&PRD)

Fibre & Polymer Research Division is one of the largest divisions of BCSIR Laboratories, Dhaka. It is a highly specialized research laboratory conducting R&D works on different branches of Polymer Chemistry and providing services to the large scale polymer-based industries of Bangladesh. R&D activities of the division are mainly focused on Cellulosic fibres, Plastics & Microplastics, Composite materials, Textiles, Jute, Rubber, Bitumen, Paint, Dyes & Pigments, Plastic & Rubber Waste Management and Utilization System, Textile Effluent Treatment, etc. The ultimate objective of the division is to develop modern and appropriate technologies for sustainable industrialization of Bangladesh based on available raw materials. This division is also providing analytical services of international standards to fibre and polymer-based industries of Bangladesh. This division has 07 very important research fields/ sections-

- Cellulosic Fibre Research Section
- Plastic Technology Research Section
- Rubber Research Section
- Dyes & Pigment Research Section
- Resin Research Section
- Paint-Varnish-Lacquer Research Section and
- Fibre & Polymer Testing Section



R&D Projects:

1. Production of polyvinyl chloride (PVC) solvent cement and composite materials using waste PVC and acrylic polymers

Shahin Sultana (PL), Zahidul Islam, and Md. Khabir Uddin Sarker

Introduction:

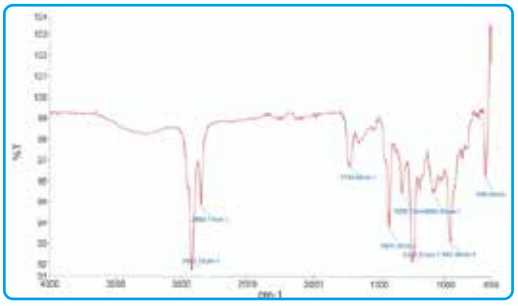
Waste PVC (wPVC) polymers are available from power plant of Bangladesh. These are used as filler materials in the cooling system of power plant and rejected as wPVC after four years. These are rigid PVC films and these waste PVC can be utilize to make value added composite materials. With the help of this project we want to utilize wPVC to make value added products to reduce import of such products and to meet our local demand.

Objectives:

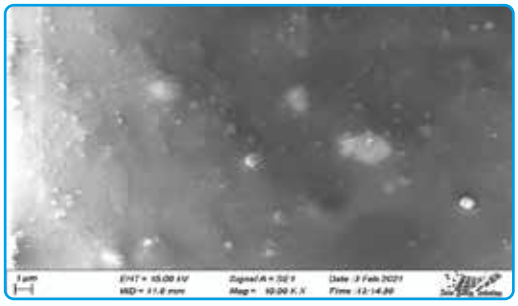
- To produce wPVC solvent cement for PVC pipes jointing and fittings.
- To produce natural fibers reinforced composite materials using wPVC and acrylic polymers.

Work Progress:

- Production of solvent cements using wPVC and virgin PVC for pipes jointing and fittings have been developed.
- Three papers have been published on wPVC.
- One patent on solvent cement has been submitted.



ATR-FTIR of wPVC



SEM of wPVC

2. Synthesis of thermoset polyester for preparation of filler and composite materials

Shahin Sultana (PL), Mohammad Majedul Haque, Muhammad Saiful Islam and Md. Khabir Uddin Sarker

Introduction:

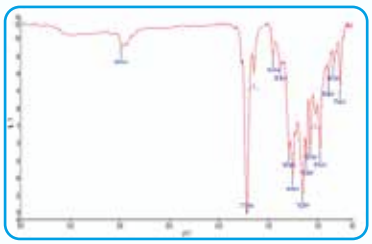
Unsaturated polyester resin (UPR) is prepared from one or more diol with saturated and unsaturated acids or anhydrides. The UPRs are thermosetting resins and commonly used in the automotive and bathroom accessories, in non-metallic auto-body fillers, tiles for roofs, electrical equipments, shower stalls, navy boats, swimming pool, pipes, ducts, water tanks, trays, composite materials etc. A huge quantity of UPR and UPR based products are imported in our country every year. The successful completion of the project will definitely impart a positive impact on our economy and environment sectors.

Objectives:

- To synthesize unsaturated polyester resin (UPR)
- To produce UPR based car body filler
- To produce acrylic modified UPR based natural/inorganic fiber reinforced composite materials

Work Progress:

- Unsaturated polyester resin (UPR) has been synthesized
- UPR based composite materials have been prepared and characterized
- Two paper is ready for submission
- To produce UPR based car body filler is in progress



ATR-FTIR of UPR

UPR-1

UPR-2

UPR-3

3. Development of lignin-based hydrogel by emulsion polymerization

Swapan Kumer Ray, Riyadh Hossen Bhuiyan, Rashed Hasan and Zahidul Islam

Brief discussion:

Hydrogels are three-dimensional natural/synthetic polymeric networks and contain cross-linked polymeric chains in their structure. These are highly hydrophilic and could be found as a colloidal gel, in which water is the dispersion medium. The hydrogels made from natural polymers have advantages of inherent biocompatibility and biodegradability in comparison to synthetic polymers. Such natural polymer-based hydrogels can be used in the fields of food, cosmetics, pharmaceuticals, biomedical implants, control release agrochemical formulations, e.g. fertilizers, pesticides, etc. Hydrogel-based agrochemical formulations can also improve the water retention of dried soils. Lignin, a highly complex aromatic biopolymer, has a great potential for the preparation of functional hydrogels for different industrial applications.

Objectives:

- Development of alkali-lignin based hydrogel by emulsion polymerization technique
- Development of import substitute product formulation for cosmetics and agricultural applications
- Utilization of available lignocellulosic resources through green chemical approach

Work progress:

- Lignin-based hydrogels have been synthesized successfully and optimized the reaction conditions
- Formulation of NPK-fertilizer containing hydrogel has been done
- Swelling properties of selected hydrogel and release pattern of NPK-fertilizer have been studied
- Writing up of paper, process and patent are in progress

Graphical abstract

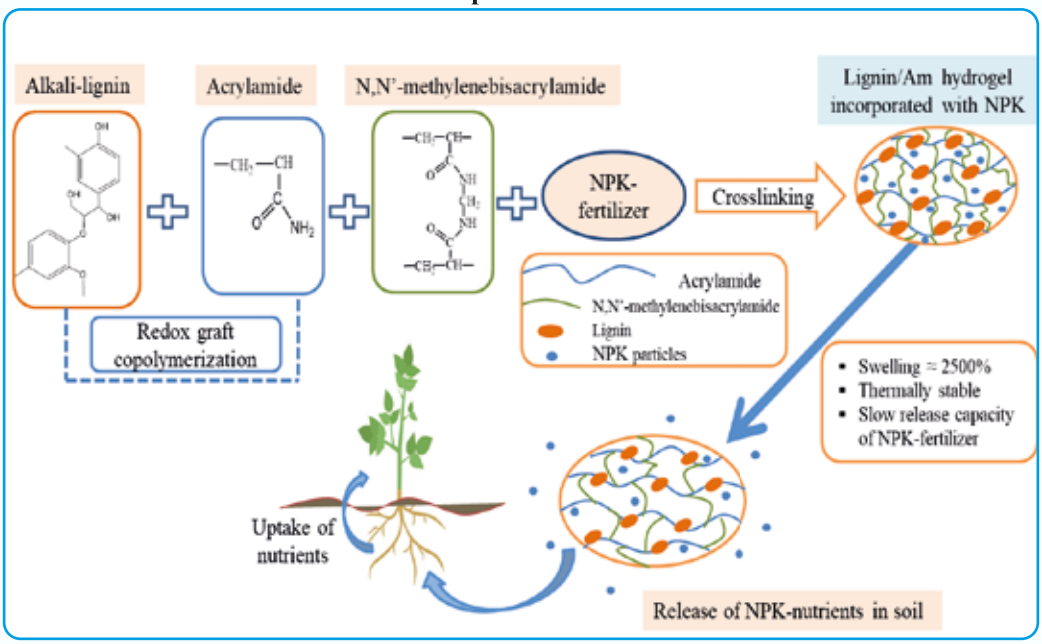


Fig.: 1: Synthesis of lignin-based hydrogel and formulation of slow release NPK-fertilizer

4. Fractionation of Lignocellulosic Biomass with Double Salt Ionic Liquids: A Green and Sustainable Method

Mohammad Mahbubur Rahman (PL), Mahbub Alam, Dr. Md. Monarul Islam, Dr. Md. Sarwar Jahan

Ionic liquids (ILs) are highly esteemed within the scientific community due to their exceptional characteristics, including low vapor pressure, non-volatility, a broad electrochemical potential window, and relatively low melting points, typically below 100 . Their diverse applications in physics, chemistry, and engineering, make them a prominent research focus in recent decades. Currently, double salts ionic liquids (DSILs), which are the combination of ILs with varying cations, anions, or both, are gaining increasing attention among researchers. DSILs offer the ability to tailor their physicochemical properties and provide diverse molecular interactions, guiding the synthesis of task-specific ILs for specific applications. The future prospects of DSILs
hold significant promise across various industrial applications. DSILs are engineered by fine- tuning the physicochemical and spectroscopic properties of ionic liquids, resulting in novel properties that offer substantial benefits in diverse fields, including food, pharmaceuticals, cosmetics, textiles, and fuel cell devices. One particularly exciting avenue for DSILs is their poten

Objectives
- Synthesis of aprotic DSILs (ADSILs) and protic DSILs (PDSILs)
- Studying the physiochemical properties of the prepared ADSILs and PDSILs
- Dissolution of lignocellulosic biomass in the prepared ADSILs and PDSILs
- Separation of cellulose, hemicellulose and lignin from the biomass using ADSILs and PDSILs

Work progress
- Synthesis and characterization of aprotic DSILs (ADSILs) have been completed
- Fractionation of coconut husk using ADSILs has been completed
- Synthesis of protic DSILs (PDSILs) has been completed

5. Production of Graphene from Graphite and/or Carbon

Mohammad Amirul Hoque (PL), Dr. Syed Farid Uddin Farhad, Dr. Shirin Akter Jahan, Dr. Mohammad Nazrul Islam Bhuiyan, Dr. Toufiq Ahmed, Dr. Md. Monarul Islam, Nushrat Jahan Ethane, Mahmuda Hakim

Graphene is a sudden and revolutionary invention of modern science. It shows extremely high tensile strength and it is 300 times stronger than Steel. It shows extremely high electrical conductivity so it is called superconductive material. It is 1300 times more conductive than copper. It is very lightweight and 1000 times less weight than a thin paper. It is a single-layer carbon atom and almost opaque. Due to its properties a huge number of chemical, apparatus, and equipment, is possible to develop with this material. It is being used for water purification, chemical synthesis, electronic circuit designing, environmental pollution control, etc. But the processing technique of Graphene is somewhat expensive and so the material is still expensive.

Objectives:
- Preparation of Graphene Oxide from Graphite and its Characterization
- Preparation of Graphene from Graphene Oxide and its Characterization
- Preparation of Graphite from Carbon and its Characterization

Work Progress:
- Five batches of Graphene Oxide were synthesized at different temperatures for the evaluation of its effect on the products.
- The effect of recycling acid liquor successively five times was investigated on the products
- The effects of temperature on the degradation of Graphene Oxide were studied at different temperatures and times were evaluated and partially reduced graphene was characterized
- The fully reduced graphene was achieved and characterized
- The removal of Arsenic and Textile dyes was investigated using Graphene Oxide And reduced Graphene Oxide

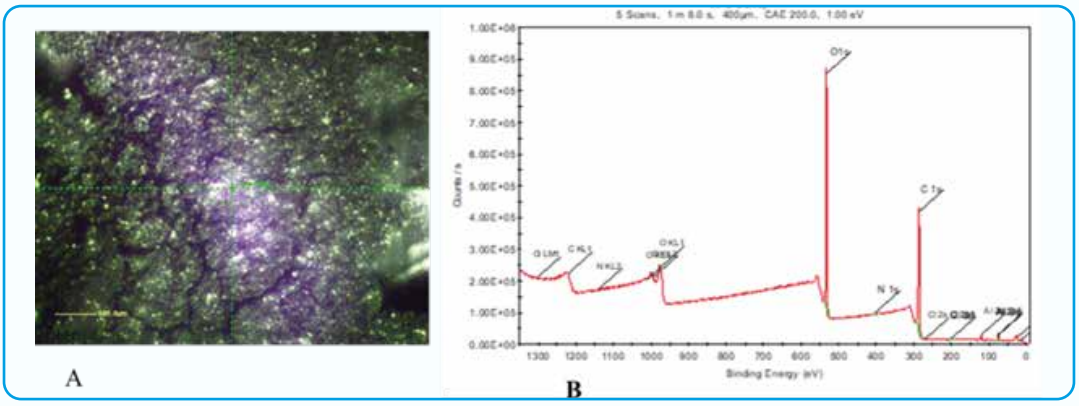


Figure-1: XPS survey scan analysis (A) XPS survey scan image of R-2 graphene oxide and B) XPS survey scan binding energy of R-2 graphene oxide.

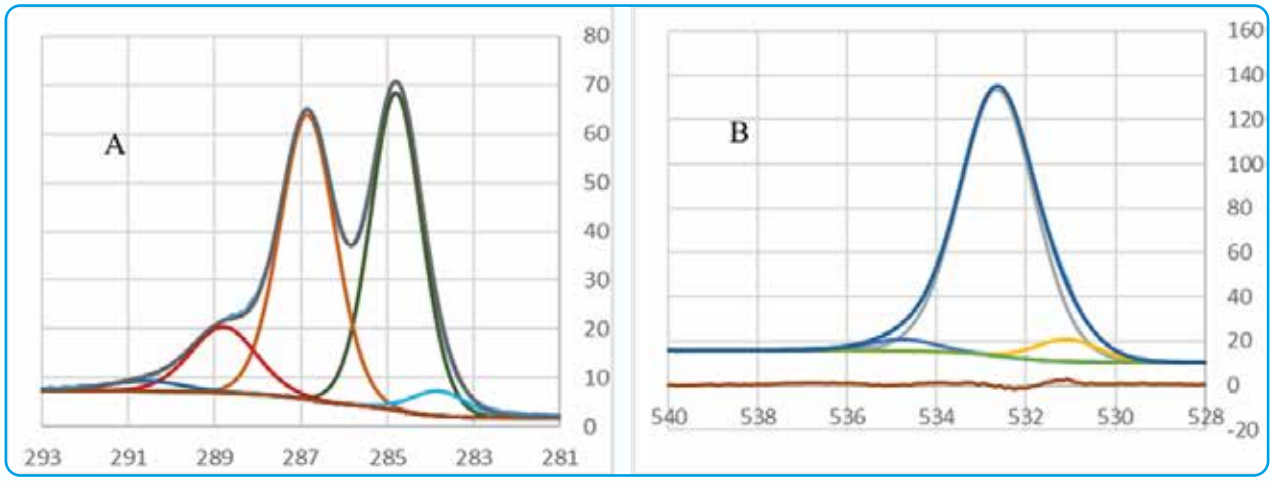


Figure-2: XPS survey scan analysis of deconvolated bonding energy of binding energy of R-4 graphene oxide. (A) C1s Scan Peak deconvolution of R-2 graphene oxide and (B) O1s Scan Peak deconvolution of R-2 graphene oxide.

Special Allocation Project

1. Recycling of waste polyolefin to manufacture new composite materials reinforced with jute fibers.

Shahin Sultana (PI), and Md. Khabir Uddin Sarker

Introduction:

At a global level, plastic production and waste continues to rise. In Bangladesh, around 977,000 tons of plastic consumed in 2020, only 31 percent were recycled and the rest 69% were mismanaged and end up in the landfills, rivers and oceans. It is causing serious health and environmental hazards. So plastic recycling is crucial to overcome the plastic pollution. In order to save our health and environment, it is possible to turn these plastic wastes into resources. In this project, waste polyolefin (PO) and jute fiber based value added products will be produced to meet our local demand.

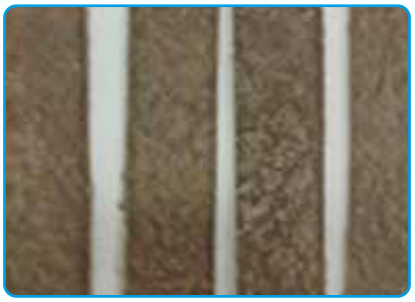
Objectives:

- To prepare injection moulded composites using waste POs and jute fibers
- To prepare compression moulded composites using waste POs and jute fibers
- To prepare composite films/ sheet by solution casting method using waste PO and jute fibers

Work progress:

- Waste PO and jute fiber based injection molded and compression molded compositesb have been prepared and characterized.
- One paper has been published and another one paper is ready for submission.

Injection molded PO-Jute composites



Compression molded PO-Jute composites

2. Development of third generation material-driven lignocellulosic-feedstock biorefinery system: Chemical modification of alkali-lignin

Swapan Kumer Ray and Riyadh Hossen Bhuiyan

Brief discussion:

Since the current biorefineries employ sophisticated conversion techniques to provide the needed products and energy, a financially viable biorefinery must meet two key criteria, (i) simple separation and fractionation technologies and does not produce any waste streams, and (ii) generic solutions that will apply across multiple feedstock. The primary objective of traditional lignocellulosic biorefineries, first and foremost, is to harvest valuable products from the carbohydrate fractions. Until now, only a few lignin-first approaches have been well disclosed. Because there is no such thing as a universal or one size-fits-all biorefinery, further research is of paramount importance to expand the portfolio of potential valorization routes, both with respect to the lignin fraction as to the residual pulp. Lignin is no longer treated as a subordinate biomass constituent, but instead as a primary valorisation target through modification, without compromising the carbohydrate fraction.

Objectives:

- Development of third generation material-driven lignocellulosic feedstock biorefinery system following green chemistry principles.
- Modification of alkali-lignin and applications of the products in plastic, rubber, biomedical, agricultural and other industries.
- Assist to manage and utilize waste lignocellulosic biomasses as raw materials to develop large-scale biorefinery industries and reduce environmental pollution.

Work progress:

- A material-driven lignocellulosic feedstock biorefinery system has been developed to isolate alkali-lignin from black liquor with higher yield.
- A new method for the acetobromination of alkali-lignin has been developed. The product was characterized by different instrumental techniques, including XPS, SEM-EDX, etc.
- A manuscript is ready for submission.
- A process is ready for submission.
- A patent is ready for submission.

Graphical abstract

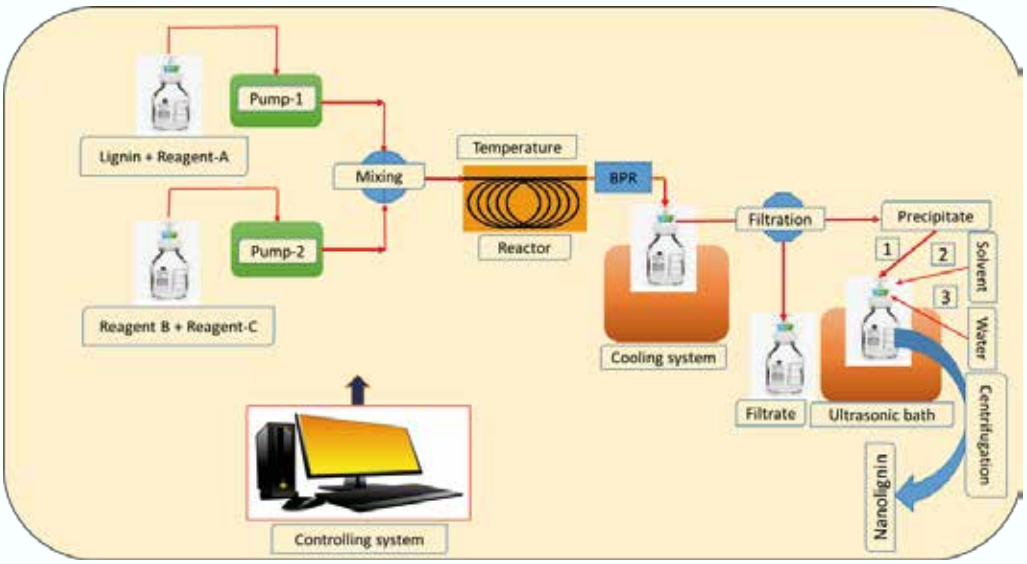


Figure 1: Continuous flow synthesis of modified alkali-lignin nanoparticles

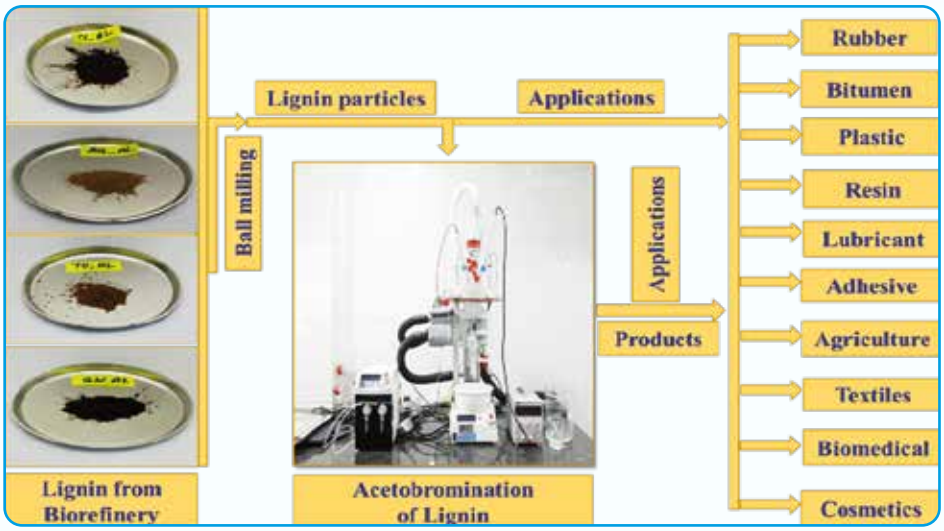


Figure 2: Applications of modified alkali-lignin in different fields

3."Utilization of Chrome Containing Leather Waste in Development of Metal Based Green Composite Material".

Dr. S. M. Asaduzzaman Sujan (PI), Dr. Md. Tushar Uddin (Co-PI)

Introduction:

To gain more profit, more employment facilities, as well as protect the environment, tannery waste materials need to be utilized properly. The present study mainly focused on the formulation of chrome shaving-poly vinyl alcohol (CS-PVA) composite sheets to be employed in clothing, regenerated leather, decoration field, key chain holder, packaging, footwear products such as shoe soles, insole, etc. The goal of this work is to fabricate flexible composite sheets from CS and PVA, an easily available water-soluble synthetic polymer with excellent mechanical properties, biocompatibility, biodegradability, non-toxicity, and chemical resistance. PVA and CS were partially hydrolyzed by nitric acid and then CS-PVA composite sheets were prepared using various proportions of PVA and CS. The thermal, mechanical, and morphological properties of the prepared CS-PVA composite sheets were studied. Applying the criteria of "clean and green technology", this study presents an easy technology for solid tannery waste management.

Objectives:

The objectives of the project are to:

- To treat tannery solid waste
- To produce valuable product collagen
- To develop green metal based composite material
- To create green environment

Work Progress:

- Chrome shavings (CS) were obtained from tannery industry situated at Savar, Dhaka, Bangladesh. CS-PVA sheet was prepared by mixing PVA in different weight ratios, such as 10, 20, 30, 40 and 50 wt % based on the weight of CS.
- Characterization of flexible composite sheet have been done by FT-IR, SEM, STA, and UTM.
- One paper has been accepted title "Development of flexible composite sheet with chrome shavings using polyvinyl alcohol as a cross linker" in the International Journal of Polymer Science.
- Project completion report has been submitted to the Ministry of Science and Technology.

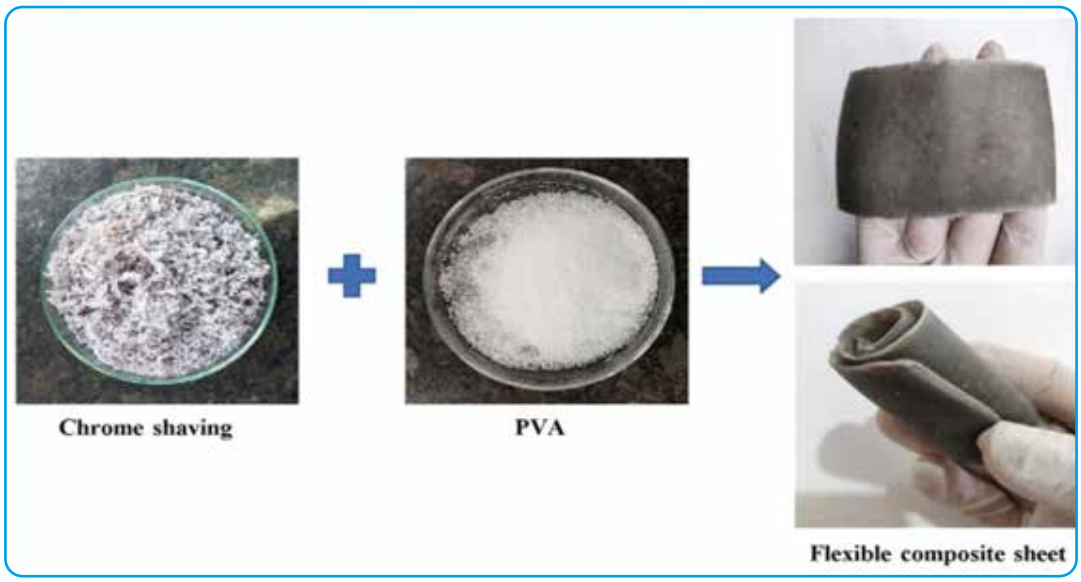


Figure 1: Continuous flow synthesis of modified alkali-lignin nanoparticles

Achievement and Activities

Published Papers:

1. Shahin Sultana, Khaleda Akter, Md. Khabir Uddin Sarker, Riyadh Hossen Bhuiyan, Mohammad Majedul Haque, and Md. Rafiqul Islam, "Color Fastness and Tensile Properties of Cotton Fabric Dyed with Extract from Albizia Procera Sawdust," Fibers and Polymers, 2022. DOI 10.1007/s12221-022-4707-x
2. Shahin Sultana, Md. Khabir Uddin Sarker, Zahidul Islam, and Muhammad Saiful Islam,"Comparative Analysis of Compression Molded Products of Recycled Waste Poly(Vinyl Chloride) Fill Materials and Virgin Poly(Vinyl Chloride)," J. Eng. Technol. Sci., 2022, 54(4), 220412.
3. Shahin Sultana, Shahnawaz Alom, Shamima Akhter Eti and Farzana Khan Rony, "Mechanical Behavior Of Polysaccharide Based Biopolymer Synthesized From The Seed Kernel Of Tamarindus Indica L" Advances In Materials Science, 2023, 23 (1). DOI: 10.2478/adms-2023-0004
4. Shahin Sultana, Zahidul Islam, Md. Khabir Uddin Sarker, Shamima Akther Eti, Swapan Kumer Ray and Samia Tabassum, "Development and assessment of thermosetting resin modified thermoplastic poly(vinyl alcohol) based biocomposites reinforced with Corchorus olitorius cellulose microfiber" has been accepted for publication in the Journal of Wuhan University of Technology-Materials Science Edition, 7 June, 2023.
5. Ray, S.K., Bhuiyan, R.H., Islam, M.S., Abedin, M.J., Islam, Z. and Hasan, R. Combined Use of Natural Rubber, Biomass and Plastic Wastes in Bitumen Modification and Flexible Pavement Construction. In Proceedings of the RILEM International Symposium on Bituminous Materials: ISBM Lyon. 2022. Springer International Publishing.
6. Uddin, M.N., Ray, S.K., Islam, M.S., Karim, M.M. and Jahan, M.S. Quantification of components of textile fabrics by using chemometric techniques with FT-NIR spectroscopic data. Bangladesh Journal of Scientific and Industrial Research, 2022. 57(4), 229-238.
7. Mohammad Amirul Hoque, Shahin Sultana, Md. Khabir Uddin Sarker and Zahidul Islam,"Recycling Waste Polypropylene to Produce New Composite Materials with Jute Reinforcements" has been accepted for publication in the Journal of Advances in Materials Science, 18 July 2023.
8. Most Afroza Khatun, Shahin Sultana, Zahidul Islam, Mohammad Shahriar Kabir, Md Sahadat Hossain, Husna Parvin Nur, A.M. Sarwaruddin Chowdhury, "Extraction of crystalline nanocellulose (CNC) from date palm mat fibers and its application in the production of nanocomposites with polyvinyl alcohol and polyvinylpyrrolidone blended films" Results in Engineering, 2023, 17, 101031. https://doi.org/10.1016/j.rineng.2023.101031

9. S. Sultana, M. K. U. Sarker and S. A. Eti, "Development and Testing of Waste Poly (Vinyl Chloride) Based Solvent Cement for Bonding of Poly (Vinyl Chloride) Pipes and Fitting", Journal of Science and Technology Research, 2022, 04 (1) 165-172.
10. Ajadur Rahman Shakil, Most. Laboni Begum, Md. Aftab Ali Shaikh, Shahin Sultana, Md. Shahidur Rahman, Md. Mahamudul Hasan Rumon, Chanchal Kumar Roy, and Md. Anamul Haque, "Jute Fiber Reinforced Hydrogel Composite for Removal of Methylene Blue Dye from Water" Dhaka Univ. J. Sci., 2022, 70(2), 59-64. DOI: https://doi.org/10.3329/dujs.v70i2.62608
11. Shashanka Shekhar Sarker, Taslima Akter, Sahana Parveen, Md. Tushar Uddin, Ajoy Kanti Mondal, S.M. Asaduzzaman Sujan* "Microalgae-based green approach for effective chromium removal from tannery effluent: A review. Arabian Journal of Chemistry, online 16 June 2023.
12. Md. Tushar Uddin, S.M.A. Sujan, Zuwu Tang, Digafe Alemu, Hosne Ara Begum, Jianguo Li, Fang Huang, Yonghao Ni, Ajoy Kanti Mondal. "Preparation of lignin-based hydrogels, their properties and applications". International Journal of Biological Macromolecules, online June 2023.
13. S. M. A. Sujan*, Mosharof Hossain, M. Nashir Uddin, A.N.M. Fakhruddin "Optimization of alkali concentration in the pretreatment of sugarcane bagasse for ethanol production", Bangladesh J. Sci. Ind. Res., 2023. Vol.58 (2), 89-98.
14. M. Mahbubur Rahman, M. Mostafizur Rahman, Md. Abu Bin Hasan Susan, M. Sarwar Jahan, Production of Nanomaterials from Forest Resources, Materials Research Foundations, 2023, Vol. 148, pp 200-228.
15. Islam, M. M., Islam, R., Hassan, S. M., Karim, M. R., Rahman, M. M., Rahman, S & Georghiou, P. E. Carboxymethyl chitin and chitosan derivatives: synthesis, characterization and antibacterial activity. Carbohydrate Polymer Technologies and Applications, 2023, 5, 100283.
16. Rahman, M. M., Alam, M., Rahman, M. M., Susan, M. A. B. H., Shaikh, M. A. A., Nayeem, J., & Jahan, M. S. A novel approach in increasing carboxymethylation reaction of cellulose. Carbohydrate Polymer Technologies and Applications, 2022, 4, 100236.
17. Md. Badiuzzaman Khan, Sabina Yeasmin Urmy, Shamsunnahar Setu , Abeer Hossain Kanta , Sneha Gautam , Shamima Akther Eti , Mohammad Mahbubur Rahman, Niger Sultana, Shahed Mahmud, Md. Abdul Baten. Abundance, distribution and composition of microplastics in sediment and fish species from an Urban River of Bangladesh Science of the Total Environment. Vol: 885, 10 August 2023, 163876.
18. N. Sultana, M. M. Rahman and S. A. Eti. Pollution loads identification and ecological risk assessment of heavy metals in Patuakhali Coastal Sediment of Bangladesh. Bangladesh Journal of Scientific and Industrial Research. May, 2023.
19. Mohammad Nazrul Islam Bhuiyan, Kazi Asma Ahmed Shamima, Meher Nahid, Sadia Afrin, Mohammad Amirul Hoque, Mohammad Majedul Haque, Mohammad Khabir Uddin Sarker, Mohammad Abdus Satter Miah, Mohammad Aftab Ali Shaikh, "Decolorizing Stevia rebaudiana (Bert.) Leaf Extracts with Activated Charcoal and Qualitative Analysis of Stevioside Using Chromatographic Methods" *Journal of Chromatography and Separation Techniques,* 2023, 4(3) 513-518. (Inter institution, IFST)
20. Muhammad Saiful Islam, Zahidul Islam, AHM Shofiul Islam Molla Jamal, Nasima Momta, Sadia Afrin Beauty "Removal efficiencies of microplastics of the three largest drinking water treatment plants in Bangladesh" Science of the Total Environmen, 2023, 895, 165155.
21. Muhammad Saiful Islam, Md Rashed Hasan, and Zahidul Islam. "Abundance, characteristics, and spatial–temporal distribution of microplastics in sea salts along the Cox's Bazar coastal area, Bangladesh." Environmental Science and Pollution Research, 2023, 8, 19994-20005.
22. Muhammad Saiful Islam, Zahidul Islam, Rashed Hasan, and AHM Shofiul Islam Molla Jamal. "Acidic hydrolysis of recycled polyethylene terephthalate plastic for the production of its monomer terephthalic acid." Progress in Rubber, Plastics and Recycling Technology, 2023, 1, 12-25.
23. Muhammad Saiful Islam, Zahidul Islam, and Md Rashed Hasan. "Pervasiveness and characteristics of microplastics in surface water and sediment of the Buriganga River, Bangladesh." Chemosphere, 2022, 307, 135945.
24. Md Zia Uddin Al Mamun, Md Sahadat Hossain, Shyama Prosad Moulick, Mohajira Begum, Rahima Akter Sathee, Md Sujan Hossen, Farhana Jahan, Riyadh Hossen Bhuiyan et al. & quot, 2023.

Nano-crystallite bones of Oreochromis niloticus and Katsuwonus pelamis for the photocatalytic degradation of Congo red dye.& quot ; Heliyon (SCIE & Scopus Index Journal, IF: 4), 2023, DOI: https://doi.org/10.1016 /j.heliyon . e18012

25. Islam, Md Johurul, Nazia Khatun, Riyadh Hossen Bhuiyan, Shahnaz Sultana, Md Aftab Ali Shaikh, Md Nur Amin Bitu, Fariha Chowdhury, and Suravi Islam, 2023. "Psidium guajava leaf extract mediated green synthesis of silver nanoparticles and its application in antibacterial coatings." RSC advances, 2023. 13, no. 28: 19164-19172.
26. Karim, R., Nahar, K., Zohora, F.T., Islam, M.M., Bhuiyan, R.H., Jahan, M.S. and Shaikh, M.A.A. Pectin from lemon and mango peel: Extraction, characterisation and application in biodegradable film. Carbohydrate Polymer Technologies and Applications, 2022, 4, p.100258.
27. Molla, M.R., Begum, M.H.A., Farhad, S.F.U., Asadur Rahman, A.S.M., Tanvir, N.I., Bashar, M.S., Bhuiyan, R.H., Alam, M.S., Hossain, M.S. and Rahman, M.T. Facile extraction and characterization of calcium hydroxide from paper mill waste sludge of Bangladesh. Royal Society Open Science, 2022, 9(8), p.220681

Patents:

1. Swapan K Ray, Riyadh H Bhuiyan, Tanvir Muslim and M Q Ehsan, "A novel and green material-driven phase III lignocellulosic feedstock biorefinery process to prepare alkali-lignin and NPK-fertilizers from black liquor", Submitted to the office of the Patents and Design and Trademarks, Motijheel, Dhaka, No. P/BD/2023/000162, Dated: 14.06.2023

Process:

1. Dr. Mohammad Nazrul Islam Bhuiyan, Mohammad Amirul Hoque, Dr. Md. Abdus Satter Miah, Samina Akter, Dr. Md. Faridul Islam, “Formulation of Milk Flavour” accepted by the authority of BCSIR. Date: 11.06.2023, Rrf.:39.02.0000.043.37.940.22/537. (Inter institution, IFST).
2. Dr. Mohammad Nazrul Islam Bhuiyan, Mohammad Amirul Hoque, Dr. Md. Abdus Satter Miah, Dr. Ashish Kumar Sarker, Dr. Tasnim Farzana, “Formulation of Cardamon Flavour” accepted by the authority of BCSIR. Date: 11.06.2023, Rrf.:39.02.0000.043.37.937.22/536. (Inter institution, IFST).
3. Dr. Mohammad Nazrul Islam Bhuiyan, Mohammad Amirul Hoque, Dr. Md. Abdus Satter Miah, Mrs. Evena Parvin Lipy, Dr. Tasnim Farzana, “Formulation of Eucalyptus Flavour” accepted by the authority of BCSIR. Date: 30.04.2023, Rrf.:39.02.0000.043.37.939.22/1280. (Inter institution, IFST).
4. Dr. Mohammad Nazrul Islam Bhuiyan, Dr. Sadia Afrin, Mohammad Amirul Hoque, Dr. Md. Abdus Satter Miah, Mrs. Evena Parvin Lipy, “Formulation of Pineapple Flavour” accepted by the authority of BCSIR. Date: 29.09.2022, Rrf.:39.02.0000.043.37.824.20/1015. (Inter institution, IFST).
5. Dr. Mohammad Nazrul Islam Bhuiyan, Mohammad Amirul Hoque, Dr. Md. Abdus Satter Miah, Dr. Ashish Kumar Sarker, Dr. Tasnim Farzana, “Formulation of Lemon Flavour” accepted by the authority of BCSIR. Date: 10.11.2022, Rrf.:39.02.0000.043.37.875.21/195. (Inter institution, IFST).

Scientists pursuing M.S/M.Phil/ PhD Courses in home or abroad:

1. Shahin Sultana, PSO, Fibre & Polymer Research Division pursuing PhD degree in the department of Theoretical and Computational Chemistry, University of Dhaka, Bangladesh under supervision of (Dr. Mohammed Abdul Aziz, Professor and Dr. Md. Saiful Islam, Professor) and working on “Synthesis and characterization of modified acrylic polymers and natural fiber reinforced polymer composites” in 2016-2017 session.
2. Swapan Kumer Ray, PSO, Fibre & Polymer Research Division pursuing PhD degree in the department of Chemistry, University of Dhaka, Bangladesh under supervision of (Md. Qamrul Ehsan, Professor and Dr. Tanvir Muslim, Professor) and working on “Preparation of Submicron Lignin Particles from Different Lignocellulosic Biomass and their Modification” in 2018-2019 session.
3. Mohammad Mahbubur Rahman, PSO, Fibre & Polymer Research Division pursuing PhD degree in the department of Chemistry, University of Dhaka, Bangladesh under supervision of (Dr. Abu Bin Hasan Susan, Professor Dr. Md. Mominul Islam, Professor and Dr. Md. Sarwar Jahan) and working on “Ionic Liquid and their Double Salts for Dissolution and Modification of Cellulose” in 2017-2018 session.

4. Shamima Akther Eti, SSO, Fibre & Polymer Research Division pursuing PhD degree in the Department of Soil, Water & Environment, University of Dhaka, Bangladesh under supervision of (Dr. Mohammed Enayet Hossain, Associate Professor, Dr. Shahid Aktar Hossain, Professor, Department of Soil, Water & Environment and Dr. Md. Mominul Islam, Professor, Department of Chemistry) and working on "Development of Polyaluminum Chloride-Based Coagulants from Aluminum Scrap for the Treatment of Textile Wastewater" in 2017-2018 session.
5. Mohammad Amirul Haque, SSO, Fibre & Polymer Research Division pursuing PhD degree in the department of Applied Chemistry & Chemical Engineering, University of Dhaka, Bangladesh under supervision of (Dr. Md. Nurunnabi, Professor and Dr. Md. Mostafizur Rahman, Professor) and working on "Synthesis, characterization and application of Graphene materials" in 2018-2019 session.

Industrial Tours / Dissemination:

Name and Designation	Name of the Institute	Date
Mohammad Amirul Hoque, SSO and Md. Khabir Uddin Sarker, SSO	Bangal Synthetic fiber ltd. Ispahani Marshal Ltd.	27-31 May, 2023

Guidance to research work (PhD/M.Phill/ M.Phill/ M.S/ NCST & BCSIR Fellow)

Sl. No.	Title of Research	Research Catagory	Name of Student	University / Institute	Supervisors in BCSIR
01.	Synthesis and characterization of natural rubber modified unsaturated polyester resin and composite materials	M.S	Md. Ashraful Haque	Department of Chemistry, University of Dhaka	Shahin Sultana, PSO and Dr. Md. Ershad Halim, Professor
02.	Preparation and Characterization of Biopolymer-Based Biocomposite Materials	M.S	Mohammad Musfiqur Rahman	Department of chemistry, University of Dhaka	Shahin Sultana, PSO and Dr. Md. Ershad Halim, Professor
03.	Preparation of lignin-based biodegradable film and characterization	M.S	Supti Paul	Dept. of Chemistry, DU	Prof. Dr. M Q Ehsan and Swapan K Ray, PSO
04.	Synthesis of hemicellulose-based hydrogel, characterization and applications	M.S	Md. Al Amin	Dept. of Chemistry, DU	Prof. Dr. Tanvir Muslim and Swapan K Ray, PSO
05.	Catalytic conversion of bagasse to furfural hydrazone dye and characterization	M.S	Rupok Sarker	Dept. of Chemistry, DU	Prof. Dr. Tanvir Muslim and Swapan K Ray, PSO
06.	Facile synthesis of acrylamide grafted lignin hydrogel and their potential in formulation of slow release NPK fertilizer	M.S	Sarna Khanam	BUST, Gopalgonj	Farzana Yeasmin, Asst. Prof. and Swapan K Ray, PSO

Sl. No.	Title of Research	Research Catagory	Name of Student	University / Institute	Supervisors in BCSIR
07.	Assessment of heavy metal migration from one-time takeout container and health risk in Bangladesh	M.S	Jahidul Hasan Shourove	Food Engineering and Tea Technology, SUST	Shamima Akther Eti and Dr. G M Robiul Islam, Professor
08.	Efficient Nutrients (NP) Recovery from Wastewater using Calcinated Magnatic Layered Double hydroxide/ HydroxHapetite (CMLDH-HAP)	M.S	Mahmuda	Environmental Science, NSTU	Shamima Akther Eti and Mohammad Mohinuzzaman, Professor
09.	Application of Mollusc shells (Mos)-derived Bioadsorbent for the remediation of hexavalent chromium from auueous solutions: Isotherm, kinetic and Thermodynamic studies.	M.S	Nurunnahar	Environmental Science, NSTU	Shamima Akther Eti and Mohammad Mohinuzzaman, Professor
10.	Microwave Synthesis and Application of Graphene Materials	M.S	Shoyeb Saharia	University of Barishal	Mohammad Amirul Hoque

Participation in training / Seminar/ Symposium/ Workshop/ Conference:

1. Shahin Sultana, PSO, has participated International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) held at University of Dhaka and CIRDAP on 02-04 September, 2022.
2. Shahin Sultana, PSO, has participated in BCSIR Congress held at BCSIR on 01-03 December, 2022.
3. Shahin Sultana, PSO, has participated in NAME conference held at Cox's Bazar on 07-08 January, 2023.
4. Shahin Sultana, PSO, has participated in the 1st International Science Conference for Women-2023 organized by Dhaka Nanomaterials Group held at Hotel Pan Pacific Sonargaon, Dhaka on 15-16 February, 2023.
5. Swapan Kumer Ray, PSO, has participated in the training course on "Techno Economical and Feasibility Study", held in 23 October 2022, organized by BCSIR Dhaka Labs.
6. Swapan Kumer Ray, PSO, has participated in the training course on "National Training and Mentoring Program for Young Innovators of Bangladesh (Phase II)", held in 10-11 October 2022, organized by Patent, Design and Trademark Office, BD and WIPO, UN
7. Swapan Kumer Ray, PSO, has participated in the training course on "Business Opportunities of Plastics Recycling Industries in Bangladesh", held in 18 October 2022, organized by SME Foundation, Dhaka
8. Swapan Kumer Ray, PSO, has participated in the BCSIR Congress-2022, held in 1-3 December 2022, organized by BCSIR and presented a research paper.
9. Swapan Kumer Ray, PSO, has participated in the International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022), held in 2-4 September 2022, organized by Bangladesh Awami League and presented a research paper.

10. Swapan Kumer Ray, PSO, has participated in the International Conclave on Materials, Energy and Climate (ICMEC 2022) held in 19-20 December 2022, organized by Dept. of Applied Chemistry and Chemical Engineering, DU and presented a research paper.
11. Swapan Kumer Ray, PSO, has provided a training on "FT-Raman Spectroscopy: Theory and applications in Polymer Chemistry", on 7-11 May 2023, organized by Central Analytical and Research Facilities (CARF), BCSIR.
12. Swapan Kumer Ray, PSO, has provided a training on "FT-MIR-NIR Spectroscopy: Theory and applications", on 14-18 May 2023, organized by Planning & Development Division, BCSIR, Dhaka
13. Dr. S.M. Asaduzzaman Sujan, PSO, has participated in the training course on "Clearance of import-export cargoes in relation of Customs procedure and WTO TFA requirement" organized by Feed the Future Bangladesh Improving Trade and Business Enabling Environment Activity, Dhaka, January 16, 2023.
14. Dr. S.M. Asaduzzaman Sujan, PSO, has participated in the training course on "Different Techniques of R&D Data Analysis and their Applications" BCSIR Laboratories, Dhaka, BCSIR, 26 June, 2023.
15. Dr. S.M. Asaduzzaman Sujan, PSO, has participated in the training course on "Simultaneous Thermal Analyzer (STA)" LRI, BCSIR, Savar, 04-08 June, 2023.
16. Mohammad Mahbubur Rahman, PSO, has participated International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) held at University of Dhaka and CIRDAP on 02-04 September, 2022.
17. Mohammad Mahbubur Rahman, PSO, has participated in BCSIR Congress held at BCSIR on 01-03 December, 2022.
18. Shamima Akther Eti, SSO, has participated International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) held at University of Dhaka and CIRDAP on 02-04 September, 2022.
19. Shamima Akther Eti, SSO, has participated in BCSIR Congress held at BCSIR on 01-03 December, 2022.
20. Shamima Akther Eti, SSO, has participated in the 1st International Science Conference for Women-2023 organized by Dhaka Nanomaterials Group held at Hotel Pan Pacific Sonargaon, Dhaka on 15-16 February, 2023.
21. Shamima Akther Eti, SSO, has participated in training program on "Different Techniques of R & D Data Analysis and their Application" held at BCSIR Laboratories, Dhaka on 26 June, 2023.
22. Mohammad Amirul Hoque, SSO, attended the training program on "Learning Session on Patent Drafting and Industrial Process" held on 24 May, 2023 at BCSIR Dhaka Laboratories.
23. Mohammad Amirul Hoque, SSO, attended the training program on "Operation and maintenance of Simultaneous Thermal Analyzer (STA)" held on 04-08 June, 2023 at LRI, BCSIR, Savar, Dhaka.
24. Mohammad Amirul Hoque, SSO, has attended the training program on "Different Techniques of R&D Data Analysis and Their Applications" held on 26 June, 2023 at BCSIR Dhaka Laboratories.
25. Zahidul Islam, SO has participated in International conference BCSIR Congress -2022 organized by Bangldesh Council of Scientific and Industrial Research (BCSIR), Dhaka, Bangladesh, 01-03 December, 2022 and presented an oral presentation entitled; "Preparation and characterization of tamarind kernel powder modified urea formaldehyde resin based bamboo fiber reinforced composites"

Number of Analytical (Ad-Hoc) problem solved:

Name of the Division	Routine type	Research type	Total
Fibre & Polymer Research Division	755	175	930

Special Analytical Services to the Industries/Institutions:

1. Food grade quality of plastics to support food safety in Bangladesh.
2. Biodegradability analysis of plastics to support Ministry of Jute, BJMC, Dept. of Jute, BSTI and Department of Environment (DoE).
3. Quality analysis of geo-textile to support Bangladesh Water Development Board (BWDB) and Bangladesh Army.
4. Quality analysis of natural rubber to support Bangladesh Forest Industries Development Corporation.
5. Quality analysis of bitumen and bitumen Emulsion to support BSTI, Importers and Construction Farms.

List of pictures of Fibre & Polymer Research Division (F&PRD):
Product Picture:

Urea-Formaldehyde Molding Powder

Terephthalic acid (TPA) monomer from waste PET plastic

Modified Bitumen

Polymeric antioxidant

NPK-fertilizer (solid)

NPK-fertilizer (liquid)

Major Instruments:


Gel Permeation Chromatograph


Simultaneous Thermal Analyzer


Reaction Calorimeter


Universal Strength Tester


Flow synthesis system


Accelerated solvent extractor

Brief Biography of the Scientists of F&PRD:

Shahin Sultana (June, 1999- present)

Office	Fibre & Polymer Research Division	Blood Group	O+
Position	Principal Scientific Officer	Degree Obtained	M.Phil (2005)
Contact	shasultana@gmail.com	Mobile	01715100985

Shahin Sultana obtained M. Phil in Chemistry from Bangladesh University of Engineering and Technology (BUET). She earned both MSc and BSc (Hons) degree in Chemistry from Jahagirnagar University. Her research interests include the chemistry of polymers, fibers, composites made of recycled and virgin polymers, as well as biocomposite materials. She has authored and co-authored 32 peer-reviewed scientific journal articles. She has one accepted patent, and nine accepted processes.

Swapan Kumer Ray (June, 2006- present)

Office	Fibre & Polymer Research Division	Blood Group	O+
Position	Principal Scientific Officer	Degree Obtained	MS
Contact	swapanray_bcsir@ymail.com	Mobile	01534149306

Swapan Kumer Ray earned his both BSc and MSc degree in Chemistry from the National University, Gazipur, Bangladesh. He is pursuing his PhD in Physical Chemistry in the University of Dhaka under the joint supervision of Professor Dr. Md. Qamrul Ehsan and Professor Dr. Tanvir Muslim. His research work is mainly focused on the development of new routes for lignin modification, third generation biorefinery, self-healing bitumen, etc. He has over 18 research articles in peer-reviewed journals, 05 industrial processes and 01 patent. He has achieved training courses on the "Assessor: ISO/IEC-17025" and "Uncertainty of Measurement" from the United Kingdom Accreditation Service (UKAS) from Sunningdale park, Ascot, UK and also from the Bangladesh Accreditation Board (BAB), Dhaka, Bangladesh. He is a life member of Bangladesh Chemical Society (BCS).

Dr. S. M. Asaduzzaman Sujan (June, 2006 to till date)

Office	Fiber& Polymer Research Division	Blood Group	O+
Position	Principal Scientific Officer	Degree Obtained	PhD (2021)
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Dr. S. M. Asaduzzaman Sujan earned his both BSc and MS degree in Applied Chemistry and Chemical Technology from the University of Dhaka. He obtained Ph.D. in department of Environmental Sciences from Jahangirnagar University, Bangladesh. His research is mainly focused on the waste management, waste to valuable products and energy, RE, fire retardant chemical synthesis etc. He also completed a prestigious training course on "Research on Biomass Technology" at AIST (National Institute of Advance Industrial Science and Technology), Chugoku, Hiroshima, Japan (2007-2008). He has over 32 research articles in peer-reviewed journals and two review articles and get 210 citation (h-index: 07). Till to date he has published 32 research articles, 18 conferences papers and 3 process as well. Dr. Asaduzzaman also accomplished two projects "Mitigation of Carbon Emission and Extension of Alternative Energy usage through dissemination of Biogas Technology (1 st and 2 nd Phase)" under the Ministry of Environment and Forest, Bangladesh Climate Change Trust, Peoples Republic of Bangladesh as a Deputy Project Director and Project Director respectively. He has also completed two special allocation projects and two consultancy works. He is an associate member of Royal Society of Chemistry, UK and member of chemical society as well.

Md. Mahbubur Rahman (June, 2006- present)

Office	Fiber & Polymer Research Division	Blood Group	A+
Position	Senior Scientific Officer	Degree Obtained	M.Phil
Contact	mahbub.bcsir@yahoo.com	Mobile	01911776171

Md. Mahbubur Rahman obtained his B.Sc. (Hons) and M.S degree in chemistry from the University of Dhaka and also awarded Master of Philosophy (M.Phil) in Material Science from Bangladesh University of Engineering and Technology (BUET). He is pursuing Ph.D. on cellulose dissolution and modification by ionic liquids in Material Chemistry Laboratory, Department of Chemistry, University of Dhaka. His research interest in cellulose chemistry, material chemistry and ionic liquids. He has authored or coauthored 18 publications and get 362 citation (h-index:6) & RG score (10.30). He has three accepted process and a patent. He is a life member of BCS, BAAS,DUCAAand DUAA.

Shamima Akther Eti (December, 2009- Present)

Office	Fiber & Polymer Research Division	Blood Group	A+
Position	Senior Scientific Officer	Degree Obtained	MS (2003)
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Shamima Akther Eti earned her both B.sc Hons (4 years) and MS degree in Soil, Water & Environment from University of Dhaka. Now she is doing her PhD in Environmental Science in the same University. She is currently affiliated with Fibre & Polymer Research Division (F &PRD), BCSIR Dhaka Laboratories, Bangladesh Council of Scientific & Industrial Research (BCSIR). Her research focus is in industrial waste management, wastewater treatment & reuse. She has over 15 research articles in peer-reviewed journals. Now she is a life member of Dhaka University of Alumni Association, EDAPHOS, NITUB (Network of Instrument Technical personnel and User scientist of Bangladesh) and BCS.

Mohammad Amirul Hoque (June 2006-Present)

Office	Fiber & Polymer Research Division	Blood Group	A+
Position	Senior Scientific Officer	Degree Obtained	MS(2001)
Contact	amirul.bcsir@yahoo.com	Mobile	01720060000

Mohammad Amirul Hoque earned his both BSc and MS degree from Applied Chemistry and Chemical Technology department (Organic Chemistry) from the University of Dhaka. He is perusing his PhD in (Advanced Materials Science of Graphene) from same department. He Joined in BCSIR in 2006 and worked 17 years in Synthetic polymers. His research is mainly focused on the design, synthesis and development of advanced materials. He also worked as a Guest Researcher in National Institute of Advanced Industrial Science and Technology (AIST) Osaka Japan in 2009-10. He worked there on Biomaterial Science, especially Synthesis of Lactic acid-based Biopolymers. He has authored or coauthored 15 publications and accepted 22 process of which 5 is leased out and One Patented. He is a life member of BCS, BAAS and GACA

Md. Khabir Uddin Sarker (June, 2006- present)

Office	Fiber & Polymer Research Division	Blood Group	A+
Position	Senior Scientific Officer	Degree Obtained	MS (2010)
Contact	khabirbcsir@yahoo.com	Mobile	01817662339

Md. Khabir Uddin Sarker earned his BSc from National University and MS degree in Environmental Science from Stamford University. His research is mainly focused on the development of natural dyes, biodegradable polymers and composite materials. He has authored or coauthored 10 publications. He has10 accepted processes and one patent. He is a life member of BAS and Bangladesh Chemical Society.

Zahidul Islam (March, 2016- present)

Office	Fibre & Polymer Research Division	Blood Group	A+
Position	Scientific Officer	Degree Obtained	MS (2010)
Contact	chemizahid@gmail.com	Mobile	01814930871

Zahidul Islam has achieved his both BSc and MSc degree in Chemistry. His research interests are in the field of Thermoplastic and thermosetting resins, Plastic Technology, Microplastics and Biopolymer synthesis. He has 08 publications and 01 Patent in International Journal.

Zahidul Islam (March, 2016- present)

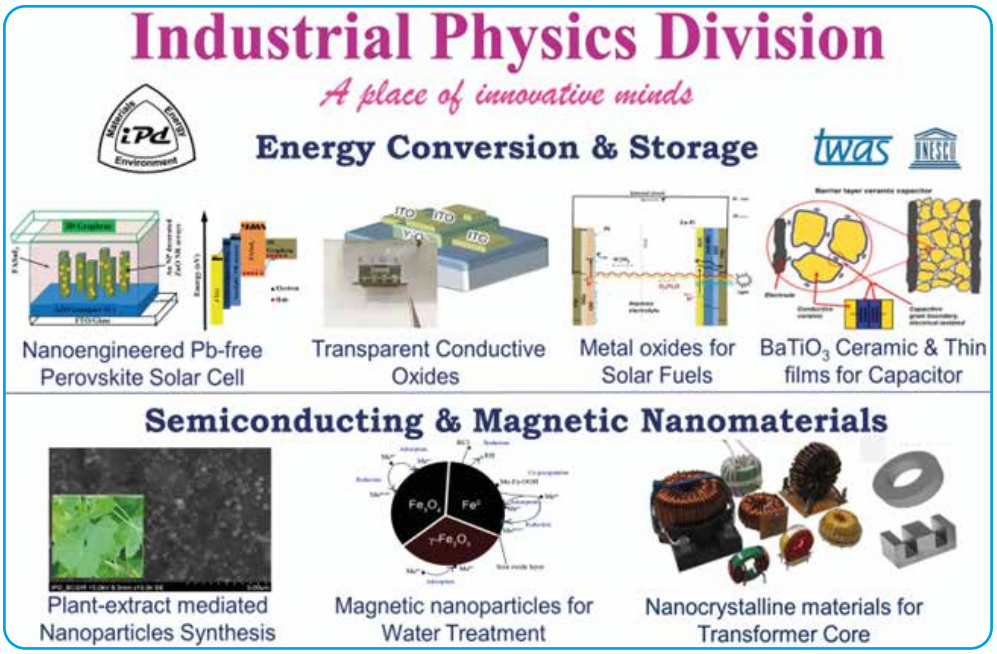
Office	Fibre & Polymer Research Division	Blood Group	A+
Position	Scientific Officer	Degree Obtained	MS (Thesis) in Inorganic Chemistry
Contact	riyadhbcsir@gmail.com	Mobile	01632072603

Riyadh Hossen Bhuiyan has achieved his both B.Sc (Hons) degree in Chemistry and MSc (Thesis) in Inorganic Chemistry. His research interests are in the field of Lignocellulosic Biomass, Biopolymer synthesis, Organic synthesis, Bitumenous materials and Active pharmaceuticals Ingredient. He has published 08 article and 01 Patent (submitted) in International Journal.

Md. Rashed Hasan (March, 2016- present)

Office	Fibre & Polymer Research Division	Blood Group	O+
Job Title	Scientific Officer	Degree Obtained	MS
Contact	rashedhasanju33@yahoo.com	Mobile	01816375618

Md. Rashed Hasan has achieved his both BSc (Hons) and MS degree in Chemistry from the Jahangirnagar University. His research interests are in the field of Biopolymer Synthesis and Modification, Microplastic Assessment & Natural Dyes Extraction. He contributes 07 publications and one patent to be a co-author.



Physicists in industry and academia have been a prime mover of industrial development as well as technological advances of modern products by translating fundamental discoveries into viable commodities and state-of-the-art tools that improve our way of life. In this era of fast-changing technology, materials and device physicists/engineers experience immense challenges globally to reduce the time and expense required to bring products and services to the end users. With this challenge in mind, Industrial Physics Division (IPD) has been engaged in the cutting-edge R&D activities in the field of materials and energy for sustainable development. Scientists and researchers of this division play a pivotal role to solve problems quickly in a wide range of academic and industrial areas, devising custom-made tools and using unconventional techniques for better understanding the synthesized as well as imported products. Tailoring material properties at the nanoscale as well as adopting advanced and high-precision measurements techniques are the core of IPD activities to fulfill the needs of diverse stakeholders as well as for upholding the country's scientific development strategy.

- Number of Scientists:07
- Total Ongoing R&D: 05
- Special Allocation: 01
- Analytical Services: 20
- Published Papers: 10

R&D Projects:

1. Development of eco-friendly dielectric ceramic materials for energy storage applications

Suravi Islam (PL), Dr. Syed Farid Uddin Farhad, Nazia Khatun, Nazmul Islam Tanvir, Dr. Samia Tabassum, Monika Mahmud, Md. Shehan Habib, Md. Saidul Islam

Introduction

All around the world, dielectric materials are playing a leading role in the scientific, technical and electronic devices. However, most of the commercial electronic devices are based on lead(Pb) which is a serious concern for environment. This situation drives strongly the need to replace lead-based piezoelectric materials like PZT which contains more than 60% of a toxic element, Pb. In the last decade, researchers showed huge interest towards development of lead-free environment friendly dielectric ceramic materials. Our research will focus on improving the functional response of environment friendly (lead free) dielectric ceramic materials.

Objectives:

- To develop eco-friendly dielectric ceramic materials with different compositions and different

sintering conditions.

- To optimize physical and electrical properties of the ceramic materials in small (laboratory) scale.

Work Progress:

- Two set of samples have been synthesized. Among them one set of Yttrium doped Barium Titanate (Y-BT) Ba1-xYxTiO3 (with x=0.00, 0.01, 0.03, 0.05, 0.07 mmol) sample have been prepared by Sol-gel method. The structural, electrical and optical properties of the synthesized samples were investigated by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), impedance analyzer and UV-Vis- NIR Spectroscopy.
- Poster presentations at International conferences, BCSIR congress-2022 , ICEPSD-2022 and WSTC-2023.
- One research paper was published to a reputed Journal and writing of one research paper is in progress.

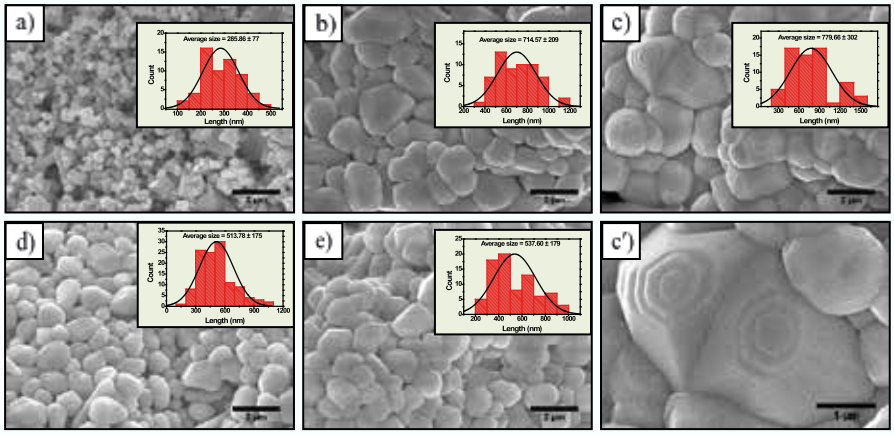


Fig. FESEM micrographs with Grain size distribution curve of Ba1-xYxTiO$_3$ (where a,b,c,d,e are x= 0.00, 0.01, 0.03, 0.05 and 0.07 respectively and c' is magnified view of c)

2. Fabrication of highly Transparent and Conducting Substrate (TCS) of using low cost and environment friendly materials for consumer electronics

Dr. Syed Farid Uddin Farhad(PL), Suravi Islam , Mohammad Sajjad Hossain, Nazmul Islam Tanvir and Md. Saidul Islam

Introduction:

Transparent and Conducting Substrates (TCS) is one of the major components for consumer electronics such as flat panel displays, smart phone, touch screen, low-emissivity energy-conserving windows, photo-electrochemical device and more importantly in solar cells. This project focuses on the use of low cost and environment friendly materials for the facile fabrication of highly transparent and conducting substrates/electrodes for optoelectronic and solar cell industry.

Objectives:

- To synthesis Binary/Ternary copper oxide, AZO, SnO_2, NiO_x and Graphene (reduced Graphene oxide (rGO)
- Optimization of physical and chemical properties of synthesized TCS and study of their performance comparedto the commercial TCS

Work Progress:

Cu_xO (x=1,2), ZnO, AZO, SnO_2 were successfully synthesized by wet-chemical techniques and reported in the peer-reviewed journals thin films. Using the technology learned from those film processing,

recently novel wide-bandgap $ZnCl_2$ thin films have been synthesized. Some physicochemical properties of as-synthesized ZnCl2 characterized by UV-Vis-NIR, FE-SEM, FTIR and XPS equipment are shown in figure-1.

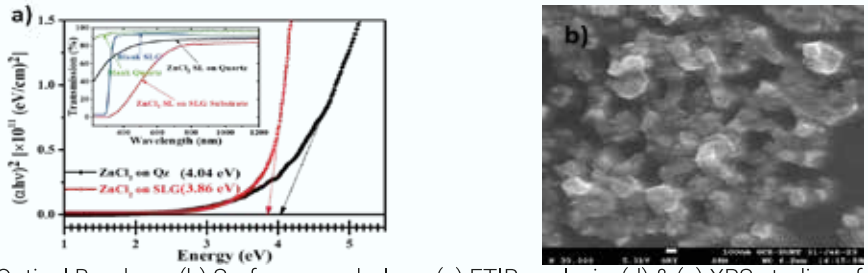


Figure-1: (a) Optical Bandgap, (b) Surface morphology, (c) FTIR analysis, (d) & (e) XPS studies of ZnCl2 thin films

- Nanostructured NiOx thin films have also been synthesized by a simple hydrothermal process atop pre-coated NiO/SLG susbstratre. Figure-2 shows surface morphology of these films.

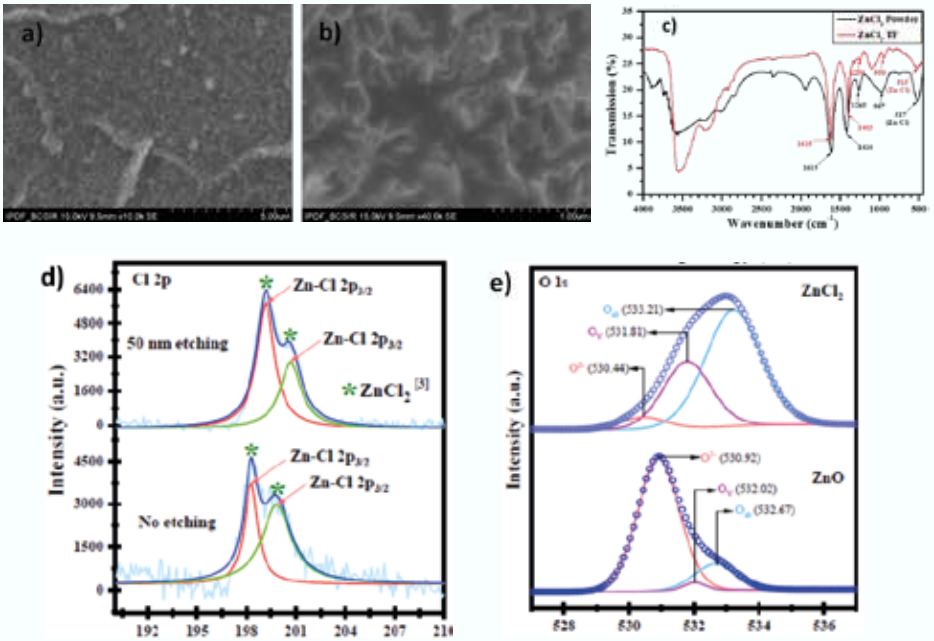


Figure-2: SEM image of NiOx thin film in a) 5.00 µm scale & b) 1.00 µm scale

- We have designed and fabricated a portable light source (PLS) with Variable Wavelength, Intensity and Illumination period to characterize our samples. This light source can also be used on any other thin films, photocatalysts etc. where their photophysical or photochemical properties are needed to be determined (Figure-3). A process has alread accepted and a patent was submitted for this innovation.

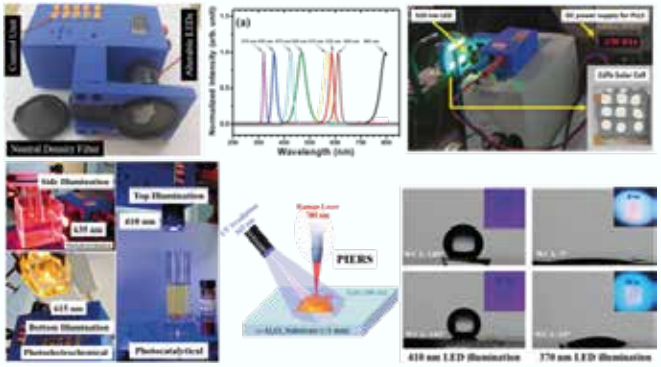


Figure-3: LED based multifunctional and portable Light source (PLS), available wavelengths range of PLS, its application for characterizing Solar Cells, Photocatalysts, Photoinduced Enhanced Raman Spectroscopy (PIERS), Bandgap matched UV illuminated monitoring of water contact angles of nanostructured thin films.

3. Synthesis of magnetic nanoparticles for electrical and electronic devices

Nazia Khatun (PL), Suravi Islam, Dr. Syed Farid Uddin Farhad ,Md. Shehan Habib, Nazmul Islam Tanvir, Md. Saidul Islam and Mahmuda Hakim

Introduction:

Nanoparticles (NPs) have tremendously revolutionized multiple sectors of our society due to their ability to be used in diverse applications. Recently, magnetic nanoparticles, have attracted enormous interest due to their salient use in several sectors, including energy, environmental, agricultural, medical, and industrial. Ferrites exhibit excellent electrical and magnetic properties. The advantages of ferrites include high electrical resistivity, low eddy current loss, high permeability and time-temperature stability, wide frequency range, shape versatility, low cost, etc. Ferrites have multitude usages such as permanent magnet, magnetic shielding, magnetic sensors, magnetic recordings, information storage, mobile communication, electronic devices, gyromagnetic device, medical devices, transformers, sensors, pollution control, catalysis, pigments, etc. In this work nano magnetic materials will be used and determined their usefulness in potential application in energy and electronic industries. Now Bangladesh is committed to achieve sustainable development goals (SDG) and we hope this project should be contributory to this purpose.

Objective

- To develop magnetic nano materials with different compositions
- To characterize and property determination (physical, electrical and magnetic properties) of synthesized nanomaterial

Work Progress:

- La-doed Cobalt-Zinc ferrites has been successfully synthesized with different composition by Sol-gel auto combustion technique and some physicochemical properties of as-synthesized La-doed Cobalt-Zinc ferrites has been done by XRD, FTIR, FE-SEM, EDS, UV-VIS-NIR spectroscopy and VSM are shown in figure-1.
- Poster presentations at International conferences, BCSIR congress-2022 , BPS-2023 and WSTC-2023.
- One paper was published in the international journal.
- A home built humidity sensor setup has been developed.

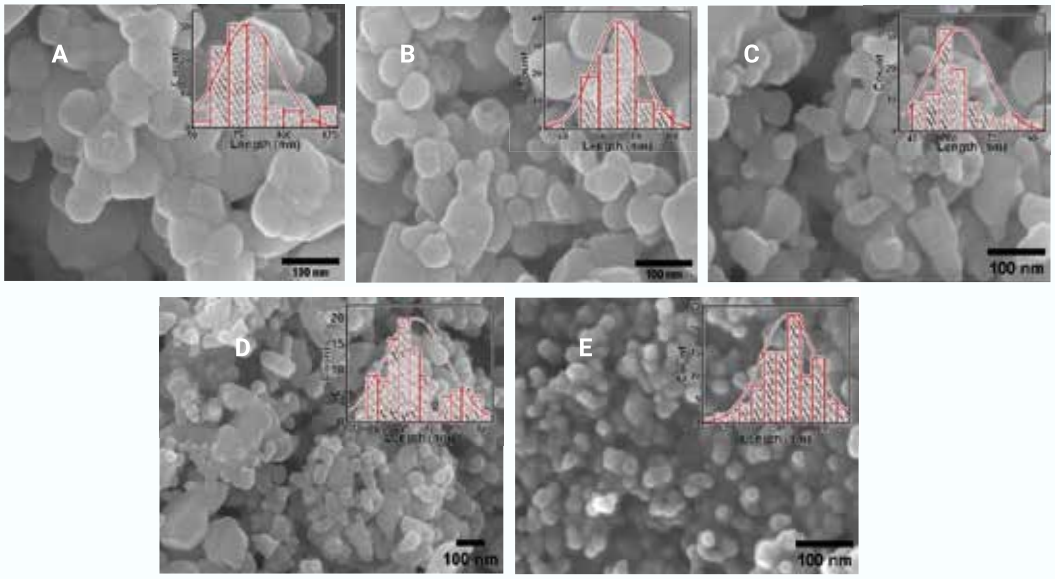


Figure 1. FE-SEM micrographs with corresponding grain size distributions of La-doed Cobalt-Zinc ferrites nanoparticles with different compositions

4. Perovskite Material-based Energy Storage Device with 2D Material as Electrodes

Md. Shehan Habib (PL), Nazmul Islam Tanvir, Md. Nur Amin Bitu, Md. Saidul Islam, Ms. Suravi Islam, Nazia Khatun and Dr. Syed Farid Uddin Farhad

Introduction:

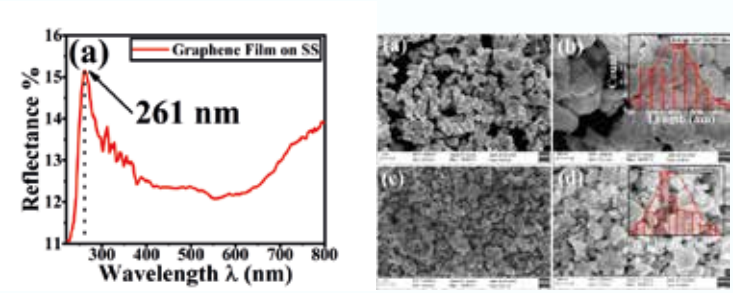
Researchers studied and designed novel materials as improved storage devices in response to a demand for more efficient and flexible energy storage and conversion devices. In recent years, perovskites with a generic ABO3 structure have been regarded as attractive materials. Perovskites are a unique class of magnetic materials with exceptional electrical, magnetic, ferroelectric, optical, and catalytic functional characteristics that are widely employed in a variety of high-performance super capacitors. Graphene is an essential building component of well-known carbon materials with two-dimensional atomic crystal, one-atom-thick layer, and ultra-high thermal conductivity. In this R&D project, a Graphene-BaTiO3-Graphene will be synthesized from two routes (precursor & powder), and the dielectric properties will be investigated.

Objectives:

1. To develop a Perovskite (BaTiO3) based Energy Storage Device from two synthesis routes (precursor & powder) with 2D (Graphene, MoS2) material based electrode
2. To compare the Dielectric properties of the device developed from two different routes

Work Progress:

1.Successfully synthesized Perovskite Materials-based energy storage (Graphene-Barium Titanate-Graphene capacitor) device with 2D materials (Graphene) as Electrodes.
2. Anti-corrosion effect of 2D materials on Carbon Steel electrode is under investigation and the manuscript is ready to submit.
3. One paper was published in the ECS Journal of Solid State Science and Technology.



5. ZnO Nanorods with Plasmonic Nanoparticles for Low Cost and High Performance Optoelectronic devices

Nazmul Islam Tanvir (PL), Dr. Syed Farid Uddin Farhad, Suravi Islam, Md. Nur Amin Bitu, Md. Shehan Habib, and Md. Saidul Islam

Introduction:

In recent times, ZnO Nanostructures (ZnO NS) have attracted a lot of attention due to its excellent optoelectronics properties, which have made ZnO NS valuable for a variety of emerging applications: transparent electrodes in liquid crystal displays, energy-saving or heat-protective windows, and electronics as thin-film transistors and light-emitting diodes and more importantly as electron tunneling layer (ETL) in photovoltaic and photoelectrochemical devices. A variety of morphologies have been developed for ZnO (NSs), such as zero-dimensional (0-D) nanoparticles, 1-D nanowires, 2-D Nano

sheets for applications mentioned above including other optoelectronics, optics and electronics devices such as gas sensor. As a toxic gas, it is important to sensitize to nitrogen oxide including other volatile organic compound (VOC) gases that are emitted from automobiles, thermal power plants, chemical plants and manufacturing facilities where toxic fluids and gases are being stored and processed and have harmful effects on the human body, including severe respiratory diseases and skin irritations [1]. Various nanostructured metal oxides such as SnO2, ZrO2, V2O5, WO3, NiOx, and ZnO have been widely used for sensing NOx gases and other VOC gases such as ethanol, acetone, toluene and hydrogen etc [1-2]. Among of them ZnO NSs have been one of the significant materials for gas sensors due to its high electron mobility (100 cm2V-1s) [3] along with nontoxicity, thermal stability and environment friendly low-cost fabrication process. Although ZnO-based sensors have a good performance, their gas sensing properties can be further improved by arranging them with Au NPs. Au NPs are relatively stable, catalytically active, water-soluble, optically sensitive, and universally biocompatible compared to other noble metallic NPs [4]. In this R&D project, Au NPs decorated ZnO NRs device will be fabricated for low cost and high performance photovoltaic, photo-electrochemical, and gas sensing devices.

Objectives:

1. Growth of defect-free ZnO nanorods in certain direction by hydrothermal process
2. Decorate ZnO NRs with Au nano particles (different size) to investigate the plasmonic effect usable for high-performance devices

Work Progress:

1. ZnO NPs were successfully synthesized by High Energy Ball Milling technique
2. Defect-free ZnO NRs with variable features were successfully grown on HEBMD ZnO NPs seeded layers
3. Narrower and denser ZnO NRs were found for ZnO NPs_25 hr seed layer (ZnO NPs~16-18 nm)
4. Surface nature of ZnO NRs can be controlled by short UV exposure
5. Mixture of Au-Ag NPs showed enhancement of R6G on ZnO NRs
6. A gas sensing electrode has been developed

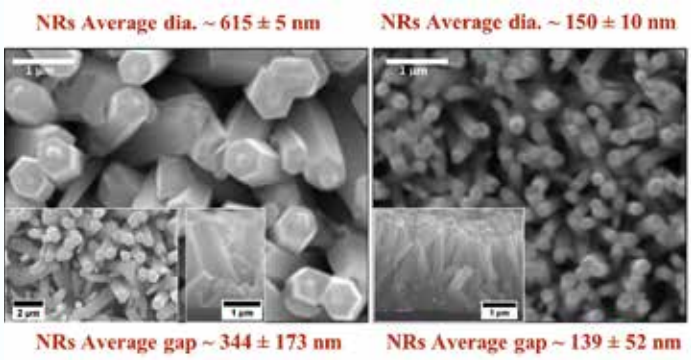


Figure: Surface Morphology of hydrothermally grown ZnO Nanorods on ZnO Seeded Layers

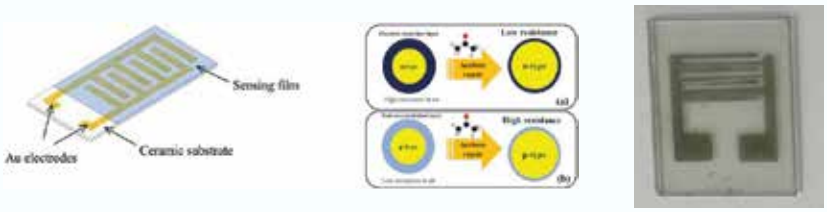


Figure 2: Home-built interdigitated electrode for gas sensing

Special Allocation Project

1. Fabrication of Multinary Metal Oxide Photoelectrodes for Sunlight driven Hydrogen Production

Dr. Syed Farid Uddin Farhad (Principal Investigator) & Nazmul Islam Tanvir (Associate Investigator)

Introduction:

A PEC system uses sunlight illuminated semiconductors to split water into hydrogen (a clean solar fuel) and oxygen. Binary metal oxides drown much attention for their potentiality for the production of large-scale solar hydrogen via PEC water splitting. However, due to unsatisfactory solar-to-hydrogen (STH) conversion efficiency of binary metal oxides, research efforts have recently been shifted to development of new Multinary (ternary and quaternary) metal oxides with large combinations of constituent metals and oxygen. In this proposal, we aim to utilize solution processable approaches to further develop Bismuth-based multinary metal oxide photo-electrodes at Energy Conversion and Storage Research (ECSR) section, Industrial Physics Division (IPD), BCSIR Laboratories, Dhaka.

Objective:

- To develop a facile and industrially scalable synthesis of bismuth based photoelectrodes and subsequent optimization of physical properties of these photoelectrodes
- To develop a robust fabrication protocol for attaining compact but ultra-thin photoelectrode layer atop the transparent conducting substrates (TCS)
- To integrate the property optimized photoelectrode into our proposed PEC system for monitoring performance

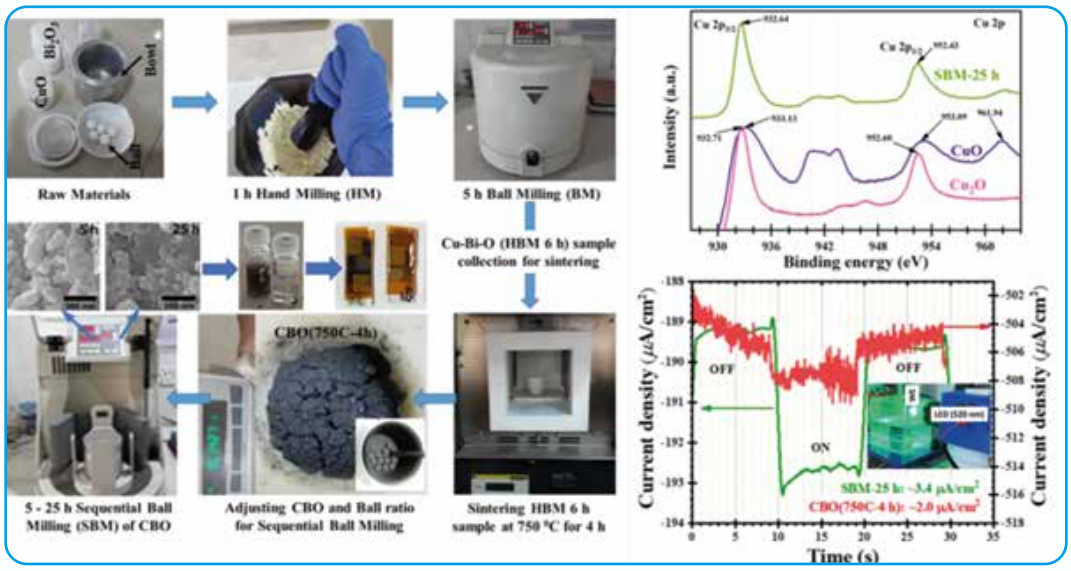


Figure 1: Schematic of the IPD-developed sequential Ball mill (SBM) technique for large scale production of CuBi2O4 materials. XPS studies shows the phase purity of CuBi2O4 materials. Drop-casted CuBi2O4/FTO shows H2 production ability in an aqueous 0.1M NaOH electrolyte (pH~13.0).

Achievements and Activities: (Only Scopus/SCI/SCIE/BJSIR listed)

Research Papers:

1. Suravi Islam., Nazia Khatun, Md. Shehan Habib, Syed Farid Uddin Farhad, Nazmul Islam Tanvir, Md. Aftab Ali Shaikh, Samia Tabassum, Dipa Islam, Md. Sajjad Hossain, Ayesha Siddika, "Effects of yttrium doping on structural, electrical and optical properties of barium titanate ceramics", 2022, Heliyon, 8, e10529.
2. Rokeya Khatun, Muhammad Shamim Al Mamun, Suravi Islam, Nazia Khatun, Mahmuda Hakim, Muhammad Sarwar Hossain, Palash Kumar Dhar, and Hasi Rani Barai, "Phytochemical-assisted synthesis of Fe3O4 nanoparticles and evaluation of their catalytic activity", 2022, Micromachines, 13, 2077.

3. Dipankar Chakraborty, Paroma Arefin, Sreebash Chandra Bhattacharjee, Mehedi Hasan, Rajib Sarkar, Suman Das, Md. Saidur Rahman, Md. Shehan Habib, Shirmin Islam, Ferdoushi Jahan, Gourango Ray, Jannatul Ferdous, Fahima Farhana, Ashraful Islam, and Mohammad Mostafa, "Biological activity of Mesua ferrea (Nageswar) seed extracts: An in vitro and in silico study", 2023, Informatics in Medicine Unlocked, 36, 101166
4. Nazia Khatun, Sajib Ahmed, Mohammad Sajjad Hossain, Syed Farid Uddin Farhad, Md. Al-Mamun, Mohammad Saiful Alam, Most. Hosney Ara Begum, Nazmul Islam Tanvir, Mahmuda Hakim, and Suravi Islam, (2023). "Influence of Y3+ and La3+ ions on the structural, magnetic, electrical, and optical properties of cobalt ferrite nanoparticles", 2023, Heliyon, 9, e13019.
5. Ashoke Kumar Sen Gupta, Syed Farid Uddin Farhad, Md. Shehan Habib, Md. Robiul Hossan, Khalid Hossain, Nipu Kumar Das, Muhammad Quamruzzaman, M. A. Matin, N. Amin, "Characterizations of extrinsically doped CZTS thin films for solar cell absorbers fabricated by sol-gel spin coating method", 2023 Applied Surface Science Advances, 13, 100352
6. Md. Nur Amin Bitu, Nazmul Islam Tanvir, Suravi Islam, Syed Farid Uddin Farhad, "Effect of substrate surface on the wide bandgap SnO2 thin films grown by spin coating", 2023, MRS Advances, 8, 194-200
7. Md. Johurul Islam, Nazia Khatun, Riyadh, Hossen Bhuiyan, Shahnaz Sultana, Md. Aftab Ali Shaikh, Md. Nur Amin Bitu, Fariha Chowdhury, and Suravi Islam, "Psidium guajava leaf extract mediated green synthesis of silver nanoparticles and its application in antibacterial coatings", 2023, RSC Advances, 13, 19164
8. Basmah H. Alshammari, Humayra Begum, Fatma A. Ibrahim, Mohamed S. Hamdy, Tahamida A. Oyshi, Nazia Khatun, Mohammad A. Hasnat, Electrocatalytic Hydrogen Evolution Reaction from Acetic Acid over Gold Immobilized Glassy Carbon Surface, 2023, Catalysts , 13(4), 744
9. Md. Saidul Islam., Syed Farid Uddin Farhad, Md. Saidul Islam, Nazmul Islam Tanvir, Suravi Islam, "A LED-based Functional Light Source for the Characterization of Thin Film Solar Cells", 2023, IEEE Xplore, 10103339
10. Md. Shaha Alam, Syed Farid Uddin Farhad, Nazmul Islam Tanvir, Md. Nur Amin Bitu, Mohammad Moniruzzaman, Mahmuda Hakim, and Md. Aftab Ali Shaikh, "Spherical and Rod-shaped Gold Nanoparticles for Surface Enhanced Raman Spectroscopy", 2023, IEEE Xplore, 10103260

Patent Submitted:

1. Syed Farid Uddin Farhad, Md. Saidul Islam, Nazmul Islam Tanvir, Md. Saidul Islam, and Suravi Islam, "A Portable Light Source with Variable Wavelength, Intensity and Illumination Period", submitted by the office of the Patents and Design and Trademarks, Motijheel, Dhaka. Date: 08.08.2022.

Process Accepted:

1. Syed Farid Uddin Farhad, Md. Saidul Islam, Nazmul Islam Tanvir, Md. Saidul Islam, and Suravi Islam, "A Process for the Production of a Light Source with Variable Intensities and Illumination Periods Using Alterable LED of Different Wavelengths from UV to NIR Region", accepted by the office. Date: 25.09.2022, Ref: 39.02.0000.043.37.887.22/868

Industrial Tours / Dissemination:

Name and Designation	Name of the Institute	Date
Suravi Islam, PSO; Dr. Syed Farid Uddin Farhad, PSO; Nazia Khatun ,SSO; Nazmul Islam Tanvir, SO; Md. Saidul Islam, SO and Md. Nur Amin Bitu, RC.	ACI Electronics Limited	22.06.2023

Guidance to Research Work (PhD/M.Phill /M.S/NCST & BCSIR Fellow):

Sl. No.	Title of Research	Research Catagory	Name of Student	University / Institute	Supervisors in BCSIR
01.	Experimental and Theoretical Investigation of Bismuth based Multinary metal oxides for solar fuels	BCSIR Postgraduate Fellow	Mst. Irin Naher	Industrial Physics Division, BCSIR Labs, Dhaka	Dr. S.F.U.Farhad, P.S.O.
02.	Psidium guajava leaf extract mediated green synthesis of silver nanoparticles and its application in antibacterial coatings	BCSIR Postgraduate Fellow	Md. Johurul Islam	Industrial Physics Division, BCSIR Labs, Dhaka	Suravi Islam, P.S.O.
03.	Synthesis and Characterization of Size controlled plasmonic nanoparticles for solar cells, solar fuels, and SERS applications	BCSIR Postgraduate Fellow	Mr. Shah Alam	Central Analytical Research Facilities (CARF), BCSIR	Dr. S.F.U.Farhad, P.S.O.
04.	Synthesis and Characterization of Ni and Mn Substituted CuZnFe2O4 Ferrites with a focus on their Suitability as Humidity Sensors	Ph.D.	Mr. Nurul Absar	Department of Physics, CUET	Dr. S.F.U.Farhad, P.S.O.
05.	Studies on Structural, Magnetic, Dielectric and Electrical properties of organomodified montmorilionite supported Copper Ferrite Nanocomposite	M.Sc	Masuma Tabasum Munmun	Department of Physics, Jagannath University	Suravi Islam, PSO
06.	Synthesis and piezoelectric properties of Li-doped $BaTYiO_3$ by a solvothermal approach	M.Sc	Md. Abdus Samad	Department of Physics, Jagannath University	Suravi Islam, PSO
07.	Effect of rare earth doping on structural, magnetic and dielectric properties of $BiFeO_3$	M.Sc	Tanmoy Kumar Ghosh	Department of Physics Rajshahi University	Suravi Islam, PSO
08.	Synthesis and Characterization of various transition elements (M, Ni) doped zinc sulfide (ZnS) thin films by sol-gel method	M.S	Mr. Elius Hossen	Department of Physics, Comilla University	Dr. S.F.U.Farhad, P.S.O.

09.	Fabrication of nanoparticle on thin film of 2D materials (MoS_2) for surface enhance Raman spectroscopy (SERS) applications	M.S	Ms. Mowtosi Rahman Sharkar	Department of Physics, Dhaka University	Dr. S.F.U.Farhad, P.S.O.
10.	Ag, Au, and Au-Ag hybrid nanoparticles for surface enhance Raman spectroscopy (SERS) applications	M.S	Mr. Tasnim Akbar Faruquee	Department of Physics, Dhaka University	Dr. S.F.U.Farhad, P.S.O.
11.	Synthesis and Characterization of Nickel Oxide incorportated MoS_2 Nanomaterials for Energy Storage Applications	M.S	Mr. Md. Wahidujjaman Bari	Department of Physics, BUET	Dr. S.F.U.Farhad, P.S.O.
12.	Experimental Insights of CZTS thin-film solar cell deposited by RF magnetron sputtering	Ph.D.	Mr. Ashoke Kumar Sen Gupta	Department of EEE, CUET	Dr. S.F.U.Farhad, P.S.O.

Participation in training / Seminar/ Symposium/ Workshop/ Conference:

Training:

1. Md. Saidul Islam (SO), participated in a training on "Integrity strategy and good governance" organized by BCSIR Laboratories, Dhaka, 22 September 2022.
2. Suravi Islam (PSO), Nazia Khatun (SSO), Md. Saidul Islam (SO), Md. Nur Amin Bitu (RC), participated in a training on "Learning Session on Patent drafting" organized by BCSIR Laboratories, Dhaka, 26 September 2022.
3. Md. Nur Amin Bitu (RC), participated in a training on "Public Awareness of Right to Information" organized by BCSIR Laboratories, Dhaka, 27 September 2022.
4. Md. Nur Amin Bitu (RC), participated in a training on "Techno Economical and Feasibility Study" organized by BCSIR Laboratories, Dhaka, 23 October 2022.
5. Md. Saidul Islam (SO), participated in a training on "Ethics in conducting research and development Activities" organized by BCSIR Laboratories, Dhaka, 07 November 2022.
6. Nazia Khatun (SSO), Md. Nur Amin Bitu (RC), participated in a training on "Basic Principle, Application and Maintenance of FTIR" organized by BCSIR Laboratories, Dhaka, 13 December 2022.
7. Suravi Islam (PSO), Nazia Khatun (SSO), Md Shehan Habib (SO) and Md. Saidul Islam (SO), participated in a training on "Basic Principle, Application and Maintenance of Raman Spectroscopy" organized by BCSIR Laboratories, Dhaka, 14 December 2022.
8. Suravi Islam (PSO), Md. Saidul Islam (SO), Md. Nur Amin Bitu (RC), participated in a training on "Basic Principle, Application and Maintenance of XRD" organized by BCSIR Laboratories, Dhaka, 15 December 2022.
9. Md Shehan Habib (SO), participated in in-house training on X-ray Diffractometer (XRD) at IGCRT, BCSIR, Dhaka held on 29 January to 02 February, 2023.
10. Nazmul Islam Tanvir (SO), and Md. Nur Amin Bitu (RC), participated in a training on "PPR in Scientific Procurement" organized by BCSIR Laboratories, Dhaka, 01 February 2023.
11. Md Shehan Habib (SO), Nazmul Islam Tanvir (SO) and Md. Saidul Islam (SO), participated in a training on "Operation and Maintenance of Programmable Logic Controller (PLC)" organized by Planning and Development Division (P&D), 02-06 April 2023.

12. Dr. Syed Farid Uddin Farhad (PSO), Nazmul Islam Tanvir (SO), Md. Nur Amin Bitu (RC), Successfully conducted a training course on "Operation and maintenance of Photo-Electrochemical Workstation with Frequency Response Analyzer", organized organized by Planning and Development (P&D), BCSIR, Dhaka, 09-13 April 2023.
13. Nazia Khatun (SSO), Md. Saidul Islam (SO), participated in a training on "Operation and maintenance of Photo-Electrochemical Workstation with Frequency Response Analyzer", organized organized by Planning and Development (P&D), BCSIR, Dhaka, 09-13 April 2023.
14. Dr. Syed Farid Uddin Farhad (PSO), Nazmul Islam Tanvir (SO), Successfully conducted a training course on "Raman Spectroscopy, Data analysis and Instrument Maintenance", organized organized by Central Analytical and Research Facilities (CARF), BCSIR, Dhaka, 07-11 May 2023.
15. Nazia Khatun (SSO) and Md. Shehan Habib (SSO), participated in a training on "Raman Spectroscopy, Data analysis and Instrument Maintenance", organized by Planning and Development (P&D), BCSIR, Dhaka, 07-11 May 2023.
16. Md. Saidul Islam (SO), participated in a training on "BET Sorptometer" organized by Central Analytical and Research Facilities (CARF), 14-18 May 2023.
17. Md. Shehan Habib (SSO), Nazmul Islam Tanvir (SO), Md. Saidul Islam (SO), Md. Nur Amin Bitu (RC), participated in a training on "National Integrity Strategy" organized by BCSIR Laboratories, Dhaka, 22 May 2023.

Conference:

1. Nazia Khatun (SSO), participated in the International Conference on BCSIR Congress-2022, Organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 01-03 December 2022 and presented poster presentation entitled "Investigation of the structural, Morphological, Dielectric and Electrical Properties of Ni-Substituted Magnesium Ferrites for Humidity Sensor".
2. Nazia Khatun (SSO), participated in the 1st International Dhaka Science Conference for Women WSTC-2023, Organized by Bangladesh Atomic Energy Comission (BAEC), 15-16 February 2023 and presented poster presentation entitled "Impact on La3+ ions on structural, magnetic and optical properties of Cobalt Zinc Ferrite".
3. Md. Saidul Islam (SO), participated in the International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022), Organized by Bangladesh Awami League, 2-4 September, 2022 and presented an oral presentation entitled "Design and Construction of a Low-cost Light Source with Variable Wavelength, Intensity and Illumination Period for Renewable Energy Research".
4. Md. Saidul Islam (SO), participated in the International Conference on BCSIR Congress-2022, Organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 01-03 December 2022 and presented an oral presentation entitled "Design and Construction of an LED-based Multifunctional Light Source for Photophysical and Photochemical Studies of Materials".
5. Md. Saidul Islam (SO), participated in the 2022 4th International Conference on Sustainable Technologies for Industry 4.0 (STI 4.0), Organized by Green University, 17-18 December, 2022 and presented an oral presentation entitled "A LED-based Functional Light Source for Characterization of Thin Film Solar Cells".
6. Md. Nur Amin Bitu (RC), participated in the International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022), Organized by Bangladesh Awami League, 2-4 September, 2022 and presented an oral presentation entitled "Fabrication of Wide Bandgap SnO2 Thin Films for Affordable, Environment-Friendly, and Sustainable Energy Sources".
7. Md. Nur Amin Bitu (RC), participated in the International Conference on BCSIR Congress-2022, Organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 01-03 December 2022 and presented an oral presentation entitled "Wide Bandgap SnO2 Thin Films for Solar Cells and Solar Fuel Devices".
8. Md. Nur Amin Bitu (RC), participated in the 2022 4th International Conference on Sustainable Technologies for Industry 4.0 (STI 4.0), Organized by Green University, 17-18 December, 2022 and presented an oral presentation entitled "Spherical and Rod-shaped Gold Nanoparticles for Surface Enhanced Raman Spectroscopy".

Award/Grants:

1. Dr. Syed Farid Uddin Farhad, PSO, has been awarded the "Researcher Development and Travel Grant" from the Royal Society of Chemistry (RSC), UK on 19 June, 2023.
2. Nazia Khatun (SSO), Syed Farid Uddin Farhad, Suravi Islam, Most. Hosney Ara Begum, Mahmuda Hakim, Riyadh Hossain Bhuiyan, Nazmul Islam Tanvir and Md. Saidul Islam have been awarded for best poster presentation at BCSIR Congress-2022, 01-03 December 2022 for the presentation entitled "Investigation of the structural, Morphological, Dielectric and Electrical Properties of Ni-Substituted Magnesium Ferrites for Humidity Sensor".
3. Md. Saidul Islam (SO), Syed Farid Uddin Farhad, Md. Saidul Islam, Nazmul Islam Tanvir and Suravi Islam have been awarded for best oral presentation at the International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022), 02-04 September 2022 for the presentation entitled "Design and Construction of a Low-cost Light Source with Variable Wavelength, Intensity and Illumination Period for Renewable Energy Research".

BCSIR Scientists, Nazia Khatun, SSO, Industrial Physics Division (IPD), BCSIR has been awarded Best Poster Presenter at BCSIR Congress 2022 Organized by BC IF BCSIR Scientists, Md. Saidul Islam, SO, Industrial Physics Division (IPD), BC SIR has been awarded Best Oral Presenter at ICEPSD Conference 2022 Organized by Bangladesh Awami League.

Number of Analytical (Ad-Hoc) Problem Solved:

Name of the Division	Routine type	Research Type	Total
IPD	70	200	270

Special Analytical services:

Apart from R&D works and analytical as well as technical supports to the diverse stakeholders, IPD scientists regularly visit local industries and arrange 'Stakeholder Meetings' for the following purposes:

1. Commercialization of IPD Developed products
2. Potential collaborative R&D projects for mutual benefits
3. Provide analytical & technical supports from IPD to local industries

Scientists of IPD are also aware of the National and Global energy crisis and to resolve this issue aligned with UN SDGs "Everyone should contribute for the sustainability of our earth planet" and this is not possible only by inventing efficient equipment and developing renewable energy technology. Because efficient technology development itself uses huge amount of energy. Scientists of IPD recognized this burning issue quite early and to this end, as a social commitment for the betterment of our people as well as for global citizens, they introduced a test project called "Energy Saving Initiative" by switching off unnecessary lights, fans and unattended equipment etc. to minimize the energy burden in the national grid. To implement this idea and to achieve the project target there is a rewarding system called "Earth Champions" for the person who scores the highest (See the right picture at the bottom panel).

Dr. S.F.U. Farhad delivered an invited talk (left) on solar-driven H2 production at the first BCSIR-CSIR joint symposium held on 30-31 May, 2023 and he got an outstanding commendation for his research from Professor Harish C. Barshilia, the chief delegate of CSIR India Scientists (right).


Suravi Islam delivered a poster presentation in WSTC-Conference in the 1st International Dhaka Science Conference for Women WSTC-2023, Organized by Bangladesh Atomic Energy Comission (BAEC), 15-16 February 2023


Suravi Islam delivered a poster presentation in WSTC-Conference in the 1st International Dhaka Science Conference for Women WSTC-2023, Organized by Bangladesh Atomic Energy Comission (BAEC), 15-16 February 2023

Short Biography of Scientists

Suravi Islam (June, 1998- Present)

Office	Industrial Physics Division	Blood Group	B+
Job Title	Principal Scientific Officer	Degree Obtained	M.Sc (1996)
Contact	suraviislambcsir@gmail.com	Mobile	01715840503

Suravi Islam received both B.Sc and M.Sc degree in Physics from the University of Dhaka. She obtained Master's degree in Environmental Management and Development from Australian National University (ANU), Canberra under AusAID scholarship. Her research interests are in the field of solid state physics and material sciences. Her current research is focused on design, synthesis and development of magnetic and dielectric materials for electrical and electronic devices. She has authored or coauthored twenty five publications in reputed Journals and one accepted process at BCSIR. She is life member of BPS, BAAS and member of BCS, NITUB and BEC. Now, she is acting as scientists-in-charge of Industrial Physics Division.

Dr. Syed Farid Uddin Farhad (June, 2006-Present)

Office	Industrial Physics Division	Blood Group	O+
Job Title	Principal Scientific Officer	Degree Obtained	Ph.D. (2016)
Contact	sf1878@my.bristol.ac.uk	Mobile	01881755767

Dr. S.F.U. Farhad is a materials and device physicists, who received both B.Sc. and M.S. degrees in Physics from the University of Dhaka. He earned Ph.D. degree on Metal Oxide-based Solar Cells under a collaborative research project of the Electron microscopy group of School of Physics and Electrochemistry group of School of Chemistry, University of Bristol, UK. His current research focusses on the ecofriendly materials for high-performance solar cells and solar fuels (H_2). Dr. Farhad recently received prestigious UNESCO/TWAS and Royal Society Chemistry (RSC), UK research grants in these fields. He has authored or coauthored 45 publications and get more than 965 citations (h-index:16; i10-index: 25). He has two accepted processes. He is a life member of IoP(UK), MRS(USA), ACS(USA), RSC(UK), BPS, and BAAS. He is also currently acting as a principal coordinator of physical sciences' equipment in the CARF, BCSIR.

Nazia Khatun (June, 2006-Present)

Office	Industrial Physics Division	Blood Group	B+
Job Title	Senior Scientific Officer	Degree Obtained	M.Sc. (Physics)
Contact	naziabcsir@gmail.com	Mobile	01710412484

Nazia Khatun earned her both B.Sc. and M.Sc. degree in Physics from the National University, Bangladesh. She has worked on the field of Material science and Solid State Physics. Her research is mainly focused on the development of magnetic and dielectric material for electrical, electronic and sensor devices. She has authored or coauthored 22 publications. She has one accepted process. She is a life member of BAAS, BPS and BEA.

Md Shehan Habib (March,2016-Present)

Office	Industrial Physics Division	Blood Group	O+
Job Title	Scientific Officer	Degree Obtained	MS (Physics)
Contact	habibshehan@gmail.com	Mobile	01710412484

Md Shehan Habib received BSc and MS in Physics from the University of Dhaka. He joined BCSIR as a scientific officer in March 2016, and currently works at Industrial Physics Division, BCSIR Laboratories Dhaka. He researches applied & experimental physics, thin films & nanotechnology, material characterization, hydrogen energy, hydrogen fuel cell, optoelectronics, semiconductor physics, thin film deposition, semiconductor device physics, materials, chemical industry, optical materials.

Nazmul Islam Tanvir (August,2016-Present)

Office	Industrial Physics Division	Blood Group	B+
Job Title	Scientific Officer (SO)	Degree Obtained	M.Sc. (2015)
Contact	nazmul.tanvir88@gmail.com	Mobile	01912218428

Nazmul Islam Tanvir received his both B.Sc. and M.Sc. degree in Physics from the National University, Bangladesh. His research is mainly focused on Optics, Solid State Physics and Materials Science. He also worked as a Research Fellow in BCSIR (2015–2016). He has authored or coauthored 19 publications. He has one accepted process.

Md. Saidul Islam (November, 2021-Present)

Office	Industrial Physics Division	Blood Group	O-
Job Title	Scientific Officer	Degree Obtained	M.Sc. (Thesis) (2017)
Contact	saidulislam0712@gmail.com	Mobile	01674921302

Md. Saidul Islam earned his both B.Sc. (Honours) and M.Sc. degree in Electrical & Electronic Engineering from University of Dhaka. His research is mainly focused on Electronic Device, Instrument Automation, Materials Science and Solid State Physics. He has authored 1 publication.

Md. Nur Amin Bitu (March, 2021-Present)

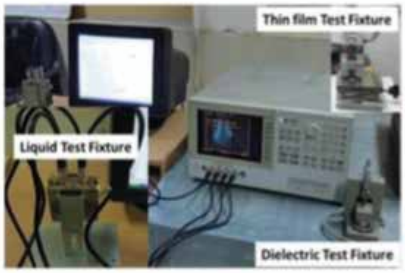
Office	Industrial Physics Division	Blood Group	B+
Job Title	Research Chemist	Degree Obtained	M.Sc. (Thesis) (2018)
Contact	nabitu.ru@gmail.com	Mobile	01732419987

Md. Nur Amin Bitu earned his both B.Sc. (Honours) and M.Sc. degree in Chemistry (Inorganic Chemistry) from the University of Rajshahi. His research is mainly focused on Energy Conversion and Storage, Green Chemistry, Coordination Chemistry, Solid State Chemistry, Electrochemistry, and Materials Science. He has authored or coauthored 25 publications in different reputed journals and get 89 citation (h-index:4; i10-index: 3).

Major Instruments of Industrial Physics Division

SEM with Ultra-dry EDX

UV-VIS-NIR Spectrometer

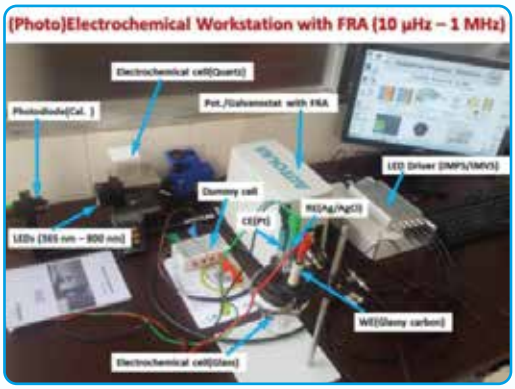


Precision Impedance Analyzer

Source Measure Unit

Tesla meter(0.1 µT – 29.99 T)(Left)
Magnetic Susceptibility Balance(Right)

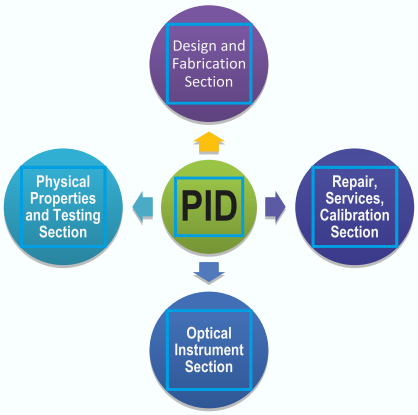
Planetary Ball Mill(Left)
Programmable HT Furnace(Right)



Physical Instrumentation Division

The main works of PID are:

a. Conducting research activities for the development of scientific/laboratory instruments using locally available raw materials.
b. Maintenance, repairing, servicing and installation of scientific equipment and electronic instruments.
c. Conducting software development and other innovative activities in the field of information technology.
d. Provide computer training (software and hardware).



Field of Research: Electrical and Electronics Engineering, Embedded System Design, Information and Communication Technology, Internet of Things (IoT).

R&D Project:

1.Predication of Air Quality using Artifical Interlligence.
Khaledun Nahar Babi (PL), Md. Abul Kashem, Md. Moniruzzaman and Md. Sadequl Islam

Introduction:

Now-a-days air pollution is one of the most important concerns of the world. Air pollution may evolve from anthropogenic or natural sources. Air pollutants of atmospheric substances like CO, CO2, SO2, NO2, and O3 suspended particulate matter (SPM), repairable suspended particulate matter (RSPM), and volatile organic compounds (VOCs) have a great effect on people's health. Most of the major cities in developing countries and most cities of the developed countries are suffering from it. The IoT-based proposed air quality monitoring system will be equipped with modern sensor devices and gateway connectivity to identify the presence of harmful gasses within the premises.

Objective:

- To design and develop a portable Air Quality Monitoring device using Internet of Things (IoT)
- To detect the concentration of air pollutants in the particular area via sensors
- To develop a user-friendly and portable interface – an Android application, which the user can use to know the pollution level in a particular area
- To develop a user-friendly web application to remotely monitor the air quality in a particular area
- To forecast future scenarios and respond in accordance with the rise of sensor-based technologies and data-driven results using Artificial Intelligence (AI)

Work Progress:

- Circuit design is completed
- Prototype model development is going on.
- One manuscript writing is going on.

Other Activities: Repairing, Servicing, Maintenance, Calibration and Installation of scientific/ laboratory equipment: During the period from 1st July, 2022 to 30th June, 2023 services were provided to 47 Laboratory/Scientific Instruments (such as: Computer CPU, Printer, UPS (Online & Offline), shker etc.)

Achievements and Activities:

Published Paper:

1. I Ahmed, F Parvin, AKMA Islam, MA Kashem, Inverse-perovskites Sc3GaX (X = B, C, N): A comprehensive theoretical investigation at ambient and elevated pressures, Computational condensed matter, 35 (2023) e00808 https://doi.org/10.1016/j.cocom.2023.e00808
2. MA. Hadi, M Akhter, MS Ahasan, I Ahmed, MA Kashem, Realization of diversity in physical properties of Zr2Se(B1-xSex) MAX phases through DFT approach, American ceramic society, (2023). https://-doi.org/10.1111/jace.19271

Accepted Process:

1. A Process for Developing a Modeling and Simulation Tool MSCS-1D for Solar Cells. Inventor: Abu Kowsar, Sumon Chandra Debnath, Md. Saidul Islam, Md. Sadequl Azam, Mashudur Rahman, Khaledun Nahar Babi, Shahin Aziz and S.F.U. Farhad, Report number: 39.02.0000.043.37.905.22/286

Scientists pursuing M.S/M.Phil/ PhD Courses in home or abroad:

2. Khaledun Nahar Babi, SSO, Physical Instrumentation Division, BCSIR Laboratories, Dhaka pursuing PhD course in Department of Computer Science and Engineering, Jahangirnagar University, Bangladesh, under the supervision of Professor Dr. Israt Jahan and Professor Dr. Md. Zahidur Rahman and working on "Multi-Agent Based Modeling and Simulation for Natural Disaster Management: Bangladesh perspective", session 2018-2019.

Guidance to research Work (PhD/M.Phill /M.Sc/NCST & BCSIR Fellow):

Sl. No.	Title of Research	Research Catagory	Name of Student	Name of the Institution	Name of Supervisors
01.	ab initio insights into the physical properties of some MAX phases, perovskite compounds and Kagome superconductors	BCSIR Fellow (Dr. Abdullah Al- Muti Shorfuddin memorial fellowship)	Istiak Ahmed	University of Rajshahi	Dr. Engr. Md. Abul Kashem, CSO

Participation in training / Seminar/ Symposium/ Workshop/ Conference:

Training:

1. Khaledun Nahar Babi (SSO) participated in the training program on "Learning Session on Patent Drafting" held on 26 September, 2022 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
2. Khaledun Nahar Babi (SSO) participated in the training program on "Techno Economical and Feasibility Study" held on 23 October, 2022 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
3. Khaledun Nahar Babi (SSO) participated in the training program on "Ethics in conducting research & development Activities" held on 07 November, 2022 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
4. Khaledun Nahar Babi (SSO) participated in the training program on "Basic Principle, Application and Maintenance of Raman Spectroscopy" held on 14 December, 2022 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
5. Khaledun Nahar Babi (SSO) participated in the training program on "Basic Principle, Application and Maintenance of XRD" held on 15 December, 2022 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.

Conference:

1. Khaledun Nahar Babi (SSO) participated in the International Congress on 'BCSIR Congress-2022' dated 01.12.2022 to 03.12.2022 at BCSIR, Dhanmondi, Dhaka-1205 organized by BCSIR and presented a research article titled 'An Intelligent Fire Detection and Control System Using the Internet of Things Technology'.

Dr. Engr. Md. Abul Kashem (August, 1992-Present)

Office	Physical Instrumentation Division	Blood Group	O+
Job Title	Chief Scientific Officer	Degree Obtained	Ph.D (2004)
Contact	kashem222@yahoo.com	Mobile	01716501220

Dr. Engr. Md Abul Kashem earned his BSc (Hon) degree in Electrical & Electronics Engineering (EEE) from the Chittagong University of Engineering and Technology (CUET). He obtained both MS and Ph.D in Electronic Engineering from Nagoya University, Japan under the supervision of Professor Sinzu Morita in the field of Thin Film Materials. He has authored or coauthored 19 research articles in international Journal and 34 conference proceedings. He got the best paper award from Journal of Photopolymer Science and Technology in 2004. He is a life fellow of Institute of Engineers' Bangladesh (IEB) and life member of BAS, BAAS, NITUB, BPS and JUAB.

Khaledun Nahar Babi (June, 2006-Present)

Office	Physical Instrumentation Division	Blood Group	O+
Job Title	Senior Scientific Officer	Degree Obtained	MSc (2012)
Contact	khaledunnahar@gmail.com	Mobile	01816218248

Khaledun Nahar Babi is pursuing PhD course at Department of Computer Science and Engineering, in Jahangirnagar University in the field of Natural Disaster Management based on Agent Based Modeling and Simulation. She has authored or coauthored 5 research articles in international Journal, 4 conference proceedings and 1 process. She is a life member of NITUB, BPS and an associate member of Bangladesh Computer Society (BCS). Research interest: Cyber Security, Software Engineering, Speech Recognition, Artificial Intelligence, Embedded System Design. Agent Based Modeling and Simulation etc. Skills and expertise: Programming in C, Java Programming, Microcontroller Programming, Microsoft Project, Visio 2013, MS Office, Computer Database, HTML, CSS, Android Application Development, Proteus 7.10 & 8.3, Agent based Modeling and Simulation, Software Architecture etc.

Md. Sadequl Islam (July, 2002-Present)

Office	Physical Instrumentation Division	Blood Group	A+
Job Title	Maintenance Engineer	Degree Obtained	B.Sc Engineering in (EEE)1998, PGDSI 2006
Contact	sadeq@bcsir.gov.bd	Mobile	01996362048

Engr. Md Sadequl Islam earned his BSc (Hon) degree in Electrical & Electronics Engineering (EEE) from the Rajshahi University of Engineering and Technology (RUET). He obtained Post Graduate Diploma in Scientific Instrumentation (PGDSI) from ISI, University Grant Commission (UGC), Agargoan, Dhaka, Bangladesh. Field of interest: Electronic control system.

Photo Gallery

Instruments

Digital Control Winding Machine

Digital Multimeter/ Switch System

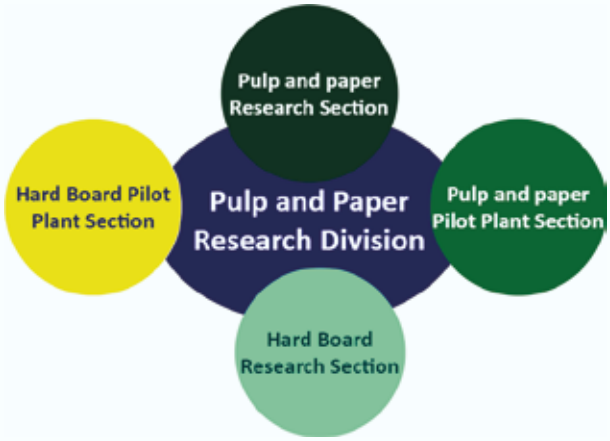
Pulp & Paper Research Division (PPRD)

Scientists of Pulp and Paper Research Division

Pulp & Paper Research Division (PPRD)

A key function of the Pulp and Paper Research Division (PPRD) is the conversion of wood biomass into pulp, paper, and biobased products. As one of BCSIR Laboratories Dhaka's earliest research divisions, PPRD plays a vital role in the research and development of lignocellulosic materials. Many efforts have been made to identify high-yield biomass for pulp production and an alternative pulping process for nonwoods. In this research division, pulp, paper, and biochemicals are made from locally available bioresources. Additionally, researchers in this division focus on lignocellulosic materials. The PPRD also offers highly regarded analytical and intellectual services.

Fields of Research



R&D Projects:

1. Co-pulping of Trewia nudiflora and Trema orientalis

Dr. M. Mostafizur Rahman, S.S.O (PL), Dr. M Sarwar Jahan, Director, Jannatun Nayeem, S. S. O, IGCRT, Razia Sultana Popy, S. O, Md. Nur Alam Likhon, S.O

Introduction

To compensate for the increasing demand of pulp and paper products, multiculture plantations of fast-growing species must be established in allocated forest land. Several fast-growing species have been studied for producing pulp in Bangladesh and Trema orientalis (locally known Nalita)is one of the fastest growing native species. Trewia nudiflora, a medium-sized hardwood tree that grows up to 20 m, is an indigenous plant of Bangladesh as well as the Indian subcontinent, having grayish-brown smooth bark. It is a fast-growing species, locally known as Latim. The habitat of Trewia nudiflora and Trema orientalis are very similar, and the anatomical and morphological properties of these both species are also analogous. So, a multiculture plantation forest can be created by planting both species in allocated forest land which can supply wood pulp to the pulp industry.

Objectives:

- To investigate the pulping potentiality of Trewia nudiflora (Latim)
- To study mixed pulping with T. orientalis (Nalita)

Work progress:

- Physical, chemical and morphological properties of the sample were performed
- Anatomical properties of the wood was done
- Kraft Pulping of the sample and co-pulping with Nalita carried out at different conditions
- Evaluation of the produced kraft pulps were done
- Bleaching of the produced pulps were done with chlorine dioxide according to D0EpD1 sequences

Table: Kraft pulping of *Trewia nudiflora* and *Trema orientalis*

	Active Alkali, %	Temperature, °C	Screen pulp yield, %	Reject, %	Total Pulp, %	Kappa Number
Trewia nudiflora	16	150	9.7	50.1	59.8	36.3
	18	150	26.3	28.7	55.0	30.7
	16	160	36.7	4.8	41.5	18.6
	18	160	38.2	3.0	41.2	18.0
	16	170	37.4	2.6	40.0	18.3
	18	170	38.2	1.7	39.9	17.2
T. orientalis	16	170	38.3	5.3	43.6	19.6
	18	170	39.5	3.0	42.5	16.5
Mixed chips	16	170	46.2	1.1	47.3	23.2
	18	170	44.9	0.5	45.4	19.4

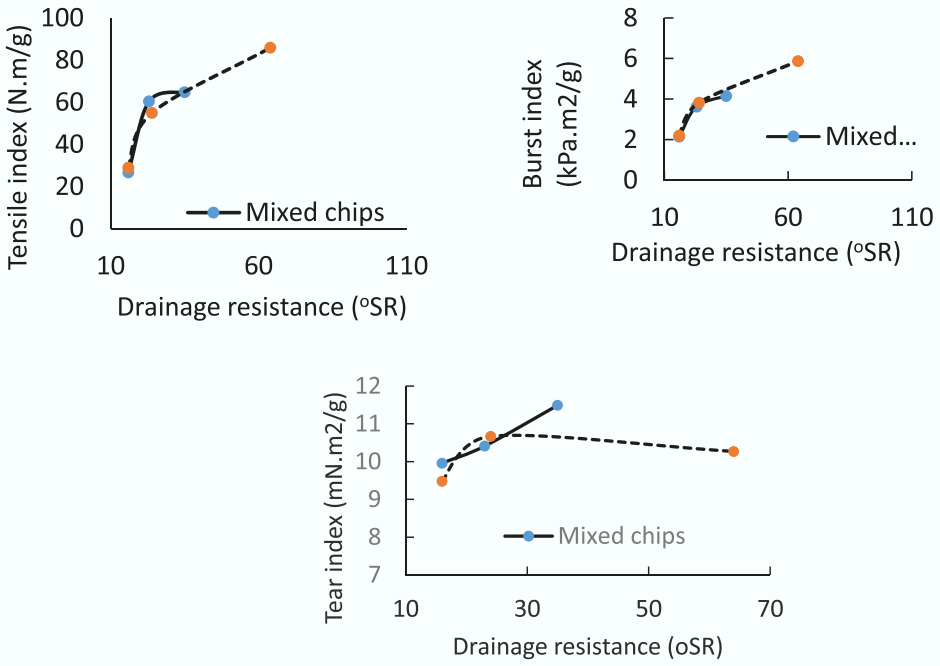


Fig.: Comparison of physical strength of *T. nudiflora* and mixed pulp as a function of drainage resistance

2. Valorization of lignin from nonwoods

Dr. M. Mostafizur Rahman, S.S.O (PL), Dr. M Sarwar Jahan, Director, Dr. Md. Nashir Uddin, PSO, Jannatun Nayeem, S. S. O, IGCRT, Razia Sultana Popy, S. O, Md. Nur Alam Likhon, S. O.

Introduction

Among natural biomasses, lignin is the second most abundant after cellulose. It is a byproduct of the pulping industry. Research is being conducted on the diversified application of lignin in addition to conventional energy production in boilers. Despite the fact that most of the research has focused on alkali lignin and lignosulfonate from wood because of its abundant production, there has been little research on nonwood lignin. Consequently, nonwood lignin from agricultural waste has been characterized and converted into a product.

Objectives:
To utilize nonwood lignin for bio-products

Work progress:
- Lignin acrylic acid copolymer was applied as corrosion inhibition
- The corrosion inhibition properties were characterized
- Phenolated lignin based hydrogel was prepared
- The hydrogel was characterized

Table: Corrosion rate and inhibit efficiency for K-lignin-AA and P- lignin-AA copolymer coated carbon steel immersed in 1 M HCl solution.

Copolymer solution (mg/L)	Lignin-AA copolymer		P-lignin-AA copolymer	
	corrosion rate, v (mg cm^{-2} h^{-1})	IE (%)	corrosion rate, v (mg cm^{-2} h^{-1})	IE (%)
0	1.5325	-	1.5325	_
50	0.7411	51.64	0.4515	70.53
100	0.5411	64.69	0.3011	80.35
150	0.4481	70.76	0.2201	85.63
200	0.4261	72.19	0.1981	87.07
300	0.3981	74.02	0.1621	89.42

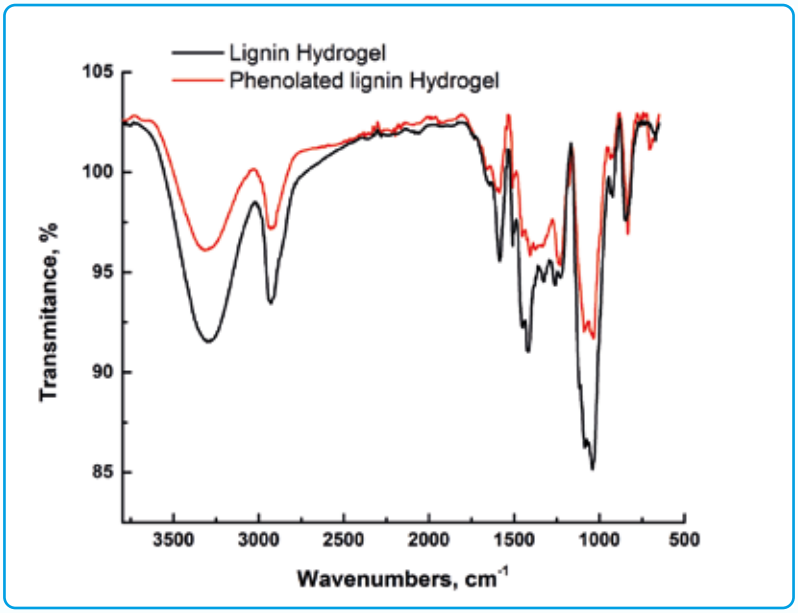


Fig.: FT-IR spectrum of Kraft lignin and Phenolated lignin hydrogel.

Achievements & Activities

1.MA Rahman, MM Rahman, K Nemoto, AKM Golam Sarwar (2023). Proximate composition and thermal properties of hemp and flax fibres. Bangladesh Journal of Scientific and Industrial Research. 58 (1), 65-70.

2. M N A Likhon, M. Mostafizur Rahman, Jannatun Nayeem, Razia Sultana Popy, A K M Golam Sarwar and M Sarwar Jahan. (2023). Pulping and papermaking properties of Zara plant.Cellulose Chem. Technol, 57 (5-6), 557-564.

3.Md. Jahurul Islam, M. Mostafizur Rahman, T. Ferdous, J. Nayeem, R. Sultana Popy, C. Tian, M Sarwar Jahan (2023). Co-pulping of Trewia Nudiflora and Trema Orientalis. TAPPI Journal, 22(6), 411-421.

4. M Mostafizur Rahman, Amiya Roy, Jannatun Nayeem, Razia Sultana Popy, Taslima Ferdous, M Sarwar Jahan (2023). Tissue paper from corn stalk pulp in biorefinery concept. Biomass conversion and biorefinery, 1-8.

5.M. Mostafizur Rahman, Nur-Al-Sarah Rafsan, Jannatun Nayeem, Razia Sultana Popy, Mohammad Moniruzzaman and M. Sarwar Jahan. (2023). Nitric acid-patassium hydroxide fractionation of rice straw: an integrated biorefinery initiative. Nordic Pulp and Paper Research Journal, 38(2), 243-252.

6. Shahin Hossain, M. Abdul Jalil, Tarikul Islam, Md Mostafizur Rahman (2022). A low-density cellulose rich new natural fiber extracted from the bark of jack tree branches and its characterizations. Heliyon, 8(11), e11667.

7. Maisha Farzana, M Mostafizur Rahman, Taslima Ferdous, M Sarwar Jahan (2022). Review on Trema orientalis as a potential bioresource in tropical countries. Trees, 36(4), 1169-1177.

8. M. Mahbubur Rahman, Mahbub Alam, M. Mostafizur Rahman, Md abu Bin Hasan Susan, Md. Aftab Ali Shaikh, Jannatun Nayeem, M. Sarwar Jahan (2022). A novel approach for enhancement of carboxymethylation of cellulose. Carbohydrates Polymer Technologies and Applications, 4, 100236.

9. M. Mostafizur Rahman, Razia Sultana Popy, Jannatun Nayeem, Kazi M. Yasin Arafat and M. Sarwar Jahan. (2022). Dissolving pulp and furfural production from jute stick. Nordic Pulp and Paper Research Journal, 37(4), 0046.

Book Chapters

1. M Mostafizur Rahman, M Sarwar Jahan, Yonghao Ni, Chapter: Pulping of jute, Book: Pulping and Papermaking of Nonwood Plant Fibres, Elsevier (2023).

2. Jannatun Nayeem, M Mostafizur Rahman, M Sarwar Jahan, Razia Sultana Popy, Chapter: Pulping of Rice straw, Book: Pulping and Papermaking of Nonwood Plant Fibres, Elsevier (2023).

Scientists pursuing M.S/M.Phil/ PhD Courses in home or abroad

1. Mamon Sarkar, RC, Pulp and Paper Research Division, Pursuing Ph.D. degree from University of Wyoming, USA.

Industrial Tours/Disseminations

Name and Designation	Name of the institution	Date
1. Dr. Md. Mostafizur Rahman, Senior Scientific Officer 2. Razia Sultana Popy, Scientific Officer 3. Md. Nur alam Likhon, Scientific Officer 4. Sharmin Islam, Research Chemist	Vertex Paper and Board Mills Ltd, safiaba, Shylhet	07.06.2023 08.06.2023

Guidance to research work (PhD/M.Phill/ M.Phill/ M.S/ NCST & BCSIR Fellow)

Sl. No.	Title of Research	Research Catagory	Name of Student	University / Institute	Supervisors in BCSIR
01.	Improvement of Bangladeshi OCC paper by physical treatment	M.S	Md. Minhajul Islam	Applied Chemistry & Chemical Engineering, University of Dhaka	Dr. Md. Mostafizur Rahman
02.	Preparation, characterization of carboxymethyl chitosan and its application in paper making process	M.S	Shouvroneel Roy	Applied Chemistry & Chemical Engineering, University of Dhaka	Dr. Md. Mostafizur Rahman

Participation in training/ Seminar/ Symposium/ Workshop / Conference:

1.Dr. Md. Mostafizur Rahman (SSO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment affairs sub-committee of Bangladesh Awami League, 2-4 September, 2022 and presented an oral presentation entitled, "Phenolation of potassium hydroxide lignin to improve its reactivity".

2.Dr. Md. Mustafizur Rahman (SSO), participated in BCSIR Congress-2022 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 01-02 December, 2022 and presented an oral presentation entitled, "Phenolated lignin-acrylic acid copolymer used as metal corrosion inhibitor".

3. Dr. Md. Mustafizur Rahman (SSO), participated in International Conclave on Materials, Energy and Climate, Dhaka, Bangladesh, 19-20 December, 2022 and presented an oral presentation entitled, "Structural characterization of potassium hydroxide liquor lignin and its biorefinery application".

4. Razia Sultana Popy (SO), participated in International Conference on Environmental Protection for Sustainable Development (ICEPSD-2022) organized by Forest and Environment affairs sub-committee of Bangladesh Awami League, 2-4 September, 2022 and presented an oral presentation entitled, "Dissolving pulp and furfural production from jute stick".

5. Razia Sultana Popy (SO), participated in BCSIR Congress-2022 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 01-02 December, 2022 and presented an oral presentation entitled, "Pulping of Trewia Nudiflora".

6. Razia Sultana Popy (SO), participated in International Conclave on Materials, Energy and Climate, Dhaka, Bangladesh, 19-20 December, 2022 presented an oral presentation entitled, "Nitric acid-patassium hydroxide fractionation of rice straw: An integrated bio-refinery initiative".

7. Razia Sultana Popy (SO), participated in training on Integrity Strategy and good governance held on 22 September, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.

8. Razia Sultana Popy (SO), participated in training on Learning Session on Patent drafting held on 26 September, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.

9. Razia Sultana Popy (SO), participated in training on Nuclear Magnetic Resonance (NMR) Spectrometer held on 16-20 October, 2022 at INARS, BCSIR, Dhaka.

10. Razia Sultana Popy (SO), participated in training on Basic Principle, Application and Maintenance of XRD held on 01 February, 2023 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.

11. Razia Sultana Popy (SO), participated in training on Operation and Maintenance of FT-MIR-NIR Spectrometer held on 16-20 October, 2023 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.

12. Md. Nur Alam Likhon (SO), participated in BCSIR Congress-2022 organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 01-02 December, 2022 and presented a poster presentation entitled, "Pulping of Zara (Poaceae)".

13. Md. Nur Alam Likhon (SO), participated in International Conclave on Materials, Energy and Climate, Dhaka, Bangladesh, 19-20 December, 2022 and presented an oral presentation entitled, "Pulping of

Zara (Poaceae)".

14. Md. Nur Alam Likhon (SO), participated in training on Learning Session on Patent drafting held on 26 September, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
15. Md. Nur Alam Likhon (SO), participated in training on Learning Session on "Public Awareness of Right to Information" held on 27 September, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
16. Md. Nur Alam Likhon (SO), participated in training on Learning Session on "Techno Economical and Feasibility Study" held on 23 October, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
17. Md. Nur Alam Likhon (SO), participated in training on Learning Session on "Basic Principle, Application and Maintenance of FTIR" held on 13 December, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
18. Md. Nur Alam Likhon (SO), participated in training on Learning Session on "Basic Principle, Application and Maintenance of Raman Spectroscopy" held on 14 December, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
19. Md. Nur Alam Likhon (SO), participated in training on Learning Session on "Basic Principle, Application and Maintenance of XRD" held on 15 December, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
20. Md. Nur Alam Likhon (SO), participated in training on Learning Session on "PPR in Scientific Procurement" held on 01 February, 2023 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
21. Md. Nur Alam Likhon (SO), participated in training on Learning Session on "Raman Spectroscopy, Data analysis and Instrument Maintenance" held on 17th-11th May, 2023 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.
22. Sharmin Islam (RC), participated in training on Learning Session on Patent drafting held on 26 September, 2022 at BCSIR Dhaka Laboratories, BCSIR, Dhaka.

Number of Analytical (Ad-hoc) problem solved:

Name of the Division	Routine type	Research Type	Total
Pulp and Paper Research Division	488	20	508

Short Biography of Scientists

Dr. Md. Sarwar Jahan (1992-Present)

Office	BCSIR Laboratories, Dhaka	Blood Group	B+
Job Title	Director	Degree Obtained	Ph.D (2000)
Contact	sarwar2065@hotmail.com	Mobile	01715078023

Dr. Md. Sarwar Jahan achieved his BSc and MSc degree in Applied Chemistry from Rajshahi University, and later he acquired PhD degree on 'jute pulping' from the same university. He has built up a versatile research career on pulping, wood and fiber chemistry, biorefinery and biomaterials. He has published more than 200 articles in the high ranked peer reviewed journals and gets 4270 citations with 35 h-index. He received many awards including David Wetherhorn Award, TAPPI, USA 2009, Bangladesh Academy of Science gold medal 2013, Successful Innovation in Science and Technology in Developing Countries, 2015, and he is an Elected Fellow, International Academy of Wood Science, 2015. He is active members of Australia and New Zealand Pulp and Paper Industries Technical Association (APPITA), Pulp and Paper Technical Association of Canada, TAPPI USA, Society of Wood Science and Technology (SWST), International Union of Forest Research Organization (IUFRO), Bangladesh Chemical Society. He is a steering committee member of INGSA, Asia. Dr. Jahan organized different international conferences and workshops in home and abroad.

Dr.Mohammad Nashir Uddin (October 2001-Present)

Office	Pulp & Paper Research Division	Blood Group	O+
Job Title	Principal Scientific Officer	Degree Obtained	Ph.D (2016)
Contact	nashirbcsir@gmail.com	Mobile	01912068516

Dr. Mohammad Nashir Uddin achieved his BSc and MSc degree in Statistics from University of Dhaka. Next, he obtained MS degree in Population Sciences from University of Dhaka with UNFPA scholarship. Later he achieved PhD degree in Chemometrics from Jahangirnagar University. His researches are mainly in the area of Chemometric modeling for quantification and classification purpose, Experimental Design, Statistical Analysis of both quantitative and qualitative data. He has authored or coauthored 45 publications and has supervised more than 20 students for accomplishing their MSc thesis. He has been performing the duty of Director of Planning and Development Division (P&D), BCSIR since September 2019 as additional charge.

Dr.Md. Mostafizur Rahman (November 2006-Present)

Office	Pulp & Paper Research Division	Blood Group	A+
Job Title	Senior Scientific Officer	Degree Obtained	Ph.D (2019)
Contact	mmrbcsir@yahoo.com	Mobile	01737683668

Dr. Md. Mostafizur Rahman his completed BSc and MSc (organic) degree in Chemistry from University of Rajshahi. Later he acquired PhD degree in Pulp and Paper focusing on brown stock pulp washing from University of Pardubice, Czech Republic. Dr. Rahman interested in pulping, browstock pulp washing, biorefinery and biomaterials. He has published 50 articles in the peer reviewed journals as first author, corresponding author and coauthor. Besides, he as supervised 13 students for accomplishing their MSc thesis. He is a member of International Society of Wood Science & Technology (SWST), Membership invoice no. 004672, Bangladesh Chemical Society, Bangladesh Association for the Advancement of Science (BAAS), Rajshahi University Chemistry Alumni Association (RUCAA), BCSIR-Scientist Association.

Razia Sultana Popy (December,2016-Present)

Office	Pulp & Paper Research Division	Blood Group	A+
Job Title	Scientific Officer	Degree Obtained	M.Sc. (2014)
Contact	razia_jnu@yahoo.com	Mobile	01727-169725

Razia Sultana Popy completed her B.Sc (Hons.) and M.Sc in Chemistry from Jagannath University. She is working in the field of non-wood pulping of agricultural wastes in biorefinery initiative and utilization of dissolved biomass. She has authored and coauthored ten (10) publications.

Md. Nur Alam Likhon (November, 2021-Present)

Office	Pulp & Paper Research Division	Blood Group	O+
Job Title	Scientific Officer	Degree Obtained	MS (2018)
Contact	likhon.bcsir@gmail.com	Mobile	01750650950

Md Nur Alam Likhon achieved both his BS Honours and MS (Organic Chemistry) degree in Chemistry from University of Dhaka. Recently he is working as a Scientific Officer in Pulp and Paper Research Division under BCSIR Laboratories, Dhaka. He has done his MS thesis on Lignin modification. His research is mainly focused on pulping and bleaching of biomass, wood chemistry, biorefinary, Lignocellulosic modification. He has authored one (1) publication.

Akash Mamon Sarkar (August, 2016-Present)

Office	Pulp & Paper Research Division	Blood Group	B+
Job Title	Research Chemist	Degree Obtained	MSc (2010)
Contact	akash.mamon@gmail.com	Mobile	6052021957

Sarkar achieved his BSc and MSc degree in Chemistry from the Jagannath University, Dhaka. He is currently in deputation for his PhD degree (Organic Chemistry) from the University of Wyoming, USA (2019 to present) under the supervision of Professor Micheal Thompson Taylor. His research is mainly focused on the Cellulose Chemistry, Synthetic Chemistry and Environmental Chemistry. He has been published 33 articles as first author, corresponding author or coauthor and got 313 citations (h-index: 9). He is a life member of Bangladesh Chemical Society and a member of American Chemical Society from 2018.

Sharmin Islam (February, 2023-Present)

Office	Pulp & Paper Research Division	Blood Group	B+
Job Title	Research Chemist	Degree Obtained	MS (2020)
Contact	sharminsweety292@gmail.com	Mobile	01851995279

Sharmin Islam achieved both her BS Honours and MS (Inorganic Chemistry) degree in Chemistry from University of Dhaka. Recently she is working as a Research Chemist in Pulp and Paper Research Division under BCSIR Laboratories, Dhaka. She has done her MS thesis on Cellulose based hydrogel. Her research is mainly focused on Lignocellulosic chemistry.

Fiber Classifier

Paper testing equipment

Rapid Kothen Sheet Former

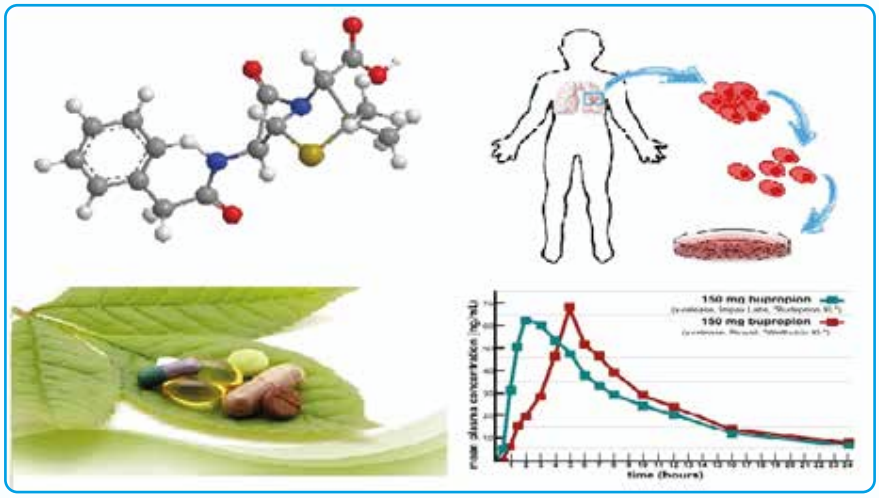
Bursting Strength Tester

Digester

Valley beater

Pharmaceutical Sciences Research Division (PSRD)

Scientists of PSRD



Pharmaceutical industry is the third largest tax paying industry in Bangladesh and contributes almost 1.0% of total GDP. Domestically, pharmaceutical companies produce around 98% of the drugs and only about 2.0% of life-saving hi-tech medicines (vaccines, anticancer drugs, blood and biosimilar products etc.) are imported. Regardless of the developments, it still has a foreign dependency for the import of Active Pharmaceutical Ingredients (APIs) and excipients, lack of Bioequivalence facilities and advanced research facilities for drug development etc. Pharmaceutical Sciences Research Division is working to overcome the aforementioned problems by establishing modern research facilities on Pharmaceutical Sciences and bioequivalence studies and thus help to support the pharmaceutical industries of Bangladesh to overcome the current challenges. Pharmaceutical Sciences Research Division has following five research sections; Scientists of Pharmaceutical Sciences Research Division are working at different field of Pharmaceutical sciences. To ensure quality medicine, Pharmaceutical Sciences Research Division is also providing analytical services on different quality parameters of drugs.

- Number of Scientists: 11
- Total R & D : 08; Ongoing (04), Completed (04)
- ADP Project: 01

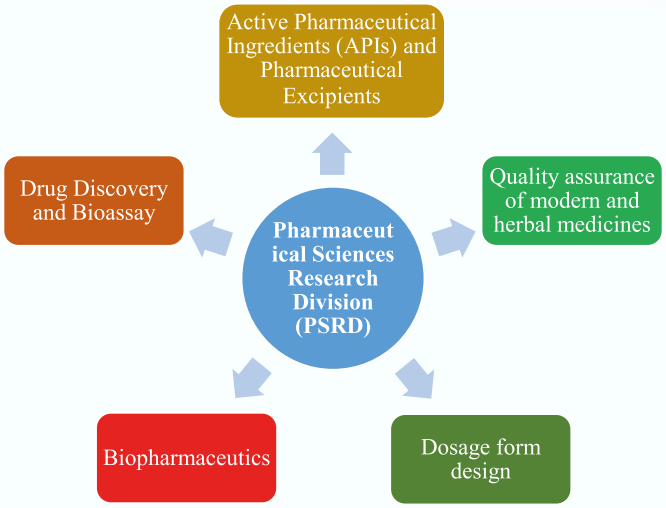


Fig.: Different Section of PSRD

Research and Development (R&D) Projects:

1. Metabolite profiling and bioassay correlation of *Vitex* sp. and *Persicaria* sp. for isolation of natural anticancer agent.

Suriya Sharmin (PL), Dr. Md. Hossain Sohrab, Satyajit Roy Rony, Dr. A.D.A. Shahinuzzaman, Fatema Moni, Md. Ariful Haq

Introduction:

An important group of medicinal plant is Persicaria sp. Different plant extracts exhibited multitude of pharmacological activities including antibacterial, antioxidant, anti-inflammatory, anti-cancer, antiviral, hepatoprotective, neuropharmacological, gastroprotective activities etc. Whereas Several of the *Vitex* sp. have traditional folklore application. Pharmacological potential of several Vitex sp. have also been reported. *V. agnus-castus* L. exhibited activities against P388 leukemia cells, antiepileptic activity, inhibition of prolactin synthesis, and also inhibited dopamine D2 and opioid receptors. *V. rotundifolia* Linn fruits, exhibited antioxidative activity, inhibited cholesterol acyltransferase, and also shown anticancer activity. *V. negundo* Linn exhibited broad cytotoxicity in a human cancer cell lines and also sowed antioxidant activity. *Vitex trifolia* Linn have shown antitumor, antiinflammatory and insecticidal activity. Several pharmacologically important compounds have been isolated from *Vitex agnus-castus, V. negundo, V. rotundifolia.* In this study *Vitex* sp. and *Persicaria* sp. Along with their associated fungi will be screened for bioactivity to identify most possible source of bioactive agents. Metabolite profiling study will be implemented to correlate their biological activities for both intra- and inter-genus variations.

Objectives:

- Development of spectroscopic and chromatographic method for metabolite profiling of *Vitex* sp. and *Persicaria* sp
- To isolate new anticancer agents from mostly untapped *Vitex* sp. and *Persicaria* sp
- Determination of molecular mechanism of anticancer activity with intra- and inter-genus comparison

Work progress:

- Plant sample collection of *Persicaria hydropiper*
- Isolation of endophytic fungi from leaves and stem of *Persicaria hydropiper*
- Investigation of different biological activities of plant and endophytic fungal extract for their comparison
- Isolation of bioactive compounds will be carried out using chromatographic techniques

2. Isolation of bioactive compounds from the leaves of Heptapleurum hypoleucum and assessment of their pharmacological potentiality.

Md. Sakhawat Hossain (PL), Dr. Md. Hossain Sohrab, Satyajit Roy Rony, Dr. A.D.A. Shahinuzzaman, Suriya Sharmin, Fatema Moni

Introduction:

Heptapleurum hypoleucum (Family: Araliaceae), locally known as *Jharobbo hogoeya* (Bangladesh Ethnobotany Online Database) is usually seen in hill tracts of Bangladesh. This plant is extensively used in the treatment of diarrhea and dysentery by the people of tribal communities. Previous study reported that, leaves of *Heptapleurum hypoleucum* are rich in different bioactive chemicals like alkaloids, phenolic, steroids, and flavonoids etc. The plant showed anti-bacterial activities against diarrhea causing bacteria like *Salmonella typhi, Streptococcus pneumoniae, Staphylococcus aureus, Shigella flexneri, and Escherichia coli*. But most of the photochemicals possess anti-microbial, antioxidant, anti-inflammatory, thrombolytic, and antidiarrheal activities. From this point of view, *Heptapleurum hypoleucum* plant is totally uncommon and no significant work has been done regarding the isolation of these bioactive compounds and other in vivo-in vitro pharmacological activities. We hypothesize from the previous study that, compounds isolated from the leaves of *Heptapleurum hypoleucum* may exhibit different pharmacological activities against different health disorders. So, the main goal of this research is to isolate several bioactive chemical compounds and to evaluate different pharmacological activities that may consider this plant as potential therapeutics in human health.

Objectives:

- To isolate pharmacologically active chemical compounds from *Heptapleurum hypoleucum*
- To characterize the isolated compounds in terms of structure elucidation
- To investigate the therapeutic effect of that compound that leads the plant as potential drug candidate

Work progress:

- Plant collection and authentication from Bangladesh National Herbarium have been done.
- Crude methanol extract has been prepared and phytochemical screening of crude extract has been done
- Partitioning of crude extract using Kupchan methods to get different fractions has been completed. Investigation of biological activities of these fractions has been completed
- Identification of possible bioactive compounds using GC-MS/MS has been done
- Isolation of bioactive compounds using silica gel column chromatography will be carried out
- Identification of pure compounds will be done using NMR, IR and MS. Investigation of pharmacological activities of pure compound will be carried out

3. Identification of pharmacophore of isolated bioactive compounds and their structure activity relationship (SAR) study.

Dr. Md. Hossain Sohrab (PL), Dr. Farhana Afroz, Fatema Moni, Saima Mollick and Md. Ariful Haq

Introduction:

Drug discovery by synthetic chemistry is inspired by small molecules isolated from various natural sources including plants, bacteria and marine sponges to name a few. The bioactivity of these compounds is the most crucial part when it comes to devising a retrosynthesis (working backwards from natural product to simple starting materials). Efficient synthetic routes enable biological investigations that delve further into trying to uncover the rich biology that can be learned through the synthesis and detailed structure-activity relationship (SAR) of natural products and derivatives including simplified versions with comparable or unique biological activity. The analysis of SAR enables the determination of the chemical groups responsible for evoking a target biological effect in the organism.

Objectives:

- Isolation of bioactive compounds from medicinal plants and their associated endophytic fungi
- Identification of pharmacophore of bioactive compounds
- Logical modification and Structure Activity Relationship (SAR) study for improved activity

Work progress:

- 07 (seven) compound having different pharmacological property has been identified and chosen as lead for further drug development proceedings
- Active site of the compound has been predicted by in-silico study of the compound
- In-silico study of toxicity profiles of some isolated compounds have been done
- 20 proteins for multi drug resistance in bacteria have been identified
- 2500 molecules from natural product database have been screened in silico for interaction / inhibition study against the 20 resistance proteins
- 3 papers are published and another 1 paper is submitted

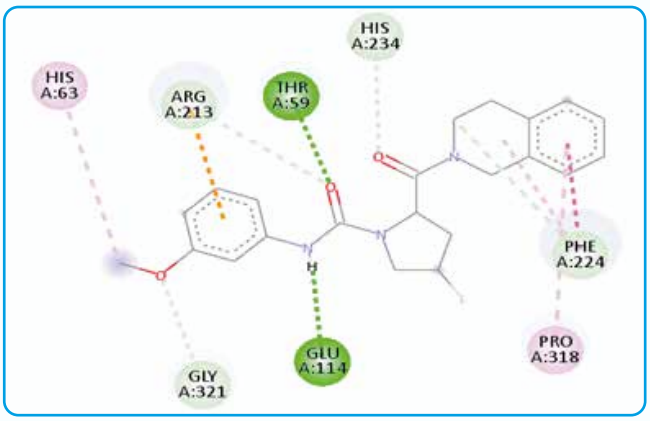


Fig.: Flavin-dependent monooxygenase etX with inhibitor

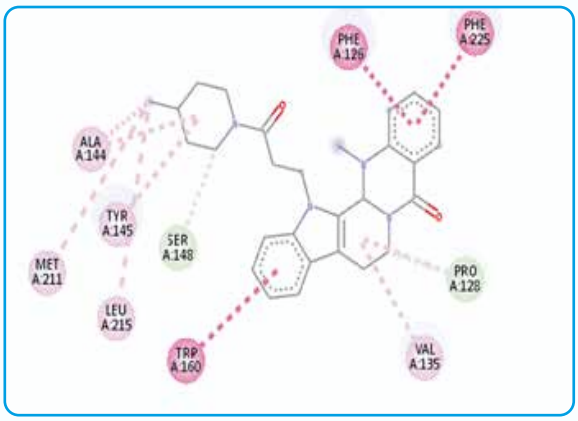


Fig.: TipA, transcriptional regulator with inhibitor

4. Isolation and characterization of novel bioactive metabolites from the medicinal plant *Sarcolobus globosus* and it's associated endophytic fungi.

Dr. ADA Shahinuzzaman (PL), Dr. Md. Hossain Sohrab, Dr. Farhana Afroz, Satyajit Roy Rony, Fatema Moni, Shammi Akhter, Md. Najem Uddin

Introduction:

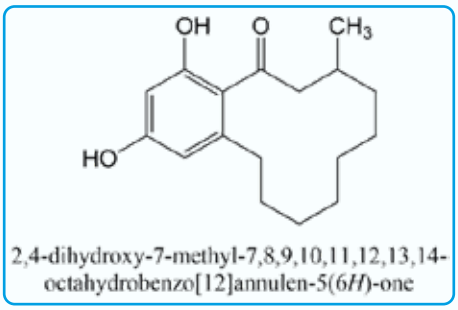
Sarcolobus globosus (বাওয়ালী লতা) is a native mangrove plant in Asia with medicinal properties. This has been traditionally used to kill dogs, cats, and wild animals. The plant's extracts have been implicated with several activities including cytotoxicity, thrombolytic activity, Neuromuscular blocking activity, cardiotonic activity, etc. This places the plant as a good mining source for drug lead discovery for anti-cancer compounds, treatment for the myocardial infraction, irregular heart rhythms, analgesics, etc. Hence, we want to screen for anti-cancer compounds, thrombolytic compounds, ion channel blockers, and anti-bacterial from *Sarcolobus globosus* and their associated endophytic fungi.

Objectives:

- Collection, culture, and molecular identification of endophytic fungi from the mangrove plant *Sarcolobus globosus* followed by metabolomics profiling of Sarcolobus globosus and its' fungi
- Structural elucidation of pure compounds through NMR and high-resolution mass spectrometry
- Computational prediction and identification of the mechanism of action of all compounds with active groups for potential bioactivity
- Validation of bioactivity and mechanism of action through in vitro assays, e.g. cell-based assays and patch clamping

Work progress:

- 12 fungi have been isolated from the plant
- Large-scale fungi culture and metabolite isolation are complete
- One molecule with potent anti-microbial activity against both gram-positive and gram-negative bacteria have been identified
- One manuscript is being prepared



2,4-dihydroxy-7-methyl-7,8,9,10,11,12,13,14-octahydrobenzo[12]annulen-5(6*H*)-one

Fig.: Compound isolated from *Sarcolobus globosus*

5. Identification of Endophytic Fungi by Amplicon Sequencing based Molecular Characterization

Saima Mollick (PL), Dr Md. Hossain Sohrab, Dr. A.D.A. Shahinuzzaman, Dr Farhana Afroze, Nadira Begum, Fatema Moni and Md. Ariful Haq

Introductions:

New viral diseases, multidrug-resistant microorganisms, and infections by various pathogens are emerging as new threats to mankind. Therefore, there is continuous need of discovery and development of new, safer, and effective drugs to combat these diseases. Recently drug discovery strategies heavily relied on microorganism where nearly 80% of the world's antibiotics have their origins. Therefore, there is an urgent need to explore new microbial habitats for the microorganisms that produce novel bioactive compounds. Endophytic fungi have been recognized as a novel source of bioactive secondary metabolites with diverse biological activities such as novel antibiotics, antimycotics, immunosuppressant, anticancer compounds and so on. Their bioactive potential was first recognized when the world's first multibillion-dollar anticancer drug, paclitaxel (Taxol), was obtained from Taxomyces andreanae, an endophytic fungus isolated from the yew plant, *Taxus brevifolia*. However, it has been estimated that less than 1% of endophytic microorganisms are currently known, suggesting that a vast majority of them are yet to be discovered. Thus, endophytic microbes represent a potential source for the discovery of new and useful compounds for the benefit of humankind.

The project is an effort through a basic and research to develop a suitable method to identify novel microbes from natural source and to support the pharmaceutical sectors to develop newer drug and medicine.

Objectives:

- To isolate and identify endophytic fungi from medicinal plants with potential bioactivity
- To develop a suitable method for fungi identification which will be efficient, rapid and low cost

Work progress:

- 11 endophytic fungi has been isolated and identified from the plants Pandanus tectorius and Portheresia coarctata
- All the fungal strains have been purified and small-scale culture of each of them are done
- Chemical screening of fungal extract is performed by TLC and are subjected to in-vitro bioassay e.g. cell-based assays and antimicrobial assay etc
- Large Scale culture and Column Chromatography of one fungal extract is done
- NMR of isolated compounds from column chromatography is completed. Structure elucidation is ongoing.
- One manuscript is being prepared.

6. Isolation and profiling of bioactive metabolites from the tropical mangrove species *Sonneratia caseolaris* and its associated fungal endophytes

Md. Ariful Haq (PL), Dr. Farhana Afroz, Dr. A.D.A. Shahinuzzaman, Shammi Akhter, Saima Mollick, Najem Uddin & Fatema Moni.

Introductions:

This project is an effort through a combination of basic and applied research to search bioactive compounds (e.g.: anti-microbial, anti-cancer etc.) from tropical mangrove species *Sonneratia caseolaris* and its associated fungal endophytes.

Objectives:

a) Collection, isolation, and identification of endophytic fungi from the mangrove plant *Sonneratia caseolaris*
b) Isolation and profiling of metabolites from endophytic fungi of *Sonneratia caseolaris*
c) Structural elucidation of bioactive compounds through spectroscopic methods
d) Evaluation of bioactivity of isolated metabolites/compounds through in vitro bio-assays, e.g. cell-based assays and antimicrobial assay etc

Work progress:

- 07 no. of endophytic fungal strains are isolated and purified
- Fungal culture cultivation and metabolite isolation are completed
- One manuscript is being prepared

7. Development and Characterization of neutralizing antibodies against SARS-CoV-2 infection

Dr. ADA Shahinuzzaman (PL), Dr. Md. Hossain Sohrab, Dr. Farhana Afroz, Satyajit Roy Rony, Suriya Sharmin,Fatema Moni, Shammi Akhter, Md. Najem Uddin and Md. Ariful Haq

Introductions:

Several strategies of intervention to SARS-CoV-2 infection are being sought. This includes treatment with anti-inflammatory drugs, viral enzyme blockers, antibodies to prevent cytokine storm etc. Although preventive measures such as wearing masks and vaccination is a preferred choice to avoid infection, yet short span of antibody production, arrival of new viral variants has challenged such schemes strongly. Yet another approach is to explore potentials of virus neutralizing antibodies to prevent disease progression and fatality. Our Aim is to identify and characterize neutralizing antibodies against locally circulating viral variants and screen in-vitro for their efficacy in preventing cell entry of pseudovirus SARS-CoV-2.

Objectives:

- Identification of antibody producing genes through RNA sequencing and protein sequencing
- Development of pseudotyped SARS-CoV-2 virus like particle
- In-vitro neutralization Assay for confirmation of neutralizing antibody activity

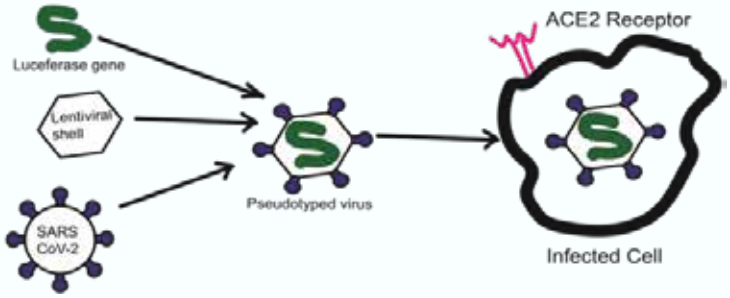


Fig.: Virus Neutralization Assay

Work progress:

• Sequence Specific Enrichment of antibody specific genes is going on.

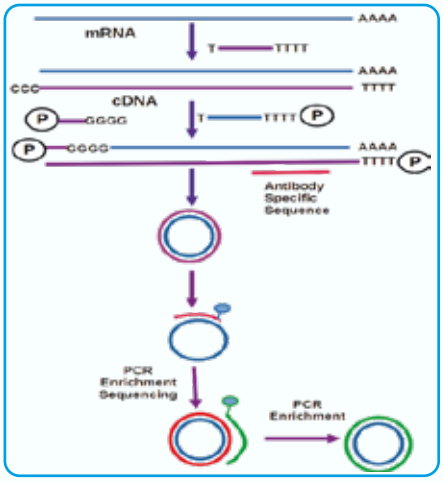


Fig.: Antibody gene sequencing and antibody specific gene enrichment for cloning

ADP (Annual Development Project):

Establishment of Institute of Bioequivalence Studies and Pharmaceutical Sciences

Introduction:

To avail the vast opportunity of pharmaceutical sector in the global market, BCSIR is implementing the ADP project "Establishment of Institute of Bioequivalence Studies and Pharmaceutical Sciences" since 2017. It will be a world class research institute creating facilities for clinical research and bioequivalence studies, synthesis of active pharmaceutical ingredients (APIs) and excipients, drug discovery and bioassay, new drug development, new and effective dosage form design, quality assurance and improvement of medicines etc. as well as related analytical services. These will open doors of export to regulated markets, reduce import dependency, develop export quality generic drugs and thus save foreign currency. People will be able to get safe, effective and quality medicine at affordable prices in the local market.

Objectives:

- Establishment of a world class 'Pharmaceutical Sciences Research Institute for Bioequivalence Studies and Drug Development'
- To create clinical research facilities for developing export quality Generic Drugs
- To create facilities of Bioequivalence Studies which will be necessary to open doors of export to regulated markets by local Pharma Industries
- To create research facilities for Drug Discovery and Bioassay, Synthesis of Active Pharmaceutical Ingredients (APIs) and Excipients, Quality Assurance of Medicines, Dosage Form Design (Formulation) as well as to provide necessary analytical services to Pharma companies

Work Progress:

- Procurement of scientific equipment and office appliances has been completed.
- Construction of laboratory building under the project is completed along with interior designing and utility works.
- According to the guidance of regulatory bodies, procurement of consultants under the project has been completed.
- Manpower development for the project has been completed.
- Procured instruments are installed and local training for these installed machines is ongoing.
- Overall progress of the ADP project up to the month of June, 2023 is 90.04%.

Achievements:

Research Papers:

1. Kazi Jannatul Ferdous, Farhana Afroz, Md. Rakibul Islam, Md. Abdul Mazid, Md. Hossain Sohrab (2023). Phytochemical Screening of Rhizome Extract of Curcuma longa Linn. Grown in Bangladesh through GC-MS and its Bioactivities. Dhaka Univ. J. Pharm. Sci. https://doi.org/10.3329/dujps.v22i1.64141
2. Md Saiful Alam, Satyajit Roy Rony, Farhana Afroz, Abdullah Al Mansur, Suriya Sharmin, Fatema Moni, Shammi Akhter, Mohammad Musarraf Hussain, Md. Hossain Sohrab (2023). A New Annulenol from Aconitum heterophyllum with Bioactivity and Cytotoxicity against Vero and Lung Cell Line. Dhaka Univ. J. Pharm. Sci. https://doi.org/10.3329/dujps.v22i1.64141
3. Fatema Moni, Suriya Sharmin, ADA Shahinuzzaman, Satyajit Roy Rony, Saima Mollick, Md. Najem Uddin, Md. Hossain Sohrab (2023). Development and Validation of a Bioanalytical Method for the Quantification of Aceclofenac in a Small Volume of Human Serum by RP-HPLC. J Anal Chem 78, 344–351. https://doi.org/10.1134/S1061934823030103
4. Mst. Mabiya Sultana Samapti, Farhana Afroz, Satyajit Roy Rony, Suriya Sharmin, Fatema Moni, Shammi Akhter, Sheikh Feroz Uddin Ahmed, and Md. Hossain Sohrab (2022). "Isolation and Identification of Endophytic Fungi from Syzygium cumini Linn and Investigation of Their Pharmacological Activities", Sci. World J., vol. 2022, Article ID 9529665, 10 pages, 2022. https://doi.org/10.1155/2022/9529665.
5. Fatema Moni, Naki Saifullah, Farhana Afroz, Satyajit Roy Rony, Suriya Sharmin, ADA Shahinuzzaman, Muhammad Abdullah Al-Mansur, Sharif Md. Al-Reza & Md. Hossain Sohrab (2022) Antibacterial and Cytotoxic Compounds from Endophyte Fusarium solani isolated from Centella asiatica (L.), Journal of Biologically Active Products from Nature, 12:5, 436-449, DOI: 10.1080/22311866.2022.2144947
6. Md. Raihanur Islam, Md. Sakhawat Hossain, Md. Sanower Hossain, Mohammad Touhidul Islam, Sharifa Sultana, Nisarat Nijhum, Kutub Uddin Ahamed, Chee-Yan Choo, Ching Siang Tan, Khang Wen Goh. Quality Assessment of Hydroxychloroquine Tablet: A Comparative Evaluation of Drug Produced by Different Pharmaceutical Companies in Bangladesh. Progress In Microbes & Molecular Biology, 2023, 6(1). a0000336. doi: 10.36877/pmmb.0000336
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9. Gazi Monjur Murshid, Md Hossain Sohrab, Khondoker Shahin Ahmed, Mohammad Mehedi Masud, Md Abdul Mazid (2022). Antiproliferative and Antibacterial Potentials of Endophytic Fungi Associated with Bangladeshi Medicinal Plant Tinospora Cordifolia. Dhaka Univ. J. Pharm. Sci., 21(2), 183-194.
10. Fatema Tuz Zohora, Mahtarin, R.; Ali, M. A.; Islam, M. J.; Md Hossain Sohrab; Choudhury Mahmood Hasan; Monira Ahsan(2023). Cytotoxicity, Antioxidant Activity, Molecular Docking, and Dynamics Simulation Analysis Against SARS-CoV-2 M and N Protein Models of Phytoconstituents of Micromelum Minutum. Biointerface Res. Appl. Chem., 13(1). Artigo em Inglês | Scopus | ID: covid-who-1789940
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13. Farhana Afroz, Fatema Moni, Suriya Sharmin, Satyajit Roy Rony, Shah Masum, Mohammad Hossain Sohrab. Efficacy of liquid-liquid extraction and protein precipitation methods in serum sample preparation for quantification of fexofenadine in human serum. ACTA Pharm. Sci., 2022. DOI: 10.23893/1307-2080.APS.6018
14. Trissa Saha, Mashrafi Bin Mobarak, Md Najem Uddin, Md Saiful Quddus, Mustafizur Rahman Naim, Nigar Sultana Pinky (2023). "Biogenic synthesis of copper oxide (CuO) NPs exploiting Averrhoa carambola leaf extract and its potential antibacterial activity". Mater. Chem. Phys., Volume 305, 2023, 127979, ISSN 0254-0584, https://doi.org/10.1016/j.matchemphys.2023.127979.
15. Md. Saddam Hossain, Md. Shahiduzzaman, Mohammad Abdur Rahim, Methun Paul, Rajib Sarkar, Farjana Showline Chaity, Md. Najem Uddin, G.M. Masud Rana, Mst. Sarmina Yeasmin, Amena Kibria, Saiful Islam, Bioactive properties and organosulfur compounds profiling of newly developed garlic varieties of Bangladesh, Food Chem.: X, Volume 17, 2023, 100577, ISSN 2590-1575, https://-doi.org/10.1016/j.fochx.2023.100577.
16. Supanna Malek Tuntun, Md. Sahadat Hossain, Md. Najem Uddin, Md. Aftab Ali Shaikh, Newaz Mohammed Bahadur, and Samina Ahmed, (2023). Crystallographic characterization and application of copper doped hydroxyapatite as a biomaterial, New J. Chem., volume 47, issue 6, pages 2874-2885, publisher, The Royal Society of Chemistry, https://doi.org/10.1039/D2NJ04130H
17. Md. Sahadat Hossain, Md. Najem Uddin, Shifa Sarkar, Samina Ahmed, Crystallographic dependency of waste cow bone, hydroxyapatite, and β-tricalcium phosphate for biomedical application, J. Saudi Chem. Soc., Volume 26, Issue 6, 2022, 101559, ISSN 1319-6103, https://doi.org/10.1016/j.-jscs.2022.101559.
18. Md. Sahadat Hossain, Md. Najem Uddin, Shirin Akter Jahan, and Samina Ahmed, Synthesis and characterization of nano crystallite plaster of Paris prepared from waste eggshells and exploration of cytotoxicity, hemolysis and antimicrobial properties, J. Mater. Chem. B, 2023, volume 11, issue 5, pages 1057-1067, publisher, The Royal Society of Chemistry, https://doi.org/10.1039/D2TB02392J
19. Md. Sahadat Hossain, Md. Aftab Ali Shaikh, Shirin Akter Jahan, Monika Mahmud, Mashrafi Bin Mobarak, Md. Saifur Rahaman, Md. Najem Uddin, Samina Ahmed, Exploring the biomedical competency of gamma-radiation aided hydroxyapatite and its composite fabricated with nano-cellulose chitosan", journal RSC Adv., year 2023, volume 13, issue 14, pages 9654-9664, publisher, The Royal Society of Chemistry, https://doi.org/10.1039/D3RA00476G
20. Md. Sahadat Hossain, Md. Najem Uddin, Samina Ahmed (2023). Biomedical competency of bassanite (plaster of Paris) synthesized from waste Pila globosa shells", Mater. Adv., volume 4, issue 5, pages 1286-1288, publisher. RSC, https://doi.org/10.1039/D2MA01005D

Method Validation:

1. Fatema Moni. "Standard Operating Procedure for Validation of Bioanalytical Method for Aceclofenac in Human Serum". Date: 15.03.2023.

Guidance to research work (PhD/M.Phill/ M.Phill/ M.S/ NCST & BCSIR Fellow)

Sl. No.	Title of Research	Research Catagory	Name of Student	University / Institute	Supervisors in BCSIR
01.	Evaluation of bioactive metabolites isolated from fungi fungi co-culture of endophytic fungus collected from the medicinal plant Sarcolobus globosus.	M.S	Farhana Alam Proma	Department of Pharmacy, Jagannath University	Dr. ADA Shahinuzzaman, SSO
02.	Isolation of Bioactive compounds from endophytic fungi of Citrus macroptera	M.S	Rafia Sultana	Department of Pharmacy, Jahangirnagar University, Savar, Dhaka.	Dr. Md. Hossain Sohrab, CSO
03.	Isolation and characterization of Secondary metabolites isolated from endophytic fungi of Kalokeshi; Eclipta alba (L.) Hassk	M.S	Marjan Alam	Department of Zoology, University of Dhaka, Dhaka.	Dr. Md. Hossain Sohrab, CSO
04.	Study of bioactive metabolites isolated from fusarium genus of endophytic fungi from Sarcolobus globosus mangrove plant.	M.S	Fahamida Binta Anower	Department of Pharmacy, Jagannath University	Dr. ADA Shahinuzzaman, SSO
05.	Investigation of anticancer and antibacterial metabolites from Seaweeds of the Bay of Bengal and their associated endophytic fungi.	PhD	Sadia Noor	Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Dhaka.	Dr. Md. Hossain Sohrab, CSO
06.	Studies on antibacterial and cytotoxic metabolites from endophytic fungi	PhD	Gazi Md. Monjur Murshid	Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Dhaka	Dr. Md. Hossain Sohrab, CSO
07.	Isolation and characterization of two ethno-pharmacologically important Gingiberaceae plants of Bangladesh and their endophytic fungi.	PhD	Kazi Jannatul Ferdous	Dept. of Biochemistry and Molecular Biologu, University of Dhaka	Dr. Farhana Afroz, SSO

08.	Isolation of bioactive compounds from Ludwigia adscendens (L.) H. Hara and investigation of their pharmacological potentiality	BCSIR Fellow	Nishat Nizhum	BCSIR	Dr. Md. Hossain Sohrab, CSO
09.	Bioanalytical method development and validation for quantification of Fexofenadine Hydrochloride and Losartan Potassium in human serum	BCSIR Fellow	Farhana Afroz	BCSIR	Dr. Md. Hossain Sohrab, CSO
10.	Bioactive metabolites from three medicinal plants and their associated endophytic fungi	BCSIR Fellow	Rabita Zinnurain	Prof. Mofizuddin Ahmed Smrity Fellowship (BCSIR)	Dr. Md. Hossain Sohrab, CSO

Participation in training/Seminar/Symposium/Workshop/Conference:

Training:

1. Saima Mollick (SO) participated in a training program on "Integrity strategy and good governance" held on 22 September, 2022 at BCSIR Laboratories, Dhaka.
2. Md. Najem Uddin (SO) participated in a training program on "Integrity strategy and good governance" held on 22 September, 2022 at BCSIR Laboratories, Dhaka.
3. Md. Ariful Haq (SO) participated in a training program on "Integrity strategy and good governance" held on 22 September, 2022 at BCSIR Laboratories, Dhaka.
4. Md. Sakhawat Hossain (SO) participated in a Learning Session on "Patent Drafting" held on 25 September, 2022 at BCSIR Laboratories, Dhaka.
5. Md. Ariful Haq (SO) participated in a training program on "Public Awarness of Right to Information" held on 27 September, 2022 at BCSIR Laboratories, Dhaka.
6. Suriya Sharmin (SSO) participated in a training program on "Techno Economical and Feasibility Study" held on 23 October, 2022 at BCSIR Laboratories, Dhaka.
7. Md. Ariful Haq (SO) participated in a training program on "Ethics in conducting research & development activities" held on 07 November, 2022 at BCSIR Laboratories, Dhaka.
8. Md. Sakhawat Hossain (SO) participated in a training program on "Basic principle, Application and Maintenance of FTIR" held on 13 December, 2022 at BCSIR Laboratories, Dhaka.
9. Md. Ariful Haq (SO) participated in a training program on "Basic principle, Application and Maintenance of Raman Spectroscopy" held on 14 December, 2022 at BCSIR Laboratories, Dhaka.
10. Md. Ariful Haq (SO) participated in a training program on "Basic principle, Application and Maintenance of XRD" held on 15 December, 2022 at BCSIR Laboratories, Dhaka.
11. Md. Sakhawat Hossain (SO) participated in a training program on "PPR in Scientific Procurement" held on 01 February, 2023 at BCSIR Laboratories, Dhaka.
12. Mamtaz Sultana (SO) participated in a training program on "PPR in Scientific Procurement" held on 01 February, 2023 at BCSIR Laboratories, Dhaka.
13. Mst. Maya Khatun (RP) participated in a training program on "PPR in Scientific Procurement" held on 01 February, 2023 at BCSIR Laboratories, Dhaka.
14. Md. Najem Uddin (SO) participated in a training program on "Preparative HPLC" held on 26 February-02 March, 2023 at BCSIR Laboratories, Rajshahi.
15. Md. Ariful Haq (SO) participated in a training program on "Preparative HPLC" held on 26 February-02 March, 2023 at BCSIR Laboratories, Rajshahi.

16. Dr. ADA Shahinuzzaman (SSO) participated in a training program on "Programmable Logic Controller (PLC)" held on 02-06 April, 2023 at BCSIR Laboratories, Dhaka.
17. Mst. Maya Khatun (RP) participated in a training program on "Operation and Maintenance of HPLC" held on 07-11 May, 2023 at IFST BCSIR, Dhaka.
18. Md. Ariful Haq (SO) participated in a training program on "national integrity Strategy" held on 22 May, 2023 at BCSIR Laboratories, Dhaka.
19. Md. Sakhawat Hossain (SO) participated in a training program on "National Integrity Strategy" held on 22 May, 2023 at BCSIR Laboratories, Dhaka.
20. Mamtaz Sultana (SO) participated in a training program on "National Integrity Strategy" held on 22 May, 2023 at BCSIR Laboratories, Dhaka.
21. Md. Ariful Haq (SO) participated in a training program on "Citizen Charter" held on 23 May, 2023 at BCSIR Laboratories, Dhaka.
22. Mamtaz Sultana (SO) participated in a Learning Session on "Patent Drafting and Industrial Process" held on 24 May, 2023 at BCSIR Laboratories, Dhaka.
23. Mst. Maya Khatun (RP) participated in a Learning Session on "Patent Drafting" held on 24 May, 2023 at BCSIR Laboratories, Dhaka.
24. Md. Ariful Haq (SO) participated in a training program on "Grievance Redress System" held on 19 June, 2023 at BCSIR Laboratories, Dhaka.
25. Md. Ariful Haq (SO) participated in a training program on "Different Techniques of R&D data Analysis and their Application" held on 26 June, 2023 at BCSIR Laboratories, Dhaka.
26. Md. Sakhawat Hossain (SO) participated in a training program on "Different Techniques of R&D Data Analysis and their Application" held on 26 June, 2023 at BCSIR Laboratories, Dhaka.
27. Mamtaz Sultana (SO) participated in a training program on "Different Techniques of R&D Data Analysis and their Application" held on 26 June, 2023 at BCSIR Laboratories, Dhaka.

Conference:

1. Md. Sakhawat Hossain, Fatema Moni, Md. Ariful Haque: "Present Scenario and Future Prospects of Hospital Pharmacy Practice in Bangladesh to Ensure Sustainable Health Service", in ICEPSD-2022, held in Dhaka, Bangladesh, 2-4 September 2022, OP-E25, Page no. 176
2. Mst. Maya Khatun, Satyajit Roy Rony, Saima Mollick, Shammi Akhter, Md. Mahafujur Rahman and Md. Ajijur Rahman: "Isolation and Characterization of Streptomyces Species from Pond Sediments and Investigation of their Antibacterial and Antioxidant Activity" in ICEPSD-2022, held in Dhaka, Bangladesh, 2-4 September 2022, PP-100, Page no. 383.
3. Farhana Afroz, Suriya Sharmin, Satyajit Roy Rony and Md. Hossain Sohrab: "Formulation of Losartan potassium immediate release tablet and its comparasion with marketed products", in BCSIR Congress-2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-J5, Page no. 58.
4. Md. Hossain Sohrab, Farhana Afroz, Suriya Sharmin, Satyajit Roy Rony, A D A Shahinuzzaman, Fatema Moni, Shammi Akhter, Saima Mollick, Md. Najem Uddin, Ariful Haque, Md. Shakhawat Hossain and Maya Khatun: "Drug Development Research in BCSIR", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. KN-K1, Page no. 60.
5. Fahmida Binte Anower, A D A Shahinuzzaman, Md. Hossain Sohrab, Satyajit Roy Rony, Suriya Sharmin, Fatema Moni, Shammi Akter, Nadira Begum, Saima Mollick, Md. Najem Uddin, Md. Ariful Haq, Emdad Hossain, A. H. M. Shofiul Islam Molla Jamal and Mohammad Musarraf Hussain: "Study of Bioactive metabolites from endophytic fungus isolates of Sarcolobus Globosus, a mangrove plant of the Sundarban", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. IL-L1, Page no. 65.
6. Suriya Sharmin, Fatema Moni, Satyajit Roy Rony, A D A Shahinuzzaman, Md. Najem Uddin, Md. Ariful Haq and Md. Hossain Sohrab: "Simultanious estimation of atenolol and trimetazidine in human serum by HPLC", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-J8, Page no. 113.

7. Nazia Hoque, Farhana Afroz, Choudhury Mahmood Hasan, Md. Sohel Rana and Md. Hossain Sohrab: "Isolation, characterization and cytotoxicity of the compounds isolated from the endophytic fungus Fusarium sp.", in BCSIR Congress-2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-K8, Page no. 119.
8. Mst Nadira Begum, Md. Hossain Sohrab, Elina Akther Zenat, Shamim Shamsi, Md Abul Bashar and Mohammad Nurul Islam: "Bioactive metabolites of endophytic fungi isolated from Gynura procumbens (Lour.) Merr", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-K12, Page no. 121.
9. Saima Mollick, Satyajit Roy Rony, A D A Shahinuzzaman, Suriya Sharmin, Fatema Moni, Md. Najem Uddin, Md. Ariful Haq and Md. Hossain Sohrab: "Exploration of endophytic fungi and their bioactive potential from the coastal plant Pandanus tectorius in Bangladesh", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-K14, Page no. 175.
10. Rabita Zinnurine, Mujibur Rahman, Satyajit Roy Rony, Suriya Sharmin, and Md. Hossain Sohrab: "Metabolite profiling and antioxidative potential of Citrus macroptera with identification of its endophytic fungal community", in BCSIR Congress-2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-K16, Page no. 176.
11. Fatema Moni, Hasib Khan Shomudro, A D A Shahinuzzaman, Suriya Sharmin, Satyajit Roy Rony, Abdurrahim, Saima Mollick, Md. Sakhawat Hossain and Md. Hossain Sohrab: "Bioactive potential of the medicinal plant Launaea asplenifolia", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-K20, Page no. 234.
12. Seagufta Afrin, Md. Hossain Sohrab, Choudhury Mahmood Hasan and Monira Ahsan: "Isolation and identification of endophytic fungi from Sesbania grandiflora and evaluation of their chemical and biological activity", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. OP-K21, Page no. 234.
13. Maya khatun, Md. Hossain Sohrab, Md. Najem Uddin, Satyajit Roy Rony, Md. Ajijur Rahman, Md. Anwar ul Islam and Md. Farhad: "Isolation, characterization and identification of the bacterial isolates from traditional foods of Bangladesh and investigation of their probiotic characteristics", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. PP-37, Page no. 318.
14. Shammi Akhter, Md. Ariful Haq, Fatema Moni, Suriya Sharmin1, ADA Shahinuzzaman1, Satyajit Roy Rony and Md. Hossain Sohrab: "Chemical and biological investigation of bioactive fractions of Lawsonia inermis L.", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. PP-92, Page no. 347.
15. Md. Sakhawat Hossain, Sharifa Sultana, Nisarat Nizhum: "Evaluation of Phytochemicals, Thrombolytic, Anti-diabetic and Anthelmintic Activities of Euphorbia tirucalli L. Leaves", in BCSIR Congress-2022, held at BCSIR, Dhaka-1205, 1-3 December 2022, Abstract no. PP-97, Page no. 350.
16. S. M. Mahmudul Hasan, Shammi Akhter, Koushik Saha and Md. Hossain Sohrab: "Phytochemical, cytotoxic, antimicrobial and antioxidant activities of different extracts of leaves, stem barks and roots of Crataeva nurvala Buch.-Ham.", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. PP-102, Page no. 353.
17. Marjan Alam, Mst. Nadira Begum, Md Aminul Islam Bhuiyan and Md. Hossain Sohrab: "Isolation and characterization of secondary metabolites isolated from endophytic fungi of Eclipta alba (L.) hassk", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. PP-106, Page no. 355.
18. Md. Ariful Haq, Md. Najem Uddin, Saima Mollick, A D A Shahinuzzaman, Suriya Sharmin, Satyajit Roy Rony, Fatema Moni and Md. Hossain Sohrab: "Isolation and profiling of bioactive metabolites from fungal endophytes associated with tropical mangrove species Sonneratia caseolaris in Bangladesh", in BCSIR Congress - 2022, held at BCSIR, Dhaka-1205, Bangladesh, 01-03 December, 2022. Abstract no. PP-107, Page no. 356.

Short Biography of Scientists

Dr. Md. Hossain Sohrab (February, 1997 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	O+
Job Title	Chief Scientific Officer	Degree Obtained	Ph.D (2005)
Contact	mhsohrab@yahoo.com	Mobile	01720121525

Dr. Md. Hossain Sohrab is the most prominent Mycologist and one of the top phytochemist in Bangladesh. He has been working as a Chief Scientific Officer and officer in charge at Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. He is the project director of "institute of Bioequivalence studies and Pharmaceutical sciences" (IBSPS). His research is mainly focused on Isolation and Synthesis of Bioactive Natural Products. He has earned his B.Pharm and M.Pharm degree from the University of Dhaka. He obtained Ph.D in Chemistry from University of Paderborn, Paderborn, Germany and Post. Doc from Institute of Environmental Research (INFU), Department of Chemistry and Chemical Biology, Technische Universität Dortmund, Otto-Hahn-Str. 6, D-44221 Dortmund, Germany (2009–2010). He has authored or coauthored more than 115 publications and get 1189 citation (h-index: 20). He has one accepted patent and one accepted process.

Satyajit Roy Rony (June, 2011 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	B+
Job Title	Senior Scientific Officer	Degree Obtained	M. Pharm.
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Satyajit Roy Rony is working as a Senior Scientific Officer in Pharmaceutical Sciences Research Division, which is a division in BCSIR laboratories, Dhaka. He earned his B. Pharm degree from Stamford University Bangladesh and M. Pharm degree from State University of Bangladesh. His research is mainly focused on Pharmaceutical Science, New Drug development, Analytical and Natural Product Chemistry. He is also working as an Assistant Project Director (APD) in the Annual Development Programme (ADP) of Government of Bangladesh named 'Institute of bioequivalence studies and pharmaceutical sciences'. He has more than 37 publications in different renowned national and international journals. He has 02 accepted process. He is a member of Bangladesh Pharmaceutical Society, Bangladesh Chemical society and Bangladesh Botanical Society.

Dr. A.D.A. Shahinuzzaman (February 2013 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	B+
Job Title	Senior Scientific Officer	Degree Obtained	Ph.D (2019)
Contact	shahinbcsir@gmail.com	Mobile	1308637064

I received my M.S. and B.S. in Genetic Engineering and Biotechnology from the University of Dhaka, Bangladesh, and Ph.D. in Chemistry from the University of Texas at Arlington, USA. During my Ph.D., I used immune precipitation and mass spectrometry-based proteomics techniques to explore immune signaling in activated macrophages and Post-translational modifications (PTMs) identification using mass spectrometry. Here, I am involved in mass spectrometric analysis (both structural and quantitative) of proteins, peptides and metabolites. I am also working in natural product purification and characterization. I have also developed workflow for in silico analysis of enzyme ligand interaction and inhibition studies. I am also involved in transcriptome sequencing based analysis and application note development as an expansion to our current workflow.

Suriya Sharmin (February 03, 2013)

Office	Pharmaceutical Sciences Research Division	Blood Group	O+
Job Title	Senior Scientific Officer	Degree Obtained	M Pharm (2010)
Contact	sharmin041@yahoo.com	Mobile	01717035571

Suriya Sharmin received her MPharm and BPharm degrees in pharmacy from the University of Dhaka. Her research interest is focused on developing new drug candidates using chemical biology, medicinal chemistry and analytical tools. She authored or co-authored about 27 publications and presented her research at several international conferences. She also developed two processes that can be adopted by industries. Currently Ms. Suriya is pursuing her PhD degree in chemistry at Florida Atlantic University, USA.

Fatema Moni (July, 2015 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	B+
Job Title	Senior Scientific Officer	Degree Obtained	M. Pharm. (2011)
Contact	moni.fatema@yahoo.com	Mobile	01816619127

Fatema completed his both B. Pharm. and M. Pharm. degree in Pharmacy from the University of Dhaka. Her research is mainly focused on the development of analytical and bioanalytical method of pharmaceutical compounds. She also completed multiple projects on isolation of bioactive metabolites from natural sources. She has 17 research articles in peer-reviewed journals and get 133 citations (h-index: 5). She has one accepted process.

Shammi Akhter (March, 2016 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	B+
Job Title	Senior Scientific Officer	Degree Obtained	MS in Pharmac eutical Technology
Contact	shammiakhter74@gmail.com	Mobile	01676454575

Shammi Akhter is working as a Senior Scientific Officer in Pharmaceutical Sciences Research Division, which is a division in BCSIR laboratories, Dhaka. She received her both B. Pharm and MS degree in Pharmaceutical Technology with thesis (Phytochemistry) from University of Asia Pacific (UAP). Her research is mainly focused on Pharmaceutical Science, New Drug discovery and Natural Product Chemistry. She is also working as an Associate Scientist (Additional Charge) in the Annual Development Programme (ADP) of Government of Bangladesh named 'Institute of bioequivalence studies and pharmaceutical sciences'. She has authored or co-authored 08 publications in different renowned national and international journals. She is a member of Bangladesh Pharmaceutical Society.

Saima Mollick (October, 2018 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	O+
Job Title	Scientific Officer	Degree Obtained	M. Pharm.
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Saima Mollick is working as a Scientific Officer in Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. She has completed B. Pharm. in Pharmacy and M. Pharm. in Clinical Pharmacy and Pharmacology from department of Pharmacy, University of Dhaka. She is involved in the research area of isolation, characterization of compounds from natural sources and new Drug discovery. She is a member of Bangladesh Pharmaceutical Society.

Md. Najem Uddin (October, 2018 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	O+
Job Title	Scientific Officer	Degree Obtained	M. Pharm. (2015)
Contact	md.arifulhaq13@gmail.com	Mobile	01768344233

Md. Ariful Haq earned his B.Pharm and M.Pharm degree from Khulna University, Khulna. He is currently working as a Scientific Officer at Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. His research is mainly focused on Phyto-chemistry, Microbiology and Natural Product Chemistry. He is 'A' grade registered Pharmacist under Pharmacy council of Bangladesh. He is also a member of Bangladesh Pharmaceutical Society.

Md. Ariful Haq (November, 2018 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	B+
Job Title	Scientific Officer	Degree Obtained	M. Pharm. (2015)
Contact	md.arifulhaq13@gmail.com	Mobile	01768344233

Md. Ariful Haq earned his B.Pharm and M.Pharm degree from Khulna University, Khulna. He is currently working as a Scientific Officer at Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. His research is mainly focused on Phyto-chemistry, Microbiology and Natural Product Chemistry. He is 'A' grade registered Pharmacist under Pharmacy council of Bangladesh. He is also a member of Bangladesh Pharmaceutical Society.

Md. Sakhawat Hossain (November, 2021 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	O+
Job Title	Scientific Officer	Degree Obtained	M. Pharm.
Contact	sakhawat.du11@gmail.com	Mobile	01737507075

Md. Sakhawat Hossain is working as a Scientific Officer in Pharmaceutical Sciences Research Division, BCSIR laboratories, Dhaka. He has completed B. Pharm in Pharmacy and M. Pharm in Pharmaceutical Chemistry from Faculty of Pharmacy, University of Dhaka, Bangladesh. He worked as a lecturer and senior lecturer in the department of Pharmacy of renowned private university for three and half years. His research area is mainly focused on isolation and characterization of bioactive compounds from natural sources and also investigation of pharmacological activities. He has 14 publications in different renowned national and international journals.

Mamtaz Sultana (January, 2023 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	B+
Job Title	Scientific Officer	Degree Obtained	MS (2017)
Contact	mamtaz.bcsir@gmail.com	Mobile	0177733494

Mamtaz Sultana earned her both BSc (Hons) and MS degree in Biochemistry and Molecular Biology from the University of Chittagong. She worked as a 'Special Research Student' in Tokyo University of Agriculture and Technology (TUAT), Tokyo, Japan under the supervision of Professor Dr. Yutaka Kuroda. Her research was mainly focused on the design, expression and synthesis of recombinant protein using site directed mutagenesis. She also worked as an Assistant Professor in Biochemistry and Molecular Biology at Primeasia University. Currently, she is working on compound isolation from endophytic fungus and their structural elucidation. She has one publication in Asian pacific journal of Tropical medicine. She is a lifetime member of CBMA and BSAB.

Mst. Maya Khatun (May, 2022 - Present)

Office	Pharmaceutical Sciences Research Division	Blood Group	B+
Job Title	Research Pharmacologist	Degree Obtained	M. Pharm.
Contact	maya2014pharmacy@gmail.com	Mobile	01767244744

Mst. Maya Khatun is working as a Research Pharmacologist in Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. She has completed B. Pharm. and M. Pharm. in Pharmacy from department of Pharmacy, University of Rajshahi. She is involved in the research area of isolation, characterization of compounds from natural sources and new Drug discovery. She is a member of Bangladesh Pharmaceutical Society.

List of Pictures:

600 MHz NMR Spectrometer

Ultra-performance liquid chromatography (UPLC)

Cyclic IMS-HRMS

Triple Quadrupole MS

Patch Clamp Electrophysiology System

HPTLC-MS

High performance liquid chromatography (HPLC)

BCSIR Dhaka Laboratories
List of accepted process (considerable for leasing)

1. Production of super paper adhesive, 20.10.10_D/L
2. Production Zinc Acetate from Zinc Oxide, 24.10.10_D/L
3. Production of Essential Oil of Garlic (Garlic Oil), 01.12.10_D/L
4. Production of Super Wood Adhesive, 02.02.11_D/L
5. Production of Printing Roller Wash, 02.02.11_D/L
6. Production of Microcrystalline cellulose, 03.02.11_D/L
7. Deodorized blood meal as organic fertilizer, 27.02.11_D/L
8. Production of Herbal Shaving Foam, 08.05.11_D/L
9. Production of Mouth Wash, 08.05.11_D/L
10. Production of Essential Oil from Kalozira,10.05.11_D/L
11. Production of Photographic Film Developer, 29.05.11_D/L
12. Production of Photographic Film Fixer, 29.05.11_D/L
13. Production of bitter gourd capsule, 25.08.11_D/L
14. Preparation of chitosan-charcoal bio-composite for chromium removal, 13.10.11_D/L
15. Production of tamarind kernel based textile sizing agent for jute & cotton yarns, 13.10.11_D/L
16. Production of tamarind kernel powder (TKP) aqueous solution, 13.10.11_D/L
17. Production of poultry feed from unused fish scales including naturalingredient, 08.01.12 _D/L
18. Production of Aloe Gel, 08.01.12_D/L
19. Production of Activated Carbon, 4.4.12_D/L
20. Production of Ethyl Salicylate, 24.07.12 _D/L
21. Production of Food Drug & Cosmetic Grade Water Soluble Curcumin Pigments, 29.01.13_D/L
22. Production of Water Soluble Curcumin, 27.02.13_D/L
23. Production of Alcohol Soluble Curcumin, 27.02.13_D/L
24. Production of herbal hand wash, 02.06.13_D/L
25. Production of synthetic rubber based rubber curing agent containing high percentage of Sulfur powder for the use in synthetic rubber based products, 03.03.14_D/L
26. Production of rubber curing agent incorporating natural rubber latex in sulfur powder for the use in natural rubber based products, 03.03.14_D/L
27. Production of pectin from ripe mango peels, 18.05.15_D/L
28. Production of starch from ripe mango seeds, 18.05.15_D/L
29. Production of fruit flavored salt for gastric comfort, 17.11.15_D/L
30. Production of Bio Fertilizer from Press mud and Spent Wash,D/L,04.01.16
31. Production of Oil from kernel of ripe mango,D/L, 05.01.16
32. Production of Anhydrous Aluminum chloride from scrap aluminum , D/L 12.06.2016
33. Rayon grade pulp from white press cutting, 18.10.16_D/L
34. Rayon Pulp from rice straw by organic acid, 18.10.16_D/L
35. Sodium Sulfide flakes from sodium sulfate, Dhaka Lab-21.08.17
36. Pectin from Ripe Jackfruit waste, 30.10.17_D/L
37. Baby Liquid Laundry Detergent, (Sponsored), 01.11.17_D/L
38. Transformer core using soft ferrite material, 27.11.17_D/L
39. Facial Cleanser (Sponsored), 11.06.18_D/L
40. Fatty Oil from Cotton seeds (BombaxCieba), 09.12.18_D/L
41. Herbal Body Oil, 09.12.18_D/L
42. Herbal Face Wash, 25.03.19_D/L
43. Ultrasound Gel, 07.4.19_D/L
44. Spin Coater for thin film solar cell fabrication, 24.4.19_D/L
45 Aluminum Sulphate Anhydrous from scrap Aluminum, 12.12.19_D/L
46 Production of Herbal Mosquito Spray (Sponsored), 27.09.20_D/L
47 Isolation of Bulk amount of Piperine as a active pharmaceutical ingredients (API) from Black pepper and White Pepper, 27.09.20_D/L
48 Production of Herbal Body wash, 17.12.20_D/L
49 Herbal Skin Care Cream (Sponsored), 09.03.21_D/L
50 Anti Bacterial Hand Wash (Sponsored), 10.03.21_D/L
51 Production of Amyl Acetate, 04.11.21_D/L
52 Production of Hand Sanitizer Gel, 16.11.21_D/L
53 Development of in-situ Arsenic Detection Kit for Aqueous Medium, 24.11.21_D/Lab
54 Production of Iron (III) Chloride (Anhydrous) from Scarp Iron, 24.01.22_D/L
55 Formulation Hair and Scalp Cleanser, 25.04.22_D/L
56 A process for the production of Herbal Powder Mouth wash, 27.09.2022_D/L
57 A Process for the production of Octyl Acetate, 29.09.2022_D/L
58 Production of Ammonium Oxalate (monohydrate) from Ammonium Carbonate, 29.09.2022_D/L
59 Formulation of Vanilla flavor, 30.10.2022_D/L
60 Production of Calcium Acetate hydrate from Calcium Carbonate, 31.10.2022_D/L
61 Formulation of Moisturizing Hand Wash, 25.01.2023_D/L
62 Formulation of Skin Care Gel, 07.05.2023_D/L

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