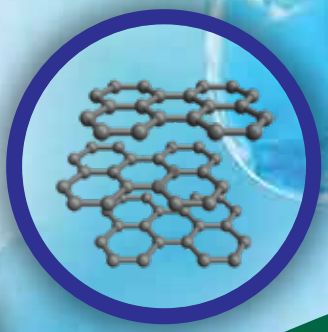
ANNUAL REPORT
2020-2021



Bangabandhu's dream, the "Sonar Bangla" ('Golden Bangla')

Building a developed and prosperous Bangladesh : a hunger-poverty-free, developed, prosperous and non-communal Sonar Bangladesh

4th Industrial Revolution

BCSIR Laboratories, Dhaka
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 laboratories, Dhaka

- 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

APA Signing Ceremony :

APA signing between BCSIR laboratories, Dhaka and BCSIR

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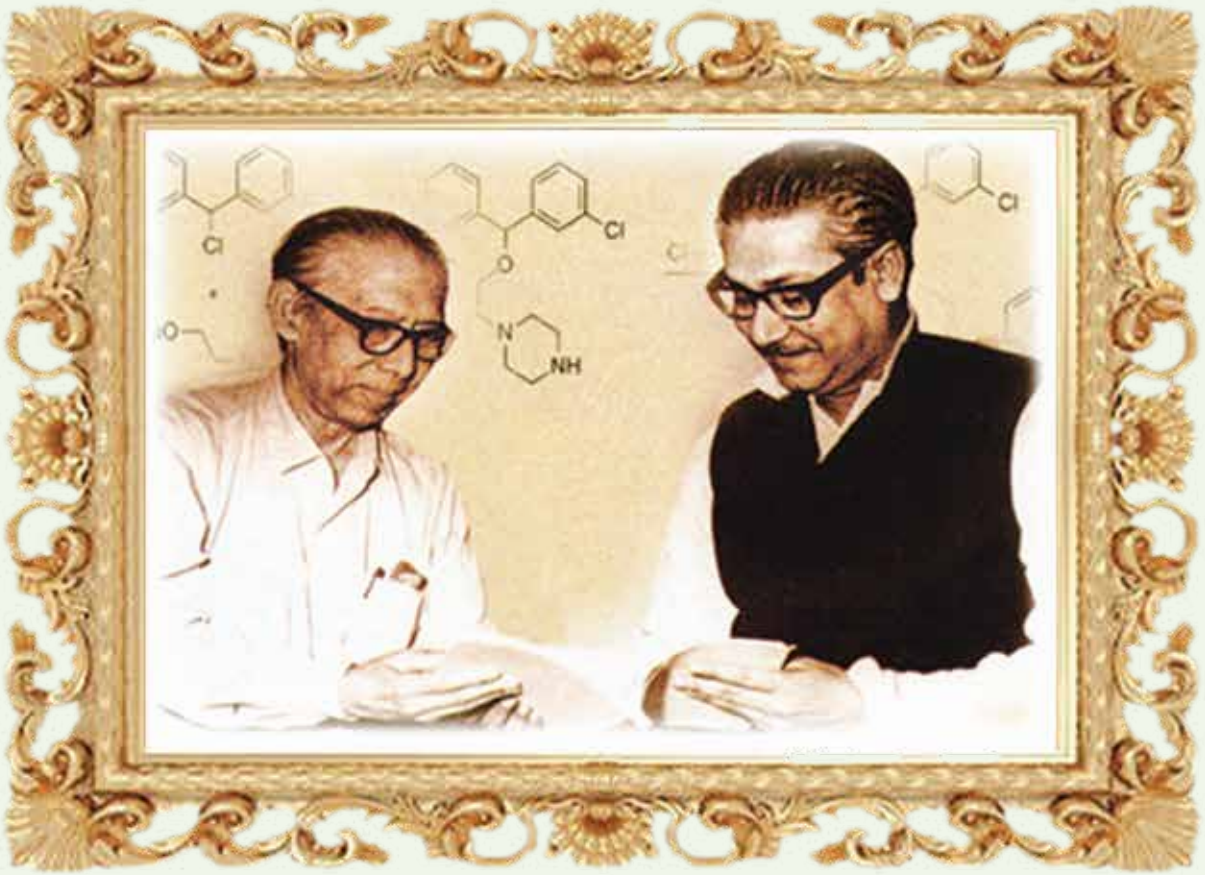

BCSIR Laboratories, Dhaka

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BCSIR

Message from the Chairman

It gives me immense pleasure to share with you an overview of the scientific achievements of BCSIR Laboratories, Dhaka, recorded during the 'Mujib Borsho'. This year we are celebrating the birth centenary of the Father of the Nation "Bangabandhu Sheikh Mujibur Rahman" who whole heartedly felt the need of science and technology to strengthen our economy. After our independence Bangabandhu established this Bangladesh Council of Scientific and Industrial Research (BCSIR) as the largest organization of the country for scientific and industrial research. It is a pride for me to lead this organization as the Chairman and I extend my sincere gratitude to the Honorable Prime Minister Sheikh Hasina for giving me this opportunity.

BCSIR Laboratories, Dhaka popularly known as Dhaka Laboratory is the parent laboratory of many other mono disciplinary institutes of BCSIR. Being the leading research unit of BCSIR it always continues to make a significant contribution in research and development work. Nevertheless, I must mention here that its activities are not just confined with customary R&D works but also analytical services, student and fellow supervisionare also included.

I am happy to let you know that in the year 2020-21, BCSIR Laboratories Dhaka has made a significant contribution by accomplishing a huge number of genome sequencing of Corona Virus as well as Aedes Mosquito. Such an attempt has uplifted our research platform.

Besides, the premier laboratories is exploring applied R&D projects focusing a number of important areas, i.e. pulp & paper, pharmaceutical sciences, soil, water & environment, chemical technology, industrial physics, physical instrumentation, and fiber & polymer etc. Moreover, a number of training programs, workshops, seminars are also organized by this laboratory which facilitated a strong platform to enrich not only our scientists but also others.

My appreciation goes to the director and all the members of BCSIR Laboratories, Dhaka for their communal efforts in achieving such impressive results during this pandemic. I believe, their efforts will continue in many folds to strengthen BCSIR collectively.

I wish their success for the upcoming days.

(Professor Dr. Md. Aftab Ali Shaikh)
Chairman, BCSIR

BCSIR

Message from the Director

I am delighted to present the Annual Report (2020-2021) of BCSIR Laboratories, Dhaka at the golden jubilee of 50th years of independence of Bangladesh. At the very beginning, I would like to show the honor to Father of the Nation Bangabandhu Sheikh Mujibur Rahman on his birth centenary who led to freedom the nation.

During the reporting period 2020-2021, second wave of covid-19 create catastrophe on normal life all over the globe specially the South-East Asia. However, our heartfelt thanks to Government of Bangladesh for the kind co-ordination to control the covid pandemic situation and approved Bangladesh Council of Scientific and Industrial Research (BCSIR) as one of the prime research organizations of the country, to operate its regular operations through maintaining appropriate health safety measures. Accordingly, BCSIR laboratories doing fine with its scope of operations i.e., R&D activities, services to industries, training to the scientists for continuous professional development (CPD) in their respective fields.

BCSIR Laboratories, Dhaka ensured satisfactory R&D development through interaction with relevant industries to find prospects of new research, weekly seminars to exchange project progress and potential as well as intensive training sessions to develop the skills of its scientists; those details are provided on in-depth of the report. In addition, BCSIR Laboratories, Dhaka has been producing quality research works and researchers who play a dominant role in the field of science and technology which fuels the national economy.

On the reporting period, as a multi-disciplinary research unit all activities have prime focus to attain the Sustainable Development Goals (SDG). BCSIR Laboratories, Dhaka has taken multi-plan initiatives to cope up the fourth industrial revolution and serving the stakeholders there by.

We kindly acknowledged the magnificent support of the Honorable Chairman of BCSIR through leading this institute for qualitative changes of contemporary developments. I am cordially appreciated the sincere affords of all the scientists specially editorial committee and staffs of this unit to publish this report.

I look forward to the coming years and continued success of this multidisciplinary unit.

Dr. Md Sarwar Jahan
Director, BCSIR Laboratories, Dhaka.

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Deputy Secretary

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Scientific Officer

Member Secretary

Dr. Md. Monarul Islam
Senior Scientific Officer

Editorial Message from the Convener

In the light of the development philosophy of our great leader **Father of the Nation Bangabandhu Sheikh Mujibur Rahman,** the government of Bangladesh adopted **"Vision 2041"** to take the Bengali nation forward on the path of progress and prosperity. Today, Bangladesh is a role model of progress due to the efficient economic management and strong political leadership of the **Honorable Prime Minister Sheikh Hasina.** Recently, Bangladesh has received a final recommendation from the United Nation as reaching the status of developing country. Holding this upward trend will enable Bangladesh to be established as a developed and prosperous country in the world very soon.

Science and technology plays an indispensable role in the progress and prosperity of a nation. Continuous transition, transformation and result oriented efforts to contribute in national development, opting 4th Industrial Revolution as future essential component and the other efforts by BCSIR Laboratories, Dhaka, in the year 2020-21 are presented in this annual report. The report encompasses details of significant contributions made by Scientists on interdisciplinary R&D, with the continued support from BCSIR and other stakeholders comprising the Ministry of Science and Technology, public and private sector, industries and academia, the achievements and accolades received, details of high impact publications and IP generation, development of human resources, significant activities, and programs organized during the reporting period. Programs under various themes meeting the mission and vision of BCSIR are being carried out by the BCSIR Laboratories, Dhaka maintaining a uniform balance between knowledge generation and translational research.

I express my heartfelt gratitude to the Honorable Chairman of BCSIR, **Prof. Dr. Md. Aftab Ali Shaikh** for his valuable advice and guidelines during the publication process of this report. BCSIR Laboratories, Dhaka, has performed well as a team, and I take this opportunity to thank our **Director, Dr. Sarwar Jahan** & publication committee, one and all who had contributed to the progress of this unit through their dedicated support.

A glimpse on the whole year activities as an annual report publication is a record of history to enjoy and cherish the glory. Here I conclude with the expectation and aspiration for annual report with much more success stories every year.

John Liton Munshi
Chief Scientific Officer (CSO) & Convener,
Annual Report Publication Committee 2020-2021.
BCSIR Laboratories, Dhaka.

BCSIR Laboratories, Dhaka

BCSIR Laboratories, Dhaka 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 Laboratories, Dhaka 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 Laboratories, Dhaka

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 Laboratories, Dhaka At a Glance

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

Projects

Total ongoing R&Ds	**: 25**
Number of ongoing ADPs	**: 01**

Achievements

Number of published papers	**: 67**
Number of accepted processes	**: 05**
Number of patents	**: 02 (submitted)**

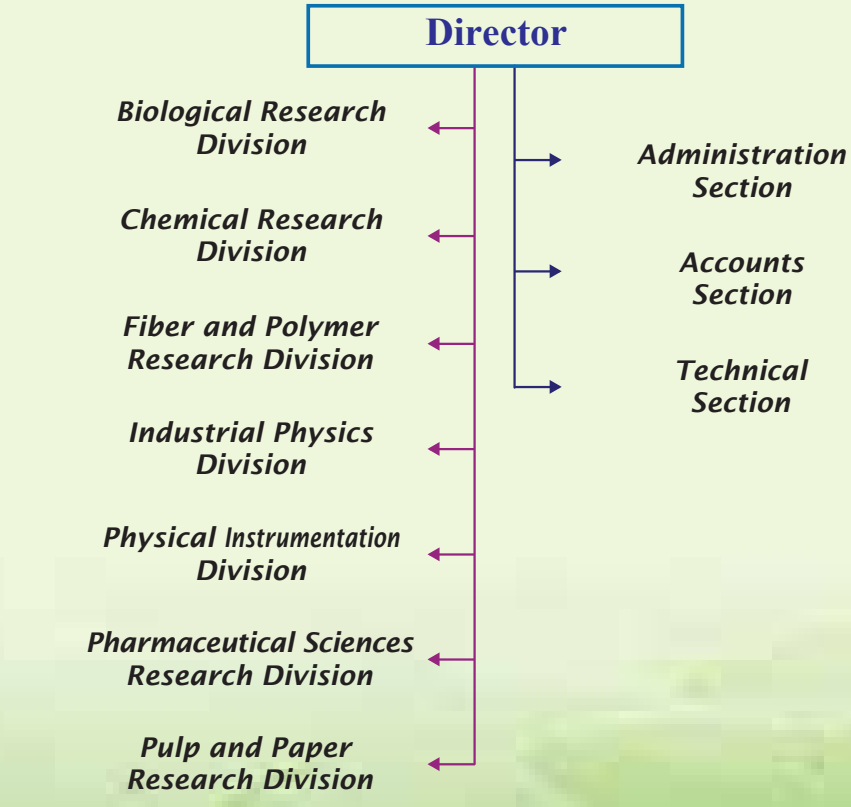
Services

Analytical services	**: 3,646**
Student supervision	**: 31**
Dissemination of technology	**: 34**

Manpower

Number of scientists	**: 67**
Number of officers	**: 17**
Number of staff	**: 46**

Organizational Chart of BCSIR Laboratories, Dhaka



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BIOLOGICAL RESEARCH DIVISION (BRD)

Scientists of BRD

BIOLOGICAL RESEARCH DIVISION (BRD)

: BIOLOGY, A WAY OF GREEN LIFE :

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

- Number of scientists: 24
- Total ongoing R & D: 07
- Analytical services: 1601
- Special Allocation: 01

  - Tissue Culture: biotechnological research along with whole genome sequencing of human, bacteria and viruses 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: to identify fungal and bacterial infection on plant and their remediation.
  - Plant Physiology: conducts research on plant hormones and biochemical activities of different vegetables.
  - Zoology: engaged on applied entomology and fisheries.

R&D projects:

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 Gowsami, 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:

- Laboratory experiment method has optimized by undergoing trial and error process
- Chemicals, reagents and kits for undergoing the experiment has received
- Sample collection of breast cancer patients is ongoing
- Nucleic acid extraction has completed of collected samples

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. Farhana Afroz , Dr. Md. Abdulla-Al-Mamun.

Introduction:

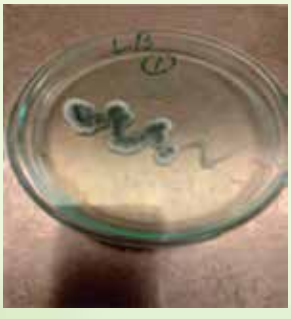
Leather is utilized in making a large number of commercial commodities and it has gained a status symbol as one of the topmost foreign exchange earner and belongs to the elite of society. Leather being a biological product is rich in protein and lipids which acts as a suitable nutrient medium for the growth of microorganisms. This type of leather problem solved by synthetic chemicals and fungicide. But these compounds produce a negative impact on the environment. Besides, the microbes are becoming to these chemicals. Generally, medicinal and antifungal plant extract are uses for bio-remediation process.

Objectives:

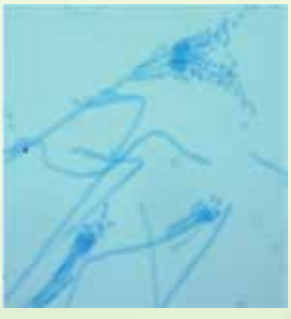
- Biological remediation of finished leather growing fungi using different bio-control agents

Work Progress:

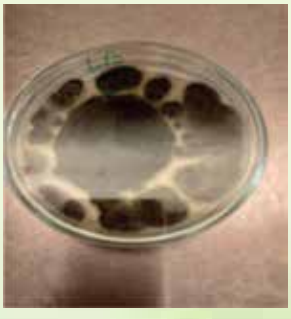
- Using different solvent methods for extraction different types of fungus were isolated from the leather bag sample using potato dextrose ager (PDA) media
- Various plant parts sample collection for extraction
- Plant extracts fungicide has been successfully extracted from neem, Lantana , and Moringa leaves by a solvent extraction method



Penicillum sp



Microschopic view-Penicillium sp.



Aspergillus sp

Microschopic view-Penicillium sp.

Economic importance of Insect in Agar formation within Agarwood tree: It's identification, biology & technique developed for rearing the insects.

Nahid Sultana (PL), Md. Rakibul Hasan and Lailatul Ferdousi

Introduction

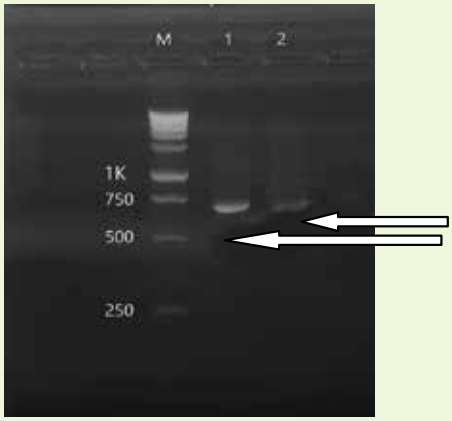
Aquilariamalaccensis commonly known as agar wood has aromatic and medicinal values. Generally it takes 4 or 5 years to accumulate resin as agar. The quality of nailing agar does not match with the naturally infested product which is mainly caused due to the infection of wood boring insect. The present research is to study the biology of the insects associated with the production of agar within agar wood tree.

Objectives:

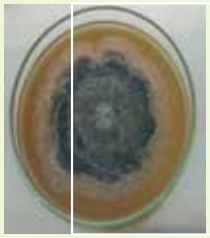
- Collection of insects from Agar plants and their taxonomic identification.
- Studying the Life-cycle of insects in laboratory scale.
- Applying the insect larva within agarwood tree to observe it's biology in natural environment.
- Identifying other biological agents incorporating agar formation within agarwoodtree .

Work Progress:

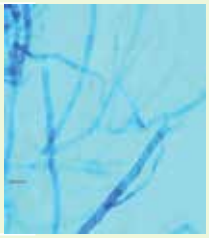
- Morphological or taxonomic identification of the insect larva collected from agar tree of Moulovibazar forest area was done using invertebrate taxonomic tools.
- Molecular identification of the larval samples were done up to PCR level and band was observed in Gel Documentation. These larvae would be identified after sequencing.
- Six different fungi from agarwood tree were identified using taxonomic and molecular tools both.



DNA barcode of two insect



a. Colony view



b. Microscopic view

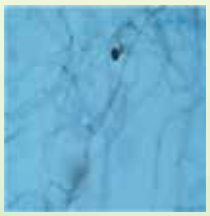
Endomelanconiopsis endophytica

a. Colony view

b. Microscopic view

Trichoderma koningiopsis

a. Colony view



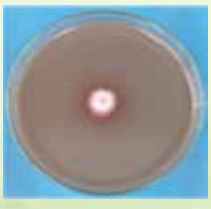
b. Microscopic view

Cladosporium cladosporiodes

a. Colony view

b. Microscopic view

Trichothecium roseum



a. Colony view

b. Microscopic view

Trichoderma harzianum

Trace Metals and Radionuclides in Raw, Pasteurized, Powder, Ultra Heat Treated Commercial Cow Milk and Infant Formula: Health Risk Assessment in Bangladesh

Dr. Mohammad Moniruzzaman, PSO, Sabrina Mostofa, SSO, Badhan Saha, SSO, Dr. Md. Monarul Islam, SSO, Afsana Parvin, SO and Priyanka DeySuchi, SO

Introduction

Pollution by trace metals and radionuclides is a global concern to the environment. Plants and animals in these areas may consume a considerable amount of metals and radionuclides. Thus directly or indirectly, by taking these plants & animals, it automatically transfers to the human body. Most trace metals such as Cu, Zn, Mn, Cr, Co, and Fe, are which are essential co-factors in many enzymes cannot produce by human body and depend on dietary manner like milk. Milk is a critical indicator of contamination within the food chain as it can provide a strong vector of radionuclides and heavy metals from the environment to humans. This research aims to determine the concentration of the trace metals and radionuclides in milk and dairy product in Bangladesh

Objectives:

- Investigate the trace metals and radionuclides in raw, pasteurized, powder, commercial cow milk and infant formula
- Human health risk assessment due to trace metals contamination and presence of radionuclides in raw, pasteurized, powder, commercial cow milk and infant formula available in Bangladesh

Work Progress

- Pasteurized, Powder, Infant Formula and Ultra Heat Treated Commercial Cow Milk of different representative brand were collected from market and super shops.
- Liquid raw milks were also collected from different dairy farms.
- More than 55 nos. of milk and milk products were digested using microwave digestion system.
- The trace metals (Pb, Cd, Cr, Ni, Cu, Zn, Ag, As, Hg, Se, Bi, Sb, U, Co, Cs, Sr, Ba, Be, Sn, Ag, Ti, V etc.) and essential elements (Ca, Mg, Fe, Mn, K, Na etc.) were analyzed from the digested samples using inductively coupled plasma-mass-spectrometry (ICPMS).

Milk and Milk products collected from different dairy frams, market and super shops

Microwave Digester

ICPMS

Development of an Easy to Use Arsenic Testing Kit for Spot Analysis of Arsenic Contaminated Water Sources.

Dr. Md Kamal Hossain (PL), Afroza Parvin, Badhan Saha, Dr. Mohammad Moniruzzaman and Dr. Samina Ahmed

Introduction:

Presently about 80% of the people in rural Bangladesh depend on groundwater for drinking. Bangladesh drinking water standard (50 µg/L)) is 5 times higher than the WHO guideline (10µg/L). The toxic effects of long-term exposure to As, a well-known carcinogen, from drinking water are commonly manifested as skin disorders such as leuco-melanosis, melanosis, keratosis, gangrene and lung, kidney and bladder cancer. So rapid screening of arsenic in ground water is out most important. Based on this background in mind we developed very low cost arsenic detection kit.

Objective

- Development an easy to use/ instant Arsenic (As) detection kit of As contaminated water.

Work Progress

- Successfully development of low cost As detection kit that is comply the Bangladesh national standard.

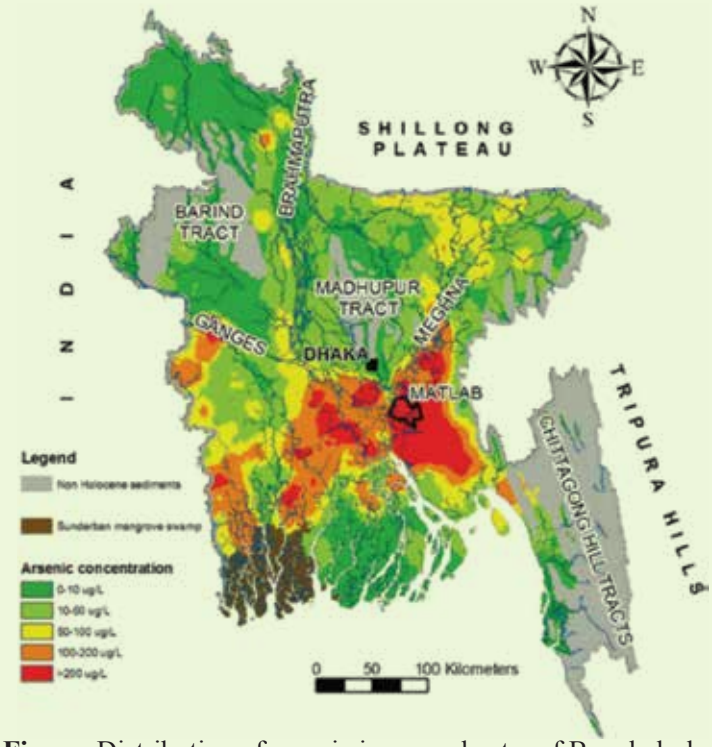


Figure. Distribution of arsenic in groundwater of Bangladesh.

Effect of Arsenic-Selenium interaction on some food crops and its possible relevance to arsenicosis disease

Badhan Saha (PL), Dr. Mohammad Moniruzzaman, Dr. Md Kamal Hossain, Afroza Parvin, Dr. Shahina Akter and Dipa Islam

Introduction:

The problem of arsenic in groundwater is serious in much of southern and eastern part of Bangladesh. There are many areas in Bangladesh, which are affected by arsenic, and a number of arsenicosis patients have been identified while in some arsenic affected areas no arsenicosis patients have been identified yet. The present work is to examine any relevance to the selenium (Se) content in soil, water and in an edible plant to the incidence of arsenicosis in some arsenic hotspots of the country where arsenicosis patients have been identified and where no arsenicosis patients have yet been reported.

Objectives:

- To find out any interaction between arsenic and selenium
- To determine arsenic and selenium content in soil, water and plant of arsenic affected areas where arsenicosis patients are prevalent and where no arsenicosis patients have been identified yet.

- To find out if there is any effect of selenium content on some common food crops grown in As-contaminated soils
- To find out possible relevance of arsenic-selenium interaction to arsenicosis disease

Work Progress

- Pot experiment has been successfully completed with Ipomoea aquatic (Kalmi/water spinach) to study the arsenic-selenium interaction.
- Samples (Soil, water & plants) from different arsenic hotspot areas of Manikganj, Munshiganj, Sonargaon, Ishwardi, Chapainawabganj, and Jessore of Bangladesh have been collected.
- Analysis of samples, data collection and data interpretation is going on.

Fig.1: Pot experiment (sand culture) with water spinach (*Ipomoea aquatica*) to study the interaction between As and Se.

Fig.2: Pot experiment with Red amaranths (*Amaranthus gangeticus*) to study the interaction between As and Se.

Fig.3: Talking to local peoples for getting the information about the arsenicosis patient of that area.

Fig.4: Collection of water samples from the tube-well of an arsenicosis patient's house.

Fig. 5: Skin-pigmentation in hand of an arsenicosis patient.

Fig.6: Laboratory work after harvesting the plants.

Formulation of Humic Acid Based Composite Fertilizer from Quality Assessment of Market Available Fertilizer

Afroza Parvin (PL), Dr. Mohammad Moniruzzaman, Dr. Md Kamal Hossain, Badhan Saha, Hemayet Hossain, Abdullah Al Mansur, Afsana Parvin and Nasima Momotaz

Introduction

Fertilizer is the most critical and costly input for sustaining agricultural production. Humic acid is biodegradable, ubiquitous in the environment and comprise the most abundant pool of non-living organic matter. Humic acids improve

soil structure by increasing microbial activities and reduce metal mobility in soil and therefore, uptake by plants. The research work has been conducted to formulate humic acid based composite fertilizer for food security and safety.

Objectives

- Quality assessment of the nutrient elements and heavy metal contents in market available fertilizer (chemical, organic and mixed fertilizer)
- Formulate new fertilizer by mixing humic acid and chemical fertilizer.
- Examine the effectiveness of the fertilizer

Work Progress

- Quality assessment of market available fertilizer was done.
- Humic acid based composite fertilizer was formulated.
- Effectiveness of the fertilizer was examined through pot experiment.

a **b** **c**

Figure: Pot experiment to study the effectiveness of fertilizer a) tomato plant, b) Spinach plant, c) Kalmi plant.

Special Allocation Project:

Bioremediation of environmentally hazardous tannery effluents by using *Chlorella, Arthrospira* and *Scenedesmus* sp.

Dr. Zamilur Rahmen (PI), Natasha Nafisa Huque, RC, John Liton Munshi, CSO

Introduction:

Tannery wastewater is one of the major sources of pollution. It contains different hazardous chemicals and include a wide range of pH, BOD, COD, TDS etc. Conventional treatment methods such as precipitation, electroplating, ion-exchange and membrane filtration are used to neutralize tannery wastewater, but these methods require continuous input of chemicals which leads to high operation cost and toxicity. Research has demonstrated the potential of different microalgae for the bioremediation of different wastewater (Brady and Duncan 1994). Proposed project aims at using these microalgae as bioremediation agent; water purification, and generating biomass to produce biofuels, or fertilizers.

Objectives:

Proposed project generally aims at finding an alternative ecofriendly solution for the bioremediation of tannery effluents. However, the major objectives of the project are described below :-

- To quantify the efficiency of different microalgae including Chlorella, Arthrospira and Scenedesmussp for the removal of inorganic nutrients, organic load and heavy metals from tannery wastewater
- To investigate the potentiality of tannery wastewater as potential medium for microalgae cultivation

Work Progress:

- Waste water has been collected from different Tanneries of savar leather industries
- *Chlorella, Arthrospira and Scenedesmuss*p has been collected and cultured in medium
- Preliminary experiments regarding bioaccumulation of different elements from TWW is in progress

Fig. (a) Collection of TWW

(b) Bioremediation experiment setup

Achievments and Activities :

Research Papers

1. Shahina Akter, Tanjina Akhtar Banu, Barna Goswami, Eshrar Osman, Mohammad Samir Uzzaman, M. Ahashan Habib, Iffat Jahan, Abu Sayeed Mohammad Mahmud, M. Murshed Hasan Sarker, M. Saddam Hossain, A. K. Mohammad Shamsuzzaman, Tasnim Nafisa, M. Maruf Ahmed Molla, Mahmuda Yeasmin, Asish Kumar Ghosh, Sheikh M. Salim Al Din, Utpal Chandra Ray, Salek Ahmed Sajib, Maqsud Hossain, M. Salim Khan, "Coding-Complete Genome Sequences of Three SARS-CoV-2 Strains from Bangladesh" *Microbiology Resource Announcements,* September 28, **2020**, 9, 39 e00764-20.
2. Barna Goswami, ShamolyAkter, Nemai Chandra Nandi, Tanjina Akthar Banu, Shahina Akter, Sadia Afrin, Ahashan Habib and Salim Khan, "Antioxidant and Antibacterial Activities of Four Local Medicinal Plants", *Plant Tissue Cult. & Biotech*., **2020** (December), 30(2), 179-187.
3. Shilpi Akther, Tanjina Akhtar Banu, Salim Khan, Shahina Akter, Ahashan Habib, Mousona Islam, Barna Goswami and Bivas Kumar Sarkar, "Micropropagation of Two Varieties of Bell pepper (Capsicum annuum L.)", *Plant Tissue Cult. &Biotech*., **2020** (December), 30(2): 267-275.
4. Evana Parvin Lipi, Mahmuda Hakim, Liton Chandra Mohanta, Dipa Islam, ChadniLyzu, Dipankar Chandra Roy, Iffat Jahan, Samina Akhter, Mohammad Raknuzzaman, Md. Abu Sayeed, "Assessment of heavy metal concentration in water, sediment and common fish species of dhaleshwari River in Bangladesh and their health implications", *Biological Trace element Research,* **2021** Jan 25. doi: 10.1007/s12011-020-02552-7. Epub ahead of print. PMID: 33491165.
5. John. Liton Munshi*, Ruhul. Baksha, Md. Zamilur. Rahaman, Natasha. Nafisa. Huque, Elina. Akther. Zinat and Nasima. Momtaz,"In Vitro plant regeneration from leaf explants of *TageteserectaL." Bangladesh J. Sci. Ind. Res*, **2021,** 56(2), 69-74.

6. Nasima Momtaz, Afroza Parvin, Md. Kamal Hossain*, Badhan Saha, Md. Moniruzzaman, Amena Kibria, Md. Abdul Matin Sarker and John Liton Munshi,"Blood meal organic fertilizer application on onion yield", Bangladesh Journal of Science and Industrial Research, 2021, 56(2), 87-94.

7. Lailatul Ferdousi, Nahid Sultana, M.A. Al-Helal and Nasima Momtaz., "Molecular Identification and Life Cycle of Black Soldier Fly *(Hermetiaillucens)* in Laboratory", Bangladesh Journal of Zoology, **2020,** 48(2): 429-440.

8. Lailatul Ferdousi, Nahid Sultana, Umme Hafsa Bithi, Sharmin Akter Lisa, Nasima Momtaz, Md. Mamunur Rasshid and Md. Badrul Islam, Nutritional Composition of House Fly Larvae (Muscadomestica) reared on Different Mixture Ratio of Cattle Blood with Organic Wastes", International Journal of Biosciences, **2020,** 17(6): 518-527.

9. Farah Monowara Jahangiri, HasinaTasmin Moutushi, Md. Moniruzzaman, Sirajul Hoque and Mohammad Enayet Hossain. **2021.** Removal of lead from aqueous solutions and wastewaters using water hyacinth *(Eichhorniacrassipes)* roots. Water Practice & Technology. 16(2), 404-419. doi: 10.2166/wpt.2021.005

10. Tabassum Sultana, Shaikat Chandra Dey, Md. Ashraful Islam Molla, Mohammad Rahat Hossain, Muhammad Mominur Rahman, Md. Saiful Quddus, Mohammad Moniruzzaman, Sayed Md. Shamsuddin, MithunSarker. **2021.** Facile synthesis of TiO2/ Chitosan nanohybrid for adsorption-assisted rapid photo degradation of an azo dye in water. Reaction Kinetics, Mechanisms and Catalysis. https://doi.org/10.1007/s11144-021-02009-5.

11. Farhana Mostafiz, Md Monirul Islam, Badhan Saha, Md. Kamal Hossain, Mohammad Moniruzzaman & Md. Habibullah-Al-Mamun, "Bioaccumulation of trace metals in freshwater prawn, Macro brachiumrosenbergii from farmed and wild sources and human health risk assessment in Bangladesh", *Environmental Science and Pollution Research,* **2020,** 27,16426–16438.

12. Abu Sayeed Shafiuddin Ahmed, Mohammad Belal Hossain, Sanjida Afrin Semme, Saad Mohammad Omar Faruque Babu, Md Kamal Hossain and Mohammad Moniruzzaman, "Accumulation of trace elements in selected fish and shellfish species from the largest natural carp fish breeding basin in Asia: a probabilistic human health risk implication"*, Environmental Science and Pollution Research,* **2020,** 27, 37852–37865.

13. Sabikun Nahar Shorna, Saika Shawkat, Anwar Hossain, Shamshad B. Quraishi, A. K. M. Atique Ullah, Mohammad Mozammal Hosen, Md. Kamal Hossain, Badhan Saha, Bijoya Paul & Md. Habibullah-Al-Mamun, "Accumulation of Trace Metals in Indigenous Fish Species from the Old Brahmaputra River in Bangladesh and Human Health Risk Implications", *Biological Trace Element Research,* **2021,** 199, 3478–3488

14. Mohammad Belal Hossain, Sanjida Afrin Semme, Abu Sayeed Shafiuddin Ahmed, Md. Kamal Hossain, Golam Sorowar Porag, Afroza Parvin, Trisha Biswas Shanta, Venkatramanan Senapathi and Selvam Sekar, "Contamination levels and ecological risk of heavy metals in sediments from the tidal river Halda", Bangladesh. *Arabian Journal of Geosciences,* **2021,** 14,158.

15. Samina Ahmed, Md. Kamal Hossain, Nawshad Haque, Warren Bruckard and Miao Chen., "An overview of Arsenic contamination in Bangladesh ground water", *Australian Nat. Sci. Agc.* **2021,** 1-68.

16. Mohammad Belal Hossain. Umme Hani Runu. Md. Milon Sarker. Md. Kamal Hossain and Afroza Parvin, "Vertical distribution and contamination assessment of heavy metals in sediment cores of ship breaking area of Bangladesh", *Environ Geochem Health,* https://doi.org/10.1007/s10653-021-00919-w.

17. Abdullah Yasin, Mst. Khadiza Begum, Badhan Saha, Priyanka Dey Suchi, Md. Mostavi Enan Eshik and Mohammad Shamsur Rahman, "Heavy metals concentration and possible health risks from shrimp nurseries at south-west region, *Bangladesh", Bangladesh J. Zool.,* **2020,** 48(1), 167-179.
18. Md. Faysal Islam, BadhanSaha, Shahid Akhtar Hossain and Md. Tanvir Ahmed Chowdhury, "Assessment of the Health Risks of Farmers due to Arsenic Exposure in *Bangladesh", Bangladesh J. Sci. Res.,* **2020,** 31-33(1), 54-62.
19. Rajata Suvra Chakrovorty, Muhammad Ali Zinnah, Md. RobiulAlam, Md. Forhad Hossain, Mohammad Moniruzzaman, BadhanSaha, Shoeb Ahmed and Rupesh Roy, "Incorporating ash removal unit in local rice parboiling industries for flue gas cleaning and heat recovery", *Journal of Environmental Management,* **2021,** 286, 112172.
20. Md. Abdullah-hil Maruf, Nusrat Jahan Punom, Badhan Saha, Mohammad Moniruzzaman, Priyanka Dey Suchi, Md. Mostavi Enan Eshik and Mohammad Shamsur Rahman, "Assessment of Human Health Risks Associated with Heavy Metals Accumulation in the Freshwater Fish *Pangasianodonhypophthalmus* in Bangladesh", *Exposure and Health,* **2021,** https://doi.org/10.1007/s12403-021-00387-8.
21. Purbita Saha Katha, Zia Ahmed, Rafiul Alam, Badhan Saha, Arup Acharjee, M. Safiur Rahman, "Efficiency analysis of egg shell and tea waste as low cost adsorbents for Cr removal from waste water sample", *South African Journal of Chemical Engineering,* **2021,** https://doi.org/10.1016/j.sajce.2021.06.001.

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

1. Mst. Nadira Begum, Senior Scientific Officer, Pursuing PhD University of Dhaka .
2. Ruhul Amin, Senior Scientific Officer, Biological Research Division, Pursuing PhD degree from Charite, Germany.
3. Nahid Sultana, Senior Scientific Officer, Biological Research Division, Pursuing PhD degree from University of Dhaka, Bangladesh.
4. Mahmuda Begum, Senior Scientific Officer, Biological Research Division, Pursuing PhD degree from University of Nottingham, UK.
5. Badhan Saha, Senior Scientific Officer (SSO), Soil and Environment Section, Biological Research Division pursuing PhD degree in the Department of Soil, Water and Environment, University of Dhaka in 2017-2018 session.
6. Mousona Islam, Senior Scientific Officer, pursuing Ph.D in Saitama University, Japan.

Industrial Tours / Dissemination :

Name of Scientist, Technician	Place	Date
Industrial Tours		
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	Standard Finis Oil Co., Tejgaon I/A, Dhaka-1208	23 August 2020
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	Bangladesh Gas Fields Company Ltd., Brahmanbaria	24 August 2020
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	Rahimafrooz Accumulators Limited , Zirani Bazar, Gazipur	01 Sepember 2020

Dr. Mohammad Moniruzzaman, PSO Dr. Mohammad Kamal Hossain, PSO Badhan Saha, SSO	Dhaka Mass Rapid Transit Development Project (Metro Rail, Government Priority Project), Line -6 (CP -02)	08 September 2020
Dr. Mohammad Moniruzzaman, PSO, Dr. Mohammad Kamal Hossain, PSO Badhan Saha, SSO	HazratShahjalal International Airport (Airport Extension Project)	10 Sepember 2020
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	PRAN Agro Ltd. and Natore Agro Ltd.	16 Sepember 2020
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	YKK BANGLADESH PTE LTD, Dhaka Export Processing Zone (DEPZ)	05 October 2020
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	SAIF Powertec Limited, Pubail, Gazipur,	15 March 2021
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	PRAN Dairy Limited (PIP-I), Palash, Narsingdi.	16 March 2021
Dr. Mohammad Moniruzzaman, PSO, Badhan Saha, SSO	PRAN Dairy Limited (PIP-II), Palash, Narsingdi.	18 March 2021
Dr. Mohammad Kamal Hossain, PSO Badhan Saha, SSO	Dhaka Mass Rapid Transit Development Project (Metro Rail, Government Priority Project), Line -6 (CP-05).	22 March 2021

Indoor air quality monitoring in food processing plant of Natore Agro Limited, PRAN Group, Bangladesh

Air Quality Monitoring at Bangladesh Gas Fields Company Limited (Titas Gas Field, Brahmanbaria)

Stack emission Monitoring at PRAN Industrial Park, Habiganj

Technology dissemination tours named Seminar and Exhibition on "Application & expansion of appropriate technology" funded by Ministry of Science & Technology.		
Name of Scientist, Technician	**Place**	**Date**
Natasha Nafisa Haque (RC) Md. Modon Mia	Gajipur, Kapasia	5-6 November 2020
John Liton Munshi (CSO) Dr. Md. Salim Khan (CSO) Md. Monirul Islam Md. Majidur Rahman	Madaripur, Shibchor	5-6 November 2020
John Liton Munshi (CSO) Md. Majidur Rahman	Tangail, Nagarpur	8-9 November 2020
Natasha Nafisa Haque (RC) Md. Modon Mia	Dhaka, Savar	12-13 November 2020
John Liton Munshi (CSO) Md. Modon Mia	Narayangonj, Araihazar	12-13 November 2020
Dr. Md. Ahashan Habib (PSO) Natasha Nafisa Haque (RC) Tapan Chandra Mollick, Jr.Tec Md. Modon Mia	Faridpur, Nagarkandha	15-16 November 2020
John Liton Munshi (CSO) Abdullah al Mamun	Rajbari, Baliakandhi	15-16 November 2020
Dr. Md. Ahsan Habib (PSO) Natasha Nafisa Haque (RC)) Md. Majidur Rahman Md Monirul Islam	Munshigang, Sirajdikhan	19-20 November 2020
John Liton Munshi (CSO) Dr. Md. Salim Khan (CSO) Tapan Chandra Mollick, Jr.Tech Abdullah al Mamun	Shoriatpur, Vedorgonj	19-20 November 2020
Dr. Md. Ahsan Habib (PSO) Natasha Nafisa Haque (RC) Md. Majidur Rahman Topon Chandra Mollic	Comilla, Brakkhonpara	22-23 November 2020
John Liton Munshi (CSO) Dr. Md. Ahsan Habib (PSO) Abdullah al Mamun	Barishal, Agailjhora	26-27 November 2020

Delduar, Tangail

Shibchor, Madaripur

Dr. Md. Salim Khan (PSO) Natasha Nafisa Haque (RC) Md. Modon Mia Topon Chandra Mollic	Hobiganj, Lakhai	26-27 November 2020
Dr. Md. Salim Khan (PSO) Natasha Nafisa Haque (RC) Md. Modon Mia Topon Chandra Mollic	B. Baria, Nasirnagar	29-30 November 2020
John Liton Munshi (CSO) Md. Majidur Rahman	Shirajganj, Ullapara	29-30 November 2020
Natasha Nafisa Haque (RC) Abdullah al Mamun	Chandpur, Motlob Uttor	3-4 December 2020
John Liton Munshi(CSO) Md. Majidur Rahman	Bogra, Nondigram	3-4 December 2020
John Liton Munshi (CSO) Abdullah al Mamun	Bhola , Lalmohon	6-7 December 2020
Dr. Md. Salim Khan (PSO) Natasha Nafisa Haque (RC) Md. Majidur Rahman	Mymanshing, Dhobaura	6-7 December 2020
John Liton Munshi (CSO) Md. Majidur Rahman	Lasmipur, Ramganj	10-11 December 2020
Natasha Nafisa Haque (RC) Md. Modon Mia	Moulovibazar, Moulovibazar Sadar	10-11 December 2020

Lalmohon, Vola

Kalia, Narail

John Liton Munshi (CSO) Md. Modon Mia	Jhalokathi, Jhalokathi Sadar	10-11 December 2020
Dr. Md. Zamilur Rahman (SSO) Md. Majidur Rahman	Kurigram, Rajarhat	13-14 December 2020
John Liton Munshi (CSO) Md. Modon Mia	Joypurhat, Joypurhat Sadar	13-14 December 2020
Natasha Nafisa Haque (RC) Abdullah al mamu	Sharpur,Sharpu Sadar	13-14 December 2020
Natasha Nafisa Haque (RC) Md. Majidur Rahman	Kushtia, Khoksha	20-21 December 2020
John Liton Munshi (CSO) Md. Modon Mia	Netrokona, Khaliajuri	24-25 December 2020

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

SI No	Title of Research	Research Category	Name of Student	Name of Academic Institute	Name of Supervisors
01	Chitosan- alginate based Plant Growth Regulator (PGR)	MSc Thesis	Fiona Reza	Dept. of Oceanography, University of Dhaka	John Liton Munshi, CSO
02	Characterization and antioxidant activity of C-phycocyanin isolated from *Spirulina platensis* under salinity stress.	MSc Thesis	Parmita Mandal	Biotechnology & Genetic Engineering, Noakhali Science & Technology University.	Dr. Md. Zamilur Rahaman, SSO
03	Phyto remediation of Buriganga river's water by using aquatic hydrophyte and microalgae.	MSc Thesis	Urmi Das	Biotechnology &Genetic Engineering, Noakhali Science &Technology University.	Dr. Md. Zamilur Rahaman, SSO
04	Bioremediation of Industrial waste water by using consortium of Cyanobacteria and Hydrophytes.	MSc Thesis	Asmaul Husna	Dept. of Botany, Eden Mohila College.	Dr. Md. Zamilur Rahaman, SSO
05	Bioremediation of textile waste water Using A consortium of Microalgae (*Chlorellasp.*) Cyanobacteria.	MSc Thesis	Farhana Akter	Dept. of Botany, Eden Mohila College.	Dr. Md. Zamilur Rahaman, SSO.
06	Studies on the antifungal effect of *Aloe vera, Lentana camera, Vitexnigundo, Wedeliachinensis* and *Cocciniagrandis*ex tracts on Leather Born Fungi.	MS	Sumyia Akter	Eden Mohila College	Mst. Elina Akther Zenat, SSO.
07.	Transformation of Pneumococcal Surface Protein A (PspA) Epitopes into Strawberry Plants as an Initiative for the Development of an Edible Vaccine	MS	Sahida Yeasmin	Noakhali Science and Technology University	Dr. Md. Salim khan, PSO and Dr. Shahina Akter, PSO

08.	Comparative study of biochemical activities and hypoglycemic properties of Gynuraprocumbens and Gynuranepalensis from in vitro grown callus/plant and in vivo grown plant	MS	Sanchita Saha	Jaganath University	Dr.Tanjina Akhtar Banu, PSO
09.	Environmental water resources and coastal engineering	Internship	Md. Istiak Ahmed, Md. Shajjadur Rahman, Rumana Sayeed , Karen Arundhati, Faria Mahamud, Fouzia Kabir	MIST	Dr. Md. Moniruzzman, PSO Dr. Md. Kamal Hossin, PSO Badhan Saha, SSO Afroza Parvin, SSO
10.	Biphenyl/Binaphthyl -Bipyridyl Based Organocatalysts for Catalytic Conversion of CO_2 into Cyclic Carbonate	Post-doctoral Fellowship	Dr. Bikash Dev Nath	BCSIR	Dr. Md. Moniruzzaman (PSO), Dr. Md. Monarul Islam (SSO)
11.	Development of novel adsorbent for the removal of Bisphenol from aqueous solution	BCSIR Fellowship	Kiron Sikdar	BCSIR	Dr. Md. Moniruzzaman (PSO) Dr. Md. Humayun Kabir, SSO
12.	Molecular characterization of carbon dioxide sequestering bacteria from organic and inorganic sources.	BCSIR Fellowship	Habiba Ibnat	BCSIR	Dr. Md. Moniruzzaman (PSO) Dr. Abhijit Chowdhury, SSO
13.	Establishment of suitable regeneration protocol of some foreign fruits.	BCSIR Fellowship	Sabrina Afroz Riya	BCSIR	Dr. Md. Salim Khan

Participation in training :

1. **Dr. Md. Salim Khan** (PSO), participated in training course on Intellectual Property for Least Development Countries arranged by Swedish International Property Office (Sida), held on 12-30 April **2021.**
2. **Dr. Mohammad Moniruzzaman** (PSO), has successfully conducted a training program as a Trainer on "Comprehensive Environmental Sampling Technique" held on 22 June, **2021** at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
3. **Dr. Mohammad Moniruzzaman** (PSO), has successfully conducted a training program as a Trainer on "Operation and maintenance of Atomic Absorption Spectrophotometer (AAS)" held on 01-05 November, **2020** at Bangladesh Council of Scientific and Industrial Research.
4. **Dr. Md Kamal Hossain** (PSO), participated in Local Training on "3 policy instruments (NIS, GRS, RTI) to establish good governance (Coarse Coordinator)" held on 6 September **2020** at BCSIR Laboratories Dhaka, Bangladesh.
5. **Dr. Md Kamal Hossain** (PSO), participated in ISO-international 33rd Understanding Training course on "ISO/IEC 17025:2017" held on 12 -14 October **2020** at Bangladesh Accreditation board (BAB), Bangladesh
6. **Dr. Md Kamal Hossain** (PSO), participated in training on "Analytical Method Validation for quality in analytical laboratory" held on 31 December, **2020** at BCSIR Laboratories, Dhaka, Bangladesh
7. **Dr. Md Kamal Hossain** (PSO), delivered Expert opinion on "Department of environment Bangladesh GAP Policies 2020" held on 2nd July **2020** at Ministry of Agriculture.
8. **Dr. Md Kamal Hossain** (PSO) participated in training on "Operating and Maintenance of BET Sorptometer" held on 10-14 January, **2021** at CARF, BCSIR, Dhaka, Bangladesh
9. **Dr. Md Kamal Hossain** (PSO), participated in training on "Basic principle, Operation, and Maintenance of HPLC" held on 26 January **2021** at BCSIR Laboratories Dhaka, Bangladesh
10. **Dr. Md Kamal Hossain** (PSO), participated in "International Remote Chemical Security training for Chemists, Engineers and safety professionals" held on 26 -28 May **2021** at Bangladesh University of engineering and technology, US- department of state and Bangladesh.
11. **Dr. Md Kamal Hossain** (PSO), participated in training on "Operation and Maintenance of photoluminescence Spectrometer" held on 6 -10 June **2021** at CARF, BCSIR, Dhaka, Bangladesh
12. **Dr. Md Kamal Hossain** (PSO), participated in training on "Principle and Application of Uv-Vis Spectrophotometer" held on 23 June **2021** at BCSIR Laboratories Dhaka, Bangladesh
13. **Dr. Shahina Akter** (PSO), participated in training course on operating and maintenance of Elemental Analyzer, held on 17-21 January, **2021**.
14. **Dr. Tanjina Akhtar Banu** (PSO), participated in training on operating and maintenance of Gas Chromotography –Mass Spectrometry (GC-MS), held on 07-11 February, **2021**.
15. **Dr. Md. Murshed Hasan Sarkar** (SSO), participated in training course Intellectual Property for Least Development Countries arranged by Swedish International Property Office (Sida), held on 12-30 April **2021**.
16. **Badhan Saha** (SSO), successfully completed the training program on "BCSIR Service Rule 1989 & Government Pension Rules" held on 27 September **2020** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research.

17. **Badhan Saha** (SSO), successfully completed the training program on "R&D Management for BCSIR Scientists" held on 14 and 16 November **2020** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research.
18. **Badhan Saha** (SSO), successfully completed the training program on "Analytical method validation for quality in analytical laboratory" held on 31 December **2020** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research.
19. **Badhan Saha** (SSO), successfully completed the training program on "Operations and maintenance of X-Ray Diffractometer (XRD)" held on 29 November to 3 December **2020** at Pilot Plant and Process Development Centre (PP&PDC), Bangladesh Council of Scientific and Industrial Research.
20. **Badhan Saha** (SS0), participated in the training program as a Trainer on "Comprehensive Environmental Sampling Technique" held on 22 June, **2021** at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
21. **Nahid Sultana** (SSO), participated in ICSTB-2021 organized by Bangladesh Council of Scientific and Research (BCSIR), 11-13 March and delivered an oral presentation entitled "Rearing of Agarwood boring insect in laboratory scale and observing the different stages of life-cycle".
22. **Nahid Sultana** (SSO), participated in training program on "Operating and maintenance of Polymerase Chain Reaction (PCR) Machine" held on 31 January-04 February, **2021** at BCSIR Laboratories, Dhaka.
23 **Afsana Parvin** (SO), successfully completed the training program on "Fiber Quality Analysis by FQA" held on 15 June, **2021** at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
24. **Afroza Parvin** (SSO), **Afsana Parvin** (SO), successfully completed the training program on "Comprehensive Environmental Sampling Technique" held on 22 June, **2021** at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research.
25. **Afroza Parvin** (SSO), **Afsana Parvin** (SO), successfully completed the training program on "Principle and Application of UV vis Spectrophotometer" held on 23 June, **2021** at BCSIR Laboratories, Dhaka, Bangladesh, Bangladesh Council of Scientific and Industrial Research.
26. **Barna Goswami** (SSO), participated in training on "Operating and maintenance of Gas Chromotography –Mass Spectrometry (GC-MS)", held on 07-11 February, **2021**.
27. **Iffat Jahan** (SSO), participated in training course on operating and maintenance of Elemental Analyzer, held on 17-21 January, **2021**.
28. **Afroza Parvin** (SSO), **Amena Kibria** (SO), participated in training program on "Analytical method validation for quality in analytical laboratory" organized by BCSIR Laboratories, Dhaka, 31 December, **2020**.
29. **Amena Kibria** (SO), participated in training course on "Operating and maintenance of Gas Chromatography-Mass Spectrometry (GC-MS)" held on 07-11 February, **2021**.
30. **Shanzida Islam** (SO), **Natsha Nafisa Haque** (RC), **MS. Elina A. Zenat** (SSO), participated in training program on "Operating system and maintenance of UV-Visible Spectrophotometer& Ion chromatograph" held from 03-07 January, **2021** at BCSIR, Dhaka.
31. **Nasima Momtaz** (RC), participated in training course on Operating and maintenance of Liquid Chromatography with tandem Mass Spectrometry (LC-MS-MS) organized by BCSIR, Dhaka.,04-08 October, **2020**.
32. **Nasima Momtaz** (RC), **Natsha Nafisa Haque** (RC), participated in training on 3 policy instruments (NIS, GRS, RTI) to establish good governance organized by BCSIR Laboratories, Dhaka, 01 March, **2020**.

Participation in Conference:

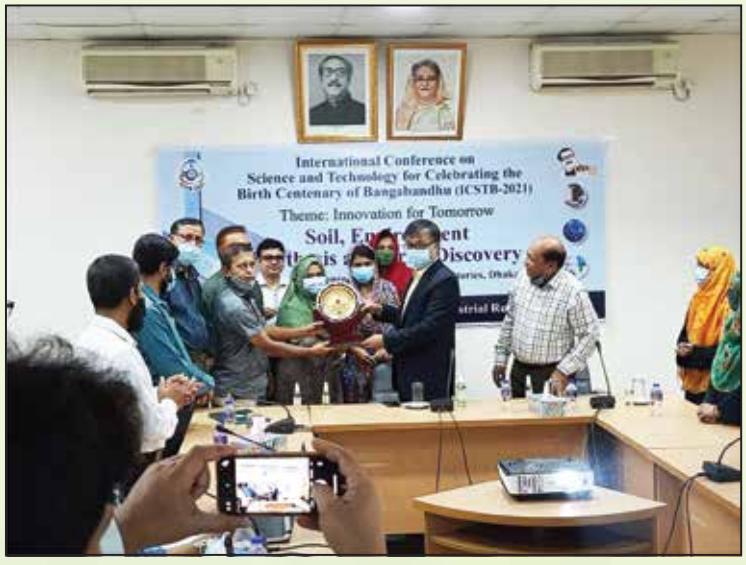
1. **Dr. Md. Salim Khan** (CSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR 11-13 March, **2021** and presented an oral presentation entitled "Whole genome mapping and identification of single nucleotide polymorphisms of four Bangladeshi individuals and their functional significance"
2. **Dr. Ahashan Habib** (PSO)**,** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR 11-13 March, **2021** and presented an oral presentation entitled "Molecular characterization of peanut (*Arachis hypogaea*) germplasms in Bangladesh"
3. **Dr. Mohammad Moniruzzaman** (PSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR, 11-13 March, **2021** and presented an invited presentation entitled "A Comparison of Emissions from Traditional, Locally converted and Improved Brick Kilns in Bangladesh: Environmental impact and mitigation".
4. **Dr. Mohammad Moniruzzaman** (PSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR, 11-13 March, **2021** and presented a poster entitled "Comparative Characterization of Humic Substances Extracted from Peat to Remediate Metal Contaminated Soils in Bangladesh".
5. **Dr. Md Kamal Hossain,** (PSO), participated in conference on Novel Method for Synthesis of High temperature stable TiO2B nanoparticle for photocatalytic environmental pollutants degradation and hydrogenproduction. January 13-15, **2020**. National institute of Technology (NIT) Durgapur, India.
6. **Dr. Md Kamal Hossain,** (PSO), participated in conference on- Invitation to the International Symposium on chemical safety and security management (ISCSSM2020),11-13 February 2020, Sena Malancha, Dhaka Cantontment.
7. **Dr. Md Kamal Hossain,** (PSO), participated in conference on "Control synthesis of various morphology of TiO2 and its potential application on environmental pollutant degradation" 11-13 March ICSTB-**2021**.
8. **Dr. Shahina Akter** (PSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR 11-13 March, **2021** and presented an oral presentation entitled "Development of an edible vaccine against pneumococcal diseases using transgenic plant".
9. **Dr. Tanjina Akhtar Banu** (PSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR 11-13 March, **2021** and presented an oral presentation entitled "Detection of germline pathogenic variants of breast cancer genes in 23 Bangladeshi patients".
10. **Badhan Saha** (SSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, **2021** and presented an oral presentation entitled "Selenium Contents in Soil, Water and Plants in Some Arsenic Hotspot Areas of Bangladesh: Possible implications for Arsenicosis Disease".
11. **Dr. Md. Murshed Hasan Sarkar** (SSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR 11-13 March, **2021** and presented an oral presentation entitled "Microbial dysbiosis in COVID-19 patients".

12. **Afroza Parvin** (SSO), participated in International Conference on Science and Technology for Celebrating the Birth Centuary of Bangabandhu (ICSTB-2021) organized by BCSIR, 11-13 March, **2021** and presented an oral presentation entitled "Removal of Lead (Pb) from Synthetic and Natural Waste Water by Peat Humic Substance".
13. **Barna Goswami** (SSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR 11-13 March, **2021** and presented an oral presentation entitled "Study of co-infection with respiratory viruses among COVID-19 cases of Bangladesh".
14. **Iffat Jahan** (SSO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR 11-13 March, **202**1 and presented an oral presentation entitled "Appearance of R681 Spike Protein Variant in Bangladesh".
15. **Nasima Momtaz** (RC), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by bcsir, Dhaka, Bangladesh, 11-13 March, **2021** and presented a poster presentation entitled "Response of blood meal and urea to growth and yield of onion *(Allium cepa)"*.
16. **Natasha Nafisa Haque** (RC), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by bcsir, Dhaka, Bangladesh, 11-13 March, **2021** and presented a poster presentation entitled "Bioremediation of Industrial waste Wales by Using a consortium of Cyanobacteria of Hydrophytes".
17. **Amena Kibria** (SO), participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by BCSIR, 11-13 March, **2021** and presented an poster presentation entitled "Mycoflora and its Dynamic in Dry Spirulina Powder".

Award :

A. **Badhan Saha** (SSO), awarded the "Integrity Award" of BCSIR Laboratories Dhaka for the year of 2020-2021 from the Honorable Chairman of Bangladesh Council of Scientific and Industrial Research (BCSIR) on 24 June, 2021.

A



B

B. **John Liton Munshi, CSO & Division in charg**e is receiving the award of "Best Research Division of Dhaka Laboratories., 2020-2021" for Biological Research Division (BRD) from Honorable Chairman of BCSIR, **Prof. Dr. Md. Aftab Ali Shaikh.**.

Number of analytical (Ad-hoc) problem Solved:

Name of the Division	Routine type	Research Type	Total
Biological Research Division	1561	40	1601

Special Contribution to the Nation:

A. Whole Genome Sequencing of SARS-CoV-2 isolates from different regions in Bangladesh :

In the COVID-19 pandemic situation, Genomic Research Laboratory, BCSIR contributes a remarkable job for the country by sequencing the whole genome of SARS-CoV-2 isolates from all over Bangladesh. Ministry of Science and Technology (MOST) has funded the Genomic Research Laboratory of BCSIR for sequencing projects and BCSIR holds the leading position by sequencing more than 1000 SARS-CoV-2 isolates and publishing 750 whole-genome sequence data in the international consortium Global Initiative on Sharing All Influenza Data (GISAID) database. Genomic Research Laboratory of BCSIR has already reported the presence of different variants (Delta, Alpha, Beta, and Gamma) in isolates of Bangladesh. Genomic diversity and the co-circulation of different SARS-CoV-2 virus variants and COVID-19 community transmission status of Bangladesh is tracked by global communities. One-third of data from Bangladesh in GISAID has been generated by Genomic Research Laboratory, BCSIR and thus Bangladesh plays a role of the profound contributor of SARS-CoV-2 genomic information in South Asian region.

Encouraging visit of Chairman BCSIR at Genomic Research Laboratory in Pandemic time

B. To accomplish the dream of Government election manifesto, the scientists of Soil and Environment section works as an Independent Monitoring Group (IMG) for environmental impact assessment of Dhaka Mass Rapid Transit (DMRT) and Hazrat Shahjalal International Airport expansion Projects.

Ambient Air Quality Monitoring at the construction site of Depot area, Diabari, Uttara and Farmgate area under Dhaka Metro Mass Rapid Transit and Hazrat Shahjalal International Airport expansion project, Dhaka, Bangladesh.

Picture for each unit/ Laboratories:




Tissue culture growth room

Scientists working on tissue culture Lab




Scientists working on genome lab




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

Scientists of Biologcal Research Division

Short biography of BRD Scientists

John Liton Munshi (February, 1997- present)

Office	Biological Research Division			Blood group	**A+**
Position	Chief Scientific Officer			Degree obtained	M.Sc. (1988)
Contact	john_liton@yahoo.com			Mobile	01711 933465
Paper nos	26	Process no.	3	Patent no.	1

John Liton Munshi earned 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 26 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	**AB+**
Position	Chief Scientific Officer	Degree obtained	Ph.D (2006)
Contact	k2salim@yahoo.com	Mobile	+8801712201504

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. Md Salim 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	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
Paper nos	41/h index 11	i10 index 12	

Dr. Mohammad Moniruzzaman earned his B.Sc (Soil, Water and Environment, 2001), MS (Environment Science, 2002) from the University of Dhaka. He awarded Ph.D. degree entitled "Remediation of Metal Contaminated Soils in Bangladesh by Chemical Technology" 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 from January 2009 to June 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 Air Quality Modeling System (AQM), Environmental Impact Assessment (EIA), GIS and Natural resource management, Environmental toxicology, Remediation technologies for contaminated soil and waste water etc. His credit to publish more than 41 papers in both national and internationally reputed journal. He is a life member of Soil Science Society of Bangladesh, Bangladesh Botanical Society, EDAPHOS, Dhaka University Soil Science Alumni Association etc.

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

Office	Biological Research Division	Blood group	**A+**
Position	Principal Scientific Officer	Degree obtained	PhD (Inorganic Chemistry, 2015)
Contact	kamalbcsir@gmail.com	Mobile	+88056810752
Paper nos	20/h index 9	i10 index 8	

Dr. Md. Kamal Hossain earned his BSc (Soil, Water and Environment, 2001), MS (Water Science, 2002) from the University of Dhaka and awarded doctoral degree (Ph.D., 2015) in Inorganic Chemistry from Sogang University, South Korea under the mentorship of Prof Kyung Byung Yoon. His Ph.D dissertation title was "Order Uniformly Crystalline Mesoporous TiO2 Polymorphs and Periodic Mesoporous Organosilicas: Novel Synthesis, Characterization and Photocatalytic Activity." His current research mainly focused on the design, synthesis and development of new mesoporous materials for photocatalytic applications, Environmental Science, Climate change and Nanomaterials. His credit to publish more than 20 papers both national and internationally including Chem. Mater (IF 10.35), Marine Science Bulletin (IF 5.35), 2 international patents (WIPO) and 2 industrial processes. Dr. Hossain also the Professional member of American Chemical Society, Chinese Chemical Society, BAS,EDAPHOS and so on.

Dr. Md. Ahashan Habib (June, 2006- present)

Office	Biological Research Division	Blood group	**O+**
Position	Principal Scientific Officer	Degree obtained	Ph.D (2014)
Contact	ahashan73@yahoo.com	Mobile	+8801711206709

Dr. Md. Ahashan Habibhas 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 30 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	Ph.D (2018)
Contact	shupty2010@gmail.com	Mobile	01724096941

Dr. Shahina Akter has passed her 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 16 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 4 MS thesis research and has published 30 scientific articles in many national and international journal of repute.

Dr. Tanjina Akhtar Banu (June, 2006- present)

Office	Biological Research Division	Blood group	**B+**
Position	Principal Scientific Officer	Degree obtained	Ph.D (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 atraining 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 6 MS thesis st udent and has published 20 scientific articles in many national and international journals.

Badhan Saha (December, 2009- present)

Office	Biological Research Division	Blood group	**B+**
Position	Senior Scientific Officer	Degree obtained	MS, PhD (On going)
Contact	badhan_swe@yahoo.com	Mobile	01911102565
Paper nos	40	h-index: 10	

Badhan Saha earned a 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 Program Associates of an Annual Development Program (ADP) from July 2009 to June 2010. Now he is doing his PhD 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 food chain. He has authored or co-authored 40 publications. He has two accepted processes. He is a life member of EDAPHOS, NITUB, BAAS, SSSB, and NAPD.

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

Office	Biological Research Division			Blood group	**O+**
Position	Senior Scientific Officer			Degree obtained	PhD (2018)
Contact	jewel.haidar@gmail.com.com			Mobile	01913465003
Paper nos	15	Process no.	3	Patent no.	0

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.

Nahid Sultana (December, 2009- present)

Office	Biological Research Division			Blood group	**A+**
Position	Senior Scientific Officer			Degree obtained	Ph.D (2021)
Contact	nahidsultana0@gmail.com			Mobile	01710181071
Paper nos	14	Process no.	1	Patent no.	0

Nahid Sultana earned her both B.Sc and MS degree in Zoology from the Department of Zoology, University of Dhaka. She obtained Ph.D Degree from Department of Zoology, University of Dhaka. She has authored or coauthored 14 publications. Her research interest on Applied Zoology and Environmental Biology. She is a life member of Zoological Society of Bangladesh.

Dr. Md. Murshed Hasan Sarkar (June, 2011- present)

Office	Biological Research Division	Blood group	**A+**
Position	Senior Scientific Officer	Degree obtained	Ph.D (2017)
Contact	murshedhasan-raj@bcsir.gov.bd	Mobile	+8801715717691

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.

Mousona Islam (June, 2011- present)

Office	Biological Research Division	Blood group	**A+**
Position	Senior Scientific Officer	Degree obtained	M.S (2005)
Contact	mousonaislam@yahoo.com	Mobile	+88056810752

Mousona Islam has completed her BSc and MS degree from Department of Botany, University of Dhaka. Currently She is pursuing her PhD in 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 opportunity to attend atraining program on "Bioinformatics Training Course" at Senate Building, University of London, UK. She has joined in BCSIR in 2011 as Scientific officer. She has co-supervised many MS thesis students and has published 13 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.Sc. (2011)
Contact	elinazenat@gmail.com			Mobile	01710181071
Paper nos	07	Process no.	0	Patent no.	0

Mst. Elina Akther Zenat earned her both BSc and MS degree in Botany from the National University. She is specialized in Miclogy 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. Her research is mainly focused on environmental chemistry, environmental remediation technologies, waste management and mitigation, air pollution monitoring and mitigation measure, environmental impact assessment etc. She authored or coauthored 09 (Nine) research articles in peer reviewed journals.

Barna Goswami (July, 2015- present)

Office	Biological Research Division	Blood group	**A+**
Position	Senior Scientific Officer	Degree obtained	MS (2012)
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 focusedon 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 onvarious molecular techniques like PCR, Real Time PCR and Next generation sequencing (NGS).Till now she has published 10 scientific articles in many national and international journal of repute.

IffatJahan (July, 2015- present)

Office	Biological Research Division	Blood group	**AB+**
Position	Senior Scientific Officer	Degree obtained	MS (2012)
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. She is a life member of DUSSA and EDAPHOS.

Shanzida Islam (October, 2018- present)

Office	Biological Research Division			Blood group	**O+**
Position	Scientific Officer			Degree obtained	M.Sc.
Contact	shanzida.shanzi@gmail.com			Mobile	0181500573
Paper nos	06	Process no.	0	Patent no.	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 coauthored 06 publications. She is a life member of NITUB.

Amena Kibria (October, 2018- present)

Office	Biological Research Division			Blood group	**A+**
Position	Scientific Officer			Degree obtained	M.Sc. (2010)
Contact	amenakibriamishu@gmail.com			Mobile	01675019467
Paper nos	03	Process no.	0	Patent no.	0

Amena Kibria completed B. Sc. in Botany (1st Position), M. Sc. in Applied Mycology (2nd Position) from Department of Botany, Faculty of Life and Earth Sciences, Jagannath University. She joined in BCSIR as a Research Fellow in May 2014 and completed her fellowship successfully in May 2018. Later, she joined in BCSIR as a Scientific Officer in October 2018. Her research interests revolve in the area of identification of fungi, use of fungi for the benefit of mankind (applied mycology), plant disease diagnosis. She has published Three Research article in different national & international Journal. 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. Her research interests are Arsenic mitigation, Heavy metals remediation, Air Pollution mitigation, Environmental Impact Assessment. She authored or coauthored 5 publications

Nasima Momtaz (November, 2018- present)

Office	Biological Research Division			Blood group	**O+**
Position	Research Chemist			Degree obtained	M.Sc. (2016)
Contact	nmlucky05@gmail.com			Mobile	01922920642
Paper nos	4	Process no.	0	Patent no.	0

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).

Natasha Nafisa Haque (November, 2018- present)

Office	Biological Research Division			Blood group	**O+**
Position	Research Chemist			Degree obtained	M.Sc. (2014)
Contact	natashahaque86@gmail.com			Mobile	01768442798
Paper nos	01	Process no.	0	Patent no.	0

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 (June, 2019- present)

Office	Biological Research Division	Blood group	**B+**
Position	Research Chemist	Degree obtained	MS (2015)
Contact	iffatjahan.ifst@bcsir.gov.bd	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

Highlight

Product Name:
Ultrasound Gel
Company Name:
Bright Shine Ltd. Gazipur.
Leased/Handover date:
January 2021

Product Name:
Herbal Mosquito Spray
Company Name:
Standard Finish Oil Co. Gazipur.
Leased/Handover date:
June 2021

Product Name:
Facial cleanser
Company Name:
M/S. Spa Ayurvedic Ltd. Noakhali
Leased/Handover date:
November 2020

Product Name:
Ultrasound Gel
Company Name:
M/S Mediquad, Narayanganj
Leased/Handover date:
August 2020

Sophisticated Equipment/Machineries:

FTIR

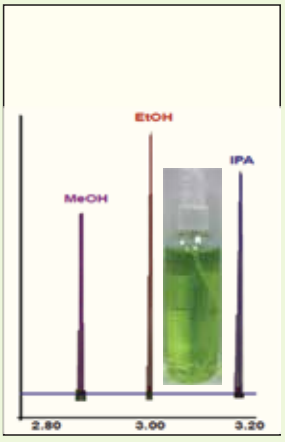
HPLC

GC

List of Pictures:
Product Image

Herbal Mosquito Spray

Synthesis of biological active compound

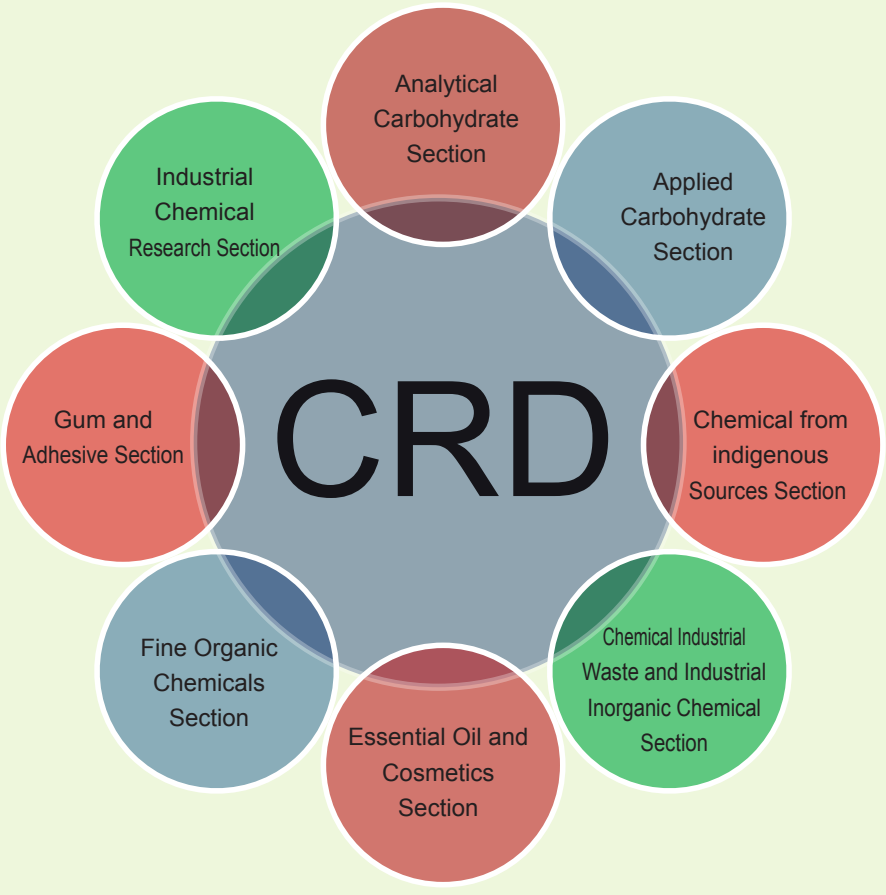


Hand sanitizer analysis

Ultrasound Gel

Herbal Hand Wash

CHEMICAL RESEARCH DIVISION



Chemical Research Division is one of the largest research divisions of BCSIR Laboratories, Dhaka.The main objectives of this division are to explore the natural resources of the country. Production of chemicals, both organic & inorganic, organic & inorganic synthesis, herbs processing's & herbal products, waste management from chemical and other industries as well as development of process for products from industrial wastes, production of different kinds of gum and adhesives from locally available raw materials are also the objectives of this division.

- Number of Scientists: 11
- Total ongoing R & D: Eight (08), MOST Special allocation: One (01)
- Analytical Services: 550

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.

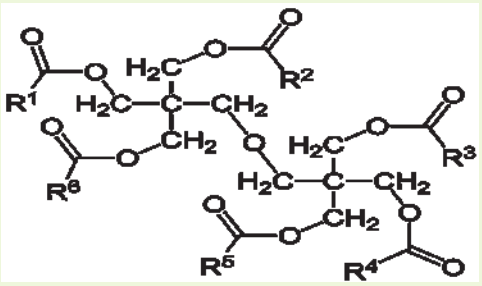
R&D Project:

1. Process for the production of esters and its derivatives from locally available chemicals and their bioactivity observations.

Dr. Shahin Aziz (PL), FatemaTuz Zohora, Dr. Most. Hosney Ara Begum, Dr. Shahana Parveen

Brief Discussion/ Introduction:

Esters are widespread in nature. Ester group can be synthesized in a number of different ways. The esters occur both in plants and in animals. In general esters have many uses in both living world and industries such as fragrances in foods, for insect communication, in transparent plastics, in cosmetic formulations, nail polish remover, plasticizer, in glues as solvents.



Polyolester

Prepared Octyl acetate ester

Objectives:

- To synthesize different esters and its derivatives from locally available chemical using low cost easy available techniques.
- These will cut down foreign currency.

Work Progress:

- Octyl acetate ester (waxy floral flavor) preparation was done.
- The prepared esters was characterized as per standard method.

2. Production of Graphene from Graphite and/or Carbon.

Md. Amirul Haque (PL), Dr. Syed Farid Uddin Forhad, Muhammad Shahriar Bashar

Introduction:

Graphene is 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 that it is called super conductive material. It is 1300 times conductive than cupper. It is very light weight and 1000 times lesser weight than a thin paper. It is single layer carbon atom and almost opaque. Due to its properties a huge number of chemicals, apparatus, equipment, is possible to develop with this material. It is being using 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.

The reaction involved in oxidation process are-

$$2KMnO_4 + H_2SO_4 \longrightarrow K_2SO_4 + 2HMnO_4$$

$$2HMnO_4 \longrightarrow Mn_2O_7 + H_2O$$

$$Mn_2O_7 \longrightarrow 2MnO_2 + 3[O] \quad \text{(Explosive step)}$$

$$MnO_2 + H_2SO_4 \longrightarrow MnSO_4 + H_2O + [O]$$

$$[\text{Graphite}]\,C + [O] + H_2O \longrightarrow -\overset{|}{\underset{|}{C}}-OH \,/\, >C=O \,/\, -\overset{O}{\overset{\|}{C}}-OH \,/$$

Figure-4: Reaction scheme for the oxidation of Carbons in Graphite to synthesis Graphene Oxide. The possibility of produced oxide groups can be hydroxyl groups, carbonyl groups, carboxylic groups, and epoxy groups.

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:

- Literature survey and few raw materials have been collected and purified them well.
- Five batches of Graphene Oxides have been synthesized via chemical oxidation method. Their purification and characterization are in progress.

Acid slurries from successive oxidation reaction of Graphite to Graphene Oxide were recovered five times and reused. The changes in properties of both acid slurries and produced Graphene Oxides were examined and found satisfactory correlations.

3. Production of Useful Laboratory Chemicals as $(NH_4)_2C_2O_4$, $Ca(C_2H_3O_2)_2$, Na_2MoO_4, $NH_4CH_3CO_2$, NH_4Cl for Research & Industrial Use

Nushrat Jahan Ethane (PL), Md. Hemayet Hossain, Khondoker Shahin Ahmed, Dr. Pizush Kanti Biswas

Introduction

Research organizations, Pharmaceuticals, Industries and Educational Institutes in our country spend a lot of foreign currencies to get proper laboratory grade chemicals. It is our view to develop the process for the production of most essentially chemicals like, $(NH_4)_2C_2O_4$, $Ca(C_2H_3O_2)_2$, Na_2MoO_4, $NH_4CH_3CO_2$, NH_4Cl using local raw materials as well as industrial wastes. Development of the process will help us to make the chemicals available not only in proper grade but also in very reasonable price.

Objective

- The main objective of this project is to develop the process for the production of laboratory chemicals like $(NH_4)_2C_2O_4$, $Ca(C_2H_3O_2)_2$, Na_2MoO_4, $NH_4CH_3CO_2$, NH_4Cl using locally available raw materials.
- Successful completion and industrialization of this project generate employment for our unemployed men and women and contribute in poverty alleviation in our country.

Work Progress

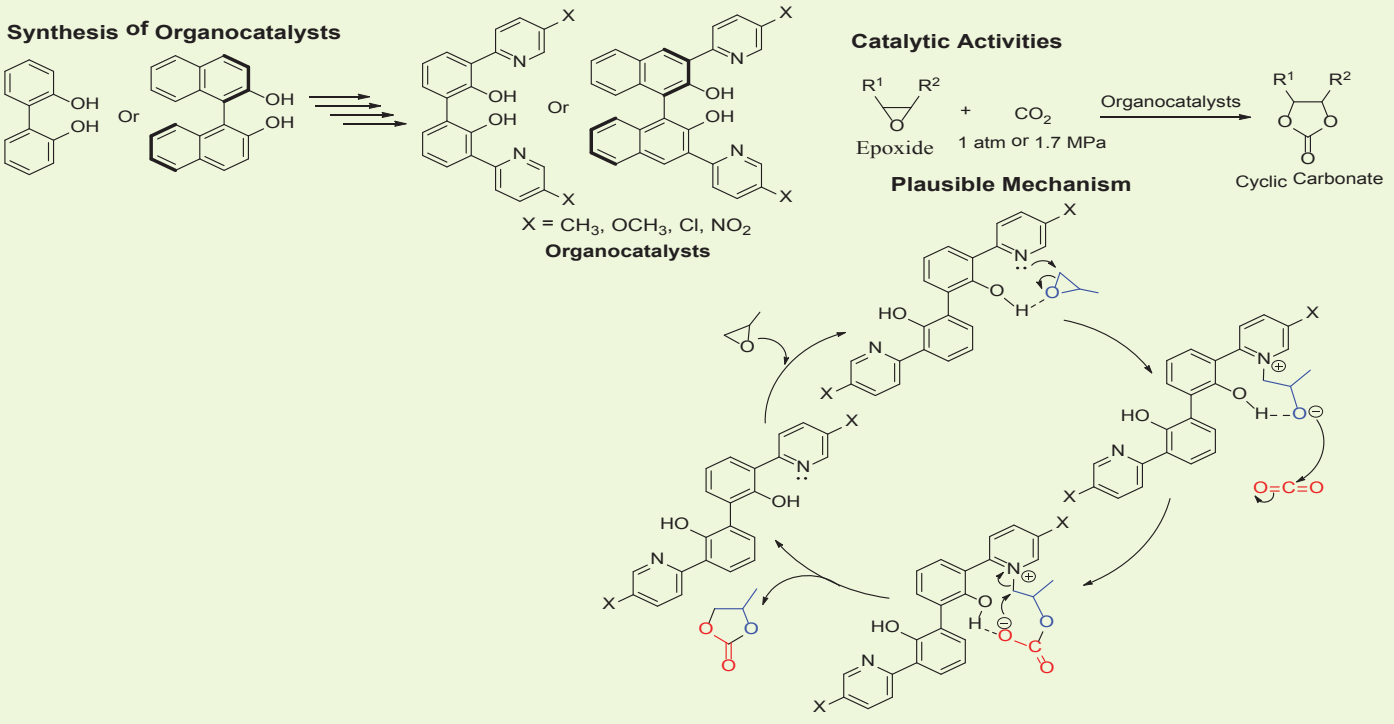
- A process for the Production of Ammonium Oxalate has been verified.
- A process for the Production of Calcium Acetate and Ammonium Chloride has been submitted for verification.
- Production of Ammonium Acetate and Sodium Molybdate are going on. .

4. Biphenyl/Binaphthyl-Bipyridyl Based Organocatalysts for Catalytic Conversion of CO_2 into Cyclic Carbonate

Md. Monarul Islam (PL), Bikash Dev Nath (Post Doc. Fellow), Mohammad Moniruzzaman, Md. Hemayet Hossain, Muhahammad Abdullah Al-Mansur, Khondoker Shahin Ahmed

Introduction:

Carbondioxide is one of the main greenhouse gases responsible for the global warming. Now days, tons of CO_2 are produced every day from different sources such as transportation, electricity production, industrial, commercial and residential areas, agricultural sectors, land use and forestry etc. The conversion of CO_2 into value-added organic compounds is an exciting research area and numerous research going on to utilize CO_2 as a renewable raw material and a number of important catalytic reactions have been reported (Scheme 1), and conversions of CO_2 to value-added cheTmicals.



Scheme 1: Synthesis of organocatalysts and their activities in the catalytic conversion of CO_2 and epoxides into cyclic carbonates

Objectives:

- Development of a suitable organocatalyst and to study the catalytic activities of the organocatalysts for the conversion of CO_2 and epoxides into cyclic carbonates
- The conversion of CO_2 into value-added organic compounds under solvent free condition (green chemistry).

Work Progress:

- Reactions are going on in Laboratory to get the target products.

5. Formulation, evaluation and comparative study of herbal skin care cosmetics from indigenous sources.

Ferdoushi Jahan (PL), Md. Abdul Momen, S.M. Mahmudul Hasan, Sahana Parveen, Badhan Saha, Khondoker Shahin Ahmed, Md. Ahedul Akbor, Rasheda Akter,

Introduction

Nature is recognized as the most valuable blessing to the human being, since all one needed to exist in this universe is provided in nature. Hence, from the ancient time, human beings used typical natural ingredients for their daily requirements such as medicines as well as cosmetics. Nowadays men and women are very much willing to look them beautiful. They have a tendency to use beauty products that includes herbs to look younger and more charming. Cosmetics alone are not sufficient for proper skin care, so the addition of active ingredients is necessary to check the damage and ageing of the skin. Recently, herbal cosmetics have gained more popularity and more acceptability among the people than synthetic ones due to their lesser or almost nil side effects.

Objective:

- To develop cost effective and quality herbal skin care cosmetics from indigenous sources.
- To examine quality and comparative study of developed product related frequently used skin care cosmetic products available in market.

Socio-economic importance of the project:

- Effective formulation of local quality products will reduce the dependency on foreign cosmetic products and will save millions of foreign currencies.
- Industrialization of this project in large scale will generate employment and will contribute in our economy.
- By this study we can give information about marketed cosmetics products which are friendly for consumer and the environment.

Work progress:

Process

1. Formulation and Evaluation of Herbal Body Wash – Accepted.
2. Formulation of Skin Care gel- Submitted for verification.

6. 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, Dipa Islam, Mohammad Mahbubur Rahman, Dr. Md. Murshed Hasan Sarkar, Mohammad Mohi Uddin

Introduction:

Antioxidant is a new type in naturopathy and at present it has huge demand in food supplementation, cosmetic and pharmacological industry. Antioxidant reduces cell damages caused by free-radical which are responsible for various ailment like ageing, cancer, coronary heart disease, diabetes mellitus, neurodegenerative disorders, inflammation etc. Natural antioxidants are mainly found in plants as Polyphenols. Polyphenols especially, flavonoids and other phenolic compounds are widely distributed in medicinal plants. From literature review we can see that, *Phyllanthus emblica, Moringa oleifera, Ficus racemosa, Ceriops decandra* etc. plants are good source of natural antioxidant.

Objectives:

- Extraction, fractionation, purification and characterization *(in-vitro and in-vivo)* 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* (leaves, flowers and seed husk) and *Ficus racemosa* (fruits) and determination *in-vitro* antioxidant activities was done.
- *Moringa oleifera* leaves, flowers and seed husk contain seven, six and nine polyphenolic compounds. On the other hand, *Ficus racemosa* fruits also contain nine polyphenolic compounds.
- On the basis of our results, *Moringa oleifera* and *Ficus racemosa* shows good antioxidant activities.

7. Fabrication of Biodegradable Packaging Material from Polysaccharide

Kamrun Nahar (PL), Md. Rezaul Karim, Sharkar Mohammad Mahamudul Hassan

Introduction

Today the biggest challenge in our lives is to deal with waste. It is great concern to us that, urban areas of Bangladesh generate 633,129 tons/year of plastic waste. The piling plastic wastes not only in the non biodegradable form, but also the toxic chemicals leach out of plastic and are found in the blood and tissue of nearly all of us. Exposure to them is linked to cancers, birth defects, impaired immunity, endocrine disruption and other ailments. To remove these concern issues, here we have reported a biodegradable packaging material which is produced using local raw materials as well as industrial food wastes to become our environment green.

Fig. Pectin silica based biodegradable Film

Objective

- To fabricate the biodegradable nanocomposite film from different polysaccharide
- To determine the physical, chemical and mechanical properties of the films for application of packaging material
- Successful completion and industrialization of this project generate employment for our unemployed men and women and contribute in poverty alleviation in our country.

Work Progress

- Literature survey and some raw materials have been collected and purified them well
- There are still some requirements of chemicals and instrument.
- Successfully fabricated some biodegradable films which have been now under characterization process

Special Allocation Projects:

Synthesis and biological studies of diamine-based Schiff-base derivatives

Md. Monarul Islam (PI) and Sharkar Mohammad Mahamudul Hassan

Introduction:

Schiff-bases are important class of organic compounds which have wide applications in many biological aspects. Schiff's bases of aliphatic aldehydes are relatively unstable which readily undergo polymerization while those of aromatic aldehydes having an effective conjugation system are found to be more stable. 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.

Objectives:

- Synthesis of different Schiff base derivatives by the coupling of Benzene-1,4-diamine with different substituted benzaldehydes.
- Synthesis of metal complexes through the complexation of Schiff base derivatives with metal salts.
- Study of the anti-microbial activities of Schiff base derivatives and their metal complexes and DFT theoretical study.

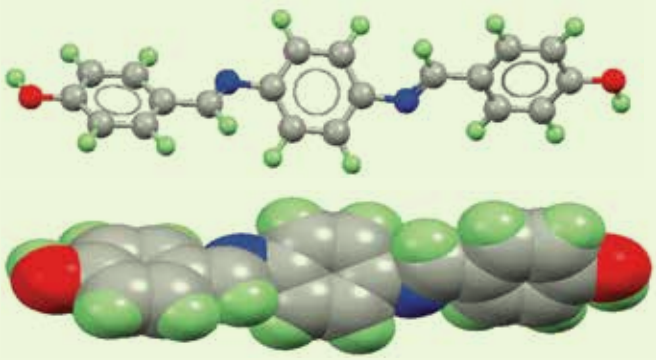


Fig: DFT structure of Schiff-base derivative. Color code: carbon = grey; oxygen atom = red; nitrogen atom = blue and hydrogen atom = light green.

Work Progress:

- New products were confirmed through TLC analysis.
- ^{1}HNMR analysis of two products was carried out.
- DFT calculation of the products is going on to understand the structure activity relationship.

Achievements and Activities:

1) Paper Published

1. Kamrun Nahar, **Shahin Aziz**, Muhammad Shariar Bashar, M. Ahsanul Haque, " Synthesis and characterization of silver nanoparticles from Cinnamomum tamala leaf extract and its antibacterial potential, *Int. J. Nano . Dimenns.*, 11(1):88-98, Winter **2020.**
2. Sharjana Rahman, **Shahin Aziz**, Phytochemical screening, Ultra Violet and FT-IR spectroscopy of ethanolic extract of *Bradelia stipularies* Leaf**.** *World Journal of Pharmacy and Pharmaceutical Sciences,* **2020**, 9 (9), 1554-1562.
3. **Shahin Aziz**, Koushik Saha, Isolation and Structural studies On Chemical Constituents from of *Catharanthus roseus*Leaf Ethyl Acetate Extract , *Scholars Academic Journal of Biosciences,* Dec, **2020**; 8 (12); 411-418.
4. **Shahin Aziz** & Koushik Saha, Isolation and Characterization of Chemical Constituents from n-hexane extract of leaf & Flower part of *Catharanthus roseus*, Available in Bangladesh. IAR J Pharm; **2020**; 1(1) (Dec. 28, 2020) : 26-31
5. **Shahin Aziz**, Koushik Saha, Md. Abdus Satter Mia, Md. Hemayet Hossain, Extraction and Determining of chemical structure from flower Dicholomethane Extract of *Catharanthus roseus, Int. J. Phar. Sci. Rev. Res.,* 68(2), May-June **2021**, 40-43.
6. Sharjana Rahman, **Shahin Aziz**, Sharika Farhana, Proximate compositions & elemental analysis of Leaf**,** root, stem & fruitof *Bradelia stipularies* Research Journal of Pharmaceutical, Biological and Chemical Sciences, 12(3), 2021, May-June, page 30.
7. Sadia Afrin, Kazi Asma Ahmed Shamima, **Mohammad Amirul Hoque**, Ashish Kumar Sarker, Mohammed A Satter and Mohammad Nazrul Islam Bhuiyan, "Determination of In-vitro Antimicrobial activity of *Stevia Rebaudiana* (Bertoni) Leaf Extracts Against Antibiotic Resistant Microorganism" *Asian Journal of Microbial, Biotech, Environmental Science,* **2021**, 23(1), 31-41.

8. Sadia Afrin, **Mohammad Amirul Hoque**, Ashish Kumar Sarker, Mohammed A Satter and Mohammad Nazrul Islam Bhuiyan, "Characterization and Profiling of Bacteriocin like Substances produced by Lactic acid Bacteria from Cheese Sample" *Access Microbiology,* **2021**, 3, 000234.

9. **Md. Monarul Islam**, Bigyan Sharma, Shofiur Rahman, Abdullah Alodhayb,Paris E. Georghiou and Takehiko Yamato "Synthesis, Structures and DFT Calculations of 9-Methoxy[3.3] metaparacyclophanes and their Lewis acid–catalyzed reactivity" *J. Mol. Struct*., **2021**, 1236, 130334.

10. **Md. Monarul Islam**, Paris E. Georghiou, Shofiur Rahman and Takehiko Yamato "Calix[3]arene-Analogous Metacyclophanes: Synthesis, Structures and Properties with Infinite Potential" *Molecules*, **2020**, 25, 4202.

11. Afroza Akter Happy, Ferdoushi Jahan, Md. Abdul Momen, "Essential Oils: Magical Ingredients for Skin Care", *Journal of Plant Sciences*, **2021**; 9(2): 54-64.

12. Afroza Akter Happy, **Ferdoushi Jahan**, **Md. Abdul Momen**, "Essential Oils: Magical Ingredients for Skin Care", Journal of Plant Sciences, 2021; 9(2): 54-64.

13. Saima Selim, Noushin Akter, Shariful Islam Nayan, Faizul Islam Chowdhury, Nadia Saffoon, Ferdous Khan, **Khondoker Shahin Ahmed**, Md Iqbal Ahmed, Mohammad Maqsud Hossain, Md Ashraful Alam, "*Flacourtia indica* fruit extract modulated antioxidant gene expression, prevented oxidative stress and ameliorated kidney dysfunction in isoprenaline administered rats", *Biochemistry and Biophysics Reports*, **2021**, 26, 101012.

14. Rahman, M., Jahan, I.A., Ahmed, S., **Ahmed, K.S.**, Roy, M., Zzaman, W. and Ahmad, I., "Bioactive compounds and antioxidant activity of black and green tea available in Bangladesh", *Food Research*, **2021**, 5(3), 107-111.

15. Muhammed Amanat, Md. Sharif Reza, Md. Sadikur Rahman Shuvo, **Khondoker Shahin Ahmed**, Hemayet Hossain, Muhammad Tawhid, Md. Saifuzzaman, Mohammad Shariful Islam, Tanoy Mazumder, Md. Amirul Islam, A F M Shahid Ud Daula, *"Zingiber roseum* Rosc. rhizome: A rich source of hepatoprotective polyphenols", *Biomedicine & Pharmacotherapy*, **2021**, 139, 111673.

16. Shariful Islam Nayan, Faizul Islam Chowdhury, Noushin Akter, Md Mizanur Rahman, Saima Selim, Nadia Saffoon, Ferdous Khan, Nusrat Subhan, Maqsud Hossain, **K. Shahin Ahmed**, Hemayet Hossain, Md Areeful Haque, Md Ashraful Alam, "Leaf powder supplementation of *Senna alexandrina* ameliorates oxidative stress, inflammation, and hepatic steatosis in high-fat diet-fed obese rats", *PLoS ONE*, **2021**, 16(4), e0250261.

17. Md. Mizanur Rahman, Nusaira Beenta Shahab, Pintu Miah, Md Mahamudur Rahaman, Arafat Ulla Kabir, Nusrat Subhan, Ahad Ali Khan, Mirola Afroze, Mala Khan, **K. Shahin Ahmed**, Hemayet Hossain, Md. Areeful Haque and Md Ashraful Alam, "Polyphenol-rich leaf of *Aphanamixis polystachya* averts liver inflammation, fibrogenesis and oxidative stress in Long-Evans rats", *Biomedicine & Pharmacotherapy*, **2021**, 138, 111530.

18. Abdus Samad, Sajal Baidya, Umme Sarmeen Akhtar, **Khondoker Shahin Ahmed**, Subrata Chandra Roy and Sagirul Islam, "Manufacture of refractory brick from locally available red clay blended with white Portland cement and its performance evaluation", *International Journal of GEOMATE*, **2021**, 20(80), 105-112.

19. Shafi Ahmed, Ismet Ara Jahan, Md. Hemayet Hossain, **Khondoker Shahin Ahmed**, Mizanur Rahman, Wahidu Zzaman, Md. Mozammel Hoque, "Bioactive compounds, antioxidant properties and phenolic profile of pulp and seed of *Syzygium cumini*", *Journal of Food Measurement and Characterization*, **2021**, 15(2), 1991–1999.

20. Ali, M.M., **Ahmed, K.S.**, Hossain, H., Roy, B., Rokeya, B., Rahaman, M.T., Jahan, I.A. and Rahman, M.M., "Total antioxidant capacity and profiling of polyphenolic compounds in jute leaves by HPLC-DAD", *Food Research,* **2021**, 5(1), 343-348.

21. **Ahmed, K.S.**, Jahan, I.A., Jahan, F. and Hossain, H. "Antioxidant activities and simultaneous HPLC-DAD profiling of polyphenolic compounds from *Moringa oleifera* Lam. Leaves grown in Bangladesh", *Food Research*, **2021**, 5(1), 401-408.
22. Shahnaz Siddiqua, Faiza Hamid Jyoti, Nadia Saffoon, Pintu Miah, Soumen Lasker, **Hemayet Hossain**, Raushanara Akter, Md. Iqbal Ahmed, Md Ashraful Alam, "Ethanolic extract of Coccinia grandis prevented glucose intolerance, hyperlipidemia and oxidative stress in high fat diet fed rats" **2021**, *Phytomedicine Plus*.
23. Md Sharif Reza, Md Sadikur Rahman Shuvo, Md Mahadi Hassan, Mohammad Anwarul Basher, Md Amirul Islam, Nura Ershad Naznin, Sarah Jafrin, **Khondoker Shahin Ahmed**, Hemayet Hossain, A F M Shahid Ud Daula, Antidiabetic and hepatoprotective potential of whole plant extract and isolated compounds of *Aeginetia indica*, **2020**, *Biomedicine & Pharmacotherapy*, 132, 110942
24. M. S. H. Khan, K. M. Y. K. Sikdar, N. Saqueeb, **M. H. Hossain**, F. Ahmed, A. B. M. Faroque and M. R. Sarkar, "Quality evaluation and determination of heavy metal contents in palm oil" **2020**, *Bangladesh J. Sci. Ind. Res.* 55(4), 301-310.
25. Noushin Akter, Faizul Islam Chowdhury, Saima Selim, Shariful Islam Nayan, Ferdous Khan, Nusrat Subhan, **Hemayet Hossain**, Md Mizanur Rahman, Md. Areeful Haque, Md Ashraful Alam, "Polyphenolics in ramontchi protect cardiac tissues via suppressing isoprenaline-induced oxidative stress and inflammatory responses in LongEvans rats", **2020**, *Journal of Functional Foods*, 75, 104250.
26. Salma Khan, Md. Mizanur Rahman, Fariha Kabir, Kamrun Nahar, Fariha Mamun, Shoumen Lasker, Nusrat Subhan, **Md. Hemayet Hossain**, Lutfun Nahar, Satyajit D. Sarker, Md Ashraful Alam , Md. Areeful Haque, "*Trichosanthes dioica* Roxb. prevents hepatic inflammation and fibrosis in CCl4-induced ovariectomized rats" **2020**, *Clinical Nutrition Experimental*, 33, 1-17

Process accepted

1. **Ferdoushi Jahan** (SSO), Dr. Samina Ahmed (CSO), **Md. Abdul Momen** (RC), "Production of Herbal Mosquito Spray" accepted by the office, Member Development, BCSIR, Dhaka. Ref. No. 39.02.0000.043.37.799.20/515 Date: 27.09.2020.
2. **Ferdoushi Jahan (SSO), Md. Abdul Momen (RC)**, S.M. Mahmudul Hasan (SSO), Sahana Parveen (CSO), Badhan Saha (SSO), **Khondoker Shahin Ahmed (SO),** Md. Ahedul Akbor (SSO), Rasheda Akter (SSO), "Formulation and Evaluation of Herbal Body Wash" accepted by the office, Member Development, BCSIR, Dhaka. Ref. No. 39.02.0000.043.37.442.19/455 Date: 17.12.2020.
3. **Ferdoushi Jahan (SSO), Md. Abdul Momen (RC)**, **Khondoker Shahin Ahmed (SO),** "Formulation of Herbal Skin Care Cream" accepted by the office, Member Development, BCSIR, Dhaka. Ref. No. 39.02.0000.043.37.805.20/398 Date: 09.03.2021.
4. **Ferdoushi Jahan (SSO), Md. Abdul Momen (RC), S.M. Mahmudul Hasan** (SSO), Sahana Parveen (CSO), "Formulation and Evaluation of Antibacterial Hand Wash" accepted by the office, Member Development, BCSIR, Dhaka. Ref. No. 39.02.0000.043.37.812.20/431 Date: 10.03.2021
5. Dr. Mohammad Nazrul Islam Bhuiyan, SSO, Dr. Sadia Afrin, SO, **Mohammad Amirul Hoque** SSO; "Production of Slightly Acidic Hypochlorite Solution (SAHS) based disinfectant for different Purposes", accepted by the authority of BCSIR. Date: 25/11/2020, Ref: 39.02.0000.043.37.809.20/84.

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

Sl. No	Title of research	Research Category	Name of the Student	Name of the Institution	Name of Supervisors
01	Biphenyl/Binaphthyl-Bipyridyl Based Organocatalysts for Catalytic Conversion of CO_2 into Cyclic Carbonate	Postdoc Fellow	Dr. Bikash Dev Nath	BCSIR	Dr. Mohammad Moniruzzaman & Dr. Md. Monarul Islam
02	Bio concentration of Cr, Cd, Ni, Pb and As in some fresh and dried fishes collected from south east coast of Bangladesh with health risk assessment. Sutro No. 39.02.0000.032.37.003.2019/1204 dated: 13.11.2019-12.11.2020	M.S thesis	Tamanna Sharmin	Dhaka University	Dr. Shahin Aziz
03	Evaluation of heavy metal concentration in canned fish and health risk analysis. Sutro No. 39.02.0000.032.37.003.2019/1204 dated: 13.11.2019-12.11.2020	M.S thesis	Jannatul Aynaum Mimi	Dhaka University	Dr. Shahin Aziz
04	Chemical and Biological Investigation on different Plant parts of *Abroma Augusta* (L.) . Sutro No. 39.02.0000.032.37.002.2018/741 dated: 11.07.2018-10.07.2020	M.Phill Research	Tahmina Khondkar Mitu	Islamic University, Kushtia	Dr. Shahin Aziz
05	Chemical and Biological Investigation on different Plant parts of *Eclipta Alba* (Linn.) Hassk Sutro No. 39.02.0000.032.37.002.2018/397 dated: 25.04.2018-24.04.2020	M.Phill Research	Shirin Akhter Banu	Islamic University, Kushtia	Dr. Shahin Aziz
06	Chemical and Biological Investigation on different Plant parts of *Adiantum Flabellulatum* Linn . Sutro No. 39.02.0000.032.37.002.2018/397 dated: 25.04.2018-24.04.2020	M. Phill Research	Taslima Akhter	Khulna University, Kushtia	Dr. Shahin Aziz
07	Chemical and Biological Investigation on different Plant parts of *Andrographis Paniculata* (Burm. F.) Wall. Ex Nees Sutro No. 39.02.0000.032.37.002.2018/397 dated: 25.04.2018-24.04.2020	Ph.D Research	Sharika Farhana	Islamic University, Kushtia	Dr. Shahin Aziz

08	Formulation, Evaluation and comparative study of herbal skin care cosmetics from indigenous sources.	Research Fellow	Afroza Akter Happy	BCSIR Laboratories Dhaka.	Ferdoushi Jahan
09	Phenolic profiling and analysis of tannin content extracted from indigenous mangrove plant for the production of quality leather	MS	Raju Kumar Das	Institute of Leather Engineering &Technology, University of Dhaka	Khondoker Shahin Ahmed
10	Phenolic antioxidants and gamma-orygenol from rice brand extract	M.Pharm	Shompa Akther	North South University	Md. Hemayet Hossain & Khondoker Shahin Ahmed
11	Phenolic antioxidants analysis and isolation from *Crataeva nurvala* extract	M.Pharm	Umma Hany Onu	North South University	Md. Hemayet Hossain & Khondoker Shahin Ahmed
12	Investigation of chemical profiles, pharmacological effects and molecular docking studies of *Euphorbia milii* (Des Moul)	M.Pharm	Mitu Akther	Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj	Khondoker Shahin Ahmed
13	Pharmacological investigation and molecular docking studies of *W. granatum*	M.Pharm	Hasna Banu	Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj	Md. Hemayet Hossain
14	Phyto-Pharmacological investigation and In Silico studies of methanolic extract of *Commelina Longifolia* Lam.	M.Pharm	Sadia Afrin	Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj	Md. Hemayet Hossain
15	Pharmacological evaluation and chemical profiling of methanolic extract of dried green fruits of *Syzygium fruticosum* (Roxb.)	M.Pharm	Md. Arman Ali	Bangabandhu Sheikh Mujibur Rahman Science and Technology University, Gopalganj	Md. Hemayet Hossain
16	Preparation of chitosan based combination product which can used as natural food preservative	Research Fellow	Nadia Sultana	BCSIR Laboratories, Dhaka	Md. Hemayet Hossain

Participation in training/ symposium/ workshop/ Conference

Training

1. **Dr. Shahin Aziz**, PSO, attended a zoom meeting on "Soap and detergents" at Bangladesh Standards and Testing Institute, (BSTI) dated at 24.09.2020 as a committee member.
2. **Dr. Shahin Aziz**, PSO, attended a scientific process (developed from Research and Development project from BCSIR) verification committee meeting from IMMM, Joypurhat BCSIR at dated 27.09.2020 as an expert with the reference no. 39.02.0000.043.37.423.19/1236 dated 14.10.2020.
3. **Dr. Shahin Aziz**, PSO, participated a training programme on "Annual Budget distribution according to 2008 & discussion on basic software tools & origin lab for research" at dated 16.11.2020 organized by BCSIR laboratories, Dhaka.
4. **Dr. Shahin Aziz**, PSO, participated a training programme on "Innovation and Innvention" at dated 15.12.2020 organized by Innovation team, BCSIR Dhaka.
5. **Dr. Shahin Aziz**, PSO, participated a training programme on "Analytical method validation for quality in analytical laboratory" at dated 31.12.2020 organized by BCSIR Laboratories, BCSIR, Dhaka.
6. **Dr. Shahin Aziz**, PSO, participated an evaluation of R & D monitoring programme in Leather Research Institute, Nayarhat, Savar, at dated 31.03.2021.
7. **Dr. Shahin Aziz**, PSO, participated BAS-AASSA Webniar on " Plastic pollution: causes, effects and solutions, Dhaka, Bangladesh at 29-30 May, 2021, organized by Bangladesh Academy of Sciences (BAS).
8. **Nushrat Jahan Ethane**, SSO, has participated training Program on " Basic Principle application and operation & maintenance of TGA" held on 28 October 2020 at BCSIR Laboratories,Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
9. **Nushrat Jahan Ethane**, SSO, has participated training Program on " Analytical method validation for quality in analytical laboratory" held on 31 December 2020 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
10. **Nushrat Jahan Ethane**, SSO, has participated training Program on "Principle and Application of UV–vis Spectrophotometer" held on 23 June 2021 at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
11. **Dr. Md. Monarul Islam**, SSO, participated in training on "Public Procurement Management" organized by National Academy for Planning and Development (NAPD) at Dhaka held from 20 September to 08 October, 2020.
12. **Dr. Md. Monarul Islam**, SSO, performed as a trainer on Gas Chromatography-MASS Spectrometry (GC-MS) training program organized by Planning & Development (P&D) Division, Dhaka held from 07 to 11 February, 2021.
13. **Ferdoushi Jahan,** SSO, participated training program on "Operating and Maintenance of Atomic Absorption Spectrophotometer (AAS)" held on 01-05 November **2020** at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka-1205.

14. **Ferdoushi Jahan,** SSO, participated training program on "Principle and application of UV-vis Spectrophotometer" held on 23 June **2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka-1205.

15. **Khondoker Shahin Ahmed**, SO, has participated training on "Fiber Quality Analyzer (FAQ)", held on 15 June, 2021, at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

16. **Khondoker Shahin Ahmed**, SO, has participated training on "Operation and maintenance of Gas Chromatography-Mass Spectrometry (GC-MS)", held on 07-11 February, **2021**, at Bangladesh Council of Scientific and Industrial Research (BCSIR).

17. **Md. Hemayet Hossain**, PSO, has participated training program as trainer on "Basic Principle, Application, Operation and Maintenance of HPLC", held on 26 January, **2021**, at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

18. **Khondoker Shahin Ahmed**, SO, has participated training program as trainer on "Basic Principle, Application, Operation and Maintenance of HPLC", held on 26 January, **2021**, at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

19. **Khondoker Shahin Ahmed**, SO, has participated training on "Analytical Method validation for quality in analytical laboratory", held on 31 December, **2020**, at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

20. **Khondoker Shahin Ahmed**, SO, has participated training on "BCSIR Service Rules 1989 & Government Pension Rules", held on 27 September, **2020**, at BCSIR Laboratories, Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

21. **Md. Abdul Momen**, RC, participated training program on "Operating and Maintenance of Atomic Absorption Spectrophotometer (AAS)" held on 01-05 November **2020** at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka-1205.

22. **Md. Abdul Momen**, RC, participated training program on "Basic Principle, Application, Operation and Maintenance of HPLC" held on 26 January **2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka-1205.

23. **Md. Abdul Momen,** RC, participated training program on "Fiber Quality Analyzer (FQA)" held on 15 June **2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka-1205.

24. **Md. Abdul Momen**, RC, participated training program on "Principle and application of UV-vis Spectrophotometer" held on 23 June 2021 at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka-1205.

25. **Fatema Tuz Zohora** (SO), participated in training on "Operating and Maintenance of Gas Chromatography –Mass Spectroscopy (GC-MS)", held on 07-11 February, **2021** at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka-1205.

26. **Fatema Tuz Zohora** (SO), participated in training on "Fiber quality Analyzer (FQA)", held on 15 June, **2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

27. **Fatema Tuz Zohora** (SO), participated in training on "Comprehensive Environmental Sampling Technique", held on 22 June, **2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).

28. **Fatema Tuz Zohora** (SO), participated in training on "Basic Principle, Applications, Operation and Maintenance of HPLC" held on 26 January, **2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
29. **Md.Rezaul Karim** (RC), participated in training on "Fiber quality Analyzer (FQA)", held on 15 June, **2021**at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
30. **Md.Rezaul Karim** (RC), participated in training on "Comprehensive Environmental Sampling Technique", held on 22 June,**2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
31. **Md.Rezaul Karim** (RC), participated in training on "Basic Principle, Applications, Operation and Maintenance of HPLC" held on 26 January, **2021** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
32. **Md.Rezaul Karim** (RC), participated in training on "Operating and maintenance of X-Ray Diffractometer(XRD)" held on 29 November-03 December, **2020** at BCSIR Laboratories Dhaka, Bangladesh Council of Scientific and Industrial Research (BCSIR).
33. **S. M Mahmudul Hassan** Participated Training program on "Operating System and maintenance of Gas Chromatoghraph-Mass Spectrometer (GC-MS)" held at Bangladesh Council of Scientific and Industrial Research (BCSIR) from 7-11 February, 2021
34. **S. M Mahmudul Hassan** Participated Training program on "Comprehensive Environment Sampling Technique" held at Bangladesh Council of Scientific and Industrial Research (BCSIR) on 22 June, 2021

Conference

1. **Shahin Aziz**, Kousik Saha presented, "Isolation and characterization of *Catharanthus roseus* flower and leaf." in International conference on science and Technology for celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) at 11-13 March, 2021 with id : IL-B06 with page no. 355 as invited lecturer (Oral presentation).
2. Sharika Farhana**, Shahin Aziz**, Sharjana Rahman and Sharif Al-Reza presented, "Qualilative and quantitative analysis of bioactive compounds and in vitro antimicrobial activity of leaf, root, stem and seed extract of *Andographis paniculata*." in International conference on science and Technology for celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) at 11-13 March, 2021 with id : OP-B24 with page no. 267. (Oral presentation).
3. Sharjana Rahman, **Shahin Aziz**, Sharika Farhana presented," Characterization of different extracts of leaf, root , stem and fruit of *Bridelia stipularis*" in International conference on science and Technology for celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) at 11-13 March, 2021 with id : PP-21 with page no. 404. (poster presentation).
4. **Mohammad Amirul Hoque,** participated in internationalconference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021), held on 11-13 March, **2021**, Organized by BCSIR and presented an oralpresentation entitled "Acid Recovery and Reuse Successively for the Synthesisof Graphene Oxide using Tour method".
5. **Nushrat Jahan Ethane**, Production of Aluminum sulfate (anhydrous) from scarp aluminum, (Poster Presentation, PP-70, p-428), International Conference on Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021), Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka, Bangladesh from 11-13 March 2021

6. **Dr. Md. Monarul Islam**, participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) 11-13 March, **202 1**and presented an oral presentation entitled "Synthetic route to alkylated pyrenes:Lewis-acid induced reactions of [2.2]metacyclophanes".

7. **Dr. Bikash Dev Nath (Post Doc. Fellow)**, participated in International Conference on Science and Technology for Celebratingthe Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) 11-13 March, **2021** and presented an oral presentation entitled "Synthesis and Characterization of Hydroxybenzaldehyde DerivedChitosan Schiff Base".

8. **Fatema Tuz Zohora**, participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021), organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, **2021,** and presented an oral presentationen titled 'Preparation and Characterization of Thin Conductive Nanocomposite Film from Dispersed Multiwalled Carbon Nanotubes Reinforced Chitosan/Polyvinyl Alcohol Blend'.

9. **Ferdoushi Jahan**, Md. Abdul Momen, Afroza Akter Happy, "Development and Evaluation of Multipurpose Herbal Skin Care Cream" (poster presentation), in International Conference on Science and Technology for Celebrating Birth Centenary of Bangabandhu (ICSTB-2021), organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka at 11-13 March 2021.

10. **Md. Abdul Momen**, Ferdoushi Jahan, Md. Ataur Rahman, Md. Mufazzal Hossain, presented oral presentation, "Preparation, characterization and application of Cu(II) doped TiO_2 in photodegradation of aqueous Remazol black B" in International Conference on Science and Technology for Celebrating Birth Centenary of Bangabandhu (ICSTB-2021), organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka at 11-13 March 2021

11. **S. M. Mahmudul Hassan,** Koushik Saha, Md. Hossain Sohrab, Presented a poster inInternational Conference on Science and Technology for Celebrating Birth Centenary of Bangabandhu (ICSTB-2021) March 11-13, 2021, BCSIR, Dhaka Bangladesh

12. Nadia Sultanaand **Md. Hemayet Hossain** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021), Organized by BCSIR on 11-13 March, 2021 and presented poster presentation entitled "Method Optimization for Preparation of Chitosan & Chitosan Based Combination Product for Use as Natural Food Preservatives".

13. **Khondoker Shahin Ahmed** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021), Organized by BCSIR on 11-13 March, 2021 and presented poster presentation entitled "Antioxidant activities and profiling of polyphenolic compounds in *Moringa oleifera* L. grown in Bangladesh".

Number of Analytical (Ad-Hoc) Problem Solved:

Name of the Division	Routine type	Research Type	Total
CRD	400	150	550

Special Contribution to the Nations:

1. A process of production of hand sanitizer based on water medium developed and leased out for commercialization to contribute covid-19.
2. Chemical Research Division of BCSIR Laboratories Dhaka is providing analysis services to different industries by determining the specific standards of Hand Sanitizer, Gel, and Hand Rub etc by the GC machine from April 2020. It is to be noted that Corona virus (COVID-19) has now become epidemic all over the world and many companies in Bangladesh are currently producing Hand Sanitizer, Gel, and Hand Rub etc. As a result, it is important to continue the analysis service at CRD, BCSIR.

Aloe Gel

Herbal Shaving Foam


Baby Laundry Detergent


Phosphate Based
Fire extinguishing powder


Carbonate Based
Fire extinguishing powder

Neem Based Cream

Short biography of CRD Scientists

Md. Hemayet Hossain (June, 2006- present)

Office	Chemical Research Division	Blood group	**B+**
Position	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 154 publications and gets 1681 citation (h-index: 20) and one book chapter. He has 4 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+**
Position	Senior 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 10 publications. He has 12 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+**
Position	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 authored or coauthored 33 publications and get 551 citation (h-index:10). He has one accepted process. He is a life member of BCS, BAAS, NITUB, DUCCA; and Founding Member of National Young Academy of Bangladesh (NYAB).

Mohammad Amirul Hoque (July, 2006- present)

Office	Chemical 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 Ph.D in (Advanced Materials Science of Graphene) from same department. He Joined in BCSIR in 2006 and worked 10 years in Synthetic polymers and now he is working in Organic synthesis laboratory. 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. He worked on Biomaterial Science, especially Synthesis of Lactic acid-based Biopolymers in (2009-2010). He has authored or coauthored 12 publications and accepted 12 process of which 5 is leased out and One Patented. He is a life member of BCS and GACA.

Ferdoushi Jahan (June, 2006- present)

Office	Chemical Research Division	Blood group	**A+**
Position	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, Herbal cosmetics and toiletries. She has 12 publications, 18 accepted process and 12 based 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-**
Position	Senior Scientific Officer	Degree obtained	M.Sc. (2000)
Contact	nushrat_je@yahoo.com	Mobile	01552338938

Nushrat Jahan Ethane completed her B.Sc. (Hon's) and M.S. degree in Chemistry from National University. Her research is mainly focused on waste management, synthesis chemistry and natural product chemistry. She is a life member of BAAS. She has 3 publications, and 7 accepted process. She has 3 publications, and 7 accepted process. She is a life member of BAAS.

Khondoker Shahin Ahmed (October, 2016- present)

Office	Chemical Research Division	Blood group	**B+**
Position	Scientific Officer	Degree obtained	MS (2013)
Contact	shahinjnu005@gmail.com	Mobile	01718507339

Khondoker Shahin Ahmed earned his both BSc. and MS degree in Chemistry from Jagannath University. His research is mainly focused on the Biological and Pharmacological activities of medicinal plants. He also works on structure elucidation of pure compounds. He worked as a Research Fellow of Professor Nurul Afsar Khan postgraduate Fellowship at BCSIR Laboratories, Dhaka, BCSIR (2013–2016). He has authored or coauthored 26 publications and get 127 citation (h-index: 6). He has 2 accepted process and 1 submitted patent. He also participates 13 national and international conferences. He is a life member of Bangladesh Chemical Society.

Fatema Tuz Zohora (November, 2018- present)

Office	Chemical Research Division	Blood group	**A+**
Position	Senior Officer	Degree obtained	MS (2014)
Contact	zohorapopy.acce@gmail.com	Mobile	01318639225

Fatema Tuz Zohora earned her both BSc and MS degree in Applied Chemistry and Chemical Engineering (ACCE) from the University of Dhaka. Currently, she is focused on fruity ester synthesis and agricultural chemistry. She has authored 01 publication.

Md. Rezaul Karim (May, 2019- present)

Office	Chemical Research Division	Blood group	**B+**
Position	Research Chemist	Degree obtained	M.Sc. (2019)
Contact	rezaulkarimchembuet@gmail.com	Mobile	01533919761

Md. Rezaul Karim received his both B.Sc. and M.Sc. degree in Chemistry (Physical Chemistry) from Begum Rokeya University, Rangpur and Bangladesh University of Engineering & Technology (BUET). Currently his research is mainly focused on the development of new advanced polymeric soft materials like hydrogels and fabrication of biodegradable packaging materials. He participates 06 national and international conferences. He has authored 01 publication.

Md. Abdul Momen (May, 2019- present)

Office	Chemical Research Division	Blood group	**A+**
Position	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, Herbal cosmetics and toiletries. He is a member of BCS (Bangladesh Chemical Society).

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, Textiles, Jute, Rubber, Bitumen, Paint, Dyes & Pigments, Plastic & Rubber Waste Management & 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 seven very important research fields/ sections-

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

R&D Projects:

1. Development of Polyaluminum Chloride to be used as coagulant for textile waste water treatment

Shamima Akther Eti (PL), Swapan Kumer Ray, Md. Jaynal Abedin and Riyadh Hossain Bhuiyan

Brief Description: The discharge of wastewater, without or with inadequate treatment, involves significant costs, including environmental and social ones. Wastewater treatment is an essential prerequisite for water reclamation and reuse. Existing Physical, Chemical and Biological Treatment Technologies are cost prohibitive, especially when applied for treating large waste streams. Application of effective coagulant (chemical treatment) seems to have the most potential for treatment of waste water. The polyaluminum chloride coagulant developed from the scrap Aluminum could minimize the cost of treatment of waste water. By successful implementation of the proposed project will help ensure the environmental sustainability.

Objectives:

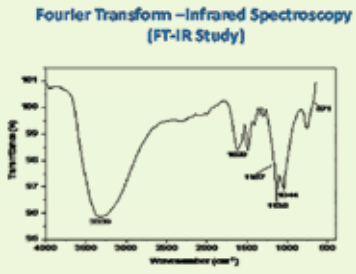
- To develop an appropriate technology for the preparation of Polyaluminum Chloride (PAC) coagulant for waste water treatment .

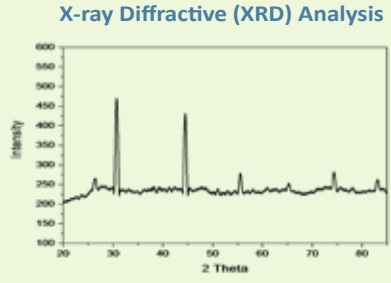
- Utilization of available scrap /waste aluminum and other low cost chemicals.
- Performance study of the prepared PAC and comparison with other conventional coagulants.
- Development of appropriate technology for recycling of sludge to ensure proper waste management

Progress Achieved:

- Polyaluminum Chloride (PAC) was synthesized from scrap aluminum.
- The synthesized PAC was characterized by state of the art technologies.
- Wastewater sample was collected form textile dying industry located in Savar, Dhaka and characterization of the physicochemical were done in the laboratory.
- The dye removal study was investigated by a series of batch studies to identify the optimum conditions to treat wastewater.
- Coagulation performance study with textile wastewater was carried out and about 73% dye removal was achieved by adding 2.5 mg of synthesized PAC in the laboratory.

All data and pictures of respective R &D activities:





2. Synthesis of thermoplastic modified thermosetting polymers, composites and nanocomposties

Shahin Sultana (PL), Lutfun Naher Hilary, Zahidul Islam, Md. Rashed Hasan and Md. Jaynal Abedin

Brief Description: Thermosetting polymer networks tend to have a characteristic low resistance to brittle fracture. To increase toughness, some research works have been found in the literature on the modification reaction of thermosetting polymer. In this research works, the prepared thermoplastic modified thermosetting polymers, composites and nanocomposites might be used in adhesive industry, packaging industry, plastic industry, automobile and other industrial, applications respectively.

Objectives:

- To synthesize thermoplastic modified thermosetting polymer.
- To prepare composites/ nanocomposites using these synthesized modified thermosetting polymers with treated and untreated natural fibers.

Work Progress:

- PVA modified urea formaldehyde resin has been synthesized and characterized.
- PVA modified resorcinol formaldehyde resin has been synthesized and characterized. A patent has been submitted.
- A poster has been presented in the 17th Asian Chemical Congress on 23 - 28 July 2017 at the Melbourne Convention Centre, Australia.

- Another poster has been presented in the CSTB-2021 on 11-13 March, 2021 at BCSIR, Dhaka, Bangladesh.
- Urea formaldehyde resin molding powder has been developed.
- Two manuscripts have been submitted for publication.

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

Shahin Sultana (PL), Zahidul Islam, Md. Jaynal Abedin, Lutfun Naher Hilary and Md. Khabir Uddin Sarker

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

Objectives:

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

Progress Achieved:

- Production of solvent cements using waste PVC and virgin PVC for pipes jointing and fittings have been developed.
- Preparation of waste PVC based composite materials are in progress.
- One patent is ready for submission.

4. Development and application of Industrially important cellulose derivatives (HPMC, MC, CMC, Cellulose acetate etc.) from lignocellulosic biomass (Jute etc.)

Muhammad Mahbubur Rahman (PL), Zahidul Islam, Muhammad Saiful Islam, Swapan Kumer Ray, Muhammad Abdullah Al-Mansur, Dipa Islam, Dr. Toufic Ahmed and Dr. M. Sarwar Jahan

Brief Description: Cellulose, a well-known fascinating biopolymer is the naturally most abundant renewable and biodegradable resource on the earth. In this project our aim is to synthesize industrially important cellulose derivatives hydroxypropyl methylcellulose (HPMC), methyl cellulose (MC), carboxymethyl cellulose (CMC) and cellulose acetate from lignocellulosic biomass considering its applications in construction, food, pharmaceutical and personal care industries. In this project we will also use ionic liquids (ILs) and their double salts (DSILs) for dissolution and modification of cellulose. ILs provide an attractive alternative to traditional solvents for both industrial and laboratory purpose on account of their potential as 'green' solvents.

Objectives:

- Isolation and purification of cellulose from jute fiber etc.
- Synthesis of cellulose derivatives HPMC, MC, CMC, Cellulose acetate, etc. from Jute fiber etc.
- Application of cellulose derivatives in the field of food, pharmaceutical, cosmetic and textile industries
- Introduction in a green approach Ionic liquid (ILs) and their double salts for dissolution and modification of cellulose.

Work Progress:

- Isolation, purification & characterization of cellulose from jute fibre is completed.
- Preparation & characterization of MC is completed.
- Preparation of CMC & cellulose acetate is going on.
- Determination of the physical properties of ionic liquids is going on.
- Dissolution of cellulose in ionic liquids is going on.

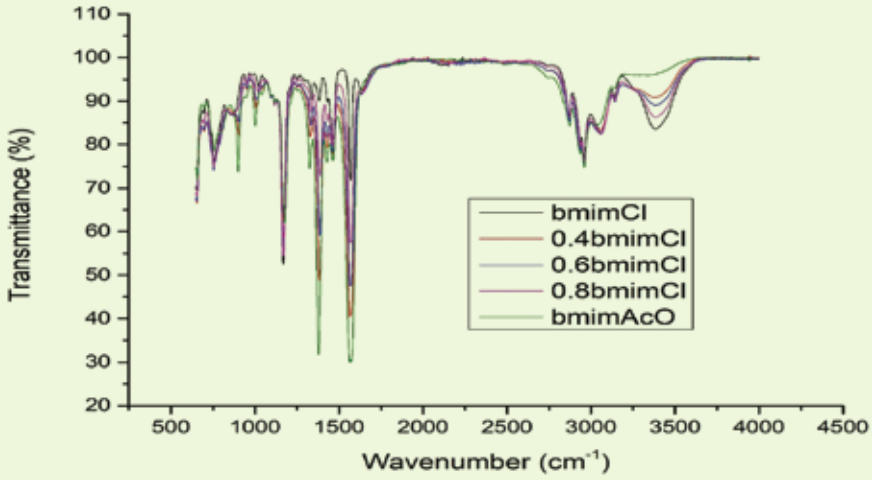


Fig. ATR-FTIR spectroscopic analysis of different mole fraction of 1-butyl-3-methyl-imidazulium chloride (bmimCl) and 1-butyl-3-methylimidazolium (bmim[AcO^-])

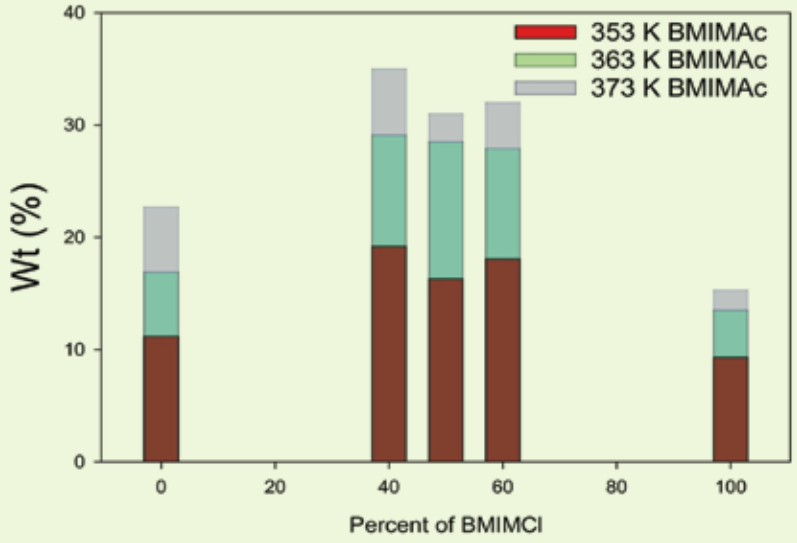


Fig. Dissolution of cellulose (wt%) with different composition double salt ionic liquid (bmimCl+bmim[AcO^-]-system)

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

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

Brief Description:

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, composite materials etc. These types of resins are also useful in making electrical

equipments, trays, wood paints, fillers, putties, shower stalls, navy boats, swimming pool, pipes, ducts, water tanks etc. A huge quantity of UPR and UPR based different types of 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.
- To produce UPR based composite materials are in progress.

6. Development of phosphorus based bio-polymer flame retardant for composites and plastic materials

Dr. Mohammad Majedul Haque (PL), Riyadh Hossain Bhuiyan, Md. Jaynal Abedin, Md. Khabir Uddin Sarker and Swapan Kumer Ray

Brief Description: Flame retardants are chemicals that are applied to materials to prevent the start or slow the growth of fire. They have been used in many consumer and industrial products, to decrease the ability of materials to be ignited. Lignocellulosic material can be used as a renewable source for the production of chemicals and polymeric materials. Cellulose, hemicelluloses and lignin are the main structural components of lignocellulosic biomasses. Chemical modifications (such as alkylation, amination, hydroxylation, nitration, phosphorylation and others) of components, e.g. lignin and cellulose can enhance its natural characteristics. Among the modifications, phosphorylation has gained interest, especially in the field of flame retardancy.

Objectives:

- Development of phosphorus based bio-polymer flame retardant for composites and plastic materials.

Progress Achieved:

- Some batches of Alkali-lignin were isolated from different biomasses.
- Purification and evaluation of physical properties of alkali-lignin have been investigated.
- The modifications of cellulose and lignin by phosphorylation have been conducted and determination of properties is in progress.

Special Allocation Projects:

1. Utilization of waste polyvinyl chloride (PVC) cooling tower fills and natural waste fibers to produce new composite materials

Shahin Sultana (PL), Lutfun Naher Hilary, Md. Khabir Uddin Sarker and Dr. Mohammad Majedul Haque

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

Objectives:

- To prepare composite films/ sheet by solution casting method using waste PVC and natural waste fibers.
- To prepare compression moulded composites using waste PVC and natural waste fibers.
- To prepare injection moulded composites using waste PVC and natural waste fibers.

Progress Achieved:

- Waste PVC materials have been collected and analyzed and produced composite materials with lebbeck wood sawdust by solution casting method. One paper has been submitted for publication.
- Compression molded product of waste PVC materials are developed and another paper is ready for submission.

2. Development of natural rubber based composite modifier for water, heat and UV-light resistant rubberized-bitumen production

Swapan Kumer Ray (PL) and Riyadh Hossain Bhuiyan

Brief Description: The road system has reached in a critical stage in many developed and developing countries due to higher traffic load with increased population. Constructions of pavement usually done with conventional bitumen and aggregates that is prone to premature failures due to cracks and rutting. Significant variation in daily and seasonal temperature of pavement and prolonged rainfall and water clogging induces early development of distress conditions of bituminous pavement. The high costs involved in the road maintenance has resulted the need to enhance road performance by newer and ecofriendly technologies.

Objectives:

- Development of 'natural rubber based composite modifier' for the production of water, heat and UV-light resistant rubberized-bitumen.
- Comparison of marshal stability and anti-stripping properties between 'rubberized bitumen-waste plastic coated aggregates' and 'general bitumen-non coated aggregates'.
- Proper utilization of lower grade natural rubber, waste biomass and waste plastics for durable pavement construction.
- Assist to mitigate environmental pollution and adaptation with climate change to ensure sustainable development of the country.

Progress Achieved:

- A patent titled "A new process for the construction of moisture and heat resistant rubberized bituminous pavement with waste thermoplastic coated aggregates" has been submitted to the office of the patents and design and trademarks, Motijheel, Dhaka.
- A process is ready for submission.
- A paper is ready for submission.

Achievements and Activities:

Paper Published:

1. Mithun Saha, Diti Rani Saha, Tahamina Ulhosna, Shazid Md Sharker, Md Hasanuzzaman Shohag, Muhammad Saiful Islam, Swapan K. Ray, G.M Sayedur Rahman and Hasan Mahmud Reza, "QbD based development of resveratrol-loaded mucoadhesive lecithin/chitosan nanoparticles for prolonged ocular drug delivery.", Journal of Drug Delivery Science and Technology, **2021,** 63, 102480. (Collaborative research work with North South University)

2. Mosharof Hossain, Lipiar Khan Mohammad Osman Goni, Nuzhat Muntaha, Mohammad Shah Jamal, Shah Mohammad Asaduzzaman Sujan, Shamim Ahmed, Dipa Islam, Riyadh Hossain Bhuiyan, Abu Naieum Muhammad Fakruddin, "Box-behnken design-based optimization for biodiesel production from waste cooking oil using Mahgany (Swietenia macrophylla) bfruit shell derived activated carbon as a heterogeneous base catalyst", Reaction Kinetivs, Mechanisms and Catalysis, **2021**. https://doi.org/10.1007/s11144-021-01995-w.
3. Shazid Md Sharker, Md. Lukman Hakim, Nazmun Nahar, Mithun Saha, Muhammad Saiful Islam, Rashida Akter, Hasan Mahmud Reza and Sung Young Park, "Drug delivery from surgical thread for local anesthesia", Biomedical Physics & Engineering Express, **2020**, 6, 015028. (Collaborative research work with North South University)
4. Mohammad Majedul Haque, Nasim Sultana, S. M. Tareque Abedin, Nur Hossain and Shariff E. Kabir, "Fatty acid analysis, cytotoxicity, antimicrobial and antioxidant activities of different extracts of the flowers of *Nyctanthes arbor-tristis* L", Bangladesh J. Sci. Ind. Res. **2020**, 55(3), 207-214.
5. Sajib Aninda Dhar, Tamjid Us Sakib, Lutfun Naher Hilary "Effects of pyrolysis temperature on production and physicochemical characterization of biochar derived from coconut fiber biomass through slow pyrolysis process", Biomass Conversion and Biorefinery, **2020**, https://doi.org/10.1007/s13399-020-01116-y.
6. Nargish Jahan Ara, Mohammad Farhadur Rahman, Zubair Hasan, Md. Shofiqul Islam, Mohammad Mahbubur Rahman, "Development of the N-Doped Cu-Carbon Composite as a Novel Catalyst for the Removal Reactive Black 5", Open Journal of Applied Sciences, **2020**, 10 (7).
7. Tanvir Sultana, Shahin Sultana, Husna P. Nur and Md. Wahab Khan, "Studies on Mechanical, Thermal and Morphological Properties of Betel Nut Husk Nano Cellulose Reinforced Biodegradable Polymer Composites" J. Compos. Sci. **2020**, 83 (4),1-15. doi:10.3390/jcs4030083.

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

1. **Shahin Sultana,** PSO, Fibre & Polymer Research Division pursuing Ph.D 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 his Ph.D degree in the department of Chemistry, University of Dhaka, Bangladesh under the supervision of Professor Dr. Md. Qamrul Ehsan and Professor Dr. Md. Tanvir Muslim, titled on "Preparation of submicron lignin particles from different lignocellulosic biomass and their modification" in 2018-2019 session.
3. **Md. Mahbubur Rahman,** SSO, Fibre & Polymer Research Division pursuing Ph.D degree in the department of Chemistry, University of Dhaka, Bangladesh under the supervision of Professor Dr. Md. Abu Bin Hasan Susan, titled on "Ionic Liquids and Their Double Salts for Dissolution and Modification of Cellulose" in 2016-2017 session.
4. **Shamima Akther Eti,** SSO, Fibre & Polymer Research Division pursuing Ph.D degree in the department of Soil, Water & Environment, University of Dhaka, Bangladesh under the supervision of Professor Dr. Shahid Akhtar Hossain titled on "Development of Polyaluminum Chloride-Based Coagulants from Aluminum Scrap for the Treatment of Textile Wastewater" in 2017-2018 session.

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

Sl. No.	Title of Research	Research Category	Name of the Student	Name of the Institution	Name of supervisors
1.	Development and application of Industrially important cellulose derivatives (HPMC, MC, CMC, Cellulose acetate etc.) from lignocellulosic biomass (Jute etc.)	BCSIR Fellow	Mahbub Alom	BCSIR Laboratories Dhaka	Mohammad Mahbubur Rahman, SSO
2.	Synthesis and characterization of polyester resin based nanocomposites	M.S	Md. Hasan Ul Amin	Department of chemistry , University of Dhaka	Shahin Sultana, PSO and Dr. Md. Ershad Halim, Professor
3.	Preparation and characterization of glycerol-plasticized and unplasticized PVA-chitosan blend film	MS Thesis	Bikash Kumar Ray	Department of Chemistry, Dhaka College, affiliated to the University of Dhaka	Muhammad Saiful Islam, SSO
4.	Syntheses of lignin derivatives and their utilization in paint and adhesive.	MS Thesis	Md. Saddam Hossain	Department of Chemistry, University of Dhaka	Swapan Kumer Ray, SSO
5.	Syntheses of lignin derivatives and their utilization in cosmetic industries	MS Thesis	Sayed Rashedul Islam	Department of Chemistry, University of Dhaka	Swapan Kumer Ray, SSO

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

1. **Swapan Kumer Ray (PSO),** participated (virtual platform) in "International Symposium on Bituminous Materials (ISBM-2020)" in Lyon, France on 14-16 December, 2020 and presented a poster titled "Combined use of natural rubber, biomass and plastic wastes in bitumen modification and flexible pavement construction".
2. **Swapan Kumer Ray (PSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, 2021 and presented an oral presentation titled "Towards the valorization of coconut husk soda-lignin".
3. **Muhammad Mahbubur Rahman (SSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, 2021 and presented an oral presentation titled "Interaction of non-ionic surfactant and cellulosic polymer in aqueous solution".

4. **Dr. Mohammad Majedul Haque (SSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, 2021 and presented an oral presentation entitled "Thermal properties and antioxidant activity of phosphorylated soda lignin".
5. **Shamima Akther Eti (SSO),** participated in International conference on Science and Technology for celebrating the Birth centenary of Banggabandhu (ICSTB-2021) organized by Bangladesh council of Scientific and Industrial Research (BCSIR), 11-13 March, 2021 and presented an oral presentation entitled "Synthesis and Characterization of Polyaluminum Chloride Coagulant for Removal of an Anionic Dye from Aqueous Solution"
6. **Shamima Akther Eti (SSO),** participated in the training program on "Comprehensive Environmental Sampling Technique" organized by BCSIR laboratories, Dhaka held in 22 June, 2021.
7. **Muhammad Saiful Islam (SSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, 2021 and presented an oral presentation entitled "Terephthalic acid from post-consumer PET bottles through repeated use of aqueous sulfuric acid hydrolysis liquor".
8. **Lutfun Naher Hilary (SO),** participated in the International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by the Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, 2021 and presented an oral presentation entitled "Wood Plastic Composites based on Waste Poly (Vinyl Chloride), Plasticizer and Lebbeck Wood Sawdust".
9. **Khabir Uddin Sarker (SSO),** participated in the International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by the Bangladesh Council of Scientific and Industrial Research (BCSIR), March 11-13, 2021 and presented a poster titled "Utilization of Tea (Camellia Sinensis) Wastes in Food Grade Dyeing of Jute Packaging Materials".
10. **Md. Jaynal Abedin (SSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March, 2021 and presented an oral presentation titled "Mechanical and thermal properties of natural rubber/polyaniline composite".
11. **Riyadh Hossain Bhuiyan (SO),** participated in the International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by the Bangladesh Council of Scientific and Industrial Research (BCSIR), March 11-13, 2021 and presented a poster titled "Nitro-lignin based super-plasticizer for the enhancement of cement fluidity".
12. **Zahidul Islam (SO),** participated in the International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by the Bangladesh Council of Scientific and Industrial Research (BCSIR), March 11-13, 2021 and presented a poster titled "Comparative Study on Urea-Formaldehyde (UF) Prepolymer, UF Cross linked Plastic and Teak Wood Sawdust Reinforced UF Cross linked Composites ".
13. **Md. Rashed Hasan (SO),** participated in the International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by the Bangladesh Council of Scientific and Industrial Research (BCSIR), March 11-13, 2021 and presented a poster titled "Selective extraction of curcuminoids from turmeric by centrifugal partition chromatograph ".

Number of Analytical (Ad-Hoc) Problem Solved:

Name of the Division	Routine type	Research type	Total
Fibre & Polymer Research Division	567	323	890

Special Contribution to the Nations:

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 Dept. of Environment.
3. Quality analysis of jeo-textiles to support Water Development Board and Bangladesh Army.
4. Quality analysis of Natural Rubber to support Bangladesh Forest Industrial Development Corporation.
5. Quality analysis of Bitumen and Bitumen Emulsions to support BSTI, Importers and Construction Firms.

List of Pictures for Fibre & Polymer Research Division:

Product Pictures

Modified Bitumen & Pavement Construction

Polyaluminum Chloride (PAC) powder

Terephthalic acid

Major instruments

HS-GC-FID/ECD system

UPLC-PDA/RI Instrument

Simultaneous Thermal Analyzer

Gel Permeation Chromatograph

Universal Strength Tester

Reaction Calorimeter

Brief Biography of the Scientists of F&PRD:

Shahin Sultana

Office	Fibre & Polymer Research Division	Blood group	**O+**
Position	Principal Scientific Officer	Degree obtained	M.Phil
Contact	shasultana@gmail.com	Mobile	+8801715100985

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 are in the area of polymer chemistry, fiber chemistry and polymer based composite and biocomposite materials. So far she has published 23 research articles in different journals and developed 09 processes in BCSIR. She is a life member of BAS.

Swapan Kumer Ray

Office	Fibre & Polymer Research Division	Blood group	**O+**
Position	Principal Scientific Officer	Degree obtained	MSc
Contact	swapanray_bcsir@ymail.com	Mobile	+88-01534149306

Swapan Kumer Ray earned his B.Sc (Hons) and M.Sc degree in Chemistry from National University. He is continuing his PhD research on the Conversion of Lignocellulosic Biomass and Valorization of Lignin following Green Chemistry Principle in the Dept. of Chemistry, Physical Chemistry Group, University of Dhaka. His research is mainly focused on Lignin Chemistry, Rubber Chemistry and Bitumen Modification. He has authored or coauthored of fifteen publications. He has five accepted processes and one patent. He is a life member of Bangladesh Chemical Society.

Md. Mahbubur Rahman

Office	Fibre & 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 Research Laboratory, Department of Chemistry, University of Dhaka. His research interest in cellulose chemistry, material chemistry and ionic liquids. He has authored or coauthored 11 publications and get 262 citation (h-index:5). He has three accepted process and a patent. He is a life member of BCS, BAAS, DUCAA and DUAA.

Shamima Akther Eti

Office	Fibre & Polymer Research Division	Blood group	**A+**
Position	Senior Scientific Officer	Degree obtained	MS (2003)
Contact	shaeti123@gmail.com	Mobile	01712181711

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 Laboratories, Dhaka, Bangladesh Council of Scientific & Industrial Research (BCSIR). Her research focus is in industrial waste management, waste water treatment & reuse. Now she is a life member of Dhaka University of Alumni Association & NITUB (Network of Instrument Technical personnel and User scientist of Bangladesh).

Dr. Mohammad Majedul Haque

Office	Fibre & Polymer Research Division	Blood group	**A+**
Position	Senior Scientific Officer	Degree obtained	PhD
Contact	majedulbcsir@gmail.com	Mobile	01914-113880

Dr. Mohammad Majedul Haque earned his both BSc and MSc degree in Chemistry from the National University. He obtained PhD in Chemistry from Jahangirnagar University, Bangladesh. His research is mainly focused on Phytochemistry. The research involved extraction, pharmacological assessment of crude extract, fingerprint analyses, isolation of compounds from bioactive extracts and characterization of pure compounds. He also works to develop value added products from biopolymers. He also interested in natural dyes, pigments and rubber research. He has authored or coauthored eleven publications. He has one accepted process.

Md. Khabir Uddin Sarker

Office	Fibre & 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 four publications. He has nine accepted processes and one patent. He is a life member of BAS and Bangladesh Chemical Society.

Muhammad Saiful Islam

Office	Plastic Technology Research Section, Fibre & Polymer Research Division	Blood group	**B+**
Position	Senior Scientific Officer	Degree obtained	MS
Contact	saifulacctdu@yahoo.com	Mobile	01721911715

Muhammad Saiful Islam has earned his both BSc and MS degree in Applied Chemistry and Chemical Engineering from the University of Dhaka. His research interests are in the field of plastic processing technology, plastic pollution including microplastics and plastic recycling. He has authored or coauthored 22 publications. Currently, he is in-charge of Plastic Technology Research Section and 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 another important focus of his present research. He is a proficient user of GC-MS, HS-GC-FID/ECD, HPLC, LC-MS/MS, FT-IR/Raman, TGA, DSC, Rheo/Micro-viscometer, Extruder and Zetasizer.

Zahidul Islam

Office	Fibre & Polymer Research Division	Blood group	**AB+**
Position	Scientific Officer	Degree obtained	MS (2010)
Contact	chemizahid@gmail.com	Mobile	01814930871

Zahidul Islam has achieved his both BSc and MS degree in Chemistry. His research interests are in the field of Thermoplastic and thermosetting resins, Plastic Technology, Microplastics and Biopolymer synthesis. He has coauthored 05 publications in various International Journals.

Riyadh Hossen Bhuiyan

Office	Fibre & Polymer Research Division	Blood group	**A+**
Position	Scientific Officer	Degree obtained	MS(2010)
Contact	riyadhbcsir@gmail.com	Mobile	01632072603

Lately Riyadh Hossen Bhuiyan has completed his both B.Sc (Hons) in chemistry and MS (Thesis) degree in In-organic Chemistry. He connected to synthesis of new Active Pharmaceutical Ingredient and drug formulation For Pharmaceutical Industry for one year. His research interests are in the field of lignin chemistry, Bituminous material, pulping industry and synthesis chemistry. He has co-authored 07 publications in various International Journals.

Md. Rashed Hasan

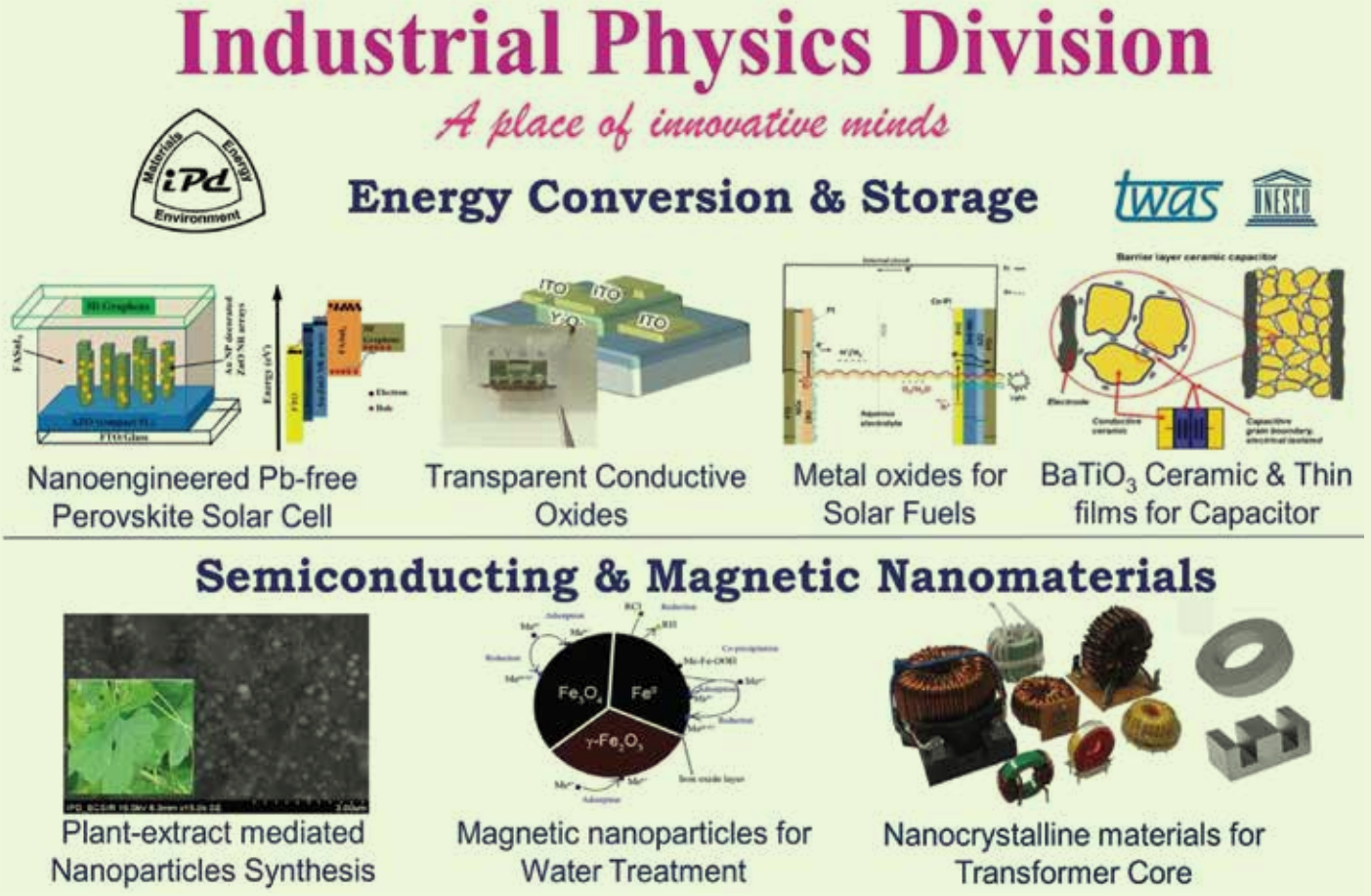
Office	Fibre & Polymer Research Division	Blood group	**O+**
Position	Scientific Officer	Degree obtained	MS
Contact	riyadhbcsir@gmail.com	Mobile	01816375618

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 Plastic Technology, Microplastics and Biopolymer synthesis. He contributes 04 publications to be a co-author

INDUSTRIAL PHYSICS DIVISION (IPD)

Scientists of IPD

Industrial Physics Division (IPD)



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 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.

Name of Scientists:

1. Suravi Islam, PSO
2. Dr. Syed Farid Uddin Farhad, PSO
3. Nazia Khatun, SSO

4. Mohammad Sajjad Hossain,SSO
5. Nazmul Islam Tanvir, RC
6. Md. Nur Amin Bitu, RC

Number of Scientists: 06
Total ongoing R & D: Four (04)
Analytical Services: 20

R&D Project:

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

Suravi Islam (PL), Dr. Syed Farid Uddin Farhad, Nazia Khatun, Mohammad Sajjad Hossain, Nazmul Islam Tanvir, Dr. Samia Tabassum, Monika Mahmud.

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:

- A set of Yttrium doped Barium Titanate(YBT) perovskite ceramics were synthesized by the 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.
- Another set of Bi and Al doped BaTiO3 have been synthesized by solid state ceramic method.
- Characterization and analysis of the samples are going on.
- A research paper is ready for publication.

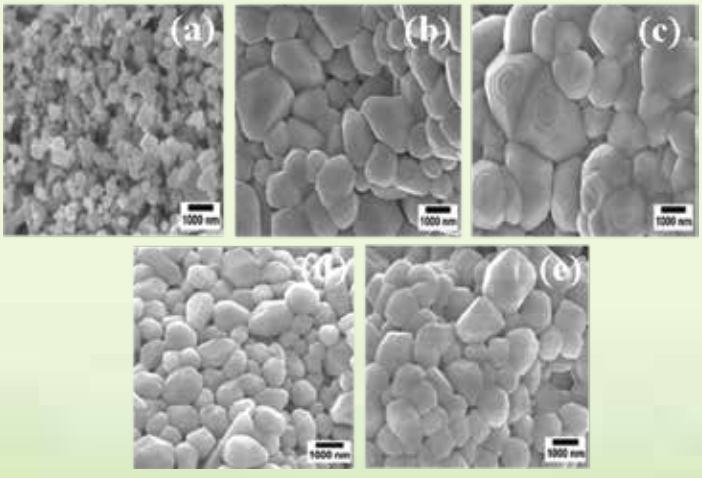


Figure: The surface morphology of YBT(where a,b,c,d,e is x=0.00,0.01,0.03,0.05 and 0.07 respectively

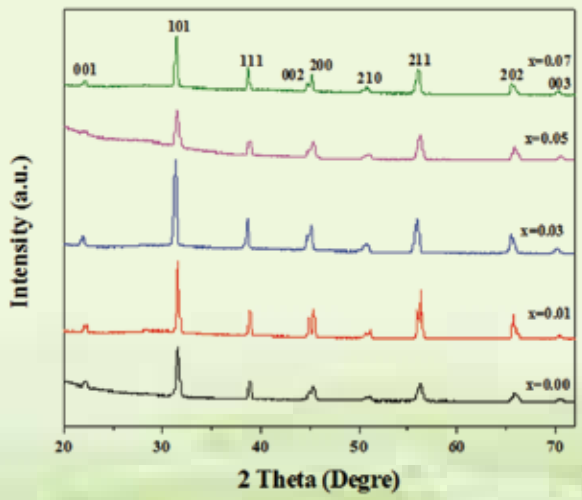


Figure: XRD patterns of Yttrium doped Barium Titanate samples

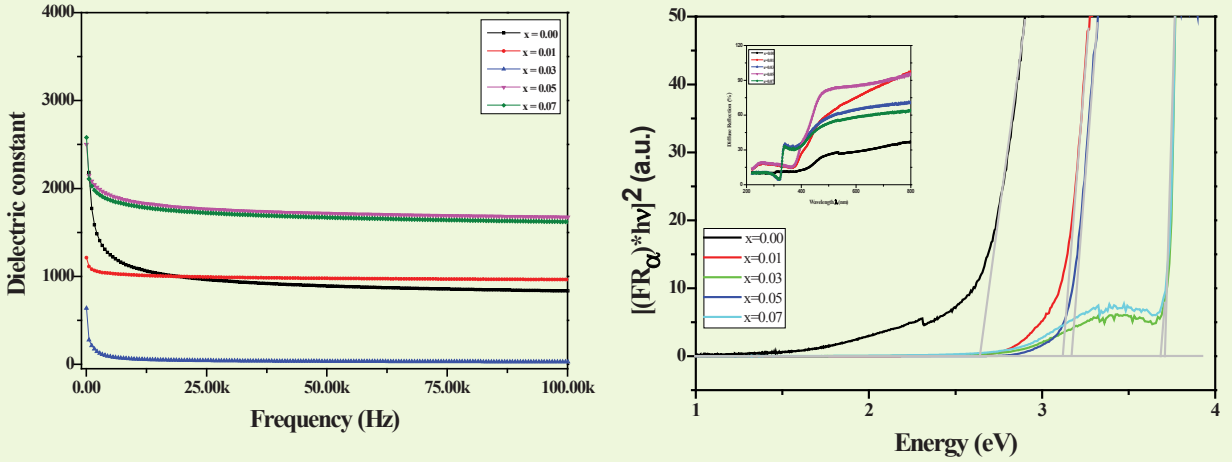


Figure: Electrical and Optical properties of Yttrium doped barium titanate

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, FTO, NiO and Graphene (reduced Graphene oxide (rGO)).
- Optimization of physical and chemical properties of synthesized TCS and study of their performance compared to the commercial TCS.

Work Progress:

Defect-free and well aligned ZnO Nanorods as well as Nanoparticles and Nanoseed layers have been synthesizes variety of deposition techniques and their physical properties have been judiciously optimized for integrating them into devices for example, Pb-free perovskite solar cells and Bismuth based photo electrochemical solar fuel devices. Some characterization results of the deposited products are shown in Figure 4.1 below.

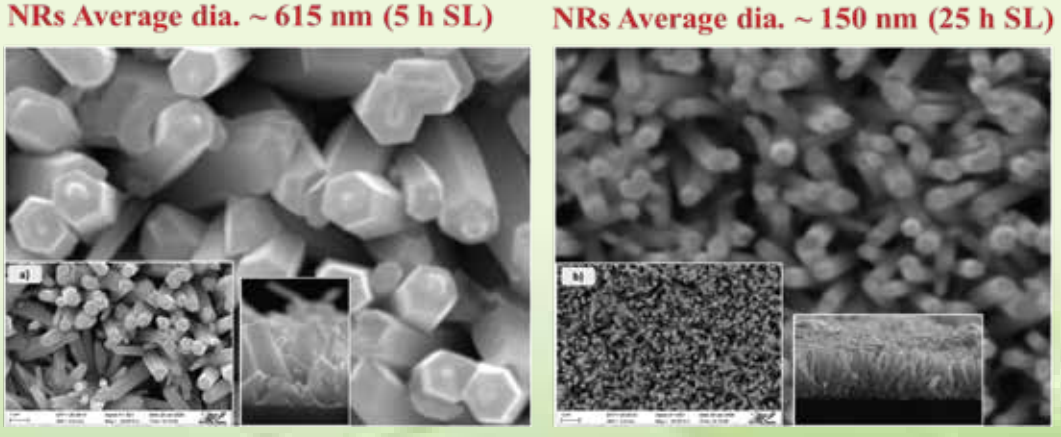


Figure: Plane and Cross-sectional view (inset) of Hydrothermally grown ZnO Nanorods on Ball Mill Derived (BMD) ZnO seed-layers with varying BM durations. Average grain size of BMD ZnO NPs are in the range of ~18 - 22 nm.

The surface nature of nanostructured ZnO electrodes could be controlled from super hydrophobic to super hydrophilic features (see figure 4.2) for diverse applications including wearable electronics.

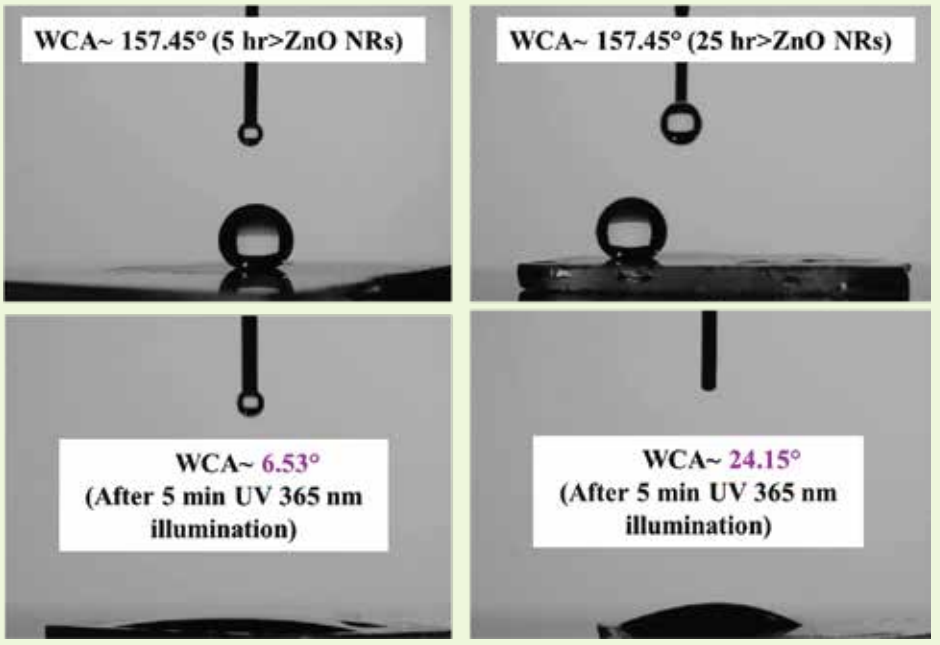


Figure: Average water contact angle (WCA) of ZnO NRs before (Top panels) after (bottom panels) short soaking with 365 nm (above the bandgap of ZnO) LED light illumination (~10 mW/cm^2).

Under the scope of this project three M.Sc. (thesis) students accomplished their research works. Further analyses of the characterization results of the deposited product are going on and at least two research publications are expected in the peer reviewed journals.

Future Plan:

FTO and NiO will be synthesized low-cost solution processable techniques and carbon based TCS materials will be characterized and optimized for potential device applications. The duration of this R&D project will end in December, 2021 and efforts will be made for extension of this project to accomplish desired targets.

4.5. Development of magnetic material for sensor.

Nazia Khatun (PL), Suravi Islam, Dr. Syed Farid Uddin Farhad and Dr. Most. Hosney Ara Begum.

Introduction:

The term ferrite is commonly used to describe a class of magnetic Oxide compounds that contain iron oxide as a principal compound. A large number of metal Oxides, mixed metal Oxides and ferrites have shown better sensitivity to certain gas and humidity. A great advantage of ferrites is their porosity, which is necessary for sensor. These pores serve as humidity or gass adsorption sites and the sensitivity of sensor depends on the size of these pores. Application of humidity sensors and its use in electronic industries is increasing in our country day by day. On the basis of analysis and results of the prepared samples, developed materials will be employed for practical use for humidity sensors.

Objective

- To synthesize magnetic material for humidity sensor application.
- To characterize the samples by XRD, FE-SEM , FTIR, UV-VIS-NIR spectroscopy, impedance analyzer and VSM to find optimum conditions in terms of performance.
- To study the physical, electrical dielectric properties and sensitivity of the samples.

Work Progress:

- $NiMgFe_2O_4$ ferrites have been synthesized with different composition through a conventional ceramic technique.
- Characterization of samples has been done by X-ray Diffraction (XRD), Fourier Transform infrared (FTIR), Field-Emission Scanning Electron Microscopy (FE-SEM), Energy- Dispersive X-Ray Spectroscopy (EDS), UV-VIS-NIR spectroscopy, impedance analyzer (with and without humidity environment) and vibrating sample magnetometer (VSM).
- Another two set of samples have been synthesized using sol-gel auto combustion method and characterization is going on.
- Two M.Sc student completed their thesis under this project.
- Two research publications are expected in the peer reviewed journals.

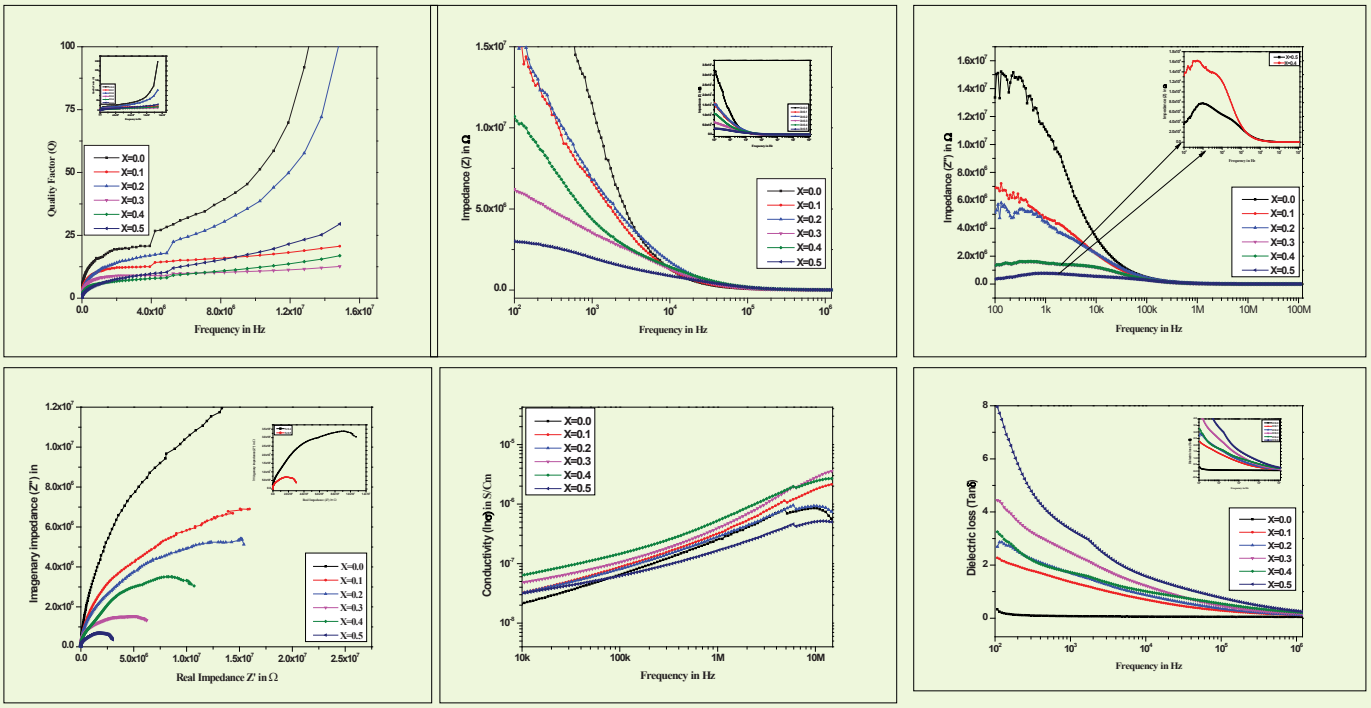


Figure: Quality factor (Q-value), Impedance (z), Imaginary impedance (Z''), Conductivity and Dielectric Loss as a function of frequency and real impedance versus imaginary impedance for $NiMgFe_2O_4$ ferrite .

Synthesis and property optimization of wide bandgap semiconducting materials through cost effective-ease technique.

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

Introduction:

The technology and understanding of films less than 1 micron thick have made tremendous advances in last 50 to 60 years, primarily because of industrial demand for reliable thin film microelectronics devices to fulfill the needs of the sputnik era. This progress has brought maturity and much scientific confidence in the use of thin films for basic and applied research. In addition to major contributions to a variety of new and future scientifically based technology, thin films studies have directly and indirectly advanced many new areas of research in solid state physics and chemistry which are based on phenomena uniquely characteristic of thickness, geometry and structure of films. The thin films have mechanical, electrical, magnetic and optical properties which may differ from those of the bulk material. ZnS thin films have been found useful in various devices.

Objective

- To develop pure and doped ZnS semiconductor materials using different simple techniques such as Electrode position (home-made), Spin coating and hydrothermal methods.
- Compare and contrast the as-made and annealed products synthesized by different techniques (one of the objectives is to assess the performance of our recently developed home-built deposition setups)
- Optimization of optical and electrical properties of synthesized ZnS thin film.

Work Progress

- ZnS thin film has been deposited on ITO with different applied potential (-1V, -2V, -3V and -4V) through electro-deposition technique.
- Characterization of samples has been done by SEM, XRD, and optical band gap analysis by UV-Vis spectrophotometer.
- One manuscript has been written for publication.

Achievements and Activities:

1) T.C. Paul, M.H. Babu, J. Podder, B.C. Dev, S.K. Sen, **Suravi Islam**, *"Influence of Fe^{3+}ions doping on TiO2thin films: Defect generation, d-d transition and band gap tuning for optoelectronic device applications",* Physica B: Physics of Condensed Matter (2020), doi: https:// doi.org/10.1016/j.physb. 2020.412618.

2) B.C. Gosh, S**.F.U. Farhad***, M.A.M Patwary, S. Majumder, M.A. Hossain, N.I. Tanvir *et al.*, "*Influence of substrate, process conditions, and post-annealing temperature on the properties of nanocrystalline ZnO thin films grown by the Successive Ionic Layer Adsorption and Reaction Method"* ACS Omega*,* Volume 6, Issue 4, 2665–2674, **2021**.

3) **S. F. U. Farhad**, "*The effect of substrate temperature and oxygen partial pressure on the properties of nanocrystalline copper oxide thin films grown by pulsed laser deposition"* Data in Brief*,* Volume 34,106644-106675*,* **2021**.

4) M.R. Islam, M. Saiduzzaman, S.S. Nishat, A. Kabir, and **S.F.U. Farhad**,*"Synthesis, characterization and visible light-responsive photocatalysis properties of Ce doped CuO nanoparticles: A combined experimental and DFT+U study"*Colloids and Surfaces A: Physicochemical and Engineering Aspects,Volume 617, 126386, **2021**.

5) A. Kowsar, S.C. Debnath, M.S. Islam, A.N. Bahar, and **S.F.U. Farhad**, "*Numerical Simulation of the High Efficiency Triple Junction Concentrator Photovoltaic Cells Using MSCS-1D*" IEEE Xplore, 0722-0725, **2021**.

6) M. Dey, N. K. Das, S.M. Dey, **S. F. U. Farhad**, A. Matin, and N. Amin, "*Impact of Source to Substrate Distance on the Properties of Thermally Evaporated CdS Film*" International Journal of Renewable Energy Research (Scopus); Volume 11, Issue 1, 495-503, **2021**.

6) M. Dey, N. K. Das, S.M. Dey, **S. F. U. Farhad**, A. Matin, and N. Amin, "*Impact of Source to Substrate Distance on the Properties of Thermally Evaporated CdS Film*" International Journal of Renewable Energy Research (Scopus); Volume 11, Issue 1, 495-503, **2021**.

7) S. Majumder, N.I. Tanvir, B.C. Gosh, S**.F.U. Farhad***et al.*, "*Optimization of the growth conditions of Cu_2O thin films and subsequent fabrication of Cu_2O/ZnO heterojunction by m-SILAR method"* IEEE Xplore, 139-142, **2020**.

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

Sl. No	Title of research	Research Category	Name of the Student	Name of the Institution	Name of Supervisors(Font 12)
1	Effect of sintering temperature on dielectric and optical properties of dodecylalky lammonium intercalated Montmorillonite Supported Ni-ferrite nanocomposite	M.Sc. (Thesis)	Farida Nasrin	Department of Physics, Jagannath University, Dhaka	Suravi Islam-PSO
2	Green synthesis of nanoparticles (Ag, Fe_3O_4) using Baccurea ramiflora and Calamus tenuis: Characterization & applications	M.Sc. (Thesis)	Rokeya Khatun	Department of Chemistry, Khulna University	Suravi Islam-PSO
3	Fabrication of dip-coated CuO and CuO-ZnO thin films for gas sensing applications	M.Phil.	Mr. A.M.M. Musa	Department of Physics/Natural Science, DUET/Uttara University	Dr. S.F.U. Farhad -PSO
4	Bismuth Based metal oxides for Solar Fuels: Experimental and DFT analysis	M.S. (Thesis)	Ms. Jannatul Fardush Tanha	Department of EEE, University of Dhaka	Dr. S.F.U. Farhad -PSO
5	Fabrication and Characterization of Cu_2O/ZnO heterojunction by m-SILAR method	M.S. (Thesis)	Mr. Bijoy Chandra Gosh	Department of Chemistry, Comilla University	Dr. S.F.U. Farhad -PSO
6	Yttrium and Lanthanum co-doped Cobalt ferrite nanoparticles: Structural, morphological, optical, magnetic and photo catalytic properties.	M.Sc. (Thesis)	Sajib Ahmed	Department of Applied Chemistry and Chemical Engineering, Noakhali Science and Technology University	Nazia Khatun-SSO
7	Lanthanum doped Zinc-Coblt ferrite nanoparticles: Structural, morphological, optical, magnetic and photo catalytic properties.	M.Sc. (Thesis)	Mohammed Osman Gani	Department of Applied Chemistry and Chemical Engineering, Noakhali Science and Technology University	Nazia Khatun-SSO

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

1. **Suravi Islam** (PSO), presented a poster presentation entitled "Effects of Yttrium doping on structural, electrical and optical properties of Barium Titanate ceramics" in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB 2021) Organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March 2021.
2. **Suravi Islam** (PSO), participated in a training on "সেবা সহজীকরণে সক্ষমতা বৃদ্ধি" বিষয়ক দুইদিন ব্যাপী প্রশিক্ষণ",29 -30 June, 2021, organized by Planning and Development (P&D) BCSIR.
3. **Suravi Islam** (PSO), participated in a training on, "Operating and maintenance of BET Sorptometer",10-14 January, 2021, Planning and Development (P&D) BCSIR.
4. **Suravi Islam** (PSO), participated in a training on, "Operating and maintenance of Wavelength Dispersive X-ray Fluorescence(WD-XRF)", 13-17 June, 2021, organized by P&D BCSIR.
5. **Suravi Islam** (PSO), participated in a training on, "Principle and application of UV-vis spectrometer", 23 June2021 organized by BCSIR Laboratories, Dhaka.
6. Dr. **S.F.U. Farhad** (PSO) presented an **Invited Talk** entitled "Semiconducting Metal Oxides for Solar Energy Conversion and Storage Devices", April 10, **2021** organized by "IEEE Electron Device Society (EDS)-BUET Student Chapter.
7. Dr. **S.F.U. Farhad** (PSO), resented an **Invited Talk** entitled "Ecofriendly Metal Oxide Semiconductors for Solar Energy Conversion and Storage", March 11-13 21, **2021** (Abstract Reference#IL-C01 page#107) in "International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021), .
8. N.K. Das, **S.F.U. Farhad**et al.presented a paper entitled "The Role of CdS:O/CdS Bilayer in the formation of CdS_{1-x}Tex Intermix Layer in CdTe Absorber", June 15-August 21, **2020** (Abstract Reference#788) accepted for presentation in "Chalcogenide PV Materials and Processing" session in the IEEE 47thVirtual Meeting (2020 IEEE PVSC-47).
9. **Nazia Khatun** (SSO), participated in International Conference On Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB 2021) Organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March 2021 and presented oral presentation entitled "Influence of $Y^{3+}$and La^{3+}on structural, optical, electrical and magnetic properties of Cobalt ferrites nanoparticle".
10. **Nazmul Islam Tanvir** (RC), participated in International Conference On Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB 2021) Organized by Bangladesh Council of Scientific and Industrial Research (BCSIR) , 11-13 March 2021 and presented a poster presentation entitled "Synthesis of ZnO Nanoparticles by High Energy Ball Milling Top-down technique for preferential c-Axis Oriented ZnO Nanorods by Hydrothermal Process".
11. **Nazia Khatun** (SSO), participated in a training on "Operating and Maintenance of Photoluminescence Spectrometer", 06-10 June 2021 organized by Planning and Development (P&D) BCSIR.
12. **Nazia Khatun** (SSO), participated in trainingon "Principle and Application of UV-VIS-NIR Spectrometer" 23 June 2021 organized by BCSIR Laboratories, Dhaka.
13. **Nazia Khatun** (SSO) **and Nazmul Islam Tanvir** (RC), participated in training on "Basic Principle, Application, Operation and Maintenance of HPLC", 26 January 2021 organized by BCSIR Laboratories, Dhaka.

14. **Nazmul Islam Tanvir** (RC), as a trainer conducting training on Raman Spectroscopy Data Analysis and Instrument Maintenance, 18-22 October 2020 organized by Planning and Development (P&D) BCSIR.
15. **Nazmul Islam Tanvir** (RC), as a trainer conducting training on "Operating and Maintenance of PhotoluminescenceSpectrometer", 06-10June 2021organized by Planning and Development (P&D) BCSIR.
16. **Nazmul Islam Tanvir** (RC), as a trainer conducting training on "Principle and Application of UV-VIS-NIR Spectrometer" , 23 June 2021 organized by BCSIR Laboratories, Dhaka.
17. **Nazmul Islam Tanvir** (RC), participated in a training on "Operating and Maintenance of Wavelength Dispersive X-ray Fluorescence (WD-XRF), 13-17 June 2021 organized by Planning and Development (P&D) BCSIR.
18. **Md. Nur Amin Bitu** (RC), participated in training on "Comprehensive Environmental Sampling Technique" , Dhaka, 22 June 2021 organized by BCSIR Laboratories.
19. **Md. Nur Amin Bitu** (RC), participated in training on "Principle and Application of UV-VIS-NIR Spectrometer" , 23 June 2021 organized by BCSIR Laboratories, Dhaka.

Award/Grants:

1. Dr. **S.F.U. Farhad** has been awarded a competitive **Royal Society of Chemistry (RSC), UK**Research Grant: Ref.# R20-3167 (GBP 4650.00) for the R&D project entitled "Facile Synthesis of Ecofriendly Perovskite Absorber Materials for Photovoltaic Applications", January, **2021.**

2. Dr. **S.F.U. Farhad** has been awarded a competitive Ministry of Science and Technology(MoST), Government of Bangladesh (GoB), **Special Allocation Project (SAP)** grants for the project entitled"Construction of Low-cost Equipment for Solar Energy Materials Synthesis and Characterization (EAS-400)" December, **2020**

3. Dr.**S.F.U. Farhad** has been awarded a prestigious **UNESCO/TWAS** Research Grants_Physics (Ref.# 20-143 RG/PHYS/AS_I (USD 15,900.00) for the R&D project entitled "Goldnanoparticle decorated ZnO Nanorod arrays for eco-friendly, highly efficient and stable perovskite solar cells" July, **2020**.

Number of Analytical (Ad-Hoc) Problem Solved:

Name of the Division	Routine type	Research Type	Total
Industrial Physics Division	20	60	80

Special Contribution to the Nations:

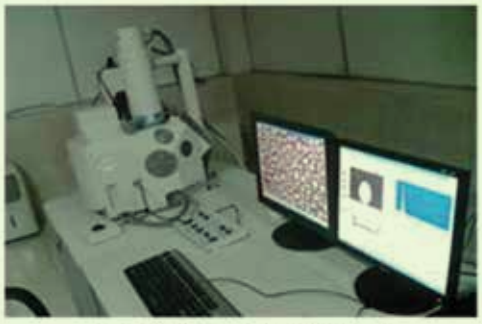
Apart from R&D works and analytical as well as technical supports to the diverse stakeholders, IPD scientists regularly visit local industries and arrange 'Stakeholder Meetings' for the following purposes:

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

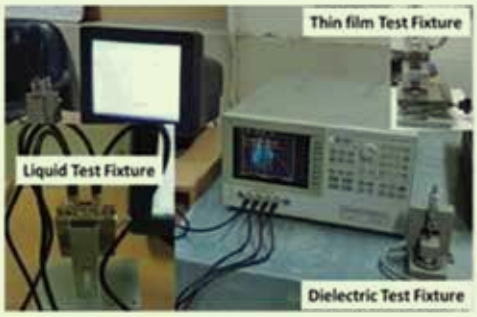
Saving Initiative" by switching off unnecessary lights, fans and unattended equipment etc. to minimize the energy burden in the national grid. To implement this idea and to achieve the project target there is a rewarding system called "Earth Champions" for the person who scores the highest (See the right picture at the bottom panel).

Major Instruments of Industrial Physics Division



SEM with Ultra-dry EDX

UV-VIS-NIR Spectrometer



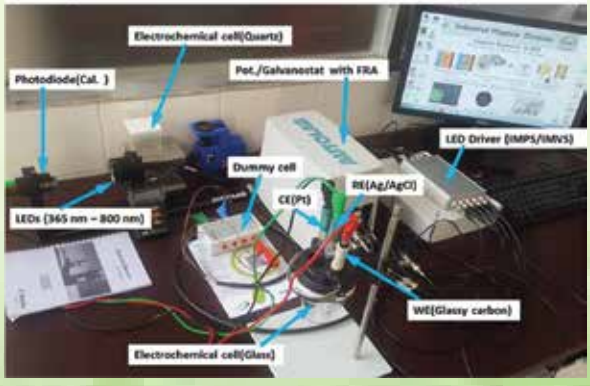
Precision Impedance Analyzer

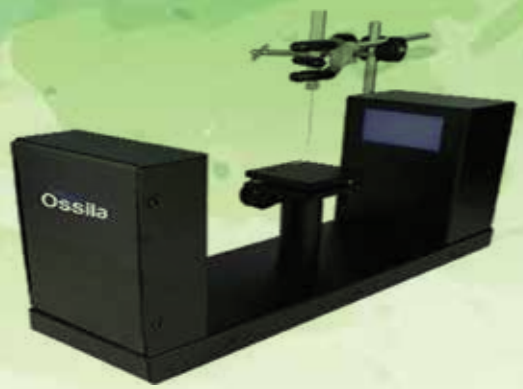
Source Measure Unit

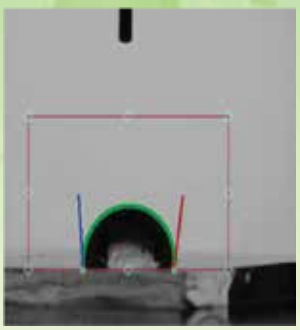
Tesla meter(0.1 µT – 29.99 T)(Left)
Magnetic Susceptibility Balance(Right)

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

(Photo)Electrochemical Workstation with FRA (10 µHz – 1 MHz)







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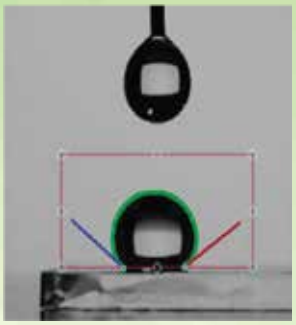

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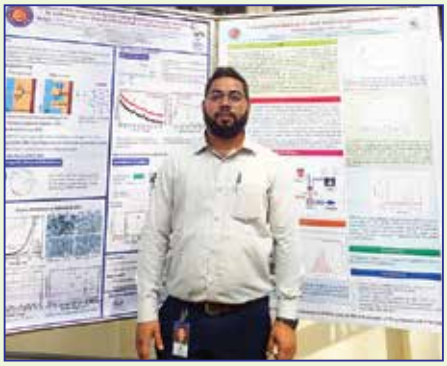


Short biography of IPD Scientists

Suravi Islam (June, 1998- present)

Office	Industrial Physics Division	Blood group	**B+**
Position	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 Masters 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 materials science. Her current research in focused on design. Synthesis and development of magnetic and dielectric materials for electrical and electronic devices. She has authored or coauthored twenty 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+**
Position	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 MS degree 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 35 publications and get 453 citation (h-index:12; i10-index: 14). 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+**
Position	Senior Scientific Officer	Degree obtained	M.Sc. (2005)
Contact	naziabcsir@gmail.com	Mobile	+88 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 design, synthesis and development of magnetic and dielectric material for electrical and electronic devices. She has authored or coauthored twenty two publications. She has one accepted process. She is a life member of BAS, BPS and BEA.

Nazmul Islam Tanvir (August, 2016- present)

Office	Industrial Physics Division	Blood group	**B+**
Position	Research Chemist (RC)	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 08 publications. He has one accepted process.

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

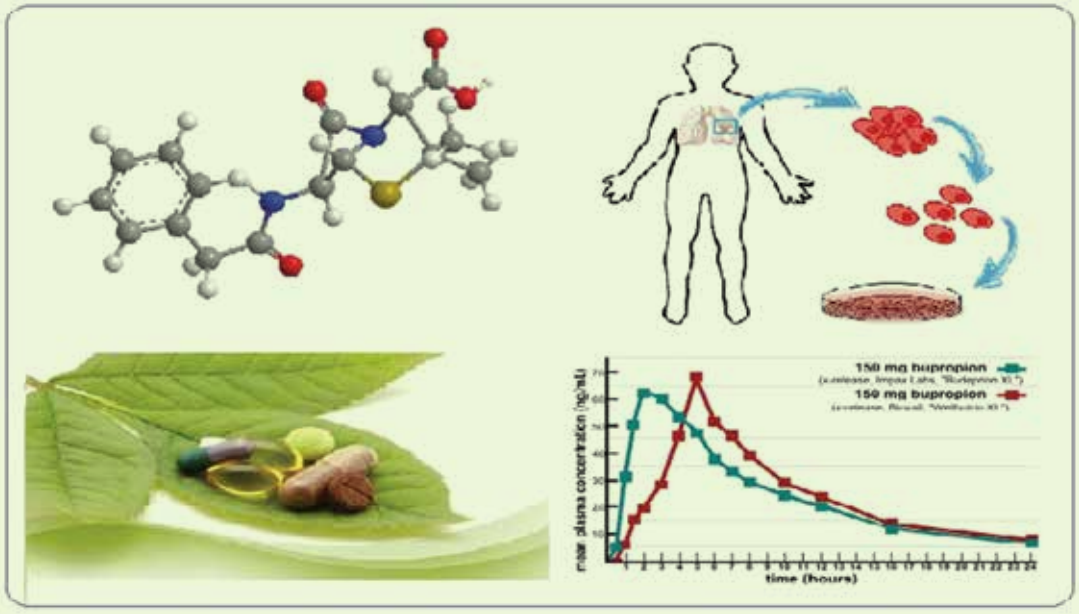
Office	Industrial Physics Division	Blood group	**B+**
Position	Research Chemist	Degree obtained	M.Sc. (Thesis) (2018)
Contact	E-mail: nabitu.ru@gmail.com	Mobile	+88 01732419987

Md. Nur Amin Bitu earned his both B.Sc. (Honors) and M.Sc. degree in Chemistry (Inorganic Chemistry) from the University of Rajshahi. His research is mainly focused on Green Chemistry, Coordination Chemistry, Solid State Chemistry, Electrochemistry, Optics, and Materials Science. He has authored or coauthored 21 publications in different reputed international journals.

PHARMACEUTICAL SCIENCES RESEARCH DIVISION (PSRD)

Scientists of PSRD

Pharmaceutical Sciences Research Division (PSRD)



As one of the highly developed economic sectors in Bangladesh, Pharmaceutical sector contributes significantly to the country's economy. Regardless of the developments, it still have foreign dependency for import of Active Pharmaceutical Ingredients (APIs) and excipients, lack of Bioequivalence facility and advance 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 pharmaceutical industries of Bangladesh. Currently Pharmaceutical Sciences Research Division has five research sections named;

i) Active Pharmaceutical Ingredients (APIs) and Pharmaceutical Excipients,
ii) Quality assurance of modern and herbal medicines
iii) Dosage form design
iv) Biopharmaceutics and
v) Drug Discovery and Bioassay.

10 (ten) scientists are working at Pharmaceutical Sciences Research Division 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.

Research and Development (R&D) Projects:

1. 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 pseudo typed SARS-CoV-2 virus like particle
- *In-vitro* neutralization Assay for confirmation of neutralizing antibody activity

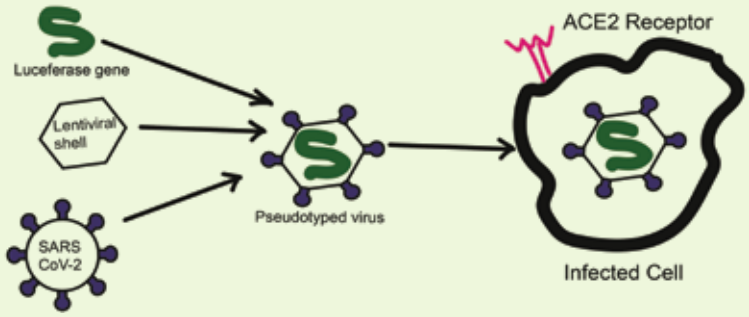


Figure: Virus Neutralization Assay

Work progress:

- Literature survey enrichment primer and reaction design are complete.
- Work redesigned to fit short budget
- Procurement of chemicals is completed; chemicals will be received once verification is done by the store.
- Project extension with two years' time and additional fund has been requested.

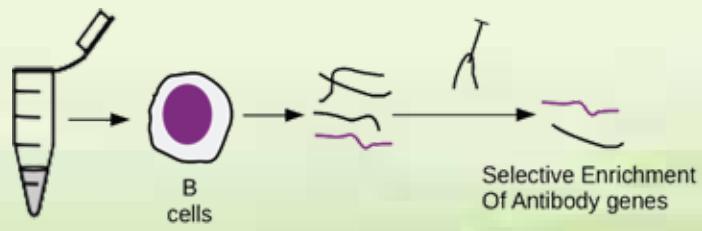


Figure: Antibody specific gene enrichment for sequencing

2. Isolation and characterization of anti-hemolytic and urease inhibitor from *Tarmarindus indica* and *Allium sativum* extracts

Md. Najem Uddin (PL), Dr. Farhana Afroz, Satyajit Roy Rony, Dr. A.D.A. Shahinuzzaman, Suriya Sharmin and Md. Ariful Haq

Introductions:

Currently, multi-drug resistance developed in bacterial pathogens is a common treatment failure in Bangladesh. Infections caused by pathogenic bacteria may lead to serious condition if the treatment is improper or impaired. The increasing evidence of antibiotic resistance in bacterial pathogens necessitates alternative therapy in restricting the antibiotic resistant infectious organisms. Therefore, researchers need to pay attention on the development of antibiotics against resistant pathogens and at the same time the management of resistant pathogens since broad spectrum antibiotics are extensively used in our country. In this regard we will investigate some of our indigenous medicinal plants *(Tamarindus indica, Emblica officinalis, Physalis minima, Asparagus racemosus, Urena lobata, Coccinia grandis, Azadirachta indica, Abroma augusta, Mimosa pudica, Aquilaria sinensis)* to find alternative new leads for drug development of infections caused by antibiotic resistant pathogenic bacteria.

Objectives:

- To find out leads to inhibit the growth of multi-antibiotic resistant Proteus isolates.
- To isolate anti-hemolytic drug for preventing Proteus toxin mediated hemolysis.
- To isolate Urease inhibitor to prevent Proteus induced urinary stones.

Work progress:

- Isolation and identification of Proteus isolates from UTI patients are done.
- Characterization of some pathogenic factor of isolated Proteus isolates are done.
- Antimicrobial susceptibility test against isolated Proteus isolates are done.
- In vitro and in vivo antihemolytic assay and Urease inhibitor activity assay using some traditional medicinal part will be done.
- Cold extraction of the processed plant samples to obtain crude extracts has been done.
- Isolation, purification, structure elucidation and characterization of compounds from crude extracts/fractions by chromatographic techniques will be done.

3. Isolation of bulk amount of active compounds from *Lawsonia alba* Lamk.

Shammi Akhter (PL), Dr. Md. Hossain Sohrab, Satyajit Roy Rony, Suriya Sharmin and Md. Ariful Haq

Introduction:

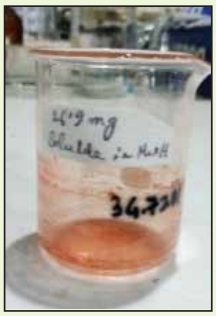
Plants synthesize numerous natural organic bioactive compounds having complex chemical structures. These plant-derived compounds play a crucial role in their ecological functions. Nature has been the origin of therapeutic mediators for thousands of years. There have been many spectacular amount of latest preparations have been white from natural deposit, several of those isolations were supported the uses of the agents in ancient medicines. *Lawsonia Alba* Lamk. (mehedi) is now deliberated as a appreciated source of inimitable natural products for development of medicines against uncountable diseases and also for the growth of industrial products.

Objectives:

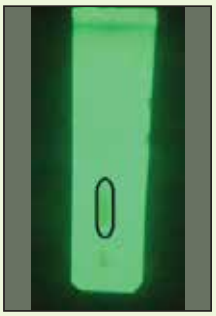
- To explore the possibility developing medicinal and cosmetic importance of henna plants as well as new process/product from it.
- To isolate selective compounds from *Lawsonia alba* Lam. which is responsible for natural color.
- Value addition of isolated active compounds (dye).

Work Progress:

- 01 Compound has been identified by NMR.
- Structure elucidation on going.
- Till now 5 compounds has been isolated from column chromatography. Further isolation is ongoing.
- A Different Extraction Methodology has been developed.
- One literature Review has been submitted.

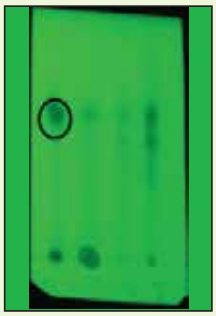


Isolated Compound



TLC screening of isolated compound

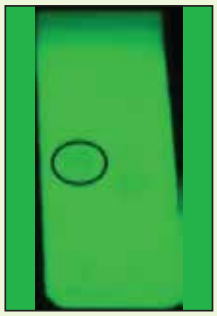
LA -41



254nm

LA 41(5)

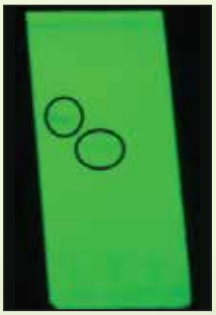
LA 40(l)



254 nm

LA 33 (i)

LA 33 (i)



254nm

Antibacterial activity against *S. typhi*

Antibacterial activity against *E. coli*

4. Development of dissolution, analytical and bioanalytical methods for estimation of Trimetazidine

Suriya Sharmin (PL), Fatema Moni, Satyajit Roy Rony, Dr. Farhana Afroz and Dr. Md. Hossain Sohrab

Introduction:

Analytical and bioanalytical method developemt goes hand in hand with the new and generic drug development process. Analytical methods should be developed for drug or drug combinations when not officially included in pharmacopoeias as drug or specific formulation, or when any change in the Analytical method. Bioanalytical method involves processing and analysis of biological matrix for a chemical compound or compounds that can be used in pharmacokinetic, drug interaction or bioequivalence studies. A discriminatory dissolution method characterizes tablets in presence of critical formulation factor to suggest bioavailability. Validation of these developed analytical methods will confirm that the procedure employed for a specific test is suitable for its intended use with satisfactorily reliable result.

Objectives:

- To develop and validate analytical methods for estimation of Trimetazidine hydrochloride.
- To develop and validate dissolution method of Trimetazidine hydrochloride MR tablets.
- To develop and validate bioanalytical method for estimation of Trimetazidine hydrochloride in blood sample for estimation of drug-drug interaction.

Work Progress:

- Degradation pattern of Trimetazidine in bulk and MR tablet dosage form has been observed.
- Dissolution method from Trimetazidine MR tablet has been developed and validated.
- Extraction methodology of Trimetazidine from human serum has been optimized

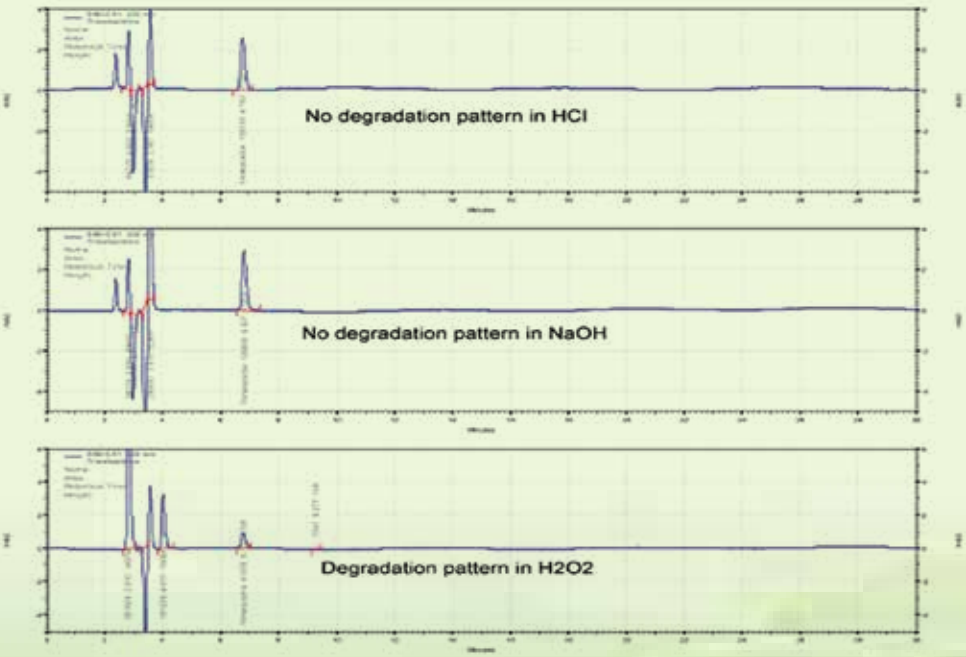


Fig: Stability indicating method of Trimetazidine analysis

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

Dr. Md. HossainSohrab (PL), Dr. Farhana Afroz, FatemaMoni, 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:

- 01 (one) compound having potential anticancer 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.

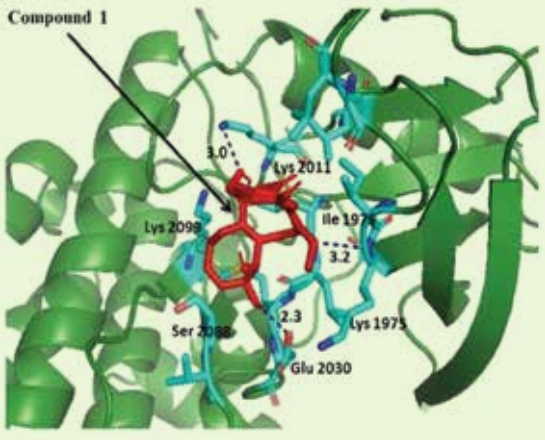


Fig. Visualisation of active site and ligand - receptor interaction of selected compound

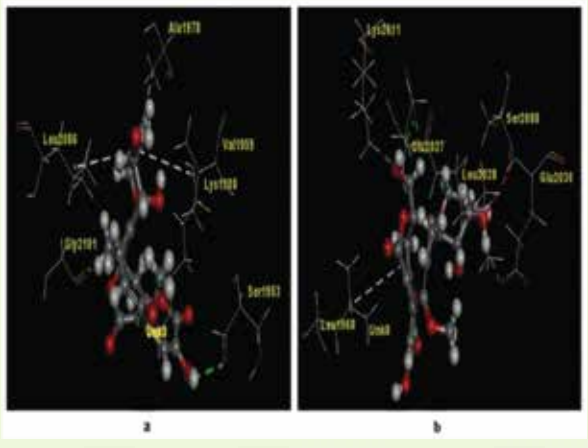


Fig: Non-bond interactions of selected compound with conforming presumed structures of ROS kinase

6. Bioassay screening of extracts, fractions and isolated metabolites obtained from natural sources.

Dr. Farhana Afroz (PL), Dr. Md. Hossain Sohrab, Satyajit Roy Rony, Suriya Sharmin and Mst. Nadira Begum.

Introduction:

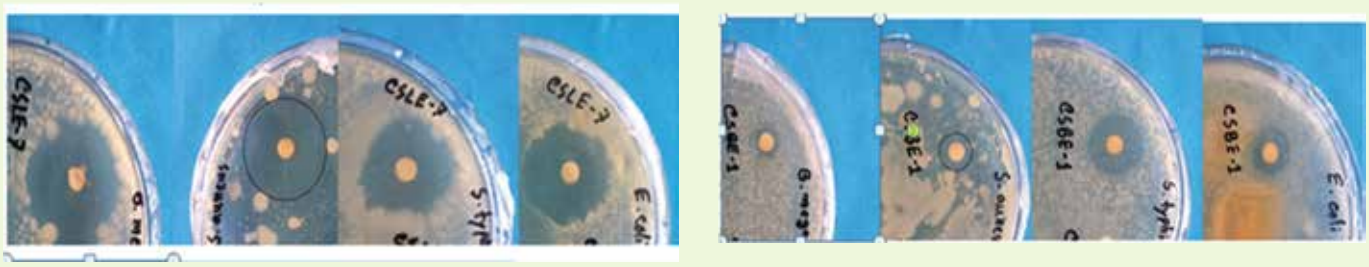
This project is an effort through a combination of basic and applied research to search anticancer/anti-inflammatory/ other bioactive compounds by performing different preliminary bioassays.

Objectives:

- Screening of anticancer/anti-inflammatory/other bioactivities of extracts, fractions and metabolites.
- To build knowledge and develop manpower capable to work in bioassay laboratory.

Work Progress:

- Anticancer activity of several isolated compounds and extracts of plant endophytic fungi have been screened on Vero and human Lung cancer cell line.
- Antimicrobial activities of different crude extracts, their column fractions and pure compounds were screened.
- Six (06) MS students from different universities have been successfully completed their MS research under this project.



CSLE-7 CSBE-1

Fig. Significant antimicrobial activity against different microbes.

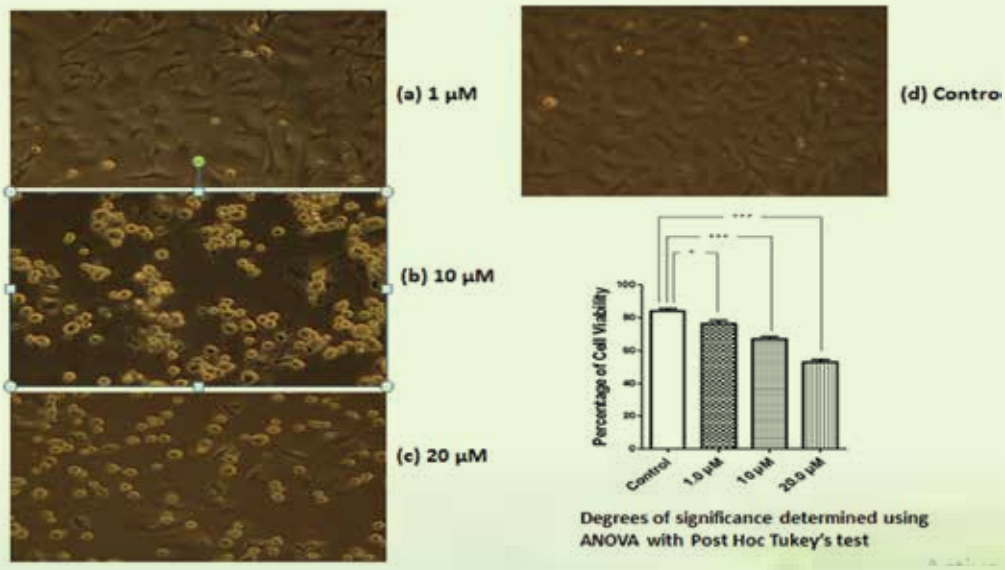


Fig: Microscopic images (20X) of Cytotoxic activity of the pure compound LE-7 (46) was determined on African Green Monkey Kidney cell (Vero cell) line at different concentration.

7. Isolation of bioactive metabolites from marine weeds and sponges as well as their associated symbiotic fungi.

Dr. Md. Hossain Sohrab (PL), Dr. Farhana Afroz, Satyajit Roy Rony, Fatema Moni and Mst. Nadira Begum.

Introduction:

Marine weeds are relatively unexplored but rich resources for bioactive compounds. For their survival in harsh environmental conditions they are producer of structurally unique secondary metabolites with diverse bioactivity.

Objectives:

- To explore the marine weeds and sponges as well as their associated symbiotic fungal extracts and screen them for bioassays.
- To purify crude extracts for isolation of active compounds.
- Total structure elucidation of the active compounds using NMR and MS.

Work Progress:

- 16 marine species have been collected.
- 21 Symbiotic fungi have been isolated and purified from 13marine species.
- Small scale cultivation of 21 fungi have been done on 03 media.
- 18 fungi have been identified morphologicaly and molecular identification of 10 fungi have been completed.
- Preliminary bioassay and chemical screening of 21 fungal extracts have been completed.
- Large scale cultivation of 04 fungus have been done.
- 07 compounds have been isolated of which 03 has been identified as new.

8. Identification, Optimization and characterization of different medicinal plant extracts by using statistical methods and technique with instrumental data.

Dr. Md. Anwar Hossain (PL), Dr. Md. Hossain Sohrab, Dr. Farhana Afroz, Satyajit Roy Rony, Shammi Akhter and Mst. Nadira Begum

Introduction:

Commercial production of drugs based on specific medicinal plants often suffers serious setbacks as certain plants grow in specific geographical locations. It is an established fact that geographical location, season, time of collection and age of the plants often affect the quality and quantity of active constituents of plants. That is why the quality of the supplied natural raw materials varies from time to time, place to place and sample to sample which in turn affect the quality and price of the drugs produced.

Objectives:

- To optimize the extraction parameters (temperature, period of soaking and solvent system) for the extraction of bioactive compounds from medicinal plants using response surface methodology.
- To evaluate the effects of these parameters on the total antioxidant, antimicrobial and cytotoxic properties using response surface methodology.

Work Progress:

- Few plants have been collected to extract metabolite.
- Extraction efficiency of metabolite from few samples has been investigated based on time, temperature and concentration.
- Total phenolic content, total flavonoid content and DPPH scavenging activity of few extracts has been investigated.

Special Allocation project

1. Bioassay guided isolation of secondary metabolites from medicinal plants and their associated endophytic fungi and value addition in isolated bioactive metabolites.

Dr. Md Hossain Sohrab (Principal Investigator), Dr. Farhana Afroz (Associate Investigator)

Introduction:

According to global snapshot of the cancer burden in 2012, Bangladesh is one of the vulnerable countries to increase cancer patient. The most prominent aetiological factors associated with hepatitis B and C viral infection, chronic alcohol consumption, aflatoxin-B1 contaminated food and all cirrhosis inducing conditions (Farazi and Depinho, 2006; Farazi et al., 2003; Thorgeirsson and Grishma, 2002). Many drugs have been examined to reduce cancer in experimental setups but few have been demonstrated evidence of clinical benefit. However, a small number of pharmacological agents are currently at the point of clinical application (Jaeschke and Woolbright, 2012; Selzner et al., 2003). The isolated bioactive molecules will be assessed for their safety and efficacy in cancer cell culture model to find out the suitable lead compounds for the preclinical and clinical study. Therefore, this project is an effort through a combination of basic and applied research to search biologically active anticancer/anti-inflammatory/other bioactive compounds and will perform the preliminary activities related to the drug discovery.

Objectives:

The main aim of this research project is to discover novel, potent and selective lead compounds with the potential to treat infectious diseases and cancers from medicinal plants and their associated endoiphytic fungi. The specific objectives of this project are:

- To work with extracts of medicinal plants and their associated endophytic fungi and screen them for antimicrobial and cytotoxic activity.
- To perform batch culture of novel strains of fungal endophytes and obtain extracts from the culture media and mycelia.
- To partially purify crude extracts before performing the bioassays to limit matrix interference in the bioassays and enhance purification when activity is detected.
- To employ antimicrobial, antioxidant and cytotoxicity assays to select extracts for further fractionation. Purification of active metabolites will be guided by assay data.
- To complete the total structure elucidation of the active compounds using NMR and MS spectrum.
- Value addition of the isolated compounds.

Work progress:

- Two medicinal plants namely *Aglaonema hookerianum* and *Nymphoides hydrophylla have* been collected.
- Endophytic fungus have been isolated from the collected plants.
- Extraction of Plant parts and isolated fungus have been completed.
- Bioactivity assay of plant extracts has been done.
- Compound isolation, structure elucidation from plant extracts have been done.
- Bioactivity assay of isolated compound are completed.

2. Bioanalytical method development and validation of some non-steroidal anti-inflammatory (NSAID) drugs.

Fatema Moni (Principal Investigator), Suriya Sharmin (Associate Investigator)

Introduction:

The analytical findings should be reliable and it is a matter of great importance in bioavailability and bioequivalence study, pharmacokinetic study as well as forensic and clinical toxicology, as it is of course a vital part for correct interpretation of analytical findings. Unreliable results may cause wrong treatment to the patient, can also lead to unjustified legal consequences for the defendant. So the necessity of validation of analytical method, at least routine analytical methods can therefore be hardly overestimated. Development and validation of fully characterized method is essential to yield reliable results that can be satisfactorily interpreted.

Objective:

- To develop and validate new, simple, accurate, reliable and accurate method to determine few common non-steroidal anti-inflammatory drugs marketed in Bangladesh into blood samples.

Work progress:

- Bioanalytical method for quantification of Aceclofenac in human serum has been developed and validated.
- Analytical method for quantification of Diclofenac has been developed.

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 of 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 market, reduce import dependency, develop export quality generic drugs and thus save foreign currency. People will be able to get safe, effective and quality medicine with affordable price in 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 market 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 partly completed.
- Manpower for development project has been completed.
- Construction of laboratory building under the project is completed and interior designing and utility work is ongoing.
- According to the guidance of regulatory bodies, procurement of consultant under the project has been completed.
- Overall progress of the ADP project up to the month of June, 2021 is 26.43%.

Achievements:

Research Papers:

1. Israt Farha Lini, Rabita Zinnurine, Md Habibur Rahman, Mst Nadira Begum, Farhana Afroz, Satyajit Roy Rony, Suriya Sharmin, Choudhury Mahmood Hasan, Md Hossain Sohrab. Bioactivity Screening and Identification of Secondary Metabolites from Fungal Endophytes of *Carica papaya* L. Leaves. Journal of Natural Remedies 20(4): 217, DOI:10.18311/jnr/2020/24110
2. SU Hannana, F Afroz, MN Begum, S Sharmin, F Moni, S Akhter, A Sarker, SR Rony, MH Sohrab. Bioactive potential of endophytic fungi isolated from *Phyllanthus niruri* L. Bangladesh Journal of Scientific and Industrial Research. 55(4), 311-318, 2020. DOI: https://doi.org/10.3329/bcsir.v55i4.50964
3. Nargis Sultana Chowdhury, Farhana Farjana, Md Hossain Sohrab. Isolation, Identification and Pharmacological Activities of Endophytic Fungi from *Aponogeton undulatus* Roxb. Pharmacology & Pharmacy, 2020, 11, 350-361. DOI: https://doi.org/10.4236/pp.2020.1112 028
4. S.M. Neaz Mahmud, Md. Hossain Sohrab, Mst. Nadira Begum, Satyajit Roy Rony, Suriya Sharmin, Fatema Moni, Shammi Akhter, Farhana Afroz. Cytotoxicity, antioxidant, antimicrobial studies and phytochemical screening of endophytic fungi isolated from *Justicia gendarussa*. Annals of Agricultural Science, Elsevier (ESCI & Scopus Index Journal), DOI: https://doi.org/10.1016/j.aoas.2020.12.003.
5. Tauhidur Rahman Nurunnabi, Sabiha Sarwar, Farah Sabrin, Farzana Alam, Lutfun Nahar, Hossain Sohrab, Satyajit D. Sarker, S. M. Mahbubur Rahman & Morsaline Billah. Molecular identification and antimicrobial activity of endophytic fungi isolated from *Heritiera fomes* (Buch. -Ham), a mangrove plant of the Sundarbans. *Beni-Suef University Journal of Basic and Applied Sciences (2020)9:61*, Springer, DOI: https://doi.org/10.1186/s43088-020-00081-9
6. Nazia Hoque, Md. Hossain Sohrab, Farhana Afroz, Satyajit Roy Rony, Suriya Sharmin, Fatema Moni, Choudhury Mahmood Hasan, Md. Sohel Rana. Cytotoxic metabolites from *Thysanolaena maxima* Roxb. available in Bangladesh. *Clinical Phytoscience (2020)6:89*, Springer, DOI: https://doi.org/10.1186/s40816-020-00226-4
7. Suriya Sharmin, Sohrab MH, Moni F, Afroz F, Rony SR, Akhter S. Simple RP-HPLC method for Aceclofenac quantitative analysis in pharmaceutical tablets. Pharmacia 67(4): 383-391, (Scopus and ESCI Index Q2 Journal),DOI: https://doi.org/10.3897/pharmacia.67.e57981

Book Chapter:

Jayanta K. Chakrabarty, Abu Hena Mostafa Kamal, **A. D. A. Shahinuzzaman,** Saiful M. Chowdhury, Proteomics Network Analysis of Polarized Macrophages, Immunometabolism: Methods and Protocols, Methods in Molecular Biology, Vol. 2184, pp 61-75, https://doi.org/10.1007/978-1-0716-0802-9_5.

Process Accepted:

Dr. Md. Hossain Sohrab, Mst. Nadira Begum, Satyajit Roy Rony, Suriya Sharmin, Fatema Moni, "A process for the production of bulk amount of Piperin as active pharmaceutical ingredients from Black Pepper and White Pepper" accepted by the office, Member Development, BCSIR, Dhaka. Ref No.: 39.02.0000.043.37.425.19/516 Date: 27.09.2020.

Industrial Tours/ Dissemination:

Name and Designation	Name of the Institute	Date
Satyajit Roy Rony, SSO Suriya Sharmin, SSO	M/S Amar Ponno, BD (Nagar Konda, Savar, Dhaka)	25.01. 2021

Guidance to research Work (PhD/M.Phil/M.S/NCST & BCSIR Fellow):

Sl. No	Title of research	Research Category	Name of the Student	Name of the Institution	Name of Supervisors in BCSIR
1	Search of growing organisms of *Curcuma longa.*	M. S. thesis is going on.	Iffat Jahan	Department of Pharmacy, University of Dhaka, Dhaka.	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
2	Biological and Chemical investigation of Endophytic fungi from *Moringa olifera* Lam.	M. S. thesis is going on.	Roksana Binta Kamal	Department of Biotechnolgy and Genetic Engineering, Jahangirnagar University, Savar, Dhaka.	Dr. Farhana Afroz, SSO, Pharmaceutical Sciences Research Division.
3	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, Pharmaceutical Sciences Research Division.
4	Bioactive metabolites from three medicinal plants and their associated endophytic fungi	M.Phil	Tahsina Nusrat	Department of Pharmacy, Jahangirnagar University, Savar, Dhaka.	Dr. Farhana Afroz, SSO, Pharmaceutical Sciences Research Division.

5	Search for Secondary Metabolites from the Plant of *Mesuanagassarium*and its associated endophytic fungi	M. S.	Shamima Sultana Rimu	Department of Pharmacy, Jahangirnagar University, Savar, Dhaka.	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
6	Isolation and Identification Of metabolites from the plant *Bauhinia acuminita* and its associated endophytic fungi	M. S.	Tasnim Hoque	Department of Pharmacy, Jahangirnagar University, Savar, Dhaka.	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
7	Isolation and screening of bioactive potentials of endophytic fungi associated with *Punica granatum* Linn	M. S. thesis is going on.	S.A.M. Salman Haque	Department of Mathematics and Natural Sciences, BRAC University, Dhaka.	Dr. Farhana Afroz, SSO, Pharmaceutical Sciences Research Division.
8	Isolation of secondary metabolites from endophytic fungi associated with *Psidium guajava* Linn	M. S. thesis is going on.	Faiza Jaima	Department of Mathematics and Natural Sciences, BRAC University, Dhaka.	Dr. Farhana Afroz, SSO, Pharmaceutical Sciences Research Division. University.
9	Identification of the drug like metabolites from marine endophytic fungi *Clonostachys rosea, Sclerotinia sclerotium* and *Fusarium solani*	M. S. thesis is going on.	Mst. Nilufa Yeasmin	Department of Fisheries, University of Dhaka.	Dr. Farhana Afroz, SSO, Pharmaceutical Sciences Research Division.
10	Effect of the Pumpkin seeds in the treatment of moderate to severe palmer arsenical Keratosis	M. S.	Dr. Roksana Khatun	Department of Pharmacology, BSMMU-Bangabandhu Sheikh Mujib Medical University, Dhaka.	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
11	Studies on antibacterial and cytotoxic metabolites from endophytic fungi	PhD is going on	Gazi Md. Monjur Murshid	Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Dhaka	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
12	Isolation and identification of secondary metabolites for endophytic fungi of *Camellia sinesis*	MSc	Md. Zahidul Hasan	Department of Biotechnology and Genetic Engineering, Jahangirnagar University.	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
13	Isolation and structure elucidation of secondary metabolites from two ethnopharmacologically important plants of Fabaceae family and their associated endophytic fungi	PhD is going on	Seagufta Afrin	Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Dhaka.	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.

14	Isolation, identification and bioscreening of endophytic fungi isolated from two mangrove plants *Ceriopsdecandra* and *Heritiera littoralis*	PhD is going on	Mita Munshi	Department of Biotechnology and Genetic Engineering, Jessore University of Science and Technology.	Dr. Farhana Afroz, SSO, Pharmaceutical Sciences Research Division.
15	Taxonomical identification of endophytic fungi from *Justicia gendarussa* Burf	MSc	S.M. Neaz Mahmud	Department of Biotechnology and Genetic Engineering, Mawlana Bhashani Science and Technology University.	Dr. Farhana Afroz, SSO, Pharmaceutical Sciences Research Division.
16	Bioanalytical method development and validation of Fexofenadine Hydrochloride and Losartan Potassium in human plasma	BCSIR Fellow	Farhana Afroz	Prof. Mofizuddin Ahmed Smrity Fellowship (BCSIR)	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
17	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, Pharmaceutical Sciences Research Division.
18	Role of natural antioxidants in high fat diet and adrenaline-induced cardiac hypertrophy	BCSIR Fellow	Kazi Jannatul Ferdous	Dr. Qudrat-I-Khuda Doctoral Fellowship (BCSIR)	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
19	Isolation of Bioactive metabolites from *Nymphoides hydrophylla* and its associated endophytic fungi	BCSIR Fellow	Zihan Rahman Khan	Prof. Mofizuddin Ahmed Smrity Fellowship (BCSIR)	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.
20	Isolation of bioactive compounds from *Commelina diffusa* and *Commelina benghalensis* and their associated endophytic fungi	BCSIR Fellow	Mahmuda Nasrin	Dr. Qudrat-I-Khuda Doctoral Fellowship (BCSIR)	Dr. Md. Hossain Sohrab, CSO, Pharmaceutical Sciences Research Division.

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

Training:

1. **Md. Najem Uddin (SO)** participated in training program on "BCSIR Service Rules 1989 & Government Pension Rules" held on 27 September, 2020 at BCSIR Laboratories Dhaka.
2. **Dr. ADA Shahinuzzaman (SSO)** participated in training program on "Operating and maintenance of Lquid Chromatography with tandem Mass Spectrometry (LC-MS-MS)" held on 04-08 October, 2020 at BCSIR Laboratories Dhaka.

3. **Satyajit Roy Rony (SSO)** participated in training program on "Public awareness training on fighting against pandemic situation" held on 20 October, 2020 at IFRD, BCSIR, Dhaka.
4. **Dr. ADA Shahinuzzaman (SSO)** participated in training program on "Public awareness training on fighting against pandemic situation" held on 20 October, 2020 at IFRD, BCSIR, Dhaka.
5. **Suriya Sharmin (SSO)** participated in training program on "Public awareness training on fighting against pandemic situation" held on 20 October, 2020 at IFRD, BCSIR, Dhaka.
6. **Shammi Akhter (SO)** participated in training program on "Public awareness training on fighting against pandemic situation" held on 20 October, 2020 at IFRD, BCSIR, Dhaka.
7. **Md. Najem Uddin (SO)** participated in training program on "Public awareness training on fighting against pandemic situation" held on 20 October, 2020 at IFRD, BCSIR, Dhaka.
8. **Md. Ariful Haq (SO)** participated in training program on "Public awareness training on fighting against pandemic situation" held on 20 October, 2020 at IFRD, BCSIR,Dhaka.
9. **Md. Najem Uddin (SO)** participated in training program on "Basic Principle application and operation & maintenance of TGA" held on 28 October, 2020 at BCSIR Laboratories Dhaka.
10. **Md. Ariful Haq (SO)** participated in training program on "Basic Principle application and operation & maintenance of TGA" held on 28 October, 2020 at BCSIR Laboratories Dhaka.
11. **Shammi Akhter (SO)** participated in training program on "Operating and maintenance of Atomic Absorption Spectrophotometer (AAS)" held on 01-05 November, 2020 at BCSIR Laboratories Dhaka.
12. **Dr. Farhana Afroz (SSO)** participated in training program on "Operating and maintenance of Nuclear Magnetic Resonance (NMR)" held on 15-19 November, 2020 at BCSIR Laboratories Dhaka.
13. **Suriya Sharmin (SSO)** participated in training program on "Operating and maintenance of Nuclear Magnetic Resonance (NMR)" held on 15-19November, 2020 at BCSIR Laboratories Dhaka.
14. **Dr. ADA Shahinuzzaman (SSO)** participated in training program on "Annual Budget Distribution according to PPR-2008 & Discussion on basic software tools (OriginLab & Turnitin)" held on 16 November, 2020 at BCSIR Laboratories Dhaka.
15. **Md. Najem Uddin (SO)** participated in training program on "Annual Budget Distribution according to PPR-2008 & Discussion on basic software tools (OriginLab & Turnitin)" held on 16 November, 2020 at BCSIR Laboratories Dhaka.
16. **Saima Mollick (SO)** participated in training program on "Operating and maintenance of High Performance Liquid Chromatography (HPLC)" held on 06-10 December, 2020 at BCSIR Laboratories Dhaka.
17. **Md. Najem Uddin (SO)** participated in training program on "Analytical method validation for quality in analytical laboratory" held on 31 December, 2020 at BCSIR Laboratories Dhaka.
18. **Satyajit Roy Rony (SSO)** participated in training program on "Operating and maintenance of Elemental Analyzer" held on 17-21January, 2021 at BCSIR Laboratories Dhaka.
19. **Saima Mollick (SO)** participated in training program on "Basic Principle, Applications, Operation and Maintenance of HPLC" held on 26 January, 2021 at BCSIR Laboratories Dhaka.
20. **Md. Najem Uddin (SO)** participated in training program on "Basic Principle, Applications, Operation and Maintenance of HPLC" held on 26 January, 2021 at BCSIR Laboratories Dhaka.

21. **Md. Ariful Haq (SO)** participated in training program on "Basic Principle, Applications, Operation and Maintenance of HPLC" held on 26 January, 2021 at BCSIR Laboratories Dhaka.
22. **Shammi Akhter (SO)** participated in training program on "Fiber Quality Analyzer (FQA)" held on 15 June, 2021 at BCSIR Laboratories Dhaka.
23. **Saima Mollick (SO)** participated in training program on "Fiber Quality Analyzer (FQA)" held on 15 June, 2021 at BCSIR Laboratories Dhaka.
24. **Md. Najem Uddin (SO**) participated in training program on "Fiber Quality Analyzer (FQA)" held on 15 June, 2021 at BCSIR Laboratories Dhaka.
25. **Md. Ariful Haq (SO)** participated in training program on "Fiber Quality Analyzer (FQA)" held on 15 June, 2021 at BCSIR Laboratories Dhaka.
26. **Shammi Akhter (SO)** participated in training program on "Comprehensive Environmental Sampling Technique" held on 22 June, 2021 at BCSIR Laboratories Dhaka.

Workshop:

1. Shammi Akhter (SO) participated in workshop program on "Innovation and Service Simplification" held on 14 October, 2020 at IFRD, BCSIR, Dhaka.

Conference:

1. **Dr. Md Hossain Sohrab (CSO),** participated International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu(ICSTB - 2021) on "Innovation for Tomorrow", held at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021, and presented an oral presentation as a Key Note speaker entitled "Endophytic fungi: A rich source of diversified bioactive natural compounds".
2. **Dr. Farhana Afroz (SSO),** participated ICSTB-2021on "Innovation for Tomorrow", held at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021, and presented an oral presentation entitled"Identification of a new antimicrobial agent from *Xylaria feejeensis* isolated from *Camellia sinensis"*.
3. **Satyajit roy Rony (SSO),** participated ICSTB-2021 on "Innovation for Tomorrow", held at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021, and presented an oral presentation entitled "Simple RP-HPLC method for estimation of trimetazidine in human serum".
4. **Fatema Moni (SSO),** participated ICSTB-2021 on "Innovation for Tomorrow", held at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021, and presented an oral presentation entitled "Comparison of extraction process of fexofenadine from serum sample".
5. **Shammi Akhter (SO),** participated ICSTB-2021 on "Innovation for Tomorrow", held at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021, and presented an oral presentation entitled "Chemical and biological investigation on *Randia dumetorum* (Monkaanta) and its associated endophytic fungi".

6. **Md. Najem Uddin (SO),** participated ICSTB-2021 on "Innovation for Tomorrow", held at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh 11-13 March, 2021, and presented an oral presentation entitled "New strategies for combating multidrug-resistant bacteria".
7. **Md. Ariful Haq (SO),** participated ICSTB-2021 on "Innovation for Tomorrow", held at Bangladesh Council of Scientific and Industrial Research (BCSIR), Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021, and presented an oral presentation entitled "Exploration of endophytic fungi and their bioactive potential from *Aquilaria sinensis* in Bangladesh".
8. Gazi Monjur murshid, **Md. Hossain Sohrab** and Md. Abdul Mazid: "Identification and bioactive potential of endophytic fungi isolated from the *plant Tinospora cordifolia",* in ICSTB - 2021, held at BCSIR, Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021. Abstract no. OP-B11, Page no. 158.
9. Farhana Afroz, Fatema Moni, Suriya Sharmin, Satyajit Roy Rony, ADA Shahinuzzaman, Shammi Akhter and **Md. Hossain Sohrab**: "Method development and validation in different solvent medium for quantification of trimetazidine by UV-Vis spectroscopy", in ICSTB - 2021, held at BCSIR, Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021. Abstract no. OP-E08, Page no. 170.
10. Nilufa Yeasmin, **Md. Hossain Sohrab,** Shammi Akhter, Habiba Mushfeka, Satyajit Roy Rony, Suriya Sharmin, Fatema Moni, Md. Monirul Islam and Farhana Afroz: "Isolation and Identification of bioactive metabolites from sea-weed associated fungi from the Bay of Bengal", in ICSTB - 2021, held at BCSIR, Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021. Abstract no. OP-D17, Page no. 221.
11. Mita Munshi, Farhana Afroz, **Md. Hossain Sohrab,** ADA Shahinuzzaman, Shammi Akhter, Nadira Begum, Md. Nazmul Hasan: "Molecular Identification of endophytic fungi isolated from *Citrus macroptera* barks and leaves from Sreemangal, Sylhet, Bangladesh", in ICSTB - 2021, held at BCSIR, Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021. Abstract no. OP-D19, Page no. 274.
12. Rabita Zinnurine, Farhana Afroz, ADA Shahinuzzaman and **Md. Hossain Sohrab**: "Morphological and molecular Identification of biologically active endophytic fungi isolated from elephant plant *Dillenia Indica",* in ICSTB - 2021, held at BCSIR, Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021. Abstract no. OP-D22, Page no. 275
13. Kazi Jannatul Ferdous, Farhana Afroz, Md. Rakibul Hasan, Suriya Sharmin and **Md. Hossain Sohrab:** "Bioactivity of endophytic fungi isolated from the plant *Zingiber officinal* Rosc.", in ICSTB - 2021, held at BCSIR, Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021. Abstract no. OP-B25, Page no. 315
14. Zihan Rahman Khan, Farhana Afroz, Satyajit Roy Rony, Mst. Nadira Begum, Md. Rakibul Islam and **Md. Hossain Sohrab**: "Morphological and molecular Identification of bioactive endophytic fungi isolated from the aquatic plant *Nymphoides hydrophylla",* ICSTB - 2021, held at BCSIR, Dr. Qudrat-I-Khuda Road, Dhanmondi, Dhaka-1205, Bangladesh, 11-13 March, 2021. Abstract no. OP-B34, Page no. 358

Number of Analytical (Ad-Hoc) Problem Solved:

Name of division	Routine type	Research type	Total
Pharmaceutical Sciences Research Division	63	-	63

List of Pictures:

Fig.: Scientists working at Pharmaceutical Sciences Research Division.

Figure: Fruit flavored salt for gastric comfort

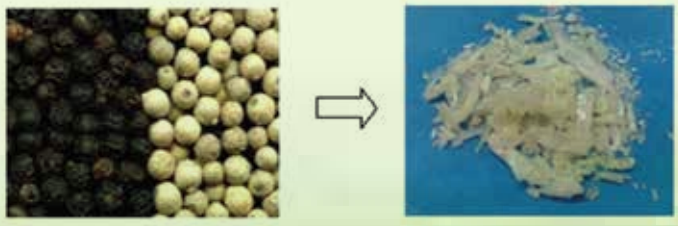


Figure: Pure Piperine as Active Pharmaceutical Ingredient (API) from Black Pepper and White Pepper

Short biography of PSRD Scientists

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

Office	Pharmaceutical Sciences Research Division	Blood group	**O+**
Position	Chief Scientific Officer	Degree obtained	Ph.D (2009-2010)
Contact	mhsohrab@yahoo.com	Mobile	+88-01720121525

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 94 publications and get 762 citation (h-index: 15). He has one accepted patent and one accepted process.

Dr. Farhana Afroz (July, 2006- present)

Office	Pharmaceutical Sciences Research Division	Blood group	**O+**
Position	Senior Scientific Officer	PhD (2010)	Ph.D (2016)
Contact	farhana@bcsir.gov.bd	Mobile	+8801711506403

Dr. Farhana Afroz has been working as Senior Scientific Officer at Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. She has been awarded International Postgraduate Research Scholarship (IPRS) in 2011 and completed her PhD degree in Medical Biochemistry from Flinders University, Australia. Her thesis title was "Regulation of antioxidant enzyme and bile acid transporter gene expression by rapamycin and oltipraz in liver". Her research focus is mainly on New Drug Development from natural sources, Regulation of Gene Expression and Cell Signaling, Bioanalytical Method Development, Proteomics and Metabolomics. She is author or coauthor of more than 25 publications. She is member of Australian Society for Medical Research (ASMR), Association of Plant Tissue Culture and Biotechnology, Bangladesh.

Satyajit Roy Rony (June, 2011- present)

Office	Pharmaceutical Sciences Research Division	Blood group	**B+**
Position	Senior Scientific Officer	Degree obtained	M. Pharm.
Contact	satyajit_pharm@yahoo.com	Mobile	01717257981

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 25 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+**
Position	Senior Scientific Officer	Degree obtained	Ph.D (2019)
Contact	shahinbcsir@gmail.com	Mobile	+880-1308637064

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, as a project leader, I am working towards characterizing the natural neutralizing antibodies produced against SARS-CoV-2 infection using proteo-genomics approaches. Additionally, as a team, we are exploring the endogenous endophytic fungi for their natural products' characterization. Our team is also establishing Bangladesh's first independent bio-equivalence study centre to support clinical trials of generic medicines and new drug leads.

Suriya Sharmin (February 03, 2013- present)

Office	Pharmaceutical Sciences Research Division	Blood group	**O+**
Position	Senior Scientific Officer	Degree obtained	M Pharm (2010)
Contact	sharmin041@yahoo.com	Mobile	01717035571

Suriya Sharmin received M. Pharm and B. Pharm degree in Pharmacy from the University of Dhaka. Her research interest is mainly focused on developing new drug candidates using chemical biology, medicinal chemistry and analytical tools. She authored or coauthored more than 15 publications. She also has two accepted processes. Ms. Suriya has presented her research on several international conferences.

Fatema Moni (July, 2015- present)

Office	Pharmaceutical Sciences Research Division	Blood group	**B+**
Position	Senior Scientific Officer	Degree obtained	M Pharm (2010)
Contact	moni.fatema@yahoo.com	Mobile	01816619127

Fatema Moni is working as a Senior Scientific Officer at Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. She has completed both B. Pharm. and M. Pharm. in Pharmacy from the University of Dhaka. Her research focus is mainly on the development of analytical and bioanalytical method of pharmaceutical product. She is also involved in the research area of isolation, characterization and bioactivity assessment of compounds isolated from natural sources. She has authored or coauthored 10 publications and get 57 citation (h-index: 3). She has one accepted process. She is a member of Bangladesh Pharmaceutical Society.

Shammi Akhter (March, 2016- present)

Office	Pharmaceutical Sciences Research Division	Blood group	**B+**
Position	Scientific Officer	Degree obtained	MS in Pharmaceutical Technology
Contact	shammiakhter74@gmail.com	Mobile	01676454575

Shammi Akhter is working as a Scientific Officer in Pharmaceutical Sciences Research Division, which is a division in BCSIR laboratories, Dhaka. Shammi Akhter 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 a Scientific Officer (Additional Charge) in the Annual Development Programme (ADP) of Government of Bangladesh named 'Instititute of bioequivalance studies and pharmaceutical sciences'. She has authored or co-authored 05 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+**
Position	Scientific Officer	Degree obtained	M. Pharm.
Contact	rsaimamollick@gmail.com	Mobile	01824626465

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 ClinicalPharmacy 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 ofBangladesh Pharmaceutical Society.

Md. Najem Uddin (October, 2018- present)

Office	Pharmaceutical Sciences Research Division	Blood group	**AB+**
Position	Scientific Officer	Degree obtained	M. Pharm. (2015)
Contact	najem.ru@gmail.com	Mobile	01737269296

Md. Najem Uddin is working as a Scientific Officer at Pharmaceutical Sciences Research Division, BCSIR Laboratories, Dhaka. He has completed both B. Pharm. and M. Pharm. degree from the University of Rajshahi. His research focus is mainly on Phyto-Pharmacology, Microbiology, 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+**
Position	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. 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.

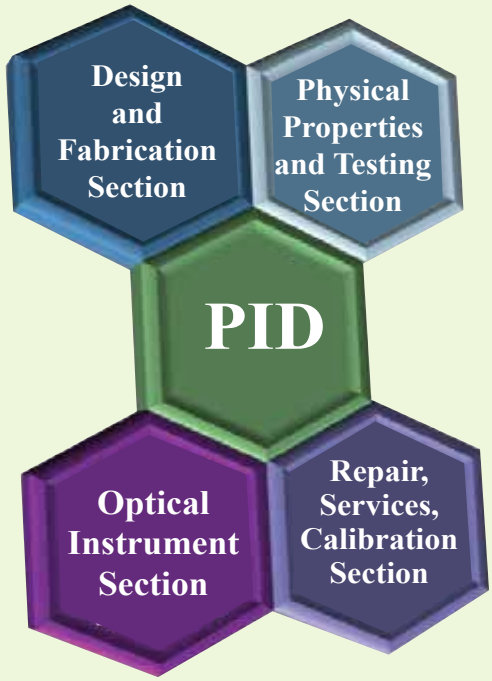
PHYSICAL INSTRUMENTATION DIVISION (PID)

Scientists of PID

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 instrument.
c. Conducting software development and other innovative activities in the field of information technology.
d. Provide computer training (software and hardware).



At present, three (03) Scientists/Engineers are working in this Division.

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

R&D Project:

1. Development of a multi agent based control system for fire disaster management.

Khaledun Nahar Babi (PL), Md. Sadequl Islam, Md. Saidul Islam, Md. Abu Kowsar, Md. Forhad Hossain, Mst Kamrun Nahar and Dr. Samina Ahmed.

Introduction: Multi agent based control system combined with automatic fire detection, an emergency response and evacuation plan can significantly reduce property damage, personal injuries and loss of life from fire.

Objective:

- To design and develop an effective multi-agent based conceptual prototype model for disaster management caused by fire spread.
- To develop a system for automatic control of firefighting equipment.
- To develop an agent based user interface for fire management.

Work Progress:

- Data collection and gathering information is completed.
- Analyzing the collected data is completed.
- Algorithm Design, Simulation and Modeling are completed.
- Report writing is going on.

Other Activities: Repairing, Servicing, Maintenance, Calibration and Installation of scientific/ laboratory equipment:

During the period from 1st July, 2020 to 30th June, 2021 services were provided to 75 Laboratory/Scientific Instruments (such as: Computer CPU, Printer, UPS (Online & Offline), Monitor etc.)

Achievements and Activities:

Published Paper:

1. Abu Kowsar, Syed Nazmus Sakib, Masum Billah, Sujoy Dey, **Khaledun Nahar Babi,** Ali Newaz Bahar, Syed Farid Uddin Farhad, "A Novel Simulator of Multijunction Solar Cells -MSCS-1D", *International Journal Of Renewable Energy Research,* Vol.10, No.3, September, 2020.

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

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

Guidance to research Work (PhD/MPhil/M.S/NCST & BCSIR Fellow):

Sl. No	Title of research	Research Category	Name of the Research Fellow	Name of the Institution/Division	Name of Supervisor
01	Analysis and simulation modeling of a multi agent based fire management system.	BCSIR Fellow, Professor Mofiz Uddin Ahmed Sriti Fellowship	Sumaiya Afroze	Physical Instrumentation Division, BCSIR Laboratories, Dhaka	Khaledun Nahar Babi (SSO)

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

1) **Khaledun Nahar Babi (SSO)** participated in the "International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021)" organized by BCSIR, Bangladesh, 11 March – 13 March, **2021** and presented the paper titled "Smart control and monitoring system for electrical appliances based on Internet of Things (IoT)".

2) **Md. Sadequl Islam (Maintenance Engineer)** participated in a training program on "Comprehensive Environmental Sampling Technique" organized by BCSIR Laboratories Dhaka, BCSIR, 22 June, **2021.**

3) **Md. Sadequl Islam (Maintenance Engineer)** participated in a training program on "Fiber Quality Analyzer (FQA)" organized by BCSIR Laboratories Dhaka, BCSIR, 15 June, **2021.**

4) **Md. Sadequl Islam (Maintenance Engineer)** participated in a training program on "Basic Principle applications, operation & maintenance of TGA"organized by BCSIR Laboratories Dhaka, BCSIR, 28 October, **2020.**

5) **Md. Sadequl Islam (Maintenance Engineer)** participated in a training program on "BCSIR Service Rules 1989 & Government Pension Rules" organized by BCSIR Laboratories Dhaka, BCSIR, 27 September, **2020.**

6) **Taijul Islam (Junior Experimental Officer)** participated in a training program on "সুশাসন সুসংহতকরণ ও অফিস ব্যবস্থাপনা" organized by BCSIR, 22-26 November, **2020.**

Short biography of PID Scientists

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

Office	Physical Instrumentation Division	Blood group	**B+**
Position	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 18 publications in international Journal and 34 conference proceedings. He got 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+**
Position	Senior Scientific Officer	Degree obtained	MSc (2012)
Contact	khaledunnahar@yahoo.com	Mobile	01816218248

Khaledun Nahar Babi is pursuing M.Phil course in Department of Computer Science and Engineering, Jahangir Nagar University, Bangladesh, under supervision of Professor Dr. Israt Jahan and Professor Dr. Md. Zahidur Rahman (joint-supervisor) in the field of Natural Disaster Management based on Agent Based Modeling and Simulation. She has authored or coauthored 4 publications in international Journal and 4 conference proceedings. She is a life member of NITUB, BPS and 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+**
Position	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), Agaorgoan Dhaka Bangladesh. Field of interest electronic control system.

PULP & PAPER RESEARCH DIVISION (PPRD)

Scientists of PPRD

Pulp & Paper Research Division (PPRD)

Pulp and Paper Research Division (PPRD) is dealing with wood biomass and its conversion into pulp, paper and biobased products. Being a pioneering research division of BCSIR Laboratories Dhaka, PPRD, it plays a vital role in the lignocellulosic material based research and development. Many efforts have been takes over the past decades to find out high yield biomass for pulp production and suitable alternative pulping process for nonwoods. This research division is mandated to develop technology by using locally available bio-resources in producing pulp, paper and bio chemicals. Scientists of this division are working on lignocellulosic products. Five scientists including one Principle Scientific Officer, one Senior Scientific Officer, two Scientific Officers and one Research Chemist of this division are giving full effort in reducing greenhouse gas emission through the development of biobased products, and green pulping process for non-wood agricultural residues as well. Moreover, PPRD is developing human resources through supervising PhD and MS students of different universities of Bangladesh.

Fields of Research

R&D Projects:

1) A low temperature fractionation of agricultural residue with zero emission

Dr. Md. Sarwar Jahan, Director (PL), Ariful Hai Quderi, PSO, Dr. Md. Mostafizur Rahman, SSO, Jannatun Nayeem, SSO, Razia Sultana Popy, SO, Md Moniruzzaman, PSO, Badhon Saha, SSO, Nur Hossain, SSO, IFST, Aminul Ahshan, PSO, INARS, Ohidul Akbar, SSO INARS

Introduction:

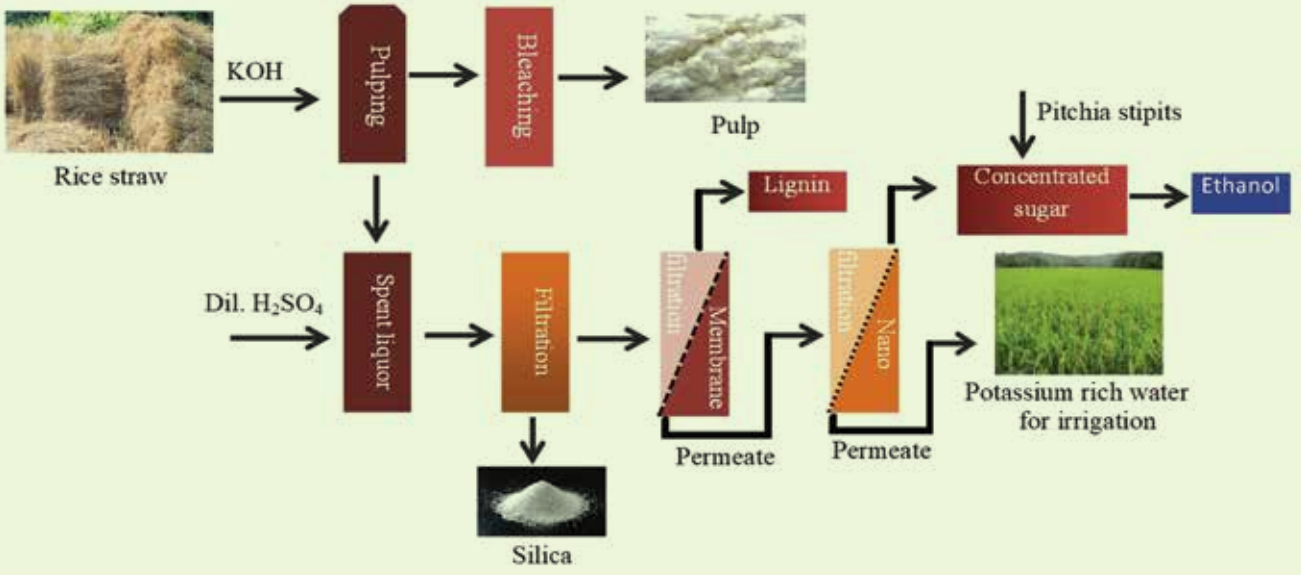
Pulping of agricultural wastes in conventional process is not technically and environmentally friendly due to high content of silica and fines, which creates problem in chemical recovery and pulp processing. Pulping pre-extraction was carried out with KOH followed by KOH pulping and bleaching by DED. Silica was separated from the pre pulping extraction and pulping liquor. After silica extraction liquor was utilized in soil amendment.

Objective:

- To optimize KOH pulping of non-woods by varying active alkali charge and time at boiling temperature.
- To bleach KOH pulp by D_0EpD_1 bleaching sequences.
- To evaluate papermaking properties of produced pulp.
- To amend soil by KOH liquor.

Work progress:

- In the delignification of rice straw with KOH under optimum conditions was performed.
- KOH rice straw pulp was bleached with $D_0(Ep)D_1$ bleaching sequence
- Papermaking properties of the pulp was performed.
- The KOH spent liquor, which contains silica and dissolved organics, was further investigated for value-added utilization.



Flow diagram

2) Development of rayon grade pulp from mixture of jute stick and jute fiber

Dr. M. Mostafizur Rahman, SSO (PL), Dr. M Sawar Jahan, Director, Dr. Md. Nashir Uddin, PSO, Jannatun Nayeem, SSO, Kazi Md. YasinArafat, SO, Razia Sultana Popy, SO

Introduction

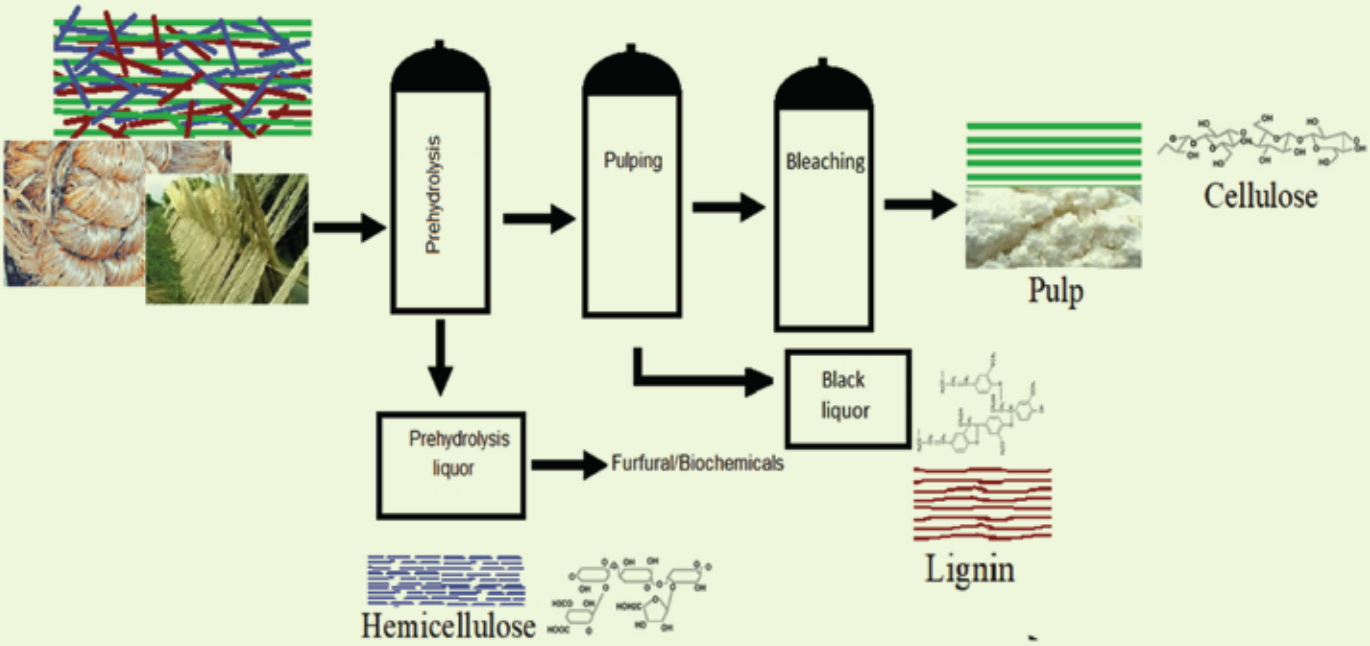
Chemical and morphological characteristics of jute is suitable to be used as raw material for producing dissolving pulp for rayon production. Textile industries in our country uses huge amount of rayon which is totally imported. Although dissolving pulp production from jute fiber is technically feasible, difficulty arises during rayon production. In the xanthation process, many particles remain unreacted. However, blending at least 60% hardwood pulp with jute dissolving pulp to overcome the difficulties. Jute stick has short length fiber which is similar to hardwood, so dissolving pulp from the mixture of jute fiber and jute stick may not affect in the rayon production process. Since the price of jute stick is much lower than that of jute fiber, consequently the production cost of the rayon will be competitive.

Objectives:

The objective of the present work is to prepare rayon grade pulp by pre-hydrolysis soda AQ process from a mixture of jute stick and jute.

Work progress:

- The morphological characteristic of the collected jute and jute stick was performed.
- The chemical properties: extractive content, pentosan content, α-cellulose are determined in the jute and jute stick was carried out according to TAPPI methods.
- Prehydrolysis of the jute and jute stick was done at different temperature and optimized the condition.
- Pulping of the jute sample carried out in soda AQ process at 150 °C
- Bleaching of the produced pulp was done with chlorine dioxide according to $D_oEpD_1EpD_2$ sequences



Flow diagram

3) Non Conventional Production of Paper Grade Pulp from Crop Wastes

Dr. M. Mostafizur Rahman, SSO (PL), Dr. M Sawar Jahan, Director, Dr. Md. Nashir Uddin, PSO, Jannatun Nayeem, SSO, Kazi Md. Yasin Arafat, SO, Razia Sultana Popy, SO, Dr. Mohammad Moniruzaman, PSO, Md. Shamim Ahmed, PSO, INARS

Introduction

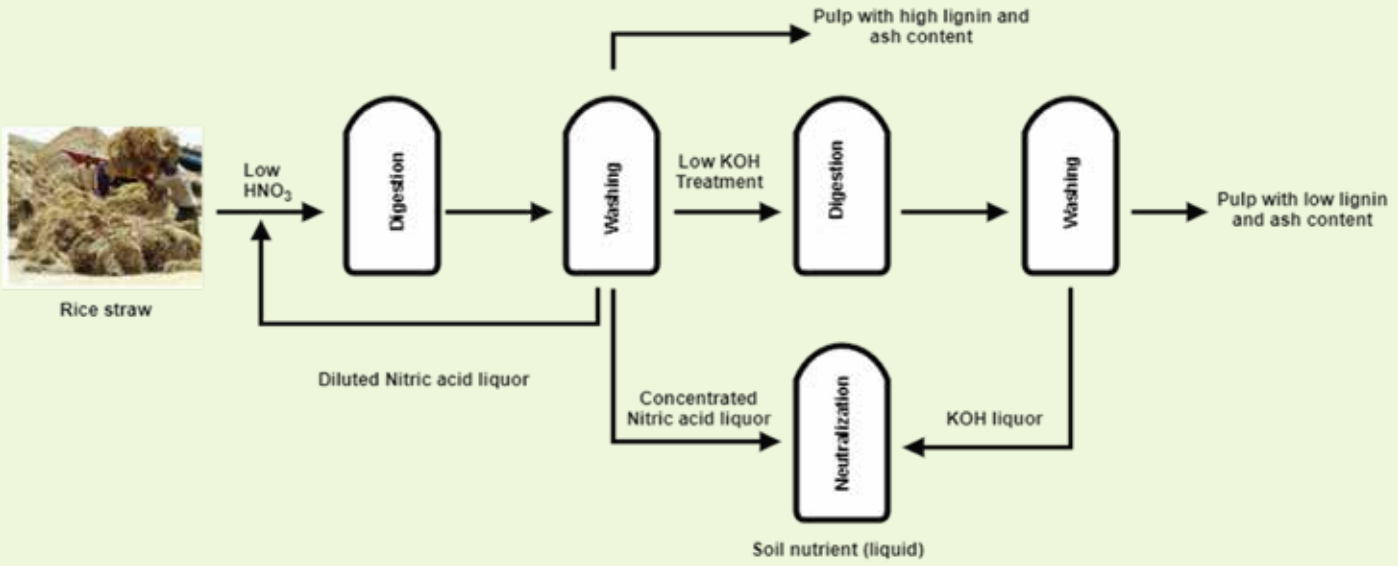
Crop wastes are supposed to be the most important lignocellulosic raw materials for the pulp and paper industry. But due to its bulky nature, high mineral content and low density compare to wood, crop residues are not suitable for conventional pulp mill. Moreover, a conventional pulp mill cannot be economically and environmentally feasible without a chemical recovery system. In that case, the nitric acid pulping process could be a suitable alternative for crops wastes pulping. Advantages of the nitric acid pulping are: low cooking temperature, low concentration of acid, comparatively shorter cooking time, reuse of cooking liquor without chemical recovery process. A huge amount of non-fibrous cells considered as pith can be removed in the nitric acid process easily. In the proposed project concept, all fractions of biomass will be separated and utilized without generating wastes. Finally, the effluent liquor produced in the proposed nitric acid process will be used as liquid fertilizer.

Objectives:

To prepare rayon grade pulp by pre-hydrolysis Kraft process from a mixture of jute stick and jute.

Work progress:

- Treatment of rice straw was done with nitric acid at different time, temperature and acid concentration.
- Rice straw pulping was carried at the below boiling temperature and low acid concentration
- The nitric acid pulp was treated with potassium hydroxide to remove more lignin
- The waste cooking liquor was analyzed for nitrogen, potassium, phosphorous, total organics to use as soil nutrient



Flow diagram

Special Allocation Projects:

1) High temperature Chlorine dioxide bleaching of non-wood pulp

PI: Jannatun Nayeem, SSO, AI:Dr. Md. Nashir Uddin, P.S.O

Introduction:

Pulp bleaching section is one of the most chemical consuming sections of pulp, paper and allied industries. A large amount of chlorine dioxide is used in conventional bleaching process which contains not only a huge amount of money but also hazardous impact on health and environment. Temperature plays an important role in pulp bleaching. By using high temperature with lower chemical dosages, preparing high quality pulp can be a good option to pulp industries.

Objective:

- To evaluate high temperature chlorine dioxide bleaching of non-wood pulp to make the pulping process more viable economically and environmentally.

Work progress:

- Pulps from non-woods were subjected to D_{HT} at 85^{o}C for 45 min and compared with D_o at 70^{o}C for 45min.
- The kappa numbers after E_P stage in D_{HT} bleaching were always lower and brightness was higher than the corresponding D_o bleaching without impacting pulp viscosity.
- The final brightness of corn stalks pulp was 84.8% at kappa factor of 0.25 in D_o process, while the same in D_{HT} process produced brightness of 87.2% at kappa factor of 0.15, saved 40% ClO_2 in the first stage.
- Similarly, kash pulp exhibited 90% brightness at kappa factor of 0.15, which also saved 40% ClO_2 over conventional D_o process.
- The brightness of bagase pulp in D_{HT} and D_O processes was almost similar. The COD value in D_{HT} was lower than D_o process.

Achievements & Activities :

Papers :

1. R.S. Popy, J. Nayeem, K.M Yasin Arafat, M.M. Rahman, M.S. Jahan, Mild potassiumhydroxide pulping of straw, *Current Research in Green and Sustainable Chemistry*, **2020**, 3,100015.
2. Taslima Ferdous, M. Abdul Quaiyum, Abdus Salam, M. Sarwar Jahan. Pulping of bagasse (Saccrarum officinarum), kash (Saccharum spontaneum and corn stalks (Zea mays), *Current Research in Green and Sustainable Chemistry*, **2020**, 3, 100017.
3. Taslima Ferdous, M. Abdul Quaiyum, M. Sarwar Jahan.Characterization and Pulping of Crops Residue: Eggplant, Cassava, Okra and Mulberry Plants. *Waste and Biomass Valorization*, **2020**, 12, 3161-3168.
4. Taslima Ferdous, M. Abdul Quaiyum, M. Sarwar Jahan. Chlorine dioxide bleaching of nineteen non-wood plants pulps, *Nordic Pulp & Paper Research Journal*, **2020**, 35(4), 569-576.
5. M Sarwar Jahan, M. Mostafizur rahman, Yonghao Ni. Alternative Initiatives for non-wood chemical pulping and integration with the biorefinery concept: A review*, Biofuels, Bioproducts & Biorefining*, **2020**, 15(1).
6. Potůček, F.,RAHMAN, M. and Miklík, J., Displacement Washing of Kraft Pulp with Various Consistency. *Cellulose Chemistry and Technology,* **2020**, 54(9-10), 943-952.
7. Akash Mamun Sarkar, M sarwar Jahan*, jannatun Nayeem, Kazi M Yasin Arafat, M Mostafizur Rahman, Razia Sultana Popy, AHM Shofiul Islam Molla Jamal and M. Abdul Quaiyum. Chemical and morphological characterization and pulping of Casuarina equisetifolia, *Nordic Pulp & Paper Research Journal*, **202**1.
8. Akash M. Sarkar, Maisha Farzana, M. Mostafizur Rahman, Yangcan Jin and M. Sarwar Jahan, Future Cellulose Based Industries In Bangladesh, *Cellulose Chemistry and Technology*, **2021**, 55(5-6), 443-459.

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

1. **Mamon Sarkar,** RC, Pulp and Paper Research Division, Pursuing PhD degree from University of Wyoming, USA.
2. **K.M Yasin Arafat**, SO, Pulp and Paper Research Division, Pursuing PhD degree from North Carolina State University,USA.

Guidance to research Work (PhD/M.Phil/M.S/NCST & BCSIR Fellow)

Sl. No	Title of Research	Research Category	Name of the Student	Name of the Institution	Name of Supervisors
1	Morphological and Chemical Characteristics of different non-wood species and their effect on pulping	PhD (Student)	Taslima Ferdous	Applied Chemistry & Chemical Engineering, University of Dhaka	Dr. M Sarwar Jahan
2	Non Conventional Production of Paper Grade Pulp from crop wastes	Professor Nurul Afsar Khan Post-graduate Fellowship	Nur-Al-Sarah Rafsan	BCSIR	Dr. Md. Mostafizur Rahman

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

1. **Dr. Mohammad Nasir Uddin (PSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March 2021 and presented an oral presentation entitled, "Method for rapid determination of hexeneuronic acid in non-wood pulp by multivariate analysis of FT-NIR spectroscopic data"
2. **Dr. Md. Mostafizur Rahman (SSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March 2021 and presented an oral presentation entitled, "Rayon grade dissolving pulp from jute stick".
3. **Jannatun Nayeem (SSO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March 2021 and presented an oral presentation entitled, "Evaluation of Erythrina fusca as pulping raw material".
4. **Kazi Md. Yasin Arafat (SO),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March 2021 and presented an oral presentation entitled, "Pulp refining in improving degree of substitution of methylcellulose preparation from jute pulp".
5. **Nur-Al-Sarah Rafsan (Research Fellow),** participated in International Conference on Science and Technology for Celebrating the Birth Centenary of Bangabandhu (ICSTB-2021) organized by Bangladesh Council of Scientific and Industrial Research (BCSIR), 11-13 March 2021 and presented an oral presentation entitled, "Non-conventional pulping of rice straw with nitric acid"

Number of Analytical (Ad-hoc) problem solved:

Name of the Division	Routine type	Research Type	Total
Pulp and Paper Research Division	149	3	152

Dr. Md. Sarwar Jahan (1992- present)

Office	BCSIR Laboratories, Dhakan	Blood group	**O+**
Position	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 190 articles in the high ranked peer reviewed journals and gets 3400 citations with 30 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+**
Position	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 36 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. Sarwar Jahan (1992- present)

Office	Pulp & Paper Research Division	Blood group	**A+**
Position	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 39 articles in the peer reviewed journals as first author, corresponding author and coauthor. Besides, he as supervised 6 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.

Kazi Md. Yasin Arafat (October, 2018- present)

Office	Pulp & Paper Research Division	Blood group	**O+**
Position	Scientific Officer	Degree obtained	M.Sc. (2017)
Contact	kaziarafat1992@gmail.com	Mobile	01924992404

Mr. Kazi Md. Yasin Arafat completed his B.Sc. and M.Sc. from the Department of Applied Chemistry & Chemical Engineering, University of Dhaka. He has successfully done Graduate Research Fellowship at Pulp and Paper Research Division, BCSIR before his current position. His research interests revolve around the area of Pulping, Biorefinery, Cellulose modification, and lignin valorization. He has authored or co-authored 09 publications. Currently, he is on deputation for pursuing his Ph.D. from the Department of Forest Biomaterials, North Carolina State University, Raleigh, NC, USA.

Razia Sultana Popy (December, 2016- present)

Office	Pulp & Paper Research Division	Blood group	**A+**
Position	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 five (05) publications.

Akash Mamon Sarkar (August, 2016- present)

Office	Pulp & Paper Research Division	Blood group	**B+**
Position	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.

Photo Gallery

Celebration of 'Mujib Borsho' at a glance

যতকাল রবে পদ্মা-মেঘনা-গৌরী যমুনা বহমান,
ততকাল রবে কীর্তি তোমার শেখ মুজিবুর রহমান।

BCSIR Laboratories, Dhaka.

List of accepted process, 2010 - 2021 (considerable for leasing)

1.	Production of super paper adhesive. D/L.20.10.2010
2.	Production Zinc Acetate from Zinc Oxide. D/L. 24.10.2010
3.	Production of Essential Oil of Garlic (Garlic Oil) D/L. 01.12.2010.
4.	Production of Super Wood Adhesive, D/L, 02.02.2011.
5.	Production of Printing Roller Wash. D/L, 02.02.2011.
6.	Production of Microcrystalline cellulose, D/L, 03.02.2011.
7.	Deodorized blood meal as organic fertilizer, D/L. 27.02.2011
8.	Production of Herbal Shaving Foam, D/L. 08.05.2011
9.	Production of Mouth Wash. D/L. 08.05.2011.
10.	Production of Essential Oil from Kalozira. D/L. 10.05.2011.
11.	Production of Photographic Film Developer. D/L. 29.05.2011
12.	Production of Photographic Film Fixer. D/L. 29.05.2011
13.	Production of bitter gourd capsule, D/L, 25/08/2011
14.	Preparation of chitosan-charcoal bio-composite for chromium removal, D/L, 13.10.2011
15.	Production of tamarind kernel based textile sizing agent for jute & cotton yarns, D/L, 13.10.2011
16.	Production of tamarind kernel powder (TKP) aqueous solution, D/L, 13.10.2011
17.	Production of poultry feed from unused fish scales including naturalingredient.DL.08.01.2012
18.	Production of Aloe Gel. DL.08.01.2012.
19.	Production of Activated Carbon. DL. 4.4.2012
20.	Production of Ethyl Salicylate D/L. 24.07.2012.
21.	Production of Food Drug & Cosmetic Grade Water Soluble Curcumin Pigments, D/L,29.01.2013
22.	Production of Water Soluble Curcumin. D/L. 27.02.2013
23.	Production of Alcohol Soluble Curcumin. D/L. 27.02.2013.
24.	Production of herbal hand wash. D/L. 02.06.2013.
25.	Production of synthetic rubber based rubber curing agent containing high percentage of Sulfur powder for the use in synthetic rubber based products, D/L,03.03.2014
26.	Production of rubber curing agent incorporating natural rubber latex in sulfur powder for the use in natural rubber based products. D/L.03.03.2014
27.	Production of pectin from ripe mango peels. D/L. 18.05.2015
28.	Production of starch from ripe mango seeds. D/L. 18.05.2015
29.	Production of fruit flavored salt for gastric comfort, D/L 17-11-2015
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 acid18.10.16,D/ L
35.	Sodium Sulfide flakes from sodium sulfate, Dhaka Lab-21.08.17
36.	Pectin from Ripe Jackfruit waste,Dhaka Lab-30.10.17
37.	Baby Liquid Laundry Detergent, Dhaka Lab,01.11.17 **(Sponsored)**
38.	Transformer core using soft ferrite material,Dhaka Lab,27.11.17
39.	Facial Cleanser (Sponsored), Dhaka Lab-11.06.18
40.	Fatty Oil from Cotton seeds (BombaxCieba),09.12.18,D/Lab
41.	Herbal Body Oil,09.12.18,D/L
42.	Herbal Face Wash,D/L,25.03.19
43.	Ultrasound Gel,07.4.19,D/L
44.	Spin Coater for thin film solar cell fabrication, D/L_24.4.19
45	Aluminum Sulphate Anhydrous from scrap Aluminum, D/L-12.12.19
46	Production of Herbal Mosquito Spray **(Sponsored)** ,D Lab-27.09.2020
47	Isolation of Bulk amount of Piperine as a active pharmaceutical ingredients (API) from Black pepper and White Pepper, D Lab_27.09.2020
48	Production of Herbal Body wash, Dhaka Lab_17.12.2020
49	Herbal Skin Care Cream **(Sponsored),** 09.03.21_D/Lab
50	Anti Bacterial Hand Wash **(Sponsored),** 10.03.21_D/Lab

Contact Address

Director

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