


“শিল্প গবেষণায় নতুন দ্বার, বিসিএসআইআর গবেষণাগার ঢাকা এর অঙ্গীকার”
-শীর্ষক অংশীজন কর্মশালা

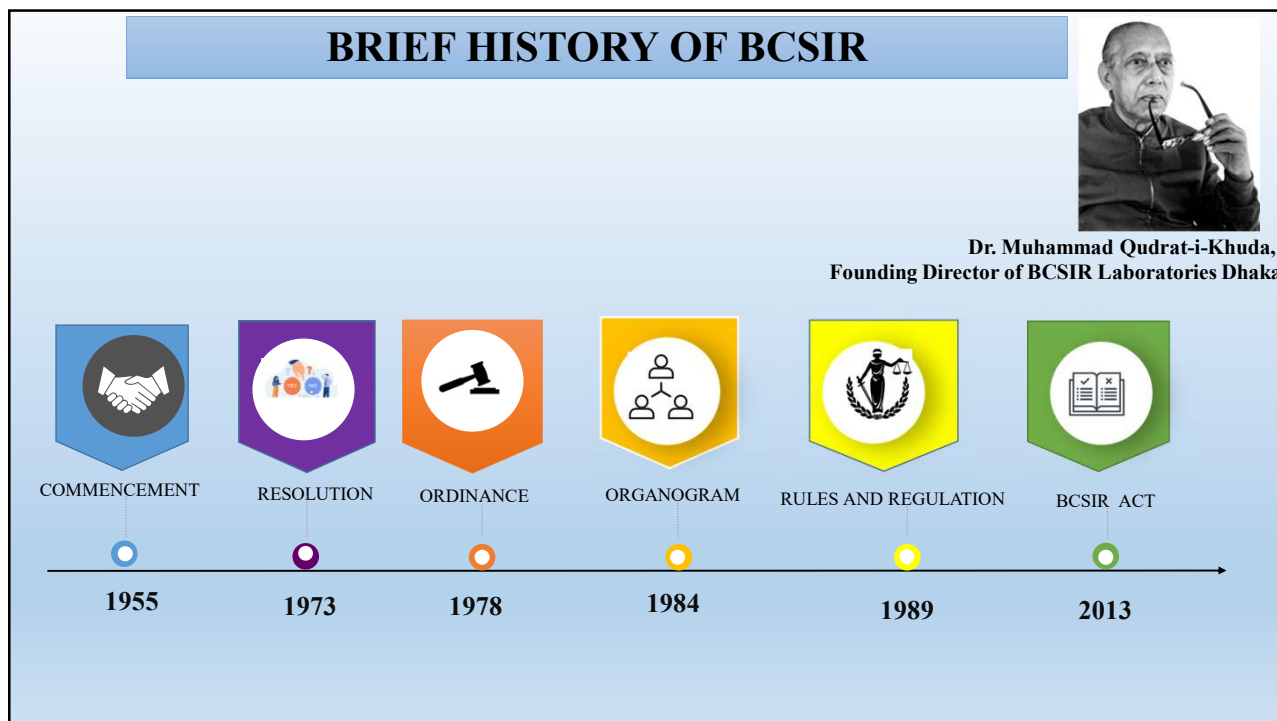
- প্রধান অতিথি : ড. সামিনা আহমেদ, চেয়ারম্যান, বিসিএসআইআর
- বিশেষ অতিথি :
 - জনাব কাজী আনোয়ার হোসেন, সদস্য (উন্নয়ন)
 - জনাব রোকনুজ্জামান, সদস্য (অর্থ)
 - জনাব মোঃ ইফতেখার আহমেদ চৌধুরী, সদস্য (প্রশাসন)
 - ড. মোসাঃ হোসনে আরা বেগম, সদস্য (বিজ্ঞান ও প্রযুক্তি)
 - ইঞ্জিনিয়ার নাহিদ শারমিন, পরিচালক, বিসিএসআইআর গবেষণাগার ঢাকা
- সভাপতি
- তারিখ : ০৯ জানুয়ারি, ২০২৫ খ্রিঃ, রোজ বৃহস্পতিবার
- সময় : সকাল ১০.০০ ঘটিকা
- স্থান : আইএফএসটি মিলনায়তন, বিসিএসআইআর

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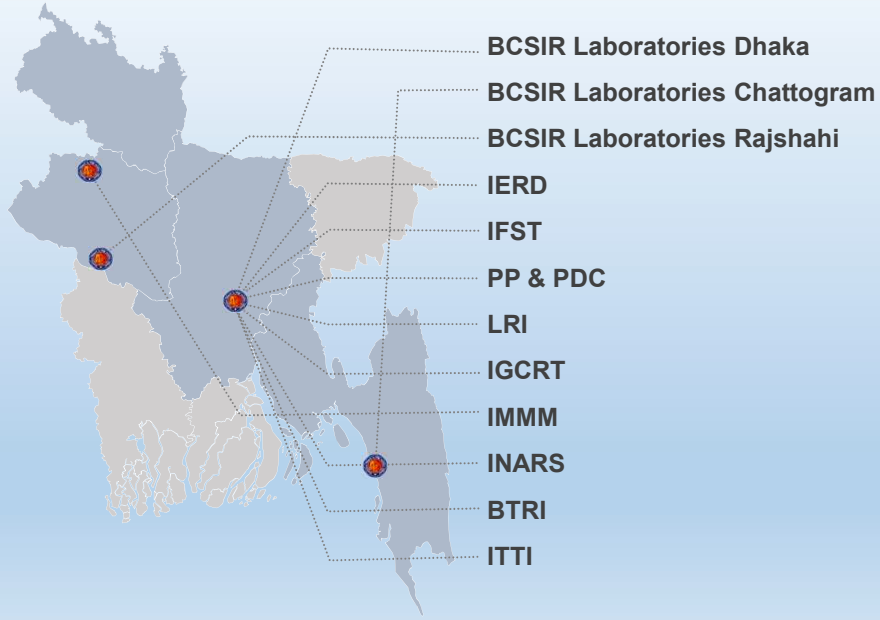



“শিল্প গবেষণায় নতুন দ্বার
বিসিএসআইআর গবেষণাগার ঢাকা এর অঙ্গীকার”
-শীর্ষক অংশীজন কর্মশালা

তারিখ: ৯ জানুয়ারি ২০২৫
আয়োজনে: বিসিএসআইআর গবেষণাগার ঢাকা



LABORATORIES AND INSTITUTES OF BCSIR



BCSIR Laboratories Dhaka

ভিশন (Vision): গবেষণায় সেন্টার অফ এক্সেলেন্স অর্জন।

মিশন (Mission): গবেষণার ক্ষেত্রে আন্তর্জাতিকমানের গবেষণাগার স্থাপন, দক্ষ জনবল সৃষ্টি, প্রযুক্তি উদ্ভাবন ও হস্তান্তরের মাধ্যমে দেশের শিল্পায়ন ও উন্নয়নে সহায়তা প্রদান।

VISION & MISSION



Citizen's Charter of BCSIR Laboratories Dhaka (সেবা প্রদান প্রতিশ্রুতি)

➤ নাগরিক সেবা

- পণ্যমান বিশ্লেষণ
- শিল্পোদ্যোক্তাদের চাহিদা অনুযায়ী সহায়তা প্রদান (যৌথ গবেষণা ও সম্পদ প্রজেক্ট)
- বুদ্ধিবৃত্তিক সেবা (পরামর্শ প্রদান)
- মানব সম্পদ উন্নয়ন
- আধুনিক যন্ত্রপাতি ও সংশ্লিষ্ট বিষয়ের উপর প্রশিক্ষণ প্রদান
- স্টেক হোল্ডারদের নিয়ে কর্মশালার আয়োজন

➤ প্রাতিষ্ঠানিক সেবা

- বিভিন্ন বিশ্ববিদ্যালয়ের শিক্ষার্থীদের গবেষণায় সহায়তা প্রদান
- রিসার্চ ফেলোদের গবেষণা কার্যক্রম তত্ত্বাবধান
- যন্ত্রপাতির উপর ইন-হাউজ প্রশিক্ষণ প্রদান
- লাগসই প্রযুক্তি সম্প্রসারণে সহায়তা প্রদান
- বিভিন্ন শিল্প-কারখানার সমস্যা সমাধান

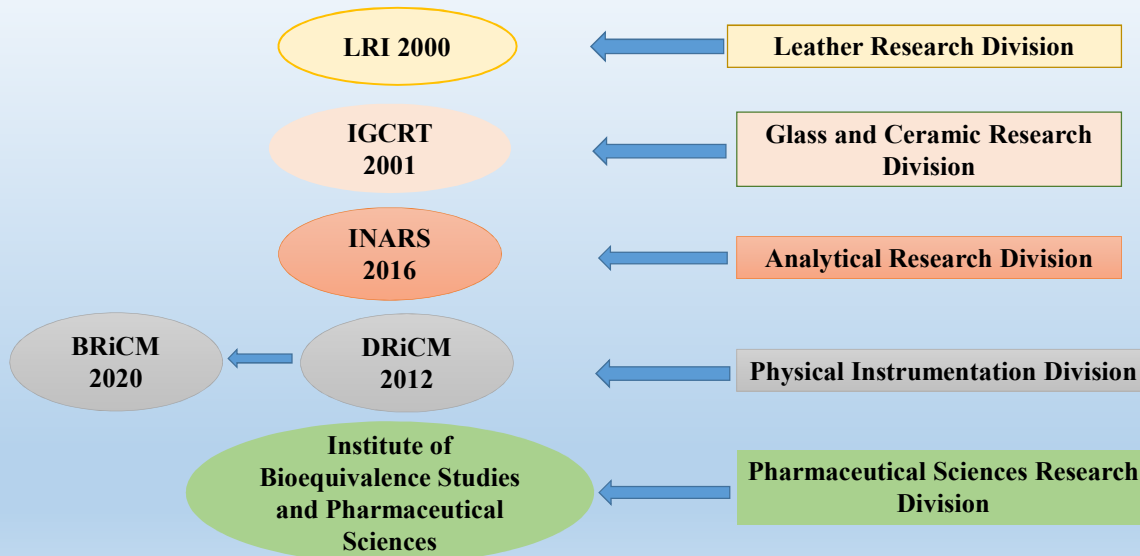
➤ অভ্যন্তরীণ সেবা

- গবেষণা কার্যক্রমে সহায়তা প্রদান (আরএন্ডডি প্রকল্প গ্রহণ; বিশেষ অনুদান প্রকল্প)
- গবেষণা সংক্রান্ত কাজে প্রয়োজনীয় রাসায়নিক দ্রব্যাদি, ক্ষুদ্র যন্ত্রপাতি, ক্ষুদ্র যন্ত্রাংশ, কাচ সামগ্রী ক্রয়
- বার্ষিক প্রতিবেদন
- গবেষণা বিষয়ক অভ্যন্তরীণ সেবা
- শুদ্ধাচার, নৈতিকতা সম্পর্কিত প্রশিক্ষণ কার্যক্রম
- বিসিএসআইআর গবেষণাগার ঢাকা এর কর্মচারীদের কল্যাণ তহবিল থেকে অনুদান প্রদান
- গবেষণার নমুনার বিশ্লেষণ

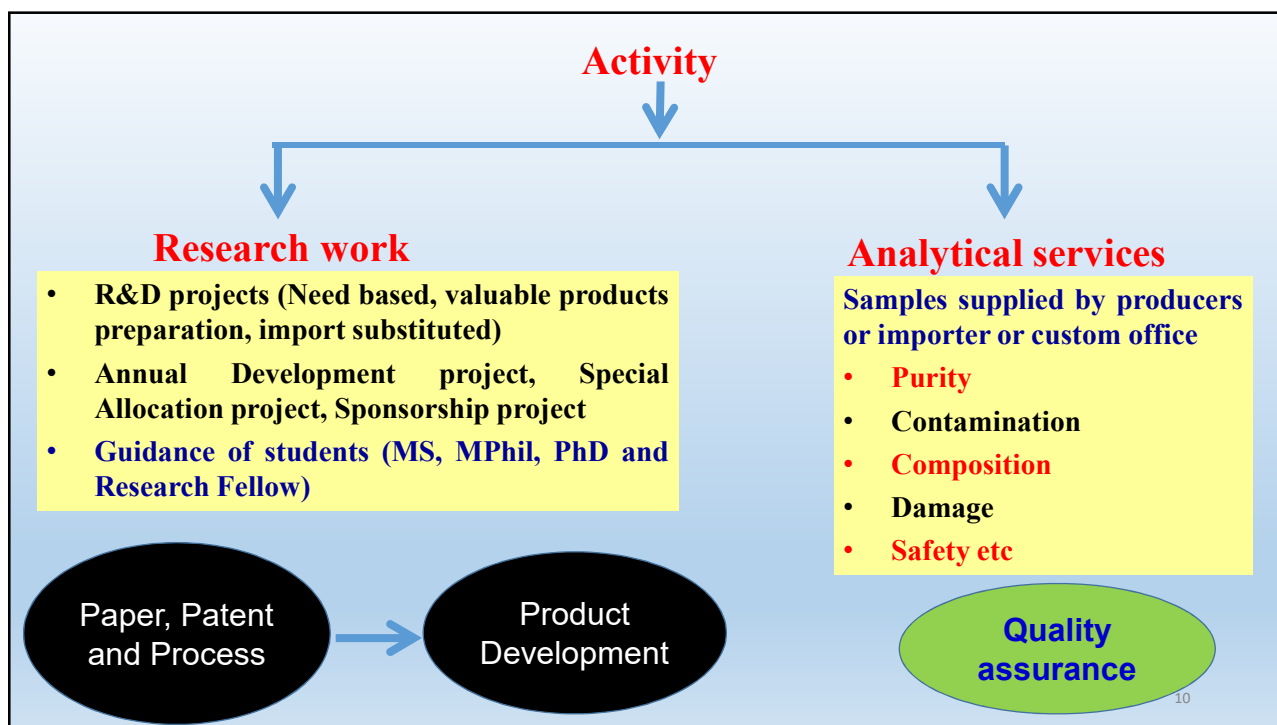
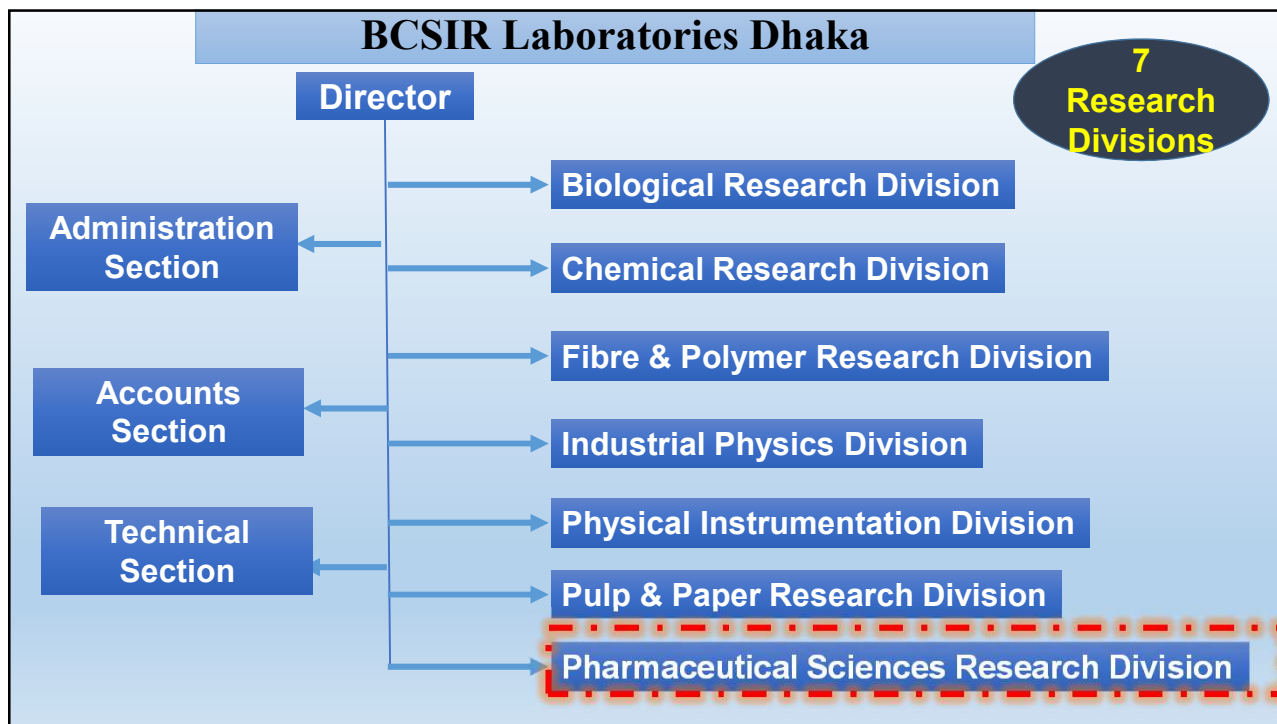


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BCSIR Laboratories Dhaka



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BCSIR Laboratories Dhaka at a glance (2023-2024)

Projects

R&D: 69

Achievements

Published paper: 98

Patent: 03

Process: 08

Services

Analytical service: 2230

Student supervision: 41

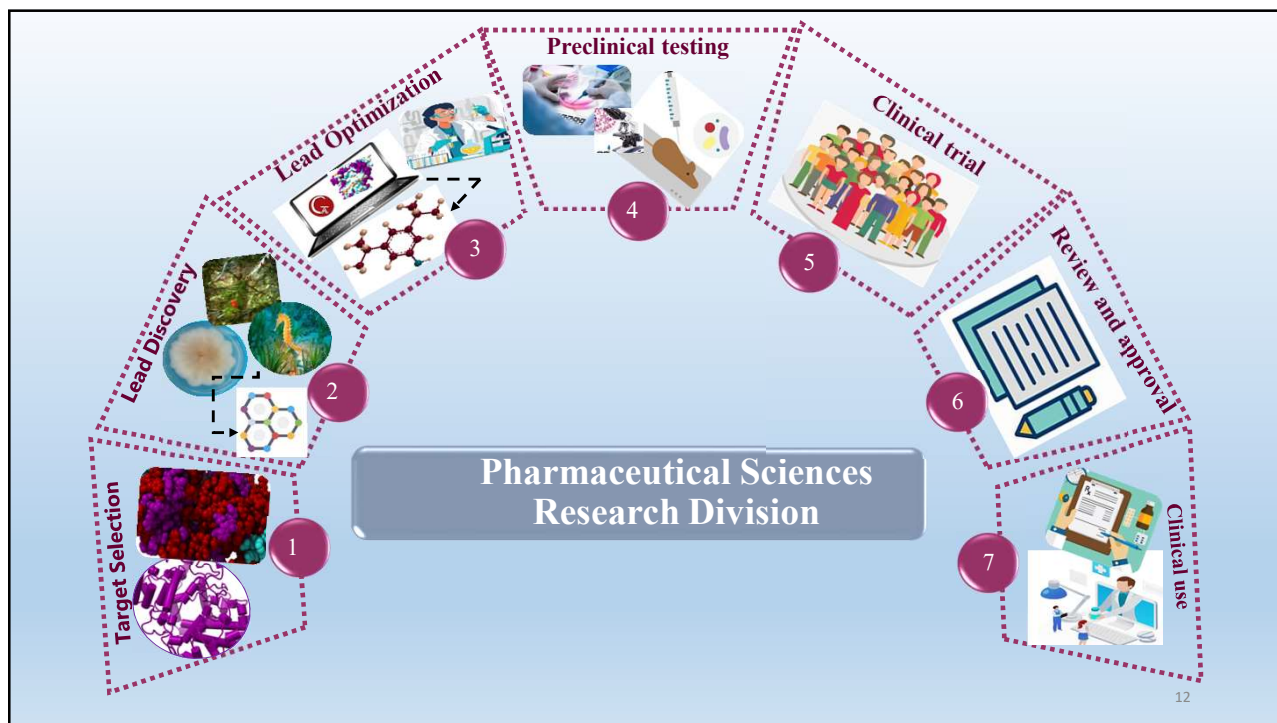
Dissemination of technology: 01

Manpower

Scientist: 100

Officer: 24

Staff: 54



Establishment of Institute of Bioequivalence Studies and Pharmaceutical Sciences



2024-Established as Institute of Bioequivalence Studies and Pharmaceutical Sciences (IBSPS)



2011-Established as Pharmaceutical Sciences Research Division (PSRD)

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Major Contributions

- ADP Project: 01
- R & D Project: 42
- Special Allocation Project: 09
- Publication: 159
- Student Supervision: 110
- Research Fellow: 26
- Accepted Process: 02
- Patent: 02
- Analytical Service: more than 380

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Establishment of Institute of Bioequivalence Studies and Pharmaceutical Sciences

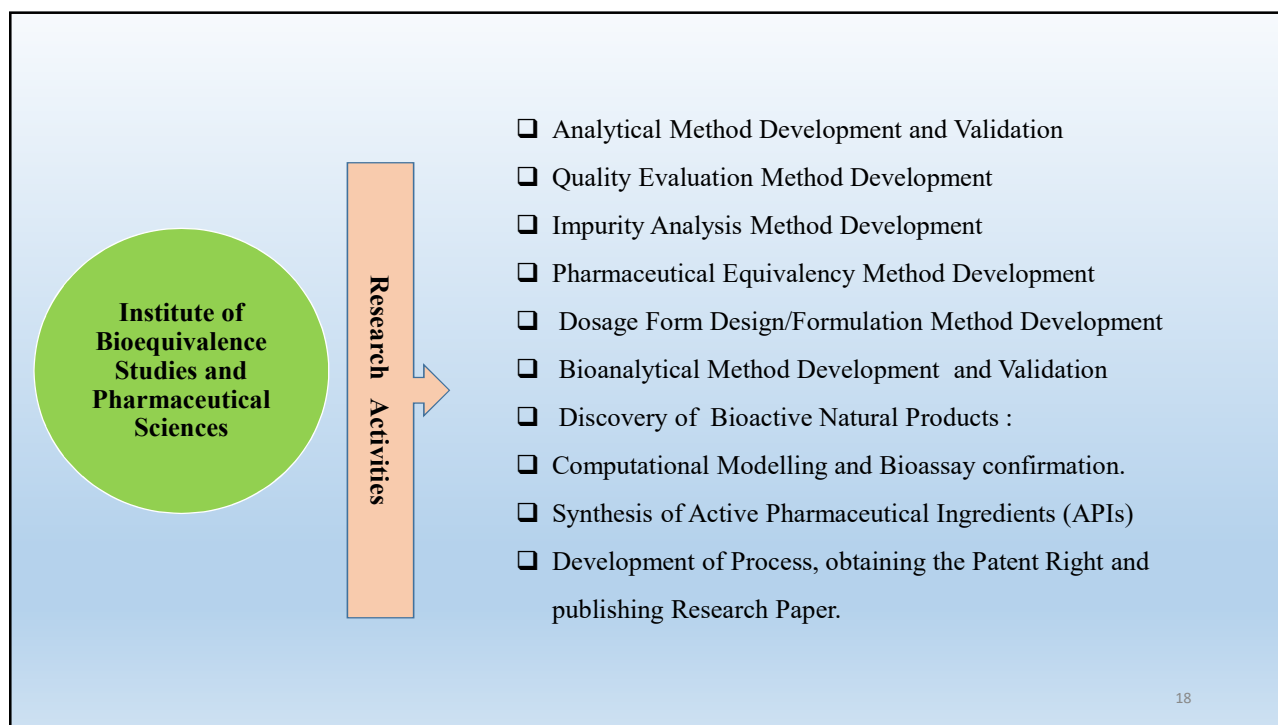
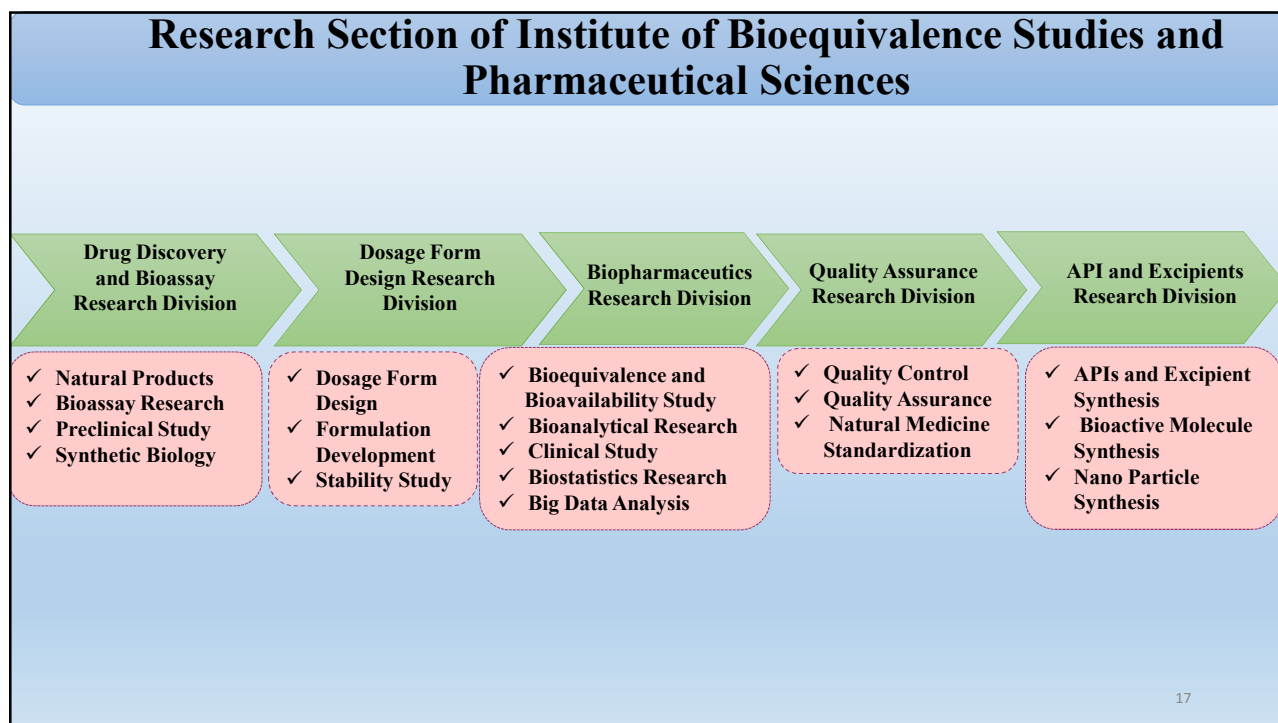
- ওষুধের উপর সমন্বিত গবেষণার বিশেষায়িত গবেষণা প্রতিষ্ঠান

উদ্যোগী মন্ত্রণালয়/বিভাগ	: বিজ্ঞান ও প্রযুক্তি মন্ত্রণালয়
বাস্তবায়নকারী সংস্থা	: বাংলাদেশ বিজ্ঞান ও শিল্প গবেষণা পরিষদ (বিসিএসআইআর)
পরিকল্পনা কমিশনের সংশ্লিষ্ট বিভাগ	: আর্থ-সামাজিক অবকাঠামো বিভাগ, পরিকল্পনা কমিশন
প্রকল্প এলাকা	: বিসিএসআইআর ক্যাম্পাস, ধানমন্ডি, ঢাকা
বাস্তবায়নকাল	: ১ জুলাই ২০১৭ হতে ৩০ জুন ২০২৪
মোট প্রকল্প ব্যয়	: ১০৬৩২.১৫ লক্ষ টাকা

‘ইনস্টিটিউট অব বায়োইকুভ্যালেন্স স্টাডিজ এন্ড ফার্মাসিউটিক্যাল সাইন্সেস’:

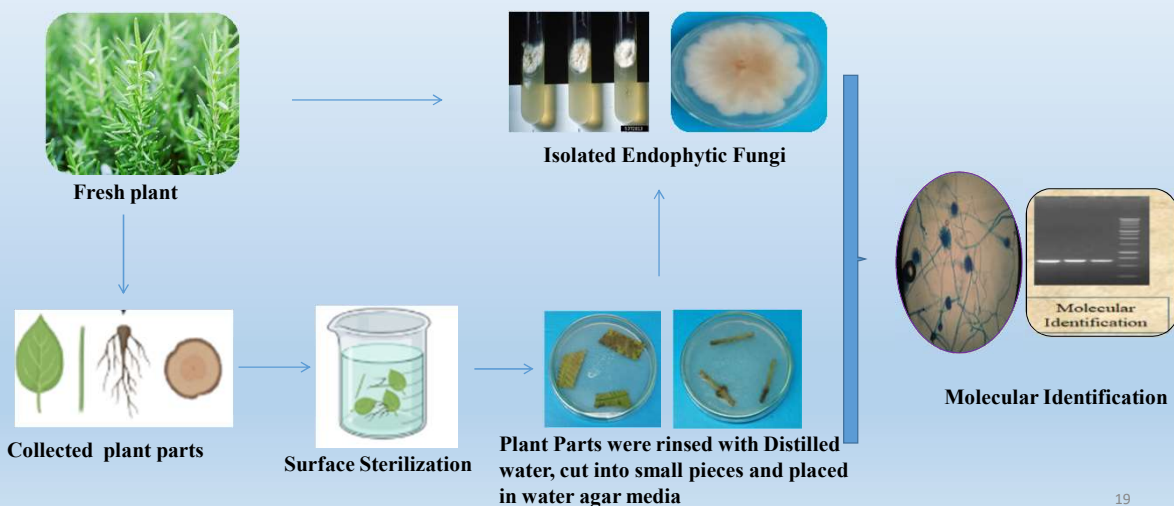
ওষুধের উপর সমন্বিত গবেষণার বিশ্বমানের বিশেষায়িত গবেষণা প্রতিষ্ঠান

- বায়োইকুভ্যালেন্স স্টাডিজের সেবা প্রদানের মাধ্যমে স্থানীয়ভাবে উৎপাদিত ওষুধ রপ্তানিতে সহায়তা করবে। এতে বৈদেশিক মুদ্রা সাশ্রয়ের পাশাপাশি বৈদেশিক মুদ্রা অর্জনের মাধ্যমে নতুন আয়ের উৎস তৈরী হবে।
- ওষুধের কাঁচামাল (APIs and Excipients) সংশ্লেষণ প্রক্রিয়া উন্নয়নের মাধ্যমে স্থানীয় ওষুধ শিল্পের আমদানি নির্ভরতা কমিয়ে বৈদেশিক মুদ্রা সাশ্রয়ে ভূমিকা রাখবে।
- রপ্তানিযোগ্য জেনেরিক ড্রাগ উন্নয়নের লক্ষ্যে ক্লিনিক্যাল গবেষণার সুবিধাদি সৃষ্টি করা হয়েছে।
- নতুন ওষুধ উদ্ভাবন, ওষুধের মানোন্নয়ন ইত্যাদির উপর গবেষণা করা ও সেবা প্রদানের সুবিধাদি সৃষ্টি করা হয়েছে।
- ওষুধ শিল্পের আমদানী ও বিদেশ নির্ভরতা কমে আসবে। ফলে দেশ স্বনির্ভর হবে।



Major contributions

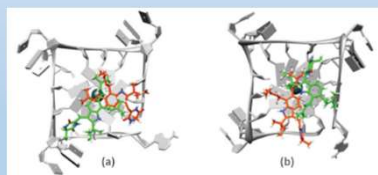
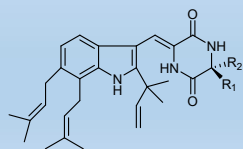
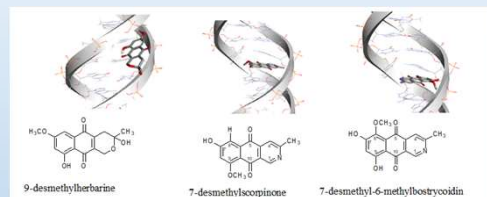
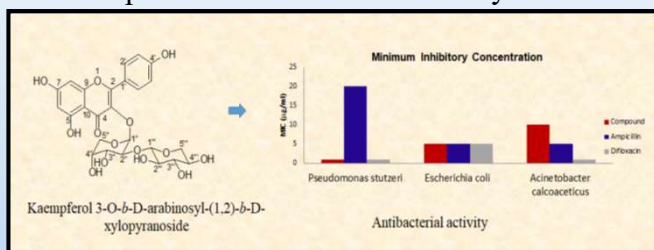
- Developed isolation, purification and characterization methods of endophytic fungi from medicinal plants and marine weeds as well as isolation, purification and structure elucidation of isolated compounds from the fungal isolates



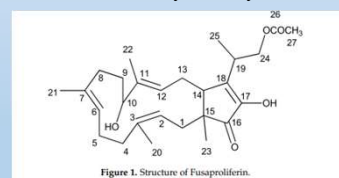
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Major contributions

- Isolated more than 150 compounds, many of them are novel or new compounds, 21 of them have potential antimicrobial and cytotoxic activity



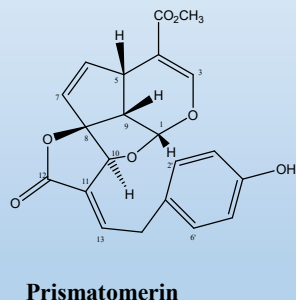
Bind selectively to telomeric quadruplex DNA and stabilize it



Compound/Standard	MIA PaCa 2 (Pancreatic)	BXPC3 (Pancreatic)	MDA MB 231 (Breast)	MCF7 (Breast)	WI 38 (Lung Fibroblast)
FUS	0.13 ± 0.09	0.76 ± 0.24	1.9 ± 0.32	3.9 ± 0.75	18 ± 0.66
Gemcitabine	7.6 ± 0.66	2.2 ± 0.43	NT	NT	NT
Doxorubicin	NT	NT	0.06 ± 0.03	0.02 ± 0.018	NT

Major contributions

- Prismatomerin, a new iridoid from the leaves of *Prismatomeris tetrandra* showed remarkable antitumor activity and also interfered with mitotic spindle formation.



Cell line	Origin	IC50 [μ M]
L-929	murine connective tissue	0.21
KB-3-1	human cervix carcinoma	0.41
A-549	human lung carcinoma	1.41
SW-480	human colon adenocarcinoma	0.060

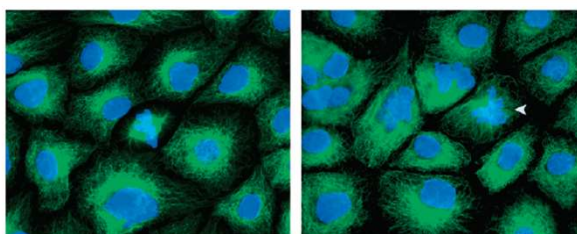


Figure 3. Influence of prismatomerin (1) on PtK₂ potato cells. Cells were stained for nuclei (blue) and microtubules (green). After incubation with 1 (0.5 μ g/mL) overnight (right photo) cells show nuclear fragmentation, but no alteration in their microtubule network. The photo also shows a mitotic cell with metaphase chromosomes (arrow) but not a mitotic spindle, as displayed by the mitotic cell in the control picture (left).

Major contributions

- Selected publications from drug discovery Research

Fusaproliferin, a Fungal Mycotoxin, Shows Cytotoxicity against Pancreatic Cancer Cell Lines

Nazim Hossain^{1,2}, Choudhury Mahmood Hasan¹, Md. Sahid Rana¹, Anami Yasuka³, Md. Hossain Sadek^{4,5}, and Khondokar Mirza Rahaman^{6,7}

Abstract: As a part of our ongoing research on endophytic fungi, we have isolated a xanthone-type mycotoxin, fusaproliferin (FUS), from a filamentous fungus, which is associated with the plant *Azadirachta indica* Linn. FUS showed rapid and cell-selective IC₅₀ against pancreatic cancer cell lines. These dependent on cell analysis and microscopy imaging showed rapid morphological changes in cancer cells but not in other noncancerous cells. This provides a new direction of research that can be further developed to obtain more potent candidates against pancreatic cancer.

Cerevisialin Alleviates Inflammation via Suppression of MAPK/NF- κ B/PI3 and Activation of the Nrf2/HO-1 Signaling Cascade

Md. Sahid Rana^{1,2,3}, Nazim Hossain^{1,2,3}, Md. Hossain Sadek^{4,5}, Md. Sahid Rana¹, Choudhury Mahmood Hasan¹, Anami Yasuka³, and Khondokar Mirza Rahaman^{6,7}

Abstract: Cerevisialin (CV) was identified from endophytic fungi, a fungus, which is associated with the plant *Azadirachta indica* Linn. CV showed rapid and cell-selective IC₅₀ against pancreatic cancer cell lines. These dependent on cell analysis and microscopy imaging showed rapid morphological changes in cancer cells but not in other noncancerous cells. This provides a new direction of research that can be further developed to obtain more potent candidates against pancreatic cancer.

Cytotoxic Naphthoquinone and Azaanthraquinone Derivatives from an Endophytic *Fusarium solani*

Nazim Hossain^{1,2,3}, Md. Hossain Sadek^{4,5}, Md. Sahid Rana¹, Choudhury Mahmood Hasan¹, Shrin Jambhale⁶, and Khondokar Mirza Rahaman^{6,7}

Abstract: Bioactivity-guided fractionation of the ethyl acetate extract obtained from the fungus of the endophytic fungus *Fusarium solani* led to the isolation of a new naphthoquinone, 2,6-dimethyl-1,4-naphthoquinone (1), and two azaanthraquinone derivatives, 2,6-dimethyl-1,4-azaanthraquinone (2) and 2,6-dimethyl-1,4-azaanthraquinone (3), along with two known compounds, their structures were elucidated by spectral analysis, as well as a direct comparison of their data with those of known compounds. Assessment of the cytotoxicity of these compounds against the human breast cancer cell lines MCF-7, MDA-MB-231, MDA-MB-468, and MCF-10A, and MCF-10A, a multidrug resistant (MDR) cell line, revealed that 1, 2, and 3 showed potent cytotoxicity against the human breast cancer cell lines. The structure elucidation of 1, 2, and 3 was confirmed by 1D and 2D NMR spectroscopy.

Endophytic *Fusarium solani*: A rich source of cytotoxic and antimicrobial naphthoquinone and aza-anthraquinone derivatives

Nazim Hossain^{1,2,3}, Farhana Akter⁴, Md. Nadim Begum⁵, Sayajit Roy Roy⁶, Sarita Bhattacharya⁷, Fatima Moin⁸, Choudhury Mahmood Hasan¹, Souvik Shikha⁹, Md. Hossain Sadek¹⁰

Abstract: The present study was designed to investigate the cytotoxicity and antimicrobial activity of the endophytic fungus *Fusarium solani* isolated from the plant *Azadirachta indica* Linn. The fungus was cultured on various media and the resulting metabolites were screened for cytotoxicity and antimicrobial activity. The results showed that the fungus produced several cytotoxic and antimicrobial compounds. The structure elucidation of these compounds was confirmed by 1D and 2D NMR spectroscopy.

Isolation and Identification of Endophytic Fungi from *Syzygium cumini* Linn and Investigation of Their Pharmacological Activities

Md. Sahid Rana^{1,2,3}, Nazim Hossain^{1,2,3}, Md. Hossain Sadek^{4,5}, Md. Sahid Rana¹, Choudhury Mahmood Hasan¹, Anami Yasuka³, and Khondokar Mirza Rahaman^{6,7}

Abstract: The present study was designed to investigate the cytotoxicity and antimicrobial activity of the endophytic fungus *Fusarium solani* isolated from the plant *Azadirachta indica* Linn. The fungus was cultured on various media and the resulting metabolites were screened for cytotoxicity and antimicrobial activity. The results showed that the fungus produced several cytotoxic and antimicrobial compounds. The structure elucidation of these compounds was confirmed by 1D and 2D NMR spectroscopy.

Evaluation of bioactivity and phytochemical screening of endophytic fungi isolated from *Cenopsis decandra* (Griff.) W. Theob, a mangrove plant in Bangladesh

Nazim Hossain^{1,2,3}, Farhana Akter⁴, Md. Nadim Begum⁵, Sayajit Roy Roy⁶, Sarita Bhattacharya⁷, Fatima Moin⁸, Choudhury Mahmood Hasan¹, Souvik Shikha⁹, Md. Hossain Sadek¹⁰

Abstract: The present study was designed to investigate the cytotoxicity and antimicrobial activity of the endophytic fungus *Fusarium solani* isolated from the plant *Azadirachta indica* Linn. The fungus was cultured on various media and the resulting metabolites were screened for cytotoxicity and antimicrobial activity. The results showed that the fungus produced several cytotoxic and antimicrobial compounds. The structure elucidation of these compounds was confirmed by 1D and 2D NMR spectroscopy.

Physicochemical, Pharmacokinetic and Cytotoxicity of the Compounds Isolated from an Endophytic *Fusarium sp.* in *Vitro* and *In Silico* Approaches

Nazim Hossain^{1,2,3}, Farhana Akter⁴, Md. Nadim Begum⁵, Sayajit Roy Roy⁶, Sarita Bhattacharya⁷, Fatima Moin⁸, Choudhury Mahmood Hasan¹, Souvik Shikha⁹, Md. Hossain Sadek¹⁰

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Major contributions

▪ Impurity analysis of generic drugs

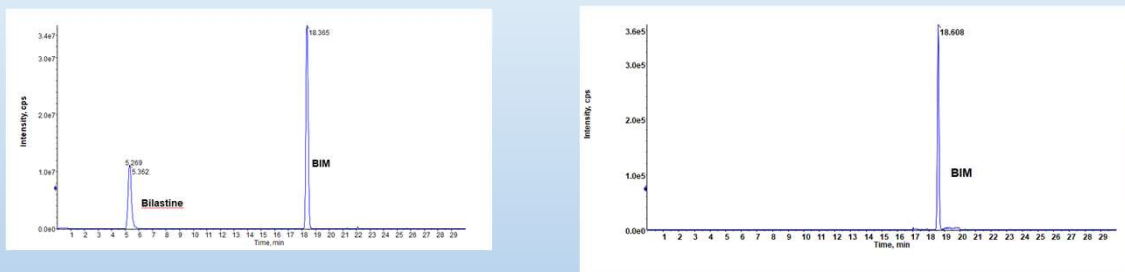


Figure: Impurity Analysis of Bilastin

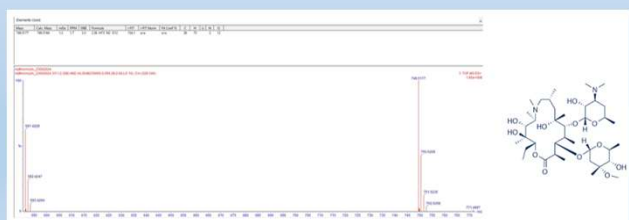
25

Major contributions

▪ Qualitative screening of different generic drugs



Ranolazine



Azithromycin

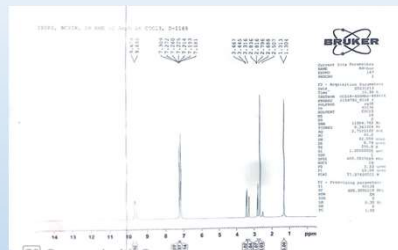
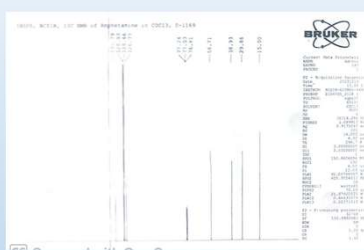
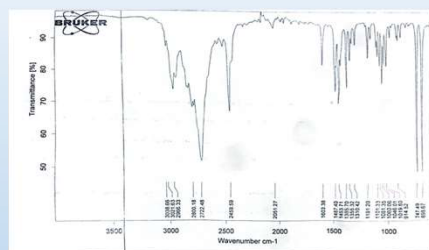


Caffeine

26

Major contributions

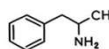
- **Detection of Amphetamine in narcotics product**

¹H NMR¹³C NMR

FTIR



HRMS



27

Major contributions



Product and method for treating thrombocytopenia.

Patent No.: WO2011028098.

World Intellectual Property Organization (WIPO),

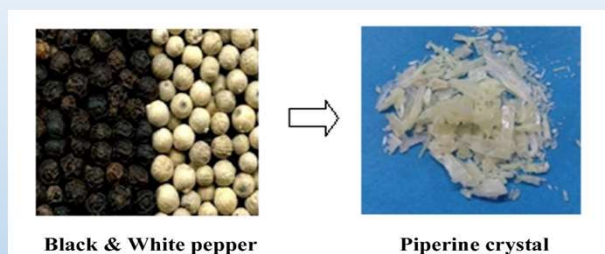
Publication date: 10.03.2011.

Process for the Preparation of Platelet Boost Capsules from *Carica papaya* Linn Leaves and the composition thereof (Patent No. 1005515, Accepted on 11.05.2014)

	Baseline platelet count ($\times 10^3/\mu\text{L}$)	Platelet count ($\times 10^3/\mu\text{L}$) after treatment with CP capsules (within day-1 to day-12)
'Cases' number (N) = 28 (Mean \pm SD)	101.93 \pm 26.15	173.75 \pm 29.98
P value (one tailed, dependent t test)	1.37225E-09 (<0.05) (Statistically significant)	
'Control' number (N)=28 (Mean \pm SD)	99.36 \pm 16.62	101.75 \pm 16.03
P value (one tailed, dependent t test)	0.10532466 (>0.05) (Not significant)	

28

Major contributions: Accepted Process and Patent



Black & White pepper **Piperine crystal**
Pure Piperine as Active Pharmaceutical Ingredient (API)
from Black Pepper and White Pepper



Fruit flavored salt for gastric comfort
(Leased out)

29

R & D Activities

Sl. No.	Project Title	Area
01.	Method Development for quantification of Naproxen, Pantoprazole and Atorvastatin using low volume of biological matrix by LC-MS/MS.	Bioavailability & Bioequivalence
02.	Formulation of hemorrhoid healing herbal supplements.	Dosage Form Design
03.	Morpho-molecular Identification and Biochemical Profiling of Endophytic Fungi Isolated from <i>Heliotropium indicum</i> .	Drug Discovery
04.	Assessment of antibiotic susceptibility pattern of pathogens responsible for common infectious diseases	Drug Discovery
05.	Quantification and Toxicity Assessment of Heavy Metal Contamination in Traditional Medicine of Bangladesh	Quality control
06.	Metabolomic profiling of three medicinal plants using an integrated approach and isolation of bioactive compounds.	Drug Discovery
07.	Method development and validation of two International Nonproprietary Names (INN) Drugs.	Quality control

30

R & D Activities

Sl. No.	Project Title	Area
08.	Dengue seroprevalence and the association of infecting dengue virus serotypes with clinical manifestation	Drug Discovery
09.	Drug discovery study on potential medicinal plants of Bangladesh and their associated endophytic fungi.	Drug Discovery
10.	Molecular characterization of extended spectrum of Beta-lactamase producing bacteria in ready to eat foods	Drug Discovery
11.	Isolation and Identification of Efflux Pump Inhibitors (EPIs) for Multi Drug Resistant Bacteria from Natural Sources.	Drug Discovery
12.	Isolation and Identification of Efflux Pump Inhibitors (EPIs) for Multi Drug Resistant Bacteria from Natural Sources.	Drug Discovery
13.	Metabolite profiling and bioassay correlation of Vitex sp. and Persicaria sp. for isolation of natural anticancer agent.	Drug Discovery
14.	Identification of pharmacophore of isolated bioactive compounds and their structure activity relationship (SAR) study	Drug Discovery

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State-of-
the-art
Research
Facilities in
IBSPS



32

Bioequivalence Study Centre

This is the  BCSIR is going to start

Bioequivalence study in Bangladesh.

Bioequivalence Study Centre

To Conduct Bioequivalence study, we are going to start CRO...

“Institute of Bioequivalence Studies and Pharmaceutical Sciences (IBSPS)”

Bioequivalence Study Centre

• Progress to start CRO

• SI. • no.	• Item	• Yes or No
1.	CRO Profile	Yes
2.	Organogram	In progress
3.	CV for Researchers and Members	In progress
4.	Job Description	Yes
5.	Whether every person involved in clinical trial has got GCP training	Will be taken in month of February
6.	Clinical trial site master file	In progress
7.	Whether the CRO/CRC has bio-analytical Lab	Yes

Bioequivalence Study Centre

SI. no.	Item	Yes or No
8.	Whether any chief investigator designed or contracted to the CRO/ CRC	In progress
9.	Whether the CRO got IRB/IEC	In progress
10.	Storage facility of IP	Yes
11.	SOP for Handling of IP	In progress
12.	Archive Facility	Yes
13.	Does the CRO/CRC have hospital facility	Yes
14	Quality Management	Yes

Bioequivalence Study Centre

Bio-analytical Laboratory



SCIEX 7500 LC-MS/MS



WATERS Xevo LC-MS/MS



WATERS HPLC

37

Compound Characterization Facilities in IBSPS

- Drug Discovery and Bioassay Lab:



600 MHz NMR Spectrometer



High Resolution Mass Spectrometer

38

Formulation Laboratories in IBSPS

- **Formulation Lab:**



Tablet Compression Machine



Tablet Coating Machine



Rheometer



Particle Size Analyzer

39

Quality Control Laboratories in IBSPS

- **Quality Control Lab:**



GC-MS/MS



IR Spectrophotometer



UV-VIS Spectrophotometer



AAS (Flame & Graphite)



Ion Chromatography



Affinity Chromatography

Synthesis Laboratories in IBSPS

- **API Synthesis Lab:**



Synthetic Reactor



HPTLC-MS

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Analytical Services

- Antimicrobial, antioxidant and Cytotoxicity test of pharmaceutical products
- Identification & quantification of pharmaceutical products (HPLC, FT-IR, UV, 600 MHz NMR, LC-MS/MS etc.)
- Moisture content of sample/LOD determination
- Determination of total colony forming unit
- Quality parameters of Pharmaceutical finished products (Assay, Dissolution etc.)

42

Analytical Services

- Particle size Analysis
- Bioanalytical method development and validation to support Bioequivalence study.
- Recording high-resolution mass spectra for characterization of compounds
- Determination of heavy metals in pharma & cosmetics products
- Analytical service to elucidate the structure of unknown compounds using NMR and mass data.

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Stakeholders of IBSPS

• Educational Institutions



• Other Organizations



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Future Aspirations of IBSPS

- ❖ New Drug Development
- ❖ Translation of Research findings from academia or other research organizations
- ❖ Quality Evaluation of drugs to support local Pharma Company
- ❖ Bioequivalence study to facilitate the export of quality drugs
- ❖ To establish clinical trial facility for translational research

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BIOLOGY, A WAY OF GREEN LIFE

Biological Research Division (BRD)



Genomic Research Laboratory, BCSIR

- To achieve Sustainable Development Goal (SDG), the Government of the People's Republic of Bangladesh had established a **state-of-the-art genomic research laboratory in BCSIR**.
- It is the only organization in Bangladesh with the facilities to perform sequencing in large numbers and generate data rapidly.

Capability of Genomic Research Laboratory

- **Whole genome sequencing** of all living organism (human, animal, plants).
- **RNA Sequencing**, Whole exome sequencing.
- **Metatranscriptomics**, Differential gene expression analysis.
- **Metagenomics** (environmental microbes like water, air, soil, gut microbiome etc.).
- **Targeted cancer genotyping** (Breast Cancer, Ovarian Cancer, Lung cancer etc.).
- Cancer gene detection through gene panel sequencing (BRCA1, BRCA2).
- Data analysis and interpretation.
- BCSIR got the capacity to produce and supply primers within Bangladesh.



NovaSeq6000,
HighThroughput
Whole Genome
Sequencer



**MiniSeq, Small
Genome Sequencer**



**NextSeq550, High
Throughput Whole
Genome Sequencer**



Oligonucleotide synthesizer

49


Invention of BCSIR-COVID Kit to Facilitate Low Cost COVID-19 Detection

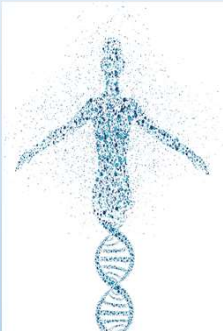
- Can detect **all types of variants** (Alpha, Beta, Gamma, Delta, Omicron, etc.)
- **Specificity, sensitivity and accuracy** is better than the Gold standard available kit. The kit allows as little as 100 copies of SARS CoV-2 genome/mL to be detected
- **Low cost**
- The RNA extraction procedure is completely unique and cost effective.


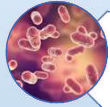
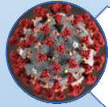



50

Whole genome sequencing done by Genome Lab







-  100 Whole Human Genome Sequencing
-  More than 400 samples of Bacteria
-  More than 1300 samples of SARS-CoV-2 (Novel corona virus)
-  21 samples of Dengue virus

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Large scale production of disease free potato plantlets and microtubers, detection of virus through DAS ELISA test.




More than **50 private organization** received the technical support from BCSIR to establish Tissue Culture Laboratories.



In vitro regeneration of economically important medicinal plants


Transgenic Plants:

- Tomato
- Tobacco
- Strawberry
- Raspberry

To develop 

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Soil and Environment Research Section



2008 establishment

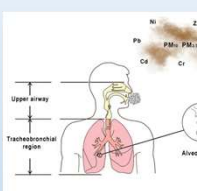
Strengthened in 2010

Achievement

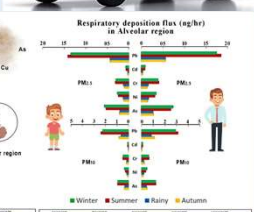
- ADP Project- 01
- R & D Project- 25
- Special Allocation Project- 05
- Consultancy Project- 02
- Publication- 150
- Student Supervision- 60
- Industrial Process- 02; Patent- 01



Air Pollution: Health Impacts and Mitigation Strategies

1. CMAQ- Community Multi-scale Air Quality modeling System
2. Spatiotemporal variation and Source apportionment of air-borne multi pollutants
3. **Respiratory deposition and health effects of airborne persistence toxic substance (PFAS, Phthalates, PAH, OCP, PCB, Dioxin, Furan)**
4. **Screening of Antibiotic Resistance gene in bioaerosol**
5. Removal of airborne toxin by evergreen tree species and Photo-bioreactor



Respiratory deposition flux (µg/hr) in Alveolar region

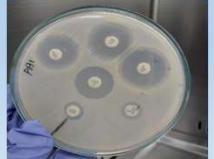


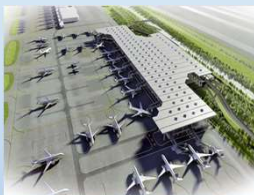
ng tree tolerance for air pollution improvement in Dhaka

Species	1	2	3	4
AP21				
AP1				
Chlorophyll a/b ratio				
SEAI				

M. indica > *F. benghalensis* > *F. religiosa* > *P. longifolia*



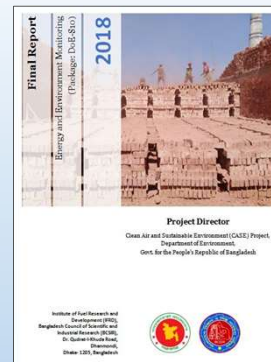
Technical support and service



MOU between BCSIR and DMRT



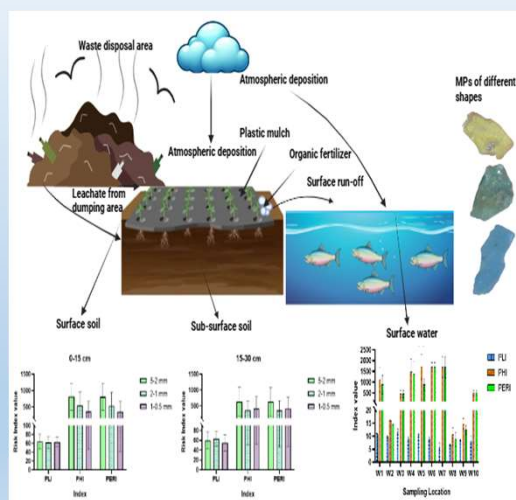
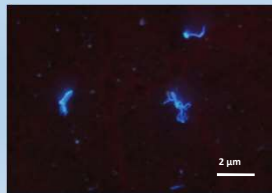
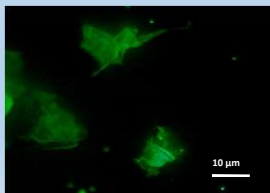
- ❑ Provide technical support to mitigate environmental pollution for Dhaka Mass Rapid Transit (Metro rail) and Hazrat Shahjalal International Airport Expansion Project
- ❑ Promoting sustainable technology to reduce emission load from brick kilns in Bangladesh
- ❑ Environmental Impact Assessment (EIA) of different industrial area, Economic zones and projects




Microplastics (MPs) contamination in environmental compartment

Key objectives


- Airborne microplastics characterization and sources apportionment in urban environment.
- Distribution patterns, bioaccumulation and potential health effects of microplastic in ecosystem and food chain.



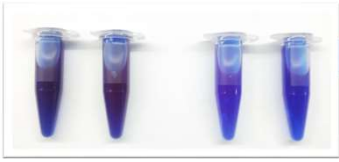
Achievements of Applied Botany Laboratory




Spirulina Pilot Plant




Spirulina Powder




**Liquid C-phycoyanin
(Food & Cosmetic grade)**




C-phycoyanin Powder



Algal Animal Feed



Commercial Spirulina Products



**Phycocyanin Market
Global Forecast (2024 – 2032)**

MARKET STATISTICS		SEGMENT STATISTICS	
Market Value (2023)	\$2 BN	Conventional product segment	Market Size (2023): \$1 BN
Market Value (2032)	\$3.6 BN	Powder form segment	CAGR (2024-2032): 6.7%
CAGR (2024-2032)	6.5%		
REGIONAL STATISTICS			
Asia	Market Size (2023)		
Pacific	\$200 MN		

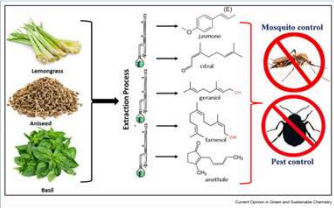
R & D activities of Plant Physiology Section

Scope of Work

- To increase the yield of various plants, crops & vegetables by using different **Plant Growth Regulators (PGR)**.
- Ensure the implementation of **organic fertilizer to sustain the quality of soil**.
- Application of sodium alginate from seaweed and chitosan from fungi, to develop a plant growth regulator.
- Development of need based products from plant sources

On Going R&D

Development of effective **bio-insecticide** for mosquito control






Fig: Plant Extract (Bio insecticide)




Fig: Treated Larvae

Activities of Plant pathology Section



Leather fungi



Plant extraction



Pathogenic fungi of rice

Activities

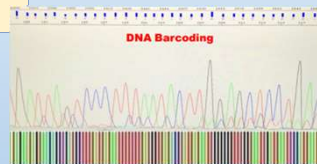
- ❖ Pathogenic fungi isolation from different crops and vegetables (Aromatic rice, potato etc) and their biological control.
- ❖ Biological remediation of finished leather growing fungi using different bio-control agents.

Ongoing research in Zoology Section

- ❖ **Formulation of poultry and ornamental fish feeds**
- ❖ **Zebra fish model system for genotoxicity research**
- ❖ **Molecular ecology and DNA Barcoding**
- ❖ **Insect and fungus inoculation for agar production**
- ❖ **Live fish feed culture techniques**



DNA Barcoding



Guppy



Sword tail



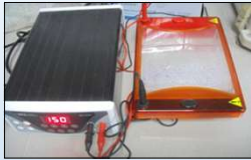
Agar insect larvae



Agar production Fungi



Equipments available in Zoology Section



Gel electrophoresis apparatus



UV-VIS Spectrophotometer



UV-Transilluminator



Stereo Microscope



PCR machine



Fish Feed Pellet Machine



Kjeldahl apparatus

61

Recent achievements of Zoology Section

Accepted Process (2023)



Spirulina-mixed fish feed



Tubifex-mixed fish feed



- Highly nutritious
- Natural color enhancer
- Growth promoting
- Not water fouling

- 100% Floating
- Low Price
- Local ingredients
- All types of ornamental fishes

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Analytical services provided by Zoology Section

- ❑ Proximate composition of fish and meat, fish feed, animal fodder etc.
- ❑ Crude nitrogen content analysis of organic samples.
- ❑ Morphometric & quantitative analysis of zooplankton.
- ❑ DNA Barcoding of animals and microbial sources.

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Chemical Research Division (CRD)



Chemical Research Division

Goals :

- ✓ Low-cost production and technological innovation utilizing indigenous resources.
- ✓ Production of raw materials for chemicals and pharmaceutical industries.
- ✓ Quality assurance of import/export products by providing analytical services.

Achievements

Patent: 20

Process: 70

Leased out in
market : 16

Leased out: 30



Published more than
200 articles



Few major products

Fire extinguisher
powder

Herbal Cosmetics

Activated carbon

Gum and adhesive

Chitosan

Liquid glucose

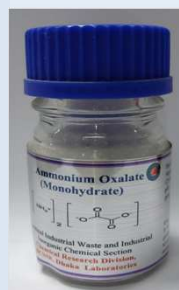
Glucosamine

Fine chemicals

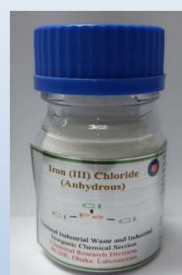
Lab reagents

Preparation of Analytical Research Grade Laboratory Chemicals from Commercial Grade Raw Materials

- i. Ammonium Oxalate $[(\text{NH}_4)_2\text{C}_2\text{O}_4]$,
- ii. Calcium Acetate $[\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2]$,
- iii. Ammonium Chloride $[\text{NH}_4\text{Cl}]$
- iv. Ammonium Acetate $[\text{NH}_4\text{CH}_3\text{CO}_2]$
- v. Sodium Molybdate $[\text{Na}_2\text{MoO}_4]$



Ammonium
Oxalate



Iron (III) Chloride



Ammonium
Chloride

Calcium Acetate
Hydrate



Analytical grade chemicals from
commercially available reagents

কেমিক্যাল রিসার্চ ডিভিশন

Leased out and ready for lease out product



Herbal Shaving Foam



Anti-Bacterial Hand Wash



Herbal Mosquito Spray



Ultrasound Gel



Baby Laundry Liquid Detergent



Aloe Gel



Neem Based Cream



Facial Cleanser



Skin Care Gel



Moisturizing Hand Wash



Air Freshener

Leased out and ready for lease out product



Body oil



Hand Sanitizer Gel



Herbal Body Wash



Herbal Skin Care Cream



Hair & Scalp Cleanser

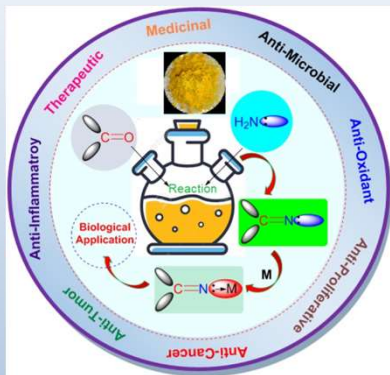


Herbal Face Wash



Dish Wash

Synthesis Laboratory



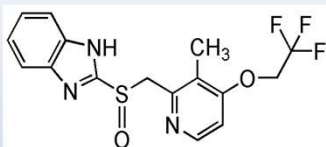
May 17, 2022

Starting materials/
reactants

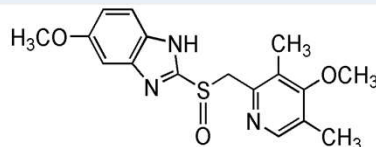
- ✓ Organic semiconductor
- ✓ Organic Light Emitting Diode (OLED)
- ✓ Fluorescence
- ✓ Liquid Crystal (LCD)
- ✓ Phosphorescence
- ✓ Chemosensor
- ✓ Macrocycle as a host
- ✓ Biological active
- ✓ Active pharmaceutical Ingredient (API)
- ✓ Natural product synthesis
- ✓ DFT Study

কেমিক্যাল রিসার্চ ডিভিশন

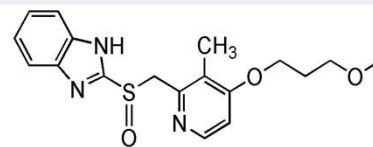
Target API (Proposed special R&D)



Dexlansoprazole

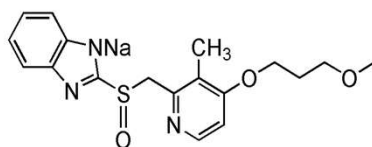


Omeprazole

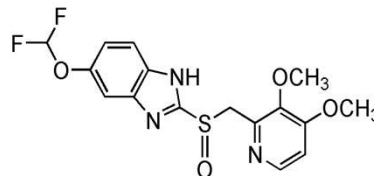


Rabeprazole

Proton-pump inhibitor (PPI)




Rabeprazole Sodium



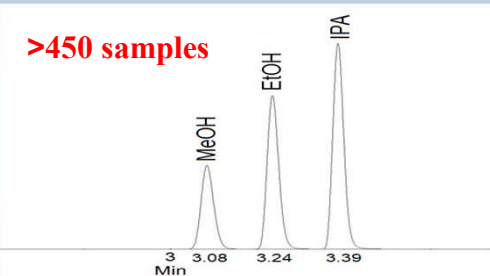
Pantoprazole

কেমিক্যাল রিসার্চ ডিভিশন


Alcohol-based Hand Sanitizers



>450 samples



Role in COVID Pandemic



WHO COVID-19 Research Database

World Health Organization

Home / Search / Alcohol based Hand Sanitizers amid COVID-19: Chemical Formulation, Analysis, Safety.

Alcohol-based Hand Sanitizers amid COVID-19: Chemical Formulation, Analysis, Safety.

Research Article
doi.org/10.1002/slct.202203290


ChemistrySelect

www.chemistryselect.org

Alcohol-based Hand Sanitizers amid COVID-19: Chemical Formulation, Analysis, Safety

ChemistrySelect, 2022, 7, e202203290


কেমিক্যাল রিসার্চ ডিভিশন



Fire
extinguish
powder

Carbonate
based

Phosphate
based

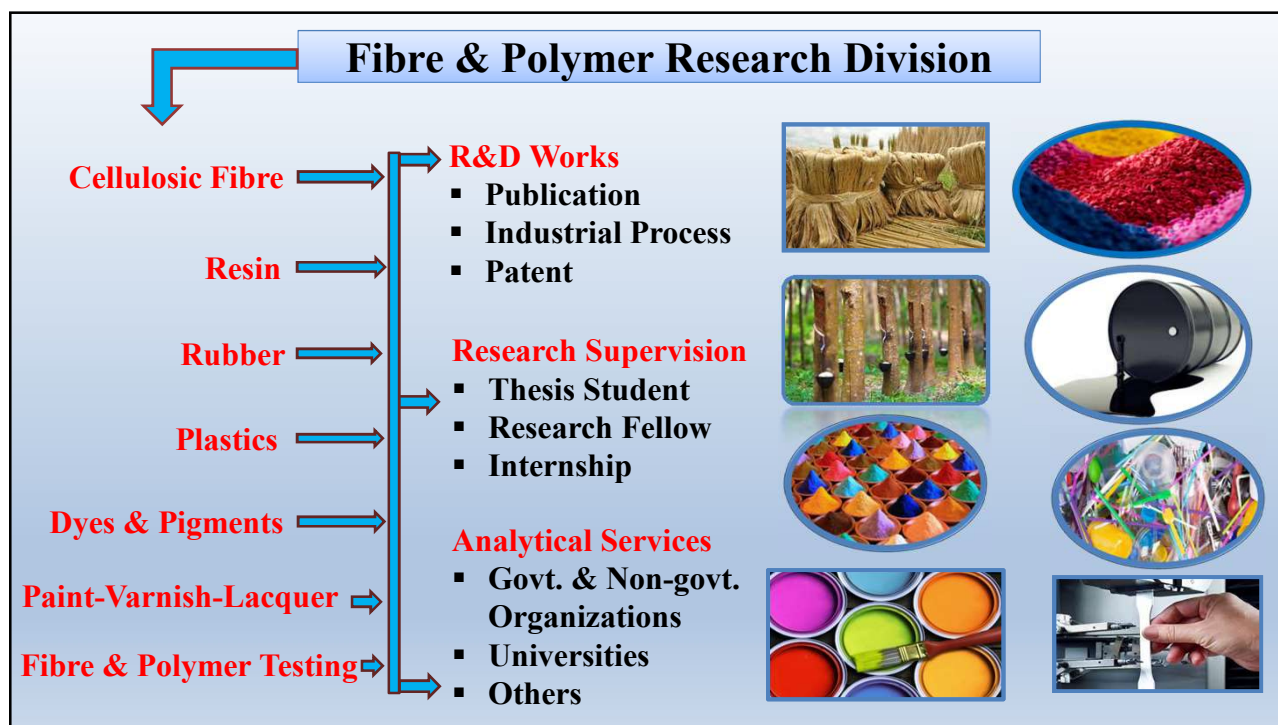


কেমিক্যাল রিসার্চ ডিভিশন

Analytical services (Industry products)

- Viscosity, Density, solubility, Moisture content, melting point of different samples
- pH and purity of soda ash, Calcium carbonate.
- Purity of all kinds of acid, Alkali, Salt
- Purity of organic solvents
- Activated carbon, Hydrose etc.
- FAME analysis
- Mosquito coil analysis (Allethrin, Esbiothrin, Dimefluthrin, Meperfluthrin)
- Pesticide DDT, Permthrin, Alcohol content analysis in Hand sanitizer/Hand rub
- Starch analysis, Polyaromatic hydrocarbon (Anthacene, pyrene) analysis
- Silver Nitrate, Nitric Acid, Ferric (III)Ammonium Sulphate
- Fire Extinguisher
- Cosmetics, Toiletries and Perfumery products: Cream, Lotion, Shampoo, Handwash, Soap, Body wash, Floor cleaner, Hair Oil, Perfume, Essential Oil etc.

কেমিক্যাল রিসার্চ ডিভিশন



Scientific Instruments: Fibre & Polymer Research Division



Measuring Extruder

ADP Title: Development of Fibre & Polymer Laboratory of BCSIR-Project

Implementation Period: July-2012 to June-2016



HS-GC-MS System



GPC/SEC System



CPC System

Scientific Instruments: Fibre & Polymer Research Division



STA



Synthesis System



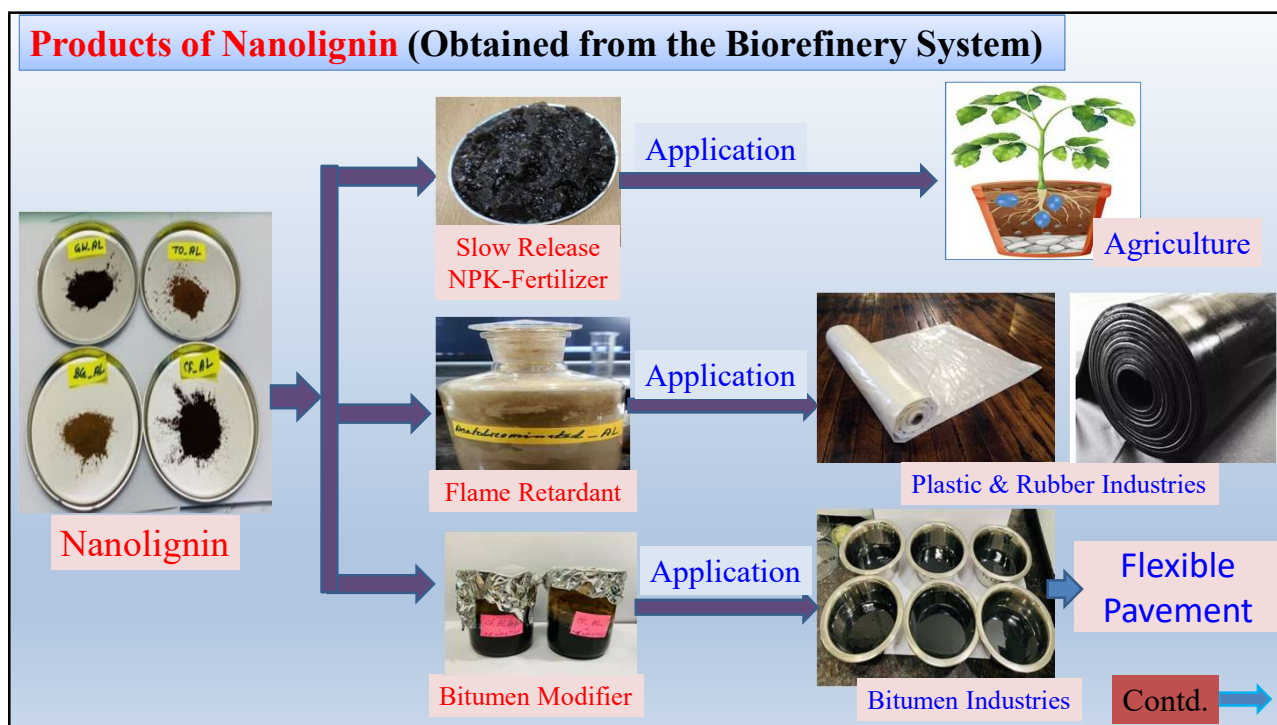
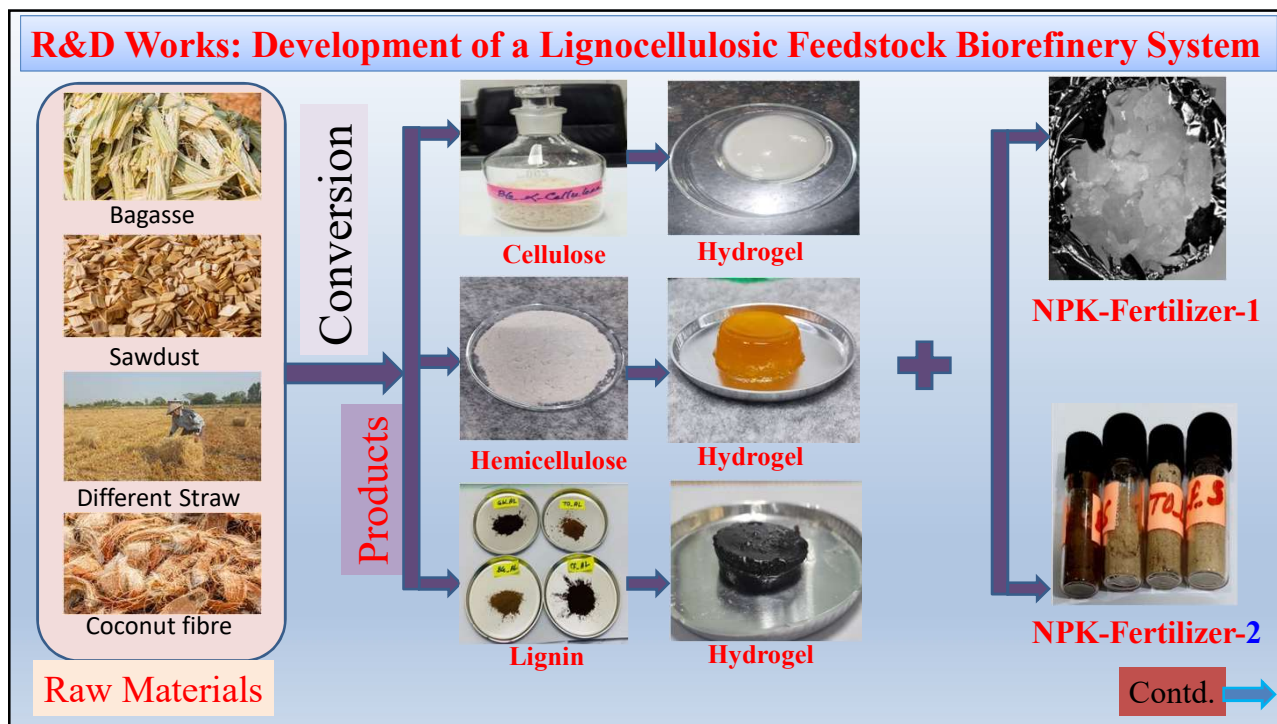
UTM

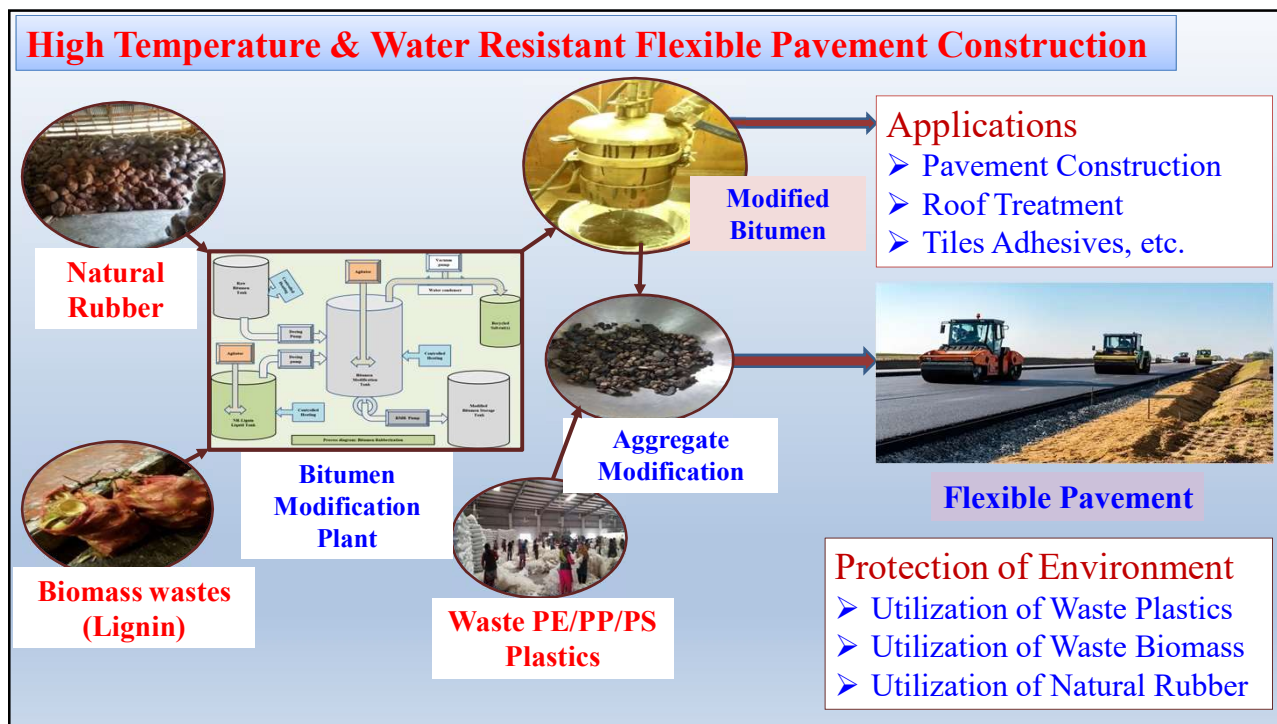


Light Fastness tester



FT-MIR-NIR System





Related Publications & Patent Applications

Development of a Material-Driven Phase III Lignocellulosic Feedstock Biorefinery System

Swapan K Ray, Riyadh H Bhuiyan, Tamvir Muslim, and M Q Ehsan*

Patent Submitted
(P/BD/2023/000162, Dated: 14.06.2023)

Advancing nutrient management in agriculture: Rice straw to nitrogen, phosphorus and potassium-containing hydrogel as slow-release fertilizer

Serna Khanam, Swapan Kumer Ray^{1,2}, Riyadh Hossen Bhuiyan¹, Shahin Sultana¹, Nahid Sharmin¹, Qamrul Ehsan¹

Patent submitted
BCSIR/39.02.0000.043.39.004.2
4/1057; Dated: 04.07.2024

Combined Use of Natural Rubber, Biomass and Plastic Wastes in Bitumen Modification and Flexible Pavement Construction

Authors: Swapan Kumer Ray, Riyadh Hossen Bhuiyan, Muhammad Saiful Islam, Md. Jaynal Abedin, Zahidul Islam, Raheed Hasan

Patent submitted
(P/BD/2021/000233; Dated: 19.07.2021)

Achievements: Last Three Years

Rendering Analytical Services to Industries, Govt. & Non-Govt. Organizations

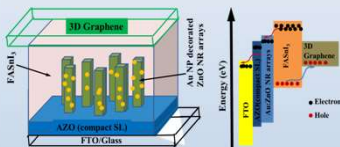


- Published Articles: 37
- Accepted Patent: 01
- Submitted Patent: 03
- Submitted Process: 01
- Analytical Service: >5000
- Student supervised: >50
- Training provided: >100

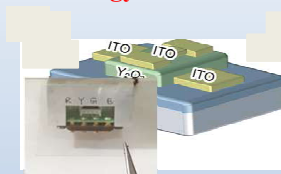
Industrial Physics Division

A place of innovative minds

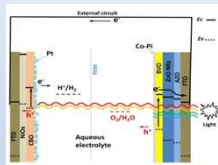
Energy Conversion & Storage



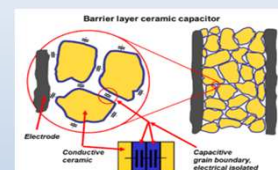
Nano-engineered Pb-free Perovskite Solar Cell



Transparent Conductive Oxides

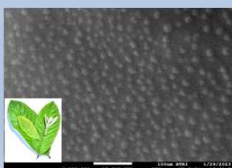


Metal oxides for Solar Fuels

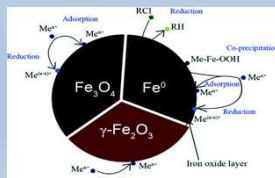


BaTiO₃ Ceramic & Thin films for Capacitor

Semiconducting & Magnetic Nanomaterials



Plant-extract mediated Nanoparticles Synthesis



Magnetic nanoparticles for Water Treatment



Nanocrystalline materials for Transformer Core

Research Scopes, Activities & Achievements (2023-2024)

	Advanced materials development for Optoelectronic and Photo-electrochemical water splitting devices
	High performance Dielectric and Semiconducting nanomaterials development for Energy conversion & storage
	Design and Fabrication of low-cost custom-made equipment and Automation of instruments to align with 4IR for enhancement of research
	Magnetic materials synthesis for transformer core, sensor, waste water treatment etc.

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Recent R&D Activities

High-performance dielectric materials for electrical and electronic device

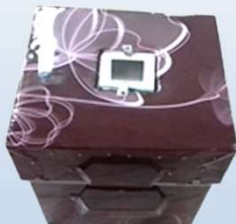
Construction of a Computer Controlled High Precision Hall Effect Measurement Setup

Fabrication of Ecofriendly Photoelectrodes for Sunlight-Driven Self sustained H₂ Production Devices

ZnO Nanorods for Low Cost and High Performance Optoelectronic Devices⁸⁴

LED (520 nm) "ON/OFF" modulated photocurrent

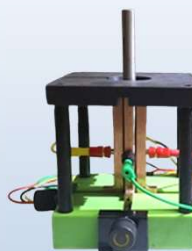
IPD Designed & Developed Affordable Instruments (SDG 11)



Domestic Oven



Portable Spin Coater



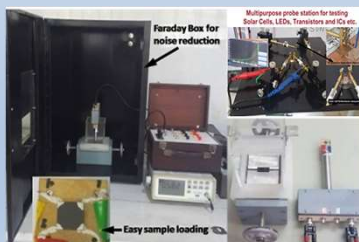
Precision Conductivity Probe



Four Point Probe



Humidity Control Setup



Precision Hall coefficient Measurement Probe

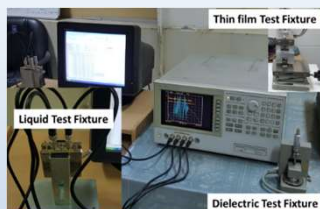


Light Source with Variable Wavelength, Intensity and Illumination Period

Notable Research Facilities



UV-VIS-NIR Spectrophotometer, Shimadzu 2600



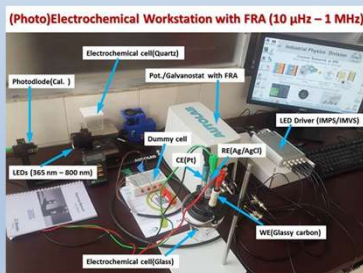
Impedance Analyzer, Agilent 4294A



Kiethly 2450 Source Measure Unit



Planetary Ball Mill, FRITSCH, Pulverisette 6



Electrochemical Work station (potentiostat/galvanostat), Metrohm, PGSTAT204



Contact Angle Goniometer, Ossila, L2004A1



Four-Point Probe, Ossila, T2001A3-UK



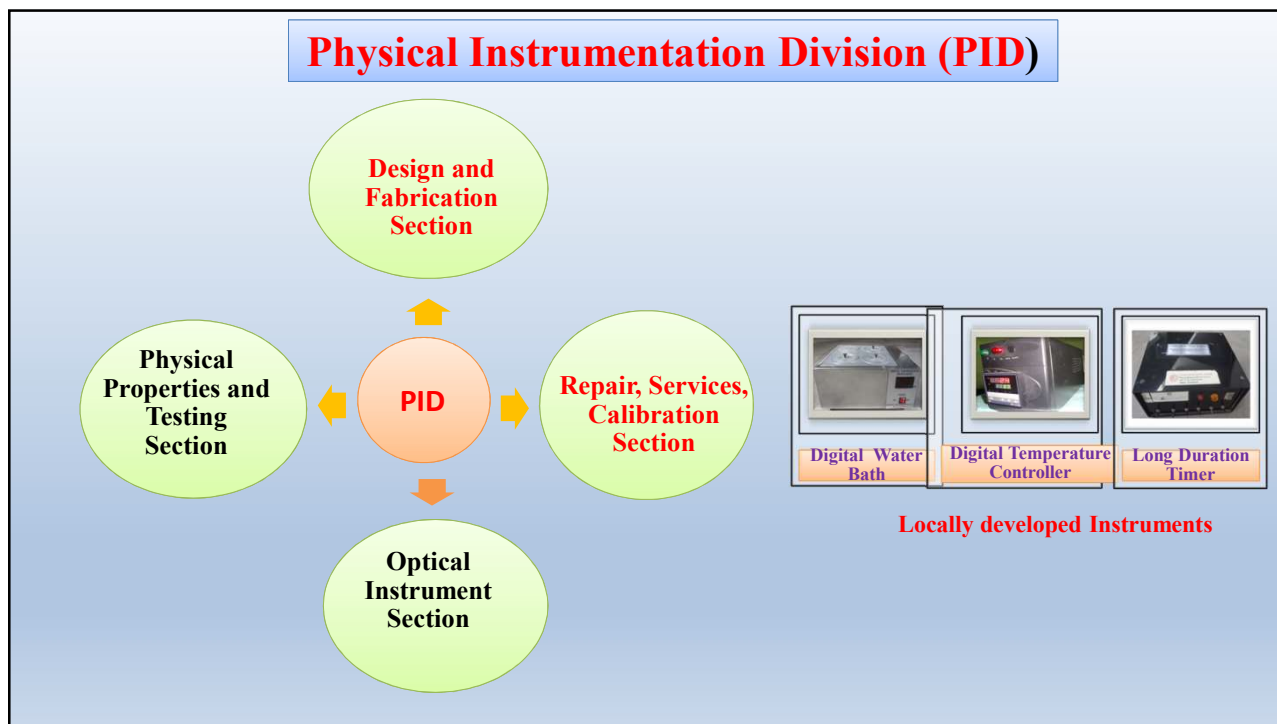
Spin Coater, Polos-SPIN150i



UV Ozone Cleaner, Ossila, L2002A2-UK




Solar Cell I-V Test System, Ossila, T2003E2-UK




Physical Instrumentation Division (PID)

Achievements

- Paper Published:**
 - i. Journal Paper: 23
 - ii. Conference Paper: 37
- Developed Instrument: 6**
- Patent: 01**



Digital Multimeter/ Switch System



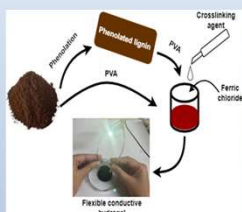
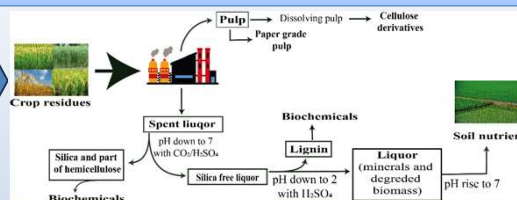
Digital Control Winding Machine

Pulp and Paper Research Division (PPRD)

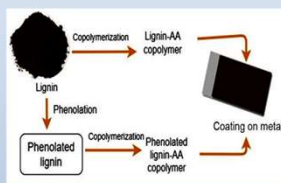


Major R & D activities

Potential raw materials from agricultural residue and their sustainability for pulp industries



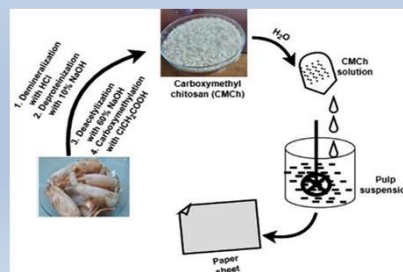
High-strength conductive hydrogel from phenolated lignin



Lignin based copolymer for metal coating

Lignin application for hydrogel preparation and metal corrosion inhibitor

Improve paper bonding strength by using modified non-wood hemicellulose, shrimp shells, Nanocellulose for packaging application and chemical modification of recycle paper



Analytical Services

- ▶ Paper strength properties
- ▶ Paper optical properties
- ▶ Paper chemical test
- ▶ Paper surface smoothness test
- ▶ Paper absorbance test
- ▶ Laboratory pulping process facility
- ▶ Paper furnishing optimization facility
- ▶ Laboratory paper sheet formation facility
- ▶ Lignocellulosic raw material characterization
- ▶ Tissue paper testing

National Contribution

- **National Curriculum and Textbook Board (NCTB):**

To ensure the quality of text books by delivering:

- ✓ Technical support in preparing specification of the papers for printing text books
- ✓ Analytical support by testing the quality of text book before and after printing
- ✓ Analytical support to the vendors who compete the tenders of NCTB for supplying papers
- ✓ Supporting the quality assessing authorities of text books who perform this work for NCTB

**National
Archive,
Security
Printing**



স্টেকহোল্ডার কর্মশালা ২০২৩-২০২৪ এর সুপারিশ ও গৃহীত পদক্ষেপসমূহ

সুপারিশসমূহ	গৃহীত পদক্ষেপসমূহ
<input type="checkbox"/> NMR সার্ভিস প্রদান করার সুপারিশ করা হয়।	<input type="checkbox"/> বিসিএসআইআর ঢাকা গবেষণাগার-এর NMR (¹ H-NMR, ¹³ C-NMR, 2D-NMR, DEPT, COSY, NOESY etc) সার্ভিস প্রদান করা শুরু হয়েছে।
<input type="checkbox"/> বৈদেশিক নির্ভরতা কমিয়ে বেশি করে দেশীয় পদ্ধতি উদ্ভাবন করা।	<input type="checkbox"/> বিসিএসআইআর এর উদ্ভাবিত প্রসেস, পণ্য ও আবিষ্কারসমূহের বৃদ্ধির জন্য যুগোপযোগী উদ্যোগ গ্রহন করা হয়েছে।
<input type="checkbox"/> শিল্প প্রতিষ্ঠান এবং গবেষণা প্রতিষ্ঠানের সম্মিলিত উদ্যোগ গ্রহণের মাধ্যমে যৌথ গবেষণা প্রকল্প নেয়া যেতে পারে।	<input type="checkbox"/> শিক্ষা প্রতিষ্ঠান এবং গবেষণা প্রতিষ্ঠানের সাথে বিসিএসআইআর ঢাকা গবেষণাগার-এর যৌথ গবেষণা কাজ বৃদ্ধির জন্য পদক্ষেপ নেয়া হয়েছে।
<input type="checkbox"/> Medicinal Plant এ বিদ্যমান Bioactive Compounds এর লাইব্রেরী করা প্রসঙ্গে।	<input type="checkbox"/> Medicinal Plant এ বিদ্যমান Bioactive Compounds এর লাইব্রেরী করার উদ্যোগ নেয়া হয়েছে।

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Acknowledgements:

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- Director, BCSIR Laboratories Dhaka
- Colleagues, BCSIR Laboratories Dhaka

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