

Activities of Bangladesh Council of Scientific and Industrial Research (BCSIR)



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Director, BCSIR Laboratories, Dhaka

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Almaty, Kazakhstan

BCSIR Management

- **BCSIR Board** : The Chairman, 4 fulltime & 4 part time members
- **Advisory Council** : Formulates Policies
- **Research Units** : Headed by Directors

Introduction to BCSIR



Activities of BCSIR

Research

- To carry out scientific and industrial research
- Commercialization of developed Technology
- Development of new research institute
- To take necessary steps in commercialization of developed technology in other institutes.

Analytical Services

- Local industry
- Import and export
- Public and private traders
- University/Research Institute

Human resources

- Training
- Fellowship
- MSc/PhD student

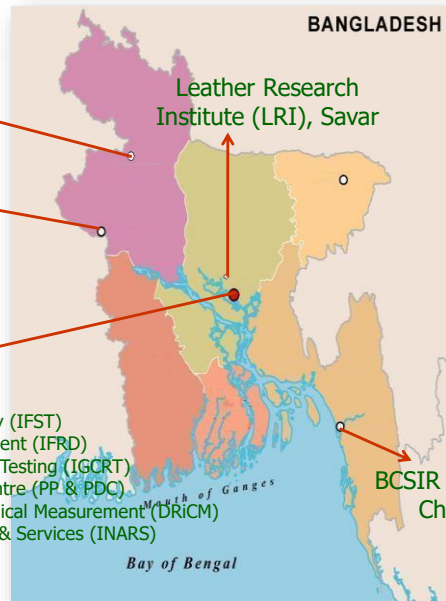
BCSIR wings

Institute of Mining, Mineralogy and Metallurgy (IMMM), Joypurhat

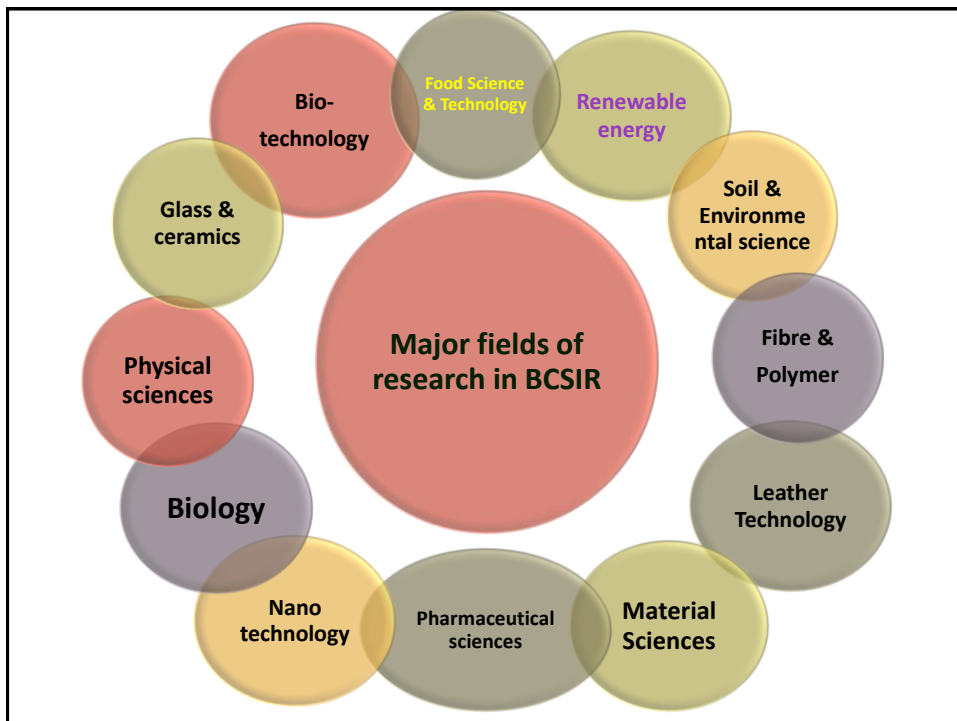
BCSIR Laboratories Rajshahi

Dhaka Main Campus:

1. BCSIR Laboratories, Dhaka
2. Institute of Food Science and Technology (IFST)
3. Institute of Fuel Research and Development (IFRD)
4. Institute of Glass & Ceramic Research & Testing (IGCRT)
5. Pilot Plant and Process Development Centre (PP & PDC)
6. Designated Reference Institute for Chemical Measurement (DRICM)
7. Institute of National Analytical Research & Services (INARS)
8. BCSIR Secretariat



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Activities of BCSIR: HRD

- **HR**
 - Posts of scientists: 473
 - PhD: 100
- **On going Higher Education (Ph. D)**
 - At Home – 45
 - From Abroad - 55
- **Fellowship offered to students: 50**



Development of method for cost effective and quality up gradation of phosphate based dry fire extinguishing agent



Phosphate based fire extinguishing powder



Available in Market

Aqueous and protein based foam concentrate for extinguishing Power plant and Aircraft fires



Formulation and development of herbal Skin care products, ultrasound gel by introducing Neem, Turmeric and Aloe



Ultrasound gel



Herbal hand wash



Mouth wash



Aloe Gel



Herbal Face Wash

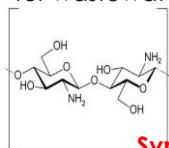


Neem Soap

Synthesis of carbohydrate acetate composite (CAC) for use in waste water treatment

Objectives:

Synthesis of chitosan/cellulose acetate bio-composite from indigenous sources for wastewater treatment.



Chitosan acetate
Cr efficiency 71%

Synthesis of chitin/chitosan-based derivatives for pharmaceutical uses

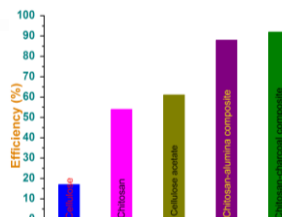


Fig. Cr removal efficiency.



Chitosan Powder.



Chitosan



Activated Carbon

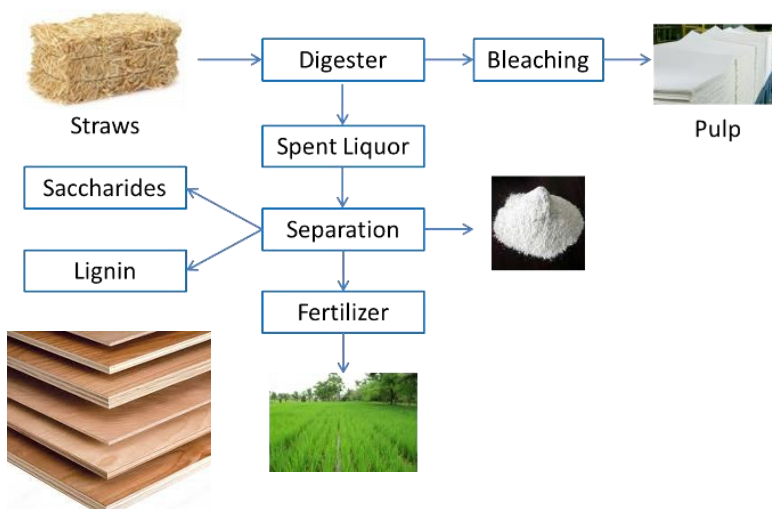


Microcrystalline cellulose



Low molecular weight chitosan (LMWC) and chitosan derivatives for use as food preservatives

BIOREFINERY



Polymer modified/rubber modified bitumen:



Constructed Pavement in BCSIR Campus

Polymer modified/rubber modified bitumen using waste plastics & natural rubber

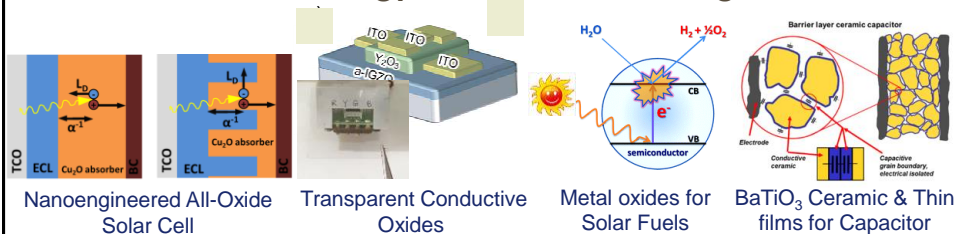
Could be used in Bangladesh (Considering present climate situation) for sustainable pavement construction.

Industrial Physics Division

A place of innovative minds



Solar Energy Conversion & Storage



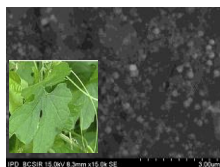
Nanoengineered All-Oxide Solar Cell

Transparent Conductive Oxides

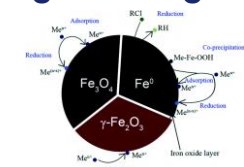
Metal oxides for Solar Fuels

BaTiO₃ Ceramic & Thin films for Capacitor

Semiconducting and Magnetic Nanomaterials



Plant-extract mediated Nanoparticles synthesis

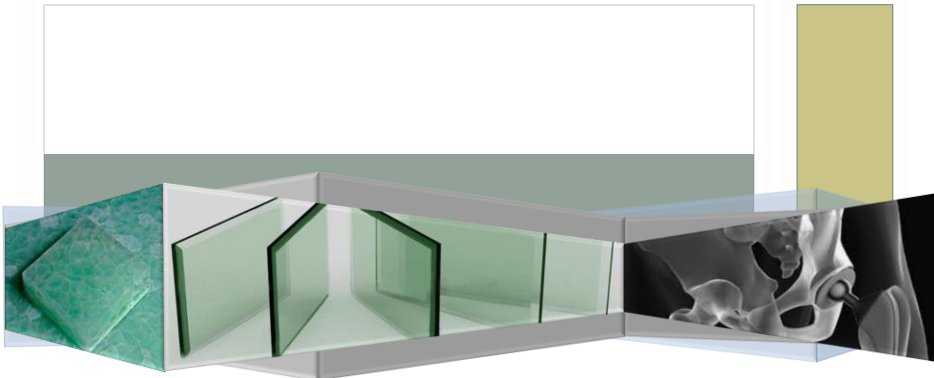


Magnetic nanoparticles for water treatment



Nanocrystalline materials for transformer core

Institute of Glass and Ceramic Research and Testing (IGCRT)



Advanced research

Healthcare ceramics

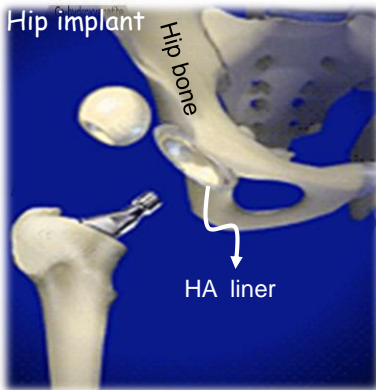
Magnetic ceramics

High performance construction materials

Eco-friendly glass & ceramics

Healthcare ceramics:

(1) Ca-hydroxyapatite (HA) —



A bone substitute **bio-ceramic** material for orthopaedics

Salient features:

- HA is chemically similar to the mineral component of bone and teeth

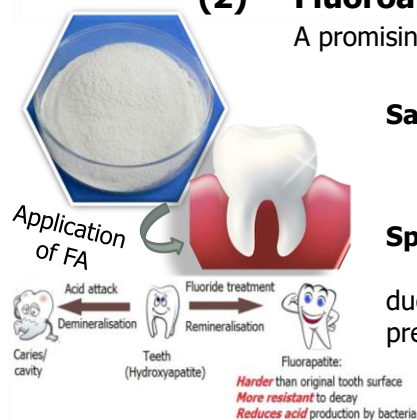
Specific application:

HA is being used as a bio-ceramic material in various applications (e.g. artificial bone, implant material etc.)

Present status: Patent and process accepted

(2) Fluoroapatite (FA) —

A promising **bio-ceramic** material for dentistry field



Salient feature:

- Prevents dental carries

Specific application:

FA is being used in dentistry field due to its extensive performance in preventing dental carries

Present status: Patent and process accepted

Magnetic ceramics:

(1) Strontium ferrite



Salient features:

- High electrical resistivity
- High stability

Applications: Electronic gadgets

(2) Magnetic Red Oxide



Applications: In magnetic resonance imaging (MRI) as contrast agents. In drug delivery or magnetic drug targeting as carriers.

Present status: Research work is going on

High performance construction materials:

(1) Cellular light weight foam for roof-

A seamless roof deck insulation



Salient features:

- Can be placed easily by pouring or pumping and does not require compaction, vibration or leveling
- Free flowing, spreads to fill all voids
- Excellent thermal insulation

Specific application:

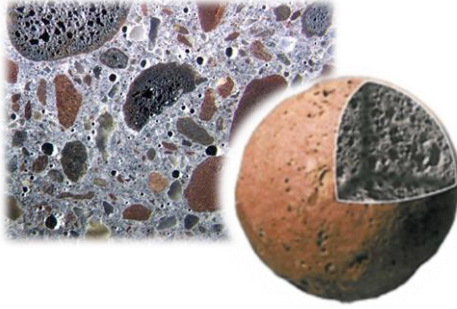
Roof insulation (জলহাদের

বিকল্প)

Present status: The project is in progress

(2) Lightweight clay aggregate -

An alternative of traditional coarse aggregate



Salient features:

- Lower bulk density
- Reduced weight

Specific application:

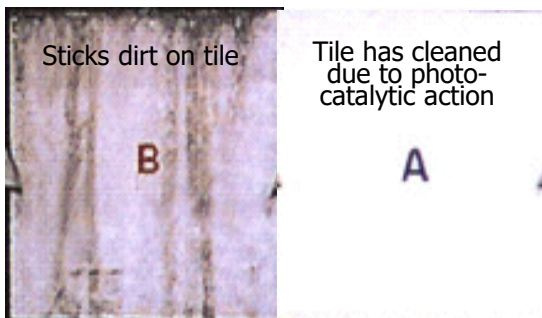
High performance concrete (HPC)

Present status: Research work is going on

Eco friendly glass and ceramics:

(1) Self-cleaning photocatalytic tiles -

Eco-friendly tiles



Salient features:

- Photocatalytic activity

Specific application:

Wash room, kitchen

A: Tiles with photocatalytic, superhydrophilic coating
B: ordinary painted wall tiles

Present status: The work is in progress

(2) Self-cleaning photocatalytic glass - Eco-friendly glass

Self-cleaning & anti-dirt surfaces



conventional glass
self-cleaning glass

Self-cleaning glass
 TiO_2 coating



Coatings - Inorganic

glass



transparent TiO_2



Salient features:

- Protects from environmental pollution
- Reduce maintenance cost

Present status: The work is in progress

INSTITUTE OF NATIONAL ANALYTICAL RESEARCH & SERVICE (INARS), BCSIR

.... committed to meet the SDG goal no. 6



ISO/IEC 17025:2005 CERTIFICATE FOR 74 PARAMETERS OF WATER OF INARS BY BANGLADESH ACCREDITATION BOARD (BAB)



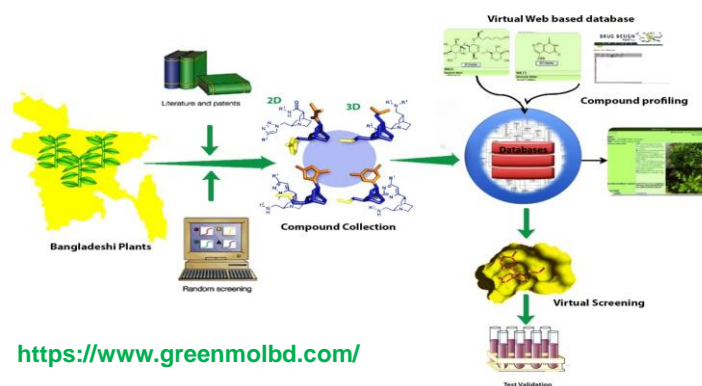
RECENT R& D PROJECTS OF INSTITUTE OF NATIONAL ANALYTICAL RESEARCH & SERVICE (INARS), BCSIR ARE FOLLOWING-

- Development of Low cost Arsenic Removal Technologies to mitigate Arsenic from contaminated water
- Removal of Heavy Metals from Polluted Water Using Low Cost Adsorbent Materials
- Removal of Lead from waste water by low cost Adsorbents
- Chemical fingerprint profile of secondary metabolites of selected medicinal plants
- Development of value added products from *Aquillaria malaccensis* Lam (Agar) and *Tergetes*
- Development and validation of analytical methods for the estimation of vitamins in medicinal and dietary products
- Isolation and characterization of Bioactive compounds from *Anethum sowa* Linn

BCSIR Laboratories, Chittagong

Molecular Modeling, Drug-design & Discovery Laboratory (MMDDL) research activities

Activities: Experimental evidence based database development of nature derived molecules of Bangladesh in the expedition of hit to lead/drug screening



Beneficiary of the Data Base: Design and development of web based Bangladeshi Natural compounds library, can be accessed worldwide, from any corner of world will accelerate the rational drug design discovery process.

Pilot Plant and Process Development Centre

Environment Friendly Chatal Boiler Developed by PP & PDC



Impact of New Environment Friendly Chatal Boiler developed by PP & PDC

Parameter	Conventional Chatal Boiler	New designed Chatal Boiler	Probable Saving %
Water Requirement	200,000 Liter/Year	100,000 Liter/Year	50%
Electricity Requirement	20,000 kWh/Year	10,000 kWh/Year	45%
Fuel Requirement	70,000 Kg/Year	45,000 Kg/Year	36%
GHG (CO ₂) Emission	40,980 Kg/Year	24,710 Kg/Year	38%
Life Time	3 Years	8-10 Years	
Cost	3 Lakh	5 Lakh	
Maintenance	No maintenance	Easy Maintenance	
Safety	No Safety measures	Safety features available	

Problems with local Chatal Mills:

Pollution

Efficiency <15%

Energy loss

Training on PLC and HMI for Industrial Automation

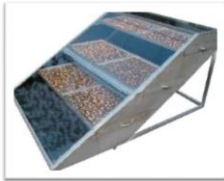


In view of developing skill manpower in the field of industrial automation, PP&PDC is conducting professional training program in PLC, HMI, VFD, Servo & Stepper motor and switch gear control for the fresh diploma & graduate engineers.

***Institute of Fuel Research
and Development***

Solar Thermal Appliances

Solar dryer for veritable and fish



Solar oven for small family



Solar hot water system for hospital



Solar still for emergency case like cyclone or fishing boat



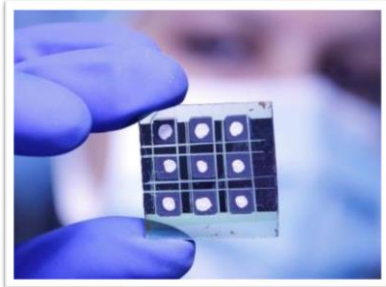
Solar Photovoltaic



Total 120 kWh grid tie solar power system installed for the first time in Bangladesh.



Solar Cell Research



For the first time in Bangladesh we fabricate CdTe based thin film solar cell from available raw materials

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Solar Cell Research

Other ongoing research

Transparent Conducting Layer

- FTO, ITO, AZO

Buffer layer

- CdS, ZnS, CdZnS

Absorber layer

- CZTS, CdTe, CdSe, ZnTe, CIGSe

Back contact

- Graphite, Mo, Ni, Ag, Cu, Al



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Products

Bio-diesel form non-edible sources



Radiator coolant



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NUTRITIVE SUPPLEMENTARY FOOD FOR PREGNANT AND LACTATING MOTHER

- Nutritious and delicious
- Vitamin and mineral rich
- Improve maternal health
- Ultimately improve child health



SPICY GUAVA PASTE (BREAD SPREAD)

- Nutritious and delicious
- Antioxidant rich
- Less expensive equipments
- Minimize Post harvest lost
- Socio-economic development
- Women Empowerment



MALTED WHEAT FLOUR

- Nutritionally rich
- Easily digestible
- Higher palatability



TRAINING

- ❖ In-house training on sophisticated laboratory instruments 15 training program per year (15-20 participants in each Training program)
- ❖ Training organize for army, navy and air forces officers and Sanitary inspectors.
- ❖ Training organize for different technical persons in industry
- ❖ Training organize for rural people in different parts of the country

Capacity Building

Capacity Building through ADP

- Establishment of Physical Facilities for Technology Transfer and Innovation in BCSIR.
- Strengthening of Leather Research Institute.
- Capacity Building of IFST for Research on Milk and Dairy Products.
- Establishment of Mineral Processing Center at IMMM, BCSIR, Joypurhat.
- Establishment of Institute of Bioequivalence Studies and Pharmaceutical Sciences
- Establishment of Genomic Research Laboratories
- Enhancement of the Infrastructure of Chemical Metrology.

Technology Business Incubator



RAS (7.5 MT/yr) at ITTI-BCSIR



Feed:

Local and Imported:

Tk100-110/kg

Protein content: 36-40%,

Mortality < 1%

FCR > 0.93

Quality:

No residue, excellent taste and color, no Chemical and medicine used

Seven days soilless Grass Production for Livestock



Hydroponic Fodder System & Rotary Garden

Soil improvement by Twister technology.

BCSIR adopts twister technology from JDC, Japan via an MoU for sustainable developments of infrastructure.

Major Soil Problems on Roads



Side breakdown



Mud accumulation



Water accumulation



Stone disposition



Railway collapse



Embankments corrosion



Runways damage



River soil erosion



- **Nanotechnology**
- **Renewable Energy**
- **Food safety**
- **Essential oil and industrial surfactant**
- **Herbal Medicine and Medicinal Plant**
- **Biotechnology**
- **Leather/shoe Technology**
- **Bioequivalence study**
- **Biomaterials, Biochemical and Bio fuel (bio refinery)**
- **Materials and metallurgical science and engineering**

THANK YOU