

## SWAPAN KUMER RAY, Ph.D

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Office: Fibre & Polymer Research Division, BCSIR Dhaka Laboratories  
Bangladesh Council of Scientific & Industrial Research (BCSIR)  
Dr. Quadrat-I-Khuda Road, Dhaka-1205, Bangladesh

### Education

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Ph. D. in Chemistry University of Dhaka, Dhaka, Bangladesh	2024
M. Sc. in Chemistry National University, Gazipur, Bangladesh	2001
B. Sc. (Hons.) in Chemistry National University, Gazipur, Bangladesh	1998

### Professional Experience

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#### Principal Scientific Officer

Fibre & Polymer Research Division, BCSIR Dhaka Laboratories  
Bangladesh Council of Scientific & Industrial Research (BCSIR) December 2019 to Present

#### Senior Scientific Officer

Fibre & Polymer Research Division, BCSIR Dhaka Laboratories  
Bangladesh Council of Scientific & Industrial Research (BCSIR) August 2011 to December 2019

#### Scientific Officer

Fibre & Polymer Research Division, BCSIR Dhaka Laboratories  
Bangladesh Council of Scientific & Industrial Research (BCSIR) June, 2006 to August 2011

### Technical Skill and Competences

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Lignocellulosic Biomass Processing & Biorefinery; Lignin Chemistry & Valorization; Analytical & Characterization Techniques of Polymers & Polymeric Systems (e.g., Rubber, Resin, Plastic, Paint, Lignocellulosic Biomass, etc.); Process Modeling & Research Design; Scientific Leadership & Research Management; Sustainability & Circular Economy Integration

## Skills on Research Tools & Techniques

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- Thermo-pressurized sequential acid/DES fractionation of lignocellulosic biomass for selective recovery of hemicellulose, cellulose pulp, and lignin
- Lignin isolation, chemical modification, and nanolignin fabrication, including flow synthesis and structure-property analysis
- Advanced materials characterization: FT-MIR-NIR, Raman, XPS, NMR, XRD, DLS, SEM/TEM, TGA/DSC, Chromatography, and Viscometry/Rheology, etc.
- Conceptual process modeling, reaction mechanism interpretation, and experimental optimization for integrated biorefinery systems
- Independent research leadership, grant writing, and laboratory supervision at Bangladesh Council of Scientific & Industrial Research (BCSIR)

## Research Grants (Selected)

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Principal Investigator	Development of natural rubber based composite modifier for water, heat and UV-light resistant rubberized-bitumen production (MOST SAP-2020-2021)
Principal Investigator	Thermochemical conversion of municipal and agricultural waste biomasses with green chemistry principle: Development of NPK fertilizer from waste liquors (MOST SAP-2021-2022)
Principal Investigator	Development of third generation material-driven lignocellulosic-feedstock biorefinery system: Chemical modification of alkali-lignin (MOST SAP-2022-2023)
Principal Investigator	Development of Agricultural Residue-based Hydrogel as NPK Containing Slow Release Fertilizer (MOST SAP-2024-2025)
Principal Investigator	Production of Nanolignin from Waste Lignocellulosic Biomass and Its Subsequent Diazotization (MOST SAP-2025-2026)

## Publications (Selected)

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- Ray SK, Bhuiyan RH, Muslim T, Ehsan MQ. Development of a material-driven phase III lignocellulosic feedstock biorefinery system. *ACS Sustainable Resource Management*. 2024 Sep 10;1(9):1994-2013.
- Ray SK, Bhuiyan RH, Khanam S, Muslim T, Ehsan Q. The acetobromination of alkali-lignin through a flow chemistry approach. *International Journal of Biological Macromolecules*. 2025 Aug 1;319:145451.
- Khanam S, Ray SK, Bhuiyan RH, Sultana S, Sharmin N, Ehsan Q. Advancing nutrient management in agriculture: Rice straw to nitrogen, phosphorus and potassium-containing hydrogel as slow-release fertilizer. *Industrial Crops and Products*. 2025 Feb 1;224:120380.

- Khanam S, Yeasmin F, Mondal AK, Naim MR, Chowdhury A, Ray SK. Redox-driven ultrafast synthesis of lignin-based hydrogel: Optimization, characterization and prospects for slow NPK-fertilizer release under varied environmental conditions. *Industrial Crops and Products*. 2025 Dec 1;237:122199.
- Khanam S, Eti SA, Bashar MS, Sujan SA, Sharmin N, Ray SK. Dynamic absorption of heavy metal from aqueous solution using lignin-hydrogel and natural filter materials in a packed column system. *International Journal of Biological Macromolecules*. 2025 Apr 1;302:140356.

## **Conference Presentations (Selected)**

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- Oral Presentation in BCSIR Congress-2022, BCSIR Campus, Dhaka-1000
- Oral Presentation in BCSIR Congress-2023, BCSIR Campus, Dhaka-1000
- Oral Presentation in ICEPSD-2022, Senate Bhaban, Dhaka University, Dhaka-1000
- Oral Presentation in CESSD-2019, Senate Bhaban, Dhaka University, Dhaka-1000

## **Thesis Supervision**

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- Supervised more than 20 M.S theses on topics including Lignocellulosic Biomass Processing & Biorefinery; Lignin Chemistry & Valorization; Sustainability & Circular Economy Integration, etc.

## **Professional Memberships (Selected)**

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- Life-member of Bangladesh Chemical Society, Dhaka, Bangladesh

## **Professional Trainings**

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### **Project Management (Selected)**

- Management Skill for Project Executives, NAPD, Dhaka-1000.
- Evaluation & Monitoring of Development Projects, NAPD, Dhaka-1000.
- Learning Session on Patent Drafting & Industrial Process, BCSIR, Dhaka-1000
- Techno Economical and Feasibility Study, BCSIR, Dhaka-1000
- The Patent Cooperation Treaty (PCT) and Youth, Bangladesh Patent Office, Dhaka-1000

### **Laboratory Accreditation**

- Training Course on Assessor; Bangladesh Accreditation Board, Dhaka, Bangladesh.
- Assessor ISO17025:2005 Training Course of UKAS, Sunningdale Park, Ascot, UK.
- Training Course on Method Validation and Traceability; Bangladesh Accreditation Board, Dhaka, Bangladesh.
- Training Course on Uncertainty of Measurement; UKAS, Sunningdale Park, Ascot, UK.

## **Training on Scientific Instrumentation (Selected)**

- Application Training on Flow and Batch Synthesis Systems: Techniques and Software operation, BCSIR, Dhaka, Bangladesh.
- Application Training on Size Exclusion Chromatography: Techniques and Software operation, BCSIR, Dhaka, Bangladesh.
- Application Training on FT-MIR/NIR Spectroscopy: Techniques and Software operation, BCSIR, Dhaka, Bangladesh.
- Application Training on FT-Raman Spectroscopy: Techniques and Software operation, BCSIR, Dhaka, Bangladesh.
- Application Training on Simultaneous Thermal Analysis (TG/DTA-DSC): Techniques and Software operation, BCSIR, Dhaka, Bangladesh.
- Application Training on Hyphenated Thermogravimetry-Gas Chromatograph-Mass Spectroscopic System (TG-GC-MS system): Techniques and Software operation, BCSIR, Dhaka, Bangladesh.
- Application Training on Headspace-Gas Chromatographic System (HS-GC-FID/ECD system): Techniques and Software operation, BCSIR, Dhaka, Bangladesh.
- Application Training on LC-MS/MS System: Techniques and Software operation, Waldbronn, Germany.

## **Grants/Awards**

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### **Project Director**

**July-2012 to June-2016**

Annual Development Project (ADP): Development of Fibre & Polymer Laboratory of BCSIR;  
Funded by the Ministry of Science & Technology, Government of Bangladesh).

## **References**

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Available up on request

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