

PENAKI TALUKDAR TURNA

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RESEARCH PROFILE

Applied chemistry graduate with a thesis-based MSc in rare-earth-doped spinel ferrite nanomaterials, carried out over two years at the Industrial Physics Division of BCSIR, with independent hands-on command of XRD, FTIR, UV-Vis DRS, SEM and impedance spectroscopy. First-author manuscript under peer review at *Journal of Magnetism and Magnetic Materials*. Since 2023, has designed and led mixed-methods research on textile-waste valorisation, ESG performance and climate impact for programmes funded by GIZ, UNDP, Oxfam and Swisscontact, delivering seven commissioned research studies. Seeking a thesis-based MSc in sustainable materials, environmental science or chemical engineering.

EDUCATION

Master of Science in Applied Chemistry and Chemical Engineering Nov 2021 - Nov 2023
Noakhali Science and Technology University (NSTU), Bangladesh CGPA 3.28 / 4.00
Thesis: *Impact of Yttrium Ions on the Structural, Optical, Magnetic and Electrical Properties of Cobalt Ferrite Nanoparticles*
Research site: Industrial Physics Division, Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka
Supervisors: Nazia Khatun, Senior Scientific Officer, BCSIR; Dr Mohammad Saiful Alam, NSTU

Bachelor of Science in Applied Chemistry and Chemical Engineering Nov 2016 - Nov 2021
Noakhali Science and Technology University (NSTU), Bangladesh CGPA 3.12 / 4.00
Selected projects: Biodegradable polymer based on natural components; medicinal uses, chemistry and pharmacology of *Gynura procumbens*

PUBLICATIONS AND MANUSCRIPTS

- Talukdar, P., Khatun, N., Farhad, S. F. U., Al-Mamun, Md., Alam, Md. S., Tanvir, N. I., Hossain, Md. S., Paul, T., and Islam, S. *Impact of Yttrium Ions on the Structural, Optical, Magnetic and Electrical Properties of Cobalt Ferrite Nanoparticles*. Submitted to *Journal of Magnetism and Magnetic Materials*. Under peer review, 2026. (First author)
- Talukdar, P. *Medicinal Uses, Chemistry and Pharmacology of Gynura procumbens: A Comprehensive Review of Biological Activity, Chemical Composition and Therapeutic Potential*. Review manuscript in preparation. (Sole author)

RESEARCH EXPERIENCE

Graduate Researcher, Nanomaterials Synthesis and Characterisation Nov 2021 - Nov 2023
Industrial Physics Division, BCSIR, Dhaka, in collaboration with NSTU

- Synthesised a series of yttrium-substituted cobalt ferrite (CoFe_2O_4) nanoparticles by co-precipitation, controlling dopant concentration, pH and calcination profile to isolate the effect of rare-earth substitution on the spinel lattice.
- Ran and interpreted the full characterisation workflow independently: XRD for phase purity and crystallite size, FTIR for bonding environment, UV-Vis DRS for optical band gap, SEM for morphology, and impedance spectroscopy for dielectric and electrical transport behaviour.
- Processed and modelled multidimensional datasets in OriginLab, establishing structure to property relationships across the doping series.
- Produced a complete physicochemical dataset and authored the resulting manuscript, now under peer review at an Elsevier materials journal.

Researcher and Project Associate, ATTI Bangladesh Needs Assessment Jul 2026 - Present
Apparel and Textile Transformation Initiative (IAF and ITMF) with Sustainability Nexus Ltd, Dhaka

- Conducting mixed-methods research (desk review, key informant interviews, focus group discussions, stakeholder surveys) across five pillars: data, capacity building, technology, finance and policy.
- Identified Key Industry Transition Needs across each pillar and co-facilitated the national findings meeting in Dhaka, convening BGMEA and BKMEA leadership to prioritise actions for solutions design.

Research Coordinator, ESG Compliance Assessment

Aug 2025 - Apr 2026

Swisscontact PROGRESS Project with Sustainability Nexus Ltd, Bangladesh

- Co-designed an ESG assessment framework for 19 Tier 2 and Tier 3 garment factories, adapting Higg Index, SA8000 and SMETA indicators to local environmental, social and governance conditions.
- Designed and ran a mixed-methods study across Dhaka, Gazipur, Narayanganj and Chattogram covering 400 workers and stakeholders; recruited, trained and supervised six field enumerators using KoboToolbox and SurveyCTO.
- Applied weighted ESG scoring with baseline comparison; conducted thematic analysis in NVivo and quantitative cross-tabulation in Excel.
- Delivered factory-level performance reports, recommendations and a monitoring and evaluation framework.

Research Assistant, Post-Industrial Textile Waste and Circularity

May 2024 - Dec 2024

GIZ with Sustainability Nexus Ltd, Bangladesh

- Mapped post-industrial textile-waste volumes, regulation, collection infrastructure and processing technologies through stakeholder interviews and market analysis.
- Triangulated evidence from waste collectors, processors, factory managers and NGO representatives to identify viable circular-economy pathways, and analysed the policy, infrastructure and technology gaps blocking them.

ADDITIONAL RESEARCH PROJECTS

Project Associate, Green Institutional ESG Assessment

Aug 2026 - Present

UNDP Bangladesh (SIPS Project) with Sustainability Nexus Ltd

- Contributing to the first formal ESG baseline assessment of a Bangladeshi public institution (BPSC), through institutional observation, stakeholder consultation and benchmarking, and supporting a Green Institutional Reporting Framework and improvement roadmap.

Project Associate, Climate and Social Research

Jan 2024 - Aug 2024

Oxfam International with Sustainability Nexus Ltd

- Led mixed-methods research on the effects of climate change and fossil-fuel dependency on garment workers' health, livelihoods and wellbeing; designed the survey and interview instruments, analysed qualitative and quantitative data, facilitated multi-stakeholder workshops and contributed to the resulting policy-advocacy report.

Project Associate, Sustainability Reporting Research

Nov 2023 - Jun 2024

BGMEA and GIZ with Sustainability Nexus Ltd

- Compiled environmental, social and governance data from BGMEA member factories and drafted disclosure sections aligned with GRI Standards for the association's first sector-level report.

CONFERENCE PRESENTATIONS AND INVITED SESSIONS

- **International Conference of the Bangladesh Electronics and Informatics Society, 2026.** Presented the yttrium-doped cobalt ferrite study and its structural, optical, magnetic and electrical findings.
- **Advancing Environmental and Social Compliance in Bangladesh RMG Sector, Swisscontact PROGRESS Project, Sep 2025.** Presented baseline and post-intervention performance assessments of selected factories and proposed improvement plans.
- **BAYLA Future Summit, Dhaka, Jul 2026; UN Global Compact Network Bangladesh Sustainability Day, Oct 2025; Green Skills and Environmental Sustainability in the RMG Sector, 2025.** Participant.

PROFESSIONAL EXPERIENCE

Senior Sustainability Engineer, The Sustainability Nexus Ltd

Oct 2023 - Present

Dhaka, Bangladesh

- Quantifies GHG inventories across Scope 1, 2 and 3 using GHG Protocol methods and recognised emission-factor databases, and supports science-based target planning.
- Conducts ESG gap assessments; analyses energy, water, waste, emissions and workforce datasets; develops evidence-based improvement roadmaps and environmental policies for industrial, institutional and healthcare clients.

- Prepares disclosure content aligned with GRI Standards, ESRS and the UN Global Compact Communication on Progress, and coordinates project teams, client engagement and field research.

Selected commissioned projects

- 2026, HREDD guidelines and risk assessment toolkit for the RMG sector, ActionAid Bangladesh; coordinated consultation with BGMEA, DIFE and the Ministry of Labour and Employment.
- 2026, ESG compliance assessment of 19 garment factories, Swisscontact PROGRESS Project; project lead and coordinator.
- 2026, ESG strategy and GRI sustainability report, Cutting Edge; project coordinator.
- 2024 to 2025, Scope 3 GHG assessment for Auchan Retail; Sustainability Report 2024 for Liz Fashion Industry Ltd; GRI reporting for BGMEA, GIZ-funded.

Laboratory Analyst Intern, Globe Pharmaceuticals Limited

Nov 2021 - Dec 2021

Noakhali, Bangladesh

- Supported quality assurance and quality control under GMP procedures, performing GC, AAS, FTIR, UV-Visible spectrophotometry and HPLC analyses.

Industrial Chemistry Trainee

2021

Training Institute for Chemical Industries, Bangladesh Chemical Industries Corporation

Final grade: A+

- Trained in industrial process control, analytical chemistry, environmental science and manufacturing quality control, with practical exposure to GC, GC-MS, HPLC, FTIR and ICP-OES instrumentation.

TECHNICAL AND RESEARCH SKILLS

Materials characterisation: XRD (phase, crystallite size, lattice parameter); FTIR; UV-Vis diffuse reflectance spectroscopy and optical band gap analysis; SEM; impedance and dielectric spectroscopy.

Synthesis: Co-precipitation of doped spinel ferrite nanoparticles; calcination and thermal treatment; sample preparation for solid-state characterisation.

Analytical chemistry: GC; GC-MS; AAS; HPLC; UV-Visible spectrophotometry; ICP-OES exposure; GMP laboratory practice.

Research methods: Mixed-methods design; survey instrument design; key informant interviews; focus group discussions; thematic analysis; cross-tabulation; triangulation; life-cycle thinking.

Software: OriginLab; NVivo; KoboToolbox; SurveyCTO; Microsoft Excel, Word and PowerPoint.

Frameworks: GRI Standards; ESRS and CSRD; GHG Protocol Scopes 1 to 3; Science Based Targets initiative; Higg Index; SA8000; SMETA; UN Global Compact; HREDD; ISO 9001; ISO 14001.

CERTIFICATIONS AND PROFESSIONAL TRAINING

- Residential Training on Human Rights and Environmental Due Diligence, Ethical Trading Initiative Bangladesh, 2026.
- CSRD Course Certification, Sustainability Reporting Institute, 2025.
- GRI Standards Training Certification, Global Reporting Initiative, 2024.
- Empower HER Skills Programme (ISO 9001, ISO 14001, GRI, ESRS, risk assessment, 5S, lean management, leadership), SGS Dhaka, 2024.

LEADERSHIP AND SERVICE

- **Vice President**, NSTU Dance Club, Jan 2023 to Dec 2024.
- **Senior Executive Member**, Chemiphilic Educational Organization, Oct 2019 to Oct 2023.
- **Volunteer**, Bangladesh Red Crescent Youth, Jan 2018 to Dec 2018.