# Niladri Talukder

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## PROFESSIONAL SUMMARY:

Ph.D. Mechanical Engineer specializing in nanomaterials for electrochemical energy storage and thermal systems. Proven record of leading research projects and translating lab-scale innovations into commercialization pathways. Experienced in advanced materials characterization, and cross-functional collaboration across academia, national labs, and industry.

## EDUCATION:

| ***Degree*** | ***Institution*** | ***Duration*** |
|---|---|---|
| Ph.D. in Mechanical Engineering | New Jersey Institute of Technology, NJ, USA | Sep 2020 — Dec 2025 |
| M.Sc. in Mechanical Engineering | Andong National University, South Korea | Sep 2015 — Aug 2017 |
| B.Sc. in Mechanical Engineering | Khulna University of Eng. & Tech., Bangladesh | Jan 2009 — Sep 2013 |

## SKILLS:

- **Materials Synthesis & Processing**: Graphene, N-doped graphene, MOFs, MXenes, and nano-carbon composites; ball milling, ultrasonication, and chemical functionalization; scalable nano-composite formulation, and process optimization.
- **Electrochemical & Energy Materials**: Lithium-ion battery, electrode architecture, interfacial stability, degradation mechanisms, cycling stability analysis, structure–property–performance correlation for energy storage systems.
- **Materials Characterization**: SEM, TEM, EDS, XPS, FTIR, Raman, XRD, DSC, TGA, EIS; structural, chemical, thermal, and electrochemical evaluation; graphitization assessment; surface chemistry analysis; degradation pathway identification.
- **Composite Design & Validation:** Design of functional composites; nano-dispersion optimization; reproducibility assessment; pilot-scale translation support; performance validation under controlled and long-term cycling conditions.
- **Experimental Design & Data Analysis**: Independent execution of controlled experiments; statistical analysis; reproducibility validation; structure–morphology–performance analysis; scientific reporting and documentation.
- **Process Optimization & Scale-Up Awareness**: Milling-assisted material engineering; particle morphology control; performance-driven materials optimization aligned with manufacturability and product development goals.
- **Technical Communication & Collaboration**: Cross-functional coordination with synthesis, characterization, and industry stakeholders; technical reporting; peer-reviewed publications; patent contribution; innovation pipeline support.

## PROFESSIONAL EXPERIENCES:

**New Jersey Institute of Technology (NJIT), NJ, USA.**

Position: Research/Teaching Assistant, and Research Associate — Sep 2020 — Current

- Project Lead: ***Carbon-based nanomaterials for electrochemical energy conversion and storage systems.***
  - Synthesize nitrogen-doped graphene/ZIF-8 (N-G/MOF) nanocatalysts for the oxygen reduction reaction (ORR) via ball milling and thermal treatment; optimize N-doping ratio and active sites by controlling milling speed and time, achieving catalytic performance surpassing N-G and approaching benchmark 10 wt% Pt/C catalyst performance.
  - Evaluate long-term stability and degradation mechanisms of N-G/MOF nanocatalysts under ORR conditions using electrochemical and advanced structural characterization techniques, establishing relationships between physical and chemical structures and catalytic performance under different operational environments.
  - Apply N-G/MOF composites in single-cell PEM fuel cells as cathode catalysts and evaluating cell performance.
- Project Lead: ***Nanomaterials-supported Phase Change Materials (PCMs) for thermal property enhancement.***
  - Leverage molecular-level interactions of engineered nanomaterials and PCMs to enhance thermal performance. Achieved ~5% increase in latent heat and ~10% improvement in thermal stability relative to the base PCM.
  - Lead a three-member team to assess the commercialization potential of Nano-PCM composites through the NSF I-Corps program. Conducted customer discovery interviews for market analysis, and value proposition validation.
  - Preparing NJIT Technology Innovation Translation and Acceleration (TITA) Seed Grant proposals and reports. Secure funding to advance technology development and commercialization efforts of novel PCM composites.

- Project Lead: ***Integrated Solar-HP system to improve efficiency and cost-effectiveness.*** [*NJ CSIT 225147*]
  - Develop heat-transfer models for integrated solar PV–heat pump (HP) systems to recover PV waste heat and evaluate seasonal performance and cost savings across U.S. cities. Achieving up to 25% PV waste-heat utilization.
- Maintain safe laboratory operations, including equipment oversight and raw material procurement, ensure regulatory compliance and supporting reliable prototype development and validation.
- Mentor 7+ undergraduate and graduate researcher assistants in materials synthesis, electrochemical testing, and data analysis while coordinating concurrent experimental activities and ensuring timely technical outcomes.
- Served as Teaching Assistant for 12 undergraduate and graduate engineering courses at NJIT for 4 years; strengthened technical communication, laboratory instruction, and student mentoring skills.

**Center for Functional Nanomaterials (CFN), Brookhaven National Laboratory, NY, USA.**

Position: Visiting Researcher *May 2021 — Dec 2025*

- Led four experimental research projects on the development of functional nanomaterials, emphasizing structure–property relationships for electrochemical fuel cells, batteries, and thermal energy storage materials.
- Established and maintained collaborations with scientists at the Center for Functional Nanomaterials (CFN); enabled advanced characterization and high-impact investigations of electrode materials and degradation mechanisms.
- Assisted the CFN staff in preparing the annual user facility report to the U.S. Department of Energy (DOE); contributed with technical content and publications to support program impact documentation.

**Source Associate Ltd., Bangladesh.**

Position: Executive (Engineering). *Oct 2019 — Dec 2020*

- Oversaw plant erection and installation activities to ensure compliance with NFPA standards; managed material planning and control processes; and developed detailed project plans and Bills of Quantities (BOQ).

**Andong National University, South Korea.**

Position: Graduate Research Assistant. *Sep 2015 — Oct 2017*

- Led a project for designing and operating a constant-volume combustion chamber with Schlieren and shadowgraph diagnostics for high-precision combustion studies. Measured laminar flame speed and Markstein length of alternative fuels, including n-butanol and fatty acid methyl esters (FAME). Experimental data supported combusted models.

## SELECTED PUBLICATIONS:

***Peer-reviewed Journal Articles: (4 out of 15)***

1. **Talukder, N.**; Wang, Y.; Tong, X.; Lee, E. S. Chemical Changes from N-doped Graphene and Metal-organic Frameworks to N-G/MOF Composites for Improved Electrocatalytic Activity. *Carbon* **2025**, 232, 119816. [*Link*]
2. **Talukder, N.**; Wang, Y.; Nunna, B. B.; Tong, X.; Lee, E. S. An Investigation on the Structural Stability of ZIF-8 in Water versus Water-derived Oxidative Species in Aqueous Environment. *Micropor. Mesopor. Mater.* **2024**, 366, 112934. [*Link*]
3. **Talukder, N.**; Wang, Y.; Nunna, B. B.; Tong, X.; Boscoboinik, A. J.; Lee, E. S. Investigation on Electrocatalytic Performance and Material Degradation of N-doped Graphene-MOF Nanocatalyst in Emulated Electrochemical Environments. *Industrial Chemistry & Materials* **2023**, 1, 360−375. [*Link*]
4. **Talukder, N.**; Lee, K. Y. Laminar Flame Speeds and Markstein Lengths of Methyl Decanoate – Air Premixed Flames at Elevated Pressures and Temperatures. *Fuel* **2018**, 234, 1346−1353. [*Link*]

***Conference/Symposium Presentations: (1 out of 16)***

1. Lee, E. S.; **Talukder, N.** Thermal Property Enhancement of Phase Change Materials (PCMs) by Engineered 2D N-Doped Graphene (N-G) Nanoparticle Support. *TMS 2026 Annual Meeting and Exhibition, San Diego, CA, USA*, **March 2026**.

## ACHIEVEMENTS, and AWARDS:

- Published 17 research articles in reputed scientific journals, international conferences (*Google Scholar Link*).
- Authored a book (13 Chapters) on Nitrogen-doped Graphene Nanomaterials: *Springer Nature 625624*. (June 2026).
- One non-provisional Patent Application through NJIT on nanomaterials supported Phase Change Materials. [*Link*]
- Five National Science Foundation (NSF) I-Corps grant awards for research and technology commercialization.