

# Musanna Galib

4-Year Doctoral Fellow (4YF) at Department of Mechanical Engineering  
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EDUCATION	<b>Ph.D.</b> • Mechanical Engineering (CGPA: 87%) [Sep 2020 - Sep 2025 ( <i>expected</i> )] UBC, Vancouver, BC, Canada <i>Dissertation title: Dendrite Inhibition Strategy using Hetero-epitaxy in Thin Film Deposition Mechanics</i>
	<b>M.Sc.</b> • Mechanical Engineering (CGPA: 3.92/4.00) [Apr 2017 – May 2019] BUET, Dhaka, Bangladesh <i>Dissertation title: Study of electro-mechanical properties of manganese-based nanocomposites for supercapacitors</i>
	<b>B.Sc.</b> • Mechanical Engineering (CGPA: 3.92/4.00; Rank: 4th in 180) [Apr 2012 - Feb 2017] BUET, Dhaka, Bangladesh <i>Dissertation title: Computer Modeling of Fire Smoke Movement in Multizone Structure Using Two Open Source Platforms</i>
RESEARCH EXPERIENCE	<b>Software Development</b> [2023- 2025] • Python package development at UBCV
	<b>Machine Learning Research</b> [2023- 2025] • Interatomic potential development at Modeling and Simulation Research Group, UBCV
	<b>Battery Research</b> [2020- 2025] • Battery recycling at Modeling and Simulation Research Group, UBCV • Multi-scale modeling at Modeling and Simulation Research Group, UBCV • Battery testing at Advanced Materials for Energy Storage Lab, UBCO
WORK EXPERIENCE	<b>Graduate Research Assistant</b> Dept. of Mechanical Engineering, UBC [Oct 2021- Apr 2025]
	<b>Graduate Teaching Assistant</b> (6 courses) Dept. of Mechanical Engineering, UBC [Sep 2022- Apr 2025] Dept. of Physics, UBC [Jan 2024- Apr 2024]
	<b>Assistant Professor of Teaching</b> (10 Courses) Dept. of Mechanical Engineering, BUET [Dec 2019- Sep 2021]
	<b>Lecturer</b> (13 Courses) Dept. of Mechanical Engineering, BUET [May 2017- Dec 2019]
TECHNICAL SKILLS	<b>Programming Languages:</b> Python, MATLAB, Bash, C, HTML, CSS. <b>Deep Learning Packages:</b> PyTorch. <b>Material Simulation Tools:</b> VASP, LAMMPS. <b>FEM Modeling Tools:</b> ABAQUS, MOOSE. <b>Visualization &amp; Design Tool:</b> Vesta, OriginPro, OVITO, Paraview, AtomsK, Solidworks. <b>Battery Testing:</b> Battery cell assembly, Cyclic testing, In-situ optical microscopy. <b>Clean-room Testing:</b> DEKTAK profilometer. <b>High-performance Computing (HPC):</b> Alliance, ARC Server. <b>Documentation &amp; Presentation Application:</b> Office Suite, LaTeX. <b>Operating System:</b> Windows (WSL), Linux (Ubuntu).

## HONORS & AWARDS

- Institute of Applied Mathematics (IAM) travel grant [May 2025]
- 1st prize in “Ideas With Impact” Competition by The Institute for Computing, Information and Cognitive Systems (ICICS) (Link) [May 2024]
- CSME Congress “Best Presentation Award” in Computational Mechanics at University of Toronto [May 2024]
- Conference Travel Support for ICICS Graduate Students for SES-2023 [Aug 2023]
- Collaborative Research Mobility Award (UBC CRMA) in UBC [Jan - Dec 2023]
- 4-Year Doctoral Fellowship in UBC [Sep 2020 - Aug 2024]
- Faculty of Applied Science Graduate Award in UBC [Sep 2021]
- President’s Academic Excellence Initiative Ph.D. Award in UBC [Sep 2020 - Apr 2025]
- International Tuition Award in UBC [Sep 2020 - Apr 2023]
- Bangladesh-Sweden Trust Fund (BSTF) Travel Grant for Ph.D. [2021]
- Dean’s List for 4 consecutive years in BUET [Feb 2013 - Feb 2017]
- University Merit for 4 consecutive years in BUET [Feb 2013 - Feb 2017]
- Board Scholarship in HSC 2011 [Jan 2011]
- Board Scholarship in SSC 2009 (37<sup>th</sup> (among 900k students) in Bangladesh) [Jan 2009]

## GRANTS & FUNDING

- DRI EDIA Champions in Digital Research Alliance of Canada [Amount: 35,000 CAD]  
*3.15 million funding opportunity (90 Grants) for graduate or post-graduate researchers in Canada* (Link)
- 4-Year Doctoral Fellowship in UBC (Link) [Amount: 93,267 CAD]

## PUBLICATION *Journal Publication*

- **Galib, M.**, Xu, J., Amardeep, A., Liu, J., and Ponga, M., ‘Dendrite Suppression in Zn Batteries Through Hetero-Epitaxial Residual Stresses Shield’, ACS Applied Materials & Interfaces , 2025 (Under Review). (Link)
- **Galib, M.**, Isiet, M., and Ponga, M., ‘AtomProNet: Data flow to and from machine learning interatomic potentials in materials science’, npj Computational Materials, 2025 (Under Review). (Link)
- Isiet, M., **Galib, M.**, Xiao, Y., Dadap, J. I., Ye, Z., and Ponga, M., ‘Understanding the spall behavior of alumina: A combined high-fidelity informed molecular dynamics and dual-pulse laser-induced femtosecond experiment approach’, Acta Materialia , 2025 (U. Review). (Link)
- **Galib, M.**, Orhan, K.O., Liu, J., and Ponga, M., ‘Residual Stress Development in Lattice Mismatched Epitaxial Thin Films via Atomic and Molecular Layer Depositions’, Journal of the Mechanics and Physics of Solids, 105897, 2024. (Link)
- Xu, J.\*, **Galib, M.\***, Wu, Z., Tao, L., Shao, Y., Zhang, Y., Guo, X., Hansen, E. J., Chen, Y., Wang, Z., Liu, C., Ponga, M., and Liu, J., ‘High-entropy Strategy to Suppress Volumetric Strain and Enhance Diffusion Rate of Na<sub>3</sub>V<sub>2</sub>(PO<sub>4</sub>)<sub>2</sub>F<sub>3</sub> Cathode for Durable and High-area-capacity Zinc-ion Battery Pouch Cells’, Nano Energy, 110373, 2024. (\*Co-first authors) (Link)
- Khan, A.A., Rabi, S.S., Jamee, T. **Galib, M.**, Ashek, F.E., and Rahman, M.A., ‘Effects of Crumpling Stage and Porosity of Graphene Electrode on the Performance of Electrochemical Supercapacitor,’ J. Phys. Chem. B, 128, 39, 9586–9597, 2024. (Link)
- **Galib, M.**, Orhan, K.O., and Ponga, M., ‘Engineering Chemo-Mechanical Properties of Zn Surfaces via Alucone Coating’, J. Phys. Chem. C, 127, 5, 2481–2492, 2023. (Link)
- **Galib, M.**, Hosen, M.M., Saha, J.K., Islam, M.M., Firoz, S.H., and Rahman, M.A., ‘Electrode Surface Modification of Graphene-MnO<sub>2</sub> Supercapacitors using Molecular Dynamics Simulations’, Journal of Molecular Modeling, 26, 251, 2020. (Link)

- Saha, P., Ishtiaque, M.M.U., Sutradhar, A., **Galib, M.**, and Hannan, M.A., ‘A sustainable approach to improve the efficiency of Earth Pipe Cooling System’, International Journal of Sustainable Engineering, 13, 5, 387-397, March 2020. (Link)

#### *Conference Publication*

- Arka, A.M., Mridha, R.H., Shafqat, R., **Galib, M.**, and Morshed, AKM M., ‘Design and Comparative Parametric Analysis Using NSGA-II for Multivariable Constrained Optimization of Shell and Tube Heat Exchangers’, 13th International Conference on Mechanical Engineering (ICME), December 2019, Dhaka, Bangladesh (Link)
- Saha, P., **Galib, M.**, Ishtiaque, M.M.U., Akanda, S.R., and Hannan, M.A., ‘Numerical Study on Improving the Efficiency of the Earth Pipe Cooling System’, International Conference on Civil and Environmental Engineering (ICCEE 2018), November 2018, Kuala Lumpur, Malaysia. (Link)
- Khandoker, M.A.R., **Galib, M.**, Islam, A., and Rahman, M.A., ‘Modeling of smoke movement in multizone garments building using two open source platforms’, The 7<sup>th</sup> BSME International Conference on Thermal Engineering 2016, June 2017, Dhaka, Bangladesh. (Link)
- Chatterjee, A., **Galib, M.**, and Sarkar, M.A.R., ‘Application of Arduino in designing modern electromechanical laboratory’, 2017 IEEE International Conference on Power, Control, Signals and Instrumentation Engineering (ICPSCI), June 2018, Chennai, India. (Link)

#### *Poster Presentation*

- **Galib, M.**, Liu, J., and Ponga, M., ‘Dendrite Inhibition Strategy using Hetero-epitaxial Residual Stresses in Thin Film Deposition Mechanics,’ 247th ECS Meeting, 19 May 2025, Montreal, Québec.
- **Galib, M.**, Liu, J., and Ponga, M., ‘Dendrite Inhibition Strategy using Hetero-epitaxial Residual Stresses in Thin Film Deposition Mechanics’, 16th World Congress on Computational Mechanics (WCCM), 24 July 2024, Vancouver, British Columbia.

#### *Book Chapter*

- Pelletier, J., Wolf, J., Scheer, E.R., Arora, J., **Galib, M.**, and Valdez, R., ‘Engineering Solutions to Equity, Diversity, and Inclusion’ chapter in the book ‘Equity, Diversity & Inclusion: Sisyphean Undertaking to an Achievable Reality’, 2025 (Under Review).

## **SOFTWARES**

### *Python Packages*

- AtomProNet: Atomic Data Processing for Neural Network (Link)
- SurfTrack: Dendrite tracking from in-situ optical microscopy (Link)
- MOOSEanalyze: Post-processing software for exodus file (Link)

## **CONTRIBUTED TALKS**

- ‘Dendrite Inhibition Strategy using Hetero-epitaxial Residual Stresses in Thin Film Deposition Mechanics’ [25 July 2024]  
16th World Congress on Computational Mechanics (WCCM 2024)  
Vancouver, British Columbia, July 21 - 26, 2024
- ‘Multiscale Approach to Study High Strain Rate Deformation’ [27 May 2024]  
Canadian Society for Mechanical Engineering (CSME)  
Toronto, Ontario, May 26-29, 2024
- ‘Dendrite Inhibition Strategy using Hetero-epitaxial Residual Stresses in Thin Film Deposition Mechanics’ [9 October 2023]  
Society of Engineering Science Annual Technical Meeting (SES 2023)  
Minneapolis, Minnesota, October 8-11, 2023

- ‘Using Thin Film to Improve Metal Anode Battery Safety’ [9 March 2023]  
Top presenter, Open heat - 3 Minutes Thesis (3MT)  
Vancouver, UBC, March 9, 2023
- ‘Residual Stresses in Thin Film Deposition Mechanics’ [19 October 2022]  
Society of Engineering Science Annual Technical Meeting (SES 2022)  
College Station, Texas, October 16 - 19, 2022

## PROFESSIONAL EXPERIENCES

- NASA Open Science 101, NASA Science Mission Directorate (Link) [Mar 2025]
- CIRTLL Associate, Center for the Integration of Research, Teaching and Learning [Oct 2024]
- Member, Battery Division, The Electrochemical Society (ECS) [2024-2025]
- Member, Canadian Society for Mechanical Engineering (CSME) [2024-2025]
- Member, Board of Undergraduate Studies of Mechanical Engineering, BUET [2017-2021]
- Member, Bureau of Research, Testing and Consultation (BRTC), BUET [2019-2021]
- Member, Publication and Secretariat committee, The 12<sup>th</sup> & 13<sup>th</sup> International Conference on Mechanical Engineering (ICME 2017 (Link) & 2019 (Link)) [2017, 2019]

## REVIEWER

- Additive Manufacturing; Journal of Energy Storage; Journal of Applied Physics

## WORKSHOPS & TRAINING ATTENDED

- Instructional Skills Workshop by Centre for Teaching, Learning, and Technology at UBC [Oct 2024]
- Project Management by Mitacs Inc., Canada [Nov 2023]

## EXTRA-CURRICULAR ACTIVITIES

- Steward, UBC Teaching Assistants’ & Instructors Union (CUPE 2278) [2024-2025]
- Vice President (External), Bangladeshi Grad Alliance (BGA) at UBC [2024-2025]
- Vice President (Academic), Mechanical Engineering Graduate Association, UBC [2022-2023]
- Award Leader, The Duke of Edinburgh’s Award Foundation Bangladesh [2017-2021]
- Gold Awardee of ‘The Duke of Edinburgh’s Award’ [2017]
- Financial Secretary at BUET Self Defense Club [2016-17]
- Member at United Nations Youth and Students Association of Bangladesh [2013-16]

## REFERENCES

- Mauricio Ponga, Ph.D.  
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