Musanna Galib

4-Year Doctoral Fellow (4YF) at Department of Mechanical Engineering
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EDUCATION

Ph.D. • Mechanical Engineering (CGPA: 87%) [Sep 2020 - April 2025 *(expected)*]
UBC, Vancouver, BC, Canada
Dissertation title: Dendrite Inhibition Strategy using Hetero-epitaxy in Thin Film Deposition Mechanics

M.Sc. • Mechanical Engineering (CGPA: 3.92/4.00) [Apr 2017 – May 2019]
BUET, Dhaka, Bangladesh
Dissertation title: Study of electro-mechanical properties of manganese-based nanocomposites for supercapacitors

B.Sc. • Mechanical Engineering (CGPA: 3.92/4.00) [Apr 2012 - Feb 2017]
BUET, Dhaka, Bangladesh
Dissertation title: Computer Modeling of Fire Smoke Movement in Multizone Structure Using Two Open Source Platforms

RESEARCH EXPERIENCE

Machine Learning Research
• Interatomic potential development at Modeling and Simulation Research Group, Mechanical Engineering, UBCV
Battery Research
• Multi-scale modeling at Modeling and Simulation Research Group, Mechanical Engineering, UBCV
• Battery testing at Advanced Materials for Energy Storage Lab, School of Engineering, UBCO

TEACHING EXPERIENCE

Graduate Teaching Assistant (5 courses)
Dept. of Mechanical Engineering, UBC [September 2022- April 2025]
Dept. of Physics, UBC [January 2024- April 2024]

Exam Invigilator
• Centre for Accessibility, UBC [November 2021- April 2025]
• UBC Sauder School of Business [December 2021- April 2025]

Assistant Professor (10 Courses)
Dept. of Mechanical Engineering, BUET [May 2019- September 2021]

Lecturer (13 Courses)
Dept. of Mechanical Engineering, BUET [May 2017- May 2019]

TECHNICAL SKILLS

Programming Languages: Python, MATLAB, Bash, C, HTML, CSS.
Deep Learning Packages: PyTorch.
Material Simulation Tools: VASP, LAMMPS.
FEM Modeling Tools: ABAQUS, MOOSE.
Visualization Tool: Vesta, OriginPro, OVITO, Paraview, Atomsk.
Battery Testing: Battery cell assembly, Cyclic testing, In-situ optical microscopy.
Clean-room Testing: DEKTAK profilometer.
High-performance Computing (HPC): Alliance, ARC Server.
Drawing & Design Tools: Solidworks.
Documentation & Presentation Application: Office Suite, LaTeX.
Operating System: Windows (WSL), Linux (Ubuntu).

HONORS & AWARDS

- 1st prize in "Ideas With Impact" Competition by The Institute for Computing, Information and Cognitive Systems (ICICS) [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 [August 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 (PAEIPA) in UBC [Sep 2020 - Apr 2025]
- International Tuition Award in UBC [Sep 2020 - Apr 2023]
- 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^{th} position in Bangladesh). [Jan. 2009]

PUBLICATION

Journal Publication

- **Galib, M.**, Liu, J., and Ponga, M., 'Dendrite Inhibition using Heteroepitaxial Residual Stress in Thin Film Deposition', 2024 (Under Preparation).
- Isiet, M., **Galib, M.**, Dadap, J., 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', 2024 (Under Preparation).
- **Galib, M.**, Orhan, K.O., Liu, J., and Ponga, M.,'Evolution of Residual Stresses in Lattice Mismatched Epitaxial Layers in Thin Film Deposition', J. Mech. Phys. Solids, 2024 (Under Review). (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 $Na_3V_2(PO_4)_2F_3$ Cathode for Durable and High-areal-capacity Zinc-ion Battery Pouch Cells', Nano Energy, 2024 (Under Review).(*Co-first authors)
- **Galib, M.**, Orhan, K.O., and Ponga, M., 'Engineering Chemo-Mechanical Properties of Zn Surfaces via Alucone Coating', 2022, J. Phys. Chem. C, 127, 5, 2481–2492. (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,' 2024, J. Phys. Chem. C (Under review). (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_2 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 7th 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 (ICPCSI), 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', 16th World Congress on Computational Mechanics (WCCM), 24 July 2024, Vancouver, British Columbia.

INVITED 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 Flim 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

SOFTWARES

Python Packages

- Imagekit: Dendrite tracking from in-situ optical microscopy (Link)
- pyVASPNN: Pre & post-processing of VASP data to extxyz for neural network training (Link)
- pyMOOSE: Post-processing software for exodus file (Link)

PROFESSIONAL EXPERIENCES

- Member, Battery Division, The Electrochemical Society [2024-2025]
- Member, Canadian Society for Mechanical Engineering [2024-2025]
- Member, Board of Undergraduate Studies (BUGS), Department of Mechanical Engineering, BUET [2017-2021]
- Member, Bureau of Research, Testing and Consultation (BRTC) [2019-2021]
- Member, Secretariat and Publication committee, The 13th International Conference on Mechanical Engineering (ICME 2019) [2019]
- Member, Publication committee, The 12th International Conference on Mechanical Engineering (ICME 2017) [2017]
- Intern at Kohinoor Chemical Co.- Bangladesh Limited [July 2016 – Sep 2016]

REVIEWER

- Additive Manufacturing [ISSN: 2214-8604]

EXTRA-CURRICULAR ACTIVITIES

- Steward & Department Representative, UBC Teaching Assistants' & Instructors Union (CUPE 2278) [Jan 2024 - Present]
- Vice President (Academic), Mechanical Engineering Graduate Association, UBC. [December 2022- December 2023]
- Award Leader, The Duke of Edinburgh's Award Foundation Bangladesh. [2017-2021]
- Gold Awardee of 'The Duke of Edinburgh's Award. [2017]
- Member at United Nations Youth and Students Association of Bangladesh (UNYSAB) [2013-16]
- Financial Secretary at BUET Self Defense Club. [2016-17]

REFERENCES

- Mauricio Ponga, Ph.D.
  Associate Professor, Department of Mechanical Engineering
  The University of British Columbia, Canada.
  ✉ mponga@mech.ubc.ca

- Jian Liu, Ph.D.
  Associate Professor, School of Engineering, Faculty of Applied Science
  The University of British Columbia, Canada.
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- Okan K. Orhan, Ph.D.
  Research Officer at Government of British Columbia
  Former Postdoctoral Research Fellow, The University of British Columbia
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  Lecturer, Department of Mechanical Engineering
  The University of British Columbia, Canada.
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