Jihong Aafia Ma, Ph.D.
Assistant Professor
Department of Mechanical Engineering
Department of Physics
University of Vermont
Burlington, VT 05405
Jihong.Ma@uvm.edu

Education and Training

Postdoctoral Associate, Macromolecular Sciences (05/2019 – 08/2020)
Oak Ridge National Laboratory, Oak Ridge, TN (Advisor: Dr. Yangyang Wang)

Postdoctoral Associate, Topological Metamaterials (09/2017 – 04/2019)
University of Minnesota, Minneapolis, MN (Advisor: Professor Stefano Gonella)

Ph.D., Mechanical Engineering (09/2012 – 06/2017)
University of Minnesota, Minneapolis, MN (Advisor: Professor Traian Dumitricã)
Dissertation title: Nanoscale Heat Transfer in Nanostructures with Defects and Mechanical Deformation: Toward Understanding and Engineering Thermal Transport

B.S., Engineering Mechanics (09/2008 – 06/2012)
Xi'an Jiaotong University, Xi'an, China (Advisor: Professor Xiaogeng Tian)
Thesis: Generalized Thermoelasticity in Layered Structures

Professional Employment and Research Experience

University of Vermont, Burlington, VT (09/2020 – Present)
- Assistant Professor, Department of Mechanical Engineering
- Assistant Professor, Department of Physics
- Assistant Professor, Materials Science Graduate Program (Executive Faculty Committee Member)

Air Force Research Laboratory, Wright Patterson, OH (07/2023 – 09/2023)
- Summer Faculty Fellow, Phonon Engineering of Solid-State Systems Program, Materials and Manufacturing Branch

Oak Ridge National Laboratory, Oak Ridge, TN (05/2019 – 08/2020)
- Postdoctoral Associate, Center for Nanophase Materials Sciences, Physical Science Directorate

University of Minnesota, Minneapolis, MN (09/2017 – 04/2019)
- Postdoctoral Associate, Department of Civil, Environmental, and Geo- Engineering

University of Minnesota, Minneapolis, MN (09/2012 – 06/2017)
- Research Assistant, Department of Mechanical Engineering

Publications

*Students and postdoctoral scholars underlined; *Corresponding author.*

Book:

1. **Ma, J**.*, Dumitricã, T., Nano-scale Heat Transfer in Nanostructures, ***Springer Briefs in Applied Sciences and Technology*** 2018, DOI: 10.1007/978-3-319-73882-6.

Referred Journal Articles:

2. Boriwaye, T.; **Ma, J.***, Effect of Grain Boundaries on Thermal Transport in Bi-Layer Graphene Nanoribbons, ***APL Materials – Special Topic: Emerging Leaders in Materials Science***, 2024, *12*(12), 121112. (IF: 5.3)

3. Walker, T.; Vuong, V.-Q.; Irle, S.*; **Ma, J.***, Evaluation of density-functional tight-binding methods for simulations of protic molecular ion pairs in gas phase and solution, ***Journal of Computational Chemistry***, Under Review. (IF: 3.7)

4. Al Ba'ba'a, H. B.*; **Ma, J.***, Inverse Design of Topological Diatomic Lattices Based on Complex Phase Locus, ***Frontiers in Acoustics – Special Topic: Acoustic Topological Insulators: Envisioned Applications and Technology Integration***, Under Review (Invited). (New Journal)

5. Guzelturk, B.*; Portner J.; Ondry, J.; Ghanbarzadeh, S.; Tarantola, M.; Jeong, A.; Field, T.; Chandler, A. M.; Wieman, E.; Hopper, T.; Watkins, N.; Yue, J.; Cheng, X.; Lin, M.-F.; Luo, D.; Kramer, P. L.; Shen, X.; Reid, A. H.; Borkiewicz, O.; Ruett, U.; Zhang, X.; Lindenberg, A. M.; **Ma, J.***; Schaller, R.*; Talapin, D. V.*; Cotts, B. L.*, Ultrafast symmetry control in photoexcited quantum dots, ***Advanced Materials***, 2024, 2414196. (IF:27.4)

6. Rajabpoor Alisepahi, A.; **Ma, J.***, In-Gap Edge and Domain-Wall States in Largely Perturbed Phononic Su–Schrieffer–Heeger Lattices. ***Crystals – Special Issue: Metamaterials and Phononic Crystals***, 2024, *14*(1), 102 (Invited). (IF: 2.7)

7. Rajabpoor Alisepahi, A.; Sarkar, S.; Sun, K; **Ma, J.***, Breakdown of Conventional Winding Number Calculation in One-Dimensional Lattices with Interactions Beyond Nearest Neighbors, ***Communications Physics*** (**Editor's Monthly Highlight**) 2023, *6*, 334. (IF: 5.4)

8. **Ma, J.***, Phonon Engineering of Micro- and Nanophononic Crystals and Acoustic Metamaterials: A Review. ***Small Science*** 2023, *3*, 2200052 (Invited). (IF: 12.7)

9. Joubaneh, E.F.; **Ma, J.***, Symmetry Effect on the Dynamic Behaviors of Sandwich Beams with Periodic Face Sheets. ***Composite Structures*** 2022, *289*,115406. (IF: 6.6)

10. **Ma, J.**; Carrillo, J.-M.; Do, C.; Chen, W.-R.; Falus, P.; Shen, Z.; Hong, K.; Sumpter, B. G.; Wang, Y., Spatial Correlations of Entangled Polymer Dynamics. ***Physical Review E*** 2021, *104*, 024503. (IF: 2.4)

11. Shen, Z.; **Ma, J.**; Carrillo, J.-M.; Chen, W.-R.; Sumpter, B. G.; Wang, Y., Spatiotemporal Mapping of Mesoscopic Liquid Dynamics, ***Physical Review E***, 2021, *103*, 022609. (IF: 2.4)

12. Zhou, D.; **Ma, J.**; Sun, K.; Gonella, S.; Mao, X., Switchable phonon diodes using nonlinear topological Maxwell lattices, ***Physical Review B*** 2020, *101*, 104106. (IF: 3.7)

13. **Ma, J.**; Sun, K.; Gonella, S., Valley Hall In-Plane Edge States as Building Blocks for Elastodynamics Logic Circuits. ***Physical Review Applied*** 2019, *12*, 044015. (IF: 4.6)

14. **Ma, J.**; Zhou, D.; Sun, K.; Mao, X.; Gonella, S., Edge Modes and Asymmetric Wave Transport in Topological Lattices: Experimental Characterization at Finite Frequencies. ***Physical Review Letters*** 2018, *121*, 094301. (IF: 8.6)

15. Xu, H.; **Ma, J.**; Dumitricã, T., Smooth Sliding and Superlubricity in the Nanofriction of Collapsed Carbon Nanotubes. ***Carbon*** 2018, *134*, 531. (IF: 10.9)

16. **Ma, J.**; Xu, H.; Dumitricã, T., Collapsed Carbon Nanotubes as Building Blocks for High-Performance Thermal Materials. ***Physical Review Materials*** 2017, *1*, 056001. (IF: 3.4)

17. **Ma, J.**; Ni, Y.; Dumitricã, T., Nanowires with Dislocations for Ultralow Lattice Thermal Conductivity. ***Physical Chemistry Chemical Physics*** **(Communication)** 2016, *18*, 9888. (IF: 3.3)

18. **Ma, J.**; Dasmahapatra, A.; Kroll, P.; Meletis, E.; Dumitricã, T., Compositional and Structural Atomistic Study of the Amorphous Si-B-N Networks of Interest for High-Performance Coatings. ***Journal of Physical Chemistry C*** 2016, *120*, 24346. (IF: 3.7)

19. Wang, C.G.; Liu, Y.P.; **Ma, J.**; Dumitricã, T.; Wadee, M.K.; Tan, H.F., Buckling behavior of carbon nanotubes under bending: from ripple to kink. ***Carbon*** 2016, *102*, 224. (IF: 10.9)

20. **Ma, J.**; Ni, Y.; Volz, S.; Dumitricã, T., Thermal Transport in Single-Walled Carbon Nanotubes Under Pure Bending. ***Physical Review Applied*** 2015, *3*, 024014. (IF: 4.6)

21. Xiong, S.; **Ma, J.**; Volz, S.; Dumitricã, T., Thermally-Active Screw Dislocation in Si Nanowires and Nanotubes. ***Small*** **(Communications)** 2014, *10*, 1756. (IF: 13.3)

Conference Proceedings:

1. Rajabpoor Alisepahi, A.; **Ma, J.***, Boundary Effect on In-Gap Edge States in Nonlocal Su-Schrieffer-Heeger Model. ***SPIE Health Monitoring of Structural and Biological Systems XVIII*** 2024, *12951*, 140.

2. Joubaneh, E.F.; **Ma, J.***, Dynamics of Periodic Sandwich Beams. ***Proceedings of the ASME 2022, International Mechanical Engineering Congress and Exposition*** 2022, 94730.

3. Joubaneh, E.F.; **Ma, J.***, Wave Propagation in Meta-Sandwich Beams. ***SPIE Health Monitoring of Structural and Biological Systems XVI*** 2022, *12048*, 170.

4. **Ma, J.**, Sun, K., Gonella, S., Phonon Manipulation with Valley-Hall Junctions. ***The Journal of the Acoustical Society of America*** 2020, *148*, 2496.

5. **Ma, J.**; Zhou, D.; Sun, K.; Mao, X.; Gonella, S., Influence of Hinge Stiffness on the Asymmetric Wave Transport in Topological Lattices: a Parametric Study. ***SPIE Health Monitoring of Structural and Biological Systems XIII*** 2019, *10972*, 272.

6. **Ma, J.**; Ni, Y.; Dumitricã, T., Thermal Conductivity and Phonon Scattering in Severely Bent Carbon Nanotubes and Bi-Layer Graphene. ***Materials Today: Proceedings*** 2015, *2*, 3819.

Awarded Grants

Project title: "Engineering Phonon Interactions in InAs Quantum Dots"
My role: PI
Program name & sponsoring agency: **Air Force Research Laboratory Summer Faculty Fellowship**

Performance period: July 5, 2023, to September 31, 2023
Budget: $18,540
Commitment: 3.0 months/year

Award Number: NSF 2132055
Project title: "RII Track-4:NSF: Atomic-Scale Understanding of the Self-Healing Mechanisms of Ionic Polymers"
My role: PI
Program name & sponsoring agency: **National Science Foundation**
Performance period: February 1, 2022, to January 31, 2025
Budget: $240,597
Commitment: 2.0 months/year

Award Number: DE-SC0023473
Project title: "Multi-scale Study of Self-Healing Polymers to Enhance Carbon Dioxide Removal"
My role: PI
Program name & sponsoring agency: **U.S. Department of Energy**
Performance period: September 1, 2022, to August 31, 2025
Budget: $750,000
Commitment: 0.8 months/year

Award Number: DE-SC0023425
Project title: "Elucidating Transient Localized Disorder of Semiconductor Nanocrystals"
My role: co-PI
Program name & sponsoring agency: **U.S. Department of Energy**
Performance period: September 1, 2022, to August 31, 2025
Budget: $750,000
Commitment: 0.25 months/year

Award Number: NSF 2230706
Project title: "PIRE: US-Japan Partnership in Excitonic Soft Materials for Clean Energy"
My role: co-I
Program name & sponsoring agency: **National Science Foundation**
Performance period: January 1, 2023, to December 31, 2025
Budget: $1,499,582
Commitment: 0.25 months/year

Award Number: NSF 2119485
Project title: "RII Track-2 FEC: Advancing Research Towards Industries of the Future to Ensure Economic Growth for EPSCoR Jurisdictions – Advanced Wireless Integration with Infrastructure Systems"
My role: co-I
Program name & sponsoring agency: **National Science Foundation**
Performance period: September 1, 2021, to August 31, 2025
Budget: $3,995,000
Commitment: 0.5 months/year

Project title: "Electromigration Research for Flip-Chip, Hybrid, and 3-D Packaging"
My role: co-PI
Program name & sponsoring agency: **Semiconductor Research Corporation**
Performance period: January 1, 2023, to December 31, 2025

Budget: $285,000
Commitment: 0.45 months/year

Project title: "Focused Elastodynamic Morphing for Deployment of Metamaterial Spaceborne Antenna and Lattice Structures for Aerospace Applications"
My role: co-PI
Program name & sponsoring agency: **NASA**
Performance period: September 1, 2023, to August 31, 2026
Budget: $1,124,999
Commitment: 1.02 months/year

Honors and Awards

- U.S. Air Force Research Laboratory Summer Faculty Fellowship (2023)
- National Science Foundation EPSCoR Research Fellowship (2022 - 2025)
- University of Vermont Early EXtra Promotion of REsearch and Scholarly Success Grant Award (2020 -2021)
- APS Division of Materials Physics Post-doctoral Travel Award (2020)
- APS Division of Computational Physics Travel Award (2020)
- Albert Swanson Memorial Fellowship Award (2016–2017)
- 2017 Minnesota Supercomputing Institute Poster Finalist (2017)
- APS Division of Materials Physics Ovshinsky Student Travel Honorable Mention Award (2016)
- Mechanical Engineering Graduate Teaching Fellowship (2015-2016)
- Mechanical Engineering Department Fellowship (2012-2013)
- Mathematical Contest in Modeling Honorable Mention Award (2012)
- The Interdisciplinary Contest in Modeling Honorable Mention Award (2011)
- Siyuan Scholarship (2008-2012)

Invited Talks

- ETOPIM13: 13th International Conference on Elastic, Electrical, Transport, and Optical Properties of Inhomogeneous Media, CUNY Advanced Science Research Center, New York City, NY, 06/16-06/20/2025 (invited by Prof. Andrea Alu)
- Joint 188th Meeting of the Acoustical Society of America and the 25th International Congress on Acoustics, New Orleans, LA, 05/18-05/23/2025 (invited by Prof. Theocharis Georgios)
- Department of Mechanical Engineering Seminar, Boston University, Boston, MA, 12/03/2024 (invited by Prof. Harold Park)
- ECS Yamagata University Student Chapter Seminar Series, Yamagata University, Yonezawa, Japan, 07/26/2024 (invited by Prof. Tsukasa Yoshida)

- Department of Chemistry Seminar, Yamagata University, Yamagata City, Japan, 07/22/2024 (invited by Prof. Jun Mastui)
- 2024 Platform for Advanced Scientific Computing (PASC24) Mini Symposium - Exploring the Structure-Property Relationship in Soft Matter with Computational Tools, ETH Zurich, Zurich, Switzerland, 06/05/2024 (invited by Dr. Jan-Michael Carrillo)
- Department of Mechanical Engineering Seminar, University of South Carolina, Columbia, SC, 11/09/2023 (invited by Prof. Austin Downey)
- Department of Mechanical and Aerospace Engineering Seminar, Syracuse University, Syracuse, NY, 10/06/2023 (invited by Prof. Wanliang Shan)
- Department of Mechanical and Aerospace Engineering Seminar, University at Buffalo, Buffalo, NY, 09/28/2023 (invited by Prof. Mostafa Nouh)
- ICAM-I2CAM Complex Mechanical Metamaterials Workshop, University of Michigan, Ann Arbor, MI, 07/12/2023 (invited by Prof. Xiaoming Mao)
- Materials and Sensors Directorate Seminar, Air Force Research Laboratory, Dayton, OH, 01/11/2023 (invited by Dr. Chandriker Dass)
- 3M Technical Forum Seminar, 3M, St. Paul, MN, 10/06/2022 (invited by Dr. Jiadi Fan)
- Computational Science and Engineering Division Seminar, Oak Ridge National Laboratory, Oak Ridge, TN, 08/16,2022 (invited by Dr. Stephan Irle)
- Department of Mechanical Engineering Seminar, University of Vermont, Burlington, VT, 02/25/2022
- Department of Civil and Environmental Engineering Seminar, University of Vermont, Burlington, VT, 02/19/2021
- Department of Mechanical Engineering Seminar, University of Vermont, Burlington, VT, 10/23/2020
- Department of Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, MN, 04/09/2019
- Department of Civil, Architectural, and Environmental Engineering, University of Texas at Austin, Austin, TX, 03/14/2019
- Department of Mechanical and Manufacturing Engineering, Miami University, Oxford, OH, 01/08/2019
- Department of Mechanical Engineering, Louisiana Tech University, Ruston, LA, 12/10/2018
- Department of Civil, Environmental, and Geo- Engineering, University of Minnesota, Minneapolis, MN, 09/29/2017

Professional Activities

- **Society Committee Member** of four American Society of Mechanical Engineers (ASME) technical committees: **Heat Transfer Division K-9**, **Phononic Crystals and Metamaterials**, **Mechanics of Soft Materials**, and **Dynamics, Vibration, and Control.**

- **Rayleigh Lecture Chair** for the annual award lecture of ASME – Division of Noise Control and Acoustics Division.

- **National Science Foundation Review Panelist** (2023 - 2025)

- **Mini-symposium Organizer and Chair** for session *Exploring the Structure-Property Relationship in Soft Matter with Computational Tools* (Co-chair with Jan-Michael Carrillo - ORNL, Yangyang Wang - ORNL, Wei-Ren Chen – ORNL), PASC24, ETH Zurich, Zurich, Switzerland, 06/05/2024

- **Session Chair** for session *Superconductivity and Thermodynamics*, 2024 American Physical Society March Meeting, Minneapolis, MN, 03/05/2024

- **Review Panelist** for FY2024 Department of Defense National Defense Science and Engineering Graduate Fellowship Program

- **Conference Session Organizer and Chair** for session *Thermal Transport in Nano/Quantum Materials* (Co-chair with Xiulin Ruan – Purdue, Dudong Feng – Purdue, Geoff Wehmeyer – Rice, Tianli Feng – Univ. Utah, and Yanbao Ma – UC Merced), 2024 International Mechanical Engineering Congress and Exposition, Portland, OR

- **Conference Session Organizer and Chair** for *Phononic Crystals and Metamaterials* (Co-chair with Mahmoud Hussein – Univ. Colorado, Michael Frazier – UCSD, Serife Tol – UMich, Rafael Ruiz – UMich, and Hasan Al Ba'ba'a – Union College), 2024 International Mechanical Engineering Congress and Exposition, Portland, OR

- **Conference Session Organizer and Chair** for *Advances in Soft Material Modeling* (Co-chair with Hossein Salahshoor – Duke, Nikolaos Bouklas – Cornell, Shawn Chester – NJIT, and Aditya Kumar - Gatech), 2024 International Mechanical Engineering Congress and Exposition, Portland, OR

- **Conference Session Organizer and Chair** for *Dynamics and Control in Micro/Nano Engineering* (Co-chair with Dumitru Caruntu – UT Rio Grande Valley, Marco Amabili – McGill, Neda Maghsoodi -Univ. South California) 2024 International Mechanical Engineering Congress and Exposition, Portland, OR

- **Workshop Session Chair** for *Structure, Functionality, and Design*, 2023 ICAM-I2CAM Complex Mechanical Metamaterials Workshop, Ann Arbor, MI

- **American Physical Society – Moore Foundation Experimental Physics Investigator Reviewer** (2023)

- **Guest Editor** for Crystals Special Issue: Metamaterials and Phononic Crystals (2023-2024)

- **Dutch Research Council NOW Proposal Reviewer** (2022-2023)

- **Conference Session Organizer and Chair** for session *First Principles and Molecular Dynamics Simulations of Thermal Transport in Solids,* 2023 International Mechanical Engineering Congress and Exposition, New Orleans, LA (Co-chair with Tianli Feng – Univ. Utah)

- **Conference Session Organizer and Chair** for session *Simulations of Thermal Transport in Nanostructures and Across Interfaces,* 2023 International Mechanical Engineering Congress and Exposition, New Orleans, LA (Co-chair with Tianli Feng – Univ. Utah)

- **NSF Student Poster Judge**, 2023 International Mechanical Engineering Congress and Exposition, New Orleans, LA

- **Undergraduate Poster Judge**, 2023 International Mechanical Engineering Congress and Exposition, New Orleans, LA

- **Department Chair Search Committee**: Department of Mechanical Engineering, University of Vermont (2024-2025)

- **Tenure-Track Faculty Search Committee**: Condensed Matter Physics, Department of Physics, University of Vermont (2022-2023)

- **Tenure-Track Faculty Search Committee**: Robotics and Automation, Department of Mechanical Engineering, University of Vermont (2022-2023)

- **Workshop Panelist** for Virtual Residency Introductory Workshop hosted by Oklahoma University Supercomputing Center for Education & Research (2022)

- **Symposium Organizer** for topic *Advances in Polymer Modeling and Simulations*, Society for Engineering Science (2020) (Co-organize with Traian Dumitricã, canceled due to COVID-19)

- **Conference Chair** for session *Electrical Polarization and Polymer Physics*, American Physical Society March Meeting (2020)

- **Best Paper Award Review Panelist** for ASME - Adaptive Structures & Material Systems (2019)

- **Journal Reviewer** for
    - Advanced Materials
    - Advanced Science
    - Advanced Functional Materials
    - Physical Review Applied
    - Physical Review B
    - Physical Review E
    - Communications Physics
    - Scientific Reports
    - Journal of Applied Physics
    - Journal of the Mechanics and Physics of Solids
    - Extreme Mechanics Letters
    - European Journal of Mechanics/ A Solids
    - Nano Letters
    - ACS Applied Nano Materials
    - ACS Applied Energy Materials
    - Proceedings of the Royal Society A
    - Journal of Vibration and Acoustics
    - The Journal of Acoustical Society of America
    - Crystals

- Molecules
- Steel and Composite Structures
- Journal of Nano Research
- Structural Engineering and Mechanics

- **Graduate Liaison and Women Coordinator** of the College of Science and Engineering, University of Minnesota (2016-2017)

Teaching Experience

Courses taught as a lecturer:

- ME 6990: Advanced Heat Transfer, Department of Mechanical Engineering, University of Vermont (Spring 2021 and Spring 2022)
- ME 2110: Materials Engineering, Department of Mechanical Engineering, University of Vermont (Fall 2020, Fall 2021, and Fall 2022, Fall 2024)
- ME 3333: Thermal Sciences III – Heat Transfer, Department of Mechanical Engineering, University of Minnesota – Twin Cities (Spring 2016)

Courses taught as a teaching assistant:

- ME 3281: System Dynamics and Control, Department of Mechanical Engineering, University of Minnesota – Twin Cities (Fall 2013 – Fall 2015)

Advisee List

Postdoctoral Associate:

- Dr. Eshagh Farzaneh Joubaneh, September 2020 – June 2022

PhD Candidates/Students:

- Amir Rajabpoor Alisepahi, Mechanical Engineering, PhD Candidate, January 2022 – present
- Temitope Boriwaye, Materials Science, PhD Candidate, September 2022 – present
- Edward Buckser, Materials Science, PhD Student, January 2023 – present
- Samira Ghanbarzadeh, Mechanical Engineering, PhD Student, September 2023 – present
- Fatemeh Sabokroozroozbahani, Mechanical Engineering, PhD student, January 2024 – present
- Soroush Soltani, Mechanical Engineering, PhD student, January 2024 – present
- Najib Al-Shaibani, Mechanical Engineering, PhD student, September 2024 – present
- Erfan Basiri Ravanbakhsh Vishkaei, Mechanical Engineering, incoming PhD student starting in January 2025

MS Thesis Students:

- Thomas Field, Mechanical Engineering, Accelerated Master's Student, September 2023 – present
- Joel Pyfrom, Mechanical Engineering, Master's Student, September 2023 – present

Honors Thesis Students:

- Thomas Field, Mechanical Engineering, September 2023 – May 2024 (Graduated with Honors)
- Alessandra Arvelo, Mechanical Engineering, September 2024 – present

Other Undergraduate Researchers:

- Ryan Kobyluck, Physics, July 2024 – present
- Helen Wang, Mechanical Engineering, January 2022 – May 2022

- Logan Larose, Mechanical Engineering, September 2020 – May 2021

Student Awards

- Joel Pyfrom (MS student) – Vermont Space Grant Consortium Graduate Fellowship (2024-2025)
- Joel Pyfrom (MS student) – University of Vermont Fisher Fellowship (2024)
- Thomas Field (Undergraduate) – Student Mechanical Engineer of the Year (2024)
- Thomas Field (Undergraduate) – Mechanical Engineering Undergraduate Research Award (2024)
- Amir Rajabpoor Alisepahi (Ph.D. student) – SPIE Travel Grant (2024)
- Logan Larose (Undergraduate) – Mechanical Engineering Undergraduate Research Award (2021)