Niaz Abdolrahim,
Assistant Professor of Mechanical Engineering and Materials Science
Department of Mechanical Engineering
University of Rochester
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Advanced Computational Mechanics and Materials Laboratory

EDUCATION

Ph.D., Mechanical Engineering May 2013

Washington State University (WSU), Pullman, Washington

Dissertation: *Multiscale modelling and simulation of deformation and strength of nanoscale metallic multilayer systems*

Advisor: Hussein M. Zbib

M.S., Aerospace Engineering June 2007

Tarbiat Modares University, Tehran, Iran

Thesis: *Experimental study of low velocity impact on Sandwich panels with honeycomb core and Comparison with the finite element analysis results*

B.S., Mechanical Engineering June 2003

Iran University of Science and Technology, Tehran, Iran

Thesis: *Finite element analysis of low cycle fatigue of Meyra Wheelchair*

PROFESSIONAL APPOINTMENTS

Assistant Professor of Mechanical Engineering 2015-present

University of Rochester (UR), Rochester, New York

- Secondary appointment in Materials Science Program
- Secondary appointment in the DOE Laboratory for Laser Energetics. Research in High Energy Density Materials

Postdoctoral Associate, Department of Materials Science and Engineering 2013-2015

Massachusetts Institute of Technology (MIT), Boston, Massachusetts

Research: Computational modeling of interface structure and interface-defect interactions in metallic films

Supervisor: Michael J. Demkowicz

Research Assistant 2009-2013

The School of Mechanical and Materials Engineering, WSU

Head of Basic Design Team, Material handling equipment 2006-2009

Momtazan Industrial Co., Tehran, Iran

HONORS and AWARDS

- University Research Award, UR — 2021
- Young Leaders Professional Development Award, The Minerals, Metals & Materials Society (TMS) Functional Materials Division — 2018
- James Clerk Maxwell Young Writers Prize, Philosophical Magazine and Philosophical Magazine Letters — 2014
- Harriet B. Rigas Award, Association for Faculty Women (AFW) for Outstanding Student in Graduate Studies, WSU — 2013
- Henry DeWitt Smith Scholarship, TMS and the American Institute of Mining, Metallurgical, and Petroleum Engineers — 2013
- Best Junior Researcher Award, TMS Annual meeting & exhibition. — 2011
- Graduate Student Travel Grant, WSU — 2011
- Travel support and a symposium assistantship for MRS fall meeting — 2010
- First place in International Kharazmi Scientific Congress; Design and construction of an intelligent robot for household tasks and A double engine model aircraft — 2001 and 2003

RESEARCH FUNDING ([~$7.2 M, ~2.3 M as the PI]

NSF-BSF: Stress-assisted structural phase transformations and plasticity in bicontinuous nanomaterials

Funded by the Mechanics of Materials and Structures (MOMS), NSF, **PI: Niaz Abdolrahim**, (September 2022- August 2025)

Total support: $525,983 (UR share $287,358)

CDS&E: Inferring Lattice Dynamics from Temporal X-ray Diffraction Data

Funded by Computational and Data-Enabled Science and Engineering (CDS&E), NSF, **PI: Niaz Abdolrahim**, co-PI: Chenliang Xu, (August 2022- July 2025)

Total support: $375,000

Time-Resolved Classification of X-ray Diffraction Data Using Deep-Learning-Powered Computer Vision Techniques

Funded by the National Nuclear Security Agency (NNSA), Stewardship Science Academic Alliance program, DOE, **PI: Niaz Abdolrahim**, co-PI: Chenliang Xu, (July 2022- June 2025)

Total support: $574,050

Physics of Explosively Disseminated Compacted Powder Agglomeration and Breakup

Funded by the Defense Threat Reduction Agency DTRA, DOD, **PI** (of the UR share)**: Niaz Abdolrahim**, co-PI: Paul Funkenbusch, Subtract to Theofanous & Co Inc. and CUBRC Inc. (November 2022- October 2025)

Total support: $1,611,378 (UR share $521,040)

Capturing Nanoscale Lattice Variations by Applying AI-Powered Computer Vision Techniques on Synthetic X-ray Diffraction Data

Funded by University Research Awards, **PI: Niaz Abdolrahim**, co-PI: Chenliang Xu, (July 2021- June 2023)

Total support: $37,500

High Energy Density Quantum Matter

Funded by DOE, PI: Rip Collins, **Senior personnel: Niaz Abdolrahim,** (September 2019- August 2022)

Total support: $3,993,888

Developing Deformation Maps for Designing Nanoporous Metals with Enhanced Ductility and Strength

Funded by the Metals and Metallic Nanostructures program at the Division of Materials Research, NSF, **PI: Niaz Abdolrahim,** (September 2016- August 2020)

Total support: $350,000

Investigating Mechanical Response of Low-to-High Density Nanoporous Materials Under Low and High (shock) Strain Rates

Funded by XSEDE, NSF, **PI: Niaz Abdolrahim**, (March 2018- March 2019)

Total support: (supercomputer allocation) 150,000 Core-hours (estimated value: $20,000)

Deformation Behaviors of Nanoporous Metallic Structures

Funded by the Extreme Science and Engineering Discovery Environment (XSEDE), NSF, **PI: Niaz Abdolrahim** (May 2017- April 2018)

Total support: (supercomputer allocation) 50,000 Core-hours (estimated value: $10,740)

STUDENTS and POSTDOCS

Current students and Postdocs:

- Jerardo Salgado (PhD), (2021-present)
- Ayoub Shahnazari (PhD), (2022-present)
- Linh Vu (BS), (2021-present)
- Zheming Guo (BS), (2021-present)
- Sicheng Qian (BS), (2022-present)

Former postdocs Advised:

- Anupam Neogi (Became scientist at ICAMS, Germany)

Former students supervised:

- Ali Khourshaei (PhD 2023, became postdoctoral associate at Johns Hopkins University)
- Ognjen Bosic (BS 2022,)
- Zhaotong Du (MS 2022, became data analyst at Discover)
- Haomin Liu (PhD 2020, became software engineer at Roblox)

- Lijie He (PhD 2021, became postdoctoral associate at Boston University)
- Muhammad Hadi (BS 2021, became MS student at Johns Hopkins)
- Yikun Zhang (BS 2020, became MS student at UC Berkeley)
- Julian Travis (BS 2020, became researcher at LLE)
- Siavash Soltani Bajestani (MS 2019, became PhD student at University of British Columbia)
- Benjamin Smilen (MS 2017, became engineer at Black & Decker)
- Ke Wang (MS 2016, became PhD student at North Carolina State University)
- Bin Ding (MS 2016, became engineer at Geely)

COURSES TAUGHT

- Spring 2021, 2022, ME 226, Introduction to Solid Mechanics (UR)
    - Undergraduate sophomore
    - Average 80 students from various disciplines: Mechanical Eng., Biomedical Eng., Chemical Eng., etc.
- Fall 2016-2022, ME 481, Mechanical Behavior of Solids (UR)
    - Graduate and undergraduate course
    - Average 10 students from Mechanical Eng. and Materials Science
- Spring 2016, 2017, 2018, ME 120, Engineering Mechanics I, Statics (UR)
    - Undergraduate freshman
    - Average 80 students from various disciplines: Mechanical Eng., Biomedical Eng, etc.
- Spring 2014, 3.22, Mechanical Behavior of Materials (MIT)
    - Graduate and undergraduate course
    - 20 students from Materials Science program

PUBLICATIONS (graduate students and postdocs, *undergraduate students*)

1. Shargh, AK., Picard, A., Hrubiak, R., Zhang, Hemley, RJ., D., Deemyad, S., **Abdolrahim, N.**, Saffarian, S., "Co-existence of vitreous and crystalline phases of H_2O at ambient temperature", PNAS (2022) 119, https://doi.org/10.1073/pnas.2117281119

2. He, L., Polsin, D., Zhang, S., Collins, G., **Abdolrahim, N.,** "Structural phase transformation of Aluminum under ramp loading compression; a combined atomistic simulation and experimental study", Scientific Reports, https://doi.org/10.1038/s41598-022-23785-7

3. Salgado, J. Du, Zh. Lerman, S., Xu, Ch., **Abdolrahim, N.,** "Automated classification of big X-ray diffraction data using deep learning", Under preparation.

4. *Bosic, O.*, Shargh, AK., **Abdolrahim, N.,** "Molecular dynamics modeling of helium nanobubble growth in irradiated copper matrix", Accepted to Journal of Nuclear Materials.

5. Shargh, AK., **Abdolrahim, N.,** "Design of architectured nanoporous silicon nitride membranes with tunable mechanical properties: A combined simulation, deep learning, and experimental investigation", Submitted.

6. Liu, H., Shargh, AK., **Abdolrahim, N.**, "Mining structure-property linkage in nanoporous materials using an interpretative deep learning approach", Materialia. (2021) 101275. https://doi.org/10.1016/j.mtla.2021.101275

7. Shargh, AK., Madejski, GR., McGrath, JL., **Abdolrahim, N.**, "Mechanical properties and deformation mechanisms of amorphous nanoporous silicon nitride membranes via combined atomistic simulations and experiments", Acta Materialia. 222 (2022) 117451. https://doi.org/10.1016/j.actamat.2021.117451.

8. He, L., **Abdolrahim, N.**, "Mechanical Enhancement of Graded Nanoporous Structure", Journal of Engineering Materials and Technology. 144 (2021). https://doi.org/10.1115/1.4051470.

9. Neogi, A., Askari, H., **Abdolrahim, N.**, "Elastic and plastic deformation behaviors of helium nano-bubbled single crystal copper: an atomistic simulation study", Journal of Nuclear Materials. 552 (2021) 152988. https://doi.org/10.1016/j.jnucmat.2021.152988.

10. Shargh, AK., Madejski, GR., McGrath, JL., **Abdolrahim, N.**, "Molecular dynamics simulation of brittle to ductile failure transition in silicon nitride nanoporous membrane", Materials Today Communications. 25 (2020) 101657. https://doi.org/10.1016/j.mtcomm.2020.101657.

11. He, L., *Hadi, M.*, Liu, H., **Abdolrahim, N.**, "Mechanism of coarsening and deformation behavior of nanoporous Cu with varying relative density", Journal of Materials Research. 35 (2020) 2620–2628. https://doi.org/10.1557/jmr.2020.68. ***[Invited paper]***

12. Liu, H., **Abdolrahim, N.**, "A Modified scaling law for stiffness of nanoporous materials accounting for deformation mode effects of nodes and ligaments", International Journal of Mechanical Sciences. 166 (2020) 105223. https://doi.org/10.1016/j.ijmecsci.2019.105223

13. Neogi, A., **Abdolrahim, N.**, "Atomistic simulation of shock compression of single-crystal and core-shell Cu@Ni nanoporous metals", Journal of Applied Physics. 126 (2019) 015901. https://doi.org/10.1063/1.5100261, ***[Featured article]***

14. Khourshaei Shargh, A., **Abdolrahim, N.**, "Molecular dynamics simulation of structural changes in single crystalline silicon nitride nanomembrane", Ceramics International. 45 (2019) 23070–23077. https://doi.org/10.1016/j.ceramint.2019.07.355.

15. Vattré, A. J., **Abdolrahim, N.**, Navale, S., and Demkowicz, M. J., "The relaxed structure of intrinsic dislocation networks in semicoherent interfaces: predictions from anisotropic elasticity theory and comparison with atomistic simulations", Extreme Mechanics Letters. 28 (2019) 50–57. https://doi.org/10.1016/j.eml.2019.02.003.

16. He, L., **Abdolrahim, N.**, "Stress-assisted structural phase transformation in Mo/Cu bi-continuous intertwined materials", ACS Appl. Nano Mater. 2 (2019) 1890–1897. https://doi.org/10.1021/acsanm.8b02219.

17. Neogi, A., Askari, H., **Abdolrahim, N.**, "Atomistic simulations of the strengthening effect of high-density bubble formation in helium irradiated single crystalline copper", Materialia. 1 (2018) 139–149. https://doi.org/10.1016/j.mtla.2018.04.004.

18. He, L., **Abdolrahim, N.**, "Deformation mechanisms and ductility enhancement in core-shell Cu@ Ni nanoporous metals", Computational Materials Science. 150 (2018) 397–404. https://doi.org/10.1016/j.commatsci.2018.04.035.

19. Liu, H., He, L., **Abdolrahim, N.**, "Molecular dynamics simulation studies on mechanical properties of standalone ligaments and networking nodes, a connection to nanoporous material", Modelling Simul. Mater. Sci. Eng. 26 (2018) 075001. https://doi.org/10.1088/1361-651X/aad8ce.

20. Soltani, S., **Abdolrahim, N.**, Sepehrband, P. "Mechanism of Intrinsic Diffusion in the Core of Screw Dislocations - A Molecular Dynamics Study", Computational Materials Science. 144 (2018) 50–55. https://doi.org/10.1016/j.commatsci.2017.11.048

21. Soltani, S., **Abdolrahim, N.**, Sepehrband, P. "Molecular dynamics study of self-diffusion in the core of a screw dislocation in face centered cubic crystals", Scripta Materialia. 133 (2017) 101–104. https://doi.org/10.1016/j.scriptamat.2017.02.021.

22. Gilmer, S.R, **Abdolrahim, N**., Wayson,S., Winans,J., Fang, D., DesOrmeaux, J., Getpreecharsawas, J., Ellis, J., Fauchet, J., McGrath, J., "Predicting the failure of thin porous membranes in bulge tests", Thin Solid Films. 631 (2017) 152–160. https://doi.org/10.1016/j.tsf.2017.04.004.

23. **Abdolrahim, N.**, and Demkowicz, M. J., "Determining coherent reference states of general semicoherent interfaces", Computational Materials Science. 118 (2016) 297–308. https://doi.org/10.1016/j.commatsci.2016.02.002. **[Editor's choice]**

24. Vattré, A. J., **Abdolrahim, N.**, Kolluri, K., and Demkowicz, M. J., "Computational design of patterned interfaces using reduced order models", Sci Rep. 4 (2014) 6231. https://doi.org/10.1038/srep06231

25. Askari, H., Maughan, M., **Abdolrahim, N.**, Sagapuram, D., Bahr, D.F., Zbib, H.M., "A stochastic crystal plasticity framework for deformation of micro-scale polycrystalline materials", International Journal of Plasticity. 68 (2015) 21–33. https://doi.org/10.1016/j.ijplas.2014.11.001

26. **Abdolrahim, N.**, Mastorakos, I.N., Shao, S., Bahr, D.F., and Zbib, H.M., "The effect of interfacial imperfections on plastic deformation in nanoscale metallic multilayer composites", Comput. Mater. Sci. 86 (2014) 118–123. https://doi.org/10.1016/j.commatSci.2014.01.045

27. Schoeppner, R.L., **Abdolrahim, N.**, Salehinia, I., Zbib, H.M., and Bahr, D.F., "Elevated temperature dependence of hardness in tri-metallic nano-scale metallic multilayer systems", Thin Solid Films. 571, Part 2 (2014) 247–252. https://doi.org/10.1016/j.tsf.2014.05.031

28. **Abdolrahim, N.**, Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "Observation of pseudoelastic behavior in large Cu-Ni composite multilayer nanowires", 2013 MRS Fall Meeting Proceedings, 2013.

29. Wo, P.C., **Abdolrahim, N**., Zhu, Y.F., Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "Precipitation strengthening in nanocomposite Cr/Cu multilayer films", Philosophical Magazine. 95 (2015) 1780–1794. https://doi.org/10.1080/14786435.2014.904056

30. **Abdolrahim, N.**, Zbib, H.M., Bahr, D.F., "Multiscale modeling and simulation of deformation in nanoscale metallic multilayer systems", Int. J. Plast. 52 (2014) 33–50. https://doi.org/10.1016/j.ijplas.2013.04.002

31. Shao, S., **Abdolrahim, N.**, Bahr, D. F., Lin. G., Zbib, H.M., "Stochastic effects in plasticity in small volumes", International Journal of Plasticity. 52 (2014) 117–132. https://doi.org/10.1016/j.ijplas.2013.09.005

32. **Abdolrahim, N.**, Bahr, D.F., Revard, B., Reilly, C., Ye, J., Balk, T.J., Zbib, H.M., "The mechanical response of core-shell structures for nanoporous metallic materials", Philosophical Magazine. 93 (2013) 736–748. https://doi.org/10.1080/14786435.2012.731528

33. **Abdolrahim, N.**, Mastorakos. IN., Zbib, H.M., "Precipitate strengthening in nanometallic material composites" Philosophical Magazine Letters. 92 (2012) 597–607. https://doi.org/10.1080/09500839.2012.704153.

34. **Abdolrahim, N.**, Mastorakos. IN., Zbib, H.M., Bahr, D.F., "Interfacial properties of Cu-Nb multilayers as a function of dislocation/disconnection content", TMS 2011 Annual Meeting Supplemental Proceedings Volume 2: Materials Fabrication, Properties, Characterization, and Modeling, p.75-82.

35. Mastorakos. IN., **Abdolrahim, N.**, Zbib, H.M., "Deformation mechanisms in composite nano-layered metallic and nanowire structures" International Journal of Mechanical Sciences. 52 (2010) 295–302. https://doi.org/10.1016/j.ijmecsci.2009.09.034

36. **Abdolrahim, N.**, Mastorakos. IN., Zbib, H.M., "Deformation mechanisms and pseudoelastic behaviors in trilayer composite metal nanowires" Phys. Rev. B. 81 (2010) 054117. https://doi.org/10.1103/PhysRevB.81.054117

INVITED SEMINARS

1. "Predicting phase transition mechanisms by integrating simulations and experiments", Lawrence Livermore National Laboratory, January 20, 2022.
2. "Predicting phase transition mechanisms by integrating atomistic simulations, experiments, and AI-powered computer vision techniques", Alfred University, September 23, 2021.
3. "Deformation mechanisms of nanoporous metallic materials", Rochester Institute of Technology, February 16, 2017.
4. "Multiscale modeling of nanoscale metallic systems", Laboratory for Laser Energetics, February 26, 2016.
5. "Interface Mediated Performance of Nanoscale Metallic Materials", Clarkson University, October 16, 2015.
6. "Interface Mediated Performance of Nanoscale Metallic Materials", Santa Clara university, March 2, 2015.
7. "Interface Mediated Performance of Nanoscale Metallic Materials", Purdue University, December 11, 2014.
8. "Multiscale Modeling and Simulation of Deformation and Strength of Nanoscale Metallic Multilayer Systems", School of Mechanical and Materials Engineering, WSU, February 28, 2013.

INVITED TALKS

1. "Automated classification of big x-ray diffraction data using Deep learning" Twenty-Sixth Congress and General Assembly of the International Union of Crystallography, Melbourne, Australia, August 23, 2023.

1. "Stress-assisted structural phase transformation in Mo/Cu bi-continuous intertwined materials", 19th International Conference on Diffusion in Solids and Liquids, Crete, Greece, June 26, 2023.

2. "Predicting phase transition mechanisms by integrating simulations and experiments", **Keynote Talk**, International Conf. on Plasticity, Damage & Fracture, Punta Cana, Dominican Republic, January 3, 2023
3. "Capturing nanoscale lattice variations by applying AI-powered computer vision techniques on synthetic x-ray diffraction data", TMS, Anaheim, CA, February 2022.
4. "Novel stress-assisted structural transformation and plasticity enhancement in Mo/Cu bicontinuous intertwined composites", MRS, Boston, MA, October 2019.
5. "Stress-assisted Structural Phase Transformation Enhances Ductility in Mo/Cu Bicontinuous Intertwined Composites", MS&T, Portland, OR, October 2019.
6. "Modified scaling laws for nanoporous materials with bending versus stretching contribution", Third International Symposium on Nanoporous Materials by Alloy Corrosion, Philadelphia, PA, February 2019.
7. "Novel stress-assisted structural phase transformation in Mo/Cu bi-continuous intertwined materials", TMS, San Antonio, TX, March 2019.
8. "Deformation behaviors of nanoporous materials: a connection to nanowires and triple nodes", MRS, Phoenix, AZ, April 2018.
9. "Continuum modeling of dislocation structures at semicoherent interfaces", MS&T, Pittsburg, PA, October 2017.
10. "Strengthening mechanisms of nanoporous metallic materials", TMS, San Diego, CA, February 2017.
11. "Relating the deformation behaviors of nanoporous metallic materials to their microstructure", International Symposium on Plasticity and Its Current Applications, Puerto Vallarta, Mexico, January 2017.
12. "Computational prediction of semi-coherent interfaces using reduced order models", International Symposium on Plasticity and Its Current Applications, Keauhou Bay, HI, January 2016.

CONFERENCES and PRESENTATIONS (graduate students and postdocs, *undergraduate students*)

1. He, L., *Vu, L., Guo, Zh.*, Shargh, AK., **Abdolrahim, N.**, "Stress-assisted structural phase transformation and plastic deformation in Mo/Cu bi-continuous intertwined materials", Fourth International Symposium on Nanoporous Materials by Alloy Corrosion, Lake Bostal, Germany, April 23, 2023.
2. Salgado, J. Du, Zh. Lerman, S., Xu, Ch., **Abdolrahim, N.,** "Time-Resolved Classification of X-ray Diffraction Data Using Deep-Learning-Powered Computer Vision Techniques", 2023 Stewardship Science Academic Programs Symposium, February 2023.
3. He, L., *Vu, L., Guo, Zh.*, Shargh, AK., **Abdolrahim, N.**, "Stress-assisted structural phase transformation in Mo/Cu bi-continuous intertwined materials", The 10th International Conference on Multiscale Materials Modeling (MMM10), October 2022.
4. Shargh, AK., Picard, A., Hrubiak, R., Zhang, Hemley, RJ., D., Deemyad, S., **Abdolrahim, N.**, Saffarian, S., "Characterizing co-existent amorphous and crystalline phases of H2O at room temperature by integrating MD simulation to experiments", MMM10, October 2022.
5. Shargh, AK., Madejski, GR., McGrath, JL., **Abdolrahim, N.**, "Design of architectured nanoporous silicon nitride membranes with tunable mechanical properties: A combined simulation, deep learning, and experimental investigation", MMM10, October 2022.
6. Salgado, J., Du, Zh., Lerman, S. Xu, Ch., **Abdolrahim, N.**, "Automated classification of big x-ray diffraction data using Deep learning", MMM10, October 2022
7. Liu, H., Shargh, AK., **Abdolrahim, N.,** "Mining structure-property linkage in nanoporous materials using an interpretative deep learning approach", TMS, March 2022.

8. Shargh, AK., Madejski, GR., McGrath, JL., **Abdolrahim, N.**, "A novel design approach to achieving high strength and ductility in traditionally brittle nanoporous silicon nitride membranes", TMS, March 2022.
9. Shargh, AK., Picard, A., Hrubiak, R., Zhang, Hemley, RJ., D., Deemyad, S., **Abdolrahim, N.**, Saffarian, S., "Phase evolution in water at high pressures from XRD and Raman spectroscopy: A combined MD simulation and experimental investigation", TMS, March 2022.
10. He, L., Polsin, D., Zhang, S., Collins, G., **Abdolrahim, N.,** "Phase transformation of Aluminum under ramp loading compression; a combined atomistic simulation and experimental study", TMS, March 2022.
11. Shargh, AK., *Bosic, O.*, **Abdolrahim, N.**, "Molecular dynamics modeling of helium nanobubble growth in irradiated copper matrix", TMS, March 2022.
12. Liu, H., Shargh, AK., **Abdolrahim, N.,** "Mining Structure-property Linkages in Nanoporous Materials Using Interpretative Deep Learning Approach", TMS, February 2021.
13. He, L., *Hadi, M.*, Liu, H., **Abdolrahim, N.**, "Mechanical Enhancement of Graded Nanoporous Structure", TMS, February 2021.
14. Shargh, AK., Madejski, GR., McGrath, JL., **Abdolrahim, N.**, "A Griffith's Theory-based Model for Strength of Silicon Nitride Nanoporous Membranes", TMS, February 2021.
15. Shargh, AK., **Abdolrahim, N.**, "The role of pore pattern on the ductility enhancement of crystalline silicon nitride nanoporous membranes", MS&T, October 2020.
16. Shargh, AK., Madejski, GR., McGrath, JL., **Abdolrahim, N.**, "New Insights into Deformation Mechanisms of Amorphous Silicon Nitride Nanoporous Membranes", MS&T, October 2020.
17. Shargh, AK., Madejski, GR., McGrath, JL., **Abdolrahim, N.**, "Brittle to Ductile Transition in Failure Mechanism of Silicon Nitride Nanoporous Membrane", MRS, December 2019.
18. Neogi, A., **Abdolrahim, N.**, "Atomistic simulations of shock compression of single-crystal and core-shell Cu@Ni nanoporous metals", MRS, December 2019.
19. "Deformation behaviors of nanoporous materials: a connection to nanowires and triple nodes", MRS, April 2018.
20. He, L., **Abdolrahim, N.,** "Deformation Mechanisms of Single Crystalline Nanoporous Copper Structures with Varying Relative Densities", TMS, March 2018.
21. Liu, H., **Abdolrahim, N.,** "Mechanical properties of standalone nanowire and networking nanowires, a connection to nanoporous materials" MRS, November 2017.
22. He, L., **Abdolrahim, N.,** "On the Deformation Mechanisms of Three-Dimensional Core-Shell Nanoporous Metals" ICME, May 2017.
23. **Abdolrahim, N.**, and Demkowicz, M. J., "Continuum modeling of coherent reference states in semicoherent interfaces", TMS, Feb 2016.
24. Vattré, A. J., **Abdolrahim, N.**, Kolluri, K., and Demkowicz, M. J., "Computational prediction of semi-coherent interface structures using reduced order models", International Symposium of Plasticity, January 2016.
25. **Abdolrahim, N.**, and Demkowicz, M. J., "Determining coherent reference states of general semicoherent interfaces", MRS Fall meeting, December 2015.
26. **Abdolrahim, N.**, and Demkowicz, M. J., "Predicting the structure of semi-coherent interface using anisotropic elasticity theory", Society for Engineering Science (SES) October 2015.
27. He, L., **Abdolrahim, N.,** "Strengthening mechanisms of core-shell nanoporous metallic materials", SES October 2015.

28. Wo, P.C., **Abdolrahim, N**., Zhu, Y.F., Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "Precipitation strengthening in Cr/Cu-Cr nanostructured metallic multilayer composites", ASME, November 2015.
29. Vattré, A. J., **Abdolrahim, N.**, Kolluri, K., and Demkowicz, M. J., "Computational prediction of semi-coherent interface structures using mesoscale models", MRS Fall meeting, December 2014.
30. **Abdolrahim, N.**, and Demkowicz, M. J., "Predicting interface dislocation structure and energy using anisotropic elasticity theory", MMM October 2014.
31. **Abdolrahim, N.**, and Demkowicz, M. J., "Continuum prediction of interface structures using reduced order models", Gordon research seminar and Gordon research conference, poster, July 2014.
32. **Abdolrahim, N.**, and Demkowicz, M. J., "Modeling interface misfit dislocations using anisotropic elasticity theory", USNCTAM June 2014.
33. Schoeppner, R.L., **Abdolrahim, N.**, Salehinia, I., Zbib, H.M., and Bahr, D.F., "Comparison of Temperature Dependence in Nano-Scale Metallic Multilayer Systems", MRS Fall meeting, December 2013.
34. **Abdolrahim, N.**, Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "Observation of Pseudoelastic Behavior in Large Cu-Ni Composite Multilayer Nanowires", MRS Fall meeting, December 2013.
35. **Abdolrahim, N.**, Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "Multiscale Modeling and Experiments of Deformation of Nanoscale Metallic Multilayer Systems", TMS Annual meeting March 2013.
36. **Abdolrahim, N.**, Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "Metallic multilayer systems for increased toughness in complex structures", MRS Fall meeting, November 2012.
37. **Abdolrahim, N.**, Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "The effect of interfacial geometry and chemistry on the strengthening of Nanoscale Multilayer Metallic Composites", MRS Fall meeting, November 2012.
38. Schoeppner, R.L., **Abdolrahim, N.**, Salehinia, I., Zbib, H.M., and Bahr, D.F., "Comparison of Temperature Dependence in Nano-Scale Metallic Multilayer Systems", MRS Fall meeting, November 2012.
39. **Abdolrahim, N.**, Mastorakos, I.N., Bahr, D.F., and Zbib, H.M., "Increased Performance in Complex Structures", MRS Fall meeting, November 2012.
40. **Abdolrahim, N.**, Zbib, H.M., "A molecular dynamics-based model for plastic flow in nanoscale metallic multilayers", Wiley Research Exposition, March 2012.
41. **Abdolrahim, N.**, Mastorakos. IN., Zbib, H.M., "Atomistic Prediction of Precipitate Strengthening in Nanoscale Metallic Multilayers", TMS Annual meeting March 2012.
42. **Abdolrahim, N.**, Zbib, H.M., "A molecular dynamics-based model for plastic flow in nanoscale metallic multilayers", MRS Fall meeting, November 2011.
43. **Abdolrahim, N.**, Mastorakos, I.N., Zbib, H.M., "Interfacial properties of Cu-Nb multilayers as a function of dislocation/disconnection content", TMS Annual meeting February 2011.
44. **Abdolrahim, N.**, Mastorakos, I.N., Zbib, H.M., "Characterization of the interface properties as a function of dislocation/disconnection content in fcc/bcc multilayers", MRS Fall meeting November 2010.
45. Mastorakos, I.N., **Abdolrahim, N.**, Zbib, H.M., "Deformation mechanisms and pseudoelastic behaviors in trilayer composite metal nanowires", ASME November 2010.
46. **Abdolrahim, N.**, Zbib, H.M., "Pseudoelasticity of single crystalline Cu & Ni Nanowires through reversible lattice reorientations: MD Simulations", WSU Show case 2009.

SERVICE: NATIONAL and INTERNATIONAL

Editorial/Funding Agency Service

- Editorial board, Materials Today Communications 2022
- Topic editor, Frontiers in Materials 2022
- Guest editor, Journal of Materials 2019
- Reviewer for NSF/CMMI, DMR panels 10 times

Conferences/Meetings

- Organizer, The Physics of Metal Plasticity: A memorial symposium in honor of Professor Hussein Zbib, The 10th International Conference on Multiscale Materials Modeling, October 2-7, 2022, Baltimore 2022
- Lead organizer, Deformation Mechanisms, Microstructure Evolution, and Mechanical Properties of Nanoscale Materials, TMS 2023, San Diego 2023
- Organizer, Deformation Mechanisms, Nanostructured materials in Extreme Environments, TMS 2023, San Diego 2023
- Representative on the Diversity Committee of Functional Materials Division (FMD) at TMS 2020-2023
- Lead organizer, Nanoarchitectured and Morphology Controlled Nanoporous Materials, TMS 2019, San Antonio 2019
- Lead organizer, Computational Kinetics and Thermodynamics Symposium, TMS 2017, San Diego 2017
- Discussion Leader, Gordon Research Seminar 2014

Activities within professional organizations

- President, MRS student chapter at WSU 2012-2013
- Secretary, MRS student chapter at WSU 2011-2012

Reviewing

Scientific Reports, Computational Materials Science, International Journal of Plasticity, Journal of Engineering Materials and Technology, Acta Materialia, Scripta Materialia, Modelling and Simulation in Materials Science and Engineering, Computational Materials Science, Journal of Nanomechanics and Micromechanics, Journal of Physics and Chemistry of Solids, Applied Physics A, Journal of the Mechanics and Physics of Solids, Materials Letters, Journal of Nuclear Materials, Materialia, Journal of Materials Research, Nature communications, ACS applied Nanomaterials, ACS Omega, Crystal Growth and Design, Frontiers in Materials, MRS Communications, Mechanics of Materials.

Professional Associations Membership

The Minerals, Metals and Materials Society (TMS), The American Ceramics Society (ACerS), Association for Iron& Steel Technology (AIST), American Society for Metals (ASM), Materials Research Society (MRS), Society of Engineering Science (SES), Chemistry and Physics of Materials Committee (CPMC) at TMS.

SERVICE: UNIVERSITY

University/departmental committees

- Outstanding dissertation committee, UR — 2020-2022
- Reviewer, University research awards, UR — 2020-2022
- Faculty search committee, Department of Mechanical Engineering, UR — 2018, 2021
- Graduate application committee, Materials Science Program, UR — 2022
- Graduate application committee, Department of Mechanical Engineering, UR — 2016-2022
- Undergraduate committee, Department of Mechanical Engineering, UR — 2016-2020
- GEAR program interview panel — 2016
- Reviewer in panel for Kuwait-MIT Center for Natural Resources and the Environment (CNRE) — 2015

PhD defense committees

- Reetam Paul — 2022
- Heta Gandhi — 2022
- Hue Fei — 2022
- Bitong Wang — 2022
- Mehrad Ansari — 2021
- Milad Khajehvand — 2021
- Xunzhi Li — 2020
- Dilnoza Amirkulova — 2020
- Karan Mehrotra — 2017

WORKSHOP PARTICIPATION

- From Atoms to Matter: An Instrumentation and Infrastructure Workshop to Accelerate the Materials Development Continuum in Alloys, Amorphous and Composite Materials, NSF (**by invitation only**) — November 2022
- Artificial Intelligence in Materials Science and Engineering — November 2021
- Machine Learning in Materials Science — October 2019
- PRedictive Integrated Structural Materials Science (PRISMS), Ann Arbor, MI — August 2016
- Basic Research Needs Nuclear Energy Workshop, DOE, (**by invitation only**) — August 2017
- NSF grant writing workshop, College Park, MD — April 2013
- Multiphysics Materials Simulations using the Open-Source MOOSE Framework Workshop, Nashville, TN — February 2016