Kasra Momeni, Ph.D.

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SUMMARY

My main areas of expertise are *Computational Mechanics and Material Science* and *Materials Genome*. My goal is to develop a s*ynergistic interaction among computation, experiment,* and *theory* to design new advanced materials with superior properties at a fraction of current cost and time-to-market. Specifically*,* I focus on *developing theoretical/numerical tools* to understand the multiscale/physics response of materials. I am utilizing various analytical methods, including atomistic-, meso-, and macro-scale models/simulations, along with experimental techniques with atomic resolutions to achieve this goal. In particular, I will study materials and processes for *additive manufacturing*, *low-dimensional electronic materials*, materials for *energy* applications, materials under *extreme conditions*, and *metamaterials*.

RESEARCH INTERESTS

Computational Mechanics and Material Science; Material Genomics; Additive Manufacturing; Hierarchical Materials by Design; Materials Under Extreme Environments; Materials for Energy; Molecular Dynamics; Phase-Field; Continuum Mechanics

EDUCATION AND TRAINING

	Organization	Reception Date
Postdoc	Materials Research Institute - The Pennsylvania State University	2016
PhD/ Postdoc	Aerospace Engineering - Iowa State University- A Phase-Field Approach to Solid-Solid Phase Transformation via Virtual Melting (Highest Honor)	2015
M.Sc.	Mechanical Engineering - Sharif University of Technology - Accelerating Molecular Dynamics Simulations of Nanoscale Structures	2008
B.Sc.	Mechanical Engineering - KNT University of Technology – Analysis of Mechanical Properties of Carbon Nanotube Composites (Highest Honor)	2006

GRANTS

- "*CAREER: Hybrid Data-driven Synthesis by Design of Atomically Thin Quantum Materials,*" **NSF-CAREER**, **PI**: Kasra Momeni, **$509,509** for 5 year (7/2020-9/2025)

- "Data-driven Materials Design for Point-of-Need Manufacturing," **ASM Materials Education Foundation**, **PI**: Kasra Momeni, **$310,408** for 3 year (11/2021-11/2024)

- "*Integrated Computational and Experimental Optimization of Materials and Methods for In Space Manufacturing (ISM) of Lightweight Metal Alloys,*" **NASA**, **co-PI**: Kasra Momeni, **$1,450,000** (share $420,000) for 3 year (9/2019-9/2022)

- "*Multimetallic Layered Composites (MMLCs) with Self-Generated Intermetallics for Safer and Economical Advanced Reactor Deployment,*" **DoE**, **co-PI**: Kasra Momeni, **$1,873,248** (share $390,495) for 3 year (6/2019-6/2022)

- "*Informatics Enabled Materials Discovery and Additive Manufacturing (IE-MDAM),*" **NSF**, **co-PI**: Kasra Momeni, **$20,000,000** (share $285,305) for 5 year (9/2020-9/2025)
- "*Designing an advanced versatile crucible for growing wafer size 2D metals,*" **NSF**, **PI**: Kasra Momeni, **$57,410** for 1 year (12/2019-12/2020)
- "*New Aluminum Alloys for In-Space Manufacturing: A Computational Approach,*" **NSF-CIMM**, **PI**: Kasra Momeni, **$10,000** for 1 year (1/2020-12/2020)
- "*A microstructure-informed continuum model for fatigue life prediction in printed aluminum parts,*" **NSF-CIMM**, **PI**: Kasra Momeni, **$10,000** for 1 year (1/2020-12/2020)
- "*Integrated Computational Materials Design for Laser-based Additive Manufacturing of Alloys,*" **ASM Materials Education Foundation**, **PI**: Kasra Momeni, **$218,427** for 3 year (11/2018-11/2021)
- "*Additively Manufactured Energy Absorbing Metamaterials with Decoupled Controllable Normal and Shear Components,*" **IfM**, **PI**: Kasra Momeni, **$8,700** for 6 months (2/2019-8/2019)
- "*A Phase-Field Model of Plastic Deformation for Multiscale Metal Forming Processes,*" **NSF-CIMM**, **PI**: Kasra Momeni, **$10,000** for 1 year (1/2018-1/2019)
- "PASCO Comprehensive Materials Testing System," **LaTech-COES**, **PI**: Kasra Momeni, **$16,000** for 3 month (1/2018-3/2018)
- "*An Advanced Phase-Field Model of Microcrack Initiation for Alloys in Aerospace Applications using Direct Experimentation,*" **LaSPACE REA**, **PI**: Kasra Momeni, **$75,089** for one year (7/1/2017-8/31/2018).
- "*Modeling Growth Morphology of h-BN Using a Multiscale Approach,*" **ATOMIC**, **co-PI**: Kasra Momeni, **$20,000** for one year (1/1/17-12/31/17).
- "*Multiscale Modeling of Multifunctional Materials: Theory and Code Development,*" **XSEDE**, **co-PI**: Kasra Momeni, **$32,204** for one year (3/15/17-3/14/18).
- "*Multiphysics Model and Application Development for Controlled 2D Materials Growth,*" **NSF-MIP**, **PI**: Kasra Momeni, **$18,078** for 1 years (1/2017-1/2018)
- "*An advanced phase-field approach to engineering laser-based 3D metal printing: effect of mechanics and interfaces,*" **NSF-CIMM**, **PI**: Kasra Momeni, **$20,000** for 1 year (1/2017-1/2019)
- "CFA-16-10667: *A Coupled Experimental and Simulation Approach to Investigate the Impact of Grain Growth, Amorphization, and Grain Subdivision in Accident Tolerant U_3Si_2 Light Water Reactor Fuel,*" **DOE-NEUP**, **co-PI**: Kasra Momeni, **$800,000** for 3 years (8/2016-7/2019)
- "*A Multi-scale/Multi-physics Tool for Predicting Fatigue Crack Initiation and Propagation in Aircraft Structural Components using Coupled FEM Phase Field Approach,*" **STTR**, **co-PI:** Kasra Momeni, **$160,000** for 13 month (1/2016-2/2017)
- "*Developing a 3D Microstructure Reconstruction Capability in the Materials Computation Center,*" **Materials Computation Center**, **co-PI**: Kasra Momeni, **$12,000** for 4 month (11/2015-2/2016)
- "*New Low-dimensional Multifunctional Materials: Defect Engineering and Functionalization,*" **LONI**, **PI**: Kasra Momeni, **$18,150** for a year (10/01/2016-04/01/2019)

AWARDS AND HONORS

- Award from President's Office of Financial Support for Advanced Technologies for my book entitled *Introduction to Nanotechnology* (in Persian), ISBN: 964-5544-52-1.
- *NSF CAREER Award* 2020
- Lead Editor of special issue on "Low-Dimensional Phase Transforming Materials" in Journal of Nanomaterials
- National Recognition Award of Louisiana Tech University for 2019
- Best Paper Prize of Institute for Micromanufacturing for 2017

- Iowa State University Zaffarano Prize Honorable Mention Award for 2015
- Iowa State University Research Excellence Award for 2015
- Graduate and Professional Student Senate Research Excellence Award for 2015
- Graduate and Professional Student Senate Teaching Excellence Award for 2015
- Iowa State University Teaching Excellence Award for 2014
- Aerospace Engineering Department Travel Grant, Spring 2013
- Aerospace Engineering Department Fellowship, Spring 2013
- NSF travel grant award to ASME IMECE 2012 conference (Rank 2nd)
- Third top student in the National Entrance Exam for M.S. 2006
- Best undergraduate thesis award 2006
- Top 1% in the National Entrance Exam for B.S. 2001, among 400,000 rivals
- Member of Engineering Honor Society ΤΒΠ and ΣΞ

PUBLICATIONS

1. *An Introduction to Nanotechnology*, A. Shokuhfar & **K. Momeni**, 2004, ISBN: 964-5544-52-1.

2. co-Editor of Persian translated version of *Materials Science and Engineering: An Introduction*, William D. Callister, Jr., John Wiley and Sons, 2000, ISBN: 964 8703-03-5.

JOURNAL PAPERS

3. "Mechanical performance of aluminum aerospace alloys optimized for in-space manufacturing processes," Jonathan Raush, **Kasra Momeni**, Shengmin Guo, *Journal of Materials Engineering and Performance* (submitted) – ***Invited***.

4. "A Thermodynamically consistent Phase-field Model of Binary Alloys," Manoj Ghosh and **Kasra Momeni**, *Acta Mechanic* (submitted).

5. "Engineering the Surface Melt for In-Space Manufacturing of Aluminum Parts," **Kasra Momeni**, Sara Neshani, Chukwudalu Uba, Huan Ding, Jonathan Raush, Shengmin Guo, *Journal of Materials Engineering and Performance* (submitted) – ***Invited***.

6. "Theoretical approaches for modeling properties and growth of layered chalcogenides," Nadire Nayir, Anne Marie, **Kasra Momeni**, Mert Sengul, Joshua Paul, Yanzhou Ji, Yuan Xuan, Stephen Xie, Chaitanya Kolluru, Simon Delarette, Yuanxi Wang, Long Qing Chen, Richard Hennig, Vincent H. Crespi, Adri C. T. van Duin, *2D Materials*, (submitted) – ***Invited***.

7. "Effect of substrate on the orientation of as grown MoS_2 monolayers," Shiddartha Paul, Riccardo Torsi, Joshua A. Robinson, and **Kasra Momeni**, *ACS Materials and Interfaces*, (submitted).

8. "Wafer scale epitaxial monolayer TMD growth by gas source chemical vapor deposition," Tanushree H. Choudhury, Mikhail Chubarov, **Kasra Momeni**, James L. Spencer, Danielle R Hickey, Tianyi Zhang, Amritanand Sebastiann, Sukwon Choi, Nasim Alem, Mauricio Terrones, Sapratshi Das, and Joan M. Redwing, *ACS Nano*, (submitted).

9. "Developing Fused Deposition Modeling Additive Manufacturing Processing Strategies for Aluminum Alloy 7075: Sample Preparation and Metallographic Characterization," Huan Ding, Congyuan Zeng, Jonathan Raush, **Kasra Momeni**, Shengmin Guo, *Materials* 15 (4), 1340 (2022).

10. Sensitivity of additively manufactured AA7075 to variation in feedstock composition and print parameters," **K. Momeni**, *Journal of Manufacturing Processes* 73, 555-562 (2022).

11. "Computational Synthesis of 2D Materials Grown by Chemical Vapor Deposition," **Kasra Momeni**, Yanzhou Ji, Long-Qing Chen, *Journal of Materials Research*, 37, 114–123 (2022). – ***Invited Feature Paper.***

12. "Sensitivity of laser powder bed fusion additive manufactured HAYNES230 to composition and print parameters," **K. Momeni** . Journal of Materials Research and Technology 15, 6453-6463 (2021).

13. "A Modified Embedded-Atom Potential for Fe-Cr-Si Alloy," Shiddartha Paul, Mario Muralles, and **Kasra Momeni**, *J. Phys. Chem. C*, 125, (41), 22863–22871 (2021).

14. "A Multiscale Insight into The Growth of h-BN: Effect of The Enclosure," Y. Ji, **K. Momeni**, and L.-Q. Chen, *2D Materials*, 8(3), 035033 (2021).

15. "Effect of Irradiation on Ni-Inconel Heterostructures in Multimetallic Layered Composites," Shiddartha Paul, Daniel Schwen, Michael Short, and **Kasra Momeni**, *Journal of Nuclear Materials,* 547, 152778 (2021).

16. "3D-Printed Strain Sensors: Electro-Mechanical Simulation and Design Analysis using Nonlinear Material Model and Experimental Investigation." S. M. Mahdi Mofidian, Shayan Davani, **Kasra Momeni**, and Hamzeh Bardaweel, *IEEE Sensors Journal,* 21 (2), 1675-1685, (2021).

17. "Nanoscale Serration Characteristics of Additively Manufactured Superalloys," Russell A Rowe, Ali Tajyar, Michael Munther, **Kasra Momeni**, and Keivan Davami, Journal of Alloys and Compounds 156723 (2020).

18. "Shear-induced diamondization of multilayer graphene structures: A computational study." Shiddartha Paul, **Kasra Momeni**, and Valery Levitas Carbon 167 (15), 140-147 (2020).

19. "Computational Synthesis of 2D Materials Beyond Graphene: A Review," **Kasra Momeni**, Yanzhou Ji, Yuanxi Wang, Shiddartha Paul, Sara Neshani, Dundar E. Yilmaz, Yun K. Shin, Difan Zhang, Jin-Wu Jiang, Harold Park, Joshua Robinson, Susan Sinnott, Adri van Duin, Vincent Crespi, Long-Qing Chen, *npj Computational Materials,* 6 (1), 1-18 (2020).

20. "Systematic Design of High-Strength Multicomponent Metamaterials," **Kasra Momeni**, S M Mahdi Mofidian, Hamzeh Bardaweel, *Materials & Design*, 183, 108124 (2019).

21. "Mechanochemistry of stable diamane and atomically thin diamond films synthesis from bi- and multilayer graphenene: A computational study," Shiddartha Paul and **Kasra Momeni**, *The Journal of Physical Chemistry C*, 123 (25), 15751-15760 (2019).

22. "Probing the Mechanical Properties of Vertically-Stacked Ultrathin Graphene/Al2O3 Heterostructures," M. Munther, M. Shaygan, A. Centeno, D. Neumaier, **K. Momeni**, K. Davami, IOP *Nanotechnology*, 30 (18), 185703 (2019).

23. "Mechanical Properties Enhancement of Low-dimensional Nanostructures through Microstructural Engineering," H. Attariani, S. Emad Rezaei, **K. Momeni**, *Extreme Mechanics Letters*, 27, 66-75 (2019).

24. "Multiscale crystal-plasticity phase field and extended finite element methods for fatigue crack initiation and propagation modeling," A. Sadeghirad, **K. Momeni**, Y. Ji, L.-Q. Chen, J. Lua, *International Journal of Fracture*, 216 (1), 41–57 (2019).

25. "Dynamic Energy Absorption Characteristics of Additively-Manufactured Shape-Recovering Lattice Structures," M. Mohsenizadeh, F. Gasbarri, M. Munther, A. Beheshti, **K. Momeni**, and K. Davami, *Materials Research Express*, 6 (4), 045302 (2019).

26. "A Roadmap for Electronic Grade 2-Dimensional Materials," N. Briggs, S. Subramanian, Z. Lin, X. Li, X. Zhang, K. Zhang, K. Xiao, D. Geohegan, R. Wallace, L.-Q. Chen, M. Terrones, A. Ebrahimi, S. Das, J. Redwing, C. Hinkle, **K. Momeni**, A. van Duin, V. Crespi, S. Kar, J. A Robinson, *2D Materials*, 6 (2), 022001 (2019).

27. "Multiscale framework for simulation-guided growth of 2D materials," **K. Momeni**, Y. Ji, K. Zhang, J. A. Robinson, L.-Q. Chen, *npj 2D Materials and Applications*, 2 (1): 27 (2018).

28. "Defect engineering, a path to make ultra-high strength low-dimensional nanostructures," H. Attariani, S. E. Rezaei, and **K. Momeni**, *Computational Materials Science,* 151*,* 307-316 (2018).

29. "Engineering Defects, a Path to Exceed Perfection," H. Attariani, **K. Momeni**, and K. Adkins, *ACS OMEGA* 2 (2), 663 (2017); (***ACS Editors' Choice***).

30. "From vertical to planar 2D MoS$_2$: a controlled synthesis technique," F. Zhang, **K. Momeni**, M. Abu AlSaud, M. Hainey Jr., J. M. Redwing, L.-Q. Chen, and N. Alem, *2D Materials*, 4 (2), 025029 (2017).

31. "Bottom-Up Synthesis of Vertically Oriented Two-Dimensional Materials," R. A. Vilá, **K. Momeni**, Q. Wang, B. M. Bersch, N. Lu, M. J. Kim, L.-Q. Chen, and J. A. Robinson, *2D Materials*, 3 (4), 041003 (2016).

32. "Atomic defects influenced mechanics of II-VI nanocrystals," M. Ghosh, S. Ghosh, H. Attariani, **K. Momeni**, M. Seibt, G. M. Rao, *Nano Letters*, 16 (10), 5969-5974 (2016).

33. "Structural transformation in monolayer materials: A 2D to 1D transformation," **K. Momeni**, H. Attariani, and R LeSar, *Physical Chemistry Chemical Physics*, 18 (29), 19873-19879 (2016).

34. "Fast 180º magnetization switching in a strain-mediated multiferroic heterostructure driven by a voltage," R.-C. Peng, J-M. Hu, **K. Momeni**, J.-J. Wang, L.-Q. Chen, and C.-W. Nan, *Scientific Reports*, 6, 27561 (2016).

35. "Fast and unidirectional magnetic domain-wall motion driven by a voltage," J-M. Hu, T. Yang, **K. Momeni**, X. Cheng, L. Chen, S. Lei, J. Wang, H. Huang, Z. Zhang, S. Trolier-McKinstry, V. Gopalan, G. P. Carman, C-W Nan, and L-Q Chen, *Nano Letters*, 16 (4), 2341-2348, (2016).

36. "A phase-field approach to nonequilibrium phase transformations in elastic solids via an intermediate phase (melt) allowing for interface stresses," **K. Momeni** and V. I. Levitas, *Physical Chemistry Chemical Physics*, 18 (17), 12183-12203 (2016).

37. "The strong influence of internal stresses on the nucleation of a nanosized, deeply undercooled melt at a solid–solid phase interface," **K. Momeni**, V. I. Levitas, and J. A. Warren, *Nano Letters*, 15 (4), 2298–2303, (2015).

38. "A Phase-Field Approach to Scale Effects and Mechanics in Solid-Solid Phase Transformation With Intermediate Interfacial Phases," **K. Momeni** and V. I. Levitas, *International Journal of Solids and Structures*, 71, 39–56, (2015).

39. "Propagating Phase Interface with Intermediate Interfacial Phase: Phase Field Approach," **K. Momeni** and V. I. Levitas, *Physical Review B*, 89 (18), 184102, (2014).

40. "Enhanced mechanical properties of ZnO nanowire-reinforced nanocomposites: a size-scale effect," **K. Momeni**, *Acta Mechanica*, 225 (9), 2549-2562, (2014).

41. "A Multiscale Approach to Nanocomposite Electrical Generators," **K. Momeni**, *Nano Energy*, 4, 132-139, (2014).

42. "Electromechanical properties of 1D ZnO nanostructures: Nanopiezotronics building blocks, surface and size-scale effects", **K. Momeni** and H. Attariani, *Physical Chemistry Chemical Physics*, 16 (10), 4522-4527 (2014).

43. "Solid-Solid Transformation via Nanoscale Intermediate Interfacial Phase: Multiple Structures, Scale, and Mechanics Effects," V.I. Levitas and **K. Momeni**, *Acta Materialia*, 65, 125-132 (2014).

44. "Finite size effect on piezoelectric properties of ZnO nanobelts: A molecular dynamics approach," **K. Momeni**, G. M. Odegard, and R. S. Yassar, *Acta Materialia*, 60 (13), 5117-5124 (2012).

45. "Structural inhomogeneity and piezoelectric enhancement in ZnO nanobelts," **K. Momeni**, A. Asthana, A. Parasad, Y. K. Yap and R.S. Yassar, *Applied Physics A*, 1-6 (2012).

46. "Optimal Aspect Ratio of Zinc Oxide Nanowires for a Nanocomposite Electrical Generator," **K. Momeni** and S. Mehdi Mortazavi Z., *Journal of Computational and Theoretical Nanoscience*, 9, 1670-1674 (2012).

47. "In situ observation of size-scale effects on the mechanical properties of ZnO nanowires," A. Asthana, **K. Momeni**, A. Prasad, Y.K.Yap, and R.S. Yassar, *Nanotechnology*, 22, 265712 (2011).

48. "On the correlation of crystal defects and band gap properties of ZnO nanobelts," A. Asthana, **K. Momeni**, A. Prasad, Y.K.Yap, and R.S. Yassar, *Applied Physics A*, 105, 909-914 (2011).

49. "A Study on the Structure-Piezoresponse Property of a ZnO Nanobelt by In Situ Transmission Microscopy," A. Asthana, **K. Momeni,** A. Prasad, Y. Yap and R. Yassar, *Microscopy and Microanalysis*, 17.S2, 1724-1725 (2011).

50. "In situ Probing of Structural and Electromechanical Properties of an Individual ZnO Nanobelt," A. Asthana, **K. Momeni,** A. Prasad, Y. Yap and R. Yassar, *Microscopy and Microanalysis*, 17.S2, 492-493 (2011).

51. "Nanocomposite Electrical Generator Based on Piezoelectric Zinc Oxide Nanowires," **K. Momeni,** G. M. Odegard and R.S. Yassar, *Journal of Applied Physics*, 108, 114303 (2010).

52. "Introducing Structural Approximation Method for Modeling Nanostructures," **K. Momeni** and A. Alasty, *Journal of Computational and Theoretical Nanoscience*, 7 (10), 423-428 (2010).

53. "Stress distribution on a single-walled carbon nanohorn embedded in an epoxy matrix composite under axial force," **K. Momeni**, R.S. Yassar, *Journal of Computational and Theoretical Nanoscience*, 7 (6), 1035-1041 (2010).

54. "Analytical formulation of stress distribution in cellulose nanocomposites," **K. Momeni**, R.S. Yassar, *Journal of Computational and Theoretical Nanoscience*, 6 (7), 1511-1518 (2009).

55. "*In situ* probing of electromechanical properties of an individual ZnO nanobelt," A. Asthana, **K. Momeni**, A. Prasad, Y. Khin Yap, and R.S. Yassar, *Applied Physical Letters*, 95, 172106 (2009).

56. "Analytical Solution of Stress Distribution on a Hollow Cylindrical Fiber of a Composite with Cylindrical Volume Element under Axial Loading," M. H. Kargarnovin and **K. Momeni**, International Journal of Mechanical, *Industrial and Aerospace Engineering*, 1 (4), 196-203 (2007).

CONFERENCE PRESENTATIONS

57. "Envisioning Pathways to Accelerated Materials Discovery Forum," Jan 20-21 (2022), virtual, **Invites**.

58. "Shear-induced diamondization of multilayer graphene structures: A computational study," Shiddartha Paul, Valery Levitas, and **Kasra Momeni**. 27th International Conference on Plasticity, Damage, and Fracture, Barcelo Punta Cana, Dominican Republic, Jan. 3-9, 2022 (invited abstract).

59. "Radiation damage study of Ni/Inconel multimetallic layered composite for fluoride-salt reactor-a molecular dynamics study," Shiddartha Paul, Daniel Schwen, Michael Short and **Kasra Momeni**. 16th U.S. National Congress on Computational Mechanics, Chicago, Illinois, USA, July 25-29, 2021.

60. "Radiation response of T91/Fe-Cr-Si multimetallic layered composite for deployment in generation IV reactors," Shiddartha Paul, Daniel Schwen, Michael Short and **Kasra Momeni**. MIT AEAB (Applied Energy A+B) Conference, MIT, Cambridge, MA, USA, August 2021 – ***Best Paper Award***.

61. "Diamondization of multilayer graphene/graphitic structures through a shear assisted phase transformation," Shiddartha Paul, Valery Levitas and **Kasra Momeni**. 2020 MRS, Spring/Fall Meeting Exhibit, Virtual.

62. "Study of shear-induced diamondization mechanism of multilayer graphene/graphitic structures," Shiddartha Paul, Valery Levitas, and **Kasra Momeni**. Society of Engineering Science (SES) 57th Annual, Technical Meeting, University of Minnesota, Minneapolis, MN, USA, September 28-30, 2020.

63. "Ni/Inconel multimetallic layered composites for fluoride-salt high-temperature reactor," Shiddartha Paul, Daniel Schwen, Michael Short, and **Kasra Momeni**, 2020 MIT "A+B" Applied Energy Symposium (MITAB), May 16-18, Boston, MA, US.

64. "Diamondization of Multilayer Graphene/Graphitic Structures through a Shear Assisted Phase Transformation," Shiddartha Paul, Valery Levitas, and **Kasra Momeni**. 2020 MRS, Spring/Fall Meeting Exhibit, Virtual.

65. "A Simulation-Driven Database of 2D Materials for Growth Chambers Design," **K. Momeni**, Y Ji, and Long-Qing Chen, Graphene and Beyond Workshop 2020, May 12-15, State College, PA, US.

66. "Amorphous Phase Mediated Phase Transformation in HMX," **K. Momeni**, MACH 2020, April 1-3, Annapolis, MD, US.

67. "Amorphization Aluminum nanoparticles under High Strain-Rate Deformation," **K. Momeni**, MACH 2020, April 1-3, Annapolis, MD, US.

68. "Amorphous Phase Mediated Phase Transformation in Solids," **K. Momeni**, V. Levitas, ICPDF, 2020, Jan 1-10, Riviera Maya, Mexico.

69. "Mechanochemistry of stable diamane and atomically thin diamond films synthesis from bi- and multilayer graphenene: A computational study," Shiddartha Paul and **Kasra Momeni**, SES, 2019, Oct 13-15, St. Louis, MO

70. "A simulation-driven database of 2D materials for growth chambers design," **K. Momeni**, M. Madadi, Y. Ji, L-Q Chen, MRS, 2019, April 22-26, Phoenix, AZ, US.

71. "Phase-field approach to nonequilibrium phase transformations in HMX energetic crystals," **K. Momeni**, MACH2019, April 3-5, Annapolis, MD, US.

72. "Energy Absorbing Metamaterials: A Computational Study," J. T Fontenot and **K. Momeni**, GCURS Conference, Rice University, Oct 6th, 2018.

73. "Coupling Crystal-Plasticity Phase Field and Extended Finite Element Methods for Efficient Modeling of Fatigue Crack Initiation and Propagation," A. Sadeghirad, **K. Momeni**, Y. Ji, X. Ren, L-Q. Chen, J. Lua, 2nd Pan American Congress on Computational Mechanics, July 22-27, 2018, New York City, US.

74. "Multiphysics Model and Application Development for Controlled 2D Materials Growth," **K. Momeni** and Long-Qing Chen, Graphene and Beyond Workshop 2018, May 8-12, State College, PA, US.

75. "Modeling Growth Morphology of h-BN Using A Multiscale Approach," **K. Momeni** and Long-Qing Chen, ATOMIC Workshop 2018, May 8-12, State College, PA, US.

76. "Size-Extreme Loading Duality in Low-Dimensional Materials," **K. Momeni** and H. Attariani, MACH2018, April 4-6, Annapolis, MD, US.

77. "Novel intrinsic Phase Transition and Strengthening in Low-dimensional Nanostructures Through Defect Engineering," H. Attariani and **K. Momeni**, MACH2018, April 4-6, Annapolis, MD, US.

78. "Simulation Guided Growth of 2D Materials—A Generalized Multiscale Framework," **Kasra Momeni**, Y. Ji, R. A. Vilá, J.A. Robinson, L-Q Chen, MRS, 2018, April 2-6, Phoenix, AZ, US.

79. "An Advanced Phase-field Framework For Design of 3D-Printed Metal Parts," **K. Momeni**, CIMM, 2018, Mar 2018, Baton Rouge, LA, US.

80. "Fuzzy Molecular Dynamics: An Adaptive Multilevel Coarse-Graining Framework," **K. Momeni**, SES 54th Annual Technical Meeting, 2017, Jul 25-28, Boston, MA, US.

81. "Property enhancement in low-dimensional materials via defect engineering, new path to materials' architecture," H. Attariani, **K. Momeni**, SES 54th Annual Technical Meeting, 2017, Jul 25-28, Boston, MA, US.

82. "Controlled Growth of 2D Materials via Simulation Guided Experiments," **K. Momeni**, R. A. Vilá, J. A. Robinson, and L.-Q. Chen, MRS, 2017, April 17-21, Phoenix, AZ, US.

83. "Property enhancement in low-dimensional materials via defect engineering, new path to materials' architecture," **K. Momeni** and H. Attariani, MACH2017, April 5-7, Annapolis, MD, US.

84. "An Advanced Phase-field Approach to Engineering Laser-Based 3D Metal Printing: Effect of Mechanics and Interfaces," **K. Momeni**, CIMM, 2017, Feb 6th, Baton Rouge, LA, US.

85. "Structural Transformation of 2D Nanosheets to 1D Materials," **K. Momeni**, H. Attariani, R. LeSar, SES 53th Annual Technical Meeting, 2016, Oct 2-5, College Park, MD, US.

86. "Phase-Field Approach to Nonequilibruim Phase Transformation with Moving Interfacial Phases and Interfacial Tension," **K. Momeni** and V. I. Levitas, SES 52th Annual Technical Meeting, 2015, Oct 26-28, College Station, TX, US.

87. "Propagating phase interface with intermediate interfacial phase: Phase field approach," **K. Momeni** and V. I. Levitas, SES 51th Annual Technical Meeting, 2014, Oct 1-3, 2014, West Lafayette, IN, US.

88. "Solid-Solid Transformations via Nanoscale Intermediate Interfacial Phases," **K. Momeni** and V. I. Levitas, Third International Symposium on Phase-field Method 2014, Aug 26-29, 2014, State College, PA, US.

89. "Intermediate Interfacial Phases: Effect of Mechanics and Size Scale," **K. Momeni** and V. I. Levitas, USNCTAM-2014, June 15-20, 2014, East Lansing, Michigan US.

90. "Solid-Solid Transformations via Nanoscale Intermediate Melt: Scale and Mechanics Effects, " **K. Momeni** and V. I. Levitas, 1st Annual Graduate and Professional Student Research Conference, April 4, 2014, Ames, IA, US.

91. "Phase-Field Model for Melt-Mediated Solid-Solid Phase Transformation," **K. Momeni** and V.I. Levitas, SES 50th Annual Technical Meeting, July 28-31, 2013, Providence, RI, US.

92. "A Nonequilibrium Diffuse Interface Model for Solid-Solid Phase Transformation of Energetic HMX Crystals," **K. Momeni** and V.I. Levitas, IMECE 2012, Nov 9-15, 2012, Houston, TX, US.

93. "Size Scale effect on generated electric potential of nanocomposite electrical generators," **K. Momeni**, IMECE 2012, Nov 9-15, 2012, Houston, Texas, US.

94. "Mechanics of Low Dimensional Material for Energy Harvesting and Storage," R. Yassar, H. Ghassemi, **K. Momeni**, A. Asthana, Y. Yap and G. Odegard, TMS2012, March 1-15, 2012, Orlando, FL, US.

95. "Effect of Size on Piezoelectric Charge Generated in Zinc Oxide Nanobelts," **K. Momeni**, A. Asthana, A. Parasad, Y.K. Yap, R.S. Yassar, 2010 MRS Spring Meeting, April 25-29, 2011, San Francisco, CA, US.

96. "Nanowires and Nanocomposites for Electrical Energy Generators: Modeling and In-Situ Microscopy," Reza Shahbazian Yassar, **K. Momeni**, A. Asthana and Y. K. Yap, 2011 MRS Spring Meeting, April 25-29, 2011, San Francisco, CA, US.

97. "Effect of Defect on the Piezoelectric Response of Zinc Oxide Nanobelts," **K. Momeni**, A. Asthana, A. Parasad, Y.K. Yap, R.S. Yassar, 2010 MRS Spring Meeting, April 25-29, 2011, San Francisco, CA, US.

98. "Mechanics of Nanotubes/Nanowires: In Situ Microscopy," R. Yassar, R., **K. Momeni**, H. Ghassemi, A. Asthana, and Y. Yap, TMS 2011, Feb 27-March 3, 2011, San Diego, CA, United States.

99. "In Situ Probing of Electromechanical Properties of an Individual ZnO Nanobelt," A. Asthana, **K. Momeni**, R. Shahbazian-Yassar, A. Prasad and Y. K. Yap, Microscopy and Microanalysis, August 1-5, 2010, Oregon, US, pp 1744-1745.

100. "Molecular Dynamics Simulation of Size Effect on Piezoelectric Properties of ZnO Nanobelts using GPUs," **K. Momeni**, G. M. Odegard, R.S. Yassar, 2010 MRS Spring Meeting, April 25-29, 2011, San Francisco, CA, US.

101.	"In-Situ TEM Studies of Nanomechanics and Fracture in Nanowires and Nanotubes," R. Yassar, H. Ghassemi, A. Pakzad, **K. Momeni,** A. Asthana, Y. Yap, TMS2010, February 14-18, 2010, Seattle, WA, US.

102.	"Electric potential distribution along ZnO nanowires, embedded in epoxy matrix," **K. Momeni,** G.M. Odegard and RS. Yassar, 2010 MRS Spring Meeting, April 5-9, 2010, San Francisco, CA, US.

103.	"Governing Differential Equation of the Stress Distribution on a Single-Walled Carbon Nanohorn in an Epoxy Matrix Nanocomposite," **K. Momeni**, A. Alasty, A. Shokuhfar, NS2008, March 11-14, 2008, Conference, Kish Island.

104.	"Designing an Intelligent Controller for a Molecular Valve," **K. Momeni** and A. Alasty, MicroNano08, June 3-5, 2008, Kowloon, Hong Kong.

105.	"Stress Distribution on Open-Ended Carbon Nanotubes," **K. Momeni** and A. Alasty, MicroNano08, June 3-5, 2008, Kowloon, Hong Kong.

106.	"Analytical Solution of Stress Distribution on a Hollow Cylindrical Fiber of a Composite with Cylindrical Volume Element under Axial Loading," M. H. Kargarnovin and **K. Momeni**, ICME2007, Dec 20, 2007, Bangkok, Thailand.

INVITED TALKS

- "Multiscale Modeling of Phase Transforming Materials," **K. Momeni**, Mar 2018, Pôle Universitaire Léonard de Vinci (PULV), Paris, France.

- "Size-Extreme Loading Duality in Low-Dimensional Materials," **K. Momeni**, April 2018, MACH 2018, Annapolis, MD

- "A Multi-scale/physics Approach to Hierarchically-Structured Materials: Mild to Extreme Environments," **K. Momeni**, May 2016, LaTech Institute for Micromanufacturing, Ruston, LA

- "A Multiscale/physics Approach to Hierarchically-Structured Materials: Mild to Extreme Environments," **K. Momeni**, March 2016, Mississippi State University, Starkville, MS

- "Phase Field Modeling Approach," **K. Momeni**, February 2016, Pennsylvania State University, University Park, PA

- "Modeling Considerations for Low-D Materials," **K. Momeni**, September 2015, Pennsylvania State University, University Park, PA

- "Multiscale/physics Approach to Hierarchically Structured Materials: Nanocomposites and Smart Materials," **K. Momeni**, March 2015, Center for Infrastructure Engineering Studies, Missouri University of Science and Technology, Rolla, MO

- "Research Writing Seminar Series: Effective Writing Tips from Published Authors," **K. Momeni**, December 2013, Ames, IA

- "Phase field modeling of solid-solid phase transformation via virtual melting: Effect of interface energy, width, and interactions," **K. Momeni**, October 2013, Ames, IA

COURSES TAUGHT

- Mechanics of Materials (Undergraduate)
- Dynamics (Undergraduate)
- Engineering Problem Solving (Undergraduate)
- Statics of Engineering (Undergraduate)
- Materials Engineering Lab (Undergraduate)
- Multiscale Material Design (Senior/Graduate)
- Machine Elements Design (Undergraduate)
- Capstone Design (Undergraduate)
- An Introduction to Nanotechnology (Senior/Graduate)

- Multiscale Modeling of Phase Transformation in Materials (Graduate)
- Multiscale Modeling of Phase Transforming Materials – Invited Lecturer, Leonard De Vanci France

COURSES DEVELOPED

- Designed a graduate multidisciplinary course entitled "*Multiscale Material Design: from Atoms to Structures*," covering theories across multiple scales with hands on coding
- Designed an undergraduate lab entitled "*Materials Engineering Lab*," covering theories of mechanical behavior of materials and computational material design with hands on experiments and software
- Designed a course entitled "*An Introduction to Nanotechnology*," for graduate students specially in the field of mechanical engineering and materials science
- Designed extracurricular student seminar series entitled "*Multi Physics/Scale Modeling/Simulation of Nanomaterials (using COMSOL)*"
- Designed extracurricular student seminar series entitled "*High Performance Computing in Materials Science*"

STUDENTS

Ph.D. (Six Ph.D. students): Shidartha Paul (Spring 2022), Rifat-E-Nur Hossain (Summer 2022), Mohammed Al-Evan Chowdhury (Summer 2022), Rachit Pokhrel (Fall 2022), Mario Hernandez (Winter 2021-2022).
MSc (Two Associate MSc students): Shidartha Paul (Summer 2020), Manoj Ghosh (Summer 2020), S M Ashique Imran (Fall 2021).

SERVICE TO THE PROFESSION

Editorial Board Member: Microstructures, MDPI-Materials
Editorial Advisory Board: Materials Science in Semiconductor Processing

Invited Participant, NSF workshop on *Advancing and Accelerating Materials Innovation* (2017)

Panelist, NSF (2016, 2019), DoE (2017, 2019, 2020)

Symposium Organization: *MACH 2018 – Low-Dimensional Materials Under Extreme Environments; MACH 2019 – Multiscale Models and Experiments for Energetic Materials; MACH 2020 – Multiscale Models and Experiments for Energetic Materials*

Journal Reviewer (33 Journals)

npj Computational Materials; Carbon; Nanoscale-Royal Society of Chemistry; Physical Chemistry Chemical Physics; Advanced Electronic Materials; Journal of Materials Chemistry C; Materials Research Letters; Journal of Mechanics and Physics of Solids; Journal of Alloys and Compounds; Journal of Nanomedicine & Nanotechnology; Journal of Nanotechnology (IOP publishing); European Journal of Mechanics; Journal of Applied Mechanics; Journal of Materials Science; Journal of Smart Materials and Structures; Computational Materials Science; Journal of Physics D: Applied Physics; Journal of Physics and Chemistry of Solids; Journal of Applied Physics A; Molecular Simulation (Taylor and Francis); Journal of Applied Surface Science; Physica E: Low-dimensional Systems and Nanostructures; Journal of Computational Electronics; Materials Research Express (IOP publishing); Surfaces and Interfaces; Journal of Chemical Engineering & Process Technology; International Journal of Mechanical Sciences; Sensors; Applied Sciences; Journal of Nanomaterials; Current Nanoscience; Scientia Iranica Journal; Journal of Engineering Materials and Technology

Conference Reviewer (5 Conferences)

The 2012 IEEE Energy Conversion Congress and Exposition (ECCE 2012); The 2013 IEEE Energy Conversion Congress and Exposition (ECCE 2013); The 2014 IEEE Energy Conversion Congress and Exposition (ECCE 2014); The 2015 IEEE Energy Conversion Congress and Exposition (ECCE 2015); ASME-IMECE2017

RESEARCH AND PROFESSIONAL POSITIONS

- Associate Professor, The University of Alabama, 2020-Now
- Assistant Professor, Louisiana Tech University, 2016-2020
- Postdoctoral Research Associate, Pennsylvania State University, 2015-2016
- Postdoctoral Research Associate, Iowa State University, Summer 2015
- Research Assistance, Iowa State University, 2011-2015
- Research Assistance, MichiganTech, 2008-2011
- Research Engineer, Sharif Research Center, 2005-2007.
- Research Engineer, NET, 2006-2007.
- Research Fellow, KNT University; Center of Advanced Materials and Nanotechnology, 2005-2006.

INDUSTRIAL EXPERIENCES

- **Consultant**, IRITEC oil and gas industry (2003)
  An innovative approach was developed for calculating the stress values in gas and oil pipeline expansion loops and implemented in a software. This software is aiding IRITEC to calculate the optimum number of expansion loops in a distance based on the material of the pipe.

- **Consultant**, Industrial Zones Inc. (2006-2007)
  Developing software package for collecting and managing the information of small and medium sized industries, and promoting collaboration among the manufacturers. Designing new products for small industries and improving their manufacturing process.

- **Consultant**, NET (2006-2007)
  Designing solar powered industrial fruit drier for reducing costs and providing environmentally friendly design.

- **Consultant**, Danesh Biotechnology Lab. (2006-2008)
  Developing software to collect of blood test data, perform a primary analysis and store the data in a central SQL database. The software is designed to manage multiple users and work with large data sets.

- **Technical Researcher**, Sharif University Research Center (2005-2007)
  Modeled multiphase flow and cavitation formation at the interface of solid and fluid, with the goal of reducing the wear due to bubble collapse and microjet formation.

PROFESSIONAL AFFILIATIONS

- Member of *American Society of Mechanical Engineers* (ASME), *Materials Research Society* (MRS), *Society of Automotive Engineers* (SAE), *United States Association for Computational Mechanics* (USCM), *Society of Engineering Science* (SES), *World Academy of Science Engineering and Technology* (WASET)

SOFTWARE DEVELOPMENT

- **KMD**, A software for simulating and visualizing nanostructure materials behavior based on molecular dynamics and structural approximation techniques. It has a GUI like FEM analysis software packages for lowering the learning curve
- **KPaperOrganizer**, A software for organizing research material with visualization capability in a graph format
- **KSysmex**, A software for collecting data from a CBC blood tester device and analysis
- **KSMIndustries**, A database of small and medium industries for marketing and networking with a purpose of reducing costs
- **KTrans**, A software for organizing students' grades and preparing transcripts
- **KFarsiMenu**, A software which translates the menu items and put them in a right-to-left order
- **KExpanLoop**, A software for designing expansion loops in gas and oil pipelines