

**Iman Salehinia, Ph.D.**

Assistant Professor  
Department of Mechanical Engineering  
Northern Illinois University  
DeKalb, IL, 60115.

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**EDUCATION**

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**Ph.D.**, Mechanical Engineering  
Washington State University  
Dissertation: Effect of point defects and their clusters on the yielding of metallic structures  
Advisor: Professor D.F. Bahr  
Pullman, WA  
*Jan. 2008 to May 2013*

**M.Sc.**, Solid Mechanics (Solid Design)  
K.N.Toosi University of Technology  
Thesis: Simulation of Deep Drawing Process and Study of Wear in this Process  
Advisor: Professor A.R. Shahani  
Tehran, Iran  
*Sep. 2004 to Sep. 2007*

**B.Sc.**, Solid Mechanical Engineering  
Amir Kabir University of Technology  
Thesis: Designing, Manufacturing and Testing of Single Disk Check Valve with Air Flow  
Advisor: Eng. D. Bahmanpour  
Tehran, Iran  
*Sep. 2000 to Sep. 2004*

**EMPLOYMENT**

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**Assistant Professor**  
Northern Illinois University  
Department of Mechanical Engineering  
Dekalb, IL  
*Aug. 2015-present*

**Clinical Assistant Professor**  
Washington State University  
School of Mechanical and Materials Engineering  
Pullman, WA  
*Aug. 2014-July 2015*

**Postdoctoral Research Associate**  
Washington State University  
Computational Mechanics and Materials Science Laboratory  
Pullman, WA  
*May 2013 to Aug. 2014*

**RESEARCH INTERESTS**

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- Mechanical and physical properties of thin films and engineered composite nanostructures
- Materials design for targeted functionality using predictive modeling approach including atomistic simulations and finite element method
- Diffusion/corrosion
- Structural defects in metals, intermetallics and ceramics, stochastic yielding, size effect

- Carbon nanotubes and carbon nano-structures
- Metal forming processes
- Wear, tribology, and surface science
- Finite element modeling of advanced manufacturing methods

## PUBLICATIONS

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1. **I. Salehinia**, I. Mastorakos, H.M. Zbib, Effects of Defects on Hydrogen Diffusion in NbC, *Applied Surface Science*, 2017, 401, 198-205.
2. M. Damadam, S. Shao, **I. Salehinia**, G. Ayoub, and H.M. Zbib, Molecular dynamics simulations of mechanical behavior in nanoscale ceramic–metallic multilayer composites, *Materials Research Letters*, <http://dx.doi.org/10.1080/21663831.2016.1275864>.
3. W. Yang, G. Ayoub, **I. Salehinia**, B. Mansoor, H.M. Zbib, Deformation mechanisms in Ti/TiN multilayer under compressive loading, *Acta Materialia*, 2017, 122, 99-108.
4. **I. Salehinia**, S. Shao, J. Wang, H.M. Zbib, Interface Structure and the Inception of Plasticity in Nb/NbC Nanolayered Composites, *Acta Materialia*, 2015, 86, 331-340.
5. **I. Salehinia**, S. Shao, J. Wang, H.M. Zbib, Plastic deformation of metal/ceramic nanolayered composites, *JOM*, 2014, 66, 2078-2085.
6. **I. Salehinia**, J. Wang, D.F. Bahr, H.M. Zbib, Molecular Dynamics Simulations of Plastic Deformation in Nb/NbC Multilayers, *International Journal of Plasticity*, 2014, 59, 119-132.
7. R.L. Schoepner, N. Abdolrahim, **I. Salehinia**, H.M.Zbib, D.F. Bahr, Temperature Dependence in Tri-Metallic Nano-Scale Metallic Multilayer Systems, *Thin Solid Films*, 2014, 571 (part 2), 247-252.
8. **I. Salehinia**, D.F. Bahr, Crystal orientation effect on dislocation nucleation and multiplication in FCC single crystal under uniaxial loading, *International Journal of Plasticity*, 2014, 52, 133-146.
9. **I. Salehinia**, D.F. Bahr, Mechanical behavior of FCC single crystals at finite temperatures in the presence of point defects, *Materials Science and Engineering A*, 2013, 588, 340-346.
10. **I. Salehinia**, S.K. Lawrence, D.F. Bahr, The effect of crystal orientation on the stochastic behavior of dislocation nucleation and multiplication during nanoindentation, *Acta Materialia*, 2013, 61, 1421-1431.
11. **I. Salehinia**, D.F. Bahr, Inception of plasticity in copper single crystal in presence of stacking fault tetrahedra, *Materials Science and Technology*, 2012, 28 (9-10), 1141-1146.
12. **I. Salehinia**, D.F. Bahr, The impact of a variety of point defects on the inception of plastic deformation in dislocation free metals, *Scripta Materialia*, 2011, 66 (6), 339-342.
13. **I. Salehinia**, V. Perez and D.F. Bahr, Effect of vacancies on incipient plasticity during contact loading, *Philosophical Magazine*, 2011, 92 (5), 550-570.
14. **I. Salehinia**, S.N. Medyanik, Effects of Vacancies on the Onset of Plasticity in Metals—An Atomistic Simulation Study, *Metallurgical and Materials Transactions A*, 2011, 42 (13), 3868-3874.
15. **I. Salehinia**, S.N. Medyanik, Transmission Between Translational and Rotational Motions in Double-Walled Carbon Nanotubes, *Journal of Computational and Theoretical Nonoscience*, 2011, 8, 179-188.
16. **I. Salehinia**, A.R. Shahani, Effect of sheet anisotropy on the wear in deep-drawing process of a cylindrical cup, *International Journal of Mechanical Sciences*, 2009, 51, 856-868.
17. A.R. Shahani, S.A. Nodamaie, **I. Salehinia**, Parametric Study of Hot Rolling Process by Finite Element Method, *International Journal of Scientia Iranica*, 2009, 16, 130-139.

18. A.R. Shahani, **I. Salehinia**, Analysis of Wear in Deep Drawing Process of a Cylindrical Cup, *Journal of Materials Processing Technology*, 2008, 200, 451-459.

### **CONFERENCE PROCEEDING PAPERS**

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19. **I. Salehinia**, V. Perez, M. Weber and D.F. Bahr, Inception of plasticity in the presence of vacancies in FCC single crystals: indenter size effect, *Mater. Res. Soc. Symp. Proc.*, 2011, 1297, 59-64.
20. A.R. Shahani, **I. Salehinia**, Finite Element Analysis of Wear in Deep Drawing Process, *Proceeding of the 1st Conference of Metal Forming of the Iranian Society of Mechanical Engineers (ISMEMFC2006)*, Tehran, Iran, December 27-28, 2006, pp. 483-490.

### **CONFERENCE PRESENTATIONS and CONTRIBUTIONS (presenter as italic)**

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1. *I. Salehinia*, W. Yang, S. Shao, G. Ayoub, J. Wang, H.M. Zbib, Plastic Deformation in Metal/Ceramic Multilayer Nanolaminates: NbC/Nb and TiN/Ti Case Studies, 2016 TMS Annual Meeting & Exhibition, Symposium: Mechanical Behavior at the Nanoscale III, Feb. 14-18, Nashville, TN.
2. *I. Mastorakos*, **I. Salehinia**, H. Zbib, Designing Ceramic/metal Multilayer Nanocomposites for Corrosion Resistance, Materials Science & Technology 2015, symposium: Computational Design of Ceramics and Glasses, Oct. 4-8, Columbus, OH.
3. *I. Salehinia*, S. Shao, J. Wang, H.M. Zbib, Plastic Deformation in NbC/Nb Multilayer Nanolaminates, MRS Fall Meeting and Exhibition, symposium RR: Scaling Effects in Plasticity-Synergy between Simulations and Experiments, Nov-Dec 2014, Boston, Massachusetts.
4. **I. Salehinia**, *I. Mastorakos*, H.M. Zbib, Hydrogen diffusion in ceramic/metal multilayer nanocomposites, ASME 2014 International Mechanical Engineering Congress & Exposition, Nov. 14-20, 2014, Montreal, Canada.
5. *D.F. Bahr*, M.R. Maughan, **I. Salehinia**, The Onset of Plasticity in FCC Metals with Point Defects and Associated Stochasticity in Hardness Measurements, MRS Fall Meeting and Exhibition, symposium KK: Dislocation plasticity, 2013, Boston, Massachusetts.
6. *R. Schoeppner*, **I. Salehinia**, H. Zbib, D.F. Bahr, N. Abdolrahim, Comparison of Temperature Dependence in Nano-Scale Metallic Multilayer Systems, MRS Fall Meeting and Exhibition, symposium ZZ: Nanostructured Materials in Extreme Environments, 2013, Boston, Massachusetts.
7. *D. Bahr*, S. Lawrence, M. Maughan, B. Li, **I. Salehinia**, H. Zbib, Using small scale testing to extract the impact of structural defects on plasticity mechanisms, Engineering Conference International (ECI): Nano- And Micromechanical Testing In Materials Research And Development IV, Oct. 6-11, 2013, Olhão, Algarve, Portugal.
8. **I. Salehinia**, S.K. Lawrence, D.F. Bahr, Stochastic behavior of FCC crystals due to spatial distribution of internal defects, *Gordon Research Seminar: Thin Film & Small Scale Mechanical Behavior*, July 21-22, 2012, Waterville, Maine.
9. **I. Salehinia**, S.K. Lawrence, D.F. Bahr, Stochastic behavior of FCC crystals due to spatial distribution of internal defects, *Gordon Research Conference: Thin Film & Small Scale Mechanical Behavior*, July 22-27, 2012, Waterville, Maine.
10. **I. Salehinia**, D.F. Bahr, Mechanical behavior of copper single crystal in the presence of point defects, *TMS Annual Meeting & Exhibition*, Symposium: From Macro to Nano, Understanding Mechanical Behavior across Length Scales: A Structural Materials Division Symposium in Honor of Robert Ritchie, 2012, Orlando, Florida.

11. *D.F. Bahr, I. Salehinia, S. Lawrence, Y. Kim, Stochastic Behavior of Dislocation Nucleation in Solids with Defects, TMS Annual Meeting and Exhibition, Symposium: Mechanical Behavior at Nanoscale I, 2012, Orlando, Florida.*
12. *D.F. Bahr, I. Salehinia, V. Perez, Y.K. Kim, Dislocation nucleation in the presence of vacancies, stacking faults, and self interstitials, Plasticity 2012, San Juan, Puerto Rico.*
13. *I. Salehinia, D.F. Bahr, Dislocation Nucleation in Copper in the Presence of Point Defects and Their Clusters. MRS Fall Meeting and Exhibition, Symposium SS: Properties and Processes at the Nanoscale—Nanomechanics of Material Behavior, 2011, Boston, Massachusetts.*
14. *D.F. Bahr, I. Salehinia, V. Perez, M. Weber, Indentation Methods to Measure Dislocation Nucleation: Experiments and Simulations, Materials Science & Technology, symposium: Hardness across the Multi-Scales of Structure and Loading Rate, 2011, Columbus, Ohio.*
15. *D.F. Bahr, V. Perez, E. Njeim, I. Salehinia, and M. Weber, Interactions between point defects and dislocation nucleation in mechanistic approaches across length scales, International Symposium on Plasticity, Jan 4 (2011), Puerto Vallarta, Mexico.*
16. *I. Salehinia, V. Perez, M. Weber, and D.F. Bahr, Inception of plasticity in the presence of vacancies in FCC single crystals: indenter size effect, MRS Fall Meeting and Exhibition, symposium P: Deformation Mechanisms, Microstructure Evolution and Mechanical Properties of Nanoscale Materials, 2010, Boston, MA.*
17. *S.N. Medyanik, I. Salehinia, Effects of Vacancies on Dislocation Nucleation in Metals – An Atomistic Simulation Study, TMS Annual Meeting and Exhibition, symposium: Modeling, Simulation, and Theory of Nanomechanical Materials Behavior, 2010, Seattle, WA.*
18. *I. Salehinia, S.N. Medyanik, Atomistic Simulation Studies of Rotational Effects in Double-wall Carbon Nanotubes, TMS Annual Meeting and Exhibition, symposium: Modeling, Simulation, and Theory of Nanomechanical Materials Behavior, 2010, Seattle, WA.*
19. *I. Salehinia, S.N. Medyanik, Linear-rotational transmission in double-wall carbon nanotubes, North American Pacific District Graduate Student Technical Conference, Apr. 2009, Washington State University, Pullman, WA.*
20. *I. Salehinia, D. Bahmanpour, H. Ardestani, Designing and Manufacturing of Single Disk Swing Check Valve with Air Flow, 15th Annual (International) Conference of the Iranian Society of Mechanical Engineers (ISME2007), May 2007, Tehran, Iran. (In Persian)*
21. *A.R. Shahani, I. Salehinia, Finite Element Analysis of Wear in Deep Drawing Process, the 1st Conference of Metal Forming of the Iranian Society of Mechanical Engineers (ISMEMFC2006), December 27-28, 2006, Tehran, Iran.*
22. *A.R. Shahani, I. Salehinia, S.A. Nodamaie, Finite element modeling of deep drawing process, the 14th Annual (International) Conference of the Iranian Society of Mechanical Engineers (ISME2006), May 15-18, 2006, Isfahan, Iran.*

## **PROPOSALS and WHITE PAPERS**

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### Funded:

- PI, Thermal and mechanical behavior of metal/carbon structure multilayer materials, NIU Research and Artistry Awards, \$12940.

### Submitted and pending:

- F. Sciammarella, N. Pohlman, B. Coller, I. Salehinia, L. Barber, Granulating the Mechanical Engineering Curriculum into Competency Modules for Advancement through Core Concepts, NSF\_RED, total budget: \$2000,000.

- I. Salehinia, Design of Metal-Coated Carbon Nanotube Foams for Improved Mechanical Response, NIU Research and Artistry Awards, \$14400.
- I. Salehinia, Mechanical behavior of metal coated carbon nanotube foam, HAYTHORNTHWAITE FOUNDATION, total budget: \$20,000
- I. Salehinia (NIU), G. Ayoub (University of Michigan, Dearborn), Collaborative research: Multiscale experimentally validated modeling to design ceramic-coated magnesium foams, NSF-Materials Engineering and Processing (MEP), total budget: \$333,937; NIU share: \$97,505.

White paper submitted and encouraged:

- Design of Metal Coated Carbon Nanotube Foam as a Thermal Interface Material, DOE/office of Science, program: Basic Energy Science, Funding Opportunity Announcement Number: DE-FOA-0001414 (Full proposal to be sent in early November)

Submitted and peer-reviewed; not-funded:

- Multiscale Modeling and Design of Strength and Ductility in Metal/Ceramic, National Science Foundation (NSF), Civil, Mechanical and Manufacturing Innovation (CMMI), Designing Materials to Revolutionize and Engineer our Future (DMREF).
- Comprehensive thermal management for CNC systems, submitted to Digital Manufacturing and Design Innovation Institute (DMDII), Comprehensive white paper, sent on Oct. 6, 2016
- I. Salehinia, D.F. Bahr, T. Fisher, Large Area “Tinned” Carbon Nanotube Foams as a Thermal Interface Material, submitted to Department of Energy, The Advanced Research Projects Agency-Energy (ARPA-E), white paper, sent on July 28, 2016.
- F. Sciammarella, I. Salehinia, J. Shelton, Microstructural certification via a predictive and comprehensive multi-scale thermal modeling methodology, Early Stage Innovations, NASA, total budget: \$499,999.

Under preparation

- I. Salehinia, D.F. Bahr, Predictive Design and Fabrication of Metal-Coated Carbon Nanotube Foam as a Thermal Interface Material, DOE/office of Science, program: Basic Energy Science, in collaboration with Purdue University, total budget: \$552,580, NIU share: \$278,092 (NIU is the lead PI).

**AWARDS and HONORS**

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- Selected for PI Academy for Research & Engagement at NIU for 2016
- Graduate School Scholarship, Washington State University, Sep. 2012
- Registration grant; Graduate and Professional Student Association, Washington State University, May 2012.
- MME Outstanding Researcher Award, School of Mechanical and Materials Engineering, Washington State University, Apr. 2012.
- Travel grant, Graduate and Professional Student Association, Washington State University, Jan. 2012.
- Registration grant, Graduate and Professional Student Association, Washington State University, Oct. 2011.
- Travel support, MRS Fall Meeting, symposium P: Deformation Mechanisms, Microstructure Evolution, and Mechanical Properties of Nanoscale Materials, Nov-Dec 2010, Boston, MA.

- Travel grant, Materials Research Society, symposium: Deformation Mechanisms, Microstructure Evolution and Mechanical Properties of Nanoscale Materials, Nov. 2010.
- Best MSc. thesis in Applied Mechanics, Iranian Society of Mechanical Engineers (ISME), 2007.

## **MENTORING ACTIVITIES**

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### Graduate advising:

- Ravindra Sunil Dhumal, Department of Mechanical Engineering, NIU, status: defending in Dec. 2018.
- Charles Gudbrandsen, Department of Mechanical Engineering, NIU, status: defending in May. 2018.
- Kyle Jankowski, Department of Mechanical Engineering, NIU, status: defending in May. 2018.
- Syed Zakrea, Department of Mechanical Engineering, NIU, status: graduated.
- Eric Hochmann, Department of Mechanical Engineering, NIU, status: Final defense date: Feb 3<sup>rd</sup>, 2017
- Dinesh Bommidi, Department of Mechanical Engineering, NIU, status: defending in Dec. 2017.
- Adnan Rasheed, Department of Mechanical Engineering, NIU, status: defending in Dec. 2017.
- Alex Snyder, Department of Mechanical Engineering, NIU, status: defending in Summer. 2017.
- Mujahid Mohiuddin Mohammed, Department of Mechanical Engineering, NIU, status: defending in Dec. 2017.
- Yuvi Kumar, Department of Mechanical Engineering, NIU, Status: graduated.
- Srikanth Gudimella, Department of Mechanical Engineering, NIU, status: defending in May. 2018.
- Co-advising, graduate student Samia Fadil, MS program in School of Mechanical and Materials Engineering, Washington State University, Status: graduated

### Undergraduate mentoring:

- Lauren Anderson, Department of Mechanical Engineering, NIU, current student
- Rafael Ortega, Department of Mechanical Engineering, NIU, current student
- Michael Koeplin, Department of Mechanical Engineering, NIU, current student
- Garrett Lee Smith, School of Mechanical and Materials Engineering, Washington State University, October 2014-Jan 2015.
- REU student, Grant Saltzgaber, University of Nebraska, Kearney, 2008.
- Veronica Perez, School of Mechanical and Materials Engineering, Washington State University, 2011.

### Postdoc mentoring:

- Mentoring, Postdoctoral researcher, Dr. Wei Yang, Mechanical Engineering Program, Texas A&M University at Qatar, status: current

PhD mentoring:

- Babak Abbasi, Department of Civil and Environmental Engineering, Washington State University, status: current
- Mohsen Damadam, School of Mechanical and Materials Engineering, Washington State University, status: current

**LEADERSHIP and SERVICE**

- **Symposium organizer:** Theory, Manufacturing and Applications of Ceramic/Metal (CerMet) Nano-laminates, Materials Science & Technology 2017 (MS&T17), October 2017, Pittsburgh PA, USA.
- **Panel reviewer:** Nanomanufacturing program, Division of Civil, Mechanical and Manufacturing Innovation, NSF
- **Member:** Graduate Council Standards Committee, Northern Illinois University, 2015-present.
- **Member:** advisory committee, Ph.D. student Babak Abbasi, Department of Civil and Environmental Engineering, Washington State University.
- **Member:** advisory committee, Ph.D. student Mohsen Damadam, School of Mechanical and Materials Engineering, Washington State University.
- **Member:** undergraduate studies committee, School of Mechanical and Materials Engineering, Washington State University, 2014-2015.
- **Reviewer:** Journal of Alloys and Compounds, Mechanics of Materials, Metallurgical and Materials Transactions A, JOM: the Journal of Minerals, Metals and Materials Society (TMS), Materials Research Society Symposium Proceeding, Philosophical Magazine, Computational Materials Science, Metals, Applied Surface Science, NASA-EPSCoR Missouri., International Journal of Plasticity, Nanoscale.
- **Reviewer and member** of the editorial board of Journal of Nanotechnology and Material Science, OMMEGA Publishers.
- **Judge:** 2014 Dr. William R. Wiley Research Exposition, Washington State University, Feb. 2014.
- **Judge:** Showcase for Undergraduate Research and Creative Activities (SURCA), Washington State University, Mar. 2014.
- **Club advisor:** SAE formula club, Department of Mechanical Engineering, NIU
- **Club advisor:** SAE Baja club, Department of Mechanical Engineering, NIU
- **Club advisor:** Mars Rover club, Department of Mechanical Engineering, NIU
- **Club advisor:** ASME club, Department of Mechanical Engineering, NIU
- **Faculty advisor:** Senior design project, MEKK Lift, Students: Ean Bush, Kourtney Borman, Michael Carroll, Kamila Krupiarz.
- **Faculty advisor:** Senior design project, Mars Rover Design: Dan Petschow, Tim Olson, Matthew Woodall, Thomas Jareczek, Gunnar Baechler.
- **Faculty advisor:** USOAR award (\$2500): Mars Rover Suspension System, Students: Matthew Woodall, Gunnar Baechler.

**TEACHING EXPERIENCE**

- Fall 2016, Northern Illinois University
  - CAD/CAM (MEE430/530): 85 students
  - Engineering Graphics (MEE270): 1 lecture section, 4 lab sections; 85 students

- Spring 2016, Northern Illinois University
  - Computer Aided Design of Mechanical Systems (MEE631): graduate course, 27 students
  - Finite Element Method (MEE480/580): elective course, 43 students
  - Strength of Materials (MEE212): 1 section, 90 students
- Fall 2015, Northern Illinois University
  - Engineering Graphics (MEE270): 1 lecture section, 4 lab sections; 100 students
  - Strength of Materials (MEE212): 1 section, 90 students
- Spring 2015, Washington State University
  - Fundamental of Thermodynamics (ME301): 2 sections, total 140 students
  - Dynamics (ME212): 30 students
- Fall 2014, Washington State University
  - Machine Design (ME414): broadcasted in three WSU campuses; 57 students
  - Dynamics (ME212): 80 students
- Spring 2014, Washington State University
  - Engineering Analysis (ME313): 1 lecture section, 2 lab sections; 60 students; Lab

### **PROFESSIONAL SOCIETIES**

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- Materials Research Society (MRS)
- Materials Advantage
- Association for Iron & Steel Technology (AIST)