Mohammadreza Asherloo

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Profile

An innovative materials scientist and problem-solver passionate about advancing the field of additive manufacturing, metallurgy, and microstructural analysis. With a proven track record of high-quality publications, my expertise lies in laser powder bed fusion, defect analysis, and fatigue performance of cutting-edge materials. As a dedicated team player and mentor, I have successfully led and nurtured a group of undergraduate and master's students in our lab. I am eager to bring my unique skillset and enthusiasm for research to a dynamic team, making a significant impact on the industry.

Education

Illinois Institute of Technology, Chicago, USA

Ph.D. in Materials Science & Engineering **2020 – Present**
M.Sc. in Materials Science & Engineering **2020 – 2022**

K.N. Toosi University of Technology (K.N.T.U.), Tehran, Iran

B.Sc. in Materials Science & Engineering **2015 – 2019**

Experiences

Illinois Institute of Technology, Chicago, USA

Failure Analysis Engineer **2022 – Present**

- Conducted failure analysis on different steels, including pipelines, using metallurgical experiments such as metallography and optical microscopy (OM).
- Employed advanced characterization techniques such as energy-dispersive X-ray spectroscopy (EDS), electron backscatter diffraction (EBSD), X-ray diffraction (XRD), and scanning electron microscopy (SEM) to analyze failure mechanisms of the steels.
- Suggested potential solutions for preventing failures based on the results of the analyses.

Teaching Assistant **2022 – Present**

- Assisted in various engineering courses, including Advanced Manufacturing Processes, Introduction to Materials Science, Mechanical Lab, and Solid Mechanics as a Teaching Assistant.
- Graded assignments, led recitations, occasionally lectured, and administered exams.
- Gained hands-on experience in working with electrical circuits, oscilloscope, function generator, solid-state relays, and low-pass and high-pass filters.

SEM Engineer **2021 – Present**

- Managed and maintained scanning electron microscopes (SEM) in the laboratory to ensure optimal performance and reliability.
- Troubleshot technical issues related to SEM equipment and performed routine maintenance tasks to ensure their proper functioning.
- Trained laboratory users on how to operate and maintain SEM equipment to obtain accurate and reliable results.
- Developed and implemented safety protocols to ensure the safe operation of the SEM equipment.
- Collaborated with laboratory staff to plan and execute experiments that require SEM imaging and analysis.

Graduate Research Assistant **2020 - Present**

- ***Titanium alloys:*** working on **Laser Powder Bed Fusion** of Ti-6Al-4V non-spherical powder produced by hydride-dehydride (HDH) process including the printing process, post-processing, advanced characterization (XRD, EBSD, DSC, SEM, and TEM), and electrochemical and mechanical properties of the printed parts.
- ***Nickel alloys:*** investigating the effects of various processing parameters on **Laser Powder Bed Fusion** of INCO718 alloy including the printing process, advanced characterization, and mechanical properties of the printed parts.
- ***Iron alloys:*** investigating the effect of temperature and dwelling time of sintering process on the mechanical and physical properties of **Binder-Jet** 3D Printed of ultra-fine 316L Stainless Steel powder.
- ***Ti-Ni alloys:*** investigating the effect of time and temperature on the diffusion process of Ti-Ni alloy by utilizing a Ti-Ni diffusion couple.

K. N. Toosi University of Technology, Tehran, Iran

Teaching Assistant **2019-2020**

- Assisted in teaching the Computer Programming in Materials Science course as a Teaching Assistant at KNTU.
- Provided assignments, graded homework, conducted recitations, and administered exams for the course.
- Held weekly office hours to provide individual assistance to students.
- Collaborated with the lead instructor to develop and improve course materials.
- Gained experience in effectively communicating complex concepts to students.
- Developed strong organizational and time management skills.

Undergraduate Research Assistant **2017-2018**

- Conducted research as an Undergraduate Research Assistant at K.N.T.U., working on two projects focused on renewable energy sources.
- Designed and tested a portable thermoelectric charger that generated electricity from the temperature difference between a user's hand and the surrounding environment.
- Analyzed solar radiation data to investigate Iran's solar energy potential and studied the feasibility of using solar energy as a source of electricity.
- Developed skills in experimental design, data analysis, and scientific communication through these projects.

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Research and Development Intern **2018 (Summer)**

- Collaborated with a team to research and develop innovative methods for reducing the weight of waxes used in the lost-wax casting of gas turbine blades, resulting in an increase in efficiency and cost savings for the company.
- Gained valuable experience in an industrial setting, including hands-on work in the lab and exposure to real-world engineering challenges.
- Contributed to the development of new techniques for analyzing and optimizing casting processes, including the use of computer simulations and data analysis.

Skills

Materials Science:

- DMG-MORI LaserTec 30 SLM machine
- X-Ray Diffraction (XRD)
- Scanning Electron Microscope (SEM)
- Differential Scanning Calorimetry (DSC)
- Energy Dispersion Spectroscopy (EDS)
- Mechanical testing machines
- Metallographic analysis of metals (OM)
- Electrochemical test equipment
- Wire Electro Discharge Machining (EDM)

Software:

- MTEX EBSD analysis package
- OriginPro
- ImageJ Image Analysis
- MAUD XRD analysis package
- X'pert High Score PANalytical XRD analysis software
- GSAS II XRD analysis software
- Oxford AZTec software
- HKL EBSD analysis software

Computer Programming:

- Python
- MATLAB
- LaTex
- R

Artificial Intelligence:

- Materials Informatics
- Neural Networks
- Data preprocessing and cleaning
- Computer Vision

Collaborations

1. NextManufacturing Center: Worked with the NextManufacturing Center at Carnegie Mellon University on multiple projects that focused on the laser powder bed fusion processing of titanium-based and nickel-based superalloys.

2. Argonne National Laboratory: Collaborated with the Applied Materials Division and X-ray Science Division of ANL to conduct Dynamic X-ray Radiography (DXR) experiments on various metal powders.

3. Kymera International – Reading Alloy: Conducted research as a PhD student in partnership with Kymera International to investigate the effects of powder morphology on the laser powder bed fusion of Ti-6Al-4V alloy.

4. University of Oklahoma: Worked with the University of Oklahoma to perform TEM observations on laser powder bed fusion processed parts.

5. Quintus Technologies: Collaborated with Quintus Technologies to conduct Hot Isostatic Pressing (HIP) on the laser powder bed fusion processed parts.

6. Nel Pretech: Worked with Nel Pretech company to conduct CT scan experiments on laser powder bed fusion processed parts to detect internal defects.

Publications (Researchgate)

9. W. Liu, B. Wu, R. Cui, H. Wang, S. Liu, **M. Asherloo**, H. Song, "*Double-pulse Laser Micro Sintering of Iron Powder in Multiple Overlapping Tracks: Experimental Study and Material Characterizations*"

8. Babaei-Dehkord, M. Soltanieh, M. Mirjalili, **M. Asherloo**, A. Mostafaei, "Understanding interfacial reactions in Ti-Ni diffusion couple" Materials (2023)

7. **M. Asherloo**, J. Hwang, R. Leroux, Z. Wu, M. Paliwal, A.D. Rollett, A. Mostafaei, "Process-microstructure-property relationships in laser powder bed fusion of non-spherical Ti-6Al-4V powder" J. Matchar. 198 (2023) 112757

6. **M. Asherloo**, Z. Wu, J.E.C. Sabisch, I. Ghamarian, A.D. Rollett, A. Mostafaei, "Variant selection during laser powder bed fusion of non-spherical Ti-6Al-4V powder" J. Mater. Sci. Technol. 147 (2023) 56

5. M. Jamalkhani, **M. Asherloo**, M. Heim, D. Nelson, A. Mostafaei, "Deciphering microstructure-defect-property relationships of vacuum-sintered binder jetted fine 316 L austenitic stainless steel powder", Addit. Manuf. 59 (2022) 103133

4. **M. Asherloo**, Z. Wu, M. Heim, D. Nelson, M. Paliwal, A.D. Rollett, A. Mostafaei, "Fatigue performance of laser powder bed fusion hydride-dehydride Ti-6Al-4V powder", Addit. Manuf. 59 (2022) 103117

3. **M. Asherloo**, Z. Wu, M.H. Delpazir, E. Ghebreiesus, S. Fryzlewicz, R. Jiang, B. Gould, M. Heim, D. Nelson, M. Marruci, M. Paliwal, A. D. Rollett, A. Mostafaei, "Laser-beam powder bed fusion of cost-effective non-spherical hydride-dehydride Ti-6Al-4V", Addit. Manuf. (2022) 102875.

2. Mostafaei, C. Zhao, Y. He, S. R. Ghiaasiaan, B. Shi, S. Shao, N. Shamsaei, Z. Wu, N. Kouraytem, T. Sun, J. Pauza, J. V. Gordon, B. Webler, N. D. Parab, **M. Asherloo**, Q. Guo, L. Chen, A. D. Rollett, "Defects and anomalies in powder bed fusion metal additive manufacturing", Curr. Opin. Solid State Mater. Sci. 26 (2022) 100974.

1. Z. Wu, **M. Asherloo**, R. Jiang, M.H. Delpazir, N. Sivakumar, M. Paliwal, J. Capone, B. Gould, A.D. Rollett, A. Mostafaei, "Study of printability and porosity formation in laser powder bed fusion built hydride-dehydride (HDH) Ti-6Al-4V", Addit. Manuf. 47 (2021) 102323.

In Prepration

M.H.Delpazir, **M. Asherloo**, M. Paliwal, A.D. Rollett, A. Mostafaei, *"Effect of different post heat-treatment on microstructure and electrochemical behavior of laser powder bed fusion hydride-dehydride Ti-6Al-4V alloy"*

M. Asherloo, K. Sreenivas, M. Ahlfors, C. Beamer, A.D. Rollett, A. Mostafaei, *"Varied HIP treatment on resultant microstructure evolution and properties of laser powder bed fusion alloy 718"*

M. Asherloo, J. Pauza, H. Fagiha, W. Tayon, A.D. Rollett, A. Mostafaei, *"Effect scanning strategy and laser parameters on microstructure and texture development in laser powder bed fusion of Inconel 718"*

Conferences and Presentations

8. **M. Asherloo**, M. Paliwal, A.D. Rollett, A. Mostafaei, *"Effect of Processing Parameters on Texture Evolution of Laser Powder Bed Fusion Processed Hydride-Dehydride Ti-6Al-4V Powder"*, MS&T 2022, Oct 9-12, Pittsburgh, Pennsylvania, USA

7. **M. Asherloo**, M. Paliwal, A.D. Rollett, A. Mostafaei, *"Effect of Post-processing on the Microstructure and Mechanical Performance of Laser Powder Bed Fusion Hydride-dehydride Ti-6Al-4V Alloy"*, PowderMet 2022, June 12-15, Portland, Oregon, USA

6. **M. Asherloo**, Z. Wu, M. Paliwal, A.D. Rollett, A. Mostafaei, *"Effect of Surface Finish on Fatigue Behavior of Laser Powder Bed Fusion Processed Hydride-Dehydride Ti-6Al-4V Powder"*, MS&T 2022, Oct 9-12, Pittsburgh, Pennsylvania, USA

5. M. Jamalkhani, **M. Asherloo**, A. Mostafaei, *"Binder Jetting of Ultra-fine 316L Austenitic Stainless Steel Powder: Microstructure Observation and Mechanical Properties"*, MS&T 2022, Oct 9-12, Pittsburgh, Pennsylvania, USA

4. M. H. Delpazir, **M. Asherloo**, M. Paliwal, A.D. Rollett, A. Mostafaei, *"Electrochemical Behavior of Additively Manufactured Non-spherical Ti-6Al-4V in Saline Water"*, MS&T 2022, Oct 9-12, Pittsburgh, Pennsylvania, USA

3. **M. Asherloo**, M. Delpazir, Z. Wu, M. Paliwal, A.D. Rollett, A. Mostafaei, *"Mechanical Strength and Fatigue Performance of Laser Powder Bed Fusion Processed Hydride-dehydride Ti-6Al-4V Powders"*, MS&T 2021, Oct 17-20, Columbus, Ohio, USA

2. **M. Asherloo**, Z. Wu, S. R. Yarasi, M. Paliwal, M. Marucci, J. Capone, A. D. Rollett, A. Mostafaei, *"Laser powder bed fusion of hydride-dehydride Ti-6Al-4V powders: Effect of hot isostatic pressing on microstructure and mechanical properties"*, TMS 2021, March 14-18, Orlando, Florida, USA

1. A. Mostafaei, **M. Asherloo**, Z. Wu, J. Capone, M. Paliwal, M. Marucci, A.D. Rollett, *"Effect of powder size and processing parameters on density and mechanical properties of laser powder bed fusion parts manufactured using hydride-dehydride Ti-6Al-4V powders"*, MS&T 2020, Oct 4-8, Pittsburgh, Pennsylvania, USA