Shahadat Hussain

POSTDOCTORAL RESEARCHER · MECHANICAL ENGINEERING · ADAM LAB

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Summary

An adept researcher with over four years of expertise in 3D printing, actively involved in various projects focusing on additive manufacturing. Proficient in exploring innovative advancements in 3D printing automation, skilled at fabricating prototypes, utilizing advanced materials characterization techniques, conducting mechanical testing, and trained in data analysis and visualization using Python libraries like pandas, numpy, scipy, matplotlib and seaborn, and scientific publications.

Work Experience

Postdoctoral Researcher
Abu Dhabi, UAE

Mechanical Engineering, Khalifa University
Feb 2020 - Present

- Analyzing the attributes of additively manufactured NiTi TPMS structures, such as Schwartz primitive and Schoen gyroid lattices, categorized as porous, cellular, and architected materials.
- Conducting tensile and fatigue testing, utilizing characterization methods including SEM, XRD, EDS, and metallography, coupled with data analysis and visualization tools like Origin Lab, MS Excel, and various Python libraries.
- Published 5 research articles in reputed scientific journals and developed lab manuals.

Project Fellow
Bhopal, India

CSIR-Advanced Materials and Processes Research Institute
May 2013 - Aug 2014

- Extensive scientific research experience with experimentation, data analysis, teamwork, problem-solving, and effective communication. Proficient in relationship building, negotiation skills.
- Engaged in diverse experimental tasks: alloy synthesis, metallography, heat treatment, and material characterization using spectroscopy, microscopy, diffractometry, calorimetry, hardness, tensile, and hot rolling.
- Published 2 research articles, presented research via posters and oral presentations, collaborated with Indian Institute of Technology, Madras.

Education

Academy of Scientific and Innovative Research
Bhopal, India

PhD (Engineering Sciences) in Materials Science and Technology
Aug 2014 - Jun 2019

- Doctoral research on Cu-Al-Ni shape memory alloys, studied impact of grain refiners, alloying additions, and processing parameters on shape memory properties for high-temperature applications.
- Published 2 research articles, and delivered 5 conference presentations.

University Institute of Technology-RGPV
Bhopal, India

Bachelor of Engineering in Mechanical Engineering
Aug 2008 - May 2012

- Graduated with first division aggregate.
- Underwent 2-week industrial training at Steel Authority of India Limited (SAIL)-Bokaro.

Skills

Software: Computer-Aided Design (CAD) such as FreeCAD 0.20, Python programming language and its libraries including pandas, numpy, scipy, matplotlib, and seaborn for data analysis and data visualization, Xpert HighScore Plus, ImageJ, Origin Lab, microscope image analysis software like Gatan Suite, and word processing tools like LaTeX.

Fabrication: Additive Manufacturing and Vacuum induction melting technique, Heat treatment of alloys and quenching.

Mechanical Testing: Tensile and compression testing using Instron 5969 static loading machine with Bluehill software and Fatigue testing using Instron 8872 dynamic loading machine with WaveMatrix software.

Metallography: Grinding, polishing, hot and cold mounting, ultrasonic and plasma cleaning using Struer and Buehler equipment, and chemical etching of metal alloys.

Materials Characterization: Scanning Electron Microscopes (SEM): JEOL 7610F, FEI Nova NanovSEM, and FEI Quanta 3D FIB, for imaging and EDS analysis, X-ray Diffraction: Bruker D2 Phasor and Riggaku MiniFlex II, Optical Microscopy: Leica microscopes, Thermal Analysis: Differential Scanning Calorimetry using Mettler Toledo DSC 1 and Setaram instruments, and Optical Emission Spectroscopy: Bruker Q4 Tasman.

Projects

Additive manufacturing of NiTi shape memory alloys, constitutive modeling and fatigue failure criteria

Abu Dhabi, UAE

Khalifa University

Feb 2020 - Present

- Involved in 3D printing of NiTi samples and TPMS structures
- Extensive characterizations performed using SEM, TEM, XRD, AFM, DSC, and fatigue testing
- Project Outcomes: Made novel findings and published 5 research articles, conference presentations and development of lab manuals.

Design and Development of Thermo-Responsive and Magnetic Shape Memory Materials and Devices for Engineering Applications

Bhopal, India

CSIR-Advanced Materials and Processes Research Institute

Jun 2013 - Aug 2014

- Develop copper-based shape memory materials with superior mechanical properties, high transition temperatures, and cost-effective production of shape memory wires and strips.
- Project outcomes: Published 2 research articles in scientific journals, presented at national events, collaborated with Indian Institute of Technology, Madras. Well-received oral and poster presentations.

Certifications

- **Introduction to Project Management**, June 2024, IBM
- **Additive Manufacturing Specialization**, June 2024, Arizona State University
- **Data Science Professional Certificate**, April 2024, IBM
- **Python for Everybody Specialization**, February 2024, University of Michigan
- **FreeCAD: A Basic 3D Modeling**, June 2023, Udemy

Publications

- **Shahadat Hussain**, Ali N Alagha, Wael Zaki, (2024) Phase Transformation Behavior of NiTi Triply Periodic Minimal Surface Lattices Fabricated by Laser Powder Bed Fusion. Journal of Materials Engineering and Performance, `https://doi.org/10.1007/s11665-024-09162-7`.
- **Shahadat Hussain**, Ali N Alagha,Gregory N. Haidemenopoulos, Wael Zaki, (2023) Microstructural and surface analysis of NiTi TPMS lattice sections fabricated by laser powder bed fusion. Journal of Manufacturing Processes, 102:375-386, `https://doi.org/10.1016/j.jmapro.2023.07.055`.