SHAHADAT HUSSAIN, PhD

MATERIALS & MECHANICAL TESTING ENGINEER — R&D AND CHARACTERIZATION

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PROFESSIONAL SUMMARY

Materials and R&D engineer with 6+ years of experience in additive manufacturing (LPBF, FFF, SLA) process development, materials qualification, characterization and mechanical/thermal testing across advanced research and applied engineering settings in the UAE. Hands-on operator of 10+ industrial 3D printing systems and a full metallurgical characterization and testing suite (SEM, XRD, DSC, Instron, MTS). Specialist in architected lattice structures (TPMS) and shape memory alloys, with direct relevance to lightweight, thermally efficient, and vibration/fatigue-resistant component design. Combines materials engineering depth with Python/MATLAB-based data analysis to drive process optimization, defect reduction, and quality mapping. Seeking to bring this qualification, testing, and process-engineering expertise to manufacturing engineering or materials qualification roles supporting power and thermal management hardware.

CORE COMPETENCIES

- Additive Manufacturing Process Development (LPBF, FFF, SLA)
- Mechanical & Thermal Qualification Testing (Static, Fatigue, Compression, Vibration/Modal)
- Materials Characterization (SEM, XRD, DSC, Optical Microscopy)
- Architected Lattice Structures for Thermal & Structural Performance (TPMS)
- Process Parameter Optimization & Defect/Quality Mapping
- NiTi & Cu-Based Shape Memory Alloys
- CAD & Build Preparation (SolidWorks, FreeCAD, Materialise Magics, GrabCAD)
- Data Analysis & Process Modeling (Python, MATLAB, SQL)
- EHS / Lab Safety & Risk Assessment

PROFESSIONAL EXPERIENCE

Research Associate — Additive Manufacturing & Advanced Materials **Sep 2024 – Present**

New York University Abu Dhabi (NYUAD), Abu Dhabi, UAE

- Delivered carbon-fiber-reinforced PLA/PPA composite lattice components (gyroid and primitive TPMS geometries) via FFF, engineered for lightweight, high-strength, vibration-damping performance relevant to structural and thermal hardware applications.
- Qualified printed composite structures against quasi-static compression, flexural, modal, and frequency-response test protocols to validate strength, energy absorption, and vibration performance under service-like loading.
- Operated and maintained 10+ industrial additive manufacturing systems (Raise3D Pro3 Plus HS, Stratasys J850/F370, Formlabs Form3, Bambu Lab Carbon X1), sustaining continuous production and prototyping throughput.

Postdoctoral Research Fellow — Metal 3D Printing & Smart Materials **Feb 2020 – Jun 2024**

Khalifa University, Abu Dhabi, UAE

- Fabricated and qualified NiTi shape memory alloy TPMS lattice structures via Laser Powder Bed Fusion (EOS M400); optimized laser power, scan speed, and energy density to control microstructure, porosity, and phase transformation behavior — a process-control approach directly transferable to defect reduction in production manufacturing.
- Executed a full materials characterization pipeline on 50+ printed samples using SEM, FIB-SEM (SEI/BSE/EDS), XRD, DSC, and optical microscopy to link process parameters to structural and functional performance.
- Ran static (Instron 5969, 50 kN), fatigue (Instron 8872, 25 kN), and compression (MTS 100 kN) qualification campaigns; developed defect and print-quality maps used to reduce porosity and improve part consistency — a qualification methodology applicable to reliability testing of power and thermal hardware.
- Authored 4 peer-reviewed publications; completed comprehensive EHS lab safety training covering chemical handling, cryogenic substances, risk assessment, and emergency response protocols.

Project Fellow — Smart & Functional Materials **Jun 2013 – Aug 2014**

CSIR – Advanced Materials & Processes Research Institute (AMPRI), Bhopal, India

- Synthesized Cu-Al-Mn and Cu-Al-Ni shape memory alloys via vacuum induction melting under a government-funded national research program; performed hot/cold rolling, heat treatment, quenching, and metallographic preparation.
- Characterized phase transformation and mechanical properties using SEM, XRD, DSC, and hardness/tensile testing; contributed to 5 peer-reviewed publications and a research collaboration with IIT Madras.

Engineering Intern — Steel Plant Operations **Jun – Jul 2011**

Bokaro Steel Plant, Steel Authority of India Limited (SAIL), Jharkhand, India

- Gained direct industrial exposure to large-scale integrated steel manufacturing processes, plant operations, and quality systems.

EDUCATION

PhD, Materials Science & Technology | 2014 – 2019

Academy of Scientific and Innovative Research (AcSIR) / CSIR-AMPRI, Bhopal, India — Thesis: Cu-based shape memory alloys: composition, processing, microstructure, and shape memory properties

BEng, Mechanical Engineering | 2008 – 2012

UIT, Rajiv Gandhi Proudyogiki Vishwavidyalaya (RGPV), Bhopal, India

TECHNICAL SKILLS

Additive Manufacturing Systems: EOS M400 (LPBF/SLM); Stratasys F370/J850 (FDM/PolyJet); Raise3D Pro3 Plus HS, Forge1 (FFF); Formlabs Form3 (SLA); Ultimaker S1

Materials Characterization: JEOL 7610F SEM; FEI Nova NanoSEM; FEI Quanta 3D FIB-SEM (SEI/BSE/EDS); Bruker D2 & Rigaku MiniFlex XRD; Mettler Toledo & Setaram DSC; Leica Optical Microscopy

Mechanical Testing: Instron 5969 (static, 50 kN); Instron 8872 (fatigue, 25 kN); MTS 100 kN UTM; Controls Simplex 350 & Automax

Design & Computing: SolidWorks, FreeCAD, Materialise Magics, GrabCAD Print; Python (Pandas, NumPy, Scikit-learn), MATLAB, SQL, Linux

CERTIFICATIONS

- Python for Everybody Specialization —University of Michigan
- IBM Data Science Professional Certificate — IBM
- Google AI Essentials Certificate — Google
- Lab Safety (EHS) — Khalifa University

PROFESSIONAL AFFILIATIONS

Member, AM-Platform: European Technology Platform in Additive Manufacturing | Associate Member, European Materials Modelling Council | Individual Member, Research Data Alliance | Technical Volunteer, Materials Research Society

PUBLICATIONS & RECOGNITION

15+ peer-reviewed publications | 500+ citations | h-index: 10 | Peer reviewer for 15+ journals including Additive Manufacturing, Materials & Design, Scripta Materialia. Full list: scholar.google.com/citations?user=tQNSWaAAAAAJ

ADDITIONAL INFORMATION

Languages: English (Professional), Hindi (Native) | Profiles: github.com/drshahadathussain | researchgate.net/profile/Shahadat-Hussain