



American Lightweight Materials
Manufacturing Innovation Institute

Position: Senior Engineer, Modelling and Simulation

Department: Engineering

Reporting To: Director of Materials & ICME

Job Location:

LIFT ALMMII Headquarters

1400 Rosa Parks Blvd

Detroit, MI 48216

Scope of Work & Purpose:

A subject matter expert that will lead state-of-the-art materials development and evaluation, through modeling and simulation; delivering innovative materials solutions and manufacturing processes for our customers and collaboratively within our ecosystem. Drive innovations in material modeling/performance simulation, for domains including but not limited to crystal plasticity, process simulations and alloy development.

ICME-based design of materials/metal alloys, focusing on microstructure, properties, and performance to optimize desirable mechanical, thermal, physical, and chemical properties. Integrate ICME-based material models into leading CAE performance simulation tools. Develop and execute plans for technical activities across a range of topics in advanced alloy development, thermo-mechanical processing (i.e., forming, forging), and heat treatment schemes to produce candidate materials for targeted applications. Expertise in steels, refractory alloys, superalloys, and aluminum alloys. In-depth understanding of process microstructure, microstructure-property and property-performance relationships due to thermo-mechanical processing material systems. Experience in materials characterization, testing, and interpretation in the context of relevant manufacturing processes (including, but not limited to forming, additive manufacturing, powder processing and sintering, and solid-state joining processes). Work collaboratively with other experts in materials modeling and ICME to optimize development cycles.

RESPONSIBILITIES

- Execute material property-performance simulation development, and ICME integration projects within time and budget constraints, internal to LIFT and collaboratively with Ecosystem member organizations.
- Conceive, develop ideas, and project plans for new, innovative modeling and simulation development programs.
- Document and communication development initiatives, including progress and final reports, presentations, conferences, and stakeholder communication.
- Support program development efforts, including preparation of white papers and proposals.

PREFERRED QUALIFICATIONS

- PhD in Materials, Metallurgical, Ceramics, Chemical, Aerospace, or Mechanical Engineering, Materials Science, Physics, or related field with 3-5 years' experience, or a Masters in Materials, Metallurgical, Ceramics, Chemical, Aerospace, or Mechanical Engineering, Materials Science, Physics, or related field with 5-10 years' experience.

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- Solid understanding of material science and mechanics of materials, and the effect of thermo-mechanical processing on micro-structure, to develop and program materials simulation algorithms and subroutines.
- Must have experience with developing material models from process and microstructure, and to integrate material properties with performance simulation CAE tools (i.e., crystal plasticity software, phase-field software, etc.).
- Preferred areas of modeling:
 - Computational Fluid Dynamics (CFD) for aerospace environments or material fluid flows
 - Process Simulations (e.g., additive manufacturing (LB-PBF, Arc-DED/WAAM), casting, extrusion, wire drawing, heat treatment, machining, spray processing, atomization, grinding, milling)
 - Microstructural simulations (solidification microstructure)
 - Crystal Plasticity
 - Materials for extreme environments (high enthalpy, high strain rate), e.g., armor, munitions, or hypersonics
 - Functionally graded materials
- Prefer experience to include refractory metals, high entropy alloys, and high-temperature refractory materials (e.g. carbon-carbon (C/C) composites), particularly for munitions or hypersonic TPS.
- Demonstrated ability to develop materials in field(s) relevant to LIFT.
- Successful track record to ideating, planning, and executing technical work in an R&D and manufacturing environment preferred.
- Ability to operate within a project-based technology development environment.
- Programming expertise in variety of languages is a plus (C++, Fortran, Python, Dbase, etc.).
- Experience in software chaining, CAE tool interface(s), GUI construction, I/O and hardware control is a plus.
- Ability to work with multi-disciplinary teams and multiple simultaneous projects.
- Ability to operate within and successfully interface with many stakeholders including LIFT member Ecosystem and end customers.
- Good oral and written communication skills.
- Ability to function effectively within a project team.

BEHAVIORAL COMPETENCIES

Customer Focus, Learning on the Fly, Intellectual Horsepower, Action Oriented, Ethics and Values, Integrity and Trust, Functional/Technical Skills, Forward Thinking.

About LIFT:

LIFT, operated by the American Lightweight Materials Manufacturing Innovation Institute (ALMMII), is a public-private partnership to develop and deploy advanced lightweight materials manufacturing technologies, and implement education and training programs to prepare the workforce. ALMMII was selected through a competitive process led by the U.S. Department of Defense under the Lightweight and Modern Metals Manufacturing Innovation (LM3I) solicitation issued by the U.S. Navy's Office of Naval Research. ALMMII is one of the founding members of Manufacturing USA, a federal initiative to create regional hubs to accelerate the development and adoption of cutting-edge manufacturing technologies.