Opportunity Title: Metals Additive Manufacturing
Opportunity Reference Code: ARL-R-WMRD-300007

Organization DEVCOM Army Research Laboratory

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Description **About the Research**

3D Printing, known as Additive Manufacturing (AM), is transforming the manufacturing industry. Army Research Laboratory (ARL), the nation's premier laboratory for land forces, is in the frontier of advancing innovative AM technologies and their applications. ARL is creating great strides in AM science and technology (S&T) to solve the Army challenges and mission readiness. Effective numerical and experimental methods for quantifying properties of the AM parts during the printing process are critical for enabling AM applications. Understanding the relationships between processing, microstructure, and properties of these material is critical to drive development of future metallic feedstock alloys. Alloys designed specifically for AM will give enhanced performance over today's state of the art, and enable the Soldier to adapt to evolving threats by manufacturing qualified components at the point of need while reducing logistical footprints.

This research opportunity aligns with the ARL S&T Campaign in the areas of Science of Manufacturing at the Point of Need, Lethality and Protection, and Sciences for Maneuver, in an effort to improve the performance, reliability and versatility of future Army systems.

Eligibility: Applicants should have received a M.S. or Ph.D. degree in Metallurgical Engineering, Materials Science and Engineering, Mechanical Engineering or a closely related discipline. Candidates should demonstrate a strong academic background with research experience in the following areas: additive manufacturing of metallic materials; numerical modeling of processes and materials; microstructure-processing-property-relations; powder processing (milling, sizing, compaction and sintering); machine learning and data analytics; and mechanical testing (static and dynamic) of materials. Additional experience with metallography (specimen preparation, optical and electron microscopy) and metallurgical characterization (x-ray diffraction, SEM, TEM, micro-CT, etc.) are highly desirable.

ARL Advisor: Brandon McWilliams

ARL Advisor Email: brandon.a.mcwilliams.civ@mail.mil

About WMRD

The goals of the Weapons and Materials Research Directorate (WMRD) are to enhance the lethality and survivability of weapons systems, and to meet the soldier's technology needs for advanced weaponry and protection. Research is pursued in energetic materials dynamics, propulsion/flight physics, projectile warhead mechanics, terminal effects phenomena, armor/survivability technologies, environmental chemistry, and advanced

materials (energetic, metals, ceramics, polymers, composite/hybrids, and mechanics) for armor, armament, missiles, ground vehicles, helicopters, and individual soldier applications necessary for maintaining and ensuring supremacy in future land warfare.

About ARL-RAP

The Army Research Laboratory Research Associateship Program (ARL-RAP) is designed to significantly increase the involvement of creative and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Army. Scientists and Engineers at the CCDC Army Research Laboratory (ARL) help shape and execute the Army's program for meeting the challenge of developing technologies that will support Army forces in meeting future operational needs by pursuing scientific research and technological developments in diverse fields such as: applied mathematics, atmospheric characterization, simulation and human modeling, digital/optical signal processing, nanotechnology, material science and technology, multifunctional technology, combustion processes, propulsion and flight physics, communication and networking, and computational and information sciences.

A complete application includes:

- **Curriculum Vitae or Resume**
- **Three References Forms**
  - An email with a link to the reference form will be available in Zintellect to the applicant upon completion of the on-line application. Please send this email to persons you have selected to complete a reference.
  - References should be from persons familiar with your educational and professional qualifications (include your thesis or dissertation advisor, if applicable)
- **Transcripts**
  - Transcript verifying receipt of degree must be submitted with the application. Student/unofficial copy is acceptable

If selected by an advisor the participant will also be required to write a **research proposal** to submit to the ARL-RAP review panel for :

- Research topic should relate to a specific opportunity at ARL (see Research Areas)
- The objective of the research topic should be clear and have a defined outcome
- Explain the direction you plan to pursue
- Include expected period for completing the study
- Include a brief background such as preparation and motivation for the research
- References of published efforts may be used to improve the proposal

A link to upload the proposal will be provided to the applicant once the advisor has made their selection.

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Questions about this opportunity? Please email ARLFellowship@orau.org

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Master's Degree or Doctoral Degree.
- **Academic Level(s):** Any academic level.
- **Discipline(s):**
  - **Computer, Information, and Data Sciences** (16)
  - **Engineering** (27)