

Opportunity Title: Computational Materials Science

Opportunity Reference Code: ARL-C-WMRD-1564905465

Organization DEVCOM Army Research Laboratory

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Description About the Research

Research opportunities exist in computational materials science of polycrystalline metals and ceramics, ranging in length scales from atomistic to mesoscale. This interdisciplinary research includes approaches related to ICME (integrated computational materials engineering), whereby research utilizes computational approaches and modeling techniques to understand and exploit relationships between material chemistry, processing methods, microstructure and its evolution, properties over multiple length and time scales, and performance of advanced materials (nanocrystalline materials, interfacial design, high strength steels, lightweight materials, etc). Much of the research within our group focuses on bridging the gap between materials science, solid mechanics, and computational science with a heavy focus on integrating with experiments. Focus areas include, but are not limited to, (1) quantum mechanical calculations of interfaces and grain boundary structures, (2) interatomic potential development and scale bridging, (3) molecular dynamics and Monte Carlo simulations of microstructure evolution and mechanical properties in nanocrystalline materials, (4) mesoscale modeling, including phase-field modeling of microstructure evolution, dislocation dynamics, and Monte Carlo approaches, (5) material informatics, metamodeling, and design optimization of material systems, (6) thermodynamic modeling for materials and processing design, and (7) quantitative materials characterization and their statistical representation. Our research is performed in collaboration with other computational and experimental teams within ARL and academia.

ARL Advisor: Mark Tschopp

ARL Advisor Email: mark.a.tschopp.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



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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.

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

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| Eligibility Requirements | <ul style="list-style-type: none">• Citizenship: U.S. Citizen Only• Degree: Doctoral Degree received within the last 60 month(s).• Academic Level(s): Any academic level.• Discipline(s):<ul style="list-style-type: none">◦ Chemistry and Materials Sciences (12 ) |
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- **Computer, Information, and Data Sciences** ([16](#) 👁)
- **Engineering** ([27](#) 👁)
- **Mathematics and Statistics** ([10](#) 👁)
- **Physics** ([16](#) 👁)
- **Science & Engineering-related** ([1](#) 👁)
- **Age:** Must be 18 years of age