

**Opportunity Title:** Modeling and Simulations of Armor Ceramics: Atomistics to Mesoscale Microstructure

**Opportunity Reference Code:** ARL-R-WMRD-1711500135

**Organization** DEVCOM Army Research Laboratory

**Reference Code** ARL-R-WMRD-1711500135

### **Description About the Research**

Located at Aberdeen Proving Ground in Maryland, the U.S. Army Research Laboratory (ARL) is the Army's central laboratory. Its diverse assortment of unique facilities and dedicated workforce of government and private sector partners make up the largest source of world-class integrated research and analysis in the Army.

Interdisciplinary research opportunities exist in materials modeling at length scales ranging from atomistics to mesoscale microstructures to support discoveries relating ceramic processing-structure-property relationships. These simulations seek to uncover fundamental mechanisms controlling microstructure evolution and mechanical response of armor ceramics to provide insights for future material design and predict performance. Areas of research include (1) thermodynamic modeling of grain boundary complexions; (2) elucidating the role of defects and grain boundary character on grain growth and mechanics; (3) mesoscale modeling of microstructure evolution and mechanics; (4) bridging simulation scales by incorporating microstructure effects into continuum performance models; (5) integrating material simulations with experiments; (6) developing virtual materials characterization techniques; and (7) quantifying variability and uncertainty of models. Our research is performed in collaboration with other computational and experimental teams within ARL and academia. Qualified candidates should be US Citizens and have received their PhD in Materials Science, Mechanical Engineering, Chemical Engineering, Physical Chemistry, Physics, or Mathematics.

*ARL Advisor:* Shawn Coleman

*ARL Advisor Email:* [shawn.p.coleman8.civ@mail.mil](mailto:shawn.p.coleman8.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

 **ORAU Pathfinder**  


Whether you are just starting your career or already at a senior level, ORAU offers internships, fellowships, research opportunities, and contract positions that can provide you with invaluable experience. Download the ORAU Pathfinder mobile app and find the right opportunity to propel you along your career path!

Visit ORAU Pathfinder 

GET IT ON  
 **Google Play**

Download on the  
 **App Store**

**Opportunity Title:** Modeling and Simulations of Armor Ceramics: Atomistics to Mesoscale Microstructure

**Opportunity Reference Code:** ARL-R-WMRD-1711500135

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.

**Questions about this opportunity?** Please email [ARLFellowship@ora.u.arl.army.mil](mailto:ARLFellowship@ora.u.arl.army.mil)

- Eligibility Requirements**
- **Citizenship:** U.S. Citizen Only
  - **Degree:** Any degree .
  - **Academic Level(s):** Any academic level.
  - **Discipline(s):**
    - **Chemistry and Materials Sciences** ([12](#))

**Opportunity Title:** Modeling and Simulations of Armor Ceramics: Atomistics to Mesoscale Microstructure

**Opportunity Reference Code:** ARL-R-WMRD-1711500135

- **Computer, Information, and Data Sciences** ([16](#) )
- **Engineering** ([27](#) )
- **Mathematics and Statistics** ([10](#) )
- **Physics** ([16](#) )
- **Age:** Must be 18 years of age