

**Opportunity Title:** Materials Under Extreme Lubricating Conditions

**Opportunity Reference Code:** ARL-R-MS-400007-F1

**Organization** DEVCOM Army Research Laboratory

**Reference Code** ARL-R-MS-400007-F1

### **Description About the Research**

Many Army ground and unmanned aerial vehicles are powered by internal combustion engines that were designed for diesel fuel, but are operated on fuels that do not provide the lubricating ability of diesel. The chemistry and rheology of many fuels do not allow for adequate lubrication of the mechanical interfaces in those components to prevent material damage from occurring. The result is premature failure of the fuel components that provide fuel to the engine combustion chambers at high pressures. Research conducted under this fellowship will seek to understand the physical, chemical, and tribological processes underlying material damage in fuel-lubricated mechanical components, identify and characterize materials and material treatments that are more robust under fuel- lubricating conditions, and determine the properties and chemical interactions that allow those materials to survive lubrication with low viscosity and lubricity liquids. The candidate shall have a foundational understanding of a physical science or engineering discipline with experimental or computational analytic/modeling skills relating to tribology, the mechanical and microstructural response of materials in contact, and/or their surface chemical interactions with fluids. Research will be conducted in a highly collaborative team environment with ARL engineers and scientists to enable solutions for robust and flexible Army air and ground propulsion systems.

*ARL Advisor:* Dr. Stephen Berkebile

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### **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**

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- 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.org](mailto:ARLFellowship@ora.u.org).

- Eligibility Requirements**
- **Citizenship:** U.S. Citizen Only
  - **Degree:** Bachelor's Degree, Master's Degree, or Doctoral Degree.
  - **Academic Level(s):** Any academic level.
  - **Discipline(s):**
    - **Chemistry and Materials Sciences** (2👁)
    - **Engineering** (5👁)
    - **Physics** (5👁)