

Opportunity Title: Microbially Induced Material Degradation Opportunity Reference Code: ARL-R-WMRD-300082

Organization DEVCOM Army Research Laboratory

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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. Microbially induced degradation of materials can play a crucial role the lifecycle of many Army assets. Accelerating the degradation of materials may provide an efficient route to recycling waste on the battlefield. On the other hand, slowing the degradation of materials is important to reduce maintenance costs and service intervals. Of particular importance is developing an understanding of the mechanisms by which microbes can alter material properties so that appropriate protection schemes can be developed. Exceptional candidates are sought in the area of biochemistry, particularly those with experience in electrochemistry.

The candidate must have a bachelors degree in molecular biology, biochemistry, microbiology, materials science, or related field and should have two or more years of laboratory experience working with prokaryotic and eukaryotic cells, experience with genomic and plasmid DNA isolation, and experience with PCR and cloning. The fellowship requires experience with the use of bioinformatics tools to analyze DNA sequences and design primers, as well as experience with developing and optimizing enzyme assays. A good understanding of electrochemistry, the use of a potentiostat, and a basic understanding of corrosion fundamentals is a prerequisite for a this fellowship opportunity. Excellent organizational skills and attention to details is required.

The research performed will be published in peer-review journals and presented research at conferences. In this research it is expected that the fellow will improve upon the skills they already have but also will develop new skills for isolation and cultivation of fungi and bacteria from environmental samples. In doing so it will be necessary to isolate and maintain a variety of non-medical fungal and bacterial cultures. Typical laboratory operations include the handling and maintenance of fungal isolates, as well as establishing protocols for culture conditions and preparing samples for downstream processing. A basic understanding of prokaryotic and eukaryotic microbiology and molecular biology is necessary for performing research in this laboratory and laboratory skills such as pipetting, aseptic techniques, cell sorting experiments, making media and solutions, designing primers, DNA and RNA extraction and purification, PCR, protein expression and purification are valuable to a prospective fellow. A candidate for this fellowship will produce and purify products, and work with materials scientists for integration and processing of these products. Several analytical techniques outside of the realm of the biochemistry lab are used regularly in our lab, including but not limited to, Scanning Electron Microscopy, Atomic Force Microscopy, Optical

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> Microscopy, and Electrochemical characterization. Good laboratory practices including maintaining a detailed laboratory notebook, following Standard Operating Procedures, following all safety rules are a must for this opportunity.

This opportunity is open to U.S. Citizens only.

ARL Advisor: Joseph Labukas

ARL Advisor Email: joseph.p.labukas.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 <u>Army Research Laboratory Research Associateship Program</u> (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



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• 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 <u>Research Areas</u>)
- 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

Eligibility • Citizenship: U.S. Citizen Only

Requirements

- Degree: Bachelor's Degree or Master's Degree.
- Academic Level(s): Any academic level.
- Discipline(s):
 - Chemistry and Materials Sciences (<u>12</u>)
 - Engineering (<u>1</u>[●])
- Age: Must be 18 years of age