

Opportunity Title: Innovation Crossroads Applied Research Experience (ARE)

at Oak Ridge National Laboratory

Opportunity Reference Code: DOE-EERE-RPP-AMO-2017-1220

Organization U.S. Department of Energy (DOE)

Reference Code DOE-EERE-RPP-AMO-2017-1220

How to Apply A complete application consists of:

- An application
- Transcript(s) - For this opportunity, an unofficial transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Selected candidate may be required to provide proof of completion of the degree before the appointment can start. File must be in PDF format.
- A current resume/CV

All documents must be in English or include an official English translation.

If you have questions, please send an email to DOE-RPP@orau.org. Please list the reference code for this opportunity in the subject line of your email.

Application Deadline 2/9/2018 8:00:00 AM Eastern Time Zone

Description The Innovation Crossroads Applied Research Experience (ARE) provides a mentored opportunity for pre-doctoral scientists and engineers to apply their education in support of an impact-driven research and development project at the Oak Ridge National Laboratory. This program is sponsored by the Advanced Manufacturing Office (AMO) of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (EERE).

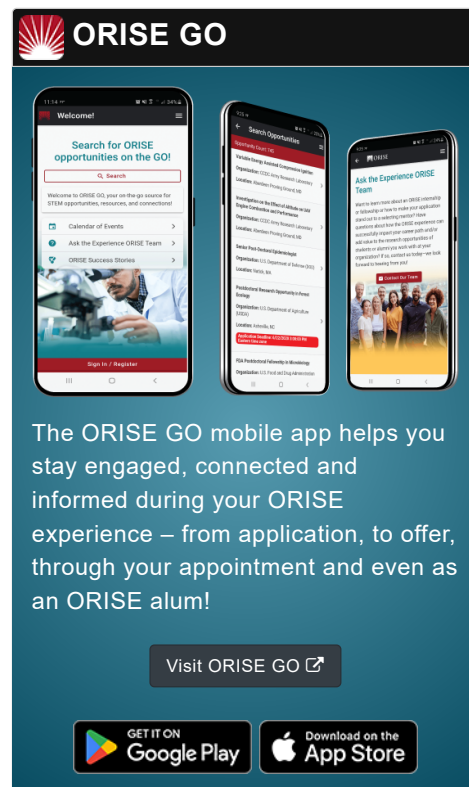
Through participation in this prestigious program, participants will:

- Be responsible for the planning and completion of a research-oriented project with direct impact on critical technical development milestones
- Gain deep insights into energy technology commercialization through mentorship and participation in business development activities
- Help develop innovative technologies that will have a real impact on the U.S. economy, environment, and society

Project Descriptions

Yellowstone Energy – Advanced Nuclear Reactor Design

Yellowstone Energy is an advanced nuclear reactor design startup working with the Oak Ridge National Laboratory through the Lab-Embedded Entrepreneurship Program (LEEP). The



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primary focus of LEEP is to address the gap between early-stage energy technologies and impactful commercial outcomes. The LEEP program presents an exceptional platform for the educational and professional development of scientists and engineers interested in the commercialization of energy technologies.

Participants will be directly involved in the planning and completion of projects including:

- Computational modeling of nuclear reactor operation under steady state and transient conditions
- Developing tools to extract computational simulation data for post-processing and visualization
- Performing power systems analysis and component sizing
- Developing computational tools for coupling legacy reactor analysis codes together for multiphysics reactor simulations

For questions about Yellowstone Energy, contact info@yellowstone.energy.

SkyNano Technologies – Electrochemical Manufacturing of Low-Cost Carbon Nanotubes Through Sustainable Manufacturing Using Co₂

SkyNano Technologies is a Tennessee-based clean energy startup with a focus on converting waste greenhouse gasses into functional nanomaterials. Right now we are focused on the conversion of CO₂ into functional carbon nanotubes (CNTs), which overcomes limitations associated with traditional CNT manufacturing and enables widespread commercial adoption through a low-cost manufacturing process. The technology was born out of research at Vanderbilt University, where we discovered the process to grow multi-walled CNTs and the ability to tune the diameters of the tubes. At ORNL, we are focusing our efforts on in-situ spectroscopy characterization of the growth process to determine process parameters that control the properties of the grown CNTs. Our efforts are focused with a goal of single-walled CNT manufacturing, as well as incorporation of CO₂-derived multi-walled and single-walled CNTs in various product applications ranging from battery and composite additives to transparent conductive films. ARE fellows will participate in fundamental laboratory experiments to further our technical understanding of our growth process as well as product development.

As an ARE Program participant, you will be responsible for:

- Working directly on a mentored project with SkyNano team members
- Applying your scientific and engineering expertise to help solve critical technical developmental challenges as identified by SkyNano team members

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- Gain deep insight into applied R&D and technology commercialization through educational programming and hands-on experience
- Running electrochemical synthesis experiments in a wet chemical laboratory setting to evaluate the influence of growth parameters on produced materials
- Characterization and analysis of carbon nanomaterials using Raman spectroscopy, thermogravimetric analysis, and imaging techniques including scanning electron microscopy, transmission electron microscopy, and atomic force microscopy.

We are looking for candidates who:

- Have a passion for nanotechnology and its technological impacts on significant societal challenges
- Are excited about working in a laboratory setting and ready to learn new technical skills
- Have a desire to learn more about technology commercialization and are willing to work on different projects ranging from basic research to product development

For questions about Skynano Technologies, contact Anna Douglas, anna.douglas@skynanotechnologies.com.

Active Energy Systems – Low-Cost Grid Scale Energy Storage

Active Energy Systems is developing a low-cost energy storage technology for large scale applications with major improvements in round trip efficiency when compared to today's batteries. Utilizing waste thermal energy sources, our technical approach side steps the efficiency barriers that limit most conventional energy storage technologies. In addition, by storing energy thermally, we use safe, low-cost materials and leverage a century of collective wisdom in thermal cycle development. Our competitive advantage lies in thermal process optimization and component design.

As an ARE Program participant, you will be responsible for:

- Materials testing to optimize phase change nucleation and growth conditions for thermal energy storage
- Cyclability studies, determining storage performance over time at different rates of charge and discharge
- Designing and building heat exchanger prototypes
- Measuring heat transfer coefficients for novel phase-change heat exchangers

For questions about Active Energy Systems – Low-Cost Grid Scale Energy Storage, contact Mitchell Ishmael, mitch@activeenergysystems.com.

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Participant Benefits

Participants will receive a stipend to be determined by AMO and ORNL. Stipends are typically based on the participant's academic standing, discipline and experience. In addition, participants will receive a stipend supplement to offset the costs of health insurance. Participants are eligible to purchase the family or individual health insurance plan offered through ORISE. A relocation allowance for participants located 50-miles away from ORNL will be provided. Participants will be eligible to receive an education/travel allowance.

Nature of Appointment

The participant will not enter into an employee/employer relationship with ORISE, ORAU, DOE, ORNL or any other office or agency. Instead, the participant will be affiliated with ORISE for the administration of the appointment through the ORISE appointment letter and Terms of Appointment.

Qualifications

Eligibility Requirements





- B.S. or M.S. in Chemistry, Engineering, Material Science, or other related technical field and be willing to relocate to the greater Knoxville area.
- U.S. citizens and Lawful Permanent Residents (LPR)

Desired qualifications:

- Relevant technical background and previous experience working in a lab
- Strong analytical, research, and communication skills (both oral and written)
- Work well in a collaborative, fast-paced team environment and ready to learn new skills and adapt experimental plans quickly

For the Active Energy System Program, preferred candidates would have a B.S. or M.S. in Chemistry, Materials Science and Engineering, Chemical Engineering, Applied Physics, or a similar degree with some laboratory or maker experience. Experience in surface chemistry, heat transfer, refrigeration or heat-to-power generation is a plus but not necessary.

Eligibility Requirements

- **Citizenship:** LPR or U.S. Citizen
- **Degree:** Bachelor's Degree or Master's Degree received within the last 60 month(s).
- **Discipline(s):**
 - **Chemistry and Materials Sciences** (12 )
 - **Computer, Information, and Data Sciences** (16 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (1 )

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- **Life Health and Medical Sciences** (1 )
- **Mathematics and Statistics** (1 )
- **Science & Engineering-related** (1 )