

**Opportunity Title:** AFRL - Effects of Inhaled Chemical & Particle Mixtures on Lung Surfactants Doctoral/Postdoctoral**Opportunity Reference Code:** AFRL-711HPW-2021-0014RR**Organization**

U.S. Department of Defense (DOD)

**Reference Code**

AFRL-711HPW-2021-0014RR

**How to Apply**

Click on *Apply* at the bottom of the opportunity to start your application.

**Description****What will I be doing?**

As an ORISE participant, you will join a community of scientists and researchers in an effort to gain knowledge in areas related to the Air Force Research Laboratory's (AFRL) mission.

The goal of this project is to implement a novel method that simulates diminished lung surfactant function and assesses respiratory health effects of particles through biophysical (cell-free) and biochemical (in vitro) endpoints. The proposal influence operational impact by improving Airmen respiratory resiliency and improve mission performance by identifying and mitigating hazardous exposure. In this proposed research, aerosols will be generated using nebulization and then passed through the surfactometer chamber where lung surfactant (LS) films are positioned immediately below the aerosol intake valves, thus simulating in vivo surfactant surface area changes during breathing. One of the advantages of the system is its ability to increase temperature to simulate heat stress, decrease oxygen content to simulate hypoxia, or reduce the temperature to simulate arctic conditions.

In addition, the project aims to produce and characterize degradation products from aerosolized chemicals, particles, and biohazards in an effort to identify specific constituents that trigger lung toxicities.

**Why should I apply?**

You will develop and advance your professional and academic career through doctoral and/or post-doctoral training. This exciting opportunity not only provides advanced research training during and beyond the doctoral degree but prepares you to follow scientific careers at the AFRL. Along the way, you will engage in activities and research in several areas. These include, but are not limited to, conducting research on the following objectives:

- Learning to design, construct, and build a user-friendly device, termed surfactometer, to use in the research laboratory as a means to screen various Air Force operationally relevant aerosols for indicators of diminished lung function.
- Collecting data (such as droplet shape, size, and other physical features of the lung surfactant fluid as well as inflammation, irritation, and allergic reactions within cells/tissues) that links to respiratory health endpoints.
- Assessing the interactions between lung surfactant films and a panel of aerosolized 'benchmark chemicals/particles' relevant to Air Force operational settings.
- Measuring the impact of diminished surfactant function on tissue surface structure and molecular profiles using a multi-lung cell/tissue model.
- Designing and building a functional device that can house and test the biological effects of aerosols on lung fluids, cells, and tissues in a sterile environment. Biophysical changes in lung fluids and biomolecular changes in cells/tissues will inform potential adverse respiratory health effects of Airmen in operational environments.

**Where will I be located?**

Wright State University in Dayton, Ohio

**What is the anticipated start date?**

Exact start dates will be determined at the time of selection and in coordination with the selected candidate.

Applications are reviewed on an ongoing basis and internships will be filled as qualified candidates are identified.

### **What is the appointment length?**

An ORISE appointment period can be a short-term (less than 2 weeks), summer (10-12 weeks), or yearlong appointment. Appointments may be extended depending on funding availability, project assignment, program rules, and availability of the participant.

### **What are the benefits?**

You will receive a stipend to be determined by AFRL. Stipends are typically based on a participant's academic standing, discipline, experience, and research facility location. Other benefits may include the following:

- Health Insurance Supplement (*Participants are eligible to purchase health insurance through ORISE*)
- Relocation Allowance
- Training and Travel Allowance

### **About AFRL**

AFRL leads the discovery, development and integration of affordable warfighting technologies for America's air, space and cyberspace forces. AFRL is a full-spectrum laboratory, responsible for planning and executing the Air Force's science and technology program. AFRL leads a worldwide government, industry and academic partnership in the discovery, development and delivery of a wide range of revolutionary technologies. The laboratory provides leading edge warfighting capabilities keeping our air, space and cyberspace forces the world's best. The 711 Human Performance Wing advances human performance in air, space and cyberspace through research, education and consultation, accomplished through the synergies created by the wing's two distinct but complementary entities: Airman Systems Directorate and U.S. Air Force School of Aerospace Medicine. For more information about AFRL, visit <https://www.wpafb.af.mil/afrl/>.

### **About ORISE**

This program, administered by Oak Ridge Associated Universities (ORAU) through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and DoD. Participants do not enter into an employee/employer relationship with ORISE, ORAU, DoD or any other office or agency. Instead, you will be affiliated with ORISE for the administration of the appointment through the ORISE appointment letter and Terms of Appointment. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE. For more information, visit the [ORISE Research Participation Program at the U.S. Department of Defense](#).

### **Key Words**

Bioengineering and Biomedical Engineering, Chemical Engineering, Environmental Engineering, Environmental Sciences, Environmental Studies, Basic Biomedical Sciences, Biophysics, Environmental Health, Physiology, Toxicology, Nanotechnology, Particle Physics, Physics (General), Physics of Fluids

### **Qualifications**

The qualified candidate should currently be pursuing or recently have received a doctoral degree. Degree must have been received within five years of the appointment start date.

Highly competitive postdoctoral applicants will have education and/or experience in one or more of the following:

- Demonstrable record of high-impact, peer-reviewed publications in surfactants characterization and toxicity or related disciplines.
- Well-developed planning and organizational skills, with the ability to prioritize multiple tasks and set and meet deadlines.
- Excellent written communication and verbal communication skills with proven ability to produce clear, succinct reports.
- An excellent team player with great initiative and demonstrated capacity to work in a collegiate manner.
- Ability to work highly independently, including chemical analysis of surfactants, toxicity assays using 3D lung cell models and interpretation of analytical data.
- 3D Cell culture, Air liquid interface co-culture models, toxicity assays, characterization of lung surfactants.
- Design and build a functional device that can house and test the biological effects of aerosols on lung fluids, cells, and tissues in a sterile environment.
- Biophysical changes in lung fluids and biomolecular changes in cells/tissues.
- Computational/statistical simulation models.

### Application Requirements

A complete application consists of:

- Zintellect Profile
- Educational and Employment History
- Essay Questions (goals, experiences, and skills relevant to the opportunity)
- Resume (PDF)
- Transcripts/Academic Records - 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. [Click here for detailed information about acceptable transcripts.](#)
- One Recommendation


If you have questions, send an email to [AIRFORCE@orise.ora.gov](mailto:AIRFORCE@orise.ora.gov). Please list the reference code of this opportunity [AFRL-711HPW-2021-0014RR] in the subject line of the email.

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### Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree received within the last 60 months or currently pursuing.
- **Discipline(s):**
  - **Communications and Graphics Design** ([2](#))
  - **Computer, Information, and Data Sciences** ([17](#))
  - **Earth and Geosciences** ([21](#))
  - **Engineering** ([27](#))
  - **Environmental and Marine Sciences** ([14](#))
  - **Life Health and Medical Sciences** ([46](#))
  - **Mathematics and Statistics** ([10](#))
  - **Other Physical Sciences** ([12](#))
  - **Other S&E-Related** ([1](#))
  - **Physics** ([16](#))
  - **Social and Behavioral Sciences** ([28](#))



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