Opportunity Title: Sensors for Wildland Fire Smoke Measurement
Opportunity Reference Code: EPA-ORD-NRMRL-AEMD-2019-01

Organization U.S. Environmental Protection Agency (EPA)

Reference Code EPA-ORD-NRMRL-AEMD-2019-01

How to Apply A complete application consists of:

- An application
- Transcripts – Click here for detailed information about acceptable transcripts
- A current resume/CV, including academic history, employment history, relevant experiences, and publication list
- Two educational or professional recommendations

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

If you have questions, send an email to EPArpp@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 7/1/2019 3:00:00 PM Eastern Time Zone

Description ***Applications will be reviewed on a rolling-basis.**

Wildland fires are one of the largest sources of air pollution in the U.S. and can impact air quality hundreds of miles downwind. The amount and composition of emissions and their dependence on the fuels and fire behavior are still poorly known, in part due to the difficulty of measuring these emissions. Additionally, the dispersion of smoke in complex topographies, such as in mountainous terrain, is difficult to predict and require measurements with high spatial resolution. Air quality monitoring stations are often sparsely situated and cannot characterize the variation in smoke concentration downwind of fires. Accurate information on smoke emissions and downwind concentrations are needed to expand our understanding of how wildland fires impact air quality.

The objective of this research project is to develop and evaluate next-generation lower-cost, light-weight sensor systems for measuring wildfire smoke. Multiple low-cost, portable sensor packages can be deployed in a dense spatial network to provide unprecedented spatial and temporal resolution of smoke concentrations near fires. Light-weight battery powered sensor packages can be mounted on unmanned aerial systems to measure and track the plumes from these fires. The research participant will participate in the design of sensor packages for multiple pollutants and the validation of these packages with more traditional emissions sampling equipment. The research participant will have the opportunity to evaluate the sensors in a laboratory environment as well as in areas impacted by wildfires or downwind of prescribed fire operations.

The research participant will collaborate with a team of engineers and scientists within and outside EPA to design, construct, and deploy sensor systems to measure wildland fire smoke. The research participant will receive training in the design and construction of air quality sensor systems. This research training may include the design of electronic hardware, software, battery and solar power systems, and physical mounting systems. The research participant will receive training in a wide array of measurement methods to evaluate smoke concentrations. Measurement methods can include gas and particle sensors, continuous measuring instruments, batch sampling, and analytical measurements. The research participant will receive training in the calibration of these instruments and sampling pumps to ensure accurate reference measurements for sensor evaluations. The research participant will also receive training in methods to analyze and visualize sensor data to identify spatial and temporal trends of smoke concentrations near wildland fires.

As part of this research project the participant will have the opportunity to:

Opportunity Title: Sensors for Wildland Fire Smoke Measurement
Opportunity Reference Code: EPA-ORD-NRMRL-AEMD-2019-01

- Design, construct and evaluate air quality sensor packages for measuring smoke
- Use a wide array of measurement methods to evaluate sensor performance
- Evaluate sensor response to smoke in laboratory and field settings
- Analyze and visualize smoke sensor data

The participant will have the opportunity to present their results at scientific conferences or through peer-reviewed manuscripts. Under the guidance of a mentor, the participant will have freedom to carry out independent research commensurate with their level of training.

Anticipated Appointment Start Date: July 1, 2019

This program, administered by 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 EPA. The initial appointment is for one year, but may be renewed upon recommendation of EPA and is contingent on the availability of funds. The participant will receive a monthly stipend commensurate with educational level and experience. Some travel and/or training allowance will be made available for field work and presentation of findings. Proof of health insurance is required for participation in this program. The appointment is full-time in the Research Triangle Park, North Carolina, area. Participants do not become employees of EPA, DOE or the program administrator, and there are no employment-related benefits.

Qualifications

The qualified candidate should have received a doctoral degree in one of the related fields, or be currently pursuing the degree and will reach completion by November 2019. Degree must have been received within five years of the appointment start date.

Preferred skills:

- Understanding of air quality sensor operation/design including optical particle counters, metal oxide sensors, and/or electrochemical sensors
- Experience with standard calibration procedures for gas analyzers and/or pumps
- Experience with or understanding of sensor related hardware, software, and wireless data transmission (e.g. Arduino, Raspberry Pi, etc.)
- Familiarity with common data analysis packages (e.g. R, Matlab, etc.)
- Strong verbal/written communication and organizational skills necessary to support field sampling and laboratory analysis
- General understanding of air pollutants from fires, e.g. CO2, CO, NOx, and PM2.5

Eligibility Requirements

- **Degree:** Doctoral Degree received within the last 60 months or anticipated to be received by 11/30/2019 11:59:00 PM.
- **Overall GPA:** 3.40
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Computer, Information, and Data Sciences** (2 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (27 👁)
  - **Environmental and Marine Sciences** (14 👁)
  - **Life Health and Medical Sciences** (3 👁)
  - **Physics** (16 👁)