Opportunity Title: Composition & Speciation of Trace Metals found in Materials in 3D printing/Additive Manufacturing
Opportunity Reference Code: EPA-ORD-NRMRL-LMMD-2019-01

Organization U.S. Environmental Protection Agency (EPA)

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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. All transcripts must be in English or include an official English translation. 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 10/31/2019 3:00:00 PM Eastern Time Zone

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

Technical improvements in Additive Manufacturing have made it possible to drastically reduce the cost of owning and operating a 3D printer in the home. The low cost of ownership and relatively inexpensive stock materials are an attractive incentive for purchasing a printer in addition to the ability to design and create nearly any object on demand.

Currently Fused Filament Fabrication (FFF) or Fused Deposition Modeling (FDM) are the most common printers sold. The printers produce objects using spools of polymer filament; the filament is heated and fused together in additive layers. A wide array of printers and variety of available filaments makes it possible to print toys, household objects, replacement parts, art, or any other of a multitude of products.

Recent research has demonstrated printers release chemicals and particles during the manufacturing/printing process. Numerous studies have been published in the last 5 years highlighting the number, mass, size, and volume of particles that are released during the printing process along with the composition and rate of volatile organic compound emissions. These publications have identified that during the printing process elevated levels of ultra-fine particles are produced. Aside from the previously identified properties, little is known about the actual chemical makeup of the aerosols and their persistence and fate within residential, occupational, and public indoor environments. The current research project will focus on developing a baseline data set on the chemical composition and properties of filaments used in 3D printing. Research efforts will be focused on determining the release of chemical from filaments through the product lifecycle and identifying potential points of exposure.

Under the guidance of a mentor, the participant will be trained in the following research activities:

- Development and application of methodologies for determining the chemical composition of 3D printer filaments
- Development and application of methodologies to quantify the chemical composition of aerosols released during the printing process

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- Development and application of methodologies to quantify the release of chemical from filaments throughout the product lifecycle
- Modeling potential exposure scenarios to chemical released during the printing process within indoor environments
- Summarizing research results for presentations and publication of manuscripts in referenced literature

The research participant will learn or refine skills related to:

- Research methodologies for characterization of nanomaterials
- Enhanced analytical laboratory skills
- Spectroscopic laboratory skills including: X-ray photoelectron spectroscopy, X-ray diffraction, X-ray absorption spectroscopy, Fourier transformed infrared spectroscopy, inductively coupled plasma mass spectroscopy and optical emission spectroscopy
- A strong understanding in the design, operation, and analysis of data collected from high energy X-ray experiments to elucidate the distribution and speciation of elements in experimental samples

The research participant will be exposed to and have professional development opportunities including:

- Research experience in the laboratory
- Opportunities to present research at professional conferences
- Opportunities to publish research results in peer-reviewed journals
- Interaction with senior NRMRL research staff
- Interaction with decision-making Program Office personnel
- Training opportunities for analytical equipment/analysis (synchrotron research) and field safety (HAZWOPER)
- Travel to professional conferences, research facilities, and field sites

Anticipated Appointment Start Date: September 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. Proof of health insurance is required for participation in this program. The appointment is full-time at EPA in the Cincinnati, Ohio, area. Participants do not become employees of EPA, DOE or the program administrator, and there are no employment-related benefits.

Completion of a successful background investigation by the Office of Personnel Management (OPM) is required for an applicant to be on-boarded at EPA. OPM can complete a background investigation only for individuals, including non-US Citizens, who have resided in the US for the past three years.

Qualifications

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

Preferred skills:

- Experience in a laboratory setting

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- Background that includes environmental chemistry and analytical chemistry

Eligibility Requirements

- **Degree:** Master's Degree or Doctoral Degree received within the last 60 months or anticipated to be received by 12/31/2019 11:59:00 PM.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (8 👁)
  - **Earth and Geosciences** (21 👁)
  - **Engineering** (5 👁)
  - **Environmental and Marine Sciences** (3 👁)
  - **Life Health and Medical Sciences** (4 👁)
  - **Science & Engineering-related** (1 👁)

Affirmation I certify that I have lived in the United States for the past three years.