Opportunity Title: Nanomaterials Implications for Human Health and the Environment
Opportunity Reference Code: EPA-ORD-NRMRL-LMMD-2018-06

Organization U.S. Environmental Protection Agency (EPA)

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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 references

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.

Description An ORISE research training opportunity is available with participation in a project to scientifically evaluate the implication of engineered nanomaterials to human health and the environment.

The research opportunity is available at the U.S. Environmental Protection Agency (EPA), Office of Research and Development (ORD), National Risk Management Research Laboratory (NRMRL). The appointment is with the Land and Materials Management Division (LMMD) in Cincinnati, Ohio.

ORD NRMRL LMMD helps provide the basis for the formulation of EPA's environmental policies and programs by playing a vital role in the scientific research mission of the Agency. NRMRL/LMMD helps develop and evaluate solutions to environmental problems faced by EPA, local and state agencies, and the public. As the laboratory focused on risk management research, NRMRL/LMMD seeks to provide information and tools that enable the Agency to develop the cost effective and sustainable approaches to protecting human health and the environment. NRMRL/LMMD supports EPA's environmental protection goals by providing direct support to Agency's regulatory and voluntary programs and by developing and evaluating the fate, transport and toxicity of nanomaterials. Studies include emission of nanomaterials and exposure risks, and cost effective risk management strategies.

The main focus of this research project is to determine the safety assessments of Engineered Nanomaterials (ENMs) conducted under TSCA including obtaining information on the release and exposure of ENMs from consumer products. Additional experimental data and predictive models are needed to characterize release and human exposure from priority products. Studies are intended to contribute to planning and developing a strategy to learn more about the transport, the transformation of nanomaterials in the environment and their risks to humans and the environment. The research also involves how nanoscale science and technology research can be used to protect the environment to reduce risks associated with sources of nano-materials. The research project is focused

on collaborating with other researchers to develop a database and fundamental understanding of the release of nanomaterials from consumer products and the fate of selected nano-materials once they enter the environment such as deposition, mobility and aggregation, reaction, dissolution and persistence in the environment. The research project also involves performing systematic assessments of the production, use and disposal of nanomaterials and their interactions with hydrophobic pollutants and other biomolecules to understand their full life cycle impact better using novel thermodynamic approaches. The research project will also support EPA's activities towards developing a better understanding of the fate and behavior of NPs within the cellular environment and how this may vary as a function of different types of cells using single-particle and singe cell ICP-MS. The research participant will gain a better understanding of the effects of nanoparticle size, surface charge, and functionalization on cell-nanoparticle interactions, including uptake quantity, uptake rate, and sub-cellular localization. The study will help to assess the stability of NPs within the cellular environment, by assessing changes in NP size over time, and potentially fluxes of metals from the NPs into the cell the cell. Notably, the technique can differentiate between dissolved and particulate metal. The research participant will have a chance to develop the methods for assessment of human exposure to nanomaterials, biological impacts of nanoparticles, linked directly to the distribution of nanoparticles in different cellular components.

- The research participant will learn specialized material accelerated aging and testing methods, measuring release of nanomaterials from consumer products, analytical techniques to characterize aging of polymers and nanoparticles. The research participate will also learn mathematical modeling of aging of polymers, transformation and transport of nanoparticles in the environment. This also include data analysis, and effective presentation of results. The research participant will be mentored in data interpretation, modeling, presentation, organization, and communication of scientific findings. The research participant will expand their knowledge interacting with a diverse group of researchers on interdisciplinary cross-cutting scientific issues related to risk of engineered nanomaterials, measuring exposure and their toxicity and methods of risk management for human health and the environment.
- The research participant will have opportunity to exercise independent initiative and judgment in the research commensurate with the level of training. The research participant may present their research at scientific meetings, authoring publications, and collaborating with a diverse and distinguished group of scientists and engineers with EPA and with many U.S. and international partners. EPA has well established relationships with many industrial partners, academics and inter-agency collaborations. EPA/ORD is conducting ongoing research with laboratory evaluations of release of consumer products containing nanomaterials and is working with academic and industrial partners for multi-laboratory studies, developing standard testing methods for

evaluating the release, exposure and toxicity of engineered nanomaterials.

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 in the Cincinnati, Ohio area. Participants do not become employees of EPA, DOE or the program administrator, and there are no employment-related benefits.

The mentor for this project is E. Sahle-Demessie (sahle-demessie.endalkachew@epa.gov). The anticipated start date for the appointment is September 4, 2018.

Qualifications Applicants must have received a Ph.D. or equivalent doctoral degree in one of the areas STEM filed related to chemistry, chemical engineering, environmental engineering, or biology within five years of the desired starting date or completion of all requirements for the degree should be expected prior to the starting date.

Applicants must possess fundamental knowledge of environmental science or engineering, environmental monitoring, air pollutant emissions characterization, and air quality research.

Applicants are preferred with specialized training or experience as follows:

- Expected to have strong laboratory skills including competence on a wide analytical methods for detection and characterization of nanoparticles in the environmental samples.
- Expected to have direct experience in research on but are not limited to, DLS, UV-Vis spectrometry, GC/FID, GC/MS, LC/MS, FTIR and UV/vis spectrometry, electron microscopy, potentiometric titrations, differential scanning calorimetry, thermogravimetric analyses and TGA/MS, ICP-MS.
- Experience in measuring engineered nanoparticles and other organic pollutants in environmental matrices.
- Experience analyzing efficiency and emissions data for health and environmental implications.
- Expected to have has experience in devising experimental methods for increasing the fundamental understanding of the fate of selected nano-materials once they enter the environment such as deposition, mobility, and aggregation, dissolution and persistence in the environment.
- Expected to have the skills to determine properties of different environmental matrices to understand mobility of nano-particle in groundwater and surface waters better and whether conventional drinking water treatment technologies such as filtration can be used to

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capture suspended nanoparticles.
- Ability to integrate science, engineering, and social science research.
- Ability to write and publish scientific articles demonstrated by publication record.

Eligibility Requirements

- **Degree:** Doctoral Degree received within the last 60 month(s).
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (2 👁)
  - **Communications and Graphics Design** (2 👁)
  - **Engineering** (4 👁)
  - **Environmental and Marine Sciences** (2 👁)
  - **Science & Engineering-related** (1 👁)