

Opportunity Title: Associations of Micro and Nanoplastics in Environment and its Human Health Implications

Opportunity Reference Code: ICPD-2023-26



Organization Office of the Director of National Intelligence (ODNI)

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How to Apply

Create and release your Profile on Zintellect – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at:
<https://orise.orau.gov/icpostdoc/index.html>.

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

Application Deadline 2/28/2023 6:00:00 PM Eastern Time Zone

Description **Research Topic Description, including Problem Statement:**

Plastics, which are nonbiodegradable, have replaced natural products such as cotton, paper and glass in numerous consumer products. Small particles of plastic, microplastics and nanoplastics (MNPs), are ubiquitous pollutants in the environment and enter human body via ingestion and inhalation. They have been observed to cross gut and blood barriers accumulating in several vital organs and fetuses in animal models. Understanding the role microplastics play in human health is therefore extremely critical.

MNPs are found at most austere and uninhabited areas of the world such as south and north poles, in deepest oceans, and in Himalayas. They have entered the drinking water and the food chain. MNPs from a variety of contaminated sources can affect human health in a variety of distinct modalities. Recent research has focused heavily upon the accumulation of MNPs in the body and specific organs, including passage through different biological barriers. It has also been shown that MNPs can also have deleterious effects based upon chemicals and toxins absorbed in the plastic – either during the original generation of the plastic or over its lifetime in the environment as it comes into contact with other chemicals, toxins, or even pathogens. Some of these chemical additives cause hormone-related cancers, infertility, and neurodevelopment disorders but impact of many others on human health is still an outstanding area of research. Bacteria adhere to the microplastic with high affinity and can enter human body along with microplastics. *Vibrio Cholerae*, a pathogen that causes cholera, was found adhered to microplastics in North and Baltic seas. Since MNPs are not biodegradable in the environment and are now ubiquitous world-wide, with limited knowledge of travel patterns, they have the potential to cause illness and/or disease in regions which are not aware of the potential risks.

There are many knowledge gaps in assessing the persistence and association of harmful chemicals and pathogens with MNPs. Currently available data is incomplete and has not considered the smallest particles of plastics and most hazardous associations for human health mainly due to lack of analytical methods. Moreover, research in methods for degradation of plastics in various environments is critically needed. The Intelligence Community (IC) Postdoc program seeks post-doctoral level research topics focused on improving our understanding of MNPs from the perspective of characterizing the environmental toxins, chemicals, and pathogens which may be associated or absorbed with them throughout their lifespan in the environment and different organisms.

Example Approaches:

Research proposals are expected to potentially include computational modeling, environmental modeling and

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collection, analytical evaluation of plastics and associated chemicals, and potentially modeling of health impact of the absorbed or bound elements (not of the plastic itself).

Proposers should ensure they have reviewed recent literature and are proposing research driving the state of the art and in alignment with the IC Postdoc program's length and funding.

Relevance to the Intelligence Community (IC):

While the direct risks of microplastics are still being researched, the indirect risks must also be assessed. Some members of the IC have increased, compared to everyday US citizens, to exposure to a wider variety of microplastics and associated chemicals or toxins. Characterizing these toxins, chemicals, and/or pathogens is valuable to the community.

Qualifications

Postdoc Eligibility

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Key Words: #Microplastics, #nanoplastics, #toxins, #chemicals, #environmental exposure

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** (12 )
 - **Communications and Graphics Design** (6 )
 - **Computer, Information, and Data Sciences** (17 )
 - **Earth and Geosciences** (21 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (14 )
 - **Life Health and Medical Sciences** (48 )
 - **Mathematics and Statistics** (11 )
 - **Other Non-Science & Engineering** (2 )
 - **Physics** (16 )
 - **Science & Engineering-related** (1 )
 - **Social and Behavioral Sciences** (29 )