

Opportunity Title: Characterization And Source Mapping of 3D Printed Materials Through Materials Analysis

Opportunity Reference Code: ICPD-2022-09

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 2/28/2022 6:00:00 PM Eastern Time Zone

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

As 3D printers and 3D printed materials become cheaper, the potential for illicit supplies created by 3D printers is increased. Items created by 3D printers are not traceable by law enforcement agencies and can be a cost-effective way to bypass security designed to prevent transport of illicit items. 3D printers have the potential to create firearms, firearm accessories, weapons, pharmaceuticals, physical keys to secure locations, lockpicking tools, false latent prints used to bypass biometric security, skimmer components, and counterfeit currency. As more materials become available for 3D printing, the potential for illicit use becomes greater. There is a growing demand for forensic examination of 3D printers and 3D printed materials. Due to the recent availability of this technology to the general public, there is a lack of research and validated test procedure that can be used for forensic examination. The goal of research associated with this topic should focus on materials analysis of 3D printed materials to associate with a brand/manufacturer or even a specific 3D printer.

Example Approaches:

Analytical Chemistry techniques such as X-ray diffractometer (XRD), X-ray Fluorescence (XRF), Scanning Electron Microscope (SEM), Gas Chromatograph Mass Selective Detector (GCMSD), Raman, FTIR, and Nuclear Magnetic Resonance Spectroscopy (NMR) can provide great detail concerning primary and trace components used in manufacturing of a specific item. Additionally, classic forensic techniques such as tool marks could provide valuable information that can characterize 3D printed material.

Relevance to the Intelligence Community:

Use cases for 3D printed materials for nefarious purposes are generally



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Through Materials Analysis

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increasing. Developing forensic techniques to identify source of production, supply chains, and prosecute individuals engaged in criminal activity will greatly enhance investigations in the Secret Service, Intelligence Community, and Law Enforcement agencies.

Key Words: 3D Printed Materials, 3D Printer, Materials Analysis, Analytical Chemistry, X-Ray Diffractometer (XRD), X-Ray Fluorescence (XRF), Scanning Electron Microscope (SEM), Gas Chromatograph Mass Selective Detector (GCMSD), Raman, FTIR, Nuclear Magnetic Resonance Spectroscopy (NMR), Forensics

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

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** ([12](#))
 - **Communications and Graphics Design** ([2](#))
 - **Computer, Information, and Data Sciences** ([16](#))
 - **Earth and Geosciences** ([21](#))
 - **Engineering** ([27](#))
 - **Environmental and Marine Sciences** ([14](#))
 - **Life Health and Medical Sciences** ([45](#))
 - **Mathematics and Statistics** ([10](#))
 - **Other Non-Science & Engineering** ([2](#))
 - **Physics** ([16](#))
 - **Science & Engineering-related** ([1](#))
 - **Social and Behavioral Sciences** ([27](#))