

**Opportunity Title:** Optical Metrology For Nanofabrication

**Opportunity Reference Code:** ICPD-2022-17

**Organization** Office of the Director of National Intelligence (ODNI)

**Reference Code** ICPD-2022-17

**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](mailto: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:**

Devices such as microelectronics, photonics, and sensors underly a vast range of IC capabilities and have benefitted from continued performance scaling under Moore's Law. These devices are fabricated through processes where nanoscale patterns are etched into functional materials with high precision and accuracy over large areas. As the length scale of these patterns decrease into the 10's of nanometers, the defect rates in fabrication processes increase exponentially, resulting in decreased yield of functional devices and higher cost per functional device. As these dimensions fall below the diffraction limit of visible light, electron beam techniques have been introduced. While providing the necessary resolution to identify defects, the small scanning area limits throughput and the high-energy electrons can potentially damage the substrate being imaged. There is a need to develop optical techniques that overcome the diffraction limit enabling both high-resolution (sub 10 nanometer) and high-throughput metrology of nanofabricated features. This research topic will investigate novel approaches to high-throughput optical metrology techniques that enable high resolution defect detection and offer compelling solutions to issues associated with functional device throughput, yield, and cost.

**Example Approaches:**

- 10.1039/C7NR00928C
- 10.1117/12.2300541

**Relevance to the Intelligence Community:**

Biologically templated nanofabrication technologies, while a nascent, have the potential to set the IC on a path toward continuous exponential improvements across its national security mission space. Contributing to the development of domestic supply chains for functional devices enabled



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by these technologies will enhance this capability.

**Key Words:** Nanofabrication, Nanomaterials, Registration, Metrology

**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](#))