

**Opportunity Title:** Multifunctional 2D Materials for Photonics and Optoelectronics Applications

**Opportunity Reference Code:** ICPD-2021-16



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

**Reference Code** ICPD-2021-16

### 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** 3/3/2021 6:00:00 PM Eastern Time Zone

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

2D materials can be variably doped and, thereby, their electromagnetic response can be tailored across a broad range of the electromagnetic spectrum from radio frequency (RF) to visible. Although graphene and mats of carbon nanotubes are arguably the best-known types of 2D materials, there is a near infinite variety including the dichalcogenides and tetrachalcogenides. Because of their tremendous variety and ability to be doped, 2D materials have the potential to meet an array of functional needs, perhaps simultaneously with or without active control. Applicants to this topic are encouraged to propose novel design concepts for photonic, optoelectronic, and RF devices featuring multifunctionality implementing the novel properties of 2D materials.

#### Example Approaches:

One application of interest is a multifunctional thin film that simultaneously serves to block incident RF radiation in the MHz and GHz ranges while detecting optical irradiation (near-IR and visible) for photonics and optoelectronics applications. This can possibly be achieved through novel 2D films, a dielectric spacer, and a 3D photodetector grid. The former could offer strong RF attenuation while maintaining high visible transparency, while the latter could serve to detect incident optical radiation. These thin-film materials could be incorporated onto substrates or onto adhesive films which could enable multifunctional applications on a variety of surfaces. This is one potential application, but applicants are encouraged to present their novel concepts for multifunctional 2D surfaces.

#### Relevance to the Intelligence Community:

The Intelligence Community (IC) often employs low-profile and low size-weight-and-power (SWaP) devices in a large variety of scenarios. The IC would potentially benefit from cutting edge advances in these novel 2D materials and the technologies they might enable.

**Key Words:** 2D Materials, Multifunctional, Optoelectronics, Photonics, Radio Frequency

### 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

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- 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** (17 )
  - **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 )