

Opportunity Title: Materials Informatics for Rapid and Efficient Design of New Systems Fellowship

Opportunity Reference Code: ICPD-2024-20

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 3 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.oraui.gov/icpostdoc/index.html>.

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

Application Deadline 2/28/2024 6:00:00 PM Eastern Time Zone

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

The rapid advancement of materials modeling has given rise to a new field, often called materials informatics or materials genomics. Descended in part from the Materials Genome Initiative, this line of research focuses on connecting the underlying physical and chemical properties of materials to their macroscale properties (i.e. hardness, corrosion resistance, melting temperature). This information, in turn, can be used to design new combinations of materials to more rapidly iterate through the R&D process and achieve key performance metrics. Oftentimes, materials informatics studies incorporate some elements of machine learning to assist in quickly screening candidate materials and selecting possible combinations. Other key features, like cost and availability, are often considered as well.

This research topic would seek to advance the science of materials informatics through development of improved models, machine learning algorithms, and collection/aggregation of basic materials data. Current models have difficulty capturing the complexity of multicomponent systems under a variety of environmental and operating conditions and are often made via empirical observations and interpolative analyses. This research effort would seek to close these knowledge gaps and work towards development of a more comprehensive system for faster material design.

Example Approaches:

One direction could be to focus on developing an informatics approach to enhance R&D for a specific system- i.e. a database of materials for satellite design. An alternative could be to develop an informatics-based approach to reverse engineering of systems (i.e., if a component does X, then it could only be material Y or Z). Further approaches can include investigation of materials science properties in an attempt to strengthen current models and expand their use to more complex systems.



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Relevance to the Intelligence Community:

- Chemical sciences, data, materials and manufacturing, space, other
- Emerging technology, modeling and prediction, reverse engineering, smart manufacturing, satellite, novel
- Develop/enhance capabilities to collect, process, and analyze information on integrated systems to develop models of complex systems of systems
- Develop/enhance sensor capabilities using novel materials
- Develop/enhance capabilities to identify supply chain vulnerabilities

Key Words: materials modeling, materials informatics, materials design, rapid R&D, smart manufacturing, reverse engineering

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 appointment start date
- 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** ([4](#) )
 - **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** ([11](#) )
 - **Other Non-Science & Engineering** ([2](#) )
 - **Physics** ([16](#) )
 - **Science & Engineering-related** ([1](#) )
 - **Social and Behavioral Sciences** ([30](#) )