

Opportunity Title: Design And Modeling of Self-Assembled Biological Structures

Opportunity Reference Code: ICPD-2022-11

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.ora.gov/icpostdoc/index.html>.

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

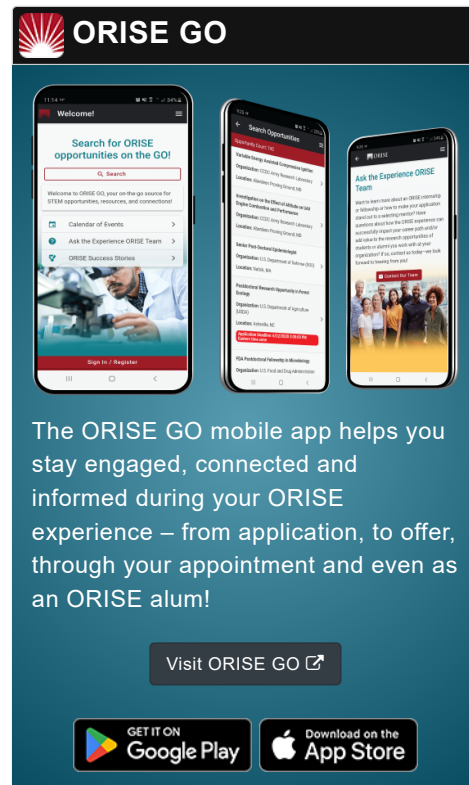
Application Deadline 2/28/2022 6:00:00 PM Eastern Time Zone

Description

Research Topic Description, including Problem Statement:

Biologic nanotechnology (e.g., DNA origami, slats and bricks; proteins) enables the self-assembly of micron-scale three-dimensional structures with nanometer-precise features composed entirely from biologic polymers (e.g., DNA, proteins). These structures have shown utility in a wide variety of laboratory scale demonstrations in application areas such as drug delivery, biosensing, nanomachines, and biologically templated nanofabrication. In-silico design and modeling tools underly advances in these technologies and enable the prediction of physical properties, self-assembly kinetics, and conformational space and kinetics of complex nanostructures before physical structures are manufactured. As applications mature and nanotechnologies move from the laboratory to industrial-scale manufacturing, the computational ecosystems must also mature into include the entire design pipeline, from nanostructure design to multi-scale simulations of individual structures and further to higher-scale interactions, such as those between multiple structures and/or those between individual structures and conjugated functional materials (e.g., carbon nanotubes, quantum dots, biomolecules) or surfaces. This research topic will investigate novel approaches to in-silico design and modeling of self-assembled biologic nanostructures that offer compelling solutions to issues associated with modeling higher-order structures.

Example Approaches:

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- 10.1093/nar/gkaa417
- 10.1021/acsnano.0c07717
- 10.1101/865733
- 10.1101/2020.05.28.119701

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 by these technologies will enhance this capability.

Key Words: Molecular Dynamics, Coarse Grain Model, Software Design Tool, Computer Aided Design, Computer Aided 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 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 )