

Opportunity Title: Determining Impact & use of Synthetic Biology Methods to

Create Existing, Modified or New Pathogens

Opportunity Reference Code: ICPD-2020-33

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 2/28/2020 6:00:00 PM Eastern Time Zone

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

Genetic engineering technologies are rapidly developing, rendering the manipulation of genetic material increasingly simple, efficient and convenient. This has numerous applications, including the generation of existing naturally occurring pathogens or novel synthetic pathogens de novo from genome assembly techniques, as well as the genetic editing of naturally occurring pathogens to produce synthetic variants. As synthetic biology techniques and methods for manipulating genetic material continue to evolve, it is likely that the technical barrier to genetic engineering will decrease, rendering this approach more accessible to those with less technical expertise or reduced capability. Malicious use of genetic engineering could be used to modulate a range of pathogen characteristics, to enhance pathogenicity, onset and severity of symptoms and environmental persistence. Furthermore, it may be challenging to determine when genetic engineering has been employed, for example when a naturally occurring pathogen is generated de novo in a laboratory setting and used as a bioweapon. As these synthetic pathogens may mimic to an extent the symptoms of wild-type variants, it is plausible that their presence may go unnoticed. The purpose of this research topic is to understand how existing and emerging genetic engineering technologies may be used to create or modify pathogens, and determine what biomarkers may be identified to facilitate the detection of their use.

Example Approaches:

Possible approaches may include:

- Collation and analysis of existing, emerging and future genetic engineering methods and technologies, and their potential applications to the production of existing, novel or modified pathogens.
- Determining how pathogen characteristics could be selectively modulated by genetic engineering techniques.
- Determining how the use of synthetic biology techniques to produce existing pathogens may be detected, both pre and post-release e.g. presence of biomarkers.
- Determining how the use of synthetic biology techniques and resulting modified organisms may hinder available detection methods.



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- Determining whether a new pathogen is the product of synthetic biology techniques.

Relevance to the Intelligence Community:

Synthetic biology is a significant step-forward in the field of genetics and is facilitating breakthroughs in the field of medicine and beyond. However, malicious use of this discipline has a range of potentially harmful, impactful applications. As the underpinning technologies develop, this may allow the modification or generation of pathogens to be carried out more easily, with less technical expertise required. It is therefore vital to know more about how the technologies that currently exist and those that are on the horizon may be applied in the malicious context of a biological attack, how they may alter the impact and how their use can be detected.

Key Words: Pathogen, Synthetic Biology, Genetic Engineering, Molecular Biology, Gene Editing, Detection, Virus

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](#) )