

Opportunity Title: Near-Field Explosive Properties, Understanding Short, High Intensity Effects on Adjacent Material

Opportunity Reference Code: ICPD-2020-34

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:**

When an explosive reacts, either through detonation or deflagration, a complex series of chemical reactions occur rapidly generating an explosive shock wave coupled with intense thermal effects in very short (microsecond) timescales.

The effects of combined thermal and shock exposure to materials in contact with the explosive charge, including reactive chemicals, biological materials or mitigation materials, is not well understood.

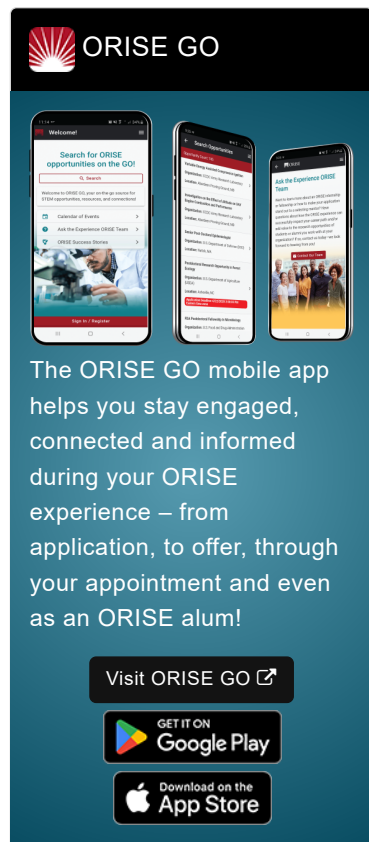
We seek research proposals that will increase our understanding of the near field behavior, including thermal and shock. This understanding gained through this research should be of sufficient accuracy to allow its application to assessments of novel devices.

Example Approaches:

- This project would include both computational and experimental aspects. Computational and theoretical approaches will be developed to predict the near field behavior of different energetic materials, including conventional, commercial and improvised. This could include a combination of thermochemical calculations, ab initio molecular modelling and hydrodynamic simulations and may integrate existing models.
- The modelling data would be complimented using precision experiments to measure the near field behavior, including the intensity and duration of the thermal output in the near field region.
- Synergistic effects between the shock/blast wave and the thermal effects would be assessed.
- An experimental method for reproducing thermal environment of an explosion in laboratory-based experiments could be developed.

Relevance to the Intelligence Community:

Assessments are frequently made on the viability and lethality of different improvised devices. In order to do this, we draw on significant existing knowledge base including data of the far field and fragment driving effects of explosives. However, due to the proliferation of knowledge on the



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internet, threats combining different methodologies are becoming more common. Due to the additional complication presented in these scenarios, we do not have a complete understanding to provide an assessment of the risk posed by these novel threats. This project will provide a validated understanding of key material interactions and potential synergies allowing validated scientific assessments to be made.

Key Words: Explosives, Temperature, Energetic Modelling, Near Field, High Intensity Environments

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](#) )