

Opportunity Title: Non-conventional energy harvesters/power sources to provide power in remote locations for 10+ years

Opportunity Reference Code: IC-18-39

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.

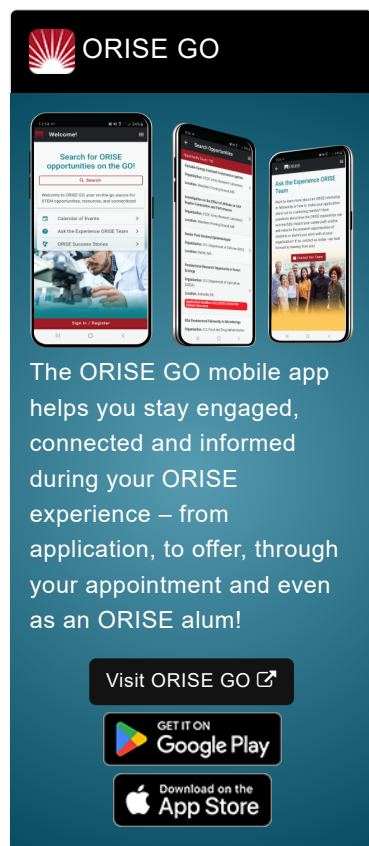
Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at:
<https://orau.org/icpostdoc/>.

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

Application Deadline 3/12/2018 11:59:00 PM Eastern Time Zone

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

- Energy harvesting and high energy battery systems are both growing industries as equipment powered off grid or remotely becomes more prevalent because it is not convenient or cost effective to connect to mains power.
- Rechargeable battery energy densities are at best 800 Wh/L and lifetimes are typically less than 10 years. The addition of energy harvesters can benefit battery systems by extending the interval of servicing and/or provide trickle charging, this is particularly advantageous in remote locations that are difficult to access. The largest market within energy harvesters is currently solar power; there are also other options such as piezoelectric or thermoelectric systems. However, some locations are not conducive to solar power (limited light exposure), nor vibration or heat harvesting. More traditional fuel based generators or high-tech fuel cells can offer higher energy densities, but these often require regular maintenance and are big and bulky.
- The subject of this topic is the research and development of a miniaturized energy harvester, fuel cell or an alternative high energy density power source that can operate regardless of worldwide location and if applicable has a wide ambient harvesting range. The power source would be expected to continue to function for 10+ years with little maintenance, and continue to function regardless of a change in environmental conditions.



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Example Approaches:

Research could include, but is not limited to:

- Robust energy harvesters that function over a wide range of ambient conditions, sustaining continuous ~ 1 mW power for 10+ years with little or no maintenance.
- Demonstration of equivalent battery energy density of 575 Wh/L over 10 years and 1150 Wh/L over 20 years.
- High energy density fuels with miniaturized fuel cells (150 c).
- Electrochemical conversion systems using redox flow mechanics or naturally occurring biological products.
- Direct conversion of high energy particles (safety would be critical to such a proposal).

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** ([6](#) )
 - **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** ([5](#) )
 - **Physics** ([16](#) )
 - **Science & Engineering-related** ([1](#) )
 - **Social and Behavioral Sciences** ([28](#) )