Opportunity Title: Non-conventional energy harvesters/power sources to provide power in remote locations for 10 years
Opportunity Reference Code: IC-17-24

Organization	Office of the Director of National Intelligence (ODNI)
Reference Code	IC-17-24
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.
Application Deadline	3/31/2017 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 where 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 5 years. The addition of energy harvesters can benefit battery systems by extending the service or recharging interval, this is particularly advantageous in remote locations that are difficult to access. The largest market within energy harvesters is currently solar power. 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 miniaturised energy harvester, fuel cell or an alternative high energy density power source that can operate regardless of worldwide location and has a wide ambient harvesting range. The Power source would be expected to continue to function for 5 – 10 years regardless of the exposure to light, environmental, vibration, and noise conditions.

Example Approaches:

A successful project might demonstrate the technology is compatible with some of the following:

- Deliver or harvest a continuous ~ 1 mW
- The device must sustain this power for 5 – 10 years without any maintenance
- A packaged device size of ~ 25 cm^3
- An equivalent energy density of 1750 Wh/L over 5 years to 3,500 Wh/L over 10 years
- The device must not affect the local environment, for example limiting noise, odour emissions and waste
- The health and safety of a high energy density package must be considered
- Working towards a demonstrator

Proposals might include, but are not limited to:

- High energy density fuels with miniaturised fuel cells (the 25 cm3 packaged device must contain the fuel tank if required)
- Electrochemical conversion using redox flow mechanics or naturally occurring biological products
- Direct conversion of high energy particles (safety would be critical to such a proposal)

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**

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- **Business** (11 👁)
- **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** (13 👁)
- **Physics** (16 👁)
- **Science & Engineering-related** (1 👁)
- **Social and Behavioral Sciences** (28 👁)