ADVANCED MATERIALS FOR PYROELECTRIC ENERGY HARVESTING

The aim of our project is to advance the material science and engineering that underpins the direct conversion of temporal changes in the ambient temperature to small quantities of electrical power. The resulting power can be used for 'fit and forget' self-powered wireless autonomous devices, wireless autonomous sensor networks and low-power electronic devices.

COMPETITIVE ADVANTAGE

- Pyroelectric energy harvesting eliminates the need for batteries to provide electrical power to individual sensors and actuators in wireless autonomous devices, wireless autonomous sensor networks and low-power electronic devices
- The pyroelectric power is available 24/7
- Pyroelectric energy harvesting is cheaper and more cost-effective than batteries, given that the basic ingredients are naturally occurring crystalline minerals
- Pyroelectric energy harvesters are more compact than batteries and have a much smaller footprint

SUCCESSFUL APPLICATIONS OF RESEARCH

- Successful application of the research outcomes would enable the Australian Defence Force to more effectively conduct pervasive monitoring and control of its critical infrastructures (airports, aircraft shelter, naval bases/ ports, command posts, ammunition depots) against physical security threats such as natural disasters (e.g. earthquakes, floods, storms), sabotage and terrorist attacks, technical failures due to human errors, design faults and interruptions to energy supply

PARTNERS

- Infratech Industries

IMPACT

- The outcomes of this research will enhance the Australian Defence Force's ability to deploy truly 'fit and forget' self-powered wireless autonomous devices, wireless autonomous sensor networks and low-power electronic devices to its critical infrastructures

CAPABILITIES AND FACILITIES

- Analytical instruments for measuring pyroelectric coefficient
- Instrument for measuring the dielectric constant of materials
- Analytical instruments such as X-ray powder diffraction (XRD), scanning electron microscope (SEM), nuclear magnetic resonance (NMR) spectroscopy, Brunauer–Emmett–Teller (BET and mercury porosimetry for measuring morphological and structural properties of pyroelectric materials
- Pyroelectric energy harvesting cells

MORE INFORMATION

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