



TECHNOLOGY SOLUTION

Power Generation and Storage



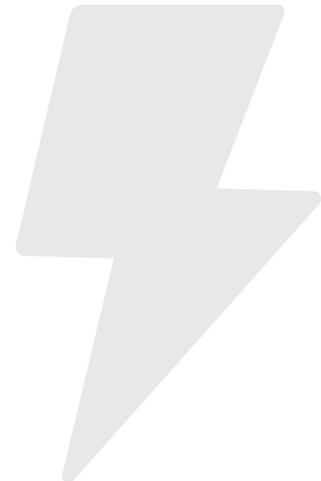
Pyroelectric Sandwich Thermal Energy Harvester

[A technology to harvest electrical energy from waste heat sources](#)

The technology was designed to provide a small, renewable and portable power source for spacecraft. Since it works on the principle of converting ambient waste heat to electrical energy for operating electronics, it can also be used in terrestrial applications such as powering electronics in motor vehicles and wireless sensor networks for internet of things (IOT) applications that experience thermal cycles, among other applications.

BENEFITS

- With further development, this technology could be the first usable pyroelectric energy harvester
- Similar technologies using thermoelectrics and piezoelectrics have already established markets, demonstrating the commercial possibilities for pyroelectrics
- A pyroelectric energy harvester is an ideal means of capturing energy from abundant waste heat

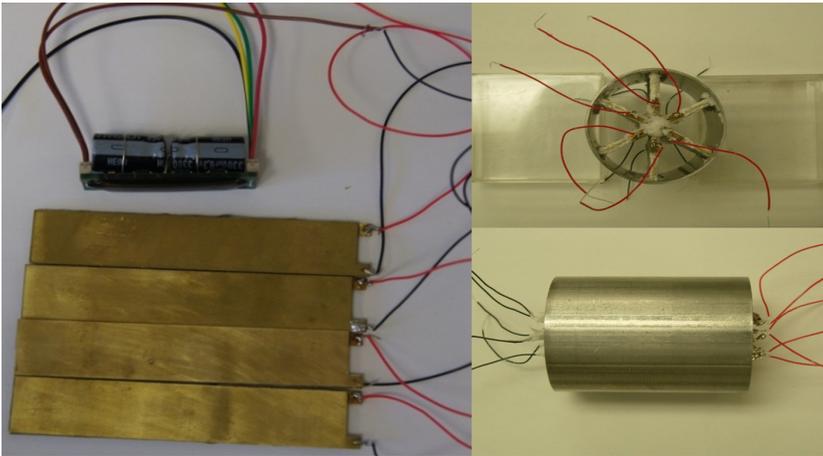


THE TECHNOLOGY

This technology harvests electrical energy utilizing a pyroelectric device that generates voltage when cyclically heated. The device consists of a pyroelectric material sandwiched between two electrodes, which in turn are contained within two thermally conductive protective layers, an electrical circuit designed to harvest the voltage generated thermally, and an energy storage unit.

The technology will enable more efficient utilization of solar and thermal energy production through harvesting energy that is currently lost as waste heat.

The technology has been demonstrated to produce electricity in the milliwatt range and requires further development to maximize power generation.



Samples of Pyroelectric Energy Harvester Devices. Image credit: NASA/Jin Ho Kang

APPLICATIONS

The technology has several potential applications:

- Provide power for automotive electronics
- Provide power for wireless sensor networks
- Provide power for Internet of Things (IoT) devices
- Harvesting energy from waste heat from:
 - Exhaust gas streams from jet engines;
 - Air streams used to cool electronics;
 - Steam fluids (vapor-liquid mixture) from power plant turbines;
 - Submarine water flow or tidal flow;
 - Circulating coolants used in different types of machinery; and
 - Atmospheric airflow

PUBLICATIONS

Patent No: 10,147,863