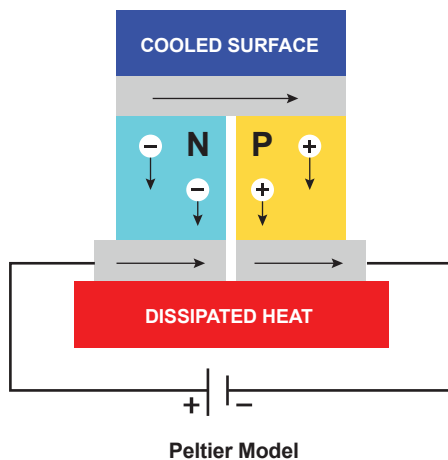


THERMOELECTRIC MICRO-COOLERS FOR ELECTRONIC AND OPTOELECTRONIC APPLICATIONS

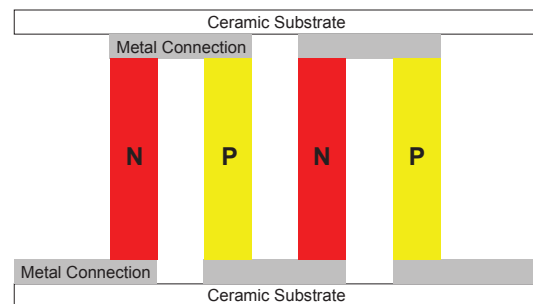
TECHNOLOGY OVERVIEW

A team at Republic Polytechnic has successfully fabricated prototype thermoelectric (TE) micro-coolers using state-of-the-art Bi_2Te_3 based thin films suitable for integration in electronic and optoelectronic components and devices. The fabricated micro-cooler exhibits desirable TE properties and good electrical reliability. Freestanding TE micro-devices of any desired shape and dimensions can be fabricated using a relatively simple process protocol, which enables large-area coating to be achieved with consistent results and at low processing temperatures.



The TE modules are capable of converting electric energy into heat and vice versa directly. The key features of the devices are:

- No moving parts, so little maintenance required
- Devices can exceed 150,000 hours of steady state operation
- Contain no chlorofluorocarbons or other materials that may require periodic replenishment
- The direction of heat-pumping in a TE system is fully reversible. Changing the polarity of the DC power supply causes heat to be pumped in the opposite direction where a cooler can then become a heater
- Precise temperature control to within 0.1°C can be maintained
- Can function in severe and sensitive environmental conditions, or in applications where conventional refrigeration units cannot be used.



Thermoelectric Micro-cooler

POTENTIAL APPLICATIONS

The technology can be applied in the areas of:

- Microelectronics
- Optoelectronics
- Healthcare
- Aerospace and Defence
- Energy and environment

Depending on their working modes, TE applications can be classified into three categories: coolers (or heaters); power generators; or thermal energy sensors. TE coolers are used in cases where the cooling system design criteria call for high reliability, small size, low weight, intrinsic safety and precise temperature control.

MARKET OPPORTUNITIES

The global market for Electronic Thermal Management (ETM) is forecast to reach \$8.6 billion by 2015 and \$10.1 billion by 2017. The market for thermoelectric energy harvesters is projected to reach \$875 million by 2023.

COMMERCIALISATION

This technology is available for licensing.

CONTACT DETAILS

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Whether you are looking for new ideas to improve your current business flow, need access to research and technology expertise, or require facilities to bring your innovative ideas to life, we may be the partner for you.

At Republic Polytechnic (RP), we bridge the gap between knowledge and application by facilitating information and technology transfer to industry partners. Taking a holistic approach, our team of experts can assess your business needs, provide consultancy, conduct feasibility studies, and render support to help increase your company's competitiveness.

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Research and Development

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Current Opportunities for Collaboration and Commercialisation

- Augmented Reality in Mainstream Sports Medicine – Diagnosis and Treatment of Lower Limb Injuries
- Brain Controlled Communicating Device for the Physically Handicapped
- Innovative Single-tube Multiplex Diagnostic Platform for Dengue and Chikungunya Viruses
- Low Cost Wireless Patient Weight Measurement System for the Physically Impaired and Bedridden
- New Catalysts for Sustainable Liquid Biofuels
- New Chemical Entities with Potential Applications in Photodynamic Therapy
- Regenerative Energy Wireless Sensor Network for Data Centre
- Thermoelectric Micro-coolers for Electronic and Optoelectronic Applications
- Visual Sentiment Analytics for Social Media Analysis
- Wireless Proximity Sensing for Safety and Security Applications

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