

High-sensitivity temperature sensor

Ultrasensitive microscale temperature sensing—flexible design possible

Overview

In biotechnology and healthcare, it is crucial to detect small temperature changes and heat generation with high sensitivity. **This invention achieves remarkable temperature sensitivity** by using ionic liquids with a high Seebeck coefficient in thermocouples, **far surpassing conventional solid-state materials**. The device employs a microfluidic chip, allowing the liquids to be physically separated but electrically connected, enabling flexible sensor structures. This system makes it possible to conduct ultra-sensitive temperature measurements even on curved and irregular surfaces, expanding the practical utility of temperature sensing well beyond what is possible with traditional solid-state sensors.

Product Application

- Ultrasensitive microscale temperature sensing
- Medical and healthcare body temperature measurement
- Industrial temperature measurement

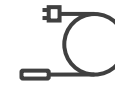
IP Data

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Features・Outstandings

Temperature sensors

Thermocouple



Thermistor



Principle

Seebeck effect

Resistance change

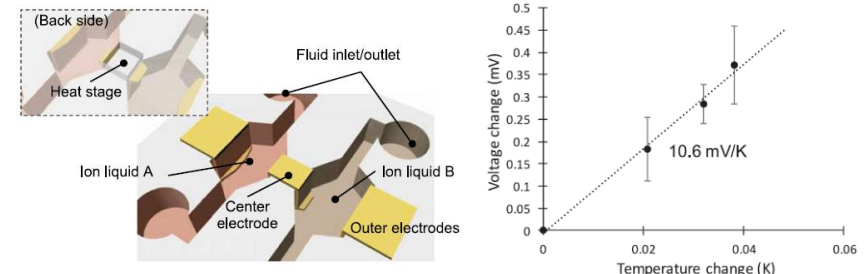
Challenges

Low sensitivity; cannot be made flexible.

Low sensitivity; not flexible.

The invention*1

Liquid thermocouple with microstructure



- Ionic liquids flow through the channels : PEG-NaOH, Iodine soln.
- Sample placed on central electrode : Electrode size ~700μm
- Detect the smallest heat change - **10.6 mV/K** sensitivity.

* The Seebeck coefficient of **typical materials is several hundred μV/K**

Inquiries welcome from companies interested in commercialization or measurement with this device.

Contact

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