Tohoku Univ. Technology

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

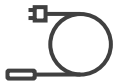
- ☐ Ultrasensitive microscale temperature sensing
- ☐ Medical and healthcare body temperature measurement
- ☐ Industrial temperature measurement

IP Data

IP No. : JP 7164177
Inventors : INOMATA Naoki, ONO Takahito
Admin No : T18-105

Features・Outstandings

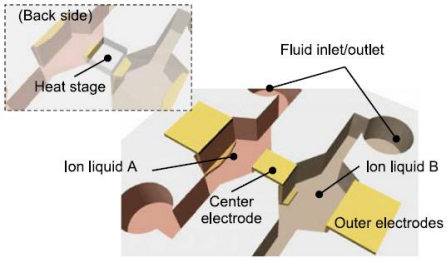
Temperature sensors

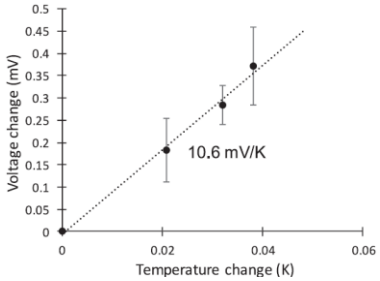
	Thermocouple	Thermistor
		
Principle	Seebeck effect	Resistance change
Challenges	Low sensitivity; cannot be made flexible.	

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

*1 DOI: 10.1109/LSENS.2019.2912418

Tohoku Techno Arch Co., Ltd.
Please visit CONTACT here