A POTENTIOMETRIC MECHANICAL SENSOR

Tech ID: 30280 / UC Case 2019-124-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20220404309	12/22/2022	2019-124

Additional Patent Pending

BRIEF DESCRIPTION

The skin sensory behavior may be mimicked using potentiometric mechanosensation and thermosensation mechanisms of this invention by regulating the potential difference between electrodes at two different electrode/electrolyte interfaces. Basically, when bringing two categories of rationally selected electrode materials into contact with an electrolyte, two different electrode/electrolyte interfaces can be formed with a potential difference measured between the two electrodes. Via structural and component manipulation of the electrolyte, external mechanical and thermal stimuli may be encoded into potential difference variation between the two electrodes, just like skin sensory cells coupling external stimuli into membrane potential variation

SUGGESTED USES

This potentiometric sensing mechanism are flexible and wearable sensing devices with novel properties that are hard-to-obtain via conventional sensing mechanisms. First, a class of soft and stretchable sensors is provided, which include stretching-independent sensing performance without utilization of structure engineering strategy and expensive intrinsically stretchable conducting materials, which are two main routes to fabricate stretchable electronics. When the sensors are subjected to tensile deformation up to 50% strain, the signal output of the sensors remains highly stable (e.g., less than 1% signal variation) during the entire stretching process. Such stretching-independent sensing performance is highly desired for manufacturing fully soft, stretchable and reliable robots and prostheses. Additionally, a new type of e-skin with a single-electrode-mode configuration is provided herein, which advantageously enhances the pixel density as well as the data acquisition speed compared with traditional dual-electrode-mode e-skins based on other sensing mechanisms. These distinctive characteristics of the potentiometric sensing mechanisms also make them very attractive for future development of innovative electronic devices and smart systems.

ADVANTAGES

An advantage of this potentiometric sensing mechanism is that the corresponding devices do not rely on external energy input and feature ultralow power consumption (recorded less than 1 nW), which can be several orders of magnitude lower than that of conventional sensing devices. Additionally, the fabricated potentiometric mechanical sensors exhibit good capability to detect both static and low-frequency dynamic mechanical stimuli, compensating for the deficiency of self-powered piezoelectric and triboelectric devices in recording static mechanical stimuli. Additionally, an all-solution processing approach is used to fabricate high-yield potentiometric mechanical sensors and temperature sensors, e.g., using all commercially available materials, revealing good scalability and cost-efficiency.

RELATED MATERIALS

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Printed All-Organic Reflectance Oximeter Array
- Biodegradable Potentiometric Sensor to Measure Ion Concentration in Soil

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OTHER INFORMATION

KEYWORDS

Skin sensors

CATEGORIZED AS

» **Sensors & Instrumentation**

» Biosensors

RELATED CASES

2019-124-0

- Scalable And High-Performance Pressure Sensors For Wearable Electronics
- Pulse Oximeter Using Ambient Light
- Simultaneous Doctor Blading Of Different Colored Organic Light Emitting Diodes
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