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香港城市大學
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Flexible Sweat-Activated Graphene Coated Ni Foam-based Mg-O2 Battery in Stretchable Microelectronics for Continuous Biomarkers Monitoring

Energy & Environment

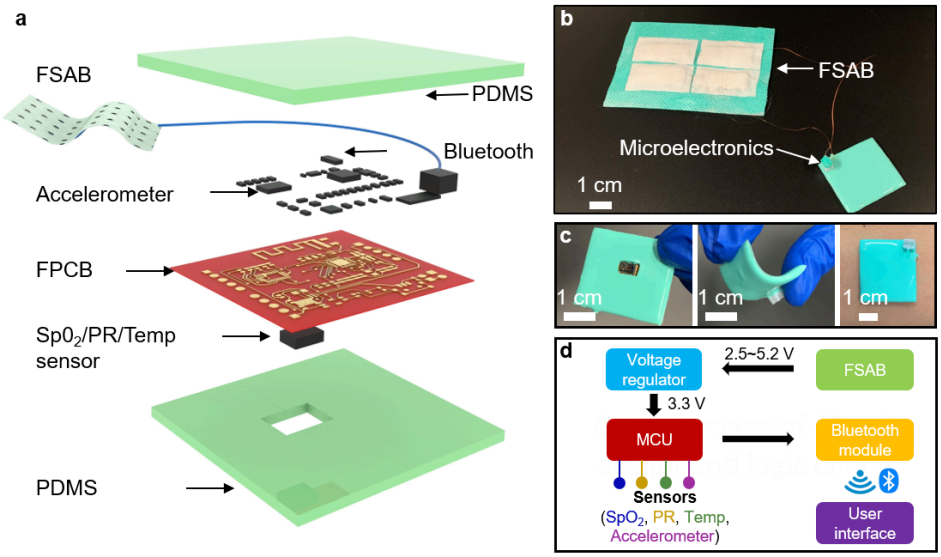
Health & Wellness

Consumer Electronics

Energy Conservation/Generation/Management/Storage (Battery)

Sensors

中文版本



a) Exploded view of the device, represented layer by layer. b) Four sweat-activated batteries on 8cm×8cm flexible substrate connected to the soft microelectronic. (3cm×3cm) c) The flexibility of the soft microelectronic under pressure. d) The diagram of the device's working principle.

Opportunity

Many commercially available wearable devices exist, including fitness trackers such as Fitbits and Mi Bands. However, most of them use traditional batteries (coin-cell or thin-film) as power sources. These traditional batteries are classified as hazardous materials and using them in contact with human skin is a safety concern. Furthermore, they are not stretchable or flexible. To overcome these limitations, the inventors have developed and tested a novel sweat-activated battery (SAB) that uses highly biocompatible materials and flexible substrates. The battery powers an electronic wearable device that monitors the user's health and can be used during exercise or other physical activities. As well as the SABs, an accelerometer, and sensors to measure peripheral capillary oxygen saturation, pulse rate, and body temperature are

IP Status
Patent filed

Technology Readiness Level (TRL) ? 4

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incorporated into the device. A Bluetooth module is also included, so that health data from the biosensors can be displayed on a smartphone. Through these affordances, the invention overcomes limitations in existing practice.

Technology

The invention is a sweat-activated flexible, stretchable battery that powers an intelligent electronic device for health monitoring purposes. Four batteries activate once they absorb sweat from the human body and power the smart electronic, which contains sensors to measure acceleration, oxygen saturation, pulse rate, and body temperature. A microcontroller is connected to these biosensors and collects the data and sends it via Bluetooth to a smartphone app that has also been developed by the inventors. The batteries are made from several layers, including a cotton layer that sits on the skin and has a high absorption capability, a magnesium sheet, and nickel foam.

Advantages

- Safe for contact with human skin
- Stretchable and flexible
- Reliable performance when twisted and bended
- Better performance due to the components used

Applications

- Personal fitness
- Sports centers
- Health-care applications
- Construction workers
- Sporting events