Ultra-Low Cost, Transferrable and Thermally Stable Sensor Array Patterned on Conductive Substrate for Biofluid Analysis

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OTHER INFORMATION

KEYWORDS

Biosensors, Sensors, Lyophilization, Saliva, Urine, Sweat, Biofluids, Wearable Products, Medical Sampling

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Medical**
  - Devices
- **Sensors & Instrumentation**
  - Biosensors
  - Medical

RELATED CASES

2017-882-0

SUMMARY

UCLA researchers from the Department of Electrical Engineering have invented a novel biosensor array that is ultra-low cost and thermally stable. It prolongs the lifetime of electrode modules of sensor products and allows for extended sensing operation in uncontrolled environments.

BACKGROUND

Biosensors and biochips are the fastest growing segment of the global microsensors market, pushing towards $8.7 billion by 2020. The increasing adoption of wearable biotechnologies and consumer biosensing products is driving the need to bring down costs and extend the lifetime of biosensor products. Conventional designs of biosensors typically consist of a consumer sensing module that directly interfaces a permanent circuit board for control, signal processing, and transmission. Since the chemical sensing layer is directly fabricated on the electrodes, the conventional sensing design cannot be refreshed after sampling and sensing biofluid. Therefore, electrodes must be discarded along with the chemical sensing layer, wasting materials and dramatically cutting down product lifespan. Furthermore, many existing biosensors have poor thermal stability that prevents them from operating in uncontrolled environments in direct contact with body temperature biofluid.

INNOVATION

A novel biosensor array was developed to physically decouple the sensing layer and the electrode module. This innovative design consists of a thermally stable disposable sensor array that is fabricated on a conductive and adhesive substrate. This substrate can be easily mounted onto its electrode counterpart, making the electrode module reusable. This design especially benefits devices that require frequent sampling of fresh biofluid. Furthermore, the probe/enzyme activity in this novel sensor array is preserved through applying a freeze-drying (lyophilization) technique. This approach enables extended sensing activity in uncontrolled environments, as the sensing reagents would stay in its nonreactive, solid form at room temperature until encountering biofluids at body temperature. Furthermore, the fabrication of this detachable biosensor array is ultra-low cost, making it extremely attractive to consumer biosensor manufacturers.

APPLICATIONS

- Consumer biosensor products
- Saliva sensing
- Urine sampling
- Interstitial fluid
- Sweat based sensors
- Wearable sensor products

ADVANTAGES

- Ultra-low cost
- Thermally stable
- Prolonged lifetime of electrode module
- Disposable sensor array

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20210113145	04/22/2021	2017-882

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Wearable Voltammetric Monitoring of Electroactive Drugs
- Mediator-Free Electroenzymatic Sensing with Enhanced Sensitivity and Selectivity for Wearable Metabolite and Nutrient Monitoring Applications
- A Wearable Freestanding Electrochemical Sensing System
- Multiplexed Sweat Extraction And Sensing Wearable Interface For Normalized And Periodic Analysis
- A 3D Microfluidic Actuation and Sensing Wearable Technology for In-Situ Biofluid Processing and Analysis

- A Wearable Platform for In-Situ Analysis of Hormones
- In-Situ Sweat Rate Monitoring For Normalization Of Sweat Analyte Concentrations

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