

A Wearable Freestanding Electrochemical Sensing System

Tech ID: 31996 / UC Case 2020-189-0

SUMMARY

Researchers in the UCLA Department of Electrical and Computer Engineering have developed a strategy for high-fidelity, wearable biomarker data acquisition and sensor integration with consumer electronics.

BACKGROUND

Wearable consumer electronics are designed to harvest physiologically relevant data and have gained popularity in personal health monitoring. To gain insight into a body's dynamic chemistry, measurements need to be made via biofluids, such as sweat. Existing non-invasive sweat-analyzing systems, however, rely on in-plane interconnections and rigid connectors, forcing them to detect biomarkers through highly strained (motion-induced) regions. This limits data fidelity and makes the device highly susceptible to failure (due to delamination, slipping, detachment, etc.) and external interference (e.g., mechanical noise). There is a need for improved, flexible strain-isolated sweat sampling for wearable devices that maintains high data fidelity.

INNOVATION

UCLA researchers have developed a disposable freestanding electrochemical sensing system (FESS) for strain-isolated sweat analysis that can be easily integrated with future wearable consumer electronics while preserving biomarker data fidelity. The FESS can be simultaneously adhered to skin and electronics with the aid of double-sided adhesion forces without the need for rigid connectors, allowing for efficient biomarker information delivery despite movement. The FESS was able to be seamlessly integrated into a smartwatch and provide robust biomarker readouts throughout the user's various activities, demonstrating the ease in which it can be integrated with consumer electronics.

APPLICATIONS

- ▶ Wearable device
- ▶ Data fidelity control
- ▶ Sweat analysis
- ▶ Early diagnosis instrument

ADVANTAGES

- ▶ Easily integrated into wearable devices
- ▶ Strain-isolated sensor
- ▶ Small size
- ▶ Versatile – can target a wide panel of biomarkers

STATE OF DEVELOPMENT

A product prototype FESS-enabled smartwatch was developed featuring sweat sampling, electrochemical sensing, and data display/transmission, all within a self-contained wearable platform.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,616,970	05/05/2026	2020-189
Germany	Issued Patent	4034684	04/29/2026	2020-189
France	Issued Patent	4034684	04/29/2026	2020-189

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OTHER INFORMATION

KEYWORDS

freestanding sensor, strain isolated sensor, sweat analysis, wearable device, wearable electronics, smartwatch, biomarker data fidelity

CATEGORIZED AS

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

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2020-189-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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