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This Bandage Developed by Scientists Can Monitor Glucose Levels in Sweat

Researchers create a flexible bandage with light-based sensors that can accurately detect glucose and other biomarkers in sweat.

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Scientists from [Nanyang Technological University](#), Singapore (NTU Singapore) have developed a groundbreaking wearable sensor that can monitor glucose levels through sweat (via [Medical Xpress](#)).

This bandage, [reported](#) in the journal Analytical Chemistry, which combines flexible materials with advanced light-based sensors, offers a non-invasive, effective, and painless way for patients, especially those with diabetes, to keep track of their health.



(Photo : Diana Polekhina on Unsplash)

NTU Singapore scientists develop a painless, non-invasive wearable sensor that monitors glucose levels through sweat, offering a comfortable alternative to traditional finger prick tests for diabetes management.

How the Bandage Works

This wearable sensor utilizes a technology known as "[flexible photonics](#)," which integrates light-based (photonic) sensors with flexible materials. The flexibility allows the sensor to be comfortably worn on the skin.

Central to this technology are optical resonators, devices that use light to detect very small changes. These resonators significantly enhance the sensitivity of the sensors, addressing the challenge of monitoring weak biological signals directly on the skin.

The bandage employs a thin film laser sensor made by embedding tiny liquid crystal lasers within a hydrogel. The hydrogel, a sponge-like material, allows small molecules from sweat to enter.

When these molecules interact with the liquid crystal lasers, they produce light signals. These signals are highly sensitive and selective, accurately detecting specific substances like lactate, glucose, and urea in sweat.

No Need for Finger Prick Tests

In a proof-of-concept test, [researchers](#) demonstrated that the sensor could detect various metabolites (substances produced during metabolism) in sweat using multiple light wavelengths.

This advancement is a significant step forward in creating wearable health monitors that utilize light-based technology, offering high sensitivity and accuracy in detecting small biological molecules.

Sensor-based monitoring devices exist as an alternative, they are often expensive, rigid, and uncomfortable for prolonged use.

The new bandage developed by NTU researchers offers a more comfortable option. By encapsulating a microlaser in liquid crystal droplets and embedding them in a soft hydrogel film, the team has created a compact and flexible light-based sensing device.

According to tests, the device can even measure glucose, lactate, and urea levels as low as 0.001 millimeters. This makes it 100 times more sensitive than other similar devices we have now. Additionally, the wearable sensor can even provide highly accurate biomarker readings within minutes.

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What's Next?

According to the researchers, this technology can help improve healthcare in Singapore and globally, where diabetes is becoming increasingly prevalent.

In Singapore alone, over 400,000 people live with the disease, with the number projected to surpass one million by 2050.

The NTU research team plans to fine-tune the microlaser sensors to detect a wider variety of substances, including drugs and other chemicals found in sweat. This could provide even more comprehensive health data for patients and healthcare providers.

Dr. Lin Chun-Hsien, MD, from the National Taiwan University Hospital, believes that this device could "provide a more convenient and effective way to monitor patients' blood glucose," benefiting both patients and physicians.

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