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Ultralow Concentration Sensing of Bio-matter with Perovskite Nickelate Devices and Arrays

A compact, highly sensitive biosensor detects ultralow concentrations of biomolecules simultaneously, enabling easy integration into wearable and implantable devices for enhanced monitoring.

Researchers at Purdue University have developed a biosensor that can detect ultralow concentrations of biomolecules. The biosensor successfully detected glucose and dopamine and could be used to detect other molecules which are difficult to detect using conventional methods. This biosensor detects biomolecules that release protons during enzymatic reactions unlike commercially available devices which rely on electron detection. The biosensor also has the capability to detect different biomolecules simultaneously. Dopamine and glucose were detected in water with a limit of detection of 50 and 500 attomolar concentration respectively. The biosensor is compact and can easily be integrated into wearable and implantable devices.

Advantages:

-Low limit of detection of biomolecules:

-100 million times more sensitive than conventional glucose monitor

-10,000x more sensitive than glucose transistor device

-10x more sensitive than glucose electrochemical sensor

-Capable of being integrated in implantable and wearable devices:

-Compact size

-Does not require external energy input

-Works at room temperature

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Category

Biotechnology & Life Sciences/Biomarker Discovery & Diagnostics

Materials Science & Nanotechnology/Advanced Functional Materials

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Potential Applications:

-Glucose sensors

-Biomolecule sensors

Related Publication:

Perovskite nickelates as bio-electronic interfaces

Nature Communications 10, Article number: 1651 (2019)

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Intellectual Property:

Provisional-Patent, 2018-12-19, United States | PCT-Patent, 2019-12-10, WO | NATL-Patent, 2021-06-08, United States | DIV-Gov. Funding, 2025-05-09, United States

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