Highly Sensitive and Stable Electrochemical Biosensors for Continuous Biomarker Monitoring

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Continuous detection and measurement of various biomarkers (e.g., nucleic acids, proteins, and small molecules) within biological fluids (e.g., blood and urine) in a sensitive, stable, and cost-effective manner plays a crucial role in health monitoring, disease diagnostics, and precise medicine.[1,2] Electrochemical sensor technology has attracted great interest as a potent way to fulfil this purpose, due to its portability, quantitative read-out, and ease of integration with circuits and microfluidic technologies.[3] However, most currently available electrochemical sensing platforms are limited by insufficient sensitivity, low stability, and/or interference by foreign species, which are significantly hindering their use as a viable bioanalytical tool for real-world applications. To tackle this critical problem, our group has developed different approaches for electrochemical sensors that enable unprecedented performance in terms of biomarker detection. These include nanocomposite-based coating, molecular probe design, and signal processing optimization.[4-7] Our studies have evolved this biosensing technology to provide performance improvement while simplifying processes, reducing costs, and shortening time. This will open avenues for the creation of more sensitive and durable real-time monitoring systems in the future, potentially enabling the revolution in medical diagnostics and point-of-care testing.

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