Nitric oxide (NO) detection biosensor in the parts per billion (ppb) level in breath, blood and other physiological fluids

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Technology description

Nitric Oxide (NO) is an important biomarker related to human health. The fraction of exhaled NO is a promising indicator of asthma; i.e., of inflammed airways, which is one sign of asthma. It also helps predict if steroid medications will be helpful to decrease inflammation. However, meaningful detection of NO in a physiological fluid, such as breath, blood, urine and others, needs to be in the very low concentration level, i.e. parts per billion (ppb), which is a benchmark that has been very difficult to achieve - until now. Dr. C.C. Liu and his team at Case Western Reserve University have recently developed a simple, very-low-cost, disposable electrochemical biosensor able to detect NO at ppb level in any physiological fluid. Preliminary testing has validated detection of NO in air. More importantly, this sensor can be made on a production scale to be fabricated uniformly and cost-effectively to yield highly reproducible results. The sensor includes a substrate with a working electrode formed on its surface, a counter electrode, also formed on the substrate surface, and a dielectric layer that covers a portion of the working electrode and counter electrode and which defines an opening to expose other portions of the working electrode and counter electrode. A polyelectrolyte film covers the exposed portions of the working electrode and counter electrode and includes at least one porphyrin compound to increase the rate of the electrochemical oxidation-reduction reaction that occurs with nitric oxide and provides the detection of nitric oxide at a lower oxidation potential. Discussions with commercial partners in exhaled breath and liquid gas analysis market sectors are underway. The NO biosensor is one of several types of sensors able to be produced from a platform technology that uses the similar concepts of various catalyst-coated substrate-based electrochemical sensors.

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