

New Methods of Fabrication for Biosensor Arrays

Methods to manufacture a sensor or sensor array system based on electrochemical detection

Researchers at Georgia Tech have developed methods to manufacture a sensor or sensor array system based on electrochemical detection. The system contains an array of microelectrodes created on a CMOS chip (complementary metal oxide semiconductor). On the surface, each microelectrode contains a capture biomolecule, which is linked to a polymeric layer through a multivalent metal complex or a covalent bond. The capture biomolecule is one half of a recognition binding pair; the other half is the target analyte to be detected, which is generally also a biomolecule. Advantages of this technology include the ability to manufacture the sensor in small sizes, the ability to mass-produce the sensor platform, the ability to combine sensors or sensor arrays and readout electronics on the same chip, and the adaptability to produce the sensors in an array format on a single chip for high-throughput applications.

Summary Bullets

- Low manufacturing and operating cost
- Compatible with multiple standard electrochemical techniques
- Can be used with CMOS detection chips with multiple chemical detection and/or actuation channels or sites

Solution Advantages

- Low manufacturing and operating cost
- Compatible with multiple standard electrochemical techniques
- Can be used with CMOS detection chips with multiple chemical detection and/or actuation channels or sites
- Includes a current source to support the electrochemical processes, temperature control, and software program for storing and evaluating the electrochemical signal produced by the biosensor-chip array.
- Portable sensor array system

Potential Commercial Applications

- Biosensors in disease diagnostics, monitoring gene expression in organisms, identification and speciation of pathogens, drugs, and contaminants
- Military and civilian security
- Environmental safety

- Genetic mapping
- Field applications

Background and More Information

Biosensors are systems capable of identifying a target biomolecule such as a polynucleotide, polypeptide, or other biomolecule of interest. Detection is typically based on specific interactions between molecules such as binding events between complementary binding pairs.

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Publications

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