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Technology Transfer Office

Colorado State University

Multi-Analyte Optical Biosensor

Within many medical, biological, and environmental fields, there is presently a need for optical biosensors capable of detecting small volumes of multiple analytes while possessing comparable sensitivity to conventional techniques. Although conventional optical sensoring techniques, such as surface Plasmon surface plasmon resonance (SPR) or enzyme linked immunosorbent assay (ELISA) enjoy high sensitivity, they either require well calibrated external equipment such as laser sources and photodetector arrays in the case of SPR or additional reagents including fluorescent tags in the case of ELISA. Additionally, applications may be restricted by the limited number of analytes that can be simultaneously detected using a single waveguide and their large inaccuracy when sensing ultra-small quantities.

Researchers in the College of Engineering at Colorado State University have developed a multi-analyte optical biosensor based on their novel LEAC design. The local, evanescent, array-coupled (LEAC) biosensor design detects the specific binding of target molecules through a perturbation of the localized evanescent field which permeates through the cladding of a planar, dielectric waveguide. The acronym, LEAC, is meant to evoke the notion of the bound target molecules controlling the amount of light "leaking" into each of the photodetector array elements. The mechanism of the LEAC sensor relies on the specific binding of an analyte target to one of several regions of immobilized biological probe molecules. Upon binding, the target molecule modifies the waveguide cross-section and thus the local evanescent field. A buried array of photodetector elements along the length of the waveguide, each opposite a region of a single type of probe molecule, can sense the modification in the evanescent field and thereby detects the binding event (see figure). Sensing of targets such as proteins, DNA, viruses and bacteria is possible with this device. Ultimately, the entire system can be integrated into a lab-on-a-chip environment structure using a single CMOS integrated circuit.

Prototype biosensors have been developed and tested. The results of which were so successful that this technology was featured on the cover of Lab-on-a-Chip, a prominent, peer-reviewed journal. Now that this innovative biosensor design has been experimentally verified with working prototypes, this technology is clearly ready for commercial development. Please contact us for more information regarding licensing and partnership opportunities!

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Patent Information
Multiple patents pending.

Inventor Information
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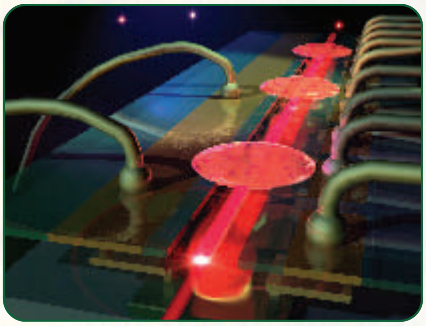
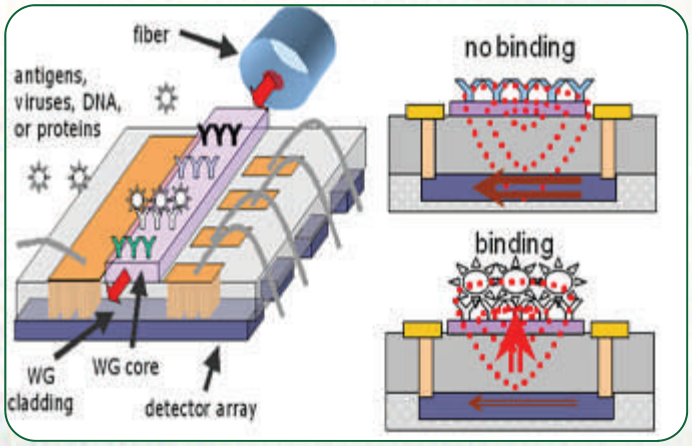
Related Technologies
09-093



Features and Benefits

- Biosensor design for direct, real-time detection of multiple analytes
- Target-induced perturbation of evanescent field detected by underlying photodetectors
- No tagging or labeling of analytes is required
- No external equipment is required for readout
- Compatability with CMOS electronics allows on-chip signal processing for improved sensitivity



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