SABIO - Specific Targeted Research Project

Ultrahigh sensitivity Slot-wAveguide BIOsensor on a highly integrated chip for simultaneous diagnosis of multiple diseases

Project Number: 026554

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Timeline
Start: 1 January 2006
End: 31 December 2008

Budget
Overall Cost: 3.667.920 €
EC Funding: 2.200.000 €

Project Partners

- UNIVERSIDAD POLITECNICA DE VALENCIA - E
- ROYAL INSTITUTE OF TECHNOLOGY – SE
- MULTITEL ASBL – B
- KHERION TECHNOLOGY LIMITED – UK
- INNSBRUCK MEDICAL UNIVERSITY – AT
- UNIVERSITE PARIS SUD XI – F
- FARFIELD SENSORS LTD. – UK
- BAYER (SCHWEIZ) AG, ZWEIGNIEDERLASSUNG WITTERSWIL – CH
- UNIVERSIDAD POLITECNICA DE MADRID - E

Vision & Aim

SABIO is a multidisciplinary project involving the emerging fields of micro-nano technology, photonics, fluidics and bio-chemistry, targeting to contribute to the development of intelligent diagnosis for the healthcare of the future. SABIO will address this objective through the demonstration of a compact polymer-based and silicon-based CMOS-compatible micro-nano system. It integrates optical biosensors for label-free biomolecular recognition based on a novel photonic structure named slot-waveguide with immobilised biomolecular receptors on its surface. This structure offers the possibility of confinement and guidance of light in a nanometer-size void channel enhancing the interaction between an optical probe and biomolecular complexes (antibody-antigen). A slot-waveguide interferometric biosensor is predicted to exhibit a surface concentration detection-limit lower than 1 pg/mm2. that is the state-of-the-art in label-free integrated optical biosensors, with additional advantages such as the possibility of multiplexed assay, which, together with reduced reaction volumes, leads to the ability to perform rapid multianalyte sensing tests, offering further advantageous possibility of quantitatively assaying several parameters simultaneously (e.g. several cancer-associated antigens in one sample or several diseases antigens). Consequently, statistical analysis of these results can potentially increase the reliability of a diagnostic over single-parameter assays. In addition, SABIO has the potential to be fast and easy to use, making routine screening of diseases more cost-effective. The ultimate targeted by SABIO is demonstrating the fast diagnostics 'outside' of laboratory settings (eg. at 'point of care', in such as General Practitioner's surgery, in the field or in urgent situations). A final demonstrator consisting of a packaged biochip will be used on clinical samples in order to detect important diseases such as hepatitis B, CMV and liver cancer.

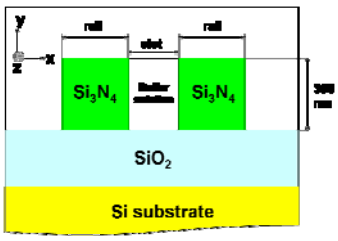

Fig.1. Schematic cross section of a slot-waveguide

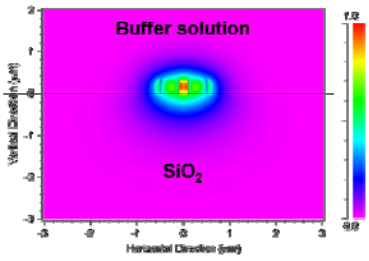

Fig.2. Optical field distribution in the slot-waveguide

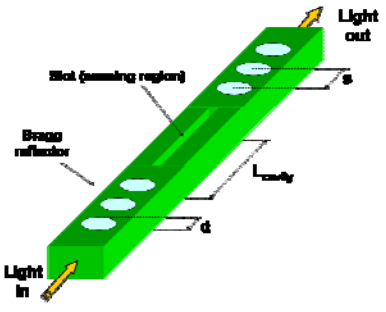

Fig.3. Optical microcavity biosensor based on a slot-waveguide