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BioTray
Microtechnology for Life Science
& Chemistry Applications

HORIBA JOBIN YVON

KDS Radeberger
Präzisions-Formen- und Werkzeugzeug-GmbH



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multidisciplinary
Collaborative Project
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A consortium of 9
partners from 4 EU
member states:

- 4 universities
- 1 research institute
- 4 industrial partners

working in a variety of
fields ranging from
physics and chemistry to
biology and medicine.

**Bloch electromagnetic
surface wave biosensors
for early cancer diagnosis**

Budget: €4.73 million
including €3.60 million
from the European
Commission

Duration 36 months
(Oct 2012- Sept 2015)



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Objective

BILOBA aims to develop and pre-clinically validate a multi-functional point-of-care platform capable of performing real-time cancer biomarker detection in a tandem configuration. The unique properties of Bloch surface waves (BSW) sustained at the surface of 1D photonic crystals (1DPC) will be advantageously implemented. Therein, a surface wave without absorption is excited, giving rise to an enormous increase of sensitivity with respect to surface perturbations. Furthermore, fluorescence enhancement due to near field effects will be exploited. By engineering the BSW dispersion both detection schemes will be combined.

Approach

1. BSW Biochips

Disposable biochips, where a dielectric 1DPC is integrated on top of a plastic slide with micro-optical elements, are the core of the sensing platform.

2. Reading device

An optical system capable of detecting fluorescent labels as well as performing label-free analysis will be designed and implemented hand-in-hand with the BSW biochips

development. All components will be integrated into one platform comprising appropriate software and interfaces.

3. Bioreceptors

High molecular selectivity will be reached by immobilizing on the biochips surface specific probe bioreceptors that will selectively catch the target cancer biomarkers to be detected.

4. Microfluidics

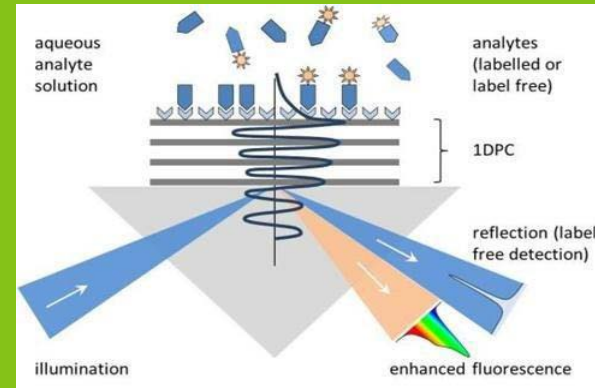
The development of a sophisticated, robust fluidic system to ensure a high signal to noise ratio even in the case of lowest analyte concentrations accompanies the work.

5. Validation

The results will be applied to early cancer biomarker analysis by validating the project's results in pre-clinical tests.

Expected impact

- The BILOBA platform represents a breakthrough in ultra-sensitive photonic systems for non invasive and point of care early diagnosis of cancer.
- BILOBA can potentially outperform conventional approaches and set a new standard for early recognition of malignancies.
- The increased performance of the BSW biochips will have a tremendous impact on the medical community, allowing cancer diagnosis at a very early stage with consequent increase of quality of life for the patients, increase of lifetime, and decrease of treatment costs.



Application

The target application is the detection of Angiopoietin-1, Angiopoietin-2 and Vascular Endothelial Growth Factor (VEGF-A) with these proteins being indicative of angiogenesis associated to human cancer progression.

Such markers have already been studied by some of the proponents both from the medical point of view and from the sensing application point of view. In particular at a medical level, the proponents have set up preclinical and clinical strategies to correlate disease progression and disease-free survival with molecular and biological markers of angiogenesis.

Consortium

- **Università di Roma "La Sapienza"**, Department of Basic and Applied Sciences for Engineering - Italy
- **Politecnico di Torino**, Department of Applied Sciences and Technology - Italy
- **Fraunhofer** Institute for Applied Optics and Precision Engineering IOF (Jena) and Institute for Material and Beam Technology IWS (Dresden) – Germany
- **Imperial College of London**, Department of Materials - United Kingdom
- **Università di Torino**, Department of Oncology - Italy
- **LABOR Srl** - Italy
- **Biotray SAS** - France
- **HORIBA Jobin Yvon SAS** - France
- **KDS Radeberg GmbH** - Germany