CENTRO DE ASTROBIOLOGÍA

PBSA

Biophotonic detectors to the space

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Partners in the PBSA Project

Summary

One of the biggest challenges of Astrobiology is the search for clear signs of present or past life on other planetary bodies.
The Project PBSA is targeting the development and qualification of an integrated Lab-on-a-Chip system that facilitates the search for traces of life in space exploration missions.

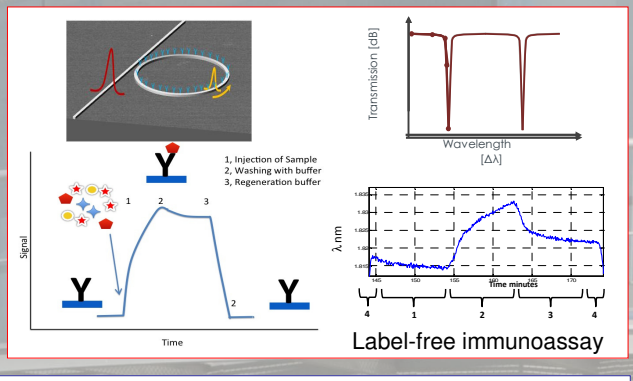
Resumen

Uno de los mayores retos de la Astrobiología es la búsqueda de señales claras de vida presente o pasada en otros cuerpos planetarios.
El proyecto PBSA tiene como objetivo el desarrollo y verificación de un sistema integrado de chip de laboratorio que facilite la búsqueda de rastros de vida en misiones de exploración espacial.

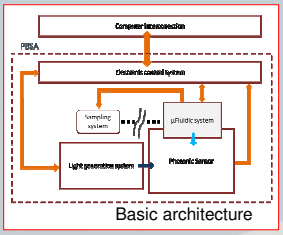
PBSA (Photonic Biosensor for Space Application, www.pbsa-fp7.eu) is founded by the Directorate-General for Enterprise and Industry (DG ENTR) within the European Commission and managed by the Unit S2 (Space Research) of the Research European Agency (REA).

THE AIM

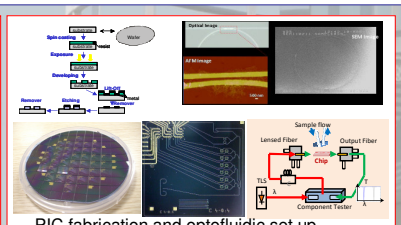
Advanced terrestrial technologies in the field of biosensors are combined for the development of a novel solution ready and tested for the space environment. The biosensing approach employs recent advances in the space developed biochemistry related to immunoassays with two main novel technologies, photonic integrated circuits (PICs) and microfluidics, with promising features for the space domain.



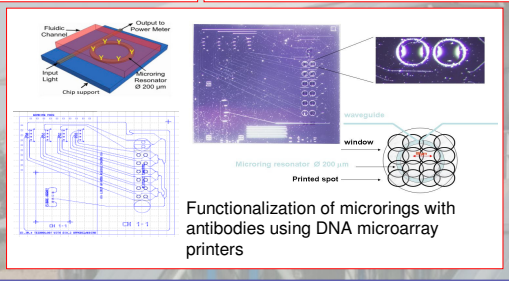
Label-free immunoassay



Basic architecture



PIC fabrication and optofluidic set up



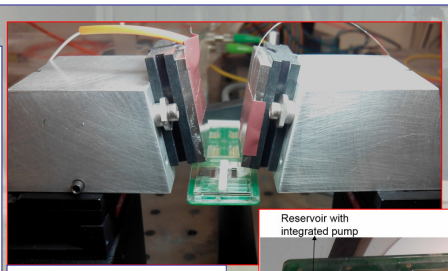
Functionalization of microrings with antibodies using DNA microarray printers

GOALS

- Transfer of advanced terrestrial technologies to the space domain: nanophotonic & microfluidics
- Improve space sensing capabilities with photonic solutions
- Develop a nanophotonic array of sensors capable to operate in space environment (radiation, temperature, vibration).
- Integrate a complete stand-alone sensor system ready for space application
- Validate these technologies in space environmental conditions

TECHNOLOGICAL APPROACH

- Antibody Microarray Assay. Underlying immunoassay technique for detection of molecular biomarkers and biomonitoring
- Photonics Technology. Transduction system from chemical binding to optical signal as label-free detection system.
- Microfluidic technology. Miniaturization of wet-chemistry systems in lab-on-a-chip
- Electro-optical system. Read out, communication and control system



Evaluation methodology: Bio / Photonic / Fluidic integration

Cartridge design for microfluidics