PROJECT DETAILS

PROJECT REFERENCE:

644669

START/END:

Gen 2015-Dic 2017

TOTAL COST:

EUR 4.068.781

EUCONTRIBUTION:

EUR 4.068.781

PROGRAMME ACRONYM:

H2020-ICT-2014-1

SUBPROGRAMMEAREA:

ICT-26-2014 Photonics KET

CONTRACT TYPE:

Research and Innovation Actions

CONSORTIUM

PROTOLAB

CLIVET

CATLAB

METROHM APPLIKON

UPPSALA UNIVERSITY

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PHOTONICS PUBLIC PRIVATE PARTNERSHIP

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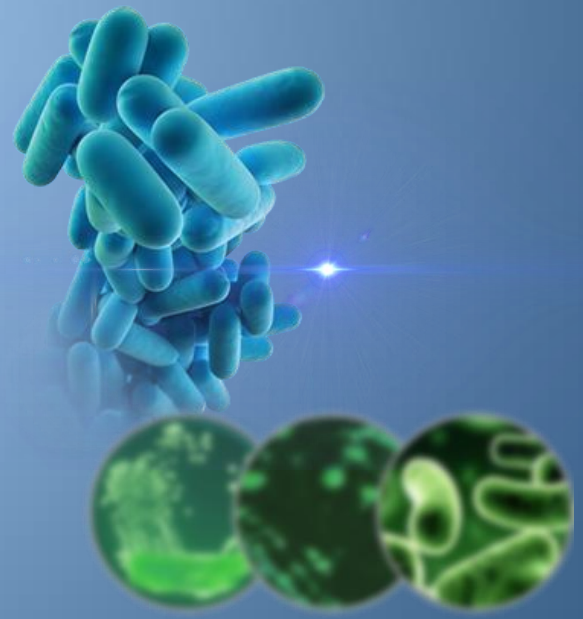
HORIZON 2020

Results incorporated in this standard received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 644669.

POSEIDON

PHOTONICS AGAINST LEGIONELLA

A new generation sensor to face a significant Health and Safety Societal challenge



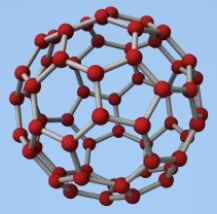
HORIZON 2020

OBJECTIVES

The objective of the POSEIDON project is to develop a SPR-based biosensing platform for the detection of L. pneumophila bacteria, with high sensitivity and high specificity, translating the results obtained as experimental proof of concept into an operating automated prototype usable in industrially relevant settings and by untrained personnel.
The following challenges will be pursued throughout the development of the project.

- **High sensitivity** and **low detection limit**
- **Selectivity** towards target pathogen detection in order to avoid both false-positive and false-negative results
- **Short analysis times**
- **Ease of use**, possibility of on-site monitoring and automation of the sample manipulation and detection procedure.
- **Efficient delivery** of the bacteria: cells should remain intact throughout the whole fluid transportation system in the device, and should not adhere to the fluidic piping and microfluidic channels, so that virtually all of the bacteria cells in the sample are delivered to the sensing unit.

The **size** of the device should allow samples to be analyzed at the point of need rather than in a separate laboratory, allowing **reduction of cost** per single measurement and increase in throughput.



INNOVATION

The POSEIDON project adopts a **multidisciplinary approach** involving key enabling technologies (**KET**) in **photonics**, aiming at the exploitation of the **Surface Plasmon Resonance (SPR**) phenomenon to develop a fully automated platform for **fast optical detection** of *L. pneumophila* pathogens.

SPR sensors provide an extremely sensitive and versatile tool for miniaturized label-free sensing platforms integrated into lab-on-chip systems for potential applications in environmental monitoring, biotechnology, medical diagnostics, drug screening, food safety and security.
Detection and investigation of viruses, bacteria and eukaryotic cells is nowadays becoming a rapidly growing field in SPR biosensing, but the detection was only achieved in laboratory settings. In this project an innovative sensing device architecture will be used to create a platform to yield reliable measurement readouts of legionella bacterial cells that would be driven and entrapped on a custom sensing surface specifically designed with opportune positive and negative controls.

The detection platform will be implemented as a **prototype** in which water and air samples are sequentially concentrated, injected into a **microfluidic system**, and delivered to the SPR sensor for analysis. The system will be designed to allow for its future integration in water distribution and **HVAC** (heating, ventilation and air conditioning) for prevention of L. pneumophila outbreaks.

APPLICATION

The POSEIDON project involves the exploitation of new concepts and approaches in materials and process integration which can open the way to new applications in physics and materials science.
SPR sensors provide an extremely sensitive and versatile tool for miniaturized label-free sensing platforms integrated into lab-on-chip systems for potential applications inenvironmental monitoring, biotechnology, medical diagnostics, drug screening, food safety and security.

The integration of nanotechnologies and materials into smart microsystems will deliver affordable high performances for uses in health and security, thus responding to the need of Europe for better exploitation of the large enabling potential of photonics not only in different industrial sectors, but also in the problem solving concerning major societal challenges.

Concerning photonics and solutions for industrial applications with a strong societal impact, legionella monitoring will be easier, faster, more specific and will ensure an increase in the frequency of monitoring in sanitary structures, or other structures at high contamination risks.
Accessibility of the technology and its use by untrained personnel will ensure **high diffusion**, impacting on health and environmental issues.
The definition of guidelines and the consequent standardization activities will promote the**exploitation of the monitoring/sanification system for new HVAC plants and the retrofitting of existing ones**. Industrial validation activities, performed on a prototype for **hospital applications**, must be standardized to make them adaptable to other types of **air conditioning systems** for high crowding buildings (i.e. shopping centers, hotels, restaurants, cinemas, production areas and offices).