Cyprus Research and innovation Center Ltd, Cyprus www.cyric.eu

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AUG Signals Hellas, Greece www.augsignals.gr

VIGO System S.A., Poland www.vigo.com.pl

IREN S.p.A., Italy www.gruppoiren.it

PHOTONICS PUBLIC PRIVATE PARTNERSHIP

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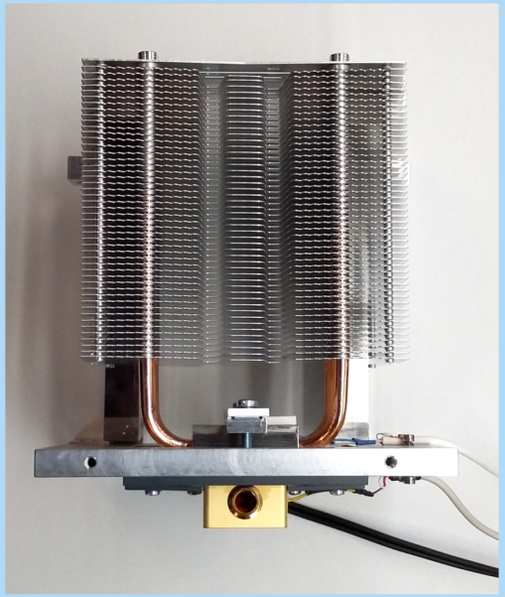
WATERSPY

High sensitivity, portable photonic device for thorough water quality analysis

www.WaterSpy.eu

What is WaterSpy?

WaterSpy is a device for pervasive and on-line monitoring of tap water.
For many contaminants, which will lead to human health hazards, good measurement devices are available. For bacterial contamination the situation is worse. Water utilities, public authorities and regulators rely heavily on trustable and fast water analysis. Especially *E. coli*, *Salmonella* and *P. aeruginosa* are of interest for human health. Currently time-consuming and expensive laboratory analysis have to be performed. WaterSpy focuses on these three strains of bacteria and develops an add on device for currently available quality monitoring platforms. The device will be able to perform automated and fast quality analysis for bacterial contaminants in water.
Challenges of the project are to meet the legal requirements for the concentration of contaminants, given in the EU directives on water quality. Due to the very low acceptable concentration of contaminants, the sensitivity of the device has to be very high to catch up with current laboratory analysis.



Laser and heatsink (FAU)

Approach and Objectives

- Key Strategic Objectives:
  - Develop compact photonics technology, capable of identifying selected heterotrophic bacterial cells in the water. Specificity and sensitivity levels will respect regulatory requirements.
  - Validate the technology's cost-effectiveness and suitability for large area coverage.

- WaterSpy develops water quality analysis photonics technology suitable for inline field measurements operating in the mid-infrared region (6-10 µm).

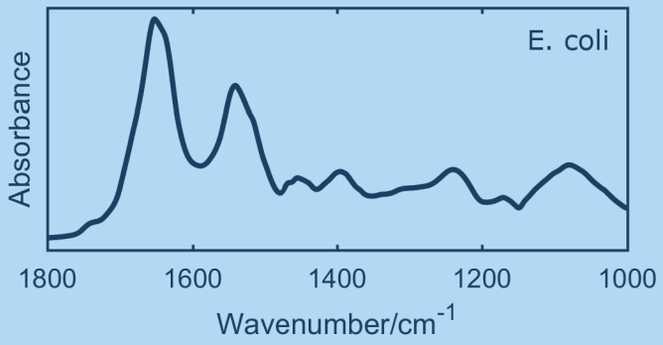
- The solution is based on the combined use of advanced Quantum Cascade Lasers employing the Vernier effect and fast and sensitive Higher Operation Temperature (HOT) photodetectors.

- Targeted analytes will be specific heterotrophic bacterial cells. Several novel techniques are employed for increasing Signal-to-Noise Ratio.

- The device will require a couple of hours for a complete sample analysis. With currently used systems, the same analysis could take up to 3 days.

- The WaterSpy technology will be integrated, for validation purposes, to a water quality monitoring platform, in the form of a portable device add-on.

- Towards the end of the project, the WaterSpy device will be tested at two pilot sites:
  - The Prato water treatment plant, which serves the city of Genova (approx. 580000 inhabitants).
  - The entry point of the Genova water distribution network.



State and Achieved Goals

- For increasing sensitivity, a pre-incubation stage has been developed.

- An optical test setup using an ATR-cell (attenuated total reflection) has been prepared and first measurements are promising.

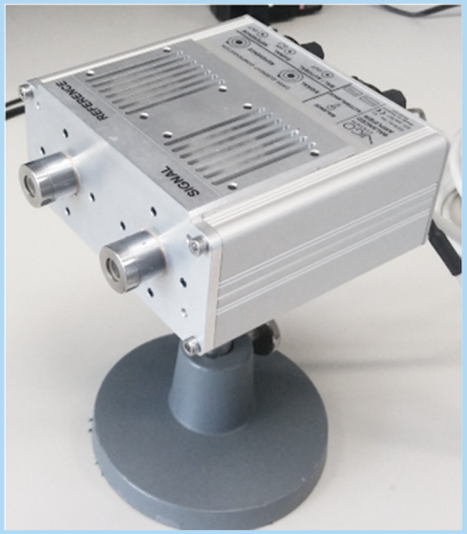
- Improvements of the applied spectroscopic method will result in a higher sensitivity.

- A highly integrated balanced detector for increasing sensitivity has been developed.

- Biochemical concepts have been tested and automated technical processes were developed.

- Detailed concepts on the mechanics and fluidics were developed.

- A first prototype will be set up at a TUW laboratory and all WaterSpy components and subsystems will be tested in the overall system.



Balanced photodetector by VIGO