Demo Case Update
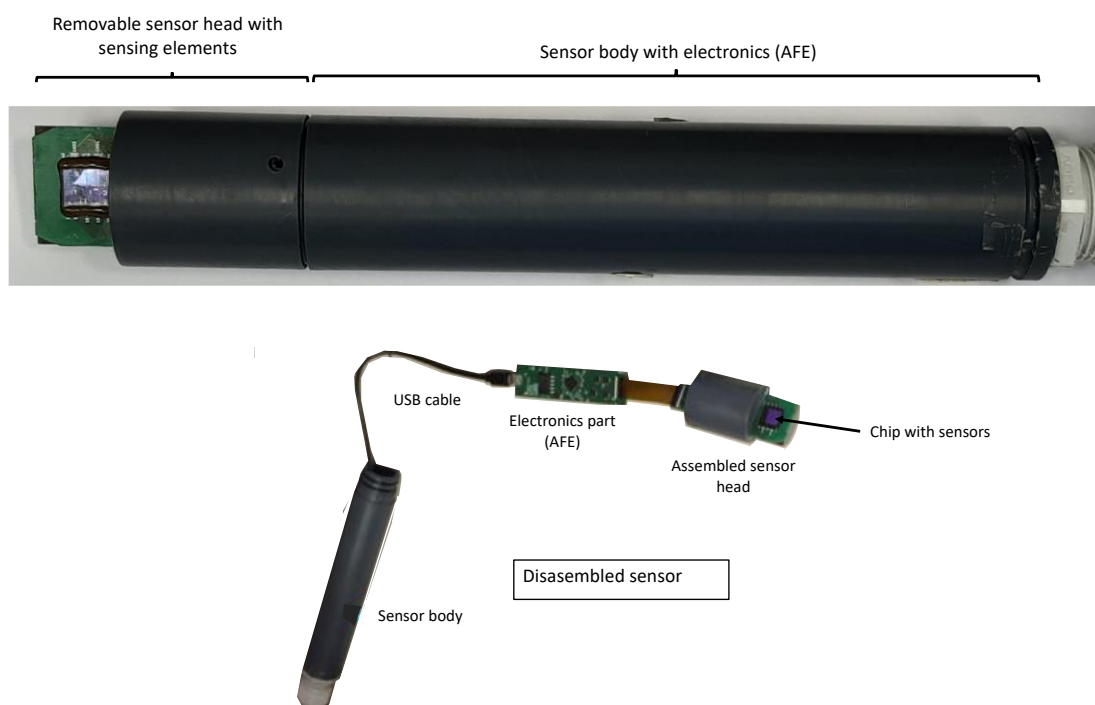## From CNRS – National Centre for Scientific Research, France
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A joint research team gathering 3 research centres in France (CNRS, Ecole Polytechnique, and Université Gustave Eiffel) is working on the development of smart application and devices and test their adaptation to water operator through the demo case 2 (city of Cannes, France). The NACRE team (acronym stands for « **Na**nosensors for **C**ities **R**espectful towards the **E**nvironment ») is working on the design of a specific probe in order to better assess the quality of water in distribution networks. Prototypes of advanced NANOSensors are now ready to be tested.

Designing NANOSensors probes with many parameters

The challenge is to better assess water quality through the on-line measurement of, at least, conductivity, temperature, pH and chlorine.

The NANOSensor is a multi-parameter probe that uses carbon-nanotubes to measure water parameters (hydraulic and quality).

Removable sensor head with sensing elements | Sensor body with electronics (AFE)

USB cable
Electronics part (AFE)
Assembled sensor head
Chip with sensors
Sensor body
Disasembled sensor

First advantage of this technology is to be able to equip each probe according to the customer's request (versatility of the technology), another advantage is a significant decrease in the NanoSensors' cost compared to the multi-parameter sensors sold today.

Ensuring long-term performance of NANOSensors

"As a follow up on our primary investigations on the ageing of the multi-parameter nanosensor probe, we have confirmed in the last months that the deposition of a porous membrane on top of the active material of the sensor acts as a protective layer and drastically improves the lifetime of the sensor."
Dr Gaël ZUCCHI, HDR, Institut Polytechnique de Paris, Laboratory of Interfaces and Thin Layers

Frist prototype ready to be tested

To evaluate the performance of NANOSensors, a 12-months test period on the TZW bench (FIWARE4WATER partner) is planned in order to check their resistance (long term performance) and their reliability (through their sensitivity) under conditions as close as possible of a real drinking water distribution network.

*"In order to provide our TZW partner sensors to be tested in a realistic environment, a whole sensor prototype has been designed. The general physical aspect is a 19 cm-long PVC tube with a 3.5 cm diameter which can be fitted into a drink water loop. It is made of two main parts, the sensor head, that comprises the sensing part and which is easily removable, and the electronics part (Analogic Front End, AFE). Work is currently underway to integrate into the AFE core components, such as a PSOC (**P**rogrammable **S**ystem **o**n **C**hip) component coupled with several multiplexers to manage the large numbers of sensors in the chip. The role of the AFE is to separately control the sensors and read raw data from them. In addition, a graphical interface for facilitating data acquisition and easily visualizing data for users is being developed."*
Dr Gaël ZUCCHI, HDR, Institut Polytechnique de Paris, Laboratory of Interfaces and Thin Layers

Linking smart water and smart city

NANOSensors will then be tested in real conditions in the drinking water distribution network of Cannes (FIWARE4WATER demo case 2).
If tests are conclusives, it will be possible to use NACRE NANOSensors not only for Cannes drinking-water distribution network, but hopefully for many other cities. Especially, they will allow to detect abnormal water quality events and react in consequence.

Author: CNRS/ Ecole Polytechnique de Paris.

Project Consortium