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Spectrophotometric monitoring system for continuous heavy metal detection in water environment

*Original*

Spectrophotometric monitoring system for continuous heavy metal detection in water environment / Catania, Felice. - (2020 Feb 12), pp. 1-190.

*Availability:*

This version is available at: 11583/2809315 since: 2020-04-07T08:38:13Z

*Publisher:*

Politecnico di Torino

*Published*

DOI:

*Terms of use:*

Altro tipo di accesso

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# Summary

Water environmental monitoring is an important key to control and take care of human life and environment health. Water quality influences fluvial and marine wildlife, but also the neighbouring environment as well. It is necessary that water monitoring instruments become within the reach of local authorities and control units, in order to increase the amount of data available on water pollution and facilitate sharing. The pre analytical phase, sample collection, transport and preservation, has a not inconsiderable impact on the total uncertainty of the result of the analysis. It should also be considered that, the set of procedures and operations that occur between the time the sample is taken, and the performance of an analysis is one of the most delicate phases of the entire analytical procedure. The analytical results, in fact, must make it possible to establish the characteristics of the analyzed matrix in the conditions in which it occurs at the moment in which the sample is taken.

The answer will be an instrument, designed with lab on chip concept, with a modular structure. The device innovation relies on total automation of the analysis, from the sampling to production of results, in particular automatic filtration, dilution, concentration and preparation of the sample previous the measurement. Precision, reliability, fastness, robustness. The innovation regards also the reduced volumes of sample and reagents, low cost technology, high versatility, in terms of cost and technology. The system, which is the object of my project, will be able to completely automate the sample preparation phase and, using the lab on chip technology, greatly minimize the time and cost of sample preparation.

A microfluidic system, consist of glass syringes, micro pumps, and degassing system, allows to acquire the necessary quantity of water sample, filtering the sample through cascade of filters, up to nanoporosity possibly dilute or concentrate the sample, mix with any reagents.

Moreover, the implementation of this miniaturized laboratory on board of an Autonomous Underwater Vehicle, for marine water monitoring in the vicinity of oil and gas platform will be discussed.