

Draft Project Title	Remote Station for Water Contaminants Monitoring and Recovery
Short Description of the project idea and expected outcomes	<p>The idea of this project is the implementation of a multifunction remote platform that will allow the monitoring of water contaminants in order to assess water quality and safety and their recovery for future re-use in industry and/or agriculture. The remote station will be composed by several modules (sample processing module, monitoring and recovery systems, read-out platform and control units, data storage and transmission modules) since the capture of the water sample until the sending of the information to an information central point. The monitoring of this contaminants by several distributed stations and its integration with the recovery systems, in an automated system, will allow the compilation and consolidation of demonstrative information and it's used as support for decision making for European water bodies strategy concerning water safety and quality and the economic viability of specific water bodies. Also, this information can be used for the elaboration of new strategies for water bodies' management and development of novel forecasting and early warning methodologies.</p>
Main Objectives	<p>The main goal of the project is to provide the management authorities and industry that relies on water resources with multifunctional remote monitoring systems to be used in water quality assessment and the recovery of valuable contaminants for their use in agriculture or industries. The monitoring of these contaminants will foremost improve the quality and safety of the water bodies by providing real-time early warning systems, which will allow to speed up the decision tree in order to prevent and mitigate their impact in environment, industry, agriculture and human health. Moreover, the monitoring of the contaminants will allow the establishment of a first-hand network of information that will accelerate the decision support needed for management of water resources, The multifunction platform will also be able to selectively concentrate and capture the dissolved or dispersed water contaminants for analysis and in order to be further used by industry or agriculture (as fertilizers, standards, etc). In this way, the impact of the monitoring programs could be greatly diminished creating a market oriented application and promoting the implementation of circular economy to water management.</p>
Specific Objectives	<p>Production and validation of a multifunction portable platform for a) the detection of water contaminants and their producers, based on tailor-made electrochemical sensors and b) the capture and concentration of the contaminants to be further use as standards.</p> <p>Synthesis and implementation of new nanoporous materials (e.g. Covalent Organic Frameworks and Molecular Imprinted Polymers) for the adsorption of water contaminants in order to be used as new tools for contaminants concentration and separation in order to perform a) in situ environmental water monitoring; b) recovery of the valuable contaminants.</p> <p>Integration of the developed monitoring and recovery tools in automated systems that will allow to increase the frequency in the analysis due to their operator independence, minimizing the time of response to mitigate the impact of spills, harmful algal blooms or unexpected discharges d and supporting the decision making for European water bodies strategy, regarding water contaminant monitoring and also economic viability of specific water bodies.</p> <p>Transfer of technology to stakeholders; the multifunctional platform(s) for water contaminants monitoring and recovery will be transferred to entities that develop several activities in the water space such as industry as well as reference institutions for the control and safety of water resources.</p> <p>Evaluation of physical and chemical parameters changes that could be influenced by climate change or human activities and its impact in the water contaminants emergence. Study and prediction of these events.</p> <p>Elaboration of new strategies for water bodies management and development of novel forecasting and early warning methodologies.</p>
List of potential activities	

Activity 1. Coordination and management: The overall aim of this activity is to ensure effective management of the project in compliance with the EC Grant Agreement and Consortium Agreement, using best practice project-management tools. The coordinator will be responsible for the scientific coordination of the project and monitoring scientific excellence (covered under the RTD work packages), as well as the financial and administrative tasks associated with the distribution of the grant.

Activity 2. Sample processing module: The sample treatment module will be used to clean the sample and remove the compounds that could interfere with the further analysis. The module should be composed by a filtering system; a mixture module could also be necessary in order to mix some reagents with the sample to release the targets compound from cells. This subsystem should be integrated and (semi)automated and based on microfluidic devices that can be coupled with the other subsystems. The concentration of analytes it will likely be necessary in order to concentrate the contaminant compounds to obtain the required sensitivity. This subsystem will contain a nanomaterial based on organic frameworks and on imprinted polymers, with the ability to capture the contaminants and concentrate them. This module should be integrated in a (semi)automated system that can be coupled with the other subsystems.

Activity 3. Sensing system. An electrochemical-based transducer system will be designed and fabricated by micro- and nano-fabrication technologies. The design and architecture of the electrochemical cells can be arranged, taking into account the number and type of molecules to be analyzed, complying a fully customized solution. The recognition elements for selective and sensitive screening of specific targets will be chosen in order to obtain the higher sensitivity and affordability of the detection system.

Activity 4. Recovery module: A module for the high efficient and selective concentration of the contaminants to be recovered will be engineered and fabricated. The system will be based on the immobilization of the nanomaterials in porous supports included in plastic cartridges coupled to an active pumping system. This system will be only active when the monitoring system detects the presence of significant levels of the contaminant in order to save energy in the active pumping system.

Activity 5. Integration of the all the sub-systems: Sample pre-treatment and processing, detection, recovery, remote datalogger, and all the control units will be assembled into a single automated portable platform. The whole system will be controlled from a specific firmware that will allow the automatic analyze of the obtained data for simple results output and the restoration of the water contaminants.

Activity 6. Data transmission and analysis: Design and development of the communications system that will allow the robust and efficient transmission of the information of the sensing system in the field through the Internet for its storage and processing in remote server. Standard radio technologies with wide area communications (GPRS/3G, etc.) and radio technologies (GSM, etc.) will be used. The communication protocols and standards used for data exchange with the datalogger will also be established. The station will be optimized for remote and real-time operation, being self-sufficient in terms of power and telecommunications.

Activity 7. Validation: Validation tests of sensing system against existing standard monitoring systems will be performed. Measurement tests of the specific response of each nanosensor (sensitivity) and response to mixtures of different target contaminants that could affect the detection. The station will also be tested in operation in the field.

Activity 8. Data integration on water management systems. The data obtained from the monitoring of the contaminants at the in situ stations will be collected and compiled at a central station for further integration in firmware to be used to help decision making.

Activity 9. Exploitation and transference: This activity includes the detailed development and fulfilling of the exploitation and dissemination strategy. Main objectives are: to define appropriate measures for managing of project results, including management of Intellectual Property, to define and yearly update a Plan for Use and Dissemination of Foreground; to develop an IPR tracking tool to effectively support the IPR management; to define appropriate measures for managing dissemination of project results, to identify adequate dissemination channels for disseminating project results; to develop a market analysis and business model; to link the project with other R&D initiatives.

The consortium of this project will cover several EU member states cross-linking existing European research networks. The collaboration between these countries will contribute to the technological and economic development of the EU, and the creation of strong links between these top-level research and industrial institutions. The proposed solution will be developed by a multidisciplinary consortium with complementary backgrounds ranging from biology, physics, engineering and environmental science. This multidisciplinary fusion has the potential to work as a key accelerator for novel and ground-breaking scientific development. Sectoral and cross-sectoral cooperation will be enhanced by building on major national, regional and international association; as well as the RTD performers and innovative companies involved in the Consortium will work to increase European KETs further. This project will impact on the development, and exploitability of its methods. The project proposed aims at improving understanding of several maritime activities, technologies and services and help boosting the blue economy by accelerating its potential through RTD&I. It supports the Blue Growth long term strategy by proposing a solution that may be applied to address specific and increasing problems in the oceans, seas and coasts within sectors with high potential for sustainable jobs and growth, such as: aquaculture and marine biotechnology, as well as produce spillovers in other sectors highlighted in the blue growth strategy, namely coastal tourism, ocean energy and seabed mining.

This project will support sustainably exploring the diversity of marine life by testing the sustainable operability of co-located maritime activities, addressing health and safety issues associated with the multi-use of marine platforms and by studying the environmental and economic viability as well as the societal acceptance by the local communities. In this sense, it proposes to support the European Union's ambitious Marine Strategy Framework Directive main goal of achieving the Good Environmental Status (GES) of EU marine waters by 2020, allowing a real time assessment of GES qualitative descriptors (Descriptor 8 and Descriptor 9) and playing a role by preserving ecosystems' physical and chemical conditions.

Additionally, the project will extensively contribute to the development and implementation of new water bodies observation technologies/systems improving the predictive capacity of the state of the water bodies' environment. This requires new technologies and the systematic collection of water bodies' observations recorded remotely using Earth Observation satellites and in situ stations. The solution will allow bringing together pan-European data from different sources, improving the understanding of how seas and coastal ecosystems behave with the aim of helping industry, public authorities and researchers find the data and make more effective use of them to develop new products and services. In this view it may be able to support the Marine Knowledge 2020 policy contributing to the optimization of European programmes on sea observation and feeding with data initiatives such as the European Marine Observation and Data Network (EMODNET).

Beyond the Blue growth and the Marine data and knowledge cross-cutting policies it is worth mentioning other integrated maritime policies that might be supported by this project: the Integrated Maritime Surveillance, which is about providing authorities active in maritime surveillance with ways to exchange information and data; and the sea basin regional strategies, aiming at revitalizing the marine and maritime economy in the Atlantic.

Call identifier	BG-04-2017 / BG-07-2017 / LIFE Programme 2017
Full topic	BG-04-2017 (Multi-use of the oceans marine space, offshore and near-shore: Enabling technologies); BG-07-2017 (Blue green innovation for clean coasts and seas); LIFE (LIFE projects support the management of water resources in the EU and the implementation of water policy, notably the EU Water Framework Directive, by addressing a wide range of issues including river basin management, water scarcity, water/ wastewater management (households and industry) and improving groundwater quality.)
Type of action (RIA, CSA, etc.)	BG-04-2017 and BG-07-2017 (Innovation actions-IA); LIFE (Action Grants)
	I will be the project leader/coordinator

Which kind of partner are you searching for?	Research Institute/University SME Industry Public institution
Expertise or specific role of partners sought	Technological partners – for the improvement of technology describe in activities 2,3 e 4 SME and Industry – for the exploitation of the sensing system and recovery module Regulatory authorities – for the implementation of the system and validation process
Partners sought from specific country or region, please indicate	France, United Kingdom, Ireland, Belgium, Netherlands, Sweden, Greece, Italy, Denmark
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Organisation	INL
Description of the organisation	The International Iberian Nanotechnology Laboratory (INL) is the first International Intergovernmental Organisation (IGO) in Europe focused on Nanosciences and Nanotechnology and it counts on Spain and Portugal as member states. INL is devoted to the development of nanotechnologies in ICT, health, energy, food and environment area. INL is a science and innovation organisation translating knowledge into societal and economic benefit through the exploration, deployment and articulation of nanotechnology. INL provides a better understand of nanotechnology to the societal stakeholders, thereby fostering the need for deployment of nanotechnology and increasing the possibility for radical innovations and everyday-life benefits enabled by nanotechnology.