

SMARTECOPONICS

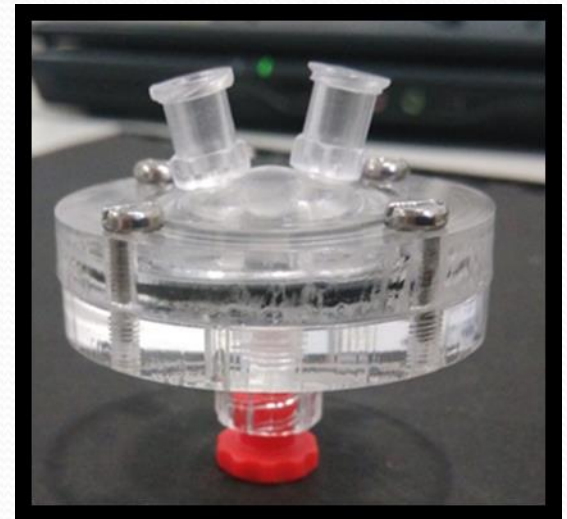


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Water JPI
WaterWorks2015 Cofunded Call
6 April 2017, Stockholm

MOTIVATION

Aquaponics combines hydroponics and recirculating aquaculture elements

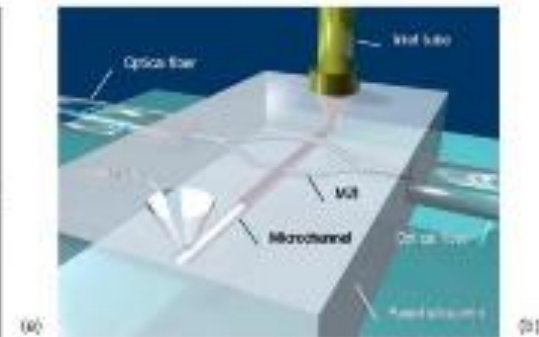
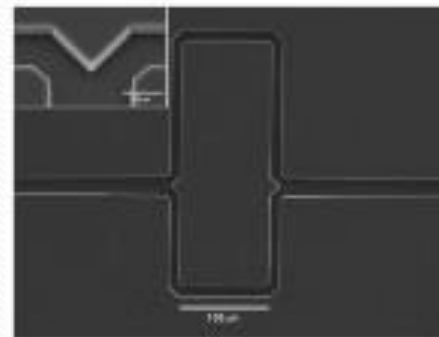
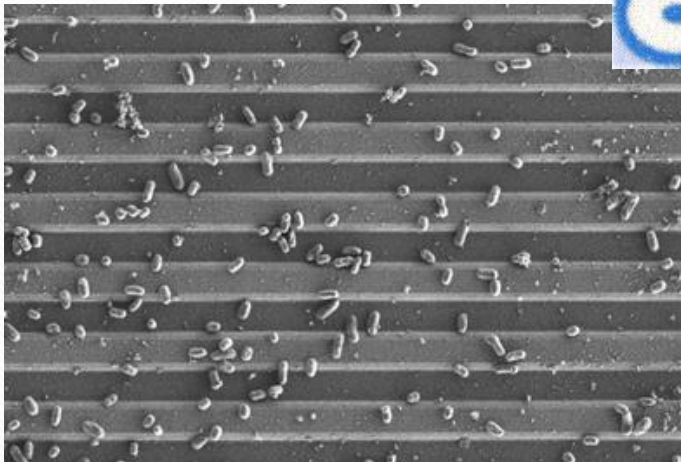


ON-SITE MICROBIAL SENSING FOR MINIMISING ENVIRONMENTAL RISKS FROM **AQUAPONICS** TO HUMAN HEALTH

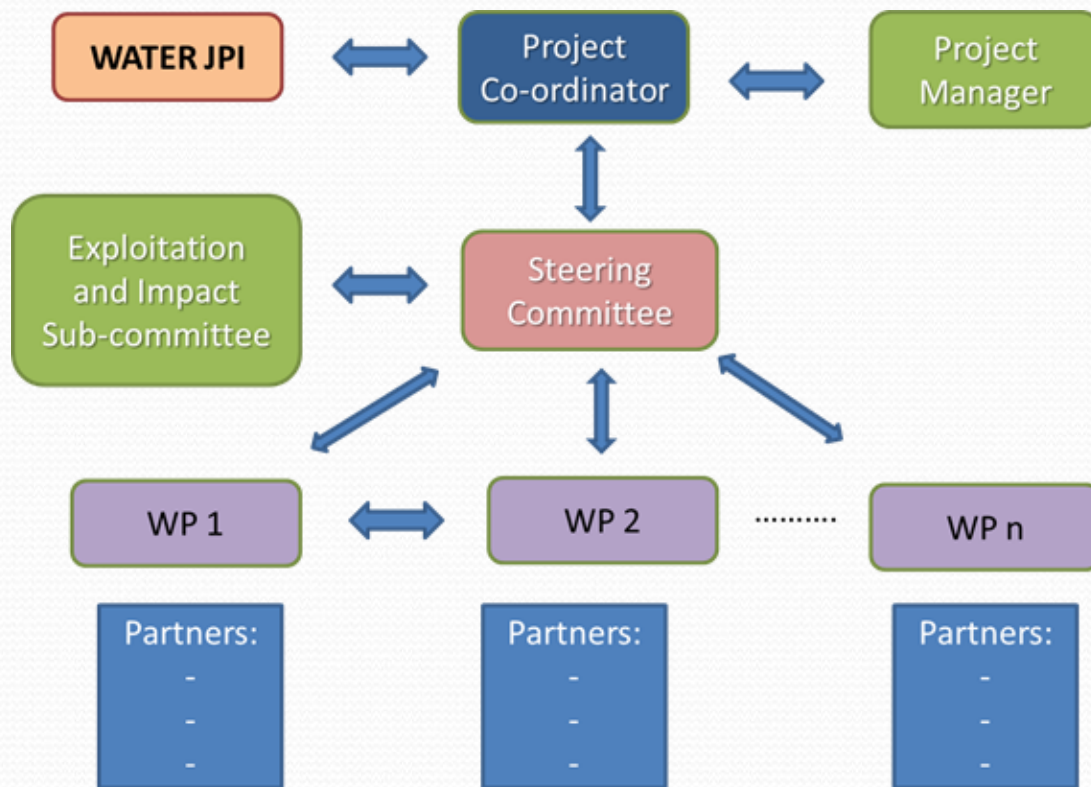
OBJECTIVES

- Determine how the presence of **selected microbial hazards** (biofilms, coliforms and cyanobacteria) can affect the food security to human health: environmental requirements for bacterial contamination.
- Design **microbial sensing devices** to monitor the toxic activity from selected pathogenic micro-organisms.
- Develop a whole **eco-friendly disinfection system** compatible with microbial community in aquaculture
- Design a **smart system** for on-site monitoring and actuation on the active cycle of water surrounding the disinfection zone.
- Demonstration of improvements in **sustainable aquaponics production**: reduction of water make-up consumption.

CONSORTIUM DESCRIPTION



WPI. Project Management/Coordination



Overall management structure of the project

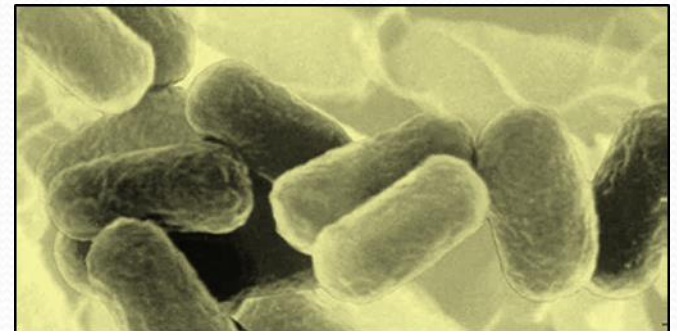
WP2. Specifications of microbial monitoring systems and disinfection needs

The **main objective of this work package** is to consider the overall aspects of the proposed monitoring solution for the aquaponics use-case.

Leader: INRA **Participants:** rest of partners (M0-6)

Task 2.1: Definition of application scenario and microbial sensing requirements
(Leader: INRA, Participants: IREA, CNM-CSIC)

Task 2.2: Disinfection needs in the application scenario. (Leader: INRA, Particip: WTG)



WP3. Development of microbial sensing devices

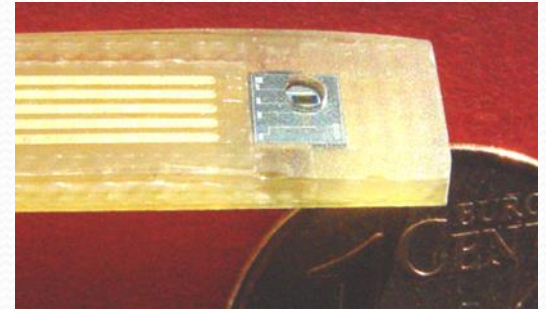
WP3 will focus on the development of necessary sensing systems for **on-site water quality monitoring**.

Leader: IREA Participants: CNM-CSIC (M7-20)

Task 2.1: Sampling multitasking system (Leader: CNM-CSIC, Partic.: WTG) (M7-15)

Task 2.2: Impedimetric microbial sensing devices: biofilms, E coli and cyanobacteria.
(Leader: CNM-CSIC, Participants: IREA) (M7-20)

Task 2.3: Optical sending devices for bio-toxins. (Leader: IREA, Partic: CNM) (M7-20)



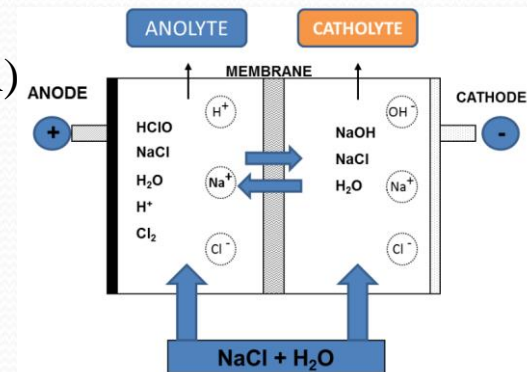
WP4. Development of an eco-friendly disinfection system

The objective of this work package is the design and implementation of a **new disinfection system based on hypochlorous acid** by saline electro-activation using dual membrane separation protocols

Leader: WTG Participants: INRA (M7-20)

Task 4.1: New graphene oxide based separation membranes: efficiency. (Leader: WTG, Participants: INRA) (M7-15)

Task 4.2: Evaluation of novel disinfection biocide compatibility in Aquaponics. (Leader WTG, Participant: INRA)



WP5. Conditioning Aquaponic pilot plants for on-site sensing and actuation

This work package will cover the **system integration** of the overall smart monitoring system.

Leader: INRA Participants: rest of partners (M16-24)

Task 5.1: Integration of both sensing platforms: measurement wat points. (Leader: INRA, Participants: IREA, CNM-CSIC) (M16-21)

Task 5.2: Disinfection system integration. (Leader: INRA, Participants: WTG) (M16-21)

Task 5.3: Smart system integration: Electronic interfaces and communication protocol. (Leader: WTG, participants: rest of partners) (M18-24)

WP6. Demonstrator and building blocks: Innovation Impacts, Dissemination and Exploitation

In the demonstration work package, the **water quality** could be optimised for fish and plants to sustain good welfare, growth and quality. The tasks of WP6 are targeted to facilitate the take-up of the **technological developments** and project outcomes.

Leader: WTG Participants: rest of partners (M25-30)

Task 6.1: Water make-up consumption and Pilot scale validation. (Leader: INRA, Participants: rest of partners) (M25-30)

Task 6.2: Transition to market. (Leader: WTG, Participants: rest of partners) (M28-30)

Task 6.3: Dissemination and exploitation plans. (Leader: CNM-CSIC, participants: rest of the partners) (M28-30)

Expected Impact of the Project

SMARTECOPONICS solutions **contribute to the goals** of the WaterWorks2015 Cofounded Call, as follow:

- ❑ Implementation of existing and breakthrough **scientific knowledge** in agricultural practices and farming systems at the farm scale
- ❑ Improving environmental water quality and **protection of human health**. Added-value of the collaboration.
- ❑ New **cost-effective technologies** and management approaches to be adopted by end-users. Future benefits.

SMARTECOPONICS covers mainly application-driven R&I, where components and systems are demonstrated, instantiated, integrated and validated. Final achievements will allow in aquaponics facilities improved **water use efficiency, reduction of water pollution, enriched environmental water quality and expanded protection of human health.**

How will your project target to following aims of the call:

- Aquaponics system design and application can be considered a **highly multidisciplinary approach** drawing from environmental, mechanical and civil engineering design concepts as well as aquatic and plant related biology, biochemistry, and biotechnology.
- Our project open a **smart solution** in a loop able to future design of cost-effective compact aquaponic facilities able to be personalizing in size, products and markets.
- SMARTECOPONICS will open **innovative practices in promising food production** (aquaponics) strategies and we will open to the research community to explore synergies with the expected results from the project (new operating smart systems).
- Future benefits will come from exploitations of new smart aquaponic format addressed to new challenges. So, after the project with the future projection and expected results new open frontiers will come to the consortium to better positioning our leadership in **sustainable water use in food production**,

COORDINATOR:

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