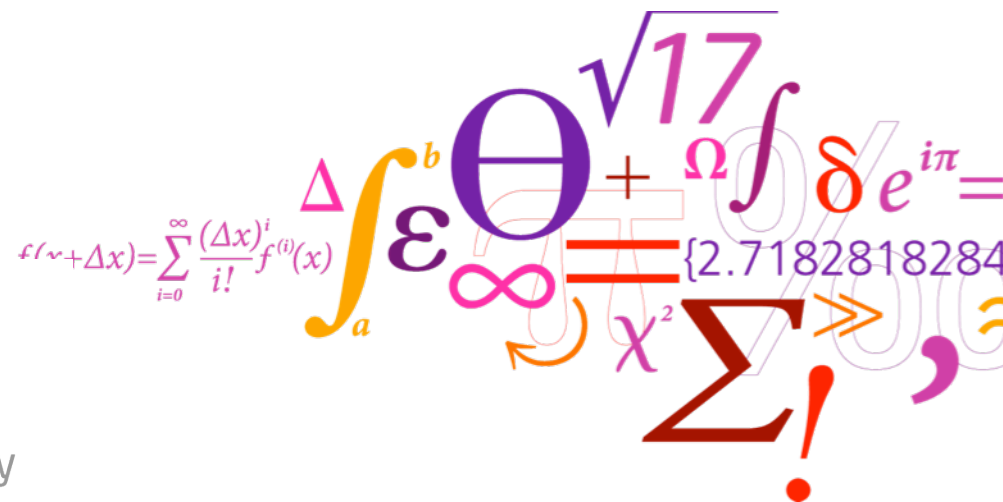


AquaVIR FP7 proposal



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Department of Micro- and Nanotechnology



The Call

- FP7 Cooperation Work Programme 2013:
- *NANOSCIENCES, NANOTECHNOLOGIES, MATERIALS AND NEW PRODUCTION TECHNOLOGIES - NMP*
- **NMP.2013.1.2-1 Nanotechnology-based sensors for environmental monitoring**

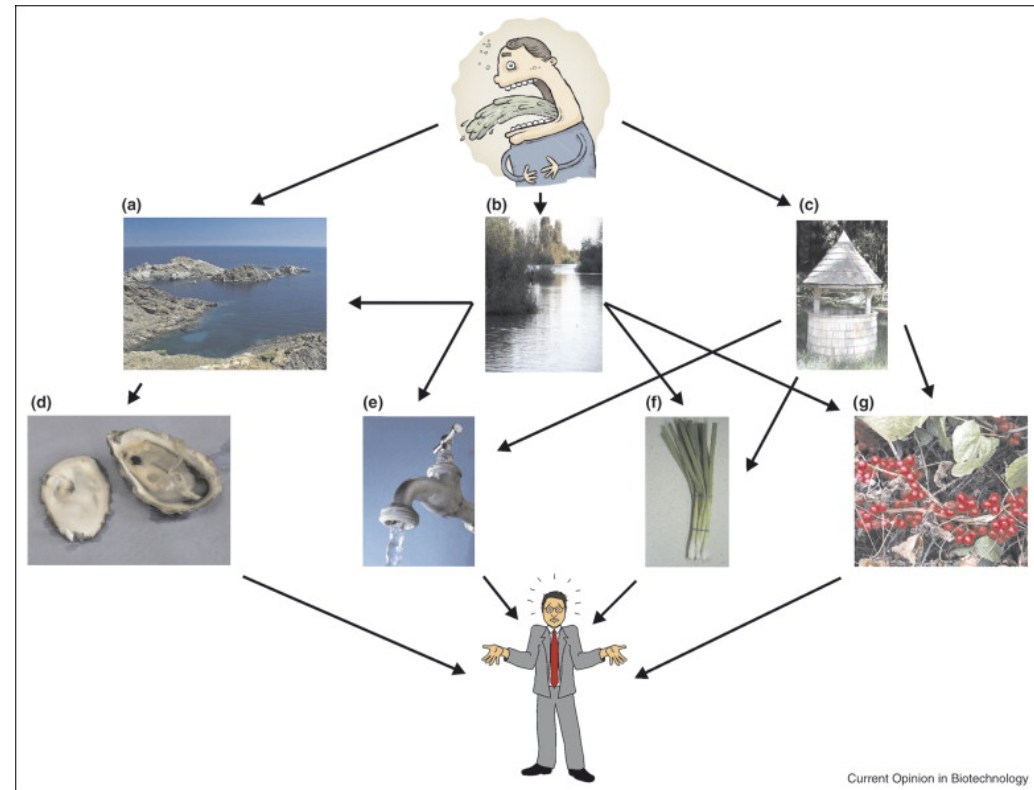
Approach:

Field based testing system for enteric viruses

Focus: Enteric viruses in water bodies

Why interesting?

- **Source:** always from human
- **Transmission:**
 - Wastewater cleaning not sufficient
 - Through wastewater
 - Contaminated hands, food
- **Infection:**
 - Single virus => sickness
- **Outbreak**



Hepatitis A, Rotavirus, Norovirus

Challenges

- Extremely low virus concentrations in water
- Aptamers for the always changing viruses

(Changing Rules of the Game....)

- No regulation/standards



What do we need for field test?

Sensor

- Easy
- Fast
- Inexpensive
- Single use
- Sensitive
- **Selective**



<http://www.envidaninternational.com/The-Danish-Way.aspx>

Virus concentrator

- No lab required
- Inexpensive

Our solution

DTU Nanotech


Water monitoring probe

Measurement unit


- water sampling and filtering unit
- control and measuring unit

Virus sensor chip

- virus concentration unit
- virus detection unit



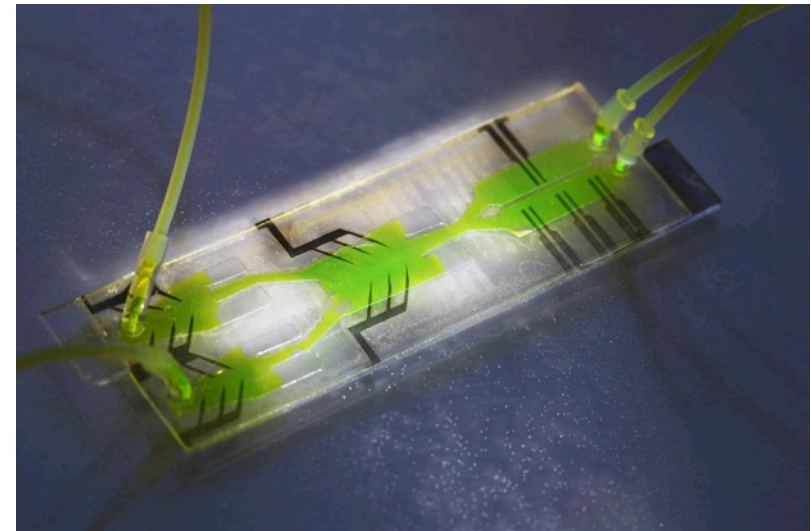
AquaVirj



Monitoring stations with user interface

Connected to the operation manager and/or local authorities

The possible solution

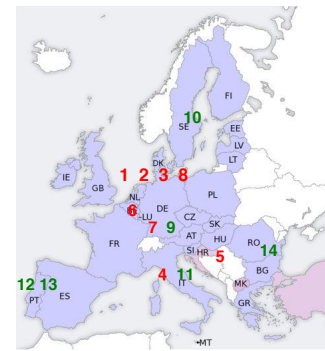


All polymer microfluidic chip

Project Partners

With complementary competencies

Coordinator: DTU Nanotech, Associate professor Noemi Rozlosnik

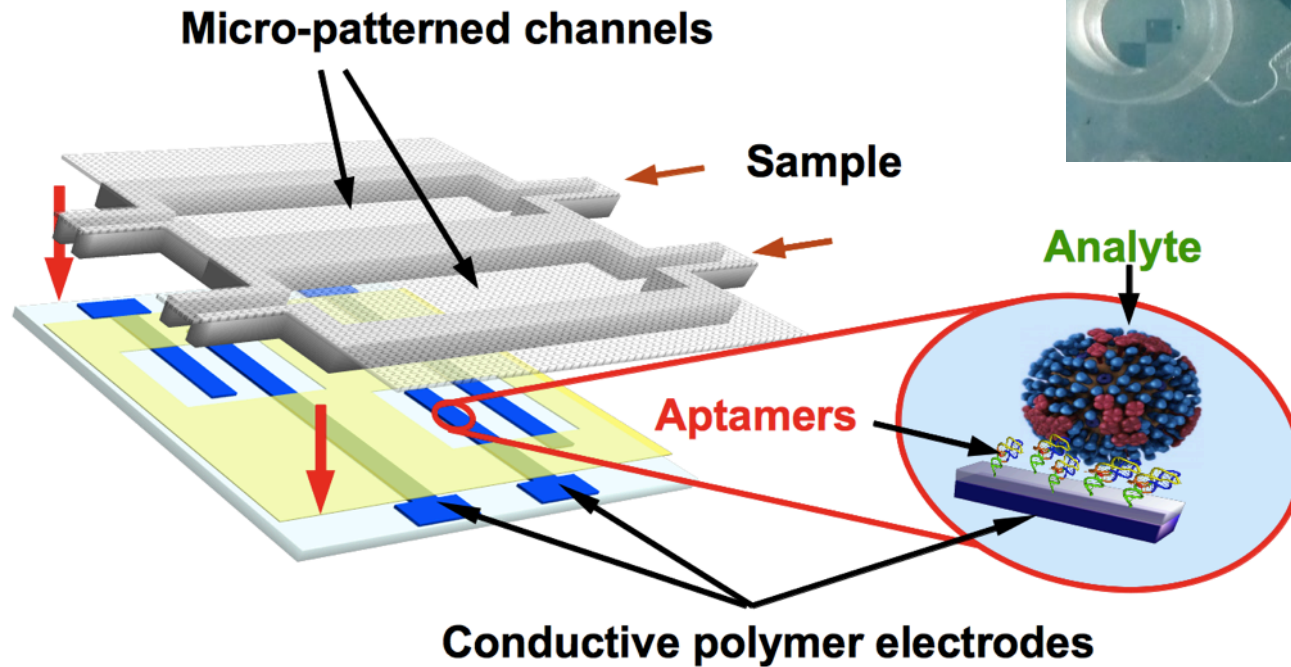


Sensor chip	P01: DTU (University) DK Technical University of Denmark 	P02: UNI (SME) DK 	Controlling Unit
Systems engineering	P03: DELTA (Research Institute) DK 	P04: URV (University) IT UNIVERSITA' DEGLI STUDI DI ROMA 	Lab test - Water Virology
Sanitary engineering	P05: BME (University) HU 	P06: CORIS (SME) BE 	Biosensor Commercialization
Mass production	P07: SAN (SME) DE 	P08: DHI (Research institute) DK 	Early warning system
Standardization	P09: DIN (Other) DE 	P10: KOV (end-user) SE 	End user testing
End user testing	P11: LRI (end-user) IT Laboratori SpA 	P12: STJ (end-user) PT 	End user testing
End user testing	P13: EPAL (end-user) PT 	P14: CNIR (end-user) RO 	End user testing

8 Developers

5 End users

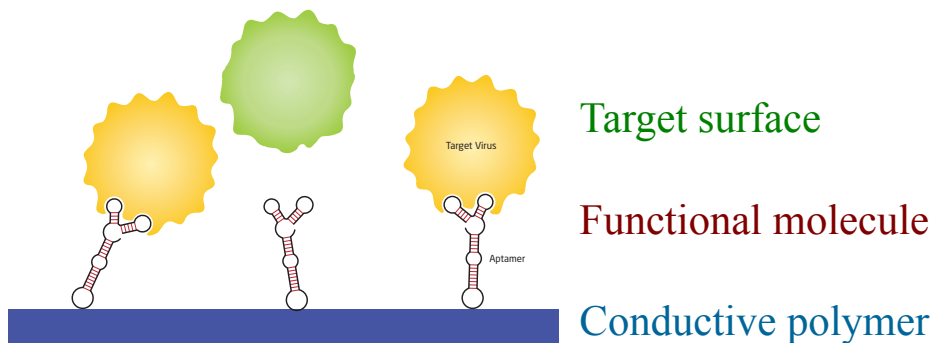
The Virus Detection



Aptamers: molecular probes for selectivity

Electrodes functionalization: target specific oligonucleotides

Aptamers: ssDNA or RNA oligonucleotides
Selected specifically against the target



Can be selected against:

- Small ions and molecules
- Viruses
- Bacteria
- Cells ...

Covalent functionalization on the CP electrodes:
Easy to adapt for any new analyte

Challenges:

- Extremely large amount of water to handle in microfluidics (10-100 liters/hour)
- Plastic electrodes with lower conductivity
- Fabrication protocol for mass production

The microfluidic virus chip

Virus concentration unit Virus detection unit

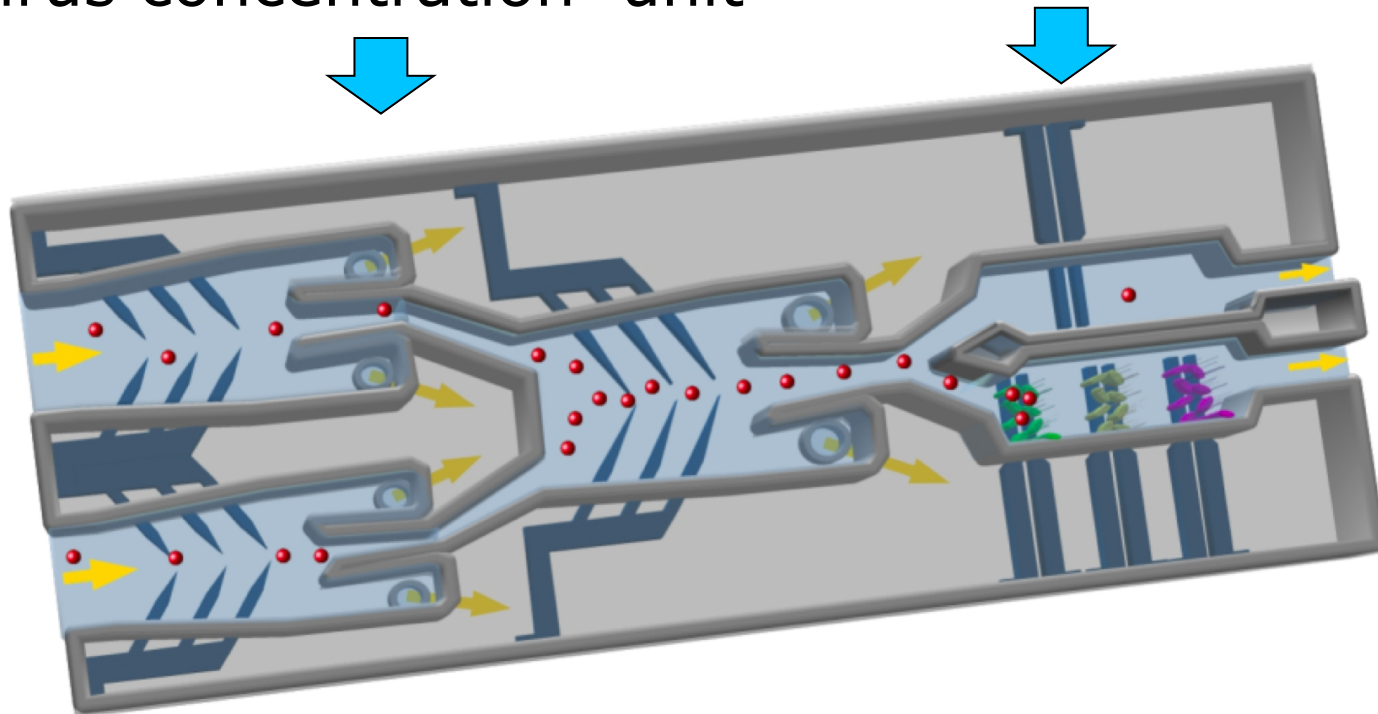


Figure 1: Schematics of the microfluidic chip including virus concentration and detection (1 unit is approx. 1 cm in length)

Thank you for your attention!

