Autumn Edition

Welcome to our Water Institute Autumn bulletin, showcasing our research and development in the area of water research. Each month, we will issue a bulletin about current water research involving our researchers from all faculties of the University. In this edition, we will provide a snapshot of some of our ongoing projects.

DCU Water Institute researchers are currently busy working on a number of exciting projects. You can read more on each of these projects below!

Microplastics are pieces of large plastic debris that have either undergone fragmentation pathways or manufactured in bulk quantities. They are typically rated as less than 5 mm in size. They are commonly found in personal care products and cosmetics to improve the feel of lotions and smooth wrinkle lines. MP's, when discarded end up in marine environments as waste, where they are ingested by marine organisms, leading to adverse effects in the food chain.

Recently our study of Dublin rivers have highlighted a range of microplastics from a variety of sources. Our team studying the sampling and measurement of microplastics are Ivan Maguire our Water Institute PhD student, and visiting interns, Kévin ALAZET, Pauline Freyand Lise Mata who are all from ENSIACET, Chemical Engineering School in Toulouse, France.

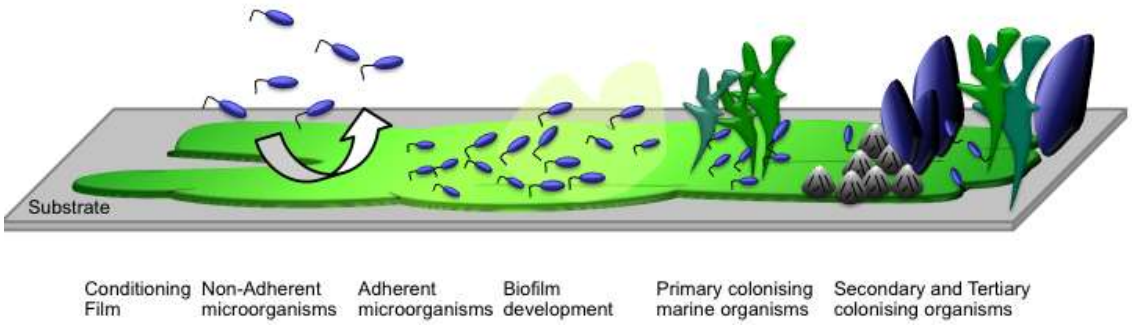
Bio-fouling

We have had the pleasure of hosting Prof José Luis Salas Sanchez for the duration of his six month sabbatical here in DCU. Dr. José Luis Salas Sanchez is a professor of the Department of Chemical and Biological Sciences in Sciences School at Universidad de las Americas Puebla (UDLAP) in Cholula, Puebla,

Mexico (since 1998) and member of the National Researchers System (SNI) level 1. He belongs to different scientific associations like the American Society of Microbiology and American Society of Tropical Medicine and Hygiene. Prof. Salas is currently working in the area of bio-fouling.

Bio-fouling is defined as the gradual accumulation of waternorne organisms (such as bacteria and protozoa) on the surfaces of engineering structures in water that contibutes to corrosion of the structures and to a decrease in efficiency of moving parts. The importance to develop novel materials to reduce the antifouling (AF) due to microorganisms is a big challenge, because of the affect on different biomedical areas (devices used for replacements of heart valves, large bones and catheters etc.), fuel consumption and consequent CO2 production by transport fleets around the world, metal corrosion on fresh or marine environments and reduction in the life span of different marine sensors.

Prof. Sanchez-Salas has just recently completed his six month sabbatical.This is a text block. You can use it to add text to your template.

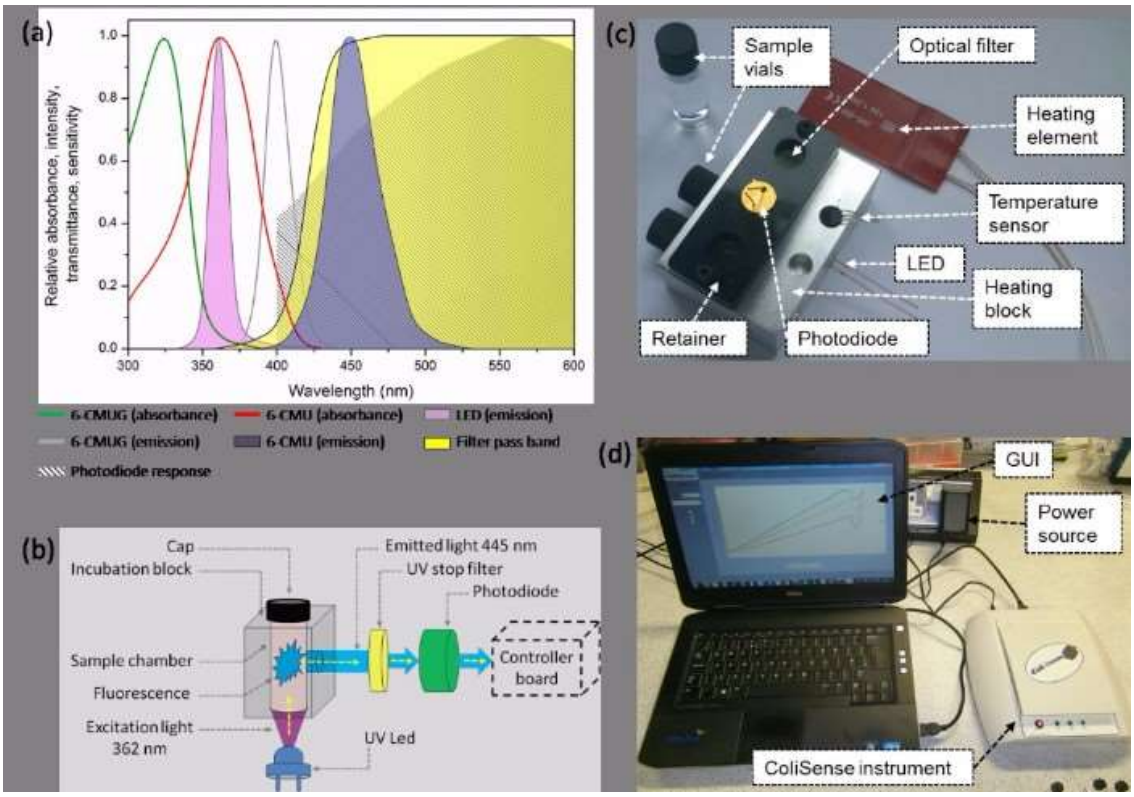


Bathing water monitoring during summer 2016 using a novel hand-held E-coli sensor

A sensitive field-portable fluorimeter with incubating capability and triplicate sample chambers was designed and built. The system was optimised for the on-site analysis of E. coli in recreational waters using fluorescent based

enzyme assays. The target analyte was β-D-Glucuronidase (GUS) which hydro- lyses a synthetic substrate 6-Chloro-4-Methyl-Umbelliferyl-β-D-Glucuronide (6-CMUG) to release the fluorescent molecule 6-Chloro-4-Methyl-Umbelliferyl (6-CMU).

The system was calibrated with 6-CMU standards. A LOD of 5 nM and a resolution of less than 1 nM was determined while enzyme kinetic tests showed detection of activities freshwater and marine samples. Results from a summer-long bathing water field trial indicate the potential for such a device to provide a rapid (within 1 hour) results during an important bathing season.

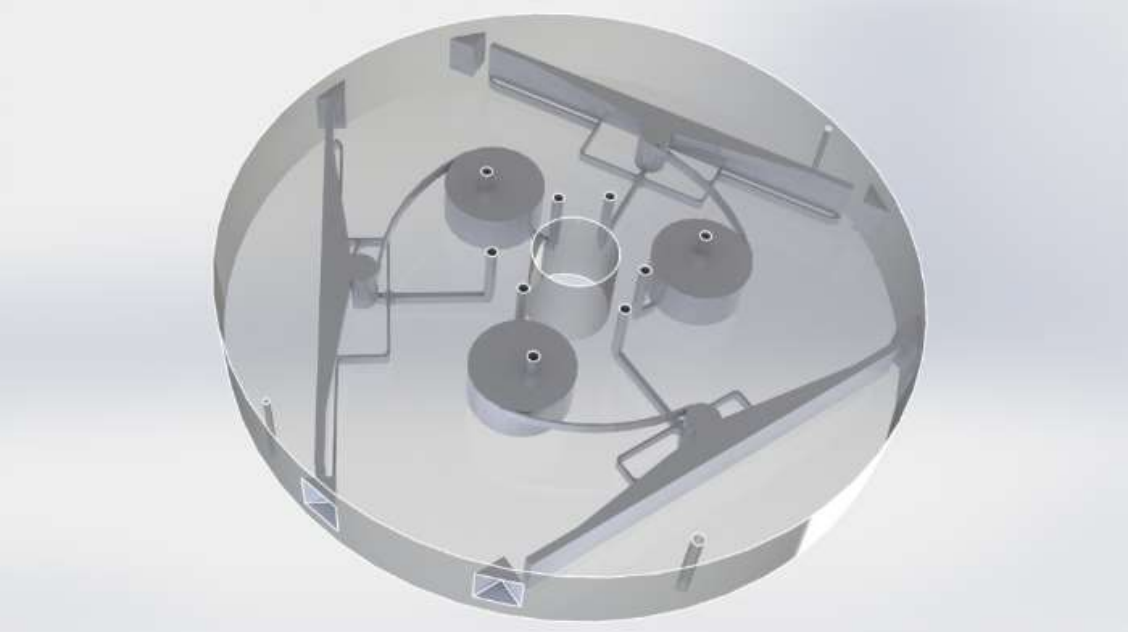


Sensing harmful marine toxins using a centrifugal biosensor

Globally, the most prevalent cyanobacterial toxins, in blooms from fresh and

brackish waters, are the cyclic peptide toxins of the microcystin family. The need for on-site algal-toxin monitoring has become increasingly urgent due to the amplified demand for fresh-water and for safe, ‘toxin-free’ shellfish and fish stocks. Along with routine testing of shellfish stocks for biotoxins, the EU also require routine monitoring for the presence of the causative algal species. The presence of toxin in less than 10 minutes with minimum user interaction and maximum reproducibility.

Ivan Maguire, Caroline Murphy and Jenny Fitzgerald develop an antibody-based biosensor - Lab-On-A-Disc (LOAD) platform which has been developed to assess algal toxin levels in-situ. Using recombinant antibody technology, the LOAD platform combines immunofluorescence with centrifugally driven microfluidic liquid handling to achieve a next-generation disposable device for high throughput sampling. This system can rapidly and accurately detect algal toxins.



For further information please contact:
Jane Wall
Project Development Manager
DCU Water Institute
E jane.wall@dcu.ie
T 01-7008514

W www.dcu.ie/water
@dcuwater