

## RESEARCH PROJECT

Positions offered (2017-2018): 1 Master research project (6-9 month)

### Advanced Disinfection Techniques for Water Reuse

Water scarcity is a consequence of both natural and anthropogenic factors including highly variable temporal and spatially heterogenic distribution of precipitations, growing populations, increasing water demand particularly for agriculture, and the widespread contamination of water resources by a plethora of organic and inorganic contaminants. For that reason, water reuse is becoming an important issue, especially in those areas with high water stress such as the Mediterranean area.

One of the most important quality parameter to control in water reuse is the presence of pathogens microorganisms. In order to do that, chlorination or UV treatments with mercury based lamps have been adopted since long time ago as the most preferred techniques. Both treatments presents several disadvantages. In the case of chlorination the formation of disinfection by-products (DBP) and in the case of the mercury UV lamps the high cost associated among others. For that reason, this project is focused on the development of more environmental friendly processes such as the use of electro-oxidation and the use of UV-LED lamps combined with the use of renewable energy generated with solar photovoltaic panels.

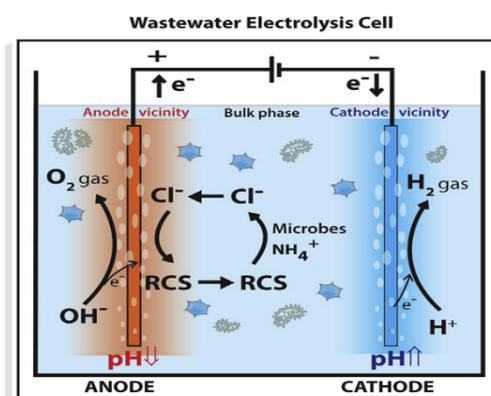


Figure 1

The candidate will work in the Ecotechnologies lab with two experimental set-up. The first one will be an electro-oxidation cell with boron doped diamond (BDD) electrodes (Figure 1) and the second will be a photo-reactor equipped with UV-LED (Figure 2). These set-ups are connected to a solar panel, which will generate the electricity needed to work all the equipment needed. The objective of the project is to optimize and assess the capacity of both techniques for the disinfection of wastewater for different water reuse applications. Also, it would be evaluated the viability of the studied systems to provide drinking water in developing countries.

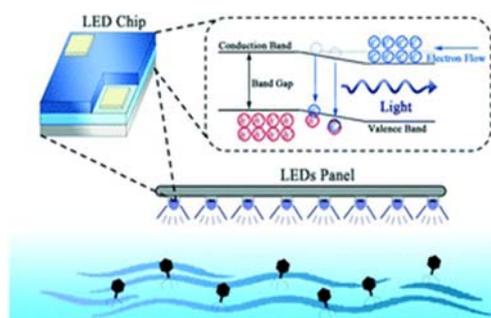


Figure 2

We are looking for a student of Chemical Engineering or Environmental Engineering highly motivated for lab work and advanced water treatments. IQS is one of the schools of engineering of the University Ramon Llull, which is located in Barcelona, one of the most wonderful cities of Spain.

#### References:

- X. Huang *et al.* Electrochemical disinfection of toilet wastewater using wastewater electrolysis cell. *Water Research*, 2016, **92**, 164-172.  
K. Song *et al.* Application of ultraviolet light-emitting diodes (UV-LEDs) for water disinfection: A review, *Water Research*, 2016, **94**, 341-349.

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