

**TFM 5: Removal of organic and inorganic contaminants of emerging concern (CECs) in synthetic and real wastewaters.**

Contaminants of emerging concern (CECs), such as pesticides and pharma pollutants, are increasingly being detected at low levels in surface water being a potential threat to ecosystems as well as for human healths and safety. One of the main reasons that have led to this undesired situation is the failure of the conventional treatment technologies to completely remove those CECs like conventional anaerobic digestion process. In order to mitigate the current problems of CECs, several treatment methods such as activated carbon, membrane filtration, and membrane filtration have been developed. However, these methods are physically based that require a high energy consumption, making it difficult to scale up those technologies. According to this, new emerging technologies have been developed as potential solutions for the removal of those compounds, such as microbial electrochemical technologies (METs), and Advanced Oxidation Processes (AOPs). In this research project the student will study two different treatments, photo-catalytic removal, and microbial electrolysis cells, for the removal of well-known CECs in synthetic and real wastewaters. The student will set-up both reactors and will optimize the main operational parameters, such as the wavelength, hydraulic retention time, temperature, and electrode materials for the photo-catalytic reactor, and the potential differential, hydraulic retention time, electrode materials, and temperature for the microbial electrolysis cells. The obtained results for both technologies will be compared to observe, and monitor, the effect of the optimization parameters on the CEC removal rates and energy consumption of both technologies to perform a final techno-economical report. This research project is completely experimental and a good knowledge in chemical engineering, reactors design, and biochemical science is desirable.

Supervisor: Dr Javier Fernández García & Dr Yeray Asensio.

Main contact: Dr Javier Fernández García

Position for one student.