

RESEARCH CONTRACT TO DEVELOP A PHD

Transitioning Wastewater Treatment Plants toward **C**ircular Economy and
Sustainability through Resource and Water recovery from liquid and
gaseous streams
CIES

Position's characteristics

An opportunity to develop a PhD with financial support for a 4-years period is offered by the Group of Environmental Biotechnology ([BioGroup](#)) of the Universidade de Santiago de Compostela.

The contract is associated to the CIES project described below and financed by the Spanish Research Agency (former FPI fellowships). The contract includes a monthly salary of 1,260.00 € (year 1 and 2), 1,350.00 € (year 3) and 1,680.00 € (year 4).

In addition, the University Doctorate Taxes will be paid by the grant, as well as a fellowship to perform a 3-month research stay abroad during the PhD period.

The contract starting date would be approximately **December 2023 – January 2024**.

Project description

The major goal of CIES is the development of a photocatalytic conversion process to valorize both the liquid and gaseous effluents from a membrane bioreactor (MBR). This project encompasses the synthesis and improvement of photocatalysts, their application in a wastewater treatment system as well as the evaluation of environmental and circular indicators. It is expected that CIES technologies accomplish a decrease of impacts and emissions leading to a more energy and resource efficient process, thus providing process routes that enable the transition to more sustainable wastewater treatment systems.

This project aims to extend previous research developed by BioGroup and NanoMag groups on the removal of emerging contaminants using innovative photocatalytic reactors. The proposal encompasses an improvement of the technologies already investigated and developed in previous projects of these research groups: HP-NANOBIO and SPOTLIGHT. The overall process to be developed comprises two different phases: one referring to the gaseous and the other to the liquid stream. In the case of gaseous effluent, CO and CO₂ will be transformed to bio-methane through photocatalytic hydrogenation, hence upgrading the biogas quality. On the other hand, the liquid effluents containing emerging pollutants not removed in previous steps will be treated also in a heterogeneous solid-liquid photocatalytic reactor, obtaining a higher quality effluent. Both for liquid and gas streams, the advance on semiconductor catalysis will be done using atomic quantum clusters (AQC) for the enhancement of their photocatalytic properties.

The candidate will be incorporated into a research team with expertise in environmental and chemical engineering, as well as treatment technologies applied to wastewater. He/she will be part of the **Group of Environmental Biotechnology (BioGroup)** from the Universidade de Santiago de Compostela. This group has access to high-quality resources and a solid network of collaborations at international level. In this regard, the candidate will work at cutting-edge lab facilities with the support of experienced researchers and technicians. At present, BioGroup staff is composed by 14 full/assoc. professors, 7 postdocs and approximately 25 PhD students, providing a stimulating and multidisciplinary environment to conduct your research.

CIES researchers belong to the **Cross-Research Center of Environmental Technologies (CRETUS)** and the **Institute of Materials (iMATUS)** composed of 91 main researchers working in the field of Environmental Technologies and Materials Science, that bring around 186 PhD students and 80 postdocs. CRETUS aims to develop and assess innovative environmental technologies with an interdisciplinary and holistic perspective, to ensure safe water, healthy soils, and sustainable cities and industries. The team of CRETUS constitutes a multidisciplinary team comprising chemists, biologists, physicists, engineers, economists, and psychologists. Through CRETUS, the candidate has access to a **mentoring program**, that looks for a continuous accompaniment of PhD students during their research, ensuring that their training adapts to their future professional perspectives. Among the courses offered to complement their formative curriculum are, as example, the following: “Information Design Lab” for improving the visual presentation of data and information, “Development of scientific leadership”, “Writing and presentation skills to improve the impact of research” or “Tools to better plan their agendas”.

Research area

Development of technologies for innovative wastewater treatment for the removal of contaminants of emerging concern, promoting safe water reuse.

Research team

[María Teresa Moreira Vilar](#) and [Manuel Arturo López Quintela](#)

Brief work description

- Evaluation of catalysts applied to the treatment of liquid effluent using the photocatalytic based process.
- Analysis of the process performance facing the removal of selected micropollutants, antibiotic resistance genes (ARGs) and antibiotic resistant bacteria (ARBs).

- Process modeling and environmental assessment of developed technology, under Life Cycle Analysis (LCA) perspective.

Requirements

- Bachelor's degree in Chemical Engineering, Biotechnology or similar areas.
- Master's degree in Chemical or Environmental Engineering, or at least have in total 300 ECTS credits passed considering Bachelor + Master subjects.
- Adequate training in wastewater treatment.
- Good level of English and ability to travel abroad to attend project meetings or conferences.
- Commitment to perform a PhD thesis.

Selection process

Applications must be sent to maite.moreira@usc.es (including in the subject: "CIES position") before 1st October 2023.

Applications must contain the following documents:

- Motivation letter (not more than 1 page), indicating the contact details of the candidate and a brief description of the reasons why he/she should be selected.
- Academic records of Bachelor and Master
- Curriculum Vitae

The selection process will include a personal interview to those candidates that based on the previous information fulfil the position requirements.