

PRESELECTION FOR RESEARCH CONTRACT ON ENZYMATIC PET RECYCLING

Position characteristics

A research contract of 5 months, extendable to 15 months, is offered at the Cross-disciplinary Research Centre in Environmental Technologies (CRETUS) of the University of Santiago de Compostela within the projects PETzyme and CREPÉ. The contract starting date is April 2025. The gross salary of the 5-month contract is 1,720 €/month in 14 payments.

Project description

Polyethylene terephthalate (PET) is commonly used to manufacture plastic products such as beverage bottles, food packaging, and clothing fibers. It is the most widely used plastic in the world and accounts for about 60% of all plastics. The main recycling process at large scale for PET, i.e. via thermomechanical processes, is limited to clear plastic and results in a loss of mechanical properties and discoloration each time is recycled. A new promising alternative to obtain the monomers from different PET materials is via enzymatic recycling, which can produce high-quality rPET with similar properties to virgin PET.

PETzyme project evaluates the feasibility of enzymatic recycling of different PET plastic wastes to obtain the monomers terephthalic acid (TPA) and ethylene glycol (EG) using free and immobilized PET hydrolases. On the other hand, the overall objective of CREPÉ is to develop an enzymatic technology for PET fiber recycling. To achieve this goal, the enzymes will be cloned and expressed in bacteria to obtain both free and immobilized enzymes at bioreactor scale. After characterization, the enzymes will be tested on different PET fibers and plastics (amorphous/crystalline, presence of dyes, additives, etc.). The possibility of depolymerizing PET/cotton blends will also be studied by combining PET hydrolases with commercial cellulases. Finally, an enzymatic membrane reactor that recovers free enzyme using an ultrafiltration membrane, and a reactor with immobilized enzyme where particles are recovered by centrifugation, will be operated.

CRETUS is a top-level research centre in environmental technologies which reunites researchers from a multidisciplinary background to develop and evaluate environmental and sustainable technologies. As part of CRETUS activities in Chemical and Environmental Engineering you will have access to state-of-the-art facilities with a highly committed staff in an inspiring working environment to conduct your research. The Environmental Engineering area is composed by 14 full/assoc. professors, 3 technicians, 2 administrative support staff, 7 postdocs and ~20 PhD students.

You will have the opportunity to collaborate in other research activities related to plastic degradation. Furthermore, PETzyme and CREPÉ present a multidisciplinary and interdisciplinary research proposal that encompasses the areas of Molecular Biology and Chemical Engineering. This position allows integrating a multidisciplinary team while

working in an innovative project, with multiple opportunities to interact with other partners and become part of the scientific community in plastic recycling.

Supervisors

Gemma Eibes and Sabela Balboa

Brief work description

- Scale-up of the enzyme production and characterization of the enzymes.
- Optimization of the operational conditions for degradation of different PET materials.
- Design and operation of an enzymatic reactor for PET recycling.

Requirements

- Candidates must have a master level degree in Chemical Engineering, Environmental Engineering, Biotechnology or similar.
- Experience in microbial culture and bioreactor operation.
- Candidates must be skilled in problem solving and understanding of complex scientific texts
- Candidates must have good communication skills as well as proficiency in written and spoken English language

Preselection process

Applications and information requests must be sent to gemma.eibes@usc.es and sabela.balboa@usc.es (including in the subject: "CREPÉ position") before February 28th 2025 at 17:00 (CET).

Applications must enclose in a single pdf file 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 they should be selected.
- Curriculum Vitae
- Name and contact of two references (e.g. former supervisors)

The preselection process involves the following steps:

1. Evaluation of applications (motivation letter and CV) and screening test

The goal of this evaluation is to assess the adequacy of applicant's profile to the requirements of the call. Upon reception of application files, the candidates will be invited to a qualifying screening test which will consist of commenting a scientific paper in a limited time.

2. Personal interview

Top three candidates after CV screening will be invited for a formal application to the research position, including a personal interview