

ANGERS UNIVERSITY
Moltech laboratory

Junior Contract Researcher
Post-doctoral contract in public law

Category : A

Presentation of the University of Angers

In the heart of a region recognized for its quality of life, the University of Angers, the 3rd largest employer in the region, offers an environment conducive to the development of its staff and students. The UA is a multidisciplinary university, welcoming more than 26000 students spread over 3 campuses and 2 relocated campuses (in Cholet and Saumur). It has 8 components (5 UFR, 1 IUT, 1 internal engineering school and 1 internal business and management school), and 31 federative research units and structures. Thanks to the many innovative projects it carries out and its openness to the world, the AU allows everyone to evolve in a stimulating environment. Its annual budget is €156 million (including €123 million in payroll). The UA has 1167 teachers and teacher-researchers, 917 administrative and technical staff and nearly 2000 individual contractors and is looking for involved and daring actors. You recognize yourself in this job offer ? Join us !

Contract features:

Starting date : 01/03/2025

Contract duration : 12 months French law work contract

Work quota : 100%

Monthly wage : 2883.63 euros gross

Location : Angers University, Laboratoire MOLECH-Anjou

Name of research project: Organic batteries based on redox conducting polymers of intrinsic porosity

Description of the research project in which the research activities entrusted to the officer take place:

Redox conducting polymers are a key solution to circumvent the main limitations of organic storage systems, allowing to retain the active organic matter onto the current collector by the insoluble character of polymer chains, introduce a wide variety of redox molecules on the skeleton of polymer chains capable of increasing the capacity and the energy density of electrodes, and to improve the conductivity because of the pi-conjugated character of polymer chains. Such qualities avoid « dead masses » in the electrodes, allowing to increase their performances. By tuning the HOMO and LUMO energetic levels of aromatic polymers, these organic materials have the potentiality to be reversibly oxidized and reduced, becoming relevant materials for both positive and negative electrodes in organic batteries. In these cases, dual p and n dopable conducting polymers are obtained. The project PolyBatt aims at preparing dual redox conducting polymers serving as anode and cathode in fully organic batteries. In these storage systems, redox molecules make a faradaic contribution to the capacitive storage in the polymer film for maximizing both the capacity and energy density. The ambition of the project is to increase the TRL level from 2 to 4 by validating the storage solution with a prototype at the laboratory scale.

Provisional project schedule: The work will be divided in two chemical and electrochemical tasks. The chemical task, planned over the first 6 months, will focus on the synthesis of monomers and preparation of polymers, while the electrochemical task, planned over the last 6 months, will involve electrode assembling and cell testing.

Expected results: The project PolyBatt aims at preparing redox duals conducting polymers. These polymers will be used as anode and cathode in organic energy storage systems. The project deliverables are polymers stable in temperature and during long time period of charge-discharge cycles (a charge retention of 80% over 200 cycles is aimed), a specific capacity comprised between 50 mAh g⁻¹ and 100 mAh g⁻¹, a cell voltage more than 2 Volts, and an improved cyclability over the 0,1 A g⁻¹ - 100 A g⁻¹ current range.

Definition of research activities and tasks to be accomplished:

The candidate will be in charge of the preparation of monomers and redox conducting polymers for storage application. The candidate will also be involved in the study of small prototypes at the laboratory scale based on the redox conducting polymers obtained both by chemical and electrochemical oxidation. Noted that the electrochemical tests will be achieved in a glove box.

Expected skills :

Knowledge :

- Advanced knowledge in organic chemistry
- Basic knowledge in electrochemistry

Know-how:

- the postdoctoral researcher should be comfortable with metal-catalyzed reactions and Schlenk-line protocol. The postdoctoral researcher will also be involved in cell assembling and testing (cells are routinely studied in a glove box).

Soft skills :

We also look for other important qualities, such as:

- Autonomy
- Communication
- Motivation

Recruitment procedures and contact :

You must submit your CV, cover letter and doctoral degree by mail at : charles.cougnon@univ-angers.fr and frederic.gohier@univ-angers.fr
copy to: recrutement@univ-angers.fr

Deadline for applications: 12/01/2025

This job description is available until the closing date for applications. On that date, it will no longer be available on the website.