POST-DOC research fellow – full-time

ANGERS UNIVERSITY
MOLTECH-Anjou laboratory
2, bd. Lavoisier
49000 Angers

Junior Contract Researcher
Post-doctoral contract in public law

Category : A

Contract features:

Starting date : October 2024
Contract duration : 21 months French law work contract
Work quota : 100%
Monthly wage : 2981.51 gross
Location : Angers University, Moltech-Anjou Laboratory, CIMI Team

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

Since the 90s, an ever growing interest has stemmed around **porous coordination polymers** (abbreviated PCPs, and also known as metal-organic framework), that are self-assembled crystalline materials constructed from multidentate organic ligands and inorganic moieties having defined spatial configurations. For these reasons, PCPs stemmed interest in various fields of applications related to their unique sorption abilities, such as the separation of complex fluid mixtures, gas storage, controlled drug delivery, optical sensing, or heterogeneous catalysis. However, PCPs usually show very poor electrical conduction properties, while the combination of controlled porosity with electrical conductivity opens the scope of applications towards electrical/electrochemical sensing, electrochemical energy storage or electrocatalysis.
Electroactive building blocks are well-known in the field of organic metals. In particular, the synthesis of organic metals or organic superconductors sprung a tremendous interest since the 70s with the discovery of the first organic superconductor based on tetrathiafulvalene scaffolds. The **Porous AND Electroactive MOFs (PANDEMIC) project aims at connecting the realm of PCPs to the organic metals field**. By combining the advantages of both fields, it is expected to develop a whole new family of electroactive ligands to yield highly desirable materials being stable, conducting and porous.
After the synthesis of the target ligands, their self-assembly into PCPs with a various set of metals following the SBUs strategy and a high-throughput approach and the characterization of the materials physical properties will be performed.

Provisional project schedule:

The project is divided in three main work packages:
- synthesis of the ligands (month 1 – 6)
- synthesis of the coordination networks (month 3 – 18)
- structural characterization of the materials and of their physical properties (SC-XRD, PXRD, TGA, DSC, BET, conductivity, cyclic voltammetry…) (month 4 – 21)

Transversal tasks such as the participation to group meetings, conferences or the writing of publications will be done all along the project.

Expected results :

The main objective of this fundamental research project are the synthesis of electroactive ligands applicable to MOF synthesis, the synthesis of coordination networks based on the latter ligands and finally the characterization of the materials properties, with a particular focus on the porosity and conductivity. Each of these three objectives is by itself a remarkable milestone brought in the field of through space conducting MOFs. While MOFs with proper conductivities have been developed, they mostly appear to be either non-porous or polycrystalline. The developed materials will later be tested as chemical sensors and implemented as battery electrodes coatings, thanks to their accessible and large surface areas coupled to their conductivity.

Definition of research activities and tasks to be accomplished:

- synthesis of ligands, synthesis of coordination polymers
- characterization (TGA/DSC/PXRD/BET…) of coordination polymers
- active participation in our network of collaborators, through email writings, visits, videocalls, measurements on-site
- writing reports, preparation of scientific articles, scientific watch
- participation to group meetings, participation to conferences
- maintenance of laboratory equipment and of the personal and common working space

Expected skills :

Knowledge :

- Synthesis
- Materials chemistry

Know-how:

- Characterization techniques for molecules and materials

Soft skills:

- team spirit
- scientific ethics
- scientific rigor

Qualifications

- **PhD degree of less than 3 years**
  Specialty : Chemistry
- Track record in the field of coordination chemistry AND/OR organic chemistry AND/OR material chemistry
- Experience in organic synthesis, cristallogenesis, crystallography and characterization of materials
- good level of written and spoken English
- commitment to scientific excellence and strong scientific ethics

Recruitment procedures and contact :

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

Deadline for applications: **17/3/2024**
This job description is available until the closing date for applications.
On that date, it will no longer be available on the website.

If needed, your contact for any further information:
at 02 41 73 54 04 or nicolas.zigon @univ-angers.fr