

Post-doctoral contract offer

Subject: Hard-soft carbon composite spheres for Na-ion batteries

General informations

Workplace: Nancy

Type of contract: FTC scientist

Contract period: 12 months

Expected date of employment: Between 1st September 2026 and 15th February 2027

Proportion of work: Full time

Remuneration: 2948 € gross/month

Desired level of education: PhD

Experience required: see below

Missions / Activities

- 1. Elaboration of hard-soft carbons composites** using a hydro- or solvothermal pre-treatment step.
- 2. Characterization of the physico-chemical properties of composites** through a set of multi-scale techniques: SEM, TEM, XRD, Raman spectroscopy, TGA, gas adsorption, helium pycnometry, SAXS.
- 3. Characterization of the electrochemical behavior of composites** by conventional techniques: galvanostatic cycling, cyclic voltammetry, electrochemical impedance spectroscopy, galvanostatic intermittent titration technique.

Work content

The post-doctoral researcher will work within the Carbon Materials research group under the supervision of Dr. Lucie Speyer.

The main topic of this research group concerns the synthesis, modification and characterization of carbon materials, and their application in many fields such as energy storage and conversion.

The post-doctoral project will be carried out in this last topic and aims to develop hard-soft carbon composite spheres as negative electrode materials for sodium-ion batteries. This project follows the activities of the team concerning the elaboration of hard carbons by pressure-assisted pyrolysis (Raspado *et al.*, J. Phys. Chem. Solids, <https://doi.org/10.1016/j.jpcs.2024.112013>).

In order to reach optimal features for this application, *i. e.* a low specific surface area (in order to improve the initial Coulombic efficiency) and a consequent closed porosity (in order to enhance the low-potential storage), hard carbon materials will be prepared with an hydro- or solvothermal pre-treatment to get spheroidal particles, and a soft carbon coating will be built on the surface of these spheres. Instead of using a supplementary step to get this coating, the project aims to begin its development during the pre-treatment step with a suitable choice of precursors and solvents. The as-obtained materials will be characterized using complementary techniques (XRD, Raman, SAXS, gas adsorption...) and their electrochemical behavior in Na-ion half cells will be evaluated.

Expected skills

Expertise in battery testing (coin cell assembly, usual electrochemical characterization) and materials chemistry is needed. Knowledge about carbon-based materials would be appreciated.

Constraints and risks

The position you are applying for is located in a sector relating to the protection of scientific and technical potential. It therefore requires, in accordance with the regulations, that your arrival be authorized by the competent authority of the Ministry of Higher Education, Research and Innovation.

About Institut Jean Lamour

The Institute Jean Lamour (IJL) is a joint research unit of CNRS and Université de Lorraine. Focused on materials and processes science and engineering, it covers: materials, metallurgy, plasmas, surfaces, nanomaterials and electronics. By 2026, IJL has 243 permanent staff (34 researchers, 131 teacher-researchers, 78 IT-BIATSS) and 389 non-permanent staff (146 doctoral students, 43 post-doctoral students / contractual researchers and more than 200 trainees), from some seventy different nationalities.

Partnerships exist with 150 companies and our research groups collaborate with more than 30 countries throughout the world.

Its exceptional instrumental platforms are spread over 4 sites ; the main one is located on Artem campus in Nancy.

Application

Applicants are invited to send a resume and cover letter to:

- lucie.speyer@univ-lorraine.fr