Postdoctoral Research Position (18 months)
Synthesis of GQD-IMAC chromatographic phase and Experimental validation

The *Laboratoire Lorrain de Chimie Moléculaire* (L2CM, UMR CNRS 7053), located at Nancy, France, and the Laboratory of Reactions and Chemical Engineering (LRGP, UMR CNRS 7274) invite applications for a **18-month postdoctoral position** starting in **November 2026**, within the framework of the **B4B (Biomolecules for Bioeconomy)** French national research program.

Scientific Context

Immobilized metal ion affinity chromatography (**IMAC**) is a cornerstone technique in biochemistry and biotechnology for the purification and separation of biomolecules exhibiting metal-chelation properties. The method relies on coordination interactions between specific residues on the biomolecules core and transition metal ions (e.g., Ni^{2+}, Fe^{3+}) immobilized on solid supports through chelating ligands. Most commercial materials rely on porous polymeric matrices, typically agarose beads functionalized with chelating ligands such as NTA. In these systems, capture efficiency is governed by the density of immobilized ligands and the accessibility of coordination sites within the porous network. However, metal densities typically remain limited to a few tens of $\mu mol.mL^{-1}$, while mass transfer within the porous structure can restrict access to active sites.[1]
GQD-IMAC project aims to develop a new generation of nanostructured IMAC platforms with enhanced separation performances through increased capture capacity for metal-chelating biomolecules. This strategy relies on the integration of polyfunctionalized graphene quantum dots (GQDs) derived from biomass, into the architecture of affinity chromatography supports (agarose beads) to create high-density metal-binding interfaces.

Graphene quantum dots (GQDs) are routinely synthesized at the L2CM laboratory by the team of Philippe Pierrat through a scalable process using a variety of non-food biomass wastes (see the team's recent publications for representative examples). Immobilized Metal Affinity Chromatography (IMAC) is a well-established area of expertise within the team of Laetitia Canabady-Rochelle at the LRGP laboratory, which has extensive experience in the development and optimization of IMAC-based separation processes (see the team's recent publications for further details).

Research Objectives

The recruited postdoctoral researcher will be responsible for:

- Synthesizing graphene quantum dots (GQDs) using the well-mastered process, functionalizing their surface (by organic chemistry tools), and immobilizing them onto agarose beads to develop the novel GQD-based IMAC materials targeted in the project.
- Characterizing the resulting GQD-IMAC supports using appropriate physicochemical techniques.
- Evaluating the performance of the GQD-IMAC supports at the LRGP laboratory through:
    - analytical-scale IMAC chromatography experiments; and
    - preparative-scale chromatographic separations.

Candidate Profile

Applicants must hold expertise in carbon-based (nano)-materials, their characterization and their subsequent functionalization by organic synthesis tools. Expertise in coordination chemistry would be a plus.
Knowledge in analytical chemistry for IMAC chromatography analysis and preparative chromatography will be a plus.
Expected skills: good knowledge of English and scientific communication skills, oral and written skills. Sense of thoroughness, organization and initiative; capacity of synthesis; reactivity and autonomy and team working.

Application

Interested candidates should send their application **by email**, including:

- A curriculum vitae
- A brief cover letter describing research interests and relevant experience
- Contact information for references

Application deadline for oral selection: **24/08/2026**
Expected starting date: **01/11/2026**

For applications, please contact the project coordinator, Philippe PIERRAT, philippe.pierrat@univ-lorraine.fr

[1] Riguero, V. et al. *Journal of Chromatography* A, 2020, *1629*, 461505.