

Research fellow in environmental chemistry

Spatio-temporal trends in contamination in urban and industrial area, using non-targeted molecular analysis of river sediments

The French National Research Institute for Agriculture, Food, and the Environment (INRAE) is a public research establishment gathering a community of 12,000 people with more than 270 units including fundamental and experimental research, spread out throughout 18 regional centres in France. Internationally, INRAE is among the top research organisations in agricultural and food sciences, plant and animal sciences, as well as in ecology and environmental science. It is the world's leading research organisation specialising in agriculture, food and the environment. Faced with a growing world population, climate change, the depletion of resources and declining biodiversity, the Institute has a major role to play in providing the knowledge base supporting the necessary acceleration of agricultural, food and environmental transitions, to address the major global challenges.

Work environment, missions and activities

Within the AQUA department, the RiverLy Research Unit (riverly.inrae.fr/) brings together expertise in hydrology, hydraulics, environmental chemistry, ecology, ecotoxicology and microbiology to develop innovative approaches for understanding the quality, functioning and dynamics of water systems. These approaches span all levels of biological organisation (from the cell to communities of organisms) and the various scales that structure water systems (from microsites to large catchment areas). This interdisciplinary research aims to better account for natural and human-induced risks in order to improve the management and restoration of watercourses.

Within the RiverLy Research Unit, you will join the team at the Laboratory of Aquatic Chemistry (LAMA, lama.riverly.inrae.fr/). The LAMA team aims to assess the sources, fate and impact of contaminants in water systems in order to reduce their input and associated risks. The team develops sampling and targeted/non-targeted analytical methodologies and strategies, tailored to characterise pollution linked to urban discharges and diffuse agricultural sources.

Your mission will be to apply and also develop complementary analytical approaches – targeted, suspected and non-targeted – in an urban and industrial river context, in order to i) improve our understanding of the nature and extent of this sediment contamination, particularly by emerging micropollutants, and ii) to assess the extent to which combining these approaches enables a better characterisation of spatial trends (using surface sediments) and temporal trends (using sediment cores). Here, we are focusing on pollution originating from a major urban and industrial centre: the Lyon metropolitan area (>2 million inhabitants) and the chemical industry corridor. The analysis of sediment cores should enable to highlight: i) the disappearance or reduction of certain molecules that are particularly harmful to the environment, following regulatory bans or remediation; ii) the emergence of new molecules recently placed on the market or residues from industrial processes. The study of surface sediments should enable to identify contamination gradients, depending on geographical areas and the uses associated with the molecules, thereby helping to improve our understanding of the various sources of these numerous and diverse micropollutants. Sedimentary samples are available and have been catalogued.

You will be more specifically in charge of:

- implement liquid chromatography coupled with non-targeted High-Resolution-Mass-Spectrometry (HRMS) analysis combined with targeted tandem mass spectrometry (MS/MS) analysis to identify as yet unknown molecules (or families of molecules), including transformation or degradation products. Particular attention will be paid to emerging PFAS and pharmaceutical substances, for which we currently have information on far too few molecules.

This includes i) the sample preparation before analyses (solvent extraction); ii) the chemo-informatic data treatment (from data acquisition by HRMS through to the generation of a list of detected and identified molecules, with an associated confidence level); the data interpretation (using relevant statistical tests).

- Special conditions of activity: chemical risks (CMR exposure). Travel to Nantes will be required for targeted analyses organised at LABERCA-ONIRIS.
- In addition to members of the LAMA-RiverLy team, you will regularly liaise with researchers at LABERCA-ONIRIS (oniris-nantes.fr/recherche-1/laberca) and LEHNA (umr5023.univ-lyon1.fr/) regarding the development, interpretation and dissemination of results.

Training and skills sought

- Recommended qualifications: PhD in chemistry or analytical chemistry, with a specialisation or interest in chemometrics (computational and statistical data analysis).
 - Desired skills: You are proficient in programming in R or another programming language, and in the mathematical and computational algorithms or software required for the processing and analysis of HRMS data (XCMS, MZmine, EnviMass, etc.). You have theoretical and practical knowledge of chromatographic techniques coupled with high-resolution mass spectrometry and of statistical data analysis (multivariate analysis, data mining, etc.).
 - Experience would be an advantage: in analytical chemistry applied to environmental matrices (sample preparation for the analysis of organic contaminants at trace/ultra-trace levels) or in non-targeted HRMS analysis.
 - Required skills: You are able to work as part of a team and interact with a range of colleagues with different areas of expertise (chemistry, environmental sciences, statistics). You are able to work independently whilst also reporting progress and raising concerns. You are organised and able to meet deadlines. You maintain a positive attitude when solving problems and are persistent.
- Ability to synthesise and present results in French and English, both in writing (reports and scientific articles) and orally.

INRAE's life quality

By joining our teams, you benefit from (depending on the type of contract and its duration):

- up to 30 days of annual leave + 15 days "Reduction of Working Time" (for a full time);
- parenting support: CESU childcare, leisure services;
- skills development systems: training, career advise;
- social support: advice and listening, social assistance and loans;
- holiday and leisure services: holiday vouchers, accommodation at preferential rates;
- sports and cultural activities;
- collective catering.

Contract details

- Hosting unit name: RiverLy
- Postal code and city workplace: 69625 VILLEURBANNE
- Type of contract: postdoctoral research
- Duration: 18 months renewable
- Starting date: as soon as possible from Janv 2027
- Remuneration: €3 135,81 to €3 726,54 gross, depending on experience

How to apply

Please send a covering letter and CV to: Cécile Miège

By email: cecile.miege@inrae.fr

✗ Deadline to apply: 18th of Dec 2026

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