

Contrats doctoraux 2026

Titre du projet de thèse : Protactinium(V) in a non-complexing medium and in the presence of an environmentally relevant ligand

Directeur(s) de thèses : Claire Le Naour (IJCLab, Orsay)

Co-directeurs de thèse : Mélody Maloubier (IJCLab), Florent Réal (PhLAM), Valérie Vallet (PhLAM)

Résumé du projet de thèse (en 20 lignes maximum) :

Objective:

This thesis investigates the hydrolysis, complexation, and structural properties of Protactinium(V) with environmentally relevant ligands (phosphate, carbonate). Combining experiments and quantum chemistry, it fills gaps in Pa(V) chemistry, critical for nuclear fuel cycles and medical applications.

Methodology:

- **Experimental:** Use ultratrace ^{233}Pa and ^{231}Pa to determine hydrolysis/complexation constants via extraction, ion exchange, and gamma spectrometry. Study Pa(V) speciation under varying pH, ligand concentration, and ionic strength.
- **Theoretical:** Apply DFT to model Pa(V) complexes, interpret XAS/RIXS spectra, and predict thermodynamic properties.

Expected Outcomes:

- Dataset of hydrolysis/complexation constants.
- Structural characterization of Pa(V) species.
- Protocols for stabilizing Pa(V) in non-complexing media.

Collaboration & Context:

Part of the PEPR SCIAM program, linking IJCLab-Orsay (experimental) and PhLAM-Lille (theoretical). Results will be published in peer-reviewed journals and presented at conferences, with collaboration from K. Kvashnina (ESRF Grenoble).

Skills Developed:

Radiochemistry, synchrotron spectroscopies, quantum chemistry, data analysis, interdisciplinary teamwork in a regulated environment.

Date de recrutement envisagée : 09/01/2026

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Remarques/commentaires supplémentaires :
