



CBH Graduate School  
Université Grenoble Alpes



ElectroPeps:



## Metallopeptide-based Electrocatalysts for Fuel Synthesis

*3-year PhD position in Grenoble, France*

**Project:** Hydrogen ( $H_2$ ) is a promising clean energy vector, but its industrial production is primarily based on fossil fuels, leading to high  $CO_2$  emissions. Only a small fraction is "green hydrogen," produced through water electrolysis using renewable energy. Similarly, ammonia ( $NH_3$ ), crucial for fertilizers and industrial applications, has potential as a carbon-free energy carrier but relies on the energy-intensive Haber-Bosch process. The electrochemical reduction of nitrite ( $NO_2^-$ ) to ammonium ( $NH_4^+$ ) offers a sustainable alternative but faces challenges in achieving high selectivity and efficiency. Metal complexes based on the ATCUN (Amino-Terminal Copper and Nickel binding) motif have shown potential for  $H_2$  and  $NH_3$  production. In this context, our project aims to investigate the potential of series of ATCUN-based metal complexes (M-ATCUN) as homogeneous electrocatalysts for  $H_2$  and  $NH_3$  production.

The PhD candidate will design and synthesize series of water-soluble (pseudo)peptide ligands, characterize the corresponding metal-complexes and their catalytic properties. By tuning the (pseudo)peptide sequence, we will be able to modulate the catalytic properties of the metallopeptides. From this structure/activity relationship study, combined with mechanistic investigation, we aim to rationalize the key parameters for optimal activity.

**Keywords:** Peptide synthesis • Electrocatalysis • Metal-binding peptides • Bioinorganic chemistry

**Location:** The PhD candidate will be part of a collaborative project between two groups in Grenoble: the CIRE team of the DCM lab (electrochemistry, spectroscopy, mechanistic investigation) and the CIBEST team of the SyMMES labs (peptide synthesis, metal-binding peptides).

DCM group: <https://dcm.univ-grenoble-alpes.fr/research/chimie-inorganique-redox>

SyMMES group: <https://www.symmes.fr/Cibest>

**Funding:** 3-year PhD position, funded by Labex Arcane.

**Profile:** The candidate should have a Master's degree in Chemistry at the beginning of the PhD. Experience in organic/peptide synthesis, inorganic chemistry or electrochemistry is recommended.

**Application deadline:** April 6<sup>th</sup>, 2025 March 26<sup>th</sup>, 2025.

**Interview:** April 9-11, 2025

The candidate will be interviewed by a Labex Arcane committee for validation of the fellowship (on May 13 2025)

**How to apply:** Applicants should send their CV (1 page max.), a cover letter, academic transcripts and two recommendation letters to [noemie.lalaoui@univ-grenoble-alpes.fr](mailto:noemie.lalaoui@univ-grenoble-alpes.fr) and [sarah.hostachy@cea.fr](mailto:sarah.hostachy@cea.fr).