



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.symm.es.fr/Cibest>

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.

Funding: 3-year PhD position, funded by Labex Arcane (<https://arcane.univ-grenoble-alpes.fr/>). The candidate will be interviewed by the Labex Arcane jury 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 and sarah.hostachy@cea.fr.

Application deadline: April 6, 2025.