

Electrifying the synthesis of organic compounds: Electrochemical coupling of N-C synthons to renewable carbon oxides

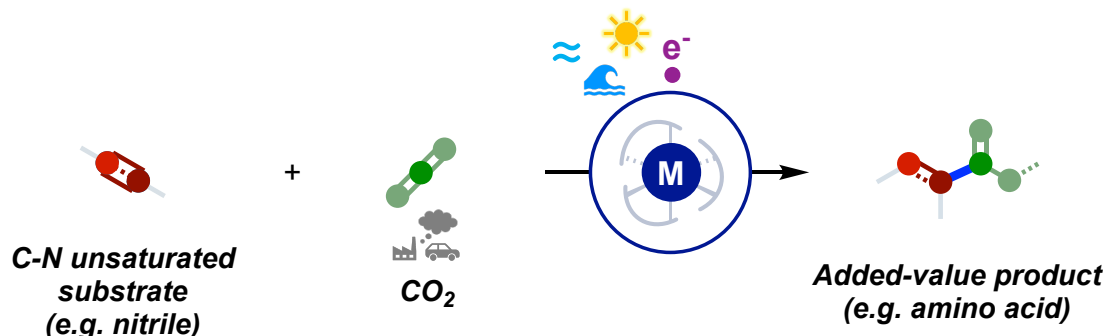
Keywords: molecular electrocatalysis, organometallics, carbon circular economy, renewable resources.

Topic

To shift from fossil-based to sustainable resources in chemical production, the wiring of synthetic pathways with renewable electricity offers a promising approach. This paradigm introduces electrosynthesis (i.e. the creation of chemical bonds using electricity) as a key technology. The reach of this technology depends on the development of efficient catalysts adapted to electrosynthetic conditions – *electrocatalysts*. In this context, our team is developing original approach to deploy electrocatalysis in synthesis.

In this PhD project, we aim at **electrifying the synthesis of value-added organic products** through the incorporation of renewable building blocks. To this end, we will develop an electrocatalytic approach to couple **C-N unsaturated compounds**, such as nitriles or imines, with **abundant small molecules**, such as **CO₂**, to produce **chemicals of interest**, such as **amino acids**, via **low-carbon syntheses** in terms of both energy resources and raw materials. The project capitalizes on molecular strategies previously described by the team and follows an interdisciplinary approach involving molecular synthesis and characterizations, electrochemical/-catalytic studies, mechanistic investigations and electrosynthesis.

Key references N. Kaeffer, W. Leitner, *JACS Au* **2022**, 2, 1266.
 G. Durin, M. Y. Lee, M. A. Pogany, T. Weyhermüller, N. Kaeffer, W. Leitner, *J. Am. Chem. Soc.* **2023**, 145, 17103.
 G. Durin, M. Lee, M. A. Pogany, C. Kahl, T. Weyhermüller, W. Leitner, N. Kaeffer, *Chem. Commun.* **2025**, 61, 520.



Candidate's profile

- MSc degree (or equivalent) in chemistry.
- Excellent knowledge and skills in molecular chemistry (organic, organometallic) in terms of synthesis, characterization and properties (reactivity, physicochemical properties).
- Proficiency in chemical handling under inert atmosphere.
- Interest or experience in electrochemistry.
- Scientific rigor in practice, analysis and reporting.
- Proactivity and team-work.

Skills and knowledge developed

- **Molecular synthesis** (organic, coordination complexes) and identification methods (NMR, GC, MS).
- Reactivity of **organometallic** species.
- **Electrochemistry** of molecular compounds (voltammetry, electrolysis, spectro-electrochemistry).
- Formatting and presentation of results in conferences and scientific articles.
- Project work and scientific collaborations.

Funding: 3-year fully-funded PhD position

Location: Strasbourg, France (Cronenbourg Campus)

Supervision: Dr. Nicolas Kaeffer

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Host: Team MeCSE ([Molecular ElectroCatalysis for Synthesis and Energy](#)) within LIMA - UMR 7042

Deadline for application: 23/10/2026

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