



**MASTER 2 Internship - 2025**  
<https://www.lrcs.u-picardie.fr/>

## **Advanced electrochemical investigation of conductive material as positive electrode**

Charge-transfer complexes (CTCs) have recently gained attention as potential materials for energy storage. While initially investigated for their optical and electronic properties, they are now emerging as promising candidates for use as redox-active components in electrochemical devices.

This specific class of materials is formed **by combining an electron-donating molecule** (referred to as D or p-type in the battery field) **with an electron-accepting molecule** (denoted A or n-type). The resulting complex can exhibit entirely different and often remarkable properties compared to the isolated donating or accepting molecule. Originally studied since the 1970s for their **exceptional electronic conductivity**[1], these compounds are now recognized as promising redox-active candidates for next-generation batteries[2–4]. The iconic TTF–TCNQ complex, for example, **offers tuneable conductivity depending on the stacking of its donor and acceptor molecules**. This unique, metal-like conductivity could drastically reduce or even eliminate the need for conductive carbon typically required in electrode formulations (10–60wt%), opening new pathways for next-generation energy storage devices.

As part of a national project, we are aiming to investigate **different type of material with high electronic conductivity, mostly charge transfer complexes** and understand their **electrochemical properties and material evolution** for an integration in a battery device. To this end, we are looking for a motivated and dynamic trainee for a 6-months 2nd-year master internship starting in February 2026.

The aims of this project are to: formulate electrode, optimize the electrolyte and investigate the electrochemical performance in battery configurations. A specific attention will be paid to the characterization of such materials using electrochemistry *and in situ/ex situ/operando* measurements with vibrational spectroscopy (IR & Raman) and X-Ray Diffraction.

**STARTING & ENDING DATES :** From February to July 2026 (6 months)

### **CONTEXT / QUALIFICATIONS :**

The work will be carried out at the LRCS Laboratory in Amiens, supervised by Matthieu Becuwe and Manon Mignon. We are looking for a student with an interest in materials chemistry and electrochemistry. Prior experience in battery application would be beneficial. English language speaking skills and team working abilities are highly recommended. This internship will provide the candidate valuable experience in electrochemical testing for energy applications, all in a stimulating and collaborative academic research environment.

The position is located in a sector covered by the protection of scientific and technical potential (PPST), and therefore requires, in accordance with regulations, that your arrival be authorized by the competent MESR authority.

### **CONTACT(S) / ADVISOR(S)**

Matthieu Becuwe [matthieu.becuwe@u-picardie.fr](mailto:matthieu.becuwe@u-picardie.fr)

Manon Mignon [manon.mignon@u-picardie.fr](mailto:manon.mignon@u-picardie.fr)

### **Selection process**

The candidate should first contact the contact person(s) above and provide (via e-mail):

- a detailed CV
- a motivation letter emphasizing the fit between the candidate's background and the proposed position
- the names and contact details of at least 2 reference persons