

PhD position for the study of molecular CO₂-reducing electrocatalysts using time-resolved X-ray spectroscopy.

Duration : 3-year position

Location : SOLEIL Synchrotron, Paris-Saclay Campus (South of Paris, France) and Université Paris Diderot, Paris.

Starting date: Fall 2018.

SOLEIL is the French national synchrotron facility, located on the Paris-Saclay campus, south of Paris. It is a multi-disciplinary instrument and a research laboratory, whose mission is to run research programs using synchrotron radiation and to develop state-of-the-art instrumentation on beamlines. SOLEIL is a unique tool for both academic research and industrial applications across a wide range of disciplines including physics, biology or chemistry. It is highly competitive in terms of beam quality and available techniques and is used by over 5 000 researchers coming from France and abroad.

The Laboratoire d'Electrochimie Moléculaire (LEM) is a joint laboratory between the Université Paris Diderot and the CNRS located in Paris. It focuses on the development and use of electrochemistry tools for the analysis of fundamental processes such as electron transfer and bond breaking or formation. It has a long-standing experience in the study of proton and CO₂ reduction electrochemical reactions and is renowned worldwide for its contributions in the field.

SOLEIL and the LEM are starting an ambitious project on the study of electrochemical reactions by time-resolved X-ray absorption spectroscopy. The development of time-resolved *in situ/operando* X-ray spectroelectrochemistry would allow the study of many electrocatalytic reactions and the identification of critical intermediates. Our project focuses on the study of molecular electrocatalysts (Fe porphyrins) for the CO₂ to CO reduction reaction. The exact structural and electronic structure of the reaction intermediates along the CO₂ to CO remains unknown due to difficulties in probing the solid-liquid interface under catalytic conditions. The identification of reaction intermediates is, however, critical to the development of catalysts that can further reduce CO into valuable chemicals. The PhD candidate will work on the development and use of time-resolved spectroelectrochemical tools at SOLEIL in order to observe intermediates species hypothesized from electrochemical measurements at the LEM. Synchrotron campaigns at the ROCK beamline in SOLEIL will be part of the project as well as data analysis using chemometric tools available at SOLEIL.

We are looking for a highly motivated candidate with a Master degree in chemistry or physical chemistry, and a strong interest in understanding electrochemical reactions related to energy issues. Experience in electrochemistry and/or spectroscopy are expected, as well as basic knowledge of inorganic synthesis. Experience in synchrotron techniques or instrumental developments would be a plus but is not required. Good communication skills (both written and oral) in English are expected, while the French language is not required.

Questions and applications should be sent to:

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