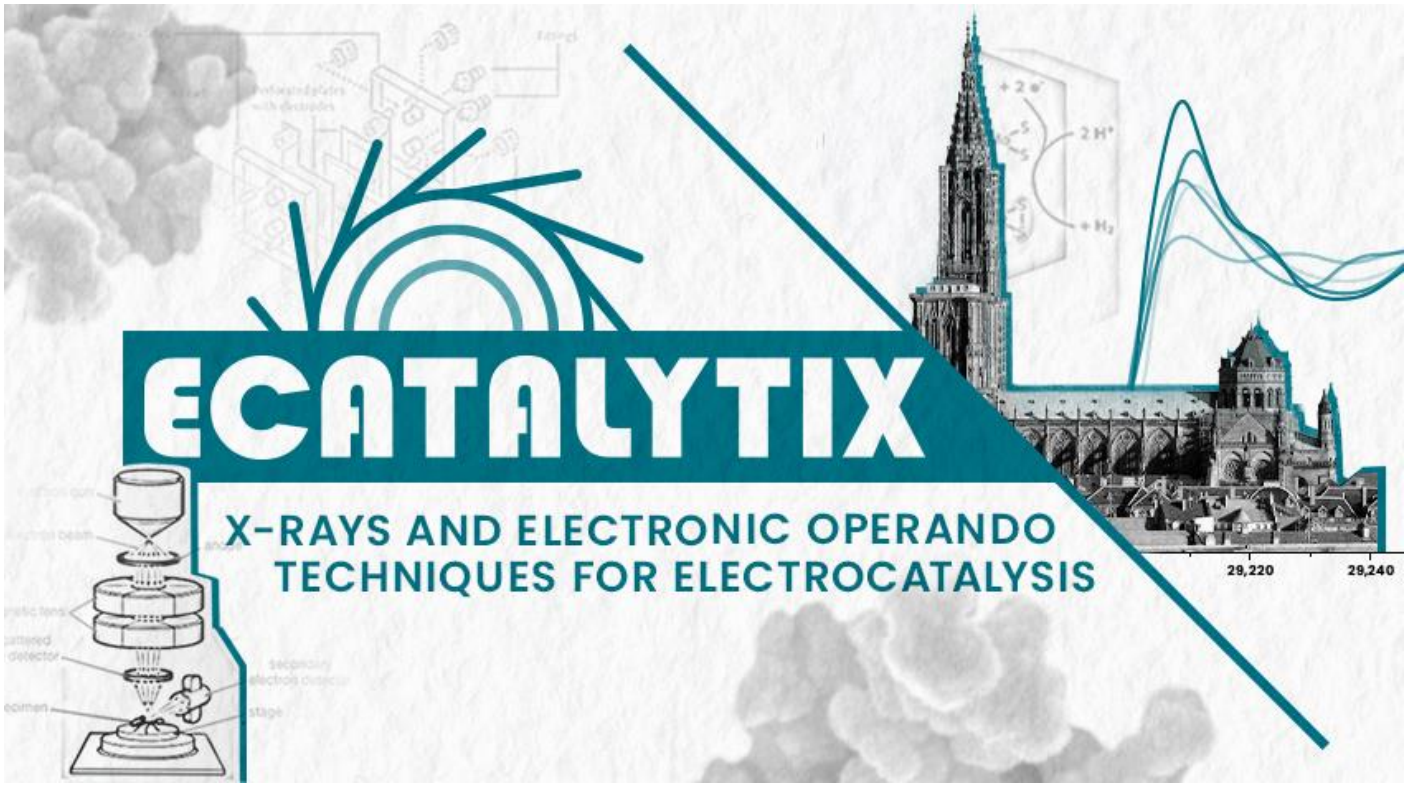

Electrocatalysis is the cornerstone of the next generation of technologies aiming to convert electrical power collected from intermittent, renewable sources into basic chemicals and fuels or the conversion of the latter in electricity. In this regard, electrocatalytic reactions, such as the electrochemical oxidation and reduction of water, the hydrogen oxidation or the carbon dioxide and oxygen reduction are all of critical importance.

The EcatalytiX symposium aims at taking a look at the current and future techniques, based on X-rays or electron beams, to observe these reactions under conditions as close as possible to operation. Gathering scientists from all Europe, the meeting wishes to shape directions to answer some of the following questions:

- **How is the coupling of X-rays and electron-based techniques to electrocatalysis going to evolve in the near future and what are the main limits,** challenges and solutions that it is currently facing (e.g., time resolution, beam effect, multi-scale analysis)?
- **What can we learn, by operando approaches, from model systems that can be applied to large-scale electrocatalytic systems**. Conversely, how can we mimic applied electrolysers or fuel cells for large instruments analytical techniques?

This symposium will be the ideal place to meet beamline scientists, microscopists and electrochemists alike, discovering state-of-the-art operando approaches and how the future of the field is shaping up.

INTERNATIONAL SOCIETY OF ELECTROCHEMISTRY ISE
DECODE
ICPEES Institut de Chimie et Procédés pour l'Énergie, l'Environnement et la Santé
FRANCE 2030
SOLEIL SYNCHROTRON
SCF Société Chimique de France Division Transversale Energie
Université de Strasbourg
USIAS University of Strasbourg Institute for Advanced Study

Programme

Wednesday, April 3rd

12:00 – 13:00 Welcome registration, coffee

13:00 – 13:30 Introduction

Session #1: State-of-the-art techniques: Where are we standing?

Chair: Jean-Jacques Gallet

13:30 – 14:00 Steps towards understanding the oxygen evolution reaction enigma by operando quick X-ray absorption spectroscopy

Emiliana Fabbri *- PSI, Villingen, Switzerland*

14:00 – 14:20 Insights from operando QXAFS and PCA for the pulsed eCO_2RR using Cu-based bimetallic catalysts

Martina Ruscher *- Fritz-Haber Institute, Germany*

14:20 – 14:40 Operando X-ray scattering for electrocatalysis and beyond

Meryem Ennaji *- ICGM, Montpellier, France*

14:40 – 15:00 Spectroscopic and electrochemical considerations for in situ and operando soft X-ray photon-in–photon-out spectroelectrochemistry

Marc F. Tesch *- Max Planck Institute, Mülheim an der Ruhr, Germany*

15:00 – 15:30 *Coffee break*

15:30 – 16:00 Structure of carbon-supported nanoparticle electrocatalysts probed with operando X-ray scattering

Rebecca Pittkowski *- Copenhagen University, Denmark*

16:00 – 16:20 Mechanistic studies of electrocatalysts for hydrogen economy exploiting X-ray absorption spectroscopy under operating conditions

Raul Garcia-Diez *- Helmholtz-Zentrum Berlin, Germany*

16:20 – 16:40 Structural transformations in NiFe layer double hydroxide and Ni (Oxy)hydroxides under operating conditions for oxygen evolution

Fabio Dionigi *- Technische Universität Berlin, Germany*

16:40 – 17:00 Liquid TEM study of Cu and CuPd thin films for nitrate electroreduction

Maria Letizia De Marco *- Institut de physique et de chimie des matériaux de Strasbourg, France*

17:00 – 17:45 Round table: Current Challenges in Operando Studies

Chairs: ***Tristan Asset and Benedikt Lassalle-Kaiser***

17:45 – 20:00 *Poster Session and Alsatian Cocktail*

Thursday, April 4th

Session #2: Model system

Chair : Nathaly Ortiz

08:30 – 09:00	Electrochemistry in the light of in situ Bragg coherent diffraction imaging ***Marie-Ingrid Richard*** *- CEA, Grenoble, France*
09:00 – 09:20	Amine-mediated electroreduction of CO_2 to formic acid and CO by COFbpyMn single-site catalyst in aqueous media ***Changwei Liu*** *- Institut Català d'Investigació Química, Tarragona, Spain*
09:20 – 09:40	Spectro-electrochemical examination of Pt electrocatalysis using in-situ NAP-XPS ***Hassan Javed*** *- Leiden Institute of Chemistry, The Netherlands*
09:40 – 10:00	Towards operando transmission electron microscopy in aqueous electrolytes: optimized liquid flow configuration ***Marco Fontana*** *- Politecnico di Torino, Italy*
10:00 – 10:30	*Coffee break*
10:30 – 11:00	Resolving the gold-electrolyte interface using in situ X-ray photoelectron spectroscopy ***Sheena Louisia*** *- Leiden Institute of Chemistry, The Netherlands*
11:00 – 11:20	The charge distribution at electrochemical interfaces probed with in situ surface resonant X-ray diffraction ***Yvonne Soldo-Olivier*** *- Leiden Institute of Chemistry, The Netherlands*
11:20 – 11:40	Operando XAS study of Fe incorporation effects on Ni-Fe Prussian blue analogue for electrocatalytic water oxidation ***Guixiang Huang*** *- Max Planck Institute, Mülheim an der Ruhr, Germany*
11:20 – 11:40	Seeing inside palladium hydrides with X-rays ***Frédéric Maillard*** *- LEPMI, Gières, France*
12:00 – 14:30	*Lunch*

Session #3: Emerging techniques and challenges: Where are we going?

Chair: Ovidiu Ersen

14:30 – 15:00	Bridging the nanoscale and the ensemble through correlated operando electron and X-ray microscopy experiments ***See Wee Chee*** *- Fritz-Haber Institute of the Max Planck Society, Berlin, Germany*
15:00 – 15:20	In situ studies of copper catalysts for electrochemical CO_2 reduction by soft X-ray spectro-microscopic characterization ***Chunyang Zhang*** *- McMaster University, Hamilton, Canada*

15:20 – 15:40	In situ hydration study of proton conductor electrolytes using a high-throughput approach ***Giulio Cordaro*** *- Université Paris-Saclay, Gif-sur-Yvette, France*
15:40 – 16:00	Unraveling the oxidation behavior of phosphorus impurities in HT-PEMFCs via in situ tender X-ray spectroscopy at the Pt|aqueous H_3PO_3 interface ***Romualdus E. Wibowo*** *- Helmholtz-Zentrum Berlin, Germany*
16:00 – 16:30	*Coffee break*
16:30 – 17:00	Tracking the evolution of Ni-based single atom catalysts for the CO_2 electroreduction reaction: An operando XAS/XES study assisted by machine learning techniques ***Andrea Martini*** *- Fritz-Haber Institute, Berlin, Germany*
17:00 – 17:45	Round table: Future Challenges of Operando Studies *Chairs:* ***Elena Savinova and Jakub Drnec***
19:00 - 22:00	*Conference dinner in downtown Strasbourg*

Friday, April 5th

Session #4: *Applied and industrial systems*

Chair: Clément Sanchez

08:30 – 09:00	Bridging discovery to application: Utilizing Synchrotron techniques in electrocatalysis ***Andrea Zitolo*** *- Synchrotron Soleil, Saint-Aubin, France*
09:00 – 09:20	Paradigm shift of platinum oxidation below fuel cell open-circuit voltage ***Raphaël Chattot*** *- Institut Charles Gerhardt, Montpellier, France*
09:20 – 09:40	An operando zero-gap MEA cell for combined spectroscopy, diffraction, and imaging, applied to the study of ion effects in CO_2 electrolysis ***Matthew Mayer*** *- Helmholtz-Zentrum Berlin, Germany*
09:40 – 10:00	Operando X-ray studies of gas evolving and consuming electrocatalysts ***Andrea Russell*** *- University of Southampton, United Kingdom*
10:00 – 10:30	*Coffee break*
10:30 – 11:00	Electrolyte distribution in silver gas diffusion electrodes for electrochemical CO_2 reduction measured by operando Synchrotron tomography ***Jens Osiewacz*** *- Clausthal University of Technology, Clausthal-Zellerfeld, Germany*
11:00 – 11:20	Electrochemical and structural study of NiRux heterofunctional catalysts for the alkaline HER ***Marie-Sophie Fernandes-Diaz*** *- Synchrotron Soleil, Saint-Aubin, France*
11:20 – 11:40	Set-ups for in-operando X-ray absorption spectroscopy/electrochemistry in half-cell and fuel-cell configurations: The case study of palladium deactivation in direct alcohol fuel cells ***Enrico Berretti*** *- CNR-ICCOM, Firenze, Italy*
11:40 – 12:00	Characterizing microstructure and gas transport properties of electrospun gas diffusion layers in proton exchange membrane fuel cells through high-resolution imagery ***Bertrand Roussillo--David de Beaufort*** *- CEA, Grenoble, France*
12:00 – 14:30	*Concluding Remarks, Followed by Lunch*