PhD position: New oxyfluorides for the production of green fuels from electrolysis

Project

If hydrogen represents a future solution for renewable energy harvesting and storage, its production must be based on carbon-free technology in a vision of sustainable development. The water splitting by electrolysis appears to be an ideal solution, the resource being almost unlimited. However, its industrial development is hampered by the sluggish kinetics of oxide ion oxidation at the anode. Although the presence of a catalyst significantly improves properties, the cost of hydrogen production remains expensive. Recently, we discovered a new oxyfluorinated catalyst $Co_{0.5}Fe_{0.5}O_{0.5}F_{1.5}$ with a rutile-type structure with performances superior to those of the state-of-the-art oxide catalysts in alkaline media. The exceptional properties of this new oxyfluoride, the first member of a new family, are based on anionic and cationic mixing. The project aims at exploring iron-based oxyfluorides containing iron as new anodic electrocatalyst family for water splitting in a basic electrolyte. To reach an optimal chemical composition with enhanced performance, 3d metal substitutions and doping with high-valence cations will be considered. For the first time, these catalysts will be tested for the CO_2 conversion to synthetic fuels (methanol, ethanol…).

Required profile

Master 2 or hold a diploma from an Engineering School in Chemistry.
Chemist in Solid State Chemistry/Inorganic Chemistry with good knowledge in crystallography (phases identification, Full Pattern Matching, Rietveld).
Background in the synthesis of crystallized inorganic compounds (solvothermal synthesis, coprecipitation and solid reactions).
Acquisition/interpretation of classical solid-state technics (TGA, IR, SEM, TEM).
Knowledge in electrochemistry and/or chromatography would be appreciated.

Interested?

We look forward to receiving your application via e-mail (jerome.lhoste@univ-lemans.fr or edouard.boivin@univ-lemans.fr) with a CV and a cover letter.

Website of laboratory : https://immm.univ-lemans.fr/fr/index.html

Starting date: September 2023. Application deadline: 31.04.2023