DEPARTAMENT DE QUÍMICA INORGÀNICA			
	OFERTA DOBLE GRAU QUÍMICA-ENGINYERIA QUÍMICA		
NÚMERO	**TEMA**	**TUTOR(S) ACADÈMIC(S) (si un és d'un altre departament, posa'l entre parèntesi)**	**TUTOR EXTERN (si escau)**
1	Transition-Metal Oxide Electrocatalysts for the Oxidative Removal of Organic and Inorganic Pollutants from Water	Abargues López, Rafael	
2	Catalysis, Gas Interaction and Gas Capture in MOF-Type Porous Materials	Tatay Aguilar, Sergio	
3	Synthesis and characterization of layered double hydroxides (LDH) for electrochemical and environmental applications	Abellán Saez, Gonzalo	
4	Metal-Organic Frameworks as Multifunctional Enzyme Hosts	Giménez Marqués, Mónica	

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT (CHEMISTRY)
CHEMISTRY AND CHEMICAL ENGINEERING DOUBLE DEGREE

ACADEMIC TUTOR 1 Dr. Rafael Abargues López

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Transition-Metal Oxide Electrocatalysts for the Oxidative Removal of Organic and Inorganic Pollutants from Water

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

El objetivo general es diseñar y evaluar electrocatalizadores basados en óxidos de metales de transición para la oxidación electroquímica de contaminantes orgánicos e inorgánicos presentes en aguas. Se considerarán compuestos orgánicos modelo, como fenoles, colorantes, alcoholes o fármacos, así como especies inorgánicas redox-activas, como nitrito, sulfito o sulfuro. Específicamente, se pretende: (i) sintetizar y caracterizar óxidos de Ni, Co, V, Fe, Mn o Cu; (ii) determinar actividad, selectividad, eficiencia faradaica, grado de mineralización y estabilidad; (iii) estudiar el efecto de la composición, estructura, morfología y estado de oxidación; y (iv) correlacionar las propiedades del material con la conversión y los productos de oxidación.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Se realizará una revisión bibliográfica sobre óxidos de metales de transición aplicados a la electrooxidación y al tratamiento de aguas. Se prepararán via óxidos simples o mixtos y electrodos soportados en electrodos mediante síntesis in situ, tratamiento térmico por la técnica FIRA (Fast Infrarred Rapid Annealing). La caracterización del material incluirá TGA, DRX, FTIR/Raman, SEM-EDS y XPS. La actividad se evaluará mediante voltametría cíclica, voltametría de barrido lineal, cronoamperometría, espectroscopía de impedancia y electrólisis a potencial o corriente controlados. El rendimiento se estudiará frente a contaminantes orgánicos representativos y especies inorgánicas como nitrito, sulfito o sulfuro. La eliminación y los productos se analizarán mediante UV-Vis, HPLC y/o GC. Se determinarán conversión, selectividad, mineralización, eficiencia faradaica, consumo energético, lixiviación metálica y estabilidad. Se optimizarán pH, potencial, concentración de contaminante, carga catalítica y tiempo de electrólisis.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT (CHEMISTRY)
CHEMISTRY AND CHEMICAL ENGINEERING DOUBLE DEGREE

ACADEMIC TUTOR 1 Sergio Tatay Aguilar

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Catalysis, Gas Interaction and Gas Capture in MOF-Type Porous Materials

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This project aims to study the interaction of selected gases with MOF-type porous materials. The main objectives are to evaluate material stability under gas exposure, analyse gas adsorption and retention, and explore possible catalytic gas conversion processes. The work will relate the structural and chemical features of the materials to their performance in gas capture and catalysis.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Selected MOF-type porous materials will be activated and exposed to different gas streams under controlled conditions. The effect of gas exposure will be evaluated by comparing the materials before and after treatment. Gas adsorption or retention will be analysed using suitable experimental techniques. When appropriate, preliminary catalytic tests will be carried out to assess gas conversion. The materials will be characterised by techniques such as powder X-ray diffraction, infrared spectroscopy, thermogravimetric analysis and/or gas adsorption measurements, depending on sample availability and experimental needs. The results will be used to correlate gas–solid interactions with material structure, stability and catalytic behaviour.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT (CHEMISTRY)
CHEMISTRY AND CHEMICAL ENGINEERING DOUBLE DEGREE

ACADEMIC TUTOR 1 Gonzalo Abellán Sáez

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Synthesis and characterization of layered double hydroxides (LDH) for electrochemical and environmental applications

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The main objective is to study the synthesis of layered double hydroxides that can be used in both electronic and environmental applications.

Secondary objectives include: optimizing the synthesis process, characterizing the resulting material structurally and in terms of composition, electrochemically characterizing the resulting material, and studying its potential in electrochemical and/or environmental applications.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Several layered double hydroxides will be synthesized on a laboratory scale. These materials will be characterized using the following techniques: X-ray Diffraction Spectroscopy (XRD), Fourier Transform Infrared Spectroscopy (FTIR), X-ray Photoelectron Spectroscopy (XPS), Thermogravimetric Analysis (TGA), Scanning Electron Microscopy (SEM/TEM), Diffuse Reflectance, and any other technique deemed necessary.
Next, the applicability of these materials as electrodes for the Oxygen Energy Reaction (OER) and the Hydrogen Evolution Reaction (HER) will be studied. Their applicability in the field of persistent water pollutants will also be investigated through the monitarization of the concentration of selected pollutants in the presence of the material.

Annex 1 (**not to be printed**)

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT (CHEMISTRY)
CHEMISTRY AND CHEMICAL ENGINEERING DOUBLE DEGREE

ACADEMIC TUTOR 1 Mónica Giménez Marqués

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Metal–Organic Frameworks as Multifunctional Enzyme Hosts

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

General objective: To analyze the potential of Metal–Organic Frameworks (MOFs) as multifunctional hosts for enzyme immobilization, focusing on their structural properties, immobilization strategies, and applications in biotechnology and catalysis.
Specific objectives:
- To synthesize and characterize a selected MOF.
- To immobilize a model enzyme within the MOF.
-To characterize the enzyme–MOF composite.
- To compare the catalytic performance of free and immobilized enzymes under different conditions.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The experimental work will involve the synthesis and characterization of a selected Metal–Organic Framework (MOF), followed by enzyme immobilization using in situ encapsulation.

The resulting enzyme–MOF biocomposite will be characterized using suitable analytical techniques (XRD, FTIR, SEM, BET and TGA), and its catalytic performance will be evaluated by measuring enzyme activity, stability, and reusability under different experimental conditions. The results will be compared with those of the free enzyme to assess the effectiveness of the MOF as a multifunctional enzyme host.

Este documento debe ser enviado a la Secretaría del Departamento

(indicando en las observaciones que es para el doble grado QIQ)