DEPARTAMENT DE QUÍMICA INORGÀNICA

NÚMERO	TEMA	TUTOR(S) ACADÈMIC(S) (si un és d'un altre departament, posa'l entre parèntesi)	TUTOR EXTERN (si escau)
1	Development of MOF-Based Electrocatalysts for Nitrate Reduction	Abánades Lázaro, Isabel - Soriano López, Joaquín	
2	Efficient nutrient removal from wastewater using multivariate modulated metal-organic frameworks	Abánades Lázaro, Isabel - Tuono Martins Xavier, Gabriela	
3	Size control over Multivariate Modulates Metal-organic framework porous: Thermodynamic vs. Kinetic Stability	Abánades Lázaro, Isabel - Morrone, Josefina	
4	Transparent Conductive Polymers for photovoltaics and photodetectors	Abargues López, Rafael	
5	Luminescent Nanocomposites for High-Efficiency and Large-Area LEDs	Abargues López, Rafael	
6	In-Situ Synthesis of NiOx Films for Efficient Hole Transport Layer in Perovskite Solar Cells	Abargues López, Rafael	
7	Transparent Semiconductors for Next-Generation Perovskite Solar Cells	Abargues López, Rafael	
8	Lead-Free Double Perovskites Nanocomposite for Photodetectors, Photocatalysis and Memristors	Abargues López, Rafael	
9	Mesoporous silicas for delivery applications	Amorós del Toro, Pedro José - El Haskouri Bennagi, Jamal	
10	Development of Colourimetric Chemical Sensors for different Vapours based on Series of Quinoline-Based M(III) Complexes	Benmansour Souilamas, Samia	
11	Development of Sensors Based on Polyoxometalate Matrices	Benmansour Souilamas, Samia	
12	Synergy between Polyoxometalates (POMs) and Redox-Active Quinoid-Ligands for Advanced Catalysis (Bibliographic)	Benmansour Souilamas, Samia	
13	Surface functionalization of Metal Organic Framework with Photoactive Molecules	Blandez Barradas, Juan Francisco	
14	Structural and Anti-oxidant properties of Metal Complexes with small azamacrocycles	Blasco Llopis, Salvador - Verdejo Viu, Begoña	
15	Development of low bandgap metal halide perovskites using close space sublimation	Bolink, Hendrik	
16	Optimizing the properties of metal halide perovskites for photovoltaic applications	Bolink, Hendrik	
17	Multifunctional compounds based on coordination chemistry approaches	Clemente León, Miguel	
18	H2 - cracker nanoparticles. Design, synthesis and characterisation of smart redox-responsive organosilica systems	Delgado Pinar, Estefanía	
19	Particle size control in mesoporous phosphates via variation of the structure-directing agent	El Haskouri Bennagi - Amorós del Toro, Pedro José	

20	Synthesis and characterization of mesoporous aluminum phosphates: optimization of surfactant extraction	El Haskouri Bennagi - Amorós del Toro, Pedro José	
21	Degradation study of mesoporous phosphates in simulated biological media	El Haskouri Bennagi, Jamal	
22	Sol-gel encapsulation of lactic acid bacteria in silica matrices: synthesis and survival evaluation	El Haskouri Bennagi, Jamal	
23	Metal-Organic Frameworks Composites for Environmental Applications	Ferrando Soria, Jesús	
24	Design and synthesis of multivariant metal-organic frameworks	Ferrando Soria, Jesús	
25	Environmental and Biomedical Applications of Hydrolytic Polyamine Metallorganic Cages	García-España Monsonís, Enrique	
26	Environmental and Biomedical Applications of Quinoline-Containing Polyamines	García-España Monsonís, Enrique	
27	Iron-Based Molecular Materials for the Selective Uptake of Gases and Pollutants	Gaspar Pedrós, Ana Belén	
28	Photocatalytic water oxidation with polyoxometalates	Giménez Saiz, Carlos	
29	Strategies for degrading RNAs	González García, Jorge	Bargiela Schonbrunn, Ariadna
30	Developing ligands to target G-Quadruplex DNA	González García, Jorge	Galiana Roselló, Cristina
31	Non-Canonical nucleic acid structures as therapeutic targets in medicine	González García, Jorge	Galiana Roselló, Cristina
32	Development of a model for the evaluation of supramolecular interaction through biophysical titrations	González García, Jorge - Blasco Llopis, Salvador	
33	Evaluation of Ultrasound-Induced Linker Cleavage and Characterization of Degradation Products	Lozano Torres, Beatriz	
34	Short Peptide Sequences as Progammable Linkers for Adaptive Metal-Organic Frameworks	Martí Gastaldo, Carlos	
35	Design, sythesis and characterization of new phenolic oximes to obtain metal complexes of biomedical interest	Martínez Lillo, F. José	
36	Current status and perspectives of copper-based complexes as anticancer agents against glioblastoma pathology	Martínez Lillo, F. José	
37	Metalloligand-based MOFs	Mínguez Espallargas, Guillermo - Salinas Uber, Jorge	
38	Controlled growth of copper chloride crystals with helical magnetism	Navarro Moratalla, Efrén	
39	Synthesis of layered hydroxides as new candidates for quantum spin liquids	Navarro Moratalla, Efrén	
40	Growth of atomically thin layered bromide crystals for electronic devices	Navarro Moratalla, Efrén	
41	Design and synthesis of bioMOFs and their application in environmental remediation	Pardo Marín, Emilio	
42	Host-guest chemistry of metal-organic frameworks (MOFs) and their use as chemical reactors	Pardo Marín, Emilio	
43	The Spin Crossover Phenomenon in Iron(II) Complexes	Real Cabezos, José Antonio	
44	Bibliographic revision on the use of 2D materials in energy conversion reactions	Ribera Hermano, Antonio Luis	

45	Synthesis, characterization, and electrochemical study of photocatalysts for energy conversion reactions based on LDHs and hybrid structures with other 2D materials	Ribera Hermano, Antonio Luis	
46	Perovskite-Nickel Acetate Nanocomposites for Photodiode Applications	Ripollés Sanchis, Teresa	
47	Composition Engineering of Metal Halide Perovskite for Photodiode Applications	Ripollés Sanchis, Teresa	
48	Novel materials, arrays of sensors and sustainable processes I	Ros Lis, Jose Vicente	
49	Novel materials, arrays of sensors and sustainable processes II	Ros Lis, Jose Vicente	
50	Novel materials, arrays of sensors and sustainable processes III	Ros Lis, Jose Vicente	
51	Thermal defect engineering for post-synthetic modification of porous materials	Rubio Giménez, Víctor	
52	Structure-Property Relationships in Vapor-Deposited Metal Halide Perovskite Thin Films for Optoelectronic Devices	Sessolo, Michele	
53	Chemical design of artificial synapses based on coordination compounds	Torres Cavanillas, Ramón	
54	Sustainable Carbon-Based Supports for Iron Nanocatalysts: Synthesis and Catalytic Performance	Úbeda Picot, Mª Ángeles - (Pérez Pla, Francisco F.)	

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Isabel Abánades Lázaro

ACADEMIC TUTOR 2 Joaquín Soriano López

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Development of MOF-Based Electrocatalysts for Nitrate Reduction

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

-Síntesis y Caracterización estructural de MOFs mediante técnicas como XRD, SEM, BET, FTIR y TGA, entre otras.
-Modificar eléctrodos con los MOFs sintetizados para su uso como electrocatalizadores en celdas electroquímicas.
-Electrosíntesis de MOFs para deposición in situ en el electrodo de trabajo
-Evaluar la actividad electrocatalítica de los MOFs en la reducción de nitratos.
-Analizar la selectividad y eficiencia de conversión hacia productos deseados.
-Correlacionar el rendimiento de los MOFs con sus propiedades estructurales con su comportamiento electrocatalítico.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Metodologías sintéticas para el control químico de MOFs en síntesis solvotermal y electrosíntesis.
Caracterización estructural de las propiedades de los MOFs:
Cristalinidad, composición, defectividad, porosidad, tamaño de partícula, hidrofobicidad/hidrofilicidad, carga, estabilidad coloidal, térmica, química y mecánica.
Modificación de electrodos: Se prepararán electrodos de trabajo modificados con los MOFs mediante dos estrategias: drop-casting y electrosíntesis directa (in situ) del MOF sobre el electrodo.
Evaluación de la actividad electrocatalítica de los MOFs hacia la reducción de nitrato:
Voltametría cíclica para estudiar los procesos redox y la actividad catalítica, voltametría de barrido lineal para determinar el potencial de inicio de reducción y la corriente máxima, espectroscopía de impedancia electroquímica para analizar la resistencia de transferencia de carga y cronoamperometría para evaluar la estabilidad del MOF a largo plazo.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Isabel Abánades Lázaro

ACADEMIC TUTOR 2 Gabriela Tuono Martins Xavier

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Efficient nutrient removal from wastewater using multivariate modulated metal-organic frameworks

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

1.To synthesize and characterize multivariate modulated MOFs and establish structure–property relationships by assessing the effect of metal composition, modulator type, and synthesis conditions on the resulting materials.

2. To evaluate the performance of multivariate modulated MOFs for nutrient removal and recovery under different experimental conditions

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Synthesis and modification strategies: The effect of different nitrogen-containing modulators on the synthesis of MOFs will be studied. These modulators are expected to control structural defects and promote the incorporation of functional groups into the framework, enhancing material properties for wastewater remediation applications.

Characterization: MOFs will be characterized to evaluate their crystalline structure, morphology, composition, particle size, surface charge, and chemical and thermal stability.

Wastewater treatment: Batch adsorption experiments will be conducted by varying key parameters such as contact time, initial concentration, pH, and adsorbent dosage. Adsorption capacity and equilibrium behavior will be evaluated through kinetic and isotherm studies. Regeneration and reusability will be assessed through successive adsorption–desorption cycles to determine material stability and practical applicability.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Isabel Abánades Lázaro

ACADEMIC TUTOR 2 Josefina Morrone

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Size control over Multivariate Modulates Metal–organic framework porous: Thermodynamic vs. Kinetic Stability

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This work aims to establish correlations between synthesis conditions and the resulting morphological properties, and to evaluate their effect on gas adsorption capacity and selectivity.
Controlling MOF shape and size: By systematically varying key synthesis parameters such as reaction time, reactant concentration, and solvent, materials with distinct particle sizes and morphologies can be obtained.
Evaluation of the shape and size´s influences in its performance in environmentally-relevant applications.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Synthetic methodologies for chemical control of MOF particle size and morphology: We will study the effect of multifunctional monocarboxylate modulators, and their analogous dicarboxylic acids,on MOF crystallisation, systematically varying synthesis parameters such as temperature, reaction time, reactant concentration, and solvent composition. The modulator-to-linker ratio and the use of mixed-solvent systems will be explored to achieve precise control over particle size and morphology. Structural characterisation of the MOFs' properties: Phase purity and crystallinity will be assessed by powder X-ray diffraction. Particle size, morphology, and composition will be evaluated by electron microscopy and complementary spectroscopic techniques, and porosity will be determined from gas adsorption data. Gas adsorption performance: We will evaluate the adsorption of environmentally-relevant gases (including N_2, CO_2). The determined surface area, pore volume, and selectivity will be correlated with the particle size and morphology obtained.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Rafael Abargues López

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Transparent Conductive Polymers for photovoltaics and photodetectors.

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This project focuses on the in-situ synthesis of transparent conducting polymers in apolar solvents for emerging optoelectronic devices. The study will examine the relationship between polymer formulation, optical transparency, electrical conductivity and interfacial charge transport. The most promising polymer films will be integrated as hole-transport materials in photovoltaic cells and photodetectors to evaluate their effect on charge extraction, photovoltaic performance, photoresponse and device stability.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The methodology involves formulating solutions for in-situ synthesis in apolar solvents and the deposition of conducting polymers within various polymeric matrices, such as acrylic polymers and polystyrenes, directly onto perovskites ($APbX_3$). Key tasks include the development of solvent systems and the deposition of precursor solutions via spin-coating, ensuring full chemical compatibility with the perovskite layers. The deposition and curing processes will be optimized using electrical, optical, morphological, and structural characterization techniques. The study will evaluate the performance as hole transport layers in the fabrication of both metal halide perovskite solar cells and photodetectors, with the goal of significantly improving their efficiency and operational stability.
Skills to be acquired: Solution processing and in-situ polymerization of conducting polymers, thin-film deposition, optical and electrical characterization, and fabrication of perovskite solar cells and photodetectors.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Rafael Abargues López

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Luminescent Nanocomposites for High-Efficiency and Large-Area LEDs

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Commercial LEDs commonly combine blue chips with rare-earth-based phosphors to produce white light, but this approach relies on critical raw materials with concentrated global supply chains. This project aims to synthesize luminescent nanocomposites based on lead halide perovskite nanocrystals confined within functional matrices for high-efficiency, large-area LED spectral-conversion layers. This approach seeks to reduce dependence on rare-earth-based phosphors, supporting a more sustainable and geopolitically resilient lighting technology. Matrix design and encapsulation strategies will be investigated to improve colour tunability and stability against humidity, O2, light and heat.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The project will develop highly luminescent perovskite nanocrystals confined within metal-organic matrices through solution processing and in-situ crystallization. Thin films will be prepared by spin-coating, while scalable deposition methods such as slot-die and spray-coating will be explored for selected formulations. The effects of composition, deposition, and encapsulation conditions on the optical performance and stability of the nanocomposites will be evaluated by ultraviolet-visible spectroscopy, photoluminescence spectroscopy, PL quantum-yield measurements, X-ray diffraction, electron microscopy and profilometry. The best materials will be tested under blue light-LED excitation to assess colour conversion, luminescence efficiency and photostability for light-converting LEDs. Skills to be acquired: Solution processing of nanomaterials, thin-film deposition and encapsulation, thickness measurement by profilometry, optical, structural and morphological characterization, and evaluation of luminescent materials for LED applications.

Annex 1 (not to be printed)

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Rafael Abargues López

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

In-Situ Synthesis of NiOx Films for Efficient Hole Transport Layer in Perovskite Solar Cells

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This Final Degree Project focuses on the low-temperature synthesis of Li- and Cs-modified NiO_x thin films as transparent hole-transport layers for perovskite solar cells. Perovskite photovoltaics are an emerging clean-energy technology combining high optoelectronic performance with low-cost solution processing. The project will investigate how alkali-metal incorporation and post-treatment conditions affect the morphology, transparency, electrical properties and hole-extraction capability of NiO_x films. The most promising layers will be integrated into perovskite solar cells and compared with reference devices to evaluate their impact on photovoltaic performance, charge extraction and operational stability.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The project will use a low-temperature solution-processing approach to prepare Li- and Cs-modified NiO_x thin films from nickel-based precursor solutions in solvents compatible with perovskite-device fabrication. Films will be deposited mainly by spin-coating, while scalable methods such as spray-coating may be explored for selected formulations. The effects of composition and post-treatment conditions on film formation will be evaluated by X-ray diffraction, ultraviolet-visible spectroscopy, scanning electron microscopy, atomic force microscopy and current-voltage measurements. Selected NiO_x layers will be integrated as hole-transport layers in perovskite solar cells to assess their influence on charge extraction, photovoltaic performance and stability.
Skills to be acquired: preparation of metal-oxide precursor solutions, low-temperature thin-film deposition, structural, optical, morphological and electrical characterization, and fabrication and evaluation of perovskite solar cells.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Rafael Abargues López

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Transparent Semiconductors for Next-Generation Perovskite Solar Cells

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This TFG aims to synthesized transparent Zn-modified SnO_2 thin films from tin(II)-based precursors through low-temperature solution processing. The project will investigate the controlled oxidation of Sn(II) to Sn(IV) and the influence of Zn incorporation on the optical, electrical and morphological properties of the films. The most promising layers will be integrated as electron transport layers in perovskite solar cells to evaluate their effect on charge extraction, photovoltaic performance and device stability.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The project will use low-temperature solution processing to prepare Zn-modified SnO_2 thin films from tin alkoxides and zinc salts in perovskite-compatible solvents. Films will be deposited by spin-coating, with spray-coating explored for formulations. Controlled ozone exposure and ultraviolet irradiation will be used to promote selective oxidation of tin species. The effects of Zn content and treatment on film properties will be studied by thermogravimetric analysis, X-ray diffraction, scanning electron and atomic force microscopy, ultraviolet-visible spectroscopy and current-voltage measurements. Selected films will be integrated as electron transport layers in perovskite solar cells and compared with SnO_2 devices to assess charge extraction, photovoltaic performance and stability.

Skills to be acquired: metal-oxide solution processing, thin-film deposition, materials characterization, and solar-cell fabrication and evaluation.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Rafael Abargues López

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Lead-Free Double Perovskites Nanocomposite for Photodetectors, Photocatalysis and Memristors.

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This Final Degree Project aims to snthysize lead-free double-perovskite nanocomposites as more sustainable alternatives to conventional lead-halide perovskites. The materials, based on silver–bismuth or silver–antimony halides confined within functional metal-organic matrices, will be studied to determine how composition and crystallization affect light absorption, charge separation and stability. Selected materials will be evaluated in photodetectors, photocatalysis and memristive devices, supporting scalable, solution-processable and lower-toxicity technologies for optoelectronics, energy conversion and neuromorphic electronics.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The methodology will combine solution processing and in-situ crystallization of lead-free double-perovskite nanodomains in functional metal-organic matrices. Precursor solutions containing alkali, monovalent and trivalent metal halides will be deposited by spin-coating, doctor-blading or spray-coating. Thermal, solvent-assisted or vapour-assisted treatments will control crystallization and film formation.
Films will be characterized by thermal analysis, X-ray diffraction, optical spectroscopy, electron microscopy and electrical measurements. Selected films will be tested by photocurrent, photocatalytic conversion and current-voltage cycling. The project will correlate composition, nanostructure, charge transport and functional performance.

Skills to be acquired: solution processing, in-situ crystallization, thin-film deposition, materials characterization and optoelectronic-device evaluation.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Pedro José Amorós del Toro

ACADEMIC TUTOR 2 Jamal El Haskouri

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Mesoporous silicas for delivery applications

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

To introduce students to classical synthesis processes, such as sol-gel chemistry, for the preparation of materials.Loading the materials with molecules of interest and studying their loading and release capacities

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

1. Preparation of mesoporous silicas using surfactant micelles as templating agents.2. Modulation of pore size using degradable agents.3.- Adaptation and optimisation of the process.4.- Characterisation of the materials obtained using X-ray diffraction, electron microscopy, gas absorption, etc.5.- Validation through load-bearing capacity tests

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Samia Benmansour

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Development of Colourimetric Chemical Sensors for different Vapours based on Series of Quinoline-Based M(III) Complexes

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The primary objective of this project is to develop and evaluate a new family of colourimetric chemical sensors for the detection of diverse chemical vapours, using a series of M(III) coordination complexes based on quinoline derivatives. Specifically, the work aims to establish a clear correlation between the structural features of these materials and their optical sensitivity, selectivity, and response time when exposed to both volatile organic compounds (VOCs) and reactive inorganic gases.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The experimental part will be divided into three main stages: ligand and complex preparation, structural activation, and vapour-sensing evaluation. First, the quinoline derivative-based ligands will be obtained and reacted with M(III) metal salts in a 2:1 stoichiometric ratio in the presence of a mild base. Then, the obtained solid materials will undergo exposure to different organic solvents and inorganic vapours. The resulting colourimetric or vapochromic shifts will be monitored and characterised via UV-Vis spectroscopy and visual tracking to determine the corresponding mechanism.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Samia Benmansour Souilamas

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Development of Sensors Based on Polyoxometalate Matrices

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The primary objective of this work is to investigate the sensing capacity of polyoxometalate (POM) matrices toward a diverse range of chemical vapours. Specifically, the work aims to evaluate the optical response of these inorganic clusters, focusing on the detection of basic vapours, such as ammonia and volatile amines, as well as the detection of reducing volatile organic compounds (VOCs), such as alcohols, under ultraviolet irradiation. Finally, the project seeks to establish a correlation between the POM composition and its multi-responsive optical behaviour.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The experimental methodology will consist of three main steps: sample preparation, vapour exposure, and optical analysis. First, the chosen polyoxometalate (POM) salts will be prepared as solid powders or thin layers. Second, these samples will be exposed to the target chemical vapours under controlled conditions; basic gases (ammonia and amines) will be used to monitor direct colour changes, while reducing VOCs (alcohols) will be tested under a UV lamp to activate photo-induced redox pathways. Finally, the resulting colour variations and the growth of the characteristic absorption bands will be recorded using an UV-Vis spectrophotometer.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Samia Benmansour Souilamas

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Synergy between Polyoxometalates (POMs) and Redox-Active Quinoid-Ligands for Advanced Catalysis (Bibliographic)

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of this bibliographic project is to systematically review and analyse the structural and electronic synergy between polyoxometalates (POMs) and redox-active quinoid-type ligands, with a specific focus on anilato derivatives coordinated to transition metals and lanthanides. The work aims to identify successful synthetic pathways for integrating bulky POM clusters into these coordination frameworks, map the electron-transfer mechanisms that drive their cooperative behaviour, and evaluate their efficiency in advanced catalytic processes, such as electrocatalysis or photocatalysis.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The methodology will follow a structured bibliographic approach based on a systematic review of contemporary scientific literature. A comprehensive search will be executed across major databases, including Scopus, Web of Science, and Google Scholar, using targeted keyword combinations linking polyoxometalates with terms like anilato, quinone or catechol frameworks, 3d/4f heterometallic complexes, and heterogeneous catalysis. The found publications will be filtered based on relevance, prioritising high-impact peer-reviewed papers from the last 10 to 15 years that explicitly detail successful crystallisation conditions, host-guest structural relationships, or synergistic redox behaviours. Finally, the collected data will be critically cross-referenced, analysed, and organised into a comparative framework.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Juan Francisco Blandez Barradas

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Surface functionalization of Metal Organic Framework with Photoactive Molecules

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This project aims to develop metal–organic frameworks (MOFs) based on well established archetypal materials modified with scintillator compounds. The MOF surface will be functionalized with photoactive molecules capable of generating biologically relevant stressors, such as reactive oxygen species (ROS), upon irradiation, providing a platform for controlled therapeutic intervention.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The methodology will rely on the synthesis of MOFs following the procedures described and developed by our group. Subsequently, material will be functionalized with photoactive molecules.
The materials will be charaterized by common techniques such us dinamic laser scattering, electron microscopies, thermogravimetric analysis, or X ray powder diffraction.
In addition, different assays will be carried out to determine the generation of biological relevant stressor species.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 SALVADOR BLASCO LLOPIS

ACADEMIC TUTOR 2 BEGOÑA VERDEJO VIU

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): INORGANIC CHEMISTRY

TITLE (Mandatory in English)

Structural and Anti-oxidant properties of Metal Complexes with small azamacrocycles

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

-Study the formation of the metal complexes by means of several analytical techniques.
-Study of the redox behaviour and antioxidant capacity of metal complexes against reactive oxygen species (ROS), using specific in vitro assays.
-Relate the activity with the structural features.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Starting with metal ions of the first transition series, new complexes will be formed with polyamine ligands available in our lab.
The formation of the complex will be assessed with several analytical techniques, namely potentiometry, electrochemistry and spectroscopic techniques.
Their antioxidant efficacy will also be evaluated using specific radical scavenging assays and in vitro tests.
Also, attempts will be made to obtain suitable crystals for structural analysis by X-ray diffraction.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Hendrik Bolink

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorganica

TITLE (Mandatory in English)

Development of low bandgap metal halide perovskites using close space sublimation

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective is to develop low bandgap metal halide perovskites and integrate them into photovoltaic devices.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The perovskite will be prepared using close-space sublimation. Important for the low bandgap perovskites that have a relatively high content of Sn besides Pb, it is important to ensure that the Sn stays in the 2+ state. to prevent the oxidation of the Sn2+ the perovskites will be prepared using the close space sublimation chember that was developed by the Valencian team.The quality of the perovskite semiconductor will be controlled using X-ray diffraction, optical absorption, scanning electron microscopy and photoluminescence. Additionally, the perovskite films will be evaluated in single junction solar cells by determining current voltage characteristics both in the dark and under simulated sun light.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Hendrik Bolink

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorganica

TITLE (Mandatory in English)

Optimizing the properties of metal halide perovskites for photovoltaic applications

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective is to develop thin film semiconductors based on metal halide perovskites and optimize their photoluminescence properties to enable more efficiency photovoltaic devices.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The perovskite will be prepared using co-sublimation of the precursors such that thin films can be achieved. The quality of the perovskite semiconductor will be controlled using X-ray diffraction, optical absorption, scanning electron microscopy and photoluminescence. Additionally, the perovskite films will be evaluated in single junction solar cells by determining current voltage characteristics both in the dark and under simulated sun light.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Miguel Clemente León

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Multifunctional compounds based on coordination chemistry approaches

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Preparation and characterization of multifunctional compounds (coordination polymers of discrete compleces) that combine several functionalities from their molecular building blocks such as magnetic ordering, chirality, spin-crossover, luminescence or electrical conductivity in the form of crystalline materials, nanoparticles or deposited as thin films or monolayers.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Growth of single crystals of the complexes
Structural characterization by single crystals and powder X-ray diffraction
Magnetic characterization of the bulk samples
Deposition on surfaces
Characterization of the deposited complexes by AFM, X-ray photoelectron spectroscopy, Raman and IR spectroscopy

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Estefanía Delgado Pinar

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

H2 - cracker nanoparticles. Design, synthesis and characterisation of smart redox-responsive organosilica systems

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The aim of this project is to develop redox-responsive mesoporous organosilica nanoparticles with tunable structural and physicochemical properties. The resulting nanomaterials will be evaluated as versatile platforms for controlled molecular release and other redox-triggered applications.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Mesoporous organosilica nanoparticles will be synthesised through sol-gel methodologies using different organosilane precursors. The materials will be characterized by complementary structural, morphological and surface analysis techniques (DRX, SEM, BET, DLS). Their redox responsiveness will be investigated under different reducing conditions (H2 chamber), along with their stability, cargo-encapsulation capacity, and release behaviour, to assess their potential for advanced nanotechnology applications.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 JAMAL EL HASKOURI BENNAGI

ACADEMIC TUTOR 2 PEDRO AMORÓS DEL TORO

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Particle size control in mesoporous phosphates via variation of the structure-directing agent

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Systematically evaluate the influence of surfactant type (CTAB, P123, F127) and concentration on the morphology, particle size and textural properties of mesoporous phosphates, using a simple design-of-experiments (DOE) approach to identify the most influential variables.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

You'll synthesize a series of mesoporous phosphate materials, testing three different surfactant "templates" and several concentrations of each, to see how these choices control the material's final structure. You'll then characterize what you've made using a suite of techniques — particle size (DLS), particle shape (SEM/TEM), and pore structure (BET, XRD) — and use simple statistical tools to figure out which synthesis variable matters most. It's a hands-on introduction to systematic materials design: change one thing, measure the effect, draw conclusions.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 JAMAL EL HASKOURI BENNAGI

ACADEMIC TUTOR 2 PEDRO AMORÓS DEL TORO

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Synthesis and characterization of mesoporous aluminum phosphates: optimization of surfactant extraction

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Synthesize mesoporous aluminum phosphates by the atrane route and compare three surfactant extraction methods (dilute acid extraction, concentrated saline solution, controlled calcination), assessing their effect on metal site preservation. Characterize materials by BET, XRD, FTIR and TEM, and evaluate preliminary stability in PBS (pH 7.4).

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

You'll synthesize mesoporous aluminum phosphate — a material more biocompatible than silica — and then face the real challenge: removing the template molecule used to create its pores without destroying the structure or losing the metal sites that make it useful. You'll compare three removal strategies (dilute acid, concentrated salt solution, controlled heating) side by side, then characterize each resulting material (BET, XRD, FTIR, TEM) to see which method best preserves the material's integrity. You'll finish with a quick test of how the material holds up in a fluid that mimics the human body (PBS, pH 7.4).

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 JAMAL EL HASKOURI BENNAGI

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Degradation study of mesoporous phosphates in simulated biological media

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Using phosphate materials made in the group, you'll soak samples in three fluids that mimic different body environments — simulated body fluid, PBS (pH 7.4), and an acidic buffer (pH 5, like inside a cell's endosome) — at body temperature, sampling after 1, 7, 14 and 28 days. You'll track how many ions leach out (ICP-OES), how the pore structure breaks down (BET), and how particle shape changes over time (TEM), then put it all together to understand the material's degradation rate — key data for knowing if and when it would dissolve safely inside the body.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Phosphate samples will be soaked in three fluids that mimic body environments — simulated body fluid, PBS (pH 7.4), and an acidic buffer (pH 5, mimicking the inside of a cell's endosome) — at 37 °C, with samples taken after 1, 7, 14 and 28 days. We'll measure how many ions leach out (ICP-OES), how the pore structure changes (BET), and how the particle shape evolves over time (TEM), then use these to model the degradation kinetics.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Jamal El Haskouri Bennagi

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Sol-gel encapsulation of lactic acid bacteria in silica matrices: synthesis and survival evaluation

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

To develop and optimize a sol-gel procedure for encapsulating lactic acid bacteria (Lactobacillus spp.) in porous silica matrices. Specific objectives: establish a sol-gel synthesis protocol compatible with bacterial viability; evaluate the effect of osmoprotective additives (glycerol, glucose) on post-encapsulation cell viability; characterize textural properties of the resulting materials (BET surface area, pore volume/distribution); assess resistance of encapsulated bacteria under simulated gastric conditions (pH 2, 2h); compare viability of free vs. encapsulated bacteria after stress exposure

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

You'll trap living lactic acid bacteria inside a silica gel as it forms — like building a microscopic protective shell around each cell while it's still alive. You'll test different silica "recipes" (TEOS alone, or mixed with APTES or MTMS) and protective additives (glycerol, glucose) to find conditions the bacteria actually survive. Then you'll challenge your encapsulated bacteria with simulated stomach acid (pH 2) and track survival over weeks in storage, comparing them to free (unprotected) bacteria. You'll also check the material's pore structure (BET, FTIR) to understand why some recipes work better than others.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Jesús Ferrando Soria

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Metal-Organic Frameworks Composites for Environmental Applications

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Synthesis and crystallization of novel oxamidate-based coordination compounds
Structural characterization
Measurement of physical and chemical properties and interpretation of experimental data

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Application of the complex-as-ligand approach to develop novel examples of oxamidato-based metal-organic frameworks (MOFs). Initiation to acquire the necessary knowledge and skills in basic organic and coordination chemistry to been able to obtain the required precursors to in a second step obtain and characterize the target MOF. Also, the student will start to get instructed on the basic characterization techniques in coordination and MOFs chemistry, as well as on the interpretation of the experimental data.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Jesús Ferrando Soria

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Design and synthesis of multivariant metal-organic frameworks

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Synthesis and crystallization of novel oxamidate-based coordination compounds
Structural characterization
Measurement of physical and chemical properties and interpretation of experimental data

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Application of the complex-as-ligand approach to develop novel examples of oxamidato-based multivariant metal-organic frameworks (MTV-MOFs). Initiation to acquire the necessary knowledge and skills in basic organic and coordination chemistry to been able to obtain the required precursors to in a second step obtain and characterize the target MTV-MOF. Also, the student will start to get instructed on the basic characterization techniques in coordination and MOFs chemistry, as well as on the interpretation of the experimental data.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Enrique García-España Monsonís

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorganica

TITLE (Mandatory in English)

Environmental and Biomedical Applications of Hydrolytic Polyamine Metallorganic Cages

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective is to prepare and evaluate the abilty of open-chain polyamines with pyridine and quinoline aryl groups to self-asssemble into metallorganic cages and analyze their ability to bind substrates of biological and/or environmental relevance

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Synthesis and charaterization of polyamines. Determination of protonation and stability constants by potentiometric and spectroscopic techniques. Determination of crystal structures by X-ray diffraction techniques. Determination of enzyme-mimicking activities.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Enrique García-España Monsonís

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorganica

TITLE (Mandatory in English)

Environmental and Biomedical Applications of Quinoline-Containing Polyamines

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective is to synthesize and evaluate macrocyclic and open-chain polyamine ligands containing quinoline groups, and to investigate their ability to bind substrates of biological and/or environmental relevance.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Synthesis and charaterization of polyamines. Determination of protonation and stability constants by potentiometric and spectroscopic techniques. Determination of enzyme-mimicking activities.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Ana Belén Gaspar Pedrós

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemsitry/ICMOL

TITLE (Mandatory in English)

Iron-Based Molecular Materials for the Selective Uptake of Gases and Pollutants

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

-Synthesize and characterize iron-based molecular materials with switchable structural and magnetic properties.
-Investigate the selective uptake of NH_3, I_2, NO, and NO_2, together with other environmentally relevant pollutants.
-Correlate molecular uptake with structural transformations and spin-crossover behavior using advanced characterization techniques.
-Evaluate the potential of these materials for selective capture, sensing, and environmental remediation applications.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

-Synthesis of iron-based molecular materials by coordination chemistry methods.
-Characterization by powder and single-crystal X-ray diffraction, infrared spectroscopy, thermogravimetric analysis, magnetic measurements, and elemental analysis.
-Gas and vapor uptake experiments using NH_3, I_2, NO, and NO_2, together with selected environmental pollutants.
-Analysis of the relationship between guest uptake, structural changes, and spin-crossover properties.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Carlos Giménez Saiz

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Photocatalytic water oxidation with polyoxometalates

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

1.- Chemical synthesis of the photocatalysts (polyoxometalates).
2.- Characterization of the polyoxometalates.
3.- Use of the polyoxometalates to generate oxygen by water oxidation assisted by visible light (photocatalysis).

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

1.- Synthesis in aqueous media, with pH and temperature control.
2.- Characterization using mainly X-ray diffraction, IR and UV-vis spectroscopies.
3.-Use of an optical oxygen sensor to determine the amount of oxygen produced and the kinetic parameters of the photocatalytic process.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 JORGE GONZÁLEZ GARCÍA

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed): ARIADNA BARGIELA SCHONBRUNN

DEPARTMENT(S): DEPARTAMENTO DE QUÍMICA INORGÁNICA

TITLE (Mandatory in English)

STRATEGIES FOR DEGRADING RNAs

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Bibliographic research of strategies to degrade RNA and application of novel drug-like molecules for degrading RNA in vitro

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

*Bibliographic research of the approaches to degrade and cleave RNA in cells using RNAse mechanisms.
*Evaluation of the RNA cleave using biophysical techniques (EMSA, fluorescence spectroscopy, MST, circular dichroism...)
*Analysis and plot of results using data sheets (Microsoft Excel, Origin...).
*Presentation of the research results (Microsoft Word and Powerpoint).
* It is highly recommended that the student has experience with RNA and biochemical methodologies.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 JORGE GONZÁLEZ GARCÍA

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed): CRISTINA GALIANA ROSELLO

DEPARTMENT(S): DEPARTAMENTO DE QUÍMICA INORGÁNICA

TITLE (Mandatory in English)

DEVELOPING LIGANDS TO TARGET G-QUADRUPLEX DNA

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Preparation of ligands and metal complexes, evaluation of the interaction with G-quadruplex and duplex DNAs with ligands and metal complexes by biophysical, biochemical and cellular assays, data analysis and presentation of results.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

-Synthesis and purification of small organic molecules and metal complexes and their characterization using standard techniques (chromatography, Nuclear Magnetic Resonance, mass spectrometry...).
-Evaluation of the interaction with DNA/RNA using biophysical techniques (UV-Vis, fluorescence, electrophoresis and thermal curves).
-Assessment of the cell activity using biochemical and cell assays (cytotoxicity, ROS quantification, confocal microscopy...)
-Analysis and plot of results using data sheets (Microsoft Excel, Origin...).
-Presentation of the research results (Microsoft Word and Powerpoint).

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 JORGE GONZÁLEZ GARCÍA

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed): CRISTINA GALIANA ROSELLO

DEPARTMENT(S): DEPARTAMENTO DE QUÍMICA INORGÁNICA

TITLE (Mandatory in English)

NON-CANONICAL NUCLEIC ACID STRUCTURES AS THERAPEUTIC TARGETS IN MEDICINE

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Preparation of ligands and metal complexes, evaluation of the interaction with non-canonical nucleic acid structures with ligands and metal complexes by biophysical, biochemical and cellular assays, data analysis and presentation of results.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

-Synthesis and purification of small organic molecules and metal complexes and their characterization using standard techniques (chromatography, Nuclear Magnetic Resonance, mass spectrometry...).
-Evaluation of the interaction with DNA/RNA using biophysical techniques (UV-Vis, fluorescence, electrophoresis and thermal experiments).
-Assessment of the cell activity using biochemical and cell assays (cytotoxicity, ROS quantification, confocal microscopy...)
-Analysis and plot of results using data sheets (Microsoft Excel, Origin...).
-Presentation of the research results (Microsoft Word and Powerpoint).

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 JORGE GONZÁLEZ GARCÍA

ACADEMIC TUTOR 2 SALVADOR BLASCO LLOPIS

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): DEPARTAMENTO DE QUÍMICA INORGÁNICA

TITLE (Mandatory in English)

DEVELOPMENT OF A MODEL FOR THE EVALUATION OF SUPRAMOLECULAR INTERACTION THROUGH BIOPHYSICAL TITRATIONS

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

- Bibliographic review of methods, software and mathematical models for evaluating interactions via biophysical titrations.
- Collection trusted data of biophysical titrations to form a validation dataset
- To fit available data with a reference software for validation purposes.
- To draft software routines for fitting supramolecular intertactions and compare the results obtained with those obtained for reference software.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

- Literature search of methods, mathematical models, software and computational packages for evaluating supramolecular interactions.
- Collect, compile and organize biophysical titrations (Excel, Origin...)
- Fitting and analyzing the titrations using routine methodologies (Origin, Solver, SupraFit, DynaFit...)
- Create a computational package for fitting titrations (Python...).
- Preparation, discussion, and review of the final project.
- It is highly recommended that the students have programming skills.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Beatriz Lozano Torres

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química inorgánica

TITLE (Mandatory in English)

Evaluation of Ultrasound-Induced Linker Cleavage and Characterization of Degradation Products

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

This project aims to elucidate the relationship between linker structure and ultrasound-induced cleavage by evaluating and characterizing a series of ultrasound-cleavable linkers.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Ultrasound-mediated degradation studies. Ultrasound-cleavable linkers will be exposed to controlled acoustic stimulation using a dedicated ultrasound device. The effect of ultrasound parameters on linker cleavage will be systematically evaluated.

Characterization of degradation products. Ultrasound-induced degradation products will be identified and characterized using high-performance liquid chromatography (HPLC), mass spectrometry (MS), and nuclear magnetic resonance (NMR) spectroscopy to elucidate the degradation pathways and confirm the chemical identity of the cleavage products.

Reactive oxygen species (ROS) assays. ROS generation during ultrasound exposure will be quantified using fluorescence-based assays to investigate the role of oxidative mechanisms in ultrasound-induced linker degradation.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Carlos Martí Gastaldo

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Short Peptide Sequences as Programmable Linkers for Adaptive Metal-Organic Frameworks

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of this project is to design, synthesize and evaluate short peptide sequences, based on two or three amino acids, as programmable linkers for the preparation of adaptive peptide-based frameworks. The work will focus on the selection of suitable peptide motifs, their synthesis and purification, their structural characterization, and their compatibility with framework-forming chemistry. The final aim is to understand how peptide sequence influences framework formation, stability, porosity and chiroptical response.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Selected dipeptide and tripeptide sequences will be designed according to their chemical functionality and potential compatibility with framework synthesis. The target peptides will be synthesized, purified by chromatography and characterized mainly by NMR spectroscopy. The purified sequences will then be reacted with selected metal sources under solvothermal or related conditions to obtain peptide-based crystalline frameworks. The resulting materials will be characterized by diffraction techniques, thermal and chemical stability tests, gas adsorption measurements and circular dichroism spectroscopy, in order to correlate peptide sequence with structure and adaptive response.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 F. JOSÉ MARTÍNEZ LILLO

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): QUÍMICA INORGÁNICA

TITLE (Mandatory in English)

Design, synthesis and characterization of new phenolic oximes to obtain metal complexes of biomedical interest

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Los objetivos principales del trabajo serán la síntesis, la caracterización y el estudio de nuevos complejos mononucleares de metales de transición con una familia de ligandos basados en oximas fenólicas que presenten propiedades interesantes en diferentes campos de investigación. Una vez caracterizados y estudiados se planteará, como objetivo adicional, el uso de estos complejos como 'metaloligandos' hacia otros iones paramagnéticos 3d y 4f para la obtención de sistemas polinucleares.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

La metodología a seguir será la siguiente:

1) Diseño y síntesis de ligandos basados en oximas fenólicas. Obtención de complejos metálicos sustituyendo a su vez unos ligandos por otros en función de las propiedades a estudiar.
2) Cristalogénesis de los sistemas a estudiar mediante diferentes técnicas de cristalización.
3) Caracterización de estos sistemas mediante técnicas experimentales complementarias, tales como espectroscopías IR y UV-visible, microscopía electrónica (SEM-EDX), difracción de rayos X de polvo y de monocristal (XRD), magnetómetro SQUID y voltamperometría cíclica (CV).
4) Estudio de la actividad antitumoral de los complejos obtenidos.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 F. JOSÉ MARTÍNEZ LILLO

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): QUÍMICA INORGÁNICA

TITLE (Mandatory in English)

Current status and perspectives of copper-based complexes as anticancer agents against glioblastoma pathology

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

1. Llevar a cabo una búsqueda bibliográfica que permita establecer el estado actual del tema, junto con las principales líneas de investigación en las que se basa.

2. Estudio del efecto del estado de oxidación del ion metálico en las propiedades a estudiar.

3. Realizar una comparativa basada en los datos recabados que pueda aportar información adicional y generar ideas de síntesis para el desarrollo de nuevos sistemas que puedan presentar una mayor actividad.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Se llevará a cabo una primera fase de indagación sistemática en diferentes bases de datos especializadas (PubMed, WoS, SciFinder, Google Scholar, CSD, etc.), que permita la obtención y estructuración de la información necesaria, teniendo en cuenta los criterios iniciales de la investigación.
A partir de las fuentes seleccionadas se realizará un análisis cuantitativo en el que se estudien diferentes aspectos, tales como documentos e investigaciones realizadas por país, número de documentos por año, métodos de síntesis, ligandos empleados, estados de oxidación y otros.
Finalmente, se interpretarán los resultados obtenidos y se extraerán las correspondientes conclusiones que se recogerán en el informe final.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Guillermo Mínguez Espallargas

ACADEMIC TUTOR 2 Jorge Salinas Uber

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Metalloligand-based MOFs

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of this project consists on the incorporation of active Pd(II) centres into porous crystalline structures.

In this regard, we propose to use of different palladium-based metalloligands in combination with inorganic clusters of different geometry to obtain a uniform distribution of the Pd centres along the material with no blockage of the pores.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The following tasks will be performed:
- Synthesis and characterization of Pd metalloligands
- Synthesis and characterization of inorganic clusters
- Preparation of MOFs
- Study of the physical properties of the bimetallic MOFs

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Efrén Navarro Moratalla

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Controlled growth of copper chloride crystals with helical magnetism

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

1. Application of vapour-phase and melt crystal growth methods to obtain high-quality single crystals of copper chloride.
2. Isolation of a single-atomic-layer copper chloride crystal.
3. Familiarisation with structural, compositional, and spectroscopic characterisation methods, applying these techniques to the crystals obtained.
4. Preliminary magnetic characterisation of the grown crystals to identify features associated with helical magnetic ordering.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Vapour and melt crystal-growth methods will be employed to synthesise copper chloride crystals. The aim is to obtain high-quality single crystals of suitable size and well-defined composition. The effect of parameters such as temperature, growth time, thermal gradient, and synthesis atmosphere on the morphology and crystallinity of the resulting materials will be investigated. The crystals obtained will be characterised using techniques such as X-ray diffraction, optical and electron microscopies and spectroscopies. Their characterisation will help optimise the growth conditions, improve crystalline quality, and promote the production of samples suitable for more advanced physical studies.
The ultimate interest in this compound lies in its helical magnetism, which originates from competing magnetic interactions in low-dimensional structures. Its magnetic properties will therefore also be investigated by SQUID and/or magneto-optical measurements in order to analyse its magnetic transition, anisotropy, and potential as a model material for studying non-collinear magnetic states.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Efrén Navarro Moratalla

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Synthesis of layered hydroxides as new candidates for quantum spin liquids

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

1. Study of solvothermal processes for crystal growth.
2. Application of these methods to the growth of simple hydroxide crystals and magnetic layered double hydroxides (LDHs) with net spin.
3. Familiarisation with single-crystal characterisation methods, applying these techniques to the crystals obtained.
4. Preliminary magnetic characterisation of the crystals in order to identify possible signatures of exotic magnetic states, such as quantum spin liquids.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Modern heterogeneous crystal-growth methods will be employed to synthesise hydroxide-type materials. These include approaches that control pH through compounds that release ammonia upon thermal decomposition under high-pressure conditions, enabling careful control of the growth environment. Crystallisation will be carried out in autoclaves to reach the required high pressures.

Simple hydroxides will first be studied as an introduction to these crystal-growth techniques. The work will then progress towards more complex compositions containing different metals, such as copper or manganese. Their relative proportions will be adjusted to promote exotic magnetic states, including quantum spin liquids, which represent the ultimate target application of these compounds.

Finally, the materials obtained will be characterised using techniques such as X-ray diffractiodiffraction, elemental analysis, and Raman spectroscopy. Their magnetic properties may also be investigated by SQUID measurements to look for a quantum spin liquid state.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Efrén Navarro Moratalla

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Growth of atomically thin layered bromide crystals for electronic devices

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

1. Study of crystal growth methods on surfaces of few-layer metal bromide crystals.
2. Optimisation of growth conditions for the selective formation of single-layer crystals on substrates.
3. Familiarisation with structural, compositional, and optical characterisation methods for ultrathin crystals, applying these techniques to the materials obtained.
4. Preliminary evaluation of the electronic properties of the grown crystals to assess their potential integration into low-dimensional electronic devices.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

To synthesise layered bromide materials, modern crystal-growth techniques will be employed, including chemical vapour transport with a controlled carrier-gas flow. The aim is to obtain high-quality crystals with controlled atomic thickness and large surface area. Initially, simple layered bromides will be studied to introduce the relevant techniques for growing and handling few-atomic-layer crystals.
The work will then advance towards more complex compositions incorporating different transition metals. The synthesis conditions will be adjusted to optimise the size, crystallinity, and thickness of the resulting crystals. The materials obtained will be characterised using techniques such as X-ray diffraction, optical and electron microscopy and spectroscopies. The ultimate interest in these compounds lies in their potential use as multiferroic active materials in optoelectronic devices. Their electrical properties may thus also be investigated through the fabrication of simple devices, in order to assess their ferroelectric and ferromagnetic behaviour and their potential applications in low-dimensional electronics.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Emilio Pardo Marín

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Design and synthesis of bioMOFs and their application in environmental remediation

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

- Preparación de nuevos polímeros de coordinación porosos (en inglés MOFs) a partir de biomoléculas orgánicas, que presenten gran estabilidad en agua y con la funcionalización adecuada para la captura de contaminantes del agua.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

- Preparación de ligandos orgánicos a partir de biomoléculas mediante técnicas de síntesis orgánica.
- Preparación de bioMOFs utilizando métodos racionales de autoensamblaje.
- Caracterización de los materiales sintetizados por difracción en rayos X, ATG, IR, isotermas de adsorción etc.
- Evaluación de la actividad descontaminante mediante técnicas analíticas.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Emilio Pardo Marín

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Host-guest chemistry of metal-organic frameworks (MOFs) and their use as chemical reactors.

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

- Preparación de nuevos polímeros de coordinación porosos (en inglés MOFs) con gran robustez, estabilidad en agua, cristalinidad y con la funcionalización adecuada para su uso como reactores químicos

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

- Preparación de ligandos orgánicos amediante técnicas de síntesis orgánica.
- Preparación de MOFs utilizando métodos racionales de autoensamblaje racionales.
- Caracterización de los materiales sintetizados por difracción en rayos X, ATG, IR, isotermas de adsorción etc.
- Uso de MOFs como reactores químicos y estudio de su química huesped-anfitrión.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 José Antonio Real Cabezos

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Dpto. Química Inorgánica

TITLE (Mandatory in English)

The Spin Crossover Phenomenon in Iron(II) Complexes

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

El objetivo de este TFG es doble:
!) Introducir los conceptos fundamentales del fenómeno de transición de espín en compuestos de hierro(II) (propiedades estructurales, magnéticas, calorimétricas, ópticas, vibracionales, etc).
2) Realizar la síntesis y caracterización de algunos de los compuestos más significativos de diferente dimensionalidad (0-,1-, 3-D)

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Realización de un estudio bibliográfico, preparación y caracterización de los complejos Fe(phen)2(NCX)2 (X = S, Se, BH3), Fe(triazol)(triazolato)2(BF4) y Fe(piracina)[Pt(CN)4].

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Antonio L. Ribera Hermano

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Bibliographic revision on the use of 2D materials in energy conversion reactions.

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

* Realizar una búsqueda bibliográfica sobre los principales resultados publicados en el tema propuesto.
* Recopilar en una memoria los datos más relevantes sobre el tema propuesto.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

* Acceder a las principales bases de datos de ámbito científico para recopilar la información que en forma de artículos y revisiones, se haya publicado sobre "Energy Conversion Reactions" utilizando fotocatalizadores basados en materiales 2D.
* Organizar la información obtenida en bloques temáticos coherentes, reacciones, familias de materiales, etc.
* Plasmar en una memoria científica los aspectos y logros más importantes que se hayan descrito hasta la fecha, sobre "Energy Conversion Reactions" utilizando fotocatalizadores basados en Materiales 2D.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Antonio L. Ribera Hermano

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgánica

TITLE (Mandatory in English)

Synthesis, characterization, and electrochemical study of photocatalysts for energy conversion reactions based on LDHs and hybrid structures with other 2D materials.

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Sintetizar Hidróxidos Dobles Laminares (LDHs) que contengan metales de transición activos para "Energy Conversion Reactions".
Caracterizar los catalizadores sintetizados mediante las técnicas básicas para este tipo de materiales (DRX, Análisis Elemental y SEM), así como técnicas más específicas (TG, Espectroscopia UV-Vis, TEM – Difracción de Electrones).
Llevar a cabo estudios electroquímicos para identificar aquellos materiales con mayor capacidad para actuar como fotocatalizadores en "Energy Conversion Reactions".

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Se sintetizarán LDHs utilizando varios métodos: i) método tradicional de coprecipitación a pH constante; ii) método de precipitación homogénea con urea como generador de pH básico; iii) método solvotermal con DMF para evitar el apilamiento de capas; iv) método solvotermal en metanol que permita el control morfológico del material para conseguir morfologías especiales; v) método mecanoquímico que permite trabajar en condiciones respetuosas con el medioambientalmente.
Paralelamente se preparan otros materiales 2D con el fin de obtener sistemas híbridos con los LDHs.
Los materiales obtenidos se caracterizarán por las técnicas básicas (DRX, EDX, SEM, etc.), utilizando técnicas más específicas (TG, UV-Vis, TEM) y sobre todo se llevará a cabo un estudio electroquímico para determinar los fotocatalizadores, que por sus propiedades, tengan mayor probabilidad de poder ser utilizados en "Energy Conversion Reactions".

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Teresa Ripollés Sanchis

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Perovskite–Nickel Acetate Nanocomposites for Photodiode Applications

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

To investigate the use of perovskite–nickel acetate nanocomposites as active materials for photodiodes. The project will evaluate how the nanocomposite structure influences the structural, optical and electrical properties of the material, as well as the performance of the fabricated photodiodes.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Preparation of perovskite–nickel acetate nanocomposite thin films by solution processing under controlled humidity conditions. Structural, optical and morphological characterization of the materials using standard techniques (UV–Vis spectroscopy, X-ray diffraction and microscopy, when available). Fabrication and characterization of photodiodes, including electrical measurements under dark and illuminated conditions. Correlation of the nanocomposite properties with the photodiode performance.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Teresa Ripollés Sanchis

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Composition Engineering of Metal Halide Perovskites for Photodiode Applications

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

To study the influence of the chemical composition of metal halide perovskites on the performance of perovskite photodiodes. Different perovskite compositions will be prepared and characterized to establish possible relationships between composition, structural and optical properties, and the main figures of merit of the photodetectors.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Preparation of perovskite precursor solutions with different chemical compositions and fabrication of thin films and photodiodes by solution processing. Structural, optical and morphological characterization of the materials using standard techniques (UV–Vis spectroscopy, X-ray diffraction and microscopy, when available). Electrical and optoelectronic characterization of the fabricated photodiodes, including current–voltage measurements under dark and illuminated conditions, responsivity and detectivity. Analysis of the relationship between perovskite composition and device performance.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Jose Vicente Ros Lis

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Novel materials, arrays of sensors and sustainable processes I

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Development and application of novel materials, arrays of sensors and sustainable processes for agricultural applications.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Synthesis and characterization of materials.
Application of materials for the development of sensing arrays.
Data analysis.
Tests in agricultura applications
Evaluation of the sustainability.
The TFG can be experimental or bibliographic depending on the student's interest.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Jose Vicente Ros Lis

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Novel materials, arrays of sensors and sustainable processes II

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Development and application of novel materials, arrays of sensors and sustainable processes for agricultural applications.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Synthesis and characterization of materials.
Application of materials for the development of sensing arrays.
Data analysis.
Tests in agricultura applications
Evaluation of the sustainability.
The TFG can be experimental or bibliographic depending on the student's interest.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Jose Vicente Ros Lis

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Inorganic Chemistry

TITLE (Mandatory in English)

Novel materials, arrays of sensors and sustainable processes III

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Development and application of novel materials, arrays of sensors and sustainable processes for agricultural applications.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

Synthesis and characterization of materials.
Application of materials for the development of sensing arrays.
Data analysis.
Tests in agricultura applications
Evaluation of the sustainability.
The TFG can be experimental or bibliographic depending on the student's interest.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Víctor Rubio Giménez

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorgànica

TITLE (Mandatory in English)

Thermal defect engineering for post-synthetic modification of porous materials.

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

Solvent-free thermal defect engineering (DE) is a viable strategy to generate missing-linker defects in porous materials such as metal-organic frameworks (MOFs) by taking advantage of the selective thermal removal of neutral volatile linkers. We previously demonstrated this concept by removing pyrazine (pz) linkers of the Hofmann-type MOF [Fe(pz){Pt(CN)4}], thus generating varying degrees of missing-linker defectivity (0-100%). Now, we will:
1. Explore the exfoliation of defective layered porous materials, analysing the effect of defectivity on the quality of the exfoliated single-layer or few-layer flakes.
2. Test the re-insertion of bulky linkers in between the defective layers to obtain new materials not accessible via direct synthesis.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

First, we will explore the effect of missing-linker DE in the exfoliation of Hofmann-type MOFs into single or few-layer flakes. Both liquid-phase and mechanical exfoliation method will be tested. The resulting flakes will be deposited onto Si wafer substrates and characterized via X-ray diffraction (XRD), Raman spectroscopy, scanning electron (SEM) and atomic force (AFM) microscopies.

Furthermore, we will investigate the re-insertion of bulky linkers to replace pz and thus yield new Hofmann-type MOFs that are not accessible via direct synthesis. Both solvent-free and solution based methods will be employed and the resulting Hofmann-type MOFs will be fully characterized using XRD, infrared spectroscopy, SEM and gas physisorption to evaluate their porosity.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Michele Sessolo

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorganica

TITLE (Mandatory in English)

Structure–Property Relationships in Vapor-Deposited Metal Halide Perovskite Thin Films for Optoelectronic Devices

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of this project is to investigate the growth of metal halide perovskite thin films by vapor deposition and establish the relationship between deposition parameters, film quality, and the resulting radiative and optoelectronic properties.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The perovskite thin films will be prepared by vapor deposition methods, using selected growth parameters and seeding layers to control film formation, morphology, and crystallinity. The effect of deposition conditions on the structural, optical, and radiative properties of the films will be evaluated using techniques such as X-ray diffraction, optical absorption, scanning electron microscopy, and photoluminescence spectroscopy.
The most promising films will be integrated into optoelectronic devices, including photodetectors and/or solar cells, and their performance will be assessed through current–voltage measurements, spectral response, and related optoelectronic characterization.

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

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 Ramon Torres Cavanillas

ACADEMIC TUTOR 2

EXTERNAL TUTOR (if needed):

DEPARTMENT(S): Química Inorganica

TITLE (Mandatory in English)

Chemical design of artificial synapses based on coordination compounds

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of this Degree Project is to explore the chemical design of coordination-based materials capable of mimicking biological synapses. Inspired by the way synapses change their response according to previous electrical activity, this project will focus on porous coordination compounds with tunable channels whose electrical behaviour can be modulated by electrically induced ion migration.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The project will involve the synthesis of coordination-based materials, including metal-organic frameworks, covalent organic frameworks, and Prussian blue-type compounds, prepared as bulk solids and, when possible, as two-dimensional materials.

The student will characterize these materials using techniques such as Raman spectroscopy, X-ray photoelectron spectroscopy, and other advanced structural and spectroscopic methods. Selected materials will then be integrated into simple electrical devices to evaluate their memristive and synaptic behaviour.

Finally, the devices will be tested using voltage sweeps and electrical pulses that emulate neuronal signals, in order to assess functions such as potentiation, depression, memory effects, and learning-like responses. The results will be related to possible applications in neuromorphic computing and artificial intelligence hardware.

VNIVERSITAT DE VALÈNCIA Facultat de Química

DEGREE FINAL PROJECT
CHEMISTRY DEGREE

ACADEMIC TUTOR 1 M. Ángeles Úbeda Picot

ACADEMIC TUTOR 2 Francisco F. Pérez Pla

EXTERNAL TUTOR (if needed): --

DEPARTMENT(S): Química Inorgánica y Química Física

TITLE (Mandatory in English)

Sustainable Carbon-Based Supports for Iron Nanocatalysts: Synthesis and Catalytic Performance

OBJECTVES / OBJECTIUS / OBJETIVOS: (Choose the language)

The objective of this study is to synthesize carbon-coated core-shell magnetite microparticles that serve as an environmentally friendly support for Fe nanoparticles. Throughout this final-year project, the structural characterization of the prepared material will be carried out using various techniques, including ICP, TGA, TEM, EDX-SEM, FTIR, and Raman. Following the characterization, the catalytic activity and stability of the prepared material will be evaluated in relation to the reduction of nitrobenzene to aniline, a reaction of both environmental and industrial importance.

METHODOLOGY / METODOLOGIA / METODOLOGÍA: (Choose the language)

The particles will be prepared by polymerizing dopamine on the surface of Fe_3O_4 microcrystals. This support will be impregnated with cations of iron, which will subsequently be reduced by pyrolysis in a controlled N_2 atmosphere. This methodology allows for the preparation of structured "core-shell" compounds. Following synthesis, the materials will undergo characterization using thermogravimetric analysis. The specific surface area and porosity will be determined using nitrogen adsorption isotherms. A morphological analysis of the particles will be performed using transmission electron microscopy. The iron deposited will be analyzed using scanning electron spectroscopy, and the nature of the carbon layer will be evaluated using Raman spectroscopy. Finally, the material's catalytic activity will be evaluated in terms of the reduction of nitrobenzene to aniline using DAD-UV-Vis absorption measurements and HPLC.