

Research Interests

I'm a curious, young researcher eager to contribute to the energy sector's transformation. With a strong background in materials science, engineering, and chemistry, I'm passionate about improving batteries and translating research into real-life applications.

PhD Candidate

Functionalized separators for Sodium-Ion Batteries

Nov. 2024-Nov. 2027

Marie Skłodowska-Curie Actions PhD fellow in RIDERS (TRaining In cutting-edge battERY technologies: high-performance materials and researchers for future electrochemical storage)

IFP Energies Nouvelles, Solaize, France. Includes secondments at LEPMI (Laboratory of Electrochemistry and Physical-Chemistry of Materials and Interfaces), Grenoble, CSIC (Superior Council of Scientific Research), Barcelona, and UCBL1 (University Claude Bernard Lyon 1), Lyon.

Supervisors: Dr. Mona Marie Obadia, Dr. Niki Halttunen, Prof. Eric Drockenmüller

Responsibilities:

- Synthesis of conductive polymers for the creation of gel polymer electrolytes
- Processing of polymer grafting onto the separators
- Electrochemical (EIS, CV) and structural characterization (SEM, DSC) of polymers and functionalized separators

Education

Master in Materials in Energy Storage and Conversion MESC+ , EMJD

Sept. 2022-Sept. 2024

Fully-funded Scholarship holder, 120 ECTS credits

Warsaw University of Technology (1st semester, Poland), Université Toulouse III Paul Sabatier (2nd semester, France), University of the Basque Country (3rd semester, Spain) with CIC energiGUNE, and Kemijski Institut (4th semester, Slovenia).

Relevant courses: Modern Techniques for synthesis of nanomaterials, Electrochemistry, Energy Storage, Crystallography, Materials Chemistry, Large Scale Facilities for Operando Studies for Energy Storage Materials (XRD, NMR, XPS, SEM).

Bachelor's in Chemical Engineering

Aug. 2017- Feb. 2022

Honorable Student, GPA 95.7/100, 402 ECTS credits

National Autonomous University of Mexico, UNAM (University Global Ranking 64th).

Relevant courses: Physical Chemistry, Project Management, Process Design and Scaling, Process Engineering, Thermochemistry.

Research Experience

Synthesis, nanostructuring of polymer cathodes for multivalent batteries Feb. 2024- Sept. 2024.
Ongoing thesis project.

Kemijski Institut. Supervisor: Dr. Jan Bitenc. Lab director: Robert Dominko.

Responsibilities:

- Perform synthesis of different organic cathodes.
- Electrode preparation and cell assembly for electrochemical testing with Li, Na and Mg in EIS, GCD, CV, and symmetrical cells.
- Use of SEM, ATR-IR, XRD, and NMR for material characterization.
- Planning and organizing thesis project.

Design of supramolecular synthons

Jun. 2019- Sept. 2022

Nuclear Sciences Institute (ICN), UNAM. Supervisor: Dr. Rafael Arcos-Ramos.

Responsibilities:

- Performing organic synthesis of synthons.
- Purification of compounds via extraction, chromatography columns and distillation.
- Characterization of supramolecular materials with ATR-IR, UV-VIS, spectrofluorometry, and NMR.
- Film deposition via Langmuir-Blodgett and spin-coating.
- Supervising undergraduate students.

Cyclometalated complexes

Dic. 2018-Mar. 2019

Inorganic Chemistry Dept, Chemistry Institute (IQ), UNAM. Supervisor: Dr. Le Lagadec.

Responsibilities:

- Microwave synthesis of cyclometalated complexes with iron, ruthenium, and osmium.
- Characterization of ligands via NMR, ATR-IR.
- Presentation of the work and future perspectives of the project.

Fluid mechanics

Aug. 2017-Aug. 2018

Chemistry Faculty (FQ), UNAM. Supervisor: Dr. Eugenia Corvera-Poiré.

Responsibilities:

- State of the art fluid mechanics of blood.
- Simulations of applying different frequencies in blood flow.
- Monthly exposition of findings and areas of opportunity in the work.

Relation between disulfide bonds and high-pressure

Jun. 2017

Biochemistry Dept, Weizmann Institute of Sciences. Supervisor: Dr. Deborah Fass.

Responsibilities:

- Molecular simulation via DFT of disulfide bonds in proteins linked to heart disease.

Awards and Scholarships

EMJD fully-funded scholarship for MESC+

Aug. 2022-Sept. 2024

For studying in MESC+ program.

1st place award to best undergraduate thesis ICN 2022

Jun. 2023

Awarded due to the outstanding undergraduate thesis work “Development of steroid-BTD derivatives. Synthesis, characterization, and evaluation of optic properties”.

Honorific mention of thesis dissertation

Feb. 2022

Awarded to outstanding dissertations by the thesis jury.

Honorific mention in CdeCMX Challenge

Aug. 2020

Project: “Correlations between air pollution and rise in covid-19 cases in Mexico City”.

Winner of the Weizmann Institute of Science’s scholarship

Jul. 2017

To participate in the International Science Summer Institute (ISSI) in Rehovot, Israel.

Honorific mention in the program *Youth towards research*

Aug. 2016

In the scientific poster section with the poster called “Nanofilm formation with coumarin 5i”.

Posters

1. *Effect on the P-bridge on the light absorption and emission in push-pull coumarins and on their supramolecular organization.* XXX International Materials Research Congress. Cancun, Mexico. August 2022.
2. *Design and synthesis of benzothiadiazole-based molecular systems: self-assembly, optical, and electronic properties.* XXX International Materials Research Congress. Cancun, Mexico. August 2022.
3. *Biotensoactives as an alternative to additives in acryl-vinyl paints.* 1st Annual Physical Chemistry Exposition, Chemistry Faculty, UNAM. November 2019.
4. *Nanofilm formation with coumarin 5i.* Program Youth Towards Research. August 2016.

Work Experience

PepsiCo Sales Intern

March 2022-Sept. 2022

PepsiCo Mexico, Wholesale Department.

Responsibilities:

- Administering of 250,000.000 EUR budget for buying promotional materials.
- Handle supplier relations to ensure the proper selection of products according to quality standards and purchasing needs.
- Weekly presentation of advancements for Wholesale Department.

Scientific Disseminator

Jul.-Aug. 2017, 2018, 2019.

UNAM summer course

Responsibilities:

- Teaching kids age 7-12 about science.
- Managing large groups of people.

Hard Skills

Soft Skills

- Wet, solid-state, hydrothermal, and ceramic **synthesis proficiency.**
- **Film formation** expertise: LB, spin coating.
- **Electrochemical characterization** mastery: EIS, CV, GCD; **cell assembly.**
- **Calorimetry proficiency:** DSC, TGA, DTA.
- Skilled in **standard characterization equipment** use: UV-VIS, ATR-IR, NMR, SEM.
- **Analytical skills** for data interpretation.

- Critical thinking
- Leadership
- Teamwork
- Adaptability
- Curiosity
- Goal-oriented
- Efficiency

Languages

Software

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|----------------------------------|---|--------------------------------|
| ○ Spanish (native) | ○ EC-Lab (advanced) | ○ Python (intermediate) |
| ○ English (TOEFL 110/120) | ○ ASPEN PLUS (intermediate) | ○ MatLab (intermediate) |
| ○ French (A2) | ○ Adobe Illustrator (intermediate) | |