MANUEL ALBERTO SAUCEDO CAÑAS

PhD Student in Inorganic & Organometallic Chemistry

Fortier Laboratory, Department of Chemistry & Biochemistry, The University of Texas at El Paso

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RESEARCH INTERESTS

Synthetic and structural inorganic/organometallic chemistry, with emphasis on low valent titanium chalcogenide Ti=E (E = N, O, S, Se, Te) multiply bonded complexes, low-coordinate iron systems supported by imidazolin-2-iminato ligands, and low valent Zr(II) synthons. Also interested in ligand design, with particular emphasis on N-heterocyclic carbene (NHCs) derived frameworks. Trained as a chemist across the full synthesis-to-characterization pipeline for challenging, air-, moisture-, temperature-, and light-sensitive complexes: single-crystal X-ray diffraction, cyclic voltammetry, NMR, EPR, UV-Vis-NIR, and X-ray absorption spectroscopy (XANES).

EDUCATION

PhD in Chemistry *Aug 2023 – present (expected graduation: Jul 2028)*

The University of Texas at El Paso (UTEP), El Paso, TX | Advisor: Prof. Skye Fortier, Fortier Laboratory

BSc in Chemistry *Aug 2018 – Jun 2023*

Universidad Autónoma de Ciudad Juárez (UACJ), Ciudad Juárez, Mexico | Advisor: Prof. Mónica Galicia

Undergraduate Thesis: "Low Cost Pencil Graphite Electrode for Sensitive Determination of Pb(II) and Cd(II)"

RESEARCH EXPERIENCE

Graduate Researcher, Fortier Laboratory *Aug 2023 – present*

The University of Texas at El Paso | Advisor: Prof. Skye Fortier

- Synthesized and characterized a series of low valent Ti=E chalcogenide complexes, correlating electrochemical, structural and spectroscopic properties.
- Developed synthetic routes toward a masked Zr(II) complex/synthon for use as a low-valent early-metal reagent.
- Designed and synthesized sterically and electronically tunable ligand frameworks, with emphasis on N-heterocyclic carbene (NHCs) derived imidazolin-2-iminato ligands, to stabilize reactive low-valent and low-coordinate metal centers.
- Independent user of single-crystal X-ray diffractometers, from crystal growth and mounting through data collection, structure solution, and refinement (APEX4, SAINT, SADABS, SHELXL, Olex2, PLATON).
- Fully independent operator of NMR spectrometers for routine and diagnostic characterization of air-sensitive diamagnetic and paramagnetic complexes, including multinuclear (^{1}H, ^{2}H, ^{13}C, ^{7}Li, ^{29}Si, ^{11}B, ^{19}F, ^{31}P) and 2D (COSY, HSQC) experiments.
- Acquiring and simulated X-band EPR spectra of paramagnetic Ti(III) and Fe(II)/(III) complexes (EasySpin/MATLAB) to extract electronic structure parameters.
- Trained user at NSLS-II (Brookhaven National Laboratory); apply X-ray absorption spectroscopy (XANES) to probe metal oxidation state and local coordination environment.
- Trained in the development of custom software for data processing, e.g., a Python-based cyclic voltammetry analysis suite.
- Mentored two undergraduate researchers in air-sensitive synthesis and characterization techniques.

Undergraduate Research Assistant, Villagrán Research Group *Jun – Aug 2023*

The University of Texas at El Paso | Supervisor: Prof. Dino Villagrán

- Investigated enhanced hydrogen evolution reaction (HER) activity through metallo-porphyrin electrografting on glassy carbon electrodes.

Undergraduate Research Assistant, Electrochemical Research Laboratory *Jun – Aug 2022*

Benemérita Universidad Autónoma de Puebla (BUAP) | Supervisor: Prof. Martín Marino Dávila Jiménez

- Synthesized and photoelectrochemically characterized BiOI/TiO_2 and BiOI/WO_3 heterostructures under UV irradiation.

PUBLICATIONS

Peer-Reviewed Journal Articles

1. N. Ocuane, N. Jafari, J. Calvillo, **M. Saucedo**, D. Villagrán. "Porphyrin-functionalized glassy carbon electrodes for electrochemical water splitting." Dalton Trans., July 2025.
   DOI: https://doi.org/10.1039/D5DT01390A
2. I. Bernal, R. A. Lalancette, S. Fortier, **M. Saucedo-Cañas**, P. Kucheryavy. "Crystal and Molecular Structure of Guaiazulene and Its Potassium Crown Ether Salt: A Conglomerate." Cryst. Growth Des., June 2025.
   DOI: https://doi.org/10.1021/acs.cgd.4c01760
3. **M. A. Saucedo**, M. Galicia, K. A. Carrasco. "Low Cost Pencil Graphite Electrode for Sensitive Determination of Pb(II) and Cd(II)." ECS Trans., February 2023.
   DOI: https://doi.org/10.1149/11001.0255ecst

Manuscripts in Preparation

1. *M. Saucedo, et al.; Fortier, S. Titanium(IV)/Titanium(III) chalcogenide complexes across the E = N, O, S, Se, Te series: synthesis, electrochemistry, and electronic structure.*

2. *M. Saucedo, et al.; Fortier, S. A linear bis(imidazolin-2-iminato) iron(II) complex: synthesis and electronic structure. In preparation.*

CONFERENCE PRESENTATIONS

- Electrochemical characterization of Titanium multiply bonded complexes.
  Annual Biochemistry and Chemistry Day, UTEP — March 2025
- Electrochemical characterization of Titanium multiply bonded complexes.
  2024 Electrochemistry Workshop, UTEP — July 2024
- Enhanced hydrogen evolution reaction through porphyrin electrografting.
  2023 Summer COURI Symposium, UTEP — August 2023
- Pencil graphite electrode implementation for trace detection of Pb(II) and Cd(II) in aqueous media.
  XXXVII National Congress of the Mexican Society of Electrochemistry (SMEQ) & 15th Meeting of the Mexican Section of the Electrochemical Society (ECS) — October 2022
- Synthesis and photoelectrochemical characterization of BiOI/TiO2 and BiOI/WO3 in the presence of UV radiation.
  XXVII Summer of Scientific and Technological Research of the Pacific — September 2022
- Structural and electrochemical performance of an Inconel 718 superalloy for aeronautic applications in acid environment.
  7th Meeting of Young Researchers of the State of Chihuahua — October 2021
- Bismuth nanoparticles modified electrode for cyanide ion detection in aqueous media.
  First International Congress for Integral Waste Management in Latin America and the Caribbean — May 2021
- Evaluation of carbon aerogel as a potential electrode for ultrasensitive detection of heavy metal ions.
  XXXV National Congress of the Mexican Society of Electrochemistry (SMEQ) & 13th Meeting of the Mexican Section of the Electrochemical Society (ECS) — October 2020

AWARDS & HONORS

- 2nd Place, Graduate Student Short Talk Contest — Annual Biochemistry and Chemistry Day, UTEP (March 2025)
- 2nd Place, Undergraduate Thesis Contest — XXXVII SMEQ Congress & 16th ECS Mexican Section Meeting (October 2023)
- 1st Place, Poster Presentation — 2023 Summer COURI Symposium, UTEP (August 2023)
- 1st Place, Biology and Chemistry Area — 8th Meeting of Young Researchers of the State of Chihuahua (October 2022)

PROFESSIONAL DEVELOPMENT & TRAINING

Short Practical Crystallography Course *January 2026*
New Mexico State University, Las Cruces, NM — Instructors: Dr. Ilia A. Guzei (UW-Madison), Dr. Tatiana V. Timofeeva (New Mexico Highlands University); intensive training in symmetry/space-group theory, diffraction principles, and structure solution and refinement (XPREP, SHELXL, OLEX2).

Fundamentals of XAS Data Analysis: A Hands-On Tutorial *March 2026*
National Synchrotron Light Source II (NSLS-II), Brookhaven National Laboratory — Accepted participant; approved facility user

TEACHING & MENTORING

- Teaching Assistant, Department of Chemistry & Biochemistry, UTEP
- Mentored two undergraduate researchers in air-sensitive synthesis and characterization techniques, Fortier Laboratory

TECHNICAL SKILLS

Synthesis: Air-, moisture-, temperature-, and light-sensitive synthesis (Schlenk line, glovebox techniques)

Ligand Design: N-heterocyclic carbenes (NHCs) and NHC-derived ligand frameworks.

Crystallography: Independent user: crystal growth, mounting, data collection, structure solution and refinement — APEX4, SAINT, SADABS, SHELXL, Olex2, PLATON.

Spectroscopy & Characterization: Multinuclear NMR (^{1}H, ^{2}H, ^{13}C, ^{7}Li, ^{29}Si, ^{11}B, ^{19}F, ^{31}P; COSY, HSQC) of air-sensitive diamagnetic and paramagnetic complexes, independent instrument operation; EPR, UV-Vis-NIR, X-ray absorption spectroscopy (XANES)

Electrochemistry: Cyclic voltammetry, Randles–Ševčík analysis; custom MATLAB GUI development for CV data processing

Languages: Spanish (native), English (fluent).

REFERENCES

Available upon request.