Raul A. Marquez

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Education

The University of Texas at Austin August **2020** – **Present**
Ph.D. Candidate, Chemistry, Analytical Chemistry Division GPA 4.0
Advisor: Prof. C. Buddie Mullins
Thesis: Effects of the reaction environment on chemical transformations in water-splitting electrocatalysts
Anticipated Graduation Date: 05/2025

Universidad Autonoma de Chihuahua August **2018** – June **2020**
M.S. Chemistry, *Cum Laude* GPA 4.0
Advisor: Prof. Víctor Hugo Ramos-Sánchez
Thesis: Evaluating and Optimizing Sulfite Electrooxidation in a Parallel-plate Reactor

Universidad Autonoma de Chihuahua August **2012** – November **2017**
B.S. Chemical Engineering, *Cum Laude* GPA 4.0
Advisor: Prof. Víctor Hugo Ramos-Sánchez
Thesis: Design of an Electrochemical Membrane Reactor for Hydrogen Production via the Hybrid Thermochemical Sulfur-Ammonia Cycle

Academic Standing

Refereed Publications	**24** (12 as first author)
Citations	**498**
H-Index	**11**

Awards and Fellowships

Provost's Graduate Excellence Fellowship, UT-Austin, includes below:	**2020–2025**
Morton Share Trust Graduate Fellowship	**2021–2023**
Royston M. Roberts Fellowship in Chemistry	**2020**
Maddin Endowed Scholarship in Chemistry	**2020**
International Doctoral Fellowship Program, CONAHCyT	**2021–2025**
CATL-ChemCatBio Graduate Student Travel Award, The American Chemical Society	**2024**
Edward G. Weston Summer Fellowship, The Electrochemical Society	**2024**
Jeff Byers Memorial Graduate Award in Chemistry and Chemical Engineering, UT-Austin	**2024**
#RSCPoster competition 2024 (1st place, Energy category), The Royal Society of Chemistry	**2024**
#RSCPosterPitch Award 2024, The Royal Society of Chemistry	**2024**
Chemistry Department Service Award 2024, UT-Austin	**2024**
ECS Texas Section Travel Award, 244th ECS Meeting, The Electrochemical Society	**2023**
General Student Poster Session Award (1st place), 243rd ECS Meeting, The Electrochemical Society	**2023**
ECS Texas Section Travel Award, 243rd ECS Meeting, The Electrochemical Society	**2023**
Master Thesis Competition (1st place), Mexican Hydrogen Society	**2022**
Faraday 2021 Teaching Award, UT-Austin	**2021**
Henze 2021 Teaching Award, UT-Austin	**2021**
Chemistry Department Service Award 2021, UT-Austin	**2021**
Matías Romero Visiting Scholars Fellowship	**2019**
Harry West Student Poster Award (1st place), AIChE Annual Meeting	**2017**

Professional Activities and Affiliations

Peer Reviewer — Materials Horizons, Journal of the Electrochemical Society, International Journal of Hydrogen Energy

***Materials Horizons* Community Board Member** — **2023–Present**

Secretary, UT-Austin ECS Student Chapter — **2023–Present**

Instructor and Ambassador, Clubes de Ciencia MX — **2022–Present**

Young Leader, Mexican Red Cross — **2009–2013**

Member of Royal Society of Chemistry, American Chemical Society, American Institute of Chemical Engineers, Electrochemical Society, Mexican Hydrogen Society.

Funding / Grants

International Doctoral Fellowship, CONAHCyT / University of Texas System — **2021–2025**
Proposal: 3D printing Approaches for Electrochemical Water Splitting: Incorporating Advanced Features into Water Electrolysis Technologies
Graduate Research Fellowship | US$132,000 for over four years

Provost's Graduate Excellence Fellowship, The University of Texas at Austin — **2020–2025**
Graduate Research Fellowship | US$130,000 for over five years (in addition to teaching and research assistantships)

Edward G. Weston Summer Fellowship, The Electrochemical Society — **2024**
Proposal: Understanding the Effects of Intermittent Water Electrolysis on Transition Metal (Oxy)hydroxide Oxygen Evolution Electrocatalysts
Research Fellowship | US$5,000

Travel Awards (Totaling US$2,100)

CATL-ChemCatBio Graduate Student Travel Award — **2024**

ECS Texas Section Travel Award (245th ECS Meeting) — **2024**

Chemistry Department Professional Development Travel Award — **2024**

Center for Electrochemistry Travel Grant — **2024**

ECS Texas Section Travel Award (244th ECS Meeting) — **2023**

ECS Texas Section Travel Award (243rd ECS Meeting) — **2023**

Scientific Publications

Completed as a Ph.D. student at UT-Austin:

24. **Marquez, R.A.**, Kalokowski, E., Espinosa, M., Ramos-Sánchez, V.H., Rodríguez-Pacheco, L.C., Valenzuela-De la Rosa, F., Mullins, C.B. Teaching Electrochemical Energy Conversion and Storage Through Active Learning: Insights from Science Workshops. *J. Chem. Educ.* **2024**, In Press. Link
23. Smith, L.A., Kawashima, K., **Marquez, R.A.**, Mullins, C.B. A Perspective on Protective Carbon Shells for Improved Stability of Alkaline Water Oxidation Electrocatalysts. *ACS Materials Lett.* **2024**, 6, 3190–3201. Link
22. **Marquez, R.A.**, Obeso, J.L., Vaidyula, R.R., López-Cervantes, V.B., Peralta, R.A., Marín Rosas, P., De los Reyes, J.A., Mullins, C.B., Ibarra, I.A. From Pollution to Energy Storage: Leveraging Hydrogen Sulfide with SU-101 Cathodes in Lithium-Sulfur Batteries. *Journal of Materials Chemistry A.* **2024**, In Press. Link
21. **Marquez, R.A.**, Oefelein, E.E., Le, T.V., Kawashima, K., Le, T.V., Smith, L.A., Mullins, C.B. Redefining the Stability of Water Oxidation Electrocatalysts: Insights from Materials Databases and Machine Learning. *ACS Materials Lett.* **2024**, 6, 7, 2905–2918. Link
20. **Marquez, R.A.**, Espinosa, M., Kalokowski, E., Son, Y.J., Kawashima, K., Le, T.V., Chukwuneke, C.E., Mullins, C.B. A Guide to Electrocatalyst Stability Using Lab-Scale Alkaline Water Electrolyzers. *ACS Energy Letters,* **2024**, 9, 2, 547–555. Link
19. **Marquez, R.A.**, Kalokowski, E., Espinosa, M., Bender, J.T., Son, Y.J., Kawashima, K., Chukwuneke, C., Smith, L.A., Celio, H., Dolocan, A., Zhan, X., Miller, N.R., Milliron, D.J., Resasco, J., Mullins, C.B. Transition

metal incorporation: electrochemical, structure, and chemical effects on nickel oxyhydroxide oxygen-evolution electrocatalysts. *Energy & Environmental Science*, **2024**, 17, 2028-2045. Link

18. Kawashima, K.,* **Marquez, R.A.**,* Smith, L.A., Vaidyula, R.R., Carrasco-Jaim, O.A., Wang, Z., Son, Y.J., Cao, C.L., Mullins, C.B. A Review of Transition Metal Boride, Carbide, Pnictide, and Chalcogenide Water Oxidation Electrocatalysts. *Chemical Reviews*, **2023**, 123, 23, 12795–13208. Link **Equal contributors.*
17. Chukwuneke, C., Kawashima, K., Li, H., **Marquez, R.A.**, Son, Y.J., Celio, H., Henkelman, G., Mullins, C.B. Electrochemically Engineered Domain: Nickel–Hydroxide/Nickel Nitride Composite for Alkaline HER Electrocatalysis. *Journal of Materials Chemistry A*, **2023**, 12, 1654-1661. Link
16. Son, Y.J., **Marquez, R.A.**, Kawashima, K., Smith, L.A., Chukwuneke, C., Babauta, J., Mullins, C.B. Navigating *iR* Compensation: Practical Considerations for Accurate Study of Oxygen Evolution Catalytic Electrodes. *ACS Energy Letters*, **2023**, 8, 10, 4323–4329. Link
15. **Marquez, R.A.**, Kawashima, K., Son, Y.J., Castelino, G., Miller, N.R., Smith, L.A., Chukwuneke, C., Mullins, C.B. Getting the Basics Right: Preparing Alkaline Electrolytes for Electrochemical Applications. *ACS Energy Letters*, **2023**, 8, 2, 1141–1146. Link
14. Kawashima, K., **Marquez, R.A.**, Son, Y.J., Guo, C., Vaidyula, R.R., Smith, L.A., Chukwuneke, C., Mullins, C.B. Accurate Potentials of Hg/HgO Electrodes: Practical Parameters for Reporting Alkaline Water Electrolysis Overpotentials. *ACS Catalysis*, **2023**, 13, 3, 1893–1898. Link
13. Son, Y.J., Kawashima, K., **Marquez, R.A.**, Smith, L.A., Chukwuneke, C., Mullins, C.B. Key concepts for understanding alkaline oxygen evolution reaction at the atomic/molecular scale. *Current Opinion in Electrochemistry*, **2023**, 39, 101298. Link
12. Wang, Z., Diao, J., Kawashima, K., Weeks, J.A., Vaidyula, R.R., **Marquez, R.A.**, Miller, N.R., Henkelman, G., Mullins, C.B. Unveiling the reaction mechanism of capacity reactivation in silver vanadate cathodes for aqueous zinc-ion batteries. *Journal of Materials Chemistry A*, **2023**, 11, 35, 18881-18892. Link
11. **Marquez, R.A.**, Kawashima, K., Son, Y.J., Rose, R., Smith, L.A., Miller, N.R., Carrasco-Jaim, O.A., Celio, H., Mullins, C.B. Tailoring 3D-Printed Electrodes for Enhanced Water Splitting. *ACS Applied Materials & Interfaces*, **2022**, 14, 37, 42153–42170. Link
10. Son, Y.J., Kim, S., Leung, V., Kawashima, K., Noh, J., Kim, K., **Marquez, R.A.**, Carrasco-Jaim, O.A., Smith, L.A., Celio, H., Milliron, D.J., Korgel, B.A., Mullins, C.B. Effects of Electrochemical Conditioning on Nickel-Based Oxygen Evolution Electrocatalysts. *ACS Catalysis*, **2022**, 12, 16, 10384–10399. Link
9. Kawashima, K., **Marquez-Montes, R.A.**, Li, H., Shin, K., Cao, C.L., Vo, K.M., Mullins, C.B. Electrochemical behavior of a Ni_3N OER precatalyst in Fe-purified alkaline media: the impact of self-oxidation and Fe incorporation. *Materials Advances*, **2021**, 2, 7, 2299-2309. Link
8. **Marquez-Montes, R.A.**, Kawashima, K., Son, Y.J., Weeks, J.A., Sun, H.H., Celio, H., Mullins, C.B. Mass transport-enhanced electrodeposition of Ni–S–P–O films on nickel foam for electrochemical water splitting. *Journal of Materials Chemistry A*, **2021**, 9, 12, 7736-7749. Link
7. **Marquez-Montes, R.A.**, Kawashima, K., Vo, K.M., Chávez-Flores, D., Collins-Martínez, V.H., Mullins, C.B., Ramos-Sánchez, V.H. Simultaneous sulfite electrolysis and hydrogen production using Ni foam-based three-dimensional electrodes. *Environmental Science & Technology*, **2020**, 54, 19, 12511-12520. Link
6. Kawashima, K., Cao, C.L., Li, H., **Marquez-Montes, R.A.**, Wygant, B.R., Son, Y.J., Mullins, C.B. Evaluation of a V_8C_7 Anode for Oxygen Evolution in Alkaline Media: Unusual Morphological Behavior. *ACS Sustainable Chemistry & Engineering*, **2020**, 8, 37, 14101-14108. Link

Papers Prior to Attendance at UT-Austin

5. Orozco-Mena, R.E., **Marquez, R.A.**, Mora-Domínguez, K.I., Collins-Martinez, V.H., Herrera-Peraza, E.F., Perez-Vega, S.B., Ramos-Sánchez, V.H. Implementing a sustainable photochemical step to produce value-added products in flue gas desulfurization. *Chemical Engineering Journal*, **2020**, 430, 133072. Link
4. Sánchez-Hernández, L.J., Ramírez-Romero, P., Rodríguez-González, F., Ramos-Sánchez, V.H., **Marquez-Montes, R.A.**, Romero-Paredes Rubio, H., Jonathan, M.P. Seasonal evidences of microplastics in

environmental matrices of a tourist dominated urban estuary in Gulf of Mexico, Mexico. *Chemosphere*, **2021**, 277, 130261. Link

3. **Marquez-Montes, R.A.**, Orozco-Mena, R.E., Camacho-Dávila, A.A., Pérez-Vega, S., Collins-Martínez, V.H., Ramos-Sánchez, V.H. Optimization of the electrooxidation of aqueous ammonium sulfite for hydrogen production at near-neutral pH using response surface methodology. *International Journal of Hydrogen Energy*, **2020**, 45, 27, 13821-13831. Link
2. **Marquez-Montes, R.A.**, Collins-Martínez, V.H., Pérez-Reyes, I., Chávez-Flores, D., Graeve, O.A., Ramos Sánchez, V.H. Electrochemical engineering assessment of a novel 3D-printed filter-press electrochemical reactor for multipurpose laboratory applications. *ACS Sustainable Chemistry & Engineering*, **2020**, 8, 9, 3896-3905. Link
1. **Marquez-Montes, R.A.**, Orozco-Mena, R.E., Lardizábal-Gutiérrez, D., Chávez-Flores, D., López-Ortíz, A., Ramos-Sánchez, V.H. Sulfur dioxide exploitation by electrochemical oxidation of sulfite in near-neutral pH electrolytes: A kinetics and mechanistic study. *Electrochemistry Communications*, **2019**, 104, 106481. Link

Selected Presentations

Oral (**Invited***):**

245th ECS meeting, San Francisco, CA — May **2024**
Dynamic Activity and Stability of Transition Metal (oxy)Hydroxide Oxygen Evolution Electrocatalysts Under Steady and Intermittent Operation.

244th ECS meeting, Gothenburg, Sweden — October **2023**
Understanding the Effects of Transition Metal Impurities on Nickel (oxy)hydroxide Electrocatalysts.

***Electrochemistry Chalk Talks Series, UT-Austin ECS Chapter,** Austin, TX — November **2023**
Mastering the Art of Composing Scientific Graphics. Recording

Chemistry Recruitment 2023, UNAM / UAM / IPN / UANL, Mexico City, Mexico — September **2023**
The Road to Grad School. A Guide to Joining the PhD Program in Chemistry.

***Fall Seminar Series, Chemistry Department at UNAM,** Mexico City, Mexico — September **2023**
The Devil is in the Impurities: Understanding the Influence of Transition Metal Impurities.

***Electrochemistry Chalk Talks Series, UT-Austin ECS Chapter,** Austin, TX — April **2023**
Understanding Electrochemical Double Layer Capacitance Measurements. Recording

***Hispanic Engineers Leadership Series, AIChE Chapter at UANL,** Monterrey, Mexico — October **2022**
Splitting Water with Electrons: Powering a Safer and Greener Future. Plenary Speaker.

2022 ChemE Future Faculty Diversity Seminar Series, Zoom (Online) — September **2022**
Taking the Next Step in Electrocatalysis: Closing Gaps Between Lab-scale Electrochemistry and Electrochemical Engineering.

***Energy and Society Virtual Plenary Session, UABC**, Zoom (Online) — November **2020**
Unraveling Electrochemical Water Splitting: Are Electrocatalysts Truly Stable? Recording

***ECS Monthly Webinars Plenary Session, UT-Austin**, Zoom (Online) — June **2020**
Hydrogen from Sulfite Electrolysis: Toward the Rational Design and Optimization of Practical Electrochemical Flow Cell Systems.

14th HYPOTHESIS International Symposium, Foz do Iguaçu, Brazil — April **2019**
Sulfur dioxide exploitation by electrochemical oxidation of sulfite in near-neutral pH via the S-NH_3 Cycle.

2017 AIChE Annual Meeting, AIChE, Minneapolis, Minnesota — October **2017**
Design of an Electrochemical Membrane Reactor for Hydrogen Production via the Sulfur-Ammonia Cycle.

Young Researchers Symposium, CONACyT, Guanajuato, Mexico — September **2016**
Design of an Ion-Exchange Membrane Electrochemical Reactor for Hydrogen Production via the S-NH_3 Cycle

Posters:

245th ECS meeting, San Francisco, CA May **2024**
A Guide to Electrocatalyst Stability Using Lab-Scale Alkaline Water Electrolyzers.

2024 #RSCPoster competition, LinkedIn (Online) Poster Pitch March **2024**
Trace Metal Incorporation Through In Situ Cation Exchange: Effects on Energy Conversion and Storage Properties. Energy category award (1st place) and best #RSCPosterPitch award.

243rd ECS meeting with SOFC-XVIII, Boston, MA May **2023**
Six Practices to Improve Alkaline Electrolyte Preparation. General Student Poster Session Award (1st place).

2023 CEC Annual Workshop on Electrochemistry, UT-Austin, Austin, TX February **2023**
Six Steps to Prepare Alkaline Electrolytes for Electrochemical Applications.

LatinXChem 2022 Virtual Poster Session, LatinXChem, Twitter (Online) November **2022**
Tailoring 3D-Printed Electrodes for Enhanced Water Splitting.

2021 ACS Southwest Regional Meeting Poster Session, ACS, Austin, TX November **2021**
Flow Cell-Assisted Electrodeposition of Ni-S-P-O Films on Nickel Foam for Electrochemical Water Splitting.

LatinXChem 2021 Virtual Poster Session, LatinXChem, Twitter (Online) Poster Pitch September **2021**
Flow Cell-Assisted Electrodeposition of Ni-S-P-O Films on Nickel Foam for Electrochemical Water Splitting.

2020 CEC Annual Workshop on Electrochemistry, UT-Austin, Austin, TX February **2020**
Simultaneous sulfite electrooxidation and hydrogen production in a 3D-printed electrochemical reactor.

2019 CEC Annual Workshop on Electrochemistry, UT-Austin, Austin, TX February **2019**
Electrochemical Oxidation of Sulfite in Near-Neutral pH Electrolytes: A Kinetics Study.

2017 Annual AIChE Student Conference, AIChE, Minneapolis, MN October **2017**
Design of a Novel Electrochemical Membrane Reactor for Hydrogen Production via the Sulfur-Ammonia Water-Splitting Cycle. Harry West Student Poster Award (1st place).

2016 Green & Sustainable Chemistry Conference, Elsevier, Berlin, Germany April **2016**
Design of an Ion-Exchange Membrane Electrochemical Reactor for Hydrogen Production via the S-NH_3 Cycle

Research Experience

Graduate Research Assistant, The University of Texas at Austin August **2020** – **Present**

- Investigated the effects of intermittent water electrolysis on catalytic stability.
- Studied the effects of metal impurity incorporation into water oxidation catalysts.
- Developed protocols to test electrocatalyst stability and purify alkaline electrolytes.
- Authored a comprehensive review on water oxidation catalysis from over 890 peer-reviewed reports.
- Employed statistical and machine learning methods to analyze catalyst databases.
- Designed and built 12+ custom electrochemical cells for *in situ* and *operando* characterization.
- Implemented flexible automation to accelerate the electrodeposition of catalytic thin films.
- Studied the impact of electrode architecture on bubble growth and detachment.
- Collaborated with Mexican researchers to use SU-101 MOFs in lithium-sulfur batteries.

Visiting Scholar, The University of Texas at Austin September **2019** – November **2019**

- Characterized Pd and Ni catalysts for sulfite electrooxidation.
- Synthesized transition metal nitride water-splitting electrocatalysts.

Graduate Research Assistant, Universidad Autonoma de Chihuahua August **2018** – June **2020**

- Designed an electrochemical flow cell for sulfite electrooxidation.
- Designed and built 6+ flow cells using 3D printing.
- Investigated the hydrodynamics and mass transfer of electrochemical flow cells.
- Studied the kinetics of sulfite ion electrooxidation on Pd electrocatalysts.

Undergraduate Research Assistant, Universidad Autonoma de Chihuahua August **2015** - June **2017**
- Formulated a proof-of-concept process for sulfite electrooxidation.
- Simulated a flue gas desulfurization plant to capture sulfur dioxide.

Work/Teaching Experience

International Instructor, Clubes de Ciencia Mx Summer **2022** – Summer **2023**
- Designed and taught two workshops on electrochemical energy devices to undergraduate students.
- Assessed the workshops' effectiveness and published the results in a referred educational article. Link

Teaching Assistant, UT-Austin August **2020** – May **2021**
- Taught Introduction to Chemical Practice for Fall and Spring semesters.
- Received two teaching awards from UT-Austin.

GRS 097: Fundamentals for Teaching Assistants, UT-Austin Fall **2020**
- Completed a semester-long pedagogy course for graduate teaching assistants

Research Assistant, Universidad Autonoma de Chihuahua August **2017** – June **2018**
- Developed corrosion tests and passivation experiments on stainless steel.

Teaching Assistant, Universidad Autonoma de Chihuahua August **2017** – June **2018**
- Taught undergraduate Physical Chemistry and graduate Instrumental Analysis courses.

Volunteering

Ambassador, Clubes de Ciencia Mx February **2024** – **Present**
- Reviewed 80+ proposals of instructors and participants for summer workshops.
- Shared information about the summer workshops at national and international conferences.

Secretary, UT-Austin ECS Student Chapter March **2023** – **Present**
- Started a series of Chalk Talks in electrochemistry
- Created the official website and managed all the chapter's social media accounts.
- Served as the chapter's photographer for academic and outreach activities.
- Recorded, edited, and posted seminar recordings on the chapter's YouTube channel.
- Coordinated social events and academic seminars.

Graduate Recruiter and Student Host, Department of Chemistry**,** UT-Austin February **2021** – **Present**
- Hosted eight visiting students and served as staff during recruitment events.
- Delivered six recruiting seminars at the top five national universities in Mexico
- Mentored 10+ applicants and offered 40+ hours of practice sessions for the TOEFL and IELTS exams.

Young leader, Mexican Youth Red Cross at Chihuahua November **2009** – December **2013**
- Received training in first-aid, humanitarian aid, and rope rescue.
- Participated in 40+ community service activities and three major disaster operations

Entrepreneurial Activities

Mentor, VirtAgro Fall **2021**
- Mentored the developers of an intelligent sprinkler system controlled by a smartphone app.

Entrepreneurship, From Ideas to Businesses, UNAM/Santander Fall **2019**
- Received training in finances, customers, marketing, human resources, and business model canvas.

Entrepreneur Leader, H24U Spring **2019**
- Developed an electrochemical system for ultra-pure hydrogen generation (H24U).
- Received training from the NSF I-Corps program
- Interviewed 130+ potential customers and created a business model canvas.

Science Communication

Catalastic! YouTube Channel — Summer **2023**
- Created a channel to promote science communication through social media. Link

Bright Spikes! Electrifying Chemical Reactions, Clubes de Ciencia MX — Summer **2023**
- Taught a workshop on electrochemical devices to 15+ high school and undergraduate students.

Electrochemistry: How Do We Transport Energy? Clubes de Ciencia MX — Summer **2022**
- Taught a workshop on electrochemical devices to 20+ high school and undergraduate students.

Quantum Chemistry for Kids, UACH — Summer **2019**
- Built a 3D-printed interactive game for teaching atomic structure
- Taught atomic structure concepts to 20+ elementary school students.

From Photons to Electrons, Clubes de Ciencia MX — Summer **2018**
- Participated as a guest instructor of a workshop on dye-sensitized solar cells for 30+ students.

Science Podcasts and Talk Shows, UACH — Summer **2016**
- Recorded and broadcasted 50+ episodes on STEM at UACH's radio station, impacting 1000+ listeners.

Mentoring

Chloe Williamson, Undergraduate student (chemical engineering), UT-Austin	Spring **2024** – **Present**
Thuy Vy Le, Undergraduate student (chemistry), UT-Austin	Fall **2023** – **Present**
Daniel Y. Ko, Undergraduate student (chemical engineering), UT-Austin	Fall **2023**
Sergio Ochoa, Undergraduate student (chemical engineering), UACH	Fall **2023** – **Present**
Michael Espinosa, Undergraduate student (chemistry), UT-Austin	Spring **2023** – **Present**
Emma Kalokowski, Undergraduate student (chemistry), UT-Austin	Fall **2022** – **Present**
Grace Castellino, Undergraduate student (chemistry), UT-Austin	Spring **2022** – Fall **2022**
Grayson Constantine, Undergraduate student (chemical engineering), UT-Austin	Fall **2021** – Spring **2022**
Kenya Mora-Dominguez, M.S. student (chemistry), UACH	Fall **2020** – Summer **2022**

Certifications

IOP Peer Review Excellence, IOP Publishing	**2023**
Responsible Conduct of Research, CITI Program	**2020**

Skills and Abilities

Instrumental Analysis and Methods: Scanning and transmission electron microscopy, X-ray diffraction, X-ray photoelectron spectroscopy, non-contact profilometry, infrared spectroscopy, UV-vis spectroscopy, Raman spectroscopy, X-ray fluorescence, electroanalytical techniques, gas chromatography, inductively coupled plasma mass spectrometry, contact angle measurements, ion beam milling, sputter coaters, tube furnaces, microwave digestion, thermogravimetric analysis, and differential scanning calorimetry. Demonstrated experience developing standard analytical procedures.

Specialized Software: SolidWorks, Origin, Minitab, Gamry Echem Analyst, ZView, ImageJ, CasaXPS, Gatan Microscopy Suite, COMSOL Multiphysics, LabVIEW, Arduino, HyperSpy, Match, Diamond, Maple, MATLAB, Zotero Reference Management, Microsoft Office.

Digital Editing Software: Inkscape, Adobe Illustrator, Adobe Premiere Pro, Adobe Animate, Adobe Photoshop, GIMP, Blender.

Languages: English (professional working proficiency), Spanish (native proficiency).

Other: Avid outdoorsman. Passionate about podcasting, photography, video and audio editing, graphic design, and 2D/3D animation.