

Raúl Hernández Sánchez

Department of Chemistry, Rice University

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❖ Employment

- Rice Sustainability Institute member, Rice University, 2025 - present
- Rice WaTER Institute and R-PAR Center member, Rice University, 2024 – present
- Rice Advanced Materials Institute member, Rice University, 2024 – present
- Associate Chair of Master’s Degree in Applied Chemical Sciences, Rice University, 2023 – present
- Norman Hackerman Welch Young Investigator, Assistant Professor, Rice University, 2022 – present
- Assistant Professor, University of Pittsburgh, 2018 – 2022
- Columbia Nano Initiative Postdoctoral Fellow, 2016 – 2018

❖ Education

- *CNI Postdoctoral Fellow*, Department of Chemistry, Columbia University, New York, NY, 01/2016 to 05/2018. Advisor: Prof. Colin Nuckolls
- *Ph.D. in Chemistry*, Department of Chemistry, Harvard University, Cambridge, MA, 08/2010 to 05/2015. Advisor: Prof. Theodore A. Betley
- *A.M. in Chemistry*, Department of Chemistry, Harvard University, Cambridge, MA, 08/2010 to 05/2012. Advisor: Prof. Theodore A. Betley
- *B. S. in Chemistry*, Department of Chemistry, ITESM Campus Monterrey, Monterrey, Mexico, 08/2005 to 05/2010. Advisor: Prof. Jesus Valencia

❖ Awards and Honors

- 2024** *Chemical Communications* Emerging Investigator.
- 2024** Named to The Atlas of Inspiring Hispanics/Latinx Scientists.
- 2023** C&EN Talented 12 class of 2023.
- 2021** NSF CAREER Award.
- 2020** ACS PRF Doctoral New Investigator Award.
- 2020** SNI Level I (National System of Researchers in México).
- 2016** Columbia Nano Initiative Postdoctoral Research Scientist Fellowship.
- 2015** Poster Prize Award 5th European Conference on Molecular Magnetism.
- 2015** Fellowship from the 5th European Conference on Molecular Magnetism.
- 2015** Featured in "Las 30 promesas" (The 30 promises) emitted by Grupo Editorial Expansion.
- 2012** ACS, Division of Inorganic Chemistry Student Travel Award.
- 2011 – 2012** CONACYT/Fundación México en Harvard Research Award.
- 2010** CONACYT/Fundación Mexico en Harvard Fellowship and Research Award, Fieser Graduate Research Award.
- 2008** Research Assistant Scholarship, Caltech.
- 2007** Summer Undergraduate Research Fellowship (SURF), Caltech.
- 2005 – 2010** Xorge A. Domínguez Scholarship, ITESM.
- 2005 – 2010** Special Chemistry Scholarship L.C.Q., ITESM.
- 2004** Honorary Mention in XV Mexican Physics Olympiad.

❖ Grant Proposals Active

5. WelchX, Welch Foundation, “Accelerating Magnetic Resonance Imaging Contrast Agent Discovery via Rapid Injection NMR: Improving the Detection of Lithium for Disease Diagnostics”. Co-PI. Amount: \$100,000.00 (50% for RHS). Period: 8/2025-7/2026.
4. Rice University Sustainability Institute Grant “Working Group on Critical Materials Recovery and Recycling”. Co-PI. Amount: \$15,000.00. Period: 6/2025-5/2026.

3. Rice University Brown Teaching Grant “Enhancing Undergraduate Chemical Biology and Inorganic Chemistry Education with High-Throughput Quantitative Analysis”. Co-PI. Amount: \$7,998.68. Period: 8/2025-7/2026.
2. Welch Foundation, “Carbon dioxide reduction facilitated by C–H anion recognition catalysts”. Single PI. Amount: \$300,000.00. Period: 6/2023-5/2026.
1. National Science Foundation, “CAREER: Tubularenes: a novel class of conjugated molecular nanotubes”. Single PI. Amount: \$598,844.00. Period: 11/2022-12/2026.

❖ Grant Proposals Completed

9. NSF Supplement “CAREER: Tubularenes: a novel class of conjugated molecular nanotubes”. Single PI. Amount: \$57,037.00. Period: 5/2024-4/2025.
8. NSF MRI, “MRI: Acquisition of a Single Crystal X-Ray Diffractometer for Research and Education with Regional Impact”. Collaborative. Amount: \$308,651.70. Period: 9/2022-8/2025.
Note: this grant was transferred to co-PI Prof. Nathaniel Rosi due to departure to Rice University.
7. National Science Foundation, “ERASE-PFAS: Bottom-up synthesis of polymeric membranes for PFAS sequestration”. Single PI. Amount: \$419,999.00. Period: 10/2022-08/2025.
6. Royal Society of Chemistry, Inclusion & Diversity Fund, “Science Clubs Mexico 2022: Inclusion and Diversity in Chemistry Education”. Collaborative. Amount: £5,000.00. Period: 01/2022-08/2022.
5. University of Pittsburgh, Center for Research Computing, “Tubularenes: expanding the boundaries of carbon-based nanotubes”. Single PI. Amount: \$0, 900,000 SUs per year (computational service units). Period: 03/2021-02/2023.
4. American Chemical Society Petroleum Research Fund Doctoral New Investigator, “Recycling hydrocarbons at polynuclear reaction sites”. Single PI. Amount: \$110,000.00. Period: 09/2020-08/2022.
3. University of Pittsburgh, Pitt Momentum Funds, “Fuel recycling at copper catalysts”. Single PI. Amount: \$16,000.00. Period: 03/2020-06/2021.
2. University of Pittsburgh, Center for Research Computing, “Tubularenes: redefining carbon-based nanotubes”. Single PI. Amount: \$0, 1,300,000 SUs (computational units). Period: 03/2020-02/2021.
1. University of Pittsburgh, Central Research Development Fund, “Tubular[n]arenes: wire-like cylindrical organic conductors”. Single PI. Amount: \$18,000.00. Period: 07/2019-06/2021.

❖ Publications (Google scholar metrics: H-index=24; 2293 citations as of 10/15/2025)

Independent career (*=corresponding author; §=equal contribution; undergraduate authors underlined)
In preparation

50. Espinoza Castro, V. M.;[§] Videa, M.;^{§*} Murcek, K.; Castro, E.; Fernandez-Delgado, O.; Echegoyen, L.;* Liu, P.;* Hernández Sánchez, R.* "Hydrogen evolution catalysis emanating from contorted molecular nanotubes". *In preparation*.
49. Xu, H.L.; Hernández Sánchez, R.* "Dioxygen stabilization as an end-on *trans*-peroxo dineodymium complex". *In preparation*.
48. Osei, M.; Videa, V.; Hernández Sánchez, R.* "Multielectron transformation resulting in a pyramidal μ_4 -nitride at an iron cluster". *In preparation*.
47. Arora, S.; Sharif, L.; Mirzaei, S.; Krishnan Achary, D.; Lamont, D.; Gillespie, J.; Espinoza Castro, V. M.; Hernández Sánchez, R.* "Clean water through anion recognition chemistry ". *In preparation*.

Under review

46. Gokhale, D.; Cerrón-Calle, G.; Kim-Fu, M.; Flores, K.; Roman Santiago, A.; Tsai, S.-W.; Aga, D.; Aich, N.; Diallo, M.; Doudrick, K.; Hanigan, D.; Hernández Sánchez, R.; Howarter, J.; Jiang, J.; Jones, G.; Lee, L.; Liu, H.; Manz, K.; McKenzie, E.; Padhye, L.; Sankaran, R.; Shepard, S.; Strathmann, T.; Venkatesan, A.; Wong, M.; Leet, R.; Speed, D.; Field, J.;* Westerhoff, P.;* Su, X.* “Challenges and opportunities in PFAS waste management for semiconductor manufacturing”. *Under review*.
45. Xu, H.-L.; Awashti, D.; Danilov, D.; Shee, J.;* Hernández Sánchez, R.* "Dioxygen activation at a neodymium-cobalt cluster". *Under review*.

Published

44. Mirzaei, S. M.;[§] Mirzaei, S.;[§] Khosravi, H.; Hernández Sánchez, R.* "Synthesis of a Highly Strained Four-Leaf Cloverarene ". *Chem. Commun.* **2025**, *61*, 14153.
43. Awasthi, D.;[§] Friede, M.;[§] Osei, M.;[§] Hansen, A.; Hernández Sánchez, R.;* Shee, J.* "Disentangling the Noncovalent Interactions That Drive Coinage Metal Cluster Dimerization". *J. Phys. Chem. A.* **2025**, *129* (33), 7689.
42. Espinoza Castro, V.;[§] Mirzaei, S.;[§] Bilal, M.; Ruiz, G. N.; Rose, M. J.; Wang, X.; Hernández Sánchez, R.* "Exciton Trapping at Shape-Persistent Molecular Nanotubes ". *Angew. Chem. Int. Ed.* **2025**. DOI: 10.1002/anie.202511093.
41. Bucella, D.; Hernández Sánchez, R.; Morrow, J. R.; Pierre, V. C.;* Wilson, J. J.* "Supramolecular inorganic chemistry: from form to function". *Supramol. Chem.* DOI: 10.1080/10610278.2025.2510449.
40. Mirzaei, S.; Hu, X.; Mirzaei, M. S.; Espinoza Castro, V. M.; Wang, X.; Figuerola, N. A.; Chang, T.; Chen, Y.-P.; Prieto Ríos, G.; Gonzalez-Pech, N. I.; Chen, Y.-S.; Hernández Sánchez, R.* "Catching fullerenes: synthesis of molecular nanogloves". *Angew. Chem. Int. Ed.* **2025**, *64*, e202505083.
39. Osei, M. K.;[§] Lucht, B.;[§] Xu, H.L.; Valles, A.; Espinoza Castro, V.; Hernández Sánchez, R.* "Cyclen-Based Octaamine Ligand Supporting the Formation of Dinuclear Metal Compounds". *Inorg. Chem.* **2025**, *64*, 6408.
38. Mirzaei, M. S.;[§] Mirzaei, S.;[§] Espinoza Castro, V.; Lawrence, C.; Hernández Sánchez, R.* "Dual molecular tweezers extending from a nanohoop ". *Chem. Commun.* **2024**, *60*, 14236.
37. Stevens, V.;[§] Khosravi, H.;[§] Hernández Sánchez, R.* "HFIP as a versatile solvent in resorcin[*n*]arene synthesis". *Beilstein J. Org. Chem.* **2024**, *20*, 2469.
36. Osei, M.; Mirzaei, S.; Mirzaei, S. M.; Valles, A.; Hernández Sánchez, R.* "Reversible dioxygen uptake at [Cu₄] clusters ". *Chem. Sci.* **2024**, *15*, 5327.
35. Osei, M.; Mirzaei, S.; Bogetti, X.; Rahman, M. A.; Castro, E.; Saxena, S.; Hernández Sánchez, R.* "Synthesis of square planar Cu₄ clusters ". *Angew. Chem. Int. Ed.* **2022**, *61*, 41, e202209529.
34. Mirzaei, S.; Espinoza Castro, V.; Hernández Sánchez, R.* "Nonspherical anion sequestration by C-H hydrogen bonding". *Chem. Sci.* **2022**, *13*, 2026.
33. Hernández Sánchez, R.;* Mirzaei, S.; Castro, E. "Carbon-based nanotubes". *De Gruyter* **2022**.
32. Mirzaei, S.; Castro, E.; Hernández Sánchez, R.* "Conjugated Molecular Nanotubes". *Chem. Eur. J.* **2021**, *27*, 8642.
31. Castro, E.;[§] Mirzaei, S.;[§] Hernández Sánchez, R.* "Radially Oriented [*n*]Cyclo-*meta*-phenylenes". *Org. Lett.* **2021**, *23*, 87.
30. Gadjeva, N. A.; Szimai, P.; Sági, O.; Alemany, P.; Conejeros, S.; Paley, D. W.; Hernández Sánchez, R.; Fowler, B.; Náfrádi, B.; Forró, L.; Roy, X. S.; Batail, P.;* Canadell, E.;* Steigerwald, M. L.;* Nuckolls, C.* "Intermolecular Resonance Correlates Electron Pairs Down a Supermolecular Chain: Antiferromagnetism in K-Doped p-Terphenyl". *J. Am. Chem. Soc.* **2020**, *142*, 20624.
29. Mirzaei, S.;[§] Castro, E.;[§] Hernández Sánchez, R.* "Tubularenes". *Chem. Sci.* **2020**, *11*, 8089.

PhD and postdoc

28. Liu, T.; Yang, J.; Geyer, F.; Conrad-Burton, F.; Hernández Sánchez, R.; Li, H.; Zhu, X.; Xiao, S.; Nuckolls, C.;* Steigerwald, M.* "Stringing the Perylene Diimide Bow". *Angew. Chem. Int. Ed.* **2020**, *59*, 14303.
27. Conrad-Burton, F.; Liu, T.; Geyer, F.; Costantini, R.; Schlaus, A.; Spencer, M.; Wang, J.; Hernández Sánchez, R.; Zhang, B.; Xu, Q.; Steigerwald, M.; Xiao, S.; Li, H.; Nuckolls, C.;* Zhu, X.* "Controlling Singlet Fission by Molecular Contortion". *J. Am. Chem. Soc.* **2019**, *141*, 13143.
26. Bartholomew A. K.; Teesdale, J. J.; Hernández Sánchez, R.; Malbrecht, B.J; Juda, C.; Ménard, G.; Bu, W.; Iovan, D. A.; Mikhailine, A. A.; Zheng, S.-L.; Sarangi, R.; Wang, S. G.; Chen, Y.-S.; Betley, T. A.* "Exposing the inadequacy of redox formalisms by resolving redox inequivalence within isovalent clusters". *Proc. Natl. Acad. Sci.* **2019**, *116*, 15836.
25. Milton, M.; Schuster, N.; Paley, D. W.; Hernández Sánchez, R.; Ng, F.; Steigerwald, M. L.; Nuckolls, C. "Defying Strain in the Synthesis of an Electroactive Bilayer Helicene". *Chem. Sci.* **2019**, *10*, 1029.

24. Hernández Sánchez, R.; Betley, T. A.* “Thermally Persistent High-Spin Ground States in Octahedral Iron Clusters”. *J. Am. Chem. Soc.* **2018**, *140*, 16792.
23. Hernández Sánchez, R.;;* Champsaur, A. M.; Choi, B.; Wang, S. G.; Bu, W.; Roy, X.; Chen, Y.-S.;;* Steigerwald, M. L.;;* Nuckolls, C.;;* Paley, D. W.* “Electron cartography in clusters”. *Angew. Chem. Int. Ed.* **2018**, *57*, 13815.
22. Schuster, N.; Hernández Sánchez, R.; Bukharina, D.; Kotov, N. A.; Breova, N.; Ng, F.;;* Steigerwald, M. L.;;* Nuckolls, C.* “A Helicene Nanoribbon with Greatly Amplified Chirality”. *J. Am. Chem. Soc.* **2018**, *140*, 6235.
21. Zhang, B.;;§ Hernández Sánchez, R.;;§ Zhong, Y.; Ball, M.; Terban, M. W.; Paley, D.; Billinge, S. J. L.; Ng, F.; Steigerwald, M. L.; Nuckolls, C.* “Hollow Organic Capsules Assemble into Cellular Semiconductors”. *Nat. Commun.* **2018**, *9*, 1957. § = equal contribution.
20. Milton, M.; Cheng, Q.; Yang, Y.;;* Nuckolls, C.;;* Hernández Sánchez, R.;;* Sisto, T.* “Molecular materials for Non-Aqueous Flow Batteries with High Coulombic Efficiency and Stable Cycling”. *Nano Lett.* **2017**, *17*, 7859.
19. Keener, M.; Peterson, M.; Hernández Sánchez, R.; Oswald, V. F.; Wu, G.; Ménard, G.* “Towards Catalytic Ammonia Oxidation to Dinitrogen: A Synthetic Cycle Using a Simple Manganese Complex”. *Chem. Eur. J.* **2017**, *23*, 11479.
18. Amiri, H.; Shepard, K.;;* Nuckolls, C.;;* Hernández Sánchez, R.* “Single-Walled Carbon Nanotubes: Mimics of Biological Ion Channels”. *Nano Lett.* **2017**, *17*, 1204.
17. Lee, H.; Campbell, M. G.; Hernández Sánchez, R.; Börgel, J.; Raynaud, J.; Parker, S. E.; Ritter, T.* “Mechanistic Insight Into High-Spin Iron(I)-Catalyzed Butadiene Dimerization”. *Organometallics* **2016**, *35*, 2923.
16. Furnace, A. G.; Piro, N. A.; Hernández Sánchez, R.; Garmigna, K. M.; Fey, N.; Robinson, M. J.; Kassel, W. S.; Nataro, C.* “Spectroscopic, structural and computational analysis of $[\text{Re}(\text{CO})_3(\text{dippM})\text{Br}]^{n+}$ (dippM = 1,1'-bis(diiso-propylphosphino)metallocene, M = Fe, $n = 0$ or 1; M = Co, $n = 1$)”. *Dalton Trans.* **2016**, *45*, 4819.
15. Blass, B. L.; Hernández Sánchez, R.; Decker, V. A.; Robinson, M. J.; Piro, N. A.; Kassel, W. S.; Diaconescu, P. L.; Nataro, C.* “Structural, Computational, and Spectroscopic Investigation of $[\text{Pd}(\kappa^3\text{-}1,1'\text{-bis}(\text{di-tert-butylphosphino})\text{ferrocenediyl})\text{X}]^+$ (X = Cl, Br, I) Compounds”. *Organometallics* **2016**, *35*, 462.
14. Hernández Sánchez, R.; Bartholomew, A.; Powers, T.; Ménard, G.; Betley, T. A.* “Maximizing electron exchange in a $[\text{Fe}_3]$ cluster”. *J. Am. Chem. Soc.* **2016**, *138*, 2235.
13. Hernández Sánchez, R.; Betley, T. A.* “Meta-Atom Behavior in Clusters Revealing Large Spin Ground States”. *J. Am. Chem. Soc.* **2015**, *137*, 13949.
12. Hernández Sánchez, R.; Zheng, S.-L.; Betley, T. A.* “Ligand Field Strength Mediates Electron Delocalization in Octahedral $[(^{\text{H}}\text{L})_2\text{Fe}_6(\text{L}')_m]^{n+}$ Clusters”. *J. Am. Chem. Soc.* **2015**, *137*, 11126.
11. Hernández Sánchez, R.; Willis, A. M.; Zheng, S.-L.; Betley, T. A.* “Synthesis of Well-Defined Bicapped Octahedral Iron Clusters $[(^{\text{en}}\text{L})_2\text{Fe}_8(\text{PMe}_2\text{Ph})_2]^n$ ($n = 0, -1$)”. *Angew. Chem. Int. Ed.* **2015**, *54*, 12009.
10. Cramer, S. A.; Hernández Sánchez, R.; Brakhage, D. F.; Jenkins, D. M.* “Probing the role of an Fe^{IV} tetrazene in catalytic aziridination”. *Chem. Commun.* **2014**, *50*, 13967.
9. Wu, B.; Hernández Sánchez, R.; Bezpalko, M. W.; Foxman, B. M.; Thomas, C. M.* “Formation of a Heterobimetallic Zirconium/Cobalt Diimido Complexes via a Four-Electron Transformation”. *Inorg. Chem.* **2014**, *53*, 10021.
8. Powers, T. M.; Gu, N. X.; Fout, A. R.; Baldwin, A. M.; Hernández Sánchez, R.; Alfonso, D. M.; Chen, Y.-S.; Zheng, S.-L.; Betley, T. A.* “Synthesis of Open-Shell, Bimetallic Mn/Fe Trinuclear Clusters”. *J. Am. Chem. Soc.* **2013**, *135*, 14448.
7. Eames, E.; Hernández Sánchez, R.; Betley, T. A.* “Metal atom lability in polynuclear complexes”. *Inorg. Chem.* **2013**, *56*, 5006.
6. Kraft, S. J.; Hernández Sánchez, R.; Hock, A. S.* “A Remarkably Active Iron Catecholate Immobilized in a Porous Organic Polymer”. *ACS Catal.* **2013**, *3*, 826.

5. Wong, L. J.; Hernández Sánchez, R.; Glancy Logan, J.; Zarkesh, R. A.; Ziller, J. W.; Heyduk, A. F.* “Disulfide reductive elimination from an iron(III) complex”. *Chem. Sci.* **2013**, *4*, 1906.
4. Harris, T. D.; Zhao, Q.; Hernández Sánchez, R.; Betley, T. A.* “Expanded Redox Accessibility via Ligand Substitution in an Octahedral Fe₆Br₆ Cluster”. *Chem. Commun.* **2011**, *47*, 6344.
3. Yamazaki, Y.; Hernandez-Sanchez, R.; Haile, S.* M. “Cation nonstoichiometry in yttrium-doped barium zirconate: phase behavior, microstructure, and proton conductivity”. *J. Mater. Chem.* **2010**, *20*, 8158-8166.
2. Telila, H.; Mamo, T.; Hernandez Sanchez, R. “The Fabrication of nanoparticle CsH₂PO₄ Electrolyte for Fuel Cell Applications”. *Caltech Undergraduate Research Journal* **2009**, Vol. 9 (No. 1), 33 – 39.
1. Yamazaki, Y.; Hernandez-Sanchez, R.; Haile, S. M.* “High Total Proton Conductivity in Large-Grained Yttrium-Doped Barium Zirconate”. *Chem. Mater.* **2009**, *21* (13), 2755-2762.

❖ Patents

Independent career

3. Arora, S.; Mirzaei, S.; Espinoza Castro, V. M.; Hernández Sánchez, R. “Compositions comprising macrocyclic hosting moieties”. U.S. Non-Provisional Patent **US 18/101,092** filed January 24th, 2023.
2. Mirzaei, S.; Castro, E.; Hernández Sánchez, R. “Synthesis of Nanotubular Molecules”. U.S. Non-Provisional Patent **US 17/386,100** filed July 27th, 2021.

As postdoc

1. Milton, M.; Cheng, Q.; Yang, Y.*; Nuckolls, C.*; **Hernández Sánchez, R.***; Sisto, T.* “Non-Aqueous Flow Batteries”. **US 16/792,501** and **WO 2019/036633 A1** filed Aug 17th, 2018.

❖ Books

Independent career

1. Hernández Sánchez, R.*; Mirzaei, S.; Castro, E. "Carbon-based nanotubes". *De Gruyter published April 2022*.

❖ Synergistic Activities and Contributions to Diversity

3. Faculty support of GPS Pathways Program, **2022 – present**. Student mentoring program to support and connect minority students with each other, faculty, and resources across the university.
2. Founder of Tips For Students (TFS), **2021 – present**. Program designed to guide undergraduates in their career decision making process by conveying the story of recent bachelor graduates working in academia and industry.
1. City Coordinator of “Clubes de Ciencia México” (www.clubesdeciencia.mx). **2016 – present**. Science outreach program designed to bring hands-on week-long workshops in STEM to students in high school and undergraduate in Mexico. The instructors are PhD/postdocs volunteers from top universities in the United States and Mexico. Since my involvement, we have reached more than 600 students in Chihuahua City.

❖ Invited Presentations

74. 40th Reaction Mechanisms Conference, June **2026**, Holland, Michigan.
73. University of Oregon, May **2026**, Eugene, Oregon.
72. Baylor University, May **2026**, Waco, Texas.
71. Harvard University, April **2026**, Cambridge, Massachusetts.
70. Massachusetts Institute of Technology, April **2026**, Cambridge, Massachusetts.
69. University of Illinois Urbana Champaign, April **2026**, Champaign-Urbana, Illinois.
68. Texas A&M, February **2026**, College Station, Texas.
67. The University of Chicago, March **2026**, Chicago, Illinois.
66. Northwestern University, March **2026**, Evanston, Illinois.
65. University of California, Berkeley, March **2026**, Berkeley, California.
64. Columbia University, January **2026**, New York, New York.
63. Georgia Institute of Technology, January **2026**, Atlanta, Georgia.
62. University of Florida, January **2026**, Gainesville, Florida.

61. Pacifichem, December **2025**, Honolulu, Hawaii.
60. UTEP, December **2025**, El Paso, Texas.
59. Caltech, November **2025**, Pasadena, California.
58. Stanford University, October **2025**, Stanford, California.
57. University of Washington, October **2025**, Seattle, Washington.
56. ACS Western Regional Meeting (WRM), October **2025**, San Jose, California.
55. University of Calgary, October **2025**, Calgary, Alberta, Canada.
54. University of British Columbia, October **2025**, Vancouver, British Columbia, Canada.
53. University of Rochester, May **2025**, Rochester, New York.
52. University of California, Los Angeles, April **2025**, Los Angeles, California.
51. University of California, Riverside, April **2025**, Riverside, California.
50. Supramolecular Inorganic Chemistry Symposium, American Chemical Society National Meeting, March **2025**, San Diego, CA, USA.
49. Andrews University, Zoom seminar, January **2025**.
48. 2024 Southwest Regional Meeting (SWRM), October **2024**, Waco, Texas.
47. University of Southern California, October **2024**, Los Angeles, California.
46. LXVII Physics National Convention, Autonomous University of Chihuahua (UACH), October **2024**, Chihuahua City, Mexico.
45. VI Mexican Supramolecular Chemistry Symposium, National Autonomous University of Mexico (UNAM), October **2024**, Mexico City, Mexico.
44. ACS Committee on Minority Affairs Luncheon Keynote Speaker, ACS National Conference, August **2024**, Denver, Colorado.
43. 2024 Harthcock Graduate Professional Development Symposium, Texas A&M, June **2024**, College Station, Texas.
42. American Chemical Society Greater Houston Section, Zoom seminar, June **2024**.
41. Organometallic subgroup at ExxonMobil, December **2023**, Baytown, Texas.
40. Materials that Build Bridges between the Discrete and the Continuous, University of Angers, November **2023**, Angers, France.
39. Southwestern Oklahoma State University, October **2023**, via Zoom.
38. ITESM Campus Monterrey, October **2023**, Monterrey, Mexico.
37. C&EN Talented 12 Class 2023. American Chemical Society National Meeting, August **2023**, San Francisco, CA, USA.
36. Sustainable Catalysts for C1 Valorization Supported by the PRF, American Chemical Society National Meeting, August **2023**, San Francisco, CA, USA.
35. University of California, Irvine, April **2023**, Irvine, CA, USA.
34. “Scientia: contributions to the betterment of the world”, Rice University, March **2023**, Houston, TX, USA.
33. Supramolecular and Organic Materials Chemistry, ACS Southwest Regional Meeting, November **2022**, Baton Rouge, LA, USA.
32. Gulf Coast Undergraduate Research Symposium (keynote speaker), Rice University, October **2022**, Houston, TX, USA.
31. University of Central Florida, September **2022**, Orlando, FL, USA.
30. Young Research Conference, Alliance for Diversity in Science and Engineering, Texas A&M University, February **2022**, College Station, TX, USA.
29. Rice University, February **2022**, Houston, TX, USA.
28. University of Houston, February **2022**, Houston, TX, USA.
27. Breaking Barriers Through Chemistry, sponsored by Thieme and The University of Texas A&M (online), August **2021**.
26. The College of New Jersey, departmental seminar (online), March **2021**.
25. American Chemical Society, Division of Inorganic Chemistry “Periodic Table Talks”, national conference (online), Feb **2021**.

24. Autonomous University of Juarez City, October **2020**, Juarez City (online), Mexico.
23. Tesla Institute, June **2020**, Juarez City (online), México.
22. Hampton University, October **2019**, Hampton, VA, USA.
21. University of Maryland, October **2019**, College Park, MD, USA.
20. Northwestern University, September **2019**, Evanston, IL, USA.
19. University of Colorado Boulder, February **2018**, Boulder, CO, USA.
18. Indiana University Bloomington, February **2018**, Bloomington, IN, USA.
17. University of California San Diego, January **2018**, San Diego, CA, USA.
16. University of California Riverside, January **2018**, Riverside, CA, USA.
15. University of Pittsburgh, January **2018**, Pittsburgh, PA, USA.
14. University of Illinois Urbana-Champaign, January **2018**, Champaign, IL, USA.
13. Princeton University, January **2018**, Princeton, NJ, USA.
12. University of Minnesota, December **2017**, Minneapolis, MN, USA.
11. Tufts University, December **2017**, Medford, MA, USA.
10. Duke University, December **2017**, Durham, NC, USA.
9. University of Massachusetts Amherst, December **2017**, Amherst, MA, USA.
8. Columbia Friday Synthesis Symposium, November **2017**, New York, USA.
7. Boston Regional Inorganic Colloquium (BRIC, Harvard), April **2017**, Cambridge, MA.
6. MRSEC Seminar, Columbia University, October **2016**, New York, USA.
5. Nanostructure in the City Symposium, October **2016**, New York, USA.
4. Columbia Friday Synthesis Symposium, May **2016**, New York, USA.
3. Undergraduate Chemistry Seminar (ITESM), October **2015**, Monterrey, México.
2. MIT Enterprise Forum Mexico, August **2015**, Oaxaca, México.
1. Movimiento NOMADX, August **2015**, Chihuahua, México.

❖ **Contributed Oral Presentations**

29. Pacificchem, December **2025**, Honolulu, Hawaii.
28. Gordon Research Conference, Organometallic Chemistry, July **2025**, Newport, RI.
27. Welch Conference (Poster), October **2024**, Houston, TX.
26. American Chemical Society National Meeting, March **2024**, Denver, CO.
25. American Chemical Society National Meeting, March **2024**, Denver, CO.
24. American Chemical Society National Meeting, March **2024**, Denver, CO.
23. International Conference on Coordination Chemistry, July **2024**, Fort Collins, CO.
22. Gordon Research Conference, Inorganic Reaction Mechanisms, March **2023**, Galveston, TX.
21. 16th International Symposium on Macrocyclic and Supramolecular Chem., June **2022**, Eugene, OR.
20. American Chemical Society National Meeting, March **2022**, San Diego, CA.
19. American Chemical Society National Meeting, March **2022**, San Diego, CA.
18. American Chemical Society National Meeting, March **2022**, San Diego, CA.
17. American Chemical Society National Meeting, August **2019**, San Diego, CA.
16. MRSEC retreat seminar, Columbia University, May **2017**, New York, USA.
15. American Chemical Society National Meeting, April **2017**, San Francisco, CA.
14. Gordon Research Conference and Seminar: Inorg. Reaction Mech., March **2017**, Houston, TX.
13. 5th European Conference on Molecular Magnetism, September **2015**, Zaragoza, Spain.
12. American Chemical Society National Meeting, August **2015**, Boston, MA.
11. American Chemical Society National Meeting, August **2014**, San Francisco, CA.
10. Gordon Research Conference and Seminar: Inorganic Chemistry, June **2014**, Biddeford, MA.
9. American Chemical Society National Meeting, April **2013**, New Orleans, LA.
8. American Chemical Society National Meeting, March **2012**, San Diego, CA.
7. Boston Regional Inorganic Colloquium (BRIC), October **2011**, Worcester, MA.
6. Bachelor Thesis Proposal Seminar, November **2009**, Monterrey, México.

5. Undergraduate Chemistry Seminar: “Nanodics at interfaces: combined application of SPR and AFM”, October **2009**, Monterrey, México.
4. Undergraduate Chemistry Seminar: “Yttrium-Doped Barium Zirconate. Defect Chemistry Study to Understand its Protonic Conductivity”, November **2008**, Monterrey, México.
3. Undergraduate Chemistry Seminar: “Effect of Barium Deficiency on the Proton Conductivity of $Ba_{1-x}Zr_{0.8}Y_{0.2}O_{3-\delta}$ ”, September **2007**, Monterrey, México.
2. Summer Undergraduate Research Fellowship Seminar: “Effect of Barium Deficiency on the Proton Conductivity of $Ba_{1-x}Zr_{0.8}Y_{0.2}O_{3-\delta}$ ”, August **2007**, Pasadena, CA.
1. Undergraduate Chemistry Seminar: “Thermal Differential Analysis of a Vitreous Sample”, November **2006**, Monterrey, México.

❖ Collaborators

Collaborators at Rice University: Prof. James Shee, Prof. Matthew Jones, Prof. Kushal Bagchi (Department of Chemistry); Prof. Matteo Pasquali, Prof. Stavroula Kampouri, and Prof. Rafael Verduzco (Department of Chemical and Biomolecular Engineering); and Prof. Xuedan Ma (Department of Materials Science and NanoEngineering); and Prof. Elimelech Menachem (Department of Civil and Environmental Engineering).

Collaborators at The University of Texas at Austin: Prof. Michael J. Rose (Department of Chemistry).

Collaborators at Texas A&M University: Prof. Andy Thomas (Department of Chemistry).

Collaborators at ITESM Mexico: Prof. Marcelo Videa (School of Engineering and Sciences).

Collaborators at University of Pittsburgh: Prof. Peng Liu (Department of Chemistry).

Collaborators at University of Texas, El Paso: Prof. Luis Echegoyen (Emeritus, Department of Chemistry and Biochemistry).

Collaborators at Wesleyan University: Prof. Natalia I. Gonzalez-Pech (Department of Chemistry).

Collaborators at Argonne National Laboratory: Dr. Yu-Sheng Chen (ChemMatCARS – The University of Chicago).

Collaborators at Oak Ridge National Laboratory: Dr. Christina Hoffman (Neutron Scattering).

Collaborators at University of Angers (CNRS): Prof. Patrick Batail.

Graduate Advisor: Professor Theodore A. Betley (Harvard).

Postdoctoral Sponsors: Professor Colin Nuckolls (Columbia) and Columbia Nano Initiative.

❖ Mentoring Accomplishments

Current members:

Research Scientist supervision:

Dr. Hormoz Khosravi 08/2025 – present (Postdoc 08/2023 – 07/2025)

Postdoctoral supervision:

Dr. Hong-Lei Xu 11/2023 – present

Dr. Holly M. Haflich 09/2025 – present

Ph.D. students:

Victor Espinoza Castro 07/2020 – present

Nghi La 10/2022 – present

Lul Sharif 11/2022 – present

Alejandro Fuentes Beltran 08/2024 – present

Undergraduate students:

Andrew Cherry 10/2025 – present

Charlotte Lawrence 11/2023 – present

Andi Xu 9/2025 – present

Past students:

Postdoctoral supervision:

Dr. Xiangquan (Eric) Hu 06/2023 – 08/2024

Dr. Edison A. Castro Portillo 09/2018 – 06/2021

Currently

Assist. Prof. at Xi'an Jiaotong University (China)

PTC Therapeutics, Inc. (Scientist II)

Dr. Thomas Allen	09/2018 – 08/2020	Centers for Disease Control (Physical Scientist)
<i>Graduate students:</i>		
Manasseh Osei	12/2019 – 08/2025	Postdoctoral Associate UT Austin
Odunola Orege	11/2022 – 05/2025	Rice graduate student
Jorge Rodas	02/2024 – 12/2024	Rice graduate student
Saeed Mirzaei	08/2022 – 11/2024	Cornell University graduate student
Valeria Stevens	11/2023 – 10/2024	Rice graduate student
Saber Mirzaei	06/2019 – 12/2022	Postdoctoral Associate UC Berkeley
Swati Arora	04/2021 – 08/2022	Thermo Fischer Scientific (Scientist III)
Brett Lucht	01/2020 – 07/2022	University of Pittsburgh graduate student
Keren Lee	01/2021 – 08/2021	University of Pittsburgh graduate student
Mohammad Azizur Rahman	12/2018 – 07/2021	West Virginia University graduate student
Omri Abarbanel	12/2018 – 02/2020	Postdoctoral Associate NETL
<i>Undergraduate students (UGS):</i>		
Mohammad Bilal	08/2022 – 07/2025	Graduate student at Texas A&M University
Sam de Armas	08/2024 – 05/2025	UGS at Rice University
Yehjune Moon	02/2024 – 12/2024	UGS at Rice University
Agustin Valles	01/2023 – 12/2024	Harvard incoming graduate student
Raúl Paredes Noroña	Summer 2024	UGS at Monterrey Tec, Mexico
Ava Grace Slobin	Summer 2024	UGS at Trinity University
Victor Caycedo	Fall 2023, Spring 2024	UGS at Rice University
Mira Goldstein	Fall 2023	UGS at Rice University
Nicholas Figueroa	Summer 2023	UGS at Hope College
Nicole Imming	Spring 2023	UGS at Rice University
Gabriella Prieto	Spring, Summer 2022	Medical school student at Ponce Health Sci. Univ
Gabriella Belsito	Spring 2022	
Nicolas D'Annunzio	Fall 2018, Spring 2019	Graduate student at UT Austin
Ryan W. McLane	Fall 2018, Spring 2019	Thermo Fisher Scientific (Inside Sales Rep.)
Madison Keating	Fall 2018, Spring 2019	UOMC Lead Medical Laboratory Scientist
James Dages	Fall 2018, Spring 2019	Polysciences, Inc. (Quality Control Lead)
Bridget Glessner	Fall 2018, Spring 2019	Cambium Analytica (Analytical Chemist)
Addison Averill	Spring 2019	Segal (Compensation and Career Strategies Associate)
Derek Lamb	Spring 2019	Columbia University graduate student
Emily Nicola	Summer 2019	Eurofins Lancaster Labs. (Scientist II)

Number of PhD-related exams and/or defenses served: 20 at Rice (total 42)

❖ Teaching Accomplishments

- Chemistry 366 (Rice), Fall 2025 – Inorganic Chemistry Laboratory – 4 undergraduate students.
- Chemistry 475/575 (Rice), Spring 2025 – Physical Methods in Inorganic Chemistry – 2 graduate and 4 undergraduate students.
- Chemistry 366 (Rice), Fall 2024 – Inorganic Chemistry Laboratory – 9 undergraduate students.
- Chemistry 590 (Rice), Fall 2024 – Professional Masters Seminar in Applied Chemistry – 7 master students.
- Chemistry 600 (Rice), Spring 2024 – Graduate Seminar – 27 graduate students.
- Chemistry 475/575 (Rice), Spring 2024 – Physical Methods in Inorganic Chemistry – 8 graduate and 4 undergraduate students.
- Chemistry 366 (Rice), Fall 2023 – Inorganic Chemistry Laboratory – 22 undergraduate students.

- Chemistry 475/575 (Rice), Spring 2023 – Physical Methods in Inorganic Chemistry – 5 graduate and 6 undergraduate students.
- Chemistry 1130/Chemistry 2180, Spring 2022 – Inorganic Chemistry (capstone course) – 26 undergraduate students.
- Chemistry 2120, Fall 2021 – Descriptive Inorganic and Organometallic Chemistry – 16 PhD students.
- Chemistry 1130/Chemistry 2180, Spring 2021 – Inorganic Chemistry (capstone course) – 2 graduate and 26 undergraduate students.
- Chemistry 2120, Fall 2020 – Descriptive Inorganic and Organometallic Chemistry – 17 PhD students.
- Chemistry 1130, Spring 2020 – Inorganic Chemistry (capstone course) – 33 undergraduate students.
- Chemistry 2120, Fall 2019 – Descriptive Inorganic and Organometallic Chemistry – 17 PhD students.
- Chemistry 2120, Fall 2018 – Descriptive Inorganic and Organometallic Chemistry – 18 PhD students.

❖ Service on Departmental Committees

At Rice

Graduate Admission Committee	2022 – present	
Seminar Committee	2022 – present	
Chemistry Teaching Interest Group	2024 – present	
CHEM Lab Curriculum Working Group	2024 – 2025	
<i>Faculty Search Committee on Energy and Sustainability</i>		2024 – 2025
<i>Faculty Search Committee on Chemical Biology and Biomaterials</i>		2023 – 2024
Graduate Studies Committee	2022 – 2024	
Safety Committee	2022 – 2024	

At Pitt

Diversity	2018 – 2022
Graduate Admission	2018 – 2022
Graduate Curriculum Committee	2021 – 2022
<i>Research Professor Search Committee</i>	2020
Graduate Student Advising Committee	2018 – 2020
Graduate Recruiting	2018 – 2020

❖ University Service

- Coordinator of Tec-Rice Research Experience (TRREx), **2023 – present**. Established and coordinated a summer research program between Monterrey Tec (Mexico) and Rice University. In summer 2024, 6 students from Tec developed research projects with PIs at Rice (Departments: four in Chemistry, one in Civil and Environmental Engineering, and one in ChBE).
- Associate Chair of Professional Science Masters in Applied Chemical Sciences, **2023 – present**. In charge of all academic aspects of the master's program, e.g., mentoring students, curriculum update, graduate admissions, degree certification, etc.
- Faculty sponsor and support for Rice student group “Camp Kesem Rice”, **2025 – present**. This student group is part of a national nonprofit supporting children facing a parent's cancer. Kesem at Rice was founded in 2014 and supports children in the greater Houston community by providing a free week-long summer camp experience and year-round peer support. Kesem at Rice is entirely operated by over 100 passionate college students and serves more than 100 children ages 6-18 per year.

❖ Service Outside the University: Scientific Reviewing Activities

Journal reviewer for:

Journal of the American Chemical Society, Nature Communications, Chemical Science, Organic Letters, Inorganic Chemistry, Chemical Communications, Environmental Science & Technology, Tetrahedron Letters, New Journal of Chemistry, Dalton Transactions.

Proposal reviewer for:

American Chemical Society Petroleum Research Fund (ad hoc), National Science Foundation (panels and ad hoc), Department of Energy (ad hoc), National Institutes of Health (panel)

Guest Editor

Chemical Communications and *Nanoscale* for themed collection "Reactivity and self-assembly in confined spaces".

❖ Service Outside the University: Miscellaneous

Poster judge at High School scientific events and fairs (Brashear High School, Taylor Allderdice High School, Chair Charter High School), poster judge at the Pittsburgh Quantum Institute Annual event, Judge at LatinXchem (2 times), Session Presider at ACS National Meetings (3 times), Advisory board member for BS in Nanotechnology Engineering at Monterrey Tec (Mexico), contributing member to NSF workshop on PFAS hosted by Intel and NSF workshop to provide feedback on ChemMatCARS (Sector 15 of the Advanced Photon Source at Argonne National Lab). Mentor of high school team preparing to compete in the local section of the International Science and Engineering Fair (ISEF).