Patrick L. Holland

Professor of Chemistry
Yale University
PO Box 208107
New Haven, CT 06520-8107
phone: 203-432-5162
email: patrick.holland@yale.edu
website: http://holland.chem.yale.edu/

Professional Positions

Yale University

Conkey P. Whitehead Professor of Chemistry (2021-)
Professor of Chemistry (2013-)

University of Rochester

Professor of Chemistry (2010-2013)
Associate Professor of Chemistry (2005-2010)
Assistant Professor of Chemistry (2000-2005)

University of Minnesota (1997-2000)

National Institutes of Health Postdoctoral Fellow
Advisor: Prof. William B. Tolman

Education

University of California, Berkeley (1993-1997)

Ph.D. in Chemistry, September 1997
Advisors: Profs. Robert G. Bergman and Richard A. Andersen

Princeton University (1989-1993)

A.B. *magna cum laude* (high honors) in Chemistry, June 1993

Awards

Franklin Award Lecturer, Stony Brook University, 2026
Xingda Lectureship, Peking University, 2024
Chisholm Lectureship, The Ohio State University, 2023
Award for Excellence in Peer Reviewing, Petroleum Research Fund, 2021
Watkins Visiting Professor, Wichita State University, 2019
Xingda Lectureship, Peking University, 2017
Friedrich Wilhelm Bessel Research Award of the Humboldt Foundation, 2016
Fellow of the American Association for the Advancement of Science, 2015
Blavatnik Award for Young Scientists, 2013
Fulbright Scholar Award, 2012
ACS Rochester Section Volunteerism Award, 2010
Sloan Research Fellowship, 2003
NSF CAREER Award, 2002
NIH Postdoctoral Fellowship, University of Minnesota, 1997-1999
American Institute of Chemists Student Awardee, 1993
Phi Beta Kappa, Princeton University, 1993

Memberships in Learned Societies

Member, American Chemical Society
Member, Royal Society of Chemistry
Fellow, American Association for the Advancement of Science
Member, Inorganic Syntheses

Service to Chemistry Community

Presidential Advisory Board for Chemistry and Music, American Chemical Society (2026-2027)
Co-organizer of symposium ("Advances in Nitrogen Fixation") at International Conference on Coordination Chemistry, Fort Collins, CO (2024)
Volume Editor for *Comprehensive Organometallic Chemistry IV* (2022)
Guest Editor of *Chemical Reviews* Issue: "Reactivity of Nitrogen from the Ground to the Atmosphere" (2020)
Editorial Board of *Chemical Society Reviews* (2019-2022)
Editorial Board of *Chemical Science* (2019-2026)
Co-organizer of William B. Tolman Award Symposium at National ACS Meeting, San Francisco, CA (2017)
Chair of Inorganic Reaction Mechanisms Gordon Research Conference (2017)
Participant in DOE N_2 Fixation Workshop (2016)
Participant in NSF Nitrogen Cycle Workshop (2015)
Vice-Chair of Inorganic Reaction Mechanisms Gordon Research Conference (2015)
Participant in *Organometallics* Roundtable (2013)
Member, *Inorganic Syntheses* (2013-present)
Editorial Board of *Inorganic Chemistry* (2012-2014)
Editorial Board of *Journal of Biological Inorganic Chemistry* (2009-2012)
Awards Co-Chair, ACS Inorganic Division (2010-2012)
Chair, Harrison Howe Award Committee, ACS Rochester Section (2007-2009)
Organized symposium ("New Faces of Biomimetic Coordination Chemistry") at National ACS Meeting, Washington, DC (2009)
Co-organized symposium ("Beta-Diketiminates: A Renaissance of Reaction Chemistries") at National ACS Meeting, Washington, DC (2005)
ad hoc member of many panels for NIH, DOE, and NSF grant review

Research Interests

Synthesis, electronic structure, geometry, and mechanisms of iron and cobalt complexes, with a particular focus on low-coordinate and high-spin complexes. Activation of small molecules, particularly alkenes, arenes, and N_2. Organometallic and bioinorganic catalysis.

Publications

h-index = 73. Total citations = 18,318.

Journal and Book Publications from Independent Career

217. D. M. Feldman, S. C. B. Suhr, T. J. Gerard, S. M. Krajewski, P. L. Holland, "Reduced Salen in a Monomeric Fe Complex," *Chem. Commun.* **2026**, under revision.

216. T. J. Gerard, Z. Mathe, M. S. Fataftah, S. DeBeer, P. L. Holland, "Nickel(I) in an All-Ferric NiFeS Cluster," *J. Am. Chem. Soc.* **2026**, under revision.

215. R. S. Donnelly, T. J. Gerard, S. M. Krajewski, B. Q. Mercado, X. Wang, P. L. Holland, "Hydride and Seek: Comparing Crystallographic Hydride Placement Techniques with an Open-Shell Cobalt Complex," *ACS Cent. Sci.* **2026**, in press.

214. N. Hidalgo, K. W. Southwell, R. S. Donnelly, B. Q. Mercado, S. M. Krajewski, X. Wang, P. L. Holland, "Alkali Metal Cation Effects for Rapid C–H Activation by Iron(0) Complexes," *Chem. Sci.* **2026**, *17*, 10061-10066.

213. R. S. Donnelly, P. L. Holland, "Alkali Metal Cation Effects on Dinitrogen Complexes and Organometallic Compounds," *Acc. Chem. Res.* **2026**, *59*, 258-269.

212. R. Walser-Kuntz, C. I. Woo, P. L. Holland, "Influences of Alkali Metal Cation Interactions on N_2 Coordination to Iron(I) β-Diketiminate Complexes in Electrolyte Solutions," *ChemRxiv* **2025**, 10.26434/chemrxiv-2025-f6j8x

211. K. Long, D. Bhattacharjee, S. H. Newman-Stonebraker, S. Suhr, B.Q. Mercado, A. Tighe, L. Romero, S. L. Thompson, E. L. Sausville, K. M. John, L. Julian, S. Mishra, O. Klingbeil, P. Gupta, U. Bhatt, A. C. Gao, S. Ricardo, C. R. Vakoc, B. C. Bornhauser, S. M. Corsello, S. S. Taylor, P. L. Holland, J. M. Sheltzer, "A clinical-stage oncology compound selectively targets drug-resistant cancers," *BioRxiv* **2025**, 2025.11.26.690878.

210. N. D. McMillion, M. Aliahmadi, Q. J. Bruch, C.-H. Chen, A. S. Hegg, P. L. Holland, A. J. M. Miller, "Water-Soluble Rhenium Nitride Complexes Supported by Multidentate Phosphinite Ligands Provide Insights into Aqueous Ammonium Synthesis Using Samarium Diiodide," *Inorg. Chem.* **2025**, *64*, 20986-20996.

209. D. M. Feldman, K. Pellumbi, I. Zimmermann, W. Wiesner, S. A. Sanden, S. C. B. Suhr, P. L. Holland, U.-P. Apfel, "Integrating First-Row Transition Metal Salen Complexes into Gas Diffusion Electrodes for CO_2 Electroreduction," *Chem. Commun.* **2025**, *61*, 16974-16977.

208. N. Hidalgo, R. Walser-Kuntz, P. L. Holland, "Prospects for forming C–N bonds from dinitrogen," *ACS Catal.* **2025**, *15*, 17478–17493.

207. Y. Li, N. Hidalgo, S. M. Bhutto, N. Chew, B. Q. Mercado, P. L. Holland, H. Chen, "Alkali Metal Control of Triplet-Mediated C–H Activation in Iron-Mediated Coupling of Dinitrogen and Benzene," *Inorg. Chem.* **2025**, *64*, 17387-17398.

206. S. McGuigan, S. J. Tereniak, A. Smith, S. Jana, C. L. Donley, L. Collins, N. Ghorai, Y. Xu, E. A. Fosu, S. Suhr, H. R. M. Margavio, H. Yang, G. N. Parsons, P. L. Holland, E. Jakubikova, T. Lian, P. A. Maggard, "Illuminating the Mechanistic Impacts of Functionalizing Crystalline Poly(triazine imide) with an Fe Quaterpyridine Molecular Catalyst for Photocatalytic CO_2 Reduction," *Inorg. Chem. Front.* **2025**, *12*, 6640-6654.

205. P. L. Holland, "What you C is what you get," *Proc. Natl. Acad. Sci. USA* **2025**, *122*, e2513611122.

204. A. S. Hegg, R. S. Donnelly, J. E. Weber, R. H. Crabtree, B. Q. Mercado, P. L. Holland, "Bypassing the Nitrido Wall using Redox-Active Isocyanide: Nucleophilic Attack on CO by a Rhenium Nitride Complex," *Angew. Chem. Int. Ed.* **2025**, *64*, e202504245.

203. J. E. Weber, N. D. McMillion, A. S. Hegg, A. E. Wertz, M. Aliahmadi, B. Q. Mercado, R. H. Crabtree, H. S. Shafaat, A. J. M. Miller, P. L. Holland, "Isocyanide Ligation Enables Electrochemical Ammonia Formation in a Synthetic Cycle for N_2 Fixation," *J. Am. Chem. Soc*. **2024**, *146*, 33595-33607.

202. A. L. Nagelski, M. S. Fataftah, S. N. MacMillan, K. C. MacLeod, S. F. McWilliams, B. Q. Mercado, K. M. Lancaster, P. L. Holland, "Bridging Carbonyl and Carbyne Complexes of Weak-Field Iron: Electronic Structure and Iron-Carbon Bonding," *J. Am. Chem. Soc.* **2024**, *146*, 32415-32430.

201. M. S. Fataftah, D. W. N. Wilson, Z. Mathe, T. J. Gerard, B. Q. Mercado, S. DeBeer, P. L. Holland, "Inserting Three-Coordinate Nickel into [4Fe-4S] Clusters," *ACS Cent. Sci.* **2024**, *10*, 1910-1919.

200. S. H. Newman-Stonebraker, T. J. Gerard, P. L. Holland, "Opportunities for Insight into the Mechanism of Efficient CO_2/CO Interconversion at a Nickel-Iron Cluster in CO Dehydrogenase," *Chem* **2024**, *10*, 1655-1667.

199. S. R. Buzsaki, S. M. Mason, P. V. Kattamuri, J. M. I. Serviano, D. N. Rodriguez, C. V. Wilson, D. M. Hood, J. D. Ellefsen, Y.-C. Lu, J. Kan, J. G. West, S. J. Miller, P. L. Holland, "Fe/Thiol Cooperative HAT Olefin Hydrogenation: Mechanistic Insights that Inform Enantioselective Catalysis," *J. Am. Chem. Soc.* **2024**, *146*, 17296-17310.

198. R. X. Hooper, A. E. Wertz, H. S. Shafaat, P. L. Holland, "Evaluating Diazene to N_2 Interconversion at Iron-Sulfur Complexes," *Chem. Eur. J.* **2024**, *30*, e202304072.

197. T.-D. Tan, J. M. I. Serviano, X. Luo, P.-C. Qian, P. L. Holland, X. Zhang, M. J. Koh, "SMART assembly of congested C(sp^3)-rich architectures by iron-catalyzed conjunctive alkylation," *Nature Catal.* **2024**, *7*, 321-329.

196. S. M. Bhutto, R. X. Hooper, S. F. McWilliams, B. Q. Mercado, P. L. Holland, "Iron(IV) alkyl complexes: electronic structure contributions to Fe–C bond homolysis and migration reactions that form N–C bonds from N_2," *Chem. Sci.* **2024**, *15*, 3485-3494.

195. D. W. N. Wilson, M. S. Fataftah, Z. Mathe, B. Q. Mercado, S. DeBeer, P. L. Holland, "Three-Coordinate Nickel and Metal-Metal Interactions in a Heterometallic Iron-Sulfur Cluster," *J. Am. Chem. Soc.* **2024**, *146*, 4013-4025.

194. A. L. Nagelski, M. Ozerov, M. S. Fataftah, J. Krzystek, S. M. Greer, P. L. Holland, J. Telser, "Electronic Structure of Three-Coordinate Fe^{II} and Co^{II} β-Diketiminate Complexes," *Inorg. Chem.* **2024**, *63*, 4511-4526.

193. C. V. Wilson, P. L. Holland, "Mechanism of Alkene Hydrofunctionalization by Oxidative Cobalt(salen) Catalyzed Hydrogen Atom Transfer," *J. Am. Chem. Soc.* **2024**, *146*, 2685-2700.

192. A. Wandzilak, K. Grubel, K. L. Skubi, S. F. McWilliams, D. Bessas, A. Rana, S.

Hugenbruch, A. Dey, P. L. Holland, S. DeBeer, "Mössbauer and Nuclear Resonance Vibrational Spectroscopy Studies of Iron Species Involved in N-N Bond Cleavage," *Inorg. Chem.* **2023**, *62*, 18449-18464.

191. A. T.-Y. Genoux, M. Pauly, C. L. Rooney, C. Choi, B. Shang, S. McGuigan, M. S. Fataftah, Y. Kayser, S. C. B. Suhr, S. DeBeer, H. Wang, P. A. Maggard, P. L. Holland, "Well-Defined Iron Sites in Crystalline Carbon Nitride," *J. Am. Chem. Soc.* **2023**, *145*, 20739-20744.

190. M. S. Fataftah, B. Q. Mercado, P. L. Holland, "Valence delocalization in carbon-bridged mixed-valence iron complexes," *Chem. Eur. J.* **2023**, *29*, e202301962.

189. A. T.-Y. Genoux, S. J. Tereniak, P. L. Holland, "Synthesis of new chelating phosphines containing an aryl chloride group," *Synthesis* **2023**, *55*, 2737-2741.

188. R. X. Hooper, B. Q. Mercado, P. L. Holland, "Desulfurization and N_2 Binding at an Iron Complex Derived from C–S Activation of Benzothiophene," *Organometallics* **2023**, *42*, 2019-2027.

187. S. M. Bhutto, S. F. McWilliams, R. X. Hooper, B. Q. Mercado, P. L. Holland, "Dinitrogen Binding and Functionalization in Low-Coordinate Alkynyliron Complexes," *Inorg. Chem*. **2023**, *62*, 9335-9342.

186. D. Chabeda, H. R. Kelly, P. L. Holland, V. S. Batista, "Small, Electron-Donating Substituents Give CO_2 Activation by Permethylpentalene Zirconium Amido Complexes the Upper Hand: A DFT Study of Distortion and Interaction," *Inorg. Chem.* **2023**, *62*, 3000-3006.

185. S. F. McWilliams, B. Q. Mercado, K. C. MacLeod, M. S. Fataftah, M. Tarrago, X. Wang, E. Bill, S. Ye, P. L. Holland, "Dynamic effects on ligand field from rapid hydride motion in an iron(II) dimer with an S = 3 ground state," *Chem. Sci*. **2023**, *14*, 2303-2312.

184. F. Hasanayn, P. L. Holland, A. S. Goldman, A. J. M. Miller, "Lewis Structures and the Bonding Classification of End-on Bridging Dinitrogen Transition Metal Complexes," *J. Am. Chem. Soc*. **2023**, *145*, 4326-4342.

183. S. M. Bhutto, R. X. Hooper, B. Q. Mercado, P. L. Holland, "Mechanism of Nitrogen-Carbon Bond Formation From Iron(IV) Disilylhydrazido Intermediates During N_2 Reduction," *J. Am. Chem. Soc.* **2023**, *145*, 4626-4637.

182. J. M. I. Serviano, E. J. T. Phipps, P. L. Holland, "Intermolecular Hydroalkoxylation and Hydrocarboxylation of 2-Azadienes with High Efficiency," *J. Org. Chem*. **2023**, *88*, 3277-3281.

181. S. Yogendra, D. W. N. Wilson, A. W. Hahn, T. Weyhermüller, C. Van Stappen, P. L. Holland, S. DeBeer, " Sulfur-Ligated [2Fe-2C]-Clusters as Synthetic Model Systems for Nitrogenase," *Inorg. Chem*. **2023**, *62*, 2663-2671.

180. A. S. Hegg, B. Q. Mercado, A. J. M. Miller, P. L. Holland, "Catalytic Reduction of Dinitrogen to Ammonia Using Molybdenum Porphyrin Complexes," *Faraday Disc.* **2023**, *243*, 429-449.

179. C. V. Wilson, D. Kim, A. Sharma, R. X. Hooper, R. Poli, B. M. Hoffman, P. L. Holland, "Cobalt-Carbon Bonding in a Salen-Supported Cobalt(IV) Alkyl Complex Postulated in

Oxidative MHAT Catalysis," *J. Am. Chem. Soc.* **2022**, *144*, 10361-10367.

178. G. P. Connor, D. Delony, J. E. Weber, B. Q. Mercado, J. B. Curley, S. Schneider, J. M. Mayer, P. L. Holland, "Facile Conversion of Ammonia to a Nitride in a Rhenium System that Cleaves Dinitrogen," *Chem. Sci.* **2022**, *13*, 4010-4018.

177. K. L. Skubi, R. X. Hooper, B. Q. Mercado, M. M. Bollmeyer, S. N. MacMillan, K. M. Lancaster, P. L. Holland, "Iron Complexes of a Proton-Responsive SCS Pincer Ligand with a Sensitive Electronic Structure," *Inorg. Chem.* **2022**, *61*, 1644-1658.

176. D. Kim, D. W. N. Wilson, M. S. Fataftah, B. Q. Mercado, P. L. Holland, "Spin states, bonding and magnetism in mixed valence iron(0)-iron(II) complexes," *Chem. Eur. J.* **2022**, *28*, e202104431.

175. P. L. Holland, "Introduction: Volume I," in *Comprehensive Organometallic Chemistry IV* (Eds. K. Meyer, D. O'Hare, G. Parkin), Vol. I, **2022**, p. 1.

174. J. E. Weber, S. M. Bhutto, A. T.-Y. Genoux, P. L. Holland, "Dinitrogen Binding and Functionalization," in *Comprehensive Organometallic Chemistry IV* (Eds. K. Meyer, D. O'Hare, G. Parkin), Vol. I, **2022**, pp. 521-554.

173. D. W. N. Wilson, P. L. Holland, "Nitrogenases and model complexes in bioorganometallic chemistry," in *Comprehensive Organometallic Chemistry IV* (Eds. K. Meyer, D. O'Hare, G. Parkin), Vol. XV, **2022**, pp. 41-72.

172. L. S. Yamout, M. Ataya, F. Hasanayn, P. L. Holland, A. J. M. Miller, A. S. Goldman, "Understanding Terminal versus Bridging End-on N_2 Coordination in Transition Metal Complexes," *J. Am. Chem. Soc.* **2021**, *143*, 9744-9757.

171. J. E. Weber, F. Hasanayn, M. S. Fataftah, B. Q. Mercado, R. H. Crabtree, P. L. Holland, "Electronic and Spin-State Effects on Dinitrogen Splitting to Nitrides in a Rhenium Pincer System," *Inorg. Chem.* **2021**, *60*, 6115-6124.

170. D. J. DiPrimio, P. L. Holland, "Repurposing Metalloproteins as Mimics of Natural Metalloenzymes for Small-Molecule Activation," *J. Inorg. Biochem.* **2021**, *219*, 111430.

169. J. W. Peters, O. Einsle, D. R. Dean, S. DeBeer, B. M. Hoffman, P. L. Holland, L. C. Seefeldt, "Comment on 'Structural evidence for a dynamic metallocofactor during N2 reduction by Mo-nitrogenase'," *Science* **2021**, *371*, eabe5481.

168. D. Kim, G. Pillon, D. J. DiPrimio, P. L. Holland, "Highly *Z*-Selective Double Bond Transposition in Simple Alkenes and Allylarenes Through A Spin-Accelerated Allyl Mechanism," *J. Am. Chem. Soc.* **2021**, *143*, 3070–3074.

167. A. L. Speelman, K. L. Skubi, B. Q. Mercado, P. L. Holland, "Synthesis and Reactivity of Iron Complexes with a Biomimetic SCS Pincer Ligand," *Inorg. Chem.* **2021**, *60*, 1965-1974.

166. S. L. Shevick, C. V. Wilson, S. Kotesova, D. Kim, P. L. Holland, R. A. Shenvi, "Catalytic hydrogen atom transfer to alkenes: a roadmap for metal hydrides and radicals," *Chem. Sci*. **2020**, *11*, 12401-12422.

165. A. L. Nagelski, M. S. Fataftah, M. M. Bollmeyer, S. F. McWilliams, S. N. MacMillan, B. Q. Mercado, K. M. Lancaster, P. L. Holland, "The Influences of Carbon Donor Ligands on

Biomimetic Multi-Iron Complexes for N_2 Reduction," *Chem. Sci.* **2020**, *11*, 12710-12720.

164. Q. J. Bruch, G. P. Connor, N. D. McMillion, A. S. Goldman, F. Hasanayn, P. L. Holland, A. J. M. Miller, "Considering Electrocatalytic Ammonia Synthesis via Bimetallic Dinitrogen Cleavage," *ACS Catal.* **2020**, *10*, 10826-10846.

163. S. M. McWilliams, D. L. J. Broere, C. J. V. Halliday, S. M. Bhutto, B. Q. Mercado, P. L. Holland, "Coupling Dinitrogen and Hydrocarbons through Aryl Migration," *Nature* **2020**, *584*, 221-226. Featured in *Chem. Eng. News* "Year in Chemistry 2020" as one of the "Sensational Syntheses of 2020." Featured in Org. Chem. Highlights.

162. D. Kim, C. Chen, B. Q. Mercado, D. J. Weix, P. L. Holland, "Mechanistic Study of Alkene Hydrosilylation Catalyzed by a β-Dialdiminate Cobalt(I) Complex," *Organometallics* **2020**, *39*, 2415-2424.

161. P. L. Holland, "Introduction: Reactivity of Nitrogen from the Ground to the Atmosphere," *Chem. Rev.* **2020**, *120*, 4919-4920.

160. G. Hochman, A. S. Goldman, F. A. Felder, J. M. Mayer, A. J. M. Miller, P. L. Holland, L. A. Goldman, P. Manocha, Z. Song, S. Aleti, "The potential economic feasibility of direct electrochemical nitrogen reduction as a route to ammonia," *ACS Sustainable Chem. Eng.* **2020**, *8*, 8938-8948.

159. Q. J. Bruch, G. P. Connor, C.-H. Chen, P. L. Holland, J. M. Mayer, F. Hasanayn, A. J. M. Miller, "Dinitrogen Reduction to Ammonium at Rhenium Utilizing Light and Proton-Coupled Electron Transfer," *J. Am. Chem. Soc.* **2019**, *141*, 20198-20208.

158. K. C. MacLeod, I. M. DiMucci, E. P. Zovinka, S. F. McWilliams, B. Q. Mercado, K. M. Lancaster, P. L. Holland, "Masked Radicals: Iron Complexes of Trityl, Benzophenone, and Phenylacetylene," *Organometallics* **2019**, *38*, 4224-4232.

157. A. L. Speelman, I. Coric, C. Van Stappen, S. DeBeer, B. Q. Mercado, P. L. Holland, "Nitrogenase-Relevant Reactivity of a Synthetic Iron-Sulfur-Carbon Site," *J. Am. Chem. Soc.* **2019**, *141*, 13148-13157.

156. G. P. Connor, B. Q. Mercado, H. M. C. Lant, J. M. Mayer, P. L. Holland, "Chemical oxidation of a coordinated PNP-pincer ligand forms unexpected Re-nitroxide complexes with reversal of nitride reactivity," *Inorg. Chem.* **2019**, *58*, 10791-10801.

155. D. E. DeRosha, V. G. Chilkuri, C. Van Stappen, E. Bill, B. Q. Mercado, S. DeBeer, F. Neese, P. L. Holland, "Planar three-coordinate iron sulfide in a synthetic [4Fe-3S] cluster with biomimetic reactivity," *Nature Chem.* **2019***, 11*, 1019-1025.

154. G. P. Connor, D. Kim, A. L. Nagelski, E. O. Schmidt, T. Hass-Mitchell, J. T. Atwater, S. A. Tridenti, S. Sohn, P. L. Holland, "Implementation of an Accessible Gas Chromatography Laboratory Experiment for High School Students," *J. Chem. Ed.* **2019**, *96*, 1707-1713.

153. D. E. DeRosha, N. A. Arnet, B. Q. Mercado, P. L. Holland, "A [2Fe-1S] Complex that Affords Access to Bimetallic and Higher Nuclearity Iron-Sulfur Clusters," *Inorg. Chem.* **2019**, *58*, 8829-8834.

152. D. Kim, S. M. W. Rahaman, B. Q. Mercado, R. Poli, P. L. Holland, "Roles of Iron Complexes in Catalytic Radical Alkene Cross-Coupling: A Computational and Mechanistic

Study," *J. Am. Chem. Soc.* **2019**, *141*, 7473-7485.

151. S. M. Bhutto, P. L. Holland, "Dinitrogen Activation and Functionalization using β-Diketiminate Iron Complexes," *Eur. J. Inorg. Chem.* **2019**, 1861-1869.

150. L. Roy, M. H. Al-Afyouni, D. E. DeRosha, B. Mondal, I. M. DiMucci, K. M. Lancaster, J. Shearer, E. Bill, W. W. Brennessel, F. Neese, S. Ye, P. L. Holland, "Reduction of CO_2 by a Masked Two-Coordinate Cobalt(I) Complex and Characterization of a Proposed Oxodicobalt(II) Intermediate," *Chem. Sci.* **2019**, *10*, 918-929.

149. S. F. McWilliams, P. C. Bunting, V. Kathiresan, B. Q. Mercado, B. M. Hoffman, J. R. Long, P. L. Holland, "Isolation and Characterization of a High-Spin Mixed-Valent Iron Dinitrogen Complex," *Chem. Commun.* **2018**, *54*, 13339-13342.

148. S. F. McWilliams, E. Bill, G. Lukat-Rodgers, K. R. Rodgers, B. Q. Mercado, P. L. Holland, "Effects of N_2 Binding Mode on Iron-Based Functionalization of Dinitrogen to Form an Iron(III) Hydrazido Complex," *J. Am. Chem. Soc.* **2018**, *140*, 8586-8598.

147. K. L. Skubi, P. L. Holland, "So Close, Yet Sulfur Away: Opening the Nitrogenase Cofactor Structure Creates a Binding Site," *Biochemistry* **2018**, *57*, 3540-3541.

146. V. Pelmentschikov, L. B. Gee, H. Wang, K. C. MacLeod, S. F. McWilliams, K. L. Skubi, S. P. Cramer, P. L. Holland, "High-Frequency Fe-H Vibrations in a Bridging Hydride Complex Characterized by NRVS and DFT," *Angew. Chem. Int. Ed.* **2018**, *57*, 9367-9371.

145. J. G. Chen, R. M. Crooks, L. C. Seefeldt, K. L. Bren, R. M. Bullock, M. Y. Darensbourg, P. L. Holland, M. J. Janik, A. K. Jones, M. G. Kanatzidis, P. King, K. M. Lancaster, S. V. Lymar, P. Pfromm, W. F. Schneider, R. R. Schrock, "Beyond fossil-fuel-driven nitrogen transformations," *Science* **2018**, *359*, 873.

144. S. J. Bonyhady, D. E. DeRosha, J. Vela, D. J. Vinyard, R. E. Cowley, B. Q. Mercado, W. W. Brennessel, P. L. Holland, "Iron and Cobalt Diazoalkane Complexes Supported by β-Diketiminate Ligands: A Synthetic, Spectroscopic and Computational Investigation," *Inorg. Chem.* **2018**, *57*, 5959-5972.

143. D. E. DeRosha, P. L. Holland, "Incorporating Light Atoms Into Synthetic Analogues of FeMoco," *Proc. Natl. Acad. Sci. USA* **2018**, *115*, 5054-5056.

142. D. L. J. Broere, B. Q. Mercado, J. T. Lukens, A. C. Vilbert, G. Banerjee, H. M. C. Lant, S. H. Lee, E. Bill, S. Sproules, K. M. Lancaster, P. L. Holland, "Reversible Ligand-Centered Reduction in Low-Coordinate Iron Formazanate Complexes," *Chem. Eur. J.* **2018**, *24*, 9417-9425.

141. D. L. J. Broere, B. Q. Mercado, P. L. Holland, "Selective Conversion of CO_2 to Isocyanate by Low-Coordinate Iron," *Angew. Chem. Int. Ed.* **2018**, *57*, 6507-6511.

140. D. L. J. Broere, B. Q. Mercado, E. Bill, K. M. Lancaster, S. Sproules, P. L. Holland, "Alkali Cation Effects on Redox-Active Formazanate Ligands in Iron Chemistry," *Inorg. Chem.* **2018**, *57*, 9580-9591.

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Publications from Minnesota (Postdoctoral)

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Publications from Berkeley (Graduate Student)

6. P. L. Holland, R. A. Andersen, R. G. Bergman, "Application of the *E-C* Approach to Understanding the Bond Energies of Late-Metal Complexes: An Alternative to pπ/dπ Repulsion," *Comments Inorg. Chem.* **1999**, *21*, 115-129.
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Patents

4. J. M. Sheltzer, K. Long, D. Bhattacharjee, P. L. Holland, S. H. Newman-Stonebraker, S. C. B. Suhr, "Compositions and Methods for Treating Subjects with Drug Resistant Cancers and Methods of Identifying the Same," U. S. Patent Application 63/944,524, **2026**.
3. C. Chen, D. J. Weix, P. L. Holland, "Diketiminate Cobalt Catalysts and Methods for Alkene Hydrosilylation," U.S. Provisional Patent Application 62/204,149, **2015**.
2. P. L. Holland, D. J. Weix, C. Chen, T. R. Dugan, "Z-Selective Alkene Isomerization by High-Spin Cobalt(II) Complexes," U.S. Provisional Patent Application 61/985,761, **2014**.
1. T. D. Krauss, R. Eisenberg, P. L. Holland, F. Qiu, Z. Han, "Methods for Producing Hydrogen Using Nanoparticle Catalyst Mixtures," U.S. Patent #10,471,409, issued Nov. 12, **2019**.

Funding

Current Research Funding

- "NSF-ANR CHE: Insights into alkene hydrofunctionalization from mechanistic and reactivity studies"
  National Science Foundation, CHE-2535171, $650,151
  PI: Patrick Holland (co-PI with Rinaldo Poli and Eric Manoury under ANR funding)
  1/26-12/29
- "Tunable Mediators for Controlling PCET Reductions"
  Basic Energy Sciences, Department of Energy, SC0026368, $880,000
  PI: Patrick Holland
  9/25-8/28
- "Low-Coordinate Synthetic Models for Iron-Sulfur Enzymes"
  National Institutes of Health, R01 GM-065313, $1,388,656
  PI: Patrick Holland
  4/23-3/27
- "Tandem catalytic C-H activation and N_2 activation using iron complexes"
  Basic Energy Sciences, Department of Energy, DE-SC0020315, $600,000
  PI: Patrick Holland
  9/23-8/26
- "CAS-SC: Electrochemical approaches to sustainable dinitrogen fixation"
  National Science Foundation, CHE-2247258, $330,000
  PI: Patrick Holland (co-PI with Alex Miller and Alan Goldman)
  8/23-7/26

Past Research Funding

- "Mechanistically guided improvement in radical alkene coupling by base metal catalysts"
  National Institutes of Health, R01 GM-129081, $1,164,862
  PI: Patrick Holland
  4/19-4/24
- "CAS: Electrochemical approaches to sustainable dinitrogen fixation"
  National Science Foundation, CHE-1954254, $321,010
  PI: Patrick Holland (collaboration with Robert Crabtree, Alex Miller and Alan Goldman)
  8/20-7/23
- "Tandem Catalytic C-H activation and N_2 activation using iron complexes"
  Basic Energy Sciences, Department of Energy, DE-SC0020315, $550,000
  PI: Patrick Holland
  9/19-8/23
- "Center for Hybrid Approaches in Solar Energy to Liquid Fuels (CHASE)"
  Basic Energy Sciences, Department of Energy, DE-SC0021173, $40,000,000
  32 PIs at UNC, NCSU, Penn, Yale, Emory, BNL
  9/20-8/23
- "Low-Coordinate Synthetic Models for Nitrogenase Activity"
  National Institutes of Health, R01 GM-065313, $1,303,066
  PI: Patrick Holland
  8/18-3/23
- "INFEWS: Evaluating the Prospects of Electrochemical Nitrogen Reduction Using Pincer Catalysts"
  National Science Foundation, CHE-1665137, $300,000
  PIs: Patrick Holland, Alex Miller, James Mayer and Alan Goldman
  9/17-8/20
- "RUI: The Sources of Substrate Specificity in Hydroquinone Dioxygenases"
  National Science Foundation, CHE-1506458, $97,870 subcontract
  PI: Timothy Machonkin
  9/15-9/19
- "SusChem: Catalytic Alkene Transformations Using High-Spin Cobalt Complexes"
  National Science Foundation, CHE-1465017, $500,000
  PI: Patrick Holland
  9/15-1/19
- "Low-Coordinate Synthetic Models for Nitrogenase Activity"
  National Institutes of Health, R01 GM-065313, $1,988,802
  PI: Patrick Holland
  9/14-7/18
- "Enabling Nitrogen Reduction Catalysis through Surface Immobilization"
  United States-Israel Binational Science Foundation, 2009541, $164,000 total
  co-PIs: Chaim Sukenik (Bar Ilan University) and Patrick Holland
  10/11-9/15

- “Low-Coordinate Synthetic Models for Nitrogenase Activity”
  National Institutes of Health, R01 GM065313, $1,211,567
  PI: Patrick Holland
  6/10-9/14
- "Modular Nanoscale and Biomimetic Assemblies for Photocatalytic Hydrogen Generation"
  Department of Energy, DE-FG02-09ER16121, $880,000
  co-PIs: Kara Bren, Richard Eisenberg, Patrick Holland, Todd Krauss
  9/12-6/13 (left group)
- "RUI: The Sources of Substrate Specificity in Hydroquinone Dioxygenases"
  National Science Foundation, CHE-0951999, $25,778 subcontract
  PI: Timothy Machonkin
  4/10-4/13
- "Nitrene Transfer Reactions with Iron Complexes"
  National Science Foundation, CHE-0911314, $430,000
  PI: Patrick Holland, co-PI: Brian Edelbach (Monroe Community College)
  8/09-6/13
- "High-Spin Cobalt Hydrides for Catalysis"
  Department of Energy, DE-FG-02-09ER16089, $670,000
  PI: Patrick Holland
  9/09-6/13
- "Modular Nanoscale and Biomimetic Assemblies for Photocatalytic Hydrogen Generation"
  Department of Energy, DE-FG02-09ER16121, $1,680,000
  co-PIs: Kara Bren, Richard Eisenberg, Patrick Holland, Todd Krauss
  9/09-9/12
- “Characterization of Catalytic Imide Group Transfer Reactions with Iron Catalysts”
  Petroleum Research Fund, 44942-AC, $80,000
  PI: Patrick Holland
  9/06-9/08
- “Low-Coordinate Synthetic Models for Nitrogenase Activity”
  National Institutes of Health, R01 GM065313, $1,073,394
  PI: Patrick Holland
  4/04-3/10
- “Synthetic Models of the Catalytic Nickel-Copper Site of Acetyl Coenzyme A”
  Petroleum Research Fund, 38275-G, $35,000
  PI: Patrick Holland
  9/02-8/05
- “CAREER: Reactive Low-Coordinate Compounds of the Late Transition Metals”
  National Science Foundation, CHE-0134658, $495,000
  PI: Patrick Holland
  1/02-12/06

Equipment, Education

- "MRI: Development of a Hybrid Mass Spectrometry Platform with Mass-Selective Optical Spectroscopy of Cryogenic Ions"
  National Science Foundation, CHE-1828190
  7/18
- "CRIF: Acquisition of A Matrix-Assisted Laser Desorption/Ionization Time of Flight (MALDI-TOF) Mass Spectrometer"
  National Science Foundation, CHE-0840410, $279,643
  8/09
- "GAANN: Graduate Assistance in Chemistry"
  Department of Education, P200A060048, $540,000
  8/06-8/09
- "CRIF: Purchase of a Gas Chromatograph-Mass Spectrometer"
  National Science Foundation, CHE-0443581, $104,174
  2/05
- "CRIF: Upgrade of an X-ray Diffractometer"
  National Science Foundation, CHE-0342508, $121,750
  2/04

Invited Lectures at Universities & Colleges

Hamilton College (Clinton, NY) – January 2001
Trinity College (Hartford, CT) – February 2001
West Chester University (West Chester, PA) – September 2001
Nazareth College (Pittsford, NY) – January 2002
SUNY Buffalo (Buffalo, NY) – February 2002
Carnegie Mellon University (Pittsburgh, PA) – April 2002
University of West Virginia (Morgantown, WV) – September 2002
SUNY Fredonia (Fredonia, NY) – September 2002
Colgate University (Hamilton, NY) – October 2002
Rochester Institute of Technology (Rochester, NY) – October 2002
SUNY Brockport (Brockport, NY) – November 2002
Purdue University (West Lafayette, IN) – February 2003
Rose-Hulman Institute of Technology (Terre Haute, IN) – February 2003
Indiana University (Bloomington, IN) – February 2003
University of Minnesota (Minneapolis, MN) – September 2003
St. John's University and College of St. Benedict (St. Cloud, MN) – September 2003
Yale University (New Haven, CT) – September 2003
Alfred University (Alfred, NY) – September 2003
Princeton University (Princeton, NJ) – October 2003
Notre Dame University (Notre Dame, IN) – October 2003
University of California-Berkeley (Berkeley, CA) – October 2003
Utah University (Salt Lake City, UT) – October 2003

Utah State University (Logan, UT) – October 2003
Fordham University (New York, NY) – December 2003
University of Chicago (Chicago, IL) – January 2004
University of Guelph (Guelph, ON) – March 2004
Syracuse University (Syracuse, NY) – March 2004
University of California-San Diego (La Jolla, CA) – April 2004
University of California-Irvine (Irvine, CA) – May 2004
California Institute of Technology (Pasadena, CA) – May 2004
University of Southern California (Los Angeles, CA) – May 2004
University of California-Riverside (Riverside, CA) – May 2004
James Madison University (Harrisonburg, VA) – July 2004
University of Rochester (Rochester, NY) – September 2004
Northwestern University (Evanston, IL) – October 2004
Messiah College (Grantham, PA) – October 2004
Haverford College (Haverford, PA) – October 2004
Boston University (Boston, MA) – November 2004
Brandeis University (Waltham, MA) – November 2004
University of Toronto-Missassauga (Missassauga, ON) - November 2004
Massachusetts Institute of Technology (Cambridge, MA) - January 2005
University of North Carolina (Chapel Hill, NC) - January 2005
North Carolina State University (Raleigh, NC) - January 2005
University of Akron (Akron, OH) - January 2005
University of Delaware (Newark, DE) - March 2005
University of Seattle (Seattle, WA) - May 2005
University of British Columbia (Vancouver, BC) - May 2005
University of Washington (Seattle, WA) - May 2005
Miami University (Oxford, OH) - October 2005
University of Cincinnati (Cincinnati, OH) - October 2005
Bucknell University (Lewisburg, PA) - October 2005
Juniata College (Huntingdon, PA) - October 2005
Dickinson College (Carlisle, PA) - October 2005
University of North Texas (Denton, TX) - January 2006
University of North Carolina (Charlotte, NC) - February 2006
Duke University (Durham, NC) - February 2006
University of Albany (Albany, NY) - March 2006
University of Wisconsin (Madison, WI) - April 2006
University of Illinois (Urbana-Champaign, IL) - April 2006
University of Florida (Gainesville, FL) - April 2006
Max Planck Institute for Bioinorganic Chemistry (Mülheim, Germany) - September 2006
Ithaca College (Ithaca, NY) - October 2006
University of Victoria (Victoria, BC) - October 2006
Simon Fraser University (Vancouver, BC) - October 2006
SUNY Cortland (Cortland, NY) - November 2006

McGill University (Montreal, QC) - November 2006
Monroe Community College (Rochester, NY) - December 2006
Gustavus Adolphus College (St. Peter, MN) - February 2007
Duquesne University (Pittsburgh, PA) - October 2007
Tsukuba University (Tsukuba, Japan) - November 2007
Osaka University (Osaka, Japan) - November 2007
Osaka City University (Osaka, Japan) - November 2007
Buffalo State College (Buffalo, NY) - November 2007
Dartmouth College (Hanover, NH) - May 2008
University of Pennsylvania (Philadelphia, PA) - September 2008
SUNY Geneseo (Geneseo, NY) - September 2008
SUNY New Paltz (New Paltz, NY) - September 2008
Johns Hopkins University (Baltimore, MD) - October 2008
Georgetown University (Washington, DC) - October 2008
Brock University (St. Catharine's, ON) - October 2008
University of Toronto (Toronto, ON) - November 2008
Bloomsburg University (Bloomsburg, PA) - November 2008
New Mexico State University (Las Cruces, NM) - November 2008
University of Texas (Austin, TX) - May 2009
University of Montreal (Montreal, QC) - September 2009
University of Oregon (Eugene, OR) - October 2009
Columbia University (New York, NY) - November 2009
Pennsylvania State Erie (Erie, PA) - November 2009
West Chester University (West Chester, PA) - November 2009
York University (Toronto, ON) - December 2009
Marquette University (Milwaukee, WI) - January 2010
University of Wyoming (Laramie, WY) - September 2010
Colorado State University (Fort Collins, CO) - September 2010
Northwestern University (Evanston, IL) - October 2010
LeMoyne College (Syracuse, NY) - October 2010
Pennsylvania State University (University Park, PA) - October 2010
University of North Carolina (Chapel Hill, NC) - January 2011
East Carolina University (Greenville, NC) - February 2011
University of North Carolina (Charlotte, NC) - March 2011
Temple University (Philadelphia, PA) - March 2011
Virginia Polytechnic Institute (Blacksburg, VA) - April 2011
Yale University (New Haven, CT) - September 2011
Ithaca College (Ithaca, NY) - September 2011
University of Illinois (Chicago, IL) - September 2011
University of Oklahoma (Norman, OK) - October 2011
University of Kansas (Lawrence, KS) - October 2011
Princeton University (Princeton, NJ) - November 2011
University of Illinois (Urbana-Champaign, IL) - December 2011

University of Miami (Coral Gables, FL) - December 2011
Weizmann Institute (Rehovot, Israel) - January 2012
Bar Ilan University (Ramat Gan, Israel) - January 2012
University of Wisconsin (Madison, WI) - January 2012
University of Göttingen (Göttingen, Germany) - April 2012
University of Münster (Münster, Germany) - April 2012
Max-Planck-Institut für Kohlenforschung (Mülheim, Germany) - April 2012
University of Kiel (Kiel, Germany) - May 2012
Humboldt University - Berlin (Berlin, Germany) - May 2012
ETH (Zürich, Switzerland) - May 2012
University of Basel (Basel, Switzerland) - May 2012
Friedrich Alexander University - Erlangen-Nürnberg (Erlangen, Germany) - June 2012
SUNY Potsdam (Potsdam, NY) - October 2012
University of Toledo (Toledo, OH) - November 2012
University of Georgia (Athens, GA) - January 2013
North Carolina State University (Raleigh, NC) - February 2013
University of Tennessee (Knoxville, TN) - February 2013
Valparaiso University (Valparaiso, IN) - April 2013
Brandeis University (Boston, MA) - January 2014
Carleton College (Northfield, MN) - January 2014
University of West Virginia (Morgantown, WV) - February 2014
Shanghai Institute of Organic Chemistry (Shanghai, China) - March 2014
Fudan University (Shanghai, China) - March 2014
Brown University (Providence, RI) - May 2014
Tufts University (Medford, MA) - September 2014
College of the Holy Cross (Worcester, MA) - October 2014
Swarthmore College (Swarthmore, PA) - October 2014
University of California (Santa Barbara, CA) - October 2014
University of Southern California (Los Angeles, CA) - October 2014
University of California (Irvine, CA) - October 2014
University of Missouri (St. Louis, MO) - December 2014
Wayne State University (Detroit, MI) - February 2015
University of New Mexico (Albuquerque, NM) - February 2015
Whitman College (Walla Walla, WA) - March 2015
University of Washington (Seattle, WA) - March 2015
Indiana University (Bloomington, IN) - April 2015
University of Houston (Houston, TX) - October 2015
Emory University (Atlanta, GA) - October 2015
Georgia Tech University (Atlanta, GA) - October 2015
Georgetown University (Washington, DC) - February 2016
Ursinus College (Collegeville, PA) - April 2016
University of Pennsylvania (Philadelphia, PA) - September 2016
Iowa State University (Ames, IA) - October 2016

University of Göttingen (Göttingen, Germany) - January 2017
Laboratoire de Chimie de Coordination (Toulouse, France) - January 2017
Universitat de Girona (Girona, Spain) - February 2017
Institut Catalá d'Investigació Quimica (Tarragona, Spain) - February 2017
Friedrich-Alexander-Universität (Erlangen-Nuremberg, Germany) - February 2017
Peking University (Beijing, China) - April 2017
Philips-Universität Marburg (Marburg, Germany) - May 2017
TU Braunschweig (Braunschweig, Germany) - May 2017
HU Berlin (Berlin, Germany) - May 2017
TU München (Munich, Germany) - May 2017
Uppsala University (Uppsala, Sweden) - May 2017
University of Regensburg (Regensburg, Germany) - May 2017
Max Planck Institute for Chemical Energy Conversion (Mülheim/Ruhr, Germany) - June 2017
University of Amsterdam (Amsterdam, Netherlands) - June 2017
Aix Marseille Université (Marseille, France) - June 2017
Rutgers University (New Brunswick, NJ) - September 2017
University of California (San Diego, CA) - October 2017
Scripps Research Institute (La Jolla, CA) - October 2017
University of Oklahoma (Norman, OK) - October 2017
University of California (Berkeley, CA) - January 2018
Massachusetts Institute of Technology (Cambridge, MA) - April 2018
Northwestern University (Evanston, IL) - May 2018
Simon Fraser University (Vancouver, BC) - October 2018
University of Victoria (Victoria, BC) - October 2018
Cornell University (Ithaca, NY) - December 2018
Indiana University (Bloomington, IN) - January 2019
University of Michigan (Ann Arbor, MI) - February 2019
University of Notre Dame (Notre Dame, IN) - February 2019
Calvin College (Grand Rapids, MI) - February 2019
Hope College (Holland, MI) - February 2019
Wichita State University (Wichita, KS) - March 2019
McGill University (Montreal, ON) - March 2019
Indiana University Purdue University at Indianapolis (Indianapolis, IN) - April 2019
Rutgers University - Newark (Newark, NJ) - May 2019
University of Chicago (Chicago, IL) - May 2019
University of Kassel (Kassel, Germany) - June 2019
University of Utrecht (Utrecht, Netherlands) - June 2019
James Madison University (Harrisonburg, VA) - June 2019
University of Freiburg (Freiburg, Germany) - August 2019
Brown University (Providence, RI) - September 2019
University of Utah (Salt Lake City, UT) - October 2019
University of Lausanne (online) - May 2020
Global Inorganic Discussion Weekend Virtual Symposium (online) - June 2020

St. Louis University (online) - September 2020
Iowa Wesleyan (online) - October 2020
University of Graz (online) - January 2021
University of Basel (online) - March 2021
Marburg University (online) - June 2021
Creighton University (online) - September 2021
Auburn University (online) - October 2021
Vanderbilt University (online) - November 2021
University of Hamburg (online) - January 2022
Connecticut College (New London, CT) - February 2022
Rutgers University (New Brunswick, NJ) - September 2022
Purdue University (West Lafayette, IN) - January 2023
University of Southern California (Los Angeles, CA) - January 2023
University of Houston (Houston, TX) - February 2023
University of Bonn (Bonn, Germany) - March 2023
Max Planck Institute for Chemical Energy Conversion (Mülheim an der Ruhr, Germany) - March 2023
University of Edinburgh (Edinburgh, UK) - March 2023
University of Alberta (Edmonton, Alberta) - September 2023
University of Calgary (Calgary, Alberta) - September 2023
The Ohio State University (Columbus, OH) - October 2023
Yale University (New Haven, CT) - April 2024
Dalian University of Technology (Dalian, China) - June 2024
Beijing Normal University (Beijing, China) - June 2024
Peking University (Beijing, China) - June 2024
Colgate University (Hamilton, NY) - October 2024
Florida International University (Miami, FL) - October 2024
EPFL (Lausanne, Switzerland) - May 2025
ETH (Zürich, Switzerland) - May 2025
University of Basel (Basel, Switzerland) - May 2025
University of California, Los Angeles (Los Angeles, CA) - January 2026
Texas A&M University (College Station, TX) - February 2026
University of Rochester (Rochester, NY) - March 2026
Colorado State University (Fort Collins, CO) - April 2026
Stony Brook University (Stony Brook, NY) - April 2026
University of California - Berkeley (Berkeley, CA) - April 2026
Trinity University (San Antonio, TX) - October 2026
Brigham Young University (Provo, UT) - January 2027
University of Wisconsin (Madison, WI) - February 2027
Emory University (Atlanta, GA) - April 2027

Lectures at Meetings/Conferences (Invited)

Bergman Symposium (Berkeley, CA) – June 2002

Nitrogen Fixation Gordon Conference (New London, NH) – June 2002
International Conference on Coordation Chemistry (Heidelberg, Germany) – July 2002
Metals in Biology Gordon Conference (Ventura, CA) – February 2003
Eisenberg/Jones Symposium, National ACS Meeting (New Orleans, LA) – March 2003
Symposium on Non-Heme Iron in Biology, National ACS Meeting (Anaheim, CA) – March 2004
Nitrogen Fixation Gordon Conference (New London, NH) – June 2004
Organometallic Chemistry Gordon Conference (Newport, RI) – July 2004
European Biological Inorganic Chemistry Conference (EUROBIC 7) (Garmisch-Partenkirchen, Germany) - August 2004
Inorganic Reaction Mechanisms Gordon Conference (Ventura, CA) - February 2005
Pacifichem (Honolulu, HI) - December 2005
Rochester Section ACS Dinner (Rochester, NY) - January 2006
Wieghardt Symposium, National ACS Meeting (Atlanta, GA) - March 2006
Iron-Sulfur Enzymes Gordon Conference (New London, NH) - June 2006
Inorganic Chemistry Gordon Conference (Newport, RI) - July 2006
International Workshop on Bioinorganic and Organometallic Perspectives in Activation of Small Molecules (Nagoya, Japan) - November 2007
Que Symposium, National ACS Meeting (New Orleans, LA) - April 2008
Symposium on Integration of Research and Education at the Frontiers of Inorganic Chemistry, National ACS Meeting (New Orleans, LA) - April 2008
Symposium on Organometallic Chemistry of the Group 15 Elements, Northeast Regional ACS Meeting (Burlington, VT) - June 2008
Symposium on Activation of Dinitrogen, National ACS Meeting (Philadelphia, PA) - August 2008
Metals in Biology Gordon Conference (Ventura, CA) - January 2009
International Conference on Biological Inorganic Chemistry, ICBIC (Nagoya, Japan) - July 2009
Iron-Sulfur Enzymes Gordon Conference (New London, NH) - June 2010
Symposium on Ligand Design, National ACS Meeting (Boston, MA) - August 2010
Wieghardt Retirement Symposium (Mülheim, Germany) - November 2010
Pacifichem (Honolulu, HI) - December 2010
Metal Hydrides Workshop (Oxford, England) - March 2012
Fulbright Berlin Conference (Berlin, Germany) - March 2012
Iron Symposium (Regensburg, Germany) - June 2012
Inorganic Chemistry Gordon Conference (Biddeford, ME) - June 2012
Andersen Symposium (Berkeley, CA) – October 2012
Inorganic Reaction Mechanisms Gordon Conference (Galveston, TX) - March 2013
Symposium on Hydrogen Production, Storage, and Utilization, National ACS Meeting (New Orleans, LA) - April 2013
International Conference on Biological Inorganic Chemistry, ICBIC (Grenoble, France) - July 2013
Symposium on Base Metal Catalysis, National ACS Meeting (Indianapolis, IN) - September 2013

Werner Nobel Centenary Symposium, National ACS Meeting (Indianapolis, IN) - September 2013
New York ACS Section: Frontiers of Inorganic and Organometallic Chemistry (New York, NY) - September 2013
Fusion Conference on Molecules and Materials for Artificial Photosynthesis (Cancun, Mexico) - February 2014
Canadian Chemistry Conference (Vancouver, BC) - June 2014
Rigaku Symposium (New Haven, CT) - June 2014
Fusion Conference on Small Molecule Activation (Chicago, IL) - July 2014
Western Canadian Undergraduate Chemistry Conference (Kelowna, BC) - May 2015
National ACS Meeting (Boston, MA) - August 2015
International Conference on Nitrogen Fixation (Monterey, CA) - October 2015
Pacifichem (Honolulu, HI) - December 2015
National ACS Meeting (San Diego, CA) - March 2016
Metallocofactors Gordon Conference (Easton, MA) - June 2016
Telluride Conference on Small Molecule Activation (Telluride, CO) - June 2016
International Conference on Coordination Chemistry (Brest, France) - July 2016
National ACS Meeting (Philadelphia, PA) - August 2016
SABIC Frontiers in Inorganic Chemistry (Kolkata, India) - January 2017
ECOST: Control over Spin States in Technology and Biochemistry (Lisbon, Portugal) - March 2017
National ACS Meeting (San Francisco, CA) - April 2017
Boston Regional Inorganic Colloquium (Boston, MA) - Feburary 2018
National ACS Meeting (New Orleans, LA) - March 2018
Blavatnik Science Symposium (New York, NY) - June 2018
National ACS Meeting (Orlando, FL) - March 2019
Canadian Chemistry Conference (Quebec, QC) - June 2019
International Conference on Biological Inorganic Chemistry (Interlaken, Switzerland) - August 2019
Annual Meeting of the Israel Chemical Society (Jerusalem, Israel) - February 2020
National ACS Meeting (San Diego, CA) - March 2022
Fusion Conference on Small Molecule Activation (Cancun, Mexico) - May 2022
Canadian Chemistry Conference and Exhibition (Calgary, AB) - June 2022
Brian Hoffman Symposium (Evanston, IL) - June 2022
Singapore International Chemistry Conference (Singapore) - December 2022 - COVID cancellation
Faraday Discussion (London, England) - March 2023
Telluride Conference on Biological and Bioinspired Redox Catalysts (Telluride, CO) - June 2023
International Hydrogenase Conference (Walla Walla, WA) - June 2023
National ACS Meeting (New Orleans, LA) - March 2024
XV School of Organometallic Chemistry "Marcial Moreno Mañas" (Alicante, Spain) - May 2024
Metallocofactors Gordon Research Conference (Eaton, MA) - June 2024
International Conference on Coordination Chemistry (Ft. Collins, CO) - July 2024

European Bioinorganic Chemistry Conference, EuroBIC (Münster, Germany) - August 2024
European Colloquium on Inorganic Reaction Mechanisms (Toulouse, France) - September 2024
Summer School on Inorganic Spectroscopy (Mülheim an der Ruhr, Germany) - September 2024
National ACS Meeting (San Diego, CA) - March 2025
International Conference on Biological Inorganic Chemistry (Long Beach, CA) - July 2025
Metals in Biology Gordon Conference (Ventura, CA) - January 2026
Telluride Conference on Biological and Bioinspired Redox Catalysts (Telluride, CO) - February 2026
DOE BES Photochemistry and Radiation Chemistry PI Meeting (Bethesda, MD) - June 2026
Organometallic Chemistry Gordon Conference (Newport, RI) - July 2026

Lectures at Meetings/Conferences (Contributed)

National ACS Meeting (Chicago, IL) - August 2001
Inorganic Discussion Weekend (Waterloo, ON) - October 2001
National ACS Meeting (Boston, MA) - August 2002
Organometallic Chemistry Gordon Conference (Newport, RI) - July 2003
National ACS Meeting (New York, NY) - September 2003
NSF Inorganic Workshop (Sedona, AZ) - June 2004
Northeast Regional ACS Meeting (Rochester, NY) - November 2004
Beta-Diketiminates Symposium, National ACS Meeting (Washington, DC) - August 2005
International Meeting of the IMBG (Autrans, France) - September 2006
International Conference on Biological Inorganic Chemistry, ICBIC (Vienna, Austria) - July 2007
International Conference on Biological Inorganic Chemistry, ICBIC (Vancouver, Canada) - August 2011
National ACS Meeting (San Francisco, CA) - August 2014
EuCheMS Inorganic Chemistry Conference (Copenhagen, Denmark) – July 2017

Research Trainees

Doctoral

Name	Degree/Year	Most Recent Known Position
Nathan Eckert	Ph.D. 2005	Head of R&D, Shepherd Chemical Co., Cincinnati, OH
Javier Vela	Ph.D. 2005	Professor, Iowa State U., Ames, IA
Ying Yu	Ph.D. 2007	Master's program in Information Systems
Keying Ding	Ph.D. 2009	Associate Professor, Middle Tennessee State Univ.
Sara Rocks	Ph.D. 2009	Associate Professor, Utah Valley U., Orem, UT
Matthew McLaughlin	Ph.D. 2011	Section Manager, GlobalFoundries

Ryan Cowley	Ph.D. 2011	Research Chemist, ThermoFisher, Sunnyvale, CA
Karen Chiang	Ph.D. 2011	Science Teacher, Uncommon Schools, Rochester, NY
Thomas Dugan	Ph.D. 2012	Sr. Research Chemist, Evonik Corp, Trexlertown, PA
Meghan (Clark) Rodriguez	Ph.D. 2012	Senior Research Scientist, Bausch + Lomb, Rochester, NY
Zhiji Han	Ph.D. 2014	Professor, Sun Yat-sen Univ., Guangzhou, China
Sarina Bellows	Ph.D. 2014	Portfolio Manager, Thermo Fisher Scientific, Rochester, NY
Chi Chen	Ph.D. 2016	Director of Research, Air Company, New York, NY
Megan Reesbeck	Ph.D. 2016	Teacher, Horace Mann School, New York, NY
Nicholas Arnet	Ph.D. 2016	Associate Professor, Nevada State College, Henderson, NV
Sean McWilliams	Ph.D. 2019	Ab Initio, Boston, MA
Daniel DeRosha	Ph.D. 2019	Business Development Manager, Agilis, New York, NY
Dongyoung Kim	Ph.D. 2020	Postdoctoral, POSTECH (Hwang)
Daniel Kim	Ph.D. 2020	Postdoctoral, University of Illinois Chicago (Mankad)
Gannon Connor	Ph.D. 2021	Associate Director, Corporate Development, Atomwise, Boston, MA
Jeremy Weber	Ph.D. 2022	Research Scientist, Lockheed Martin, Boston, MA
Samuel Bhutto	Ph.D. 2022	Postdoctoral, Boston Univ. (Cueny)
Alexandra Nagelski	Ph.D. 2023	Postdoctoral, Los Alamos National Lab
Conner Wilson	Ph.D. 2023	Senior Scientist, Amgen
Reagan Hooper	Ph.D. 2023	Postdoctoral, SLAC National Accelerator Laboratory, Palo Alto, CA (Cordones-Hahn/Gaffney)
Savannah Mason	Ph.D. 2024	Research chemist, MASS Analytical
Alexander Hegg	Ph.D. 2025	Postdoctoral, Cornell University (Kephart)
Juan Serviano	Ph.D. 2025	Process Chemistry Scientist, Vertex Pharmaceuticals, Boston, MA
Linda Zuckerman	Ph.D. 2026	seeking employment
Ryan Donnelly	current student	Expected completion 2027
Teddy Gerard	current student	Expected completion 2027
Kendal Southwell	current student	Expected completion 2029
Lindsey Baker	current student	Expected completion 2029
Chandler Woo	current student	Expected completion 2030
Olga Zubarieva	current student	Expected completion 2030
Ryan Pinard	current student	Expected completion 2030

Master's

Name	Degree/Year	Most Recent Known Position
Elizabeth Gregory	M.S. 2004	Assistant Director of EH&S, SUNY Brockport
Travis Hebden (BS/MS)	M.S. 2005	Supply Chain Engineer, Intel Corp., Hillsboro, OR
Liwei Zhu	M.S. 2007	Student Loan Pricing Manager, Discover Financial Services
Tawana Robinson	M.S. 2008	Baylor Genome Sequencing Center, Waco, TX
Wenwen Yao	M.S. 2011	Senior Engineer, Waters Corp, Boston, MA
Malik Al-Afyouni	M.S. 2013	Analytical Chemist, Eastman Chemical, Akron, OH
Anna Brosnahan	M.S. 2016	Strategic Intelligence / Market Intelligence, Capital One, Maclean, VA
Nan (Ken) Xie	M.S. 2020	Teacher
Jessica Armstrong	M.S. 2020	Program Manager, American Chemical Society
Daniel DiPrimio (BS/MS)	M.S. 2021	Grad Student, Harvard Univ., Cambridge, MA

Postdoctoral

Name	Time in Group	Most Recent Known Position
Jeremy Smith	2000-2003	Professor of Chemistry, Indiana Univ.
Savariraj Kingsley	2002-2003	Scientist, Glencore, Edmonton, Canada
Wilda Vargas-Gregory	2004-2005	Adjunct Professor, POPAC Nursing School, Mayaguez, PR
Jérôme Elhaïk	2005-2006	Journalist, Évreux, France
Azwana Sadique	2004-2007	Assistant Professor, Monroe Community College, Rochester, NY
Bryan Stubbert	2006-2007	Senior Consultant, NexantECA, Houston, TX
Benjamin Dible	2006-2009, 2010	Director, IP Search and Intelligence, Merck, Boston, MA
Aydin Kavara	2010-2011	Team Leader, Pall Corp., Boston, MA
P. M. Gurubasavaraj	2010-2011	Assistant Professor, Rani Chennamma University, India
William McNamara	2010-2012	Associate Professor, William & Mary, Williamsburg, VA
Katarzyna Grubel	2011-2014	Scientist, Pacific Northwest National Laboratory, Richland, WA
Simon Bonyhady	2013-2015	Senior Scientist, Huber, Atlanta, GA
Richard Lewis	2013-2015	Regulatory Expert, Hyman, Phelps & McNamara, Washington, DC
Cory MacLeod	2012-2016	Senior Scientist, Biovectra, Charlottetown, PEI

Ilija Coric	2013-2016	Assistant Professor, Univ. Zürich
Daniel Broere	2016-2018	Assistant Professor, Utrecht Univ.
Amy Speelman	2016-2019	Chemist, Pacific Northwest National Lab, Richland, WA
Kazimer Skubi	2017-2020	Assistant Professor, Carleton College
Erik Phipps	2020-2022	Scientist, Takeda Pharmaceuticals, Cambridge, MA
Daniel Wilson	2020-2022	Research Fellow, University College London
Alexandre Genoux	2021-2023	Postdoctoral Fellow, Ecole Polytechnique Federale de Lausanne (EPFL)
Chris Gendy	2022-2023	Nova Chemical, Calgary, Alberta
Majed Fataftah	2019-2023	Assistant Professor, University of Illinois Urbana-Champaign
Samuel Newman-Stonebraker	2023-2025	Senior Scientist, Sanofi, Cambridge, MA
Nereida Hidalgo	2023-2025	Research Fellow, Seville, Spain
Ryan Walser-Kuntz	2023-2025	Chemist, Vertex Pharmaceuticals, Boston, MA
Simon Suhr	2023-2026	Postdoctoral, Helmholtz Institute, Berlin, Germany
Aishanee Sur	2025-	Currently in group
Kaeden Teindl	2026-	Starting in February

Undergraduate Theses

Name	**Degree/Year**	**Most Recent Known Position**
Emily Bones Abbott	B.S. 2001	Assistant Director, External Communications, American Chemical Society, Washington, DC
Lanyn Perez Taliaferro	B.S. 2002	Program Officer, NIAID, Bethesda, MD
Nicole Ketterer	B.S. 2003	Senior Research Scientist, Chevron Oronite, Richmond, CA
Travis Hebden	B.S. 2004	Engineer, Intel, Portland, OR
Benjamin Gilston	B.S. 2005	Senior Scientist, KBI Biopharma, NC
Pamela Barrett	B.S. 2006	Research Scientist, Cooperative Institute for Climate, Ocean, and Ecosystem Studies, Seattle, WA
Amanda Mack	B.S. 2008	Teacher, Pingree School, South Hamilton, MA
Matthew Golder	B.S. 2010	Assistant Professor, Univ. Washington, Seattle, WA
Ethan Kaplan	B.A. 2010	Assurance Director, PricewaterhouseCoopers, New York, NY
Jonathan Goldberg	B.S. 2012	Senior Research Chemist, Materia, Pasadena, CA
Maxwell Hecht	B.S. 2013	Chemist, Jordi Labs, Mansfield, MA

Emma Brennan-Wydra	B.S. 2015	Senior Data Analyst, Games, New York Times
Bechir-Auguste Pierre	B.S. 2015	Vice President, Harvest Partners LP, New York, NY
David Minoli	B.S. 2016	Postdoctoral in Prosthodontics, University of Pennsylvania, Philadelphia, PA
Emily Silva	B.S. 2017	Graduate Student, Public Health, Harvard Univ., Cambridge, MA
Mackenzie Adelberg	B.S. 2017	Environmental Laboratories, Inc., Cincinnati, OH
Kuan Jiang	B.S. 2019	Medical Student, Dartmouth College
Josef Lawrence	B.S. 2020	Graduate Student, Princeton Univ., Princeton, NJ
Kaitlin Porter	B.S. 2020	Medical Student, Hebert School of Medicine, Bethesda, MD
Dan DiPrimio	B.S. 2021	Graduate Student, Harvard Univ., Cambridge, MA
Elena Urquiola	B.S. 2023	Chemist, HRL Laboratories, Malibu, CA
Maria Grillo	B.S. 2023	Graduate Student, Massachusetts Institute of Technology, Cambridge, MA
Carmelita Ro-Mendez	B.S. 2024	Graduate Student, University of Washington, Seattle, WA
Jessica Liu	B.S. 2025	Consultant, Virtu, New York City
Tashroom Ahsan	B.S. 2025	seeking employment
Matthew Zoerb	B.S. 2026	Graduate Student, University of California Berkeley
Dana Feldman	B.S. 2027 (anticipated)	current student
Rajas Ketkar	B.S. 2027 (anticipated)	current student
Ryan Nguyen	B.S. 2028 (anticipated)	current student
Callen Kuwahara	B.S. 2029 (anticipated)	current student

Course Teaching at Rochester (rating out of 5 in parentheses; NA = not available)

Chemistry 131 ("General Chemistry"): 2012 (3.4)

Chemistry 211 (“Inorganic Chemistry”): 2002 (NA), 2003 (3.6), 2004 (4.0)

Chemistry 234 (“Advanced Synthetic Techniques”): 2007 (4.0), 2008 (4.9), 2009 (4.5), 2010 (4.5)

Chemistry 411 (“Advanced Inorganic Chemistry”): 2000 (NA), 2001 (NA), 2002 (NA), 2003 (NA), 2004 (NA)

Chemistry 412 (“Inorganic Spectroscopy”): 2002 (3.7), 2003 (4.1), 2004 (4.3)

Chemistry 414 (“Bioinorganic Chemistry”): 2005 (4.7), 2006 (4.7), 2007 (4.4), 2008 (4.1), 2009 (4.6)

Chemistry 415 ("Group Theory"): 2010 (5.0)

Chemistry 421 ("Basic Organometallic Chemistry"): 2011 (4.5), 2012 (4.5)

Chemistry 422 ("Advanced Organometallic Chemistry"): 2012 (3.9)

Chemistry 424 ("Inorganic Spectroscopy"): 2010 (4.8)

Course Teaching at Yale (rating out of 5 in parentheses)

Chemistry 457/557 ("Modern Coordination Chemistry"): 2013 (NA), 2014 (4.5)

Chemistry 554 ("Bioinorganic Chemistry"): 2015 (4.2), 2018 (3.5), 2019 (2.5)

Chemistry 161 ("General Chemistry I"): 2015 (2.8), 2016 (2.9), 2017 (3.0), 2018 (2.8)

- initiated use of active learning strategies to move beyond the traditional lecture format
- enrollment increased from 211 (in 2015) to 305 (in 2018)

Chemistry 555 or 505 ("Inorganic Reaction Mechanisms"): 2016 (3.8), 2020 (4.4)

Chemistry 550 ("Physical Methods in Inorganic Chemistry"): 2019 (4.3)

Chemistry 502 ("Fundamentals of Transition Metal Chemistry"): 2020 (4.0), 2021 (N/A), 2022 (4.7), 2023 (3.5), 2024 (3.3)

Chemistry 503 ("Fundamentals of Organometallic Chemistry"): 2020 (4.0), 2021 (N/A), 2022 (3.8)

Chemistry 252 ("Inorganic Chemistry"): 2022 (4.1), 2024 (3.7), 2025 (2.9)

Chemistry 513 ("Electronic Structure of Metals and DFT"): 2020 (3.3), 2024 (4.1)

Other Pedagogy:

- Short course on Organometallic Chemistry (Eastman Kodak Co.): 2002
- created website for sharing group exercises on inorganic chemistry
- invited talk in national symposium for VIPEr (Virtual Inorganic Pedagogical Electronic Resource), April 2008.
- B. A. Reisner, J. L. Stewart, B. S. Williams, L. A. Goj, P. L. Holland, H. J. Eppley, A. R. Johnson, "Virtual Inorganic Pedagogical Electronic Resource Learning Objects in Organometallic Chemistry," *J. Chem. Educ.* **2012**, *89*, 185-187.
- leader for presentation on "Writing Effective Workshop Problems" at Rochester Cluster of Leadership in Education, January 2013.
- National Academies Education Short Course, May 2015.
- led faculty discussion on active learning methods in large classes, Yale Center for Teaching & Learning, April 2016.
- Yale Center for Teaching and Learning Faculty Forum "How Faculty are Using Technology to Meet Pedagogical Goals," October 2017.
- Panelist for "How to Make Your Fellowship Application Stand Out," Graduate Writing Lab at Yale, April 2018.

- Workshop on Proposal Writing for Students, Fall 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025.

Highlights of Departmental Service

• UR: Headed redesign of departmental Web page (2002)

• UR: Faculty supervisor for crystallography facility (2003-2013)

- in charge of hiring new crystallographer on two occasions
- wrote equipment grant for upgrade of detector

• UR: Chair of Graduate Studies (2005-2008)

- established system for feedback to all TAs
- initiated regular town-hall meetings with students
- established "First-Year Graduate Seminar" for ethics and acculturation, expanded grad student orientation to include more TA training
- changed graduate student fellowship system to be merit-based
- added students to departmental committees for greater empowerment

• UR: Chair of Synthesis/Catalysis Mechanism Research Cluster (2009-2012)

- organized annual retreat of synthetic groups
- organized regular meetings of faculty to discuss research synergies

• Yale: Director of Graduate Studies (2015-2016)

- initiated town-hall meetings of students and established student committee for feedback
- initiated student Joint Safety Team, overhauled department safety training to be hands-on
- initiated student surveys to assess, improve departmental climate
- organized full-department meetings to discuss sexual harassment prevention

  (highlighted: Wang, L.; Widener, A. "Confronting sexual harassment in chemistry," *Chem. Eng. News* **2017**, *95* (37), 28-37).
- after my official role ended, continued to informally support these efforts

• Yale: Director of Graduate Student Climate & Diversity (2018-2022)

- originator of this position, which focuses on supporting student climate, mental health, diversity, and training experiences for our graduate students
- advise student Climate & Diversity Committee and student Professional Development Network
- coordinating recruiting at conferences/fairs for underrepresented minorities
- interface with university-level diversity and wellness resources
- implemented annual workshops on proposal writing and mentoring for students
- organized student/staff faculty partners who created a Diversity Action Plan
- organized anti-bias workshop for department, 2020
- organized departmental symposium and display on Women in Chemistry
- applied successfully to become a ACS Bridge Partner program

- advised students establishing DEI Advocates program: peers to help community members with concerns

• Yale: PI of ACS Bridge Partner program (2022-2025)

- recruit two minoritized students per year for a one-year postbaccalaureate term of research and training to prepare them for graduate school

• Yale: Director of Undergraduate Studies (2024)

- management of course offerings, advising of majors, and many other responsibilities

Other University Service - Yale

• Chemical Safety Committee (2014-2016)

- organized visit of William Tolman for seminar describing safety culture and Joint Safety Teams (JST) between students, faculty, EHS; this initiative resulted in formation of a JST group at Yale Chemistry, which is now student-run (https://jst.chem.yale.edu)
- helped to establish new model for chemical safety training with "Safety Day," which features rotating stations with student-led training on different aspects of safety. This system, which has continued, has greatly increased the interactive nature of safety training in the department, and supports the safety culture.

• University-Wide Committee on Sexual Misconduct (2016-2020)

- departmental Title IX representative
- panelist on cases involving student or faculty misconduct

• Fellow of Ezra Stiles College (2014-present)

- advisor to numerous undergraduate students
- participant in events that bring together science and humanities
- member of committee to choose new Head of House (2020)

• Climate and Inclusion Committee, Graduate School of Arts & Sciences (2019-2024)

- Reviewing and testing materials & initiatives for the Graduate School across departments.

• Interviews with *Yale Daily News* (student newspaper)

- I have been interviewed several times for perspectives on teaching, research, and departmental innovations.

• Presentation to Office of Development

- "Research at Yale" series

• Advisory Committee to the Office of Postdoc Affairs (2021-present)

- Advocacy and oversight of policies for postdoctoral and postbaccalaureate students.