Michael J. Rose
Associate Professor
Director, Center for Electrochemistry
University of Texas, Austin
Department of Chemistry
Synthetic Inorganic Chemistry & Solar Fuels
mrose@cm.utexas.edu | http://www.cm.utexas.edu/mike_rose | http://www.roseresearchgroup.org | http://electrochemistry.utexas.edu

---

Education and Research

University of Texas, Austin – (2022 – present) *Director*, Center for Electrochemistry
(2019 – present) *Associate Professor*, Department of Chemistry
(2012 – 2018) *Assistant Professor*, Department of Chemistry

California Institute of Technology – (2009-12) NSF ACC-F Postdoctoral Fellowship (2010-2012); NSF/CCI-Solar Postdoctoral Scholar (2009-2010). Joint appointment in the research groups of Prof Harry Gray and Prof Nate Lewis. Syntheses of Fe, Ni and Co catalysts for H_2 generation and covalent Si–C/C–C attachment of transition metal complexes to silicon photoelectrodes.

University of California, Santa Cruz – Ph.D. Chemistry (2009). Bio-inorganic chemistry, Advisor: Prof Pradip Mascharak. ***a)*** Syntheses, structures, and biological utility of ruthenium-based NO donors derived from carboxamide ligands and coordinated chromophores. ***b)*** Synthetic modeling of iron-containing nitrile hydratase: photoregulation of carboxamide/thiolate Fe-active site by NO & effect of *S*-oxygenation on NO photolability.

Roche Pharmaceuticals (Palo Alto), Inflammatory and Viral Disease Unit (2000-2002) – Research Associate I (2000-2001) / Research Associate II (2001-2002). Drug discovery with purinergic (P_2Y_2/P_2Y_1) and muscarinic (M_1-M_5) G-protein coupled receptors: steady-state and kinetic inhibitors. Development of tissue culture assays for inflammatory mucin production (muc4/5/5ac). Mentor: Dave Swinney, Ph.D.

University of California, Davis – B.S. Fermentation Science (2000). This major incorporates basic and applied chemistry (analytical, organic and biochemistry) in biotechnology and food sciences.

Awards and Fellowships

Ed Stiefel Young Investigator Award & Lecture, Metals in Biology Gordon Conference, January 2017
Cottrell Scholar (2016): Heavy Atom Ligation & Undergraduate Outreach Corps
Teaching Excellence Award, College of Natural Sciences (2015): Teaching & Promoting Undergraduate Research
Office of Naval Research, Young Investigator (2013-2017): Hybrid Molecular/Materials Semiconductors
Ralph Powe Junior Faculty Enhancement Award (2013-2014): Synthetic Modeling of Mono-Iron Hydrogenase
NSF ACC-F Postdoctoral Fellowship (2010-2012): Attachment of Molecular H_2 Catalysts to Semiconductors
NSF/CCI-Solar Postdoctoral Fellowship (2009-2010): A Molecular All-Manganese Water-Splitting Cell
Chancellor's Dissertation Fellowship (2007-2008) UCSC, Thesis research support

Other Notable Funding

Welch Catalyst Grant (2024-2029, co-PI): Artificial Dinitrogen Transferase Enzymes ($5M)
Keck Foundation (2019-2022, co-PI): Silicon Interfaces to Enable PDI Singlet Fission & Triplet Transfer ($1M)
Lam Research Corporation (2015-2017): Electroless Metal Deposition on Semiconductor Substrates
Dreyfus Foundation Special Programs (2014-2018): *H2fromH2O*, Water-Splitting Outreach Program

Memberships

Subscribing member of American Chemical Society (ACS): Inorganic Division (2003-present)

Publications

	Total	Last 5 Years
***h*-index:**	**30**	**18**
***i*10-index:**	**59**	**46**
Citations:	**2913**	**1083**
Publications:	**91**	**33**

[Independent Career — In Revisions, Submitted or Substantially in Progress]

1) X. Chen, U. Braga, G. N. Ruiz, J. A. Smolen, K. Wilson, G. Yadav, S. Xiang, H. Kim, A. B. Braunschwieg, M. J. Rose, S. T. Roberts and J. D. Batteas*. Substrate Surface Energy Dependent Morphology and Photoluminescence of 5,10,15,20-Tetrakis-(2,3,4,5,6 pentafluorophenyl) Porphyrin Nano-Assemblies. *To be submitted*.
2) G. N. Ruiz, S. Vasylevskyi, M. Aubrey and M. J. Rose*. The Real Structure of the First Synthetic Inorganic Compound, Prussian Blue, Revealed by Electron Diffraction Crystallography (MicroED). *To be submitted*.
3) A. T. Larson, S. Vasylevskyi, and M. J. Rose*. Distal Scaffold Dynamics Modulates Eyring Activation Parameters in Re(I) Substitution Reactions: A Case for Dynamics as the 'Third Coordination Sphere'. *To be submitted*.
4) J. Labrecque, V. M. Lynch, D. K. McIntosh, J. Horseman and M. J. Rose*. Scaffold Flexibility Increases Biomimetic Reactivity in a Model of [Fe]-Hydrogenase: A Rationally Designed Synthetic Pscychrophile. *To be submitted*.
5) B. K. Cashman, R. Mondol, J. P. Shupp, J. Telser, J Krzystek and M. J. Rose*. Enhanced Easy Axis Magnetism in a Heavy Pnictogen (P→Bi) Co^{I} (S = 1) Series Featuring the First Covalent Bismuth-(3*d*)Metal Paramagnet. *To be submitted*.
6) C. Cobb and M. J. Rose*. An Authentic Iron-Carbide Cluster Featuring a Ferrous Site Supported by Multi-Phosphide and Hydride Ligation. *To be submitted.*
7) C. Joseph, E. J. Dick and M. J. Rose*. Structures, Reactivity and Formation Kinetics of the Fe_4Mo_2 Variant of the Interstitial Carbide Iron Carbonyl Clusters. *To be submitted.*
8) C. Cobb, R. K. Ngo, S. Vasylevskyi, J. Balderas, E. J. Dick and M. J. Rose*. Single-Step Access to Thiolate-Supported, Six-Iron Clusters with an Authentic Carbide: Utility of non-PSEPT Anionic Intermediate. *In Revisions at Inorg. Chem.*
9) B. R. Pollok, J. R. Brinker, S. G. Lewis, S. Daemi, S. T. Roberts, F. E. Osterloh, J. D. Eaves and M. J. Rose*. Tetracene Functionalized Si(111) Achieves Enhanced Solar to Chemical Energy Conversion with Defect Free TiO_2. *In Revisions*.
10) R. Mondol and M. J. Rose*. Antimony-Enhanced Magnetic Anisotropy in a Chelate-Supported Cobalt(II) Iodide: The Heavy Atom Effect. *In Revisions.*

[Independent Career — Published]

11) E. E. Stumbo‡, S. T. Goralski‡, P. R. Leclair, S. A. Kerns and M. J. Rose*. Two-Site Binding of a Dodecyl-Appended Rhenium Complex to Bovine β-Lactoglobulin. *J. Inorg. Biochem.* Accepted. ‡equal authorship
12) H.-J. Kim and M. J. Rose*. Role of Interfacial Potential Drop on Redox-Couple Dependent Voltages using Hybridized Si(111)–Bis(Anthracene) Photoelectrodes. *ChemElectrochem* **2024**, *11*, e202400468.
13) T. Volek, M. A. Verkamp, G. N. Ruiz, A. J. Staat, B. C. Li, M. J. Rose, J. D. Eaves and S. T. Roberts. The Interplay of Singlet Fission and Structural Disorder Controls Triplet Exciton Transport in Ethylphenyl Perylenediimide Crystals. *J. Am. Chem. Soc*. **2024**, *146*, 29575-29587.
14) T. Ho, B. J. Lee, T. Buchanan, M. Heikes, R. Steinart, E. Milem, S. T. Goralski, Y.-N. Wang, S.-H. Lee, V. M. Lynch, M. J. Rose, K. Mitchell-Koch and K. Hull. Cu-Catalyzed Three-Component Alkene Carboamination: Insights and Rational Design to Overcome Limitations. *J. Am. Chem. Soc.* **2024**, 25176-25189.

15) C. Hallock and M. J. Rose*. Electrochemical Impedance of Well-Passivated Semiconductors Reveals Bandgaps, Fermi Levels & Interfacial Density of States. *J. Am. Chem. Soc*. **2024**, 146, 18989-18998.
16) A. T. Larson, B. Boyle, J. Labrecque, A. Ly, C. Bui, S. Vasylevskyi and M. J. Rose*. Synthesis & Conformational Dynamics of Selenanthrene (Oxides): Establishing an Energetic Flexibility Index for Scaffolds. *Inorg. Chem.* **2024**, *63*, 10240-10250.
17) C. R. Cobb, E. J. Dick. K. Ngo and M. J. Rose*. Redox-Promoted Ligand Substitutions on $[Fe_6(\mu_6\text{-}C)(CO)_{16}]^{2-}$: Tripodal Phosphine Supported Iron-Carbide Clusters. *Chem. Sci.* **2024**, 11455-11471.
18) M. J. Rose and H. S. White. *Commentary:* Allen J. Bard: Electrochemist who Developed Scanning Electrochemical Microscopy. *Nature* **2024**, *629*, 285.
19) J. M. Strain‡, G. N. Ruiz‡, S. T. Roberts and M. J. Rose*. Substrate-Induced Thin-Film Crystal Phases of Perylenediimide (PDI): Thin Films on Methylated Silicon(111). *Langmuir* **2024**, *40*, 2519-2530. ‡equal authorship
20) M. J. Rose*. *Perspective:* Semiconductor Band Structure, Symmetry and Molecular Interface Hybridization for the Chemist. *J. Am. Chem. Soc.* **2024**, *146*, 5735-5748.
21) J. Labrecque, Y.-I. Cho, F. Agboola, D. McIntosh and M. J. Rose*. Distal Scaffold Flexibility Accelerates Ligand Substitution Kinetics in Manganese(I) Tricarbonyls: Flexible Thianthrene vs Rigid Anthracene. *Dalton Trans.* **2023**, 52, 4028-4037.
22) S. T. Goralski, K. M. Cid-Seara, J. J. Jarju, A. LaGrow, M. J. Rose* and L. M. Salonen*. Threefold Reactivity of a COF-Embedded Rhenium Catalyst: Reductive Etherification, Oxidative Esterification or Transfer Hydrogenation. *Chem. Commun*. **2022**, 12074-12077.
23) J. M. Gurrentz, K. A. Jarvis, I. R. Gearba-Dolocan and M. J. Rose*. Atomic Layer Deposited Al_2O_3 as a Protective Overlayer for Focused Ion Beam Preparation of Plan-View STEM Samples. *Ultramicroscopy* **2022**, 113562.
24) W. V. Taylor, B. K. Cashman, Z.-L. Xie, K. K. Ngo and M. J. Rose*. Synthesis and Magnetic Properties of Antimony-Ligated Co(II) Complexes: Stibines versus Phosphines. *Inorg. Chem.* **2022**, *61*, 6733-6741.
25) S. T. Goralski and M. J. Rose*. Emerging Artificial Metalloenzymes Asymmetric Hydrogenation Reactions. *Curr. Opin. Chem. Biol.* **2021**, 102096.
26) S. A. Kerns#, J. Seo#, V. M. Lynch, J. Shearer, S. T. Goralski, E. R. Sullivan and M. J. Rose*. Scaffold-based [Fe]-Hydrogenase Model: H_2 Activation Initiates Fe(0)-hydride Extrusion and Non-biomimetic Hydride Transfer. *Chem. Sci.* **2021**, 12838-12846. #Equal contributions
27) J. M Gurrentz and M. J. Rose*. Covalent Attachment of Polyoxometalates to Passivated Si(111) Substrates: A Stable and Electronic Defect-Free Si|POM Platform. *J. Phys. Chem. C*. **2021**, *125*, 14287-14298.
28) D. G. Boucher, K. L. Kearney, E. Ertekin and M. J. Rose*. Tuning *p*-Si(111) Photovoltage via Molecule|Semiconductor Electronic Coupling. *J. Am. Chem. Soc*. **2021**, *143*, 2567-2580.
29) C. Joseph, C. R. Cobb and M. J. Rose*. Single-Step Insertion of Sulfides and Thiolate into Iron Carbide-Carbonyl Clusters: Unlocking the Synthetic Door to FeMoco Analogues. *Angew. Chem. Intl. Ed.* **2021**, *133*, 3475-3479.
30) C. Joseph, J. P. Shupp, C. R. Cobb and M. J. Rose*. Construction of Synthetic Models for Nitrogenase Relevant NifB Biogenesis Intermediates and Iron-Carbide-Sulfide Clusters. *Catalysts* (Bio-Inorganic Special Edition) **2020**, *10*, 1317.
31) S. A. Kerns and M. J. Rose*. Scaffold-based Functional Models of [Fe]-Hydrogenase: Building the Bridge between Biological Structure and Molecular Function. *Acc. Chem. Res.* **2020**, *53*, 1637-1647.
32) M. J. Rose*. [Fe]-Hydrogenase (Hmd): Insights from Enzyme Structure, Spectroscopy and Synthetic Models. *Comprehensive Coordination Chemistry III* **2020**.
33) J. M. Gurrentz and M. J. Rose*. Non-Catalytic Benefits of Ni(II) Binding to an Si(111)-PNP Construct for Photoelectrochemical Hydrogen Evolution: Metal Ion Induced Flat Band Potential Modulation. *J. Am. Chem. Soc.* **2020**, *142*, 5657-5667.

34) R. T. Perarek, D. G. Boucher, N. R. Neale and M. J. Rose*. Energetic Tug-of-War between Pt and Leaky TiO_2: Positive and Negative Effects on the Function of Molecularly Modified p-Si(111)|TiO_2|Pt Photocathodes. *ChemElectroChem* **2020**, *7*, 1048-1056.
35) S. T. Goralski, T. A. Manes, S. E. A. Lumsden, V. M. Lynch and M. J. Rose*. Divergent Solution and Solid State Structures of Mono- and Dinuclear Nickel(II) Pyridone Complexes. *Organometallics* **2020**, 39, 1070-1079.
36) Z.-L. Xie, W. Chai, S. A. Kerns, G. A. Henkelman and M. J. Rose*. Bio-inspired CNP Iron(II) Pincer Relevant to [Fe]-Hydrogenase: Effect of Dicarbonyl versus Monocarbonyl Motifs in H_2 Activation and Transfer Hydrogenation. *Inorg. Chem*. **2020**, 59, 2548-2561.
37) J. P. Shupp and M. J. Rose*. Facile Hydrogen Atom Abstraction and Sulfide Formation from a Methyl-Thiolate Capped Iron-Sulfur-Carbonyl Cluster. *Dalton Trans.* **2020**, *49*, 23-26
38) B. K. Cashman, K. M. Sandmann and M. J. Rose*. Isolation and X-Ray Structure of Dialkylbismuth(III) Iodo 'Nanosquare': Breaking the Mold of Polymeric R_2BiX. *Inorg. Chem.* **2019**, *58*, 13751-13754.
39) J. McGale, G. E. Cutsail III, C. Joseph, M. J. Rose and S. DeBeer*. Spectroscopy and Mössbauer Characterization of M_6 and M_5 Iron(Molybdenum) Carbide Clusters: High Carbide-Iron Covalency Enhances Local Iron Site Electron Density Despite Oxidation. *Inorg. Chem.* **2019**, *58*, 12918-12932
40) Y. I. Cho, G. Durgaprasad and M. J. Rose*. Unexpected Facial Ligation in a CNP Iron(II) 'Pincer' and the Consistent Role of Methenyl(acyl) Unit as a Pendant Base in H_2 Heterolysis in Model Complexes of Mono-Iron Hydrogenase (Hmd). *Inorg. Chem.* **2019**, *58*, 12689-12699.
41) W. V. Taylor, C. X. Cammack, S. A. Shubert and M. J. Rose*. Thermoluminescent Antimony-Supported Copper-Iodo Cuboids: Approaching NIR Emission via High Crystallographic Symmetry. *Inorg. Chem.* **2019**, *58*, 16330-16345. *Invited Complementary Front Cover*; *Editors Choice ACS 365*
42) D. G. Boucher, J. R. Speller, R. Han, F. E. Osterloh and M. J. Rose*. Decoupling Effects of Surface Recombination and Barrier Height on *p*-Si(111) Photovoltage in Semiconductor|Liquid Junctions via Molecular Dipoles and Metal Oxides. *ACS Appl. Energy Mater.* **2019**, *2*, 66-79.
43) R. T. Pekarek, K. L. Kearney, B. M. Simon, E. Ertekin, A. Rockett and M. J. Rose*. Identifying Charge Transfer Mechanisms at Semiconductor Heterojunctions with Molecular Surface Dipoles and Multiscale Computational Modeling. *J. Am. Chem. Soc*. **2018**, *140*, 13223-13232.
44) J. Imbrogno, R. C. Ferrier Jr, B. K. Wheatle, M. J. Rose, N. Lynd*. Decoupling Catalysis and Chain-Growth Functions of Mono(μ-alkoxo)-Di(alkylaluminums) in Epoxide Polymerization: Emergence of the N/Al Adduct Catalyst. *ACS Catalysis* **2018**, *8*, 8796-8803.
45) Z.-L. Xie, D. L. Pennington, D. G. Boucher, J. Lo and M. J. Rose*. Effects of Thiolate Ligation in Mono-Iron Hydrogenase (Hmd): Stability of the $\{Fe(CO)_2\}^{2+}$ Core with NNS Ligands. *Inorg. Chem.* **2018**, *57*, 10028-10039.
46) W. V. Taylor, Z.-L. Xie, N. I. Cool, S. A. Shubert and M. J. Rose*. Syntheses, Structures and Characterization of Nickel(II) Stibines: Steric and Electronic Rationale for Metal Deposition. *Inorg. Chem.* **2018**, *57*, 10364-10374.
47) R. T. Pekarek, A. L. Bleier, E. R. Sullivan, E. A. Bevan, O. Ursi, T. H. Rose and M. J. Rose*. *H2fromH2O*: A Water-Splitting Kit with Instructional Applications in Secondary Education. *J. Lab. Chem. Ed.* **2018**, *6*, 47-59.
48) R. T. Pekarek, H. Celio and M. J. Rose*. Synthetic Insights into Surface Functionalization of Si(111)–R Photoelectrodes: Steric Control and Deprotection of Molecular Passivating Layers. *Langmuir* **2018**, *34*, 6328-6327.
49) S. Kerns, A.-C. Magtaan, P. Vong and M. J. Rose*. Functional Hydride Transfer by a Thiolate-Containing Model of Mono-Iron Hydrogenase featuring an Anthracene Scaffold. *Angew. Chem. Int. Ed.* **2018**, *57*, 2855-2858.
50) C. Joseph, S. Kuppuswamy, V. M. Lynch and M. J. Rose*. Fe_5Mo Cluster with Iron-Carbide and Molybdenum-Carbide Bonding Motifs: Structure and Selective Alkyne Reductions. *Inorg. Chem.* **2018**, *57*, 20-23.
51) D. W. Redman, M. J. Rose and K. J. Stevenson*. Electrodeposition of Amorphous Molybdenum Chalcogenides from Ionic Liquids and Their Activity for the Hydrogen Evolution Reaction. *Langmuir* **2017**, *33*, 9354-9360.

52) Z.-L. Xie, G. Durgaprasad, A. K. Ali and M. J. Rose*. Substitution Reactions of Iron(II) Carbamoyl-Thioether Complexes Related to Mono-Iron Hydrogenase. *Dalton Trans*. **2017**, *46*, 10814-10829.
53) J. Seo, T. E. Sotman, E. Sullivan, B. D. Ellis, T. Phung and M. J. Rose*. Structural and Electronic Modification of Pyridones and Pyrones via Regioselective Bromination and Trifluoromethylation. *Tetrahedron*. **2017**, *73*, 4519-4528.
54) J. P. Shupp, A. R. Rose and M. J. Rose*. Synthesis and Interconversions of Reduced, Alkali-Metal Supported Iron-Sulfur-Carbonyl Complexes. *Dalton Trans*. **2017**, *46*, 9163-9171.
55) T. A. Manes and M. J. Rose*. Rigid Scaffolds for the Design of Molecular Catalysts and Biomimetic Active Sites: A Case Study of Anthracene-based Ligands for Modeling Mono-Iron Hydrogenase (Hmd). *Coord. Chem. Rev.* **2017**, *353*, 295-308.
56) S. Kuppuswamy, J. D. Wofford, C. Joseph, Z.-L. Xie, A. K. Ali, V. M. Lynch, P. A. Lindahl, and M. J. Rose*. Structures, Interconversions and Spectroscopy of Carbonyl Clusters with an Interstitial Carbide: Localized Metal Center Reduction via Cluster Oxidation. *Inorg. Chem*. **2017**, 56, 5998-6012.
57) J. Seo, T. A. Manes and M. J. Rose*. Structural & Functional Synthetic Model of Mono-Iron Hydrogenase Featuring an Anthracene Scaffold. *Nature Chem.* **2017**, 9, 552-557.
58) H. J. Kim, K. L. Kearney, L. H. Le, Z. J. Haber, A. A. Rockett and M. J. Rose*. Charge-Transfer through Ultrathin Film TiO_2 on *n*-Si(111) Photoelectrodes: Experimental and Theoretical Investigation of Electric Field-Enhanced Transport with a Non-Aqueous Redox Couple. *J. Phys. Chem. C* **2016**, 25697-25708.
59) Y. I. Cho, M. L. Ward and M. J. Rose*. Substituent Effects of N4 Schiff Base Ligands on the Formation of Fluoride-Bridged Dicobalt(II) Complexes via B–F Abstraction: Structures and Magnetism. *Dalton Trans*. **2016**, *45*, 13466-13476.
60) T. A. Manes and M. J. Rose*. Mono- and Dinuclear Manganese Carbonyls Supported by Novel 1,8-Disubstituted (L = Py, S^{Me}, SH) Anthracene Ligand Scaffolds. *Inorg. Chem.* **2016**, *55*, 5127-5138.
61) O. M. Williams, J. W. Shi and M. J. Rose*. Photoelectrochemical Study of *p*-GaP(100)|ZnO|Au-NP Devices: Strategies for Enhanced Electron Transfer and Aqueous Catalysis. *Chem. Commun*. **2016**, *52*, 9145-9148.
62) W. V. Taylor, U. H. Soto, V. M. Lynch and M. J. Rose*. Antimony-Supported Cu_4I_4 Cuboid with Short Cu–Cu Bonds: Structural Basis for Far-Visible/NIR Thermoluminescence. *Inorg. Chem.* **2016**, *55*, 3206-32087.
63) D. R. Redman, H. J. Kim, K. J. Stevenson and M. J. Rose*. Photo-Assisted Electrodeposition of MoS_x from Ionic Liquid on Organic-Functionalized Silicon Photoelectrodes for H_2 Generation. *J Mater. Chem. A* **2016**, 7027-7035.
64) G. Durgaprasad, Z.-L. Xie and M. J. Rose*. Iron-Hydride Detection and Intramolecular Hydride Transfer in a Synthetic Model of Mono-Iron Hydrogenase with a CNS Chelate. *Inorg. Chem.* **2016**, 55, 386-389.
65) H. J. Kim, J. Seo and M. J. Rose*. H_2 Photogeneration Using a Phosphonate-Anchored Ni-PNP Catalyst on a Band-Edge-Modified *p*-Si(111)|AZO Construct. *ACS Appl. Mater. Interfaces* **2016**, *8*, 1061-1066.
66) T. A. Manes and M. J. Rose*. Redox Properties of a Bis-pyridine Rhenium Carbonyl Derived from an Anthracene Scaffold. *Inorg. Chem. Commun.* **2015**, *61*, 221-224.
67) F. Li, V. M. Basile and M. J. Rose*. Electron Transfer through Surface-Grown, Ferrocene-Capped Oligophenylene Molecular Wires (5–50 Å) on *n*-Si(111) Photoelectrodes. *Langmuir*, **2015**, *31*, 7712-7716.
68) J. Seo, R. T. Pekarek and M. J. Rose*. Photoelectrochemical Operation of a Surface-Bound, Nickel Phosphine H_2 Evolution Catalyst on *p*-Si(111): A Molecular Semiconductor|Catalyst Construct. *Chem. Commun.* **2015**, *51*, 13264-13267.
69) O. M. Williams, A. H. Cowley and M. J. Rose*. Structural and Electronic Characterization of Multi-Electron Reduced Naphthalene(BIAN)-Cobaloximes. *Dalton. Trans.* **2015**, *44*, 13017-13029.
70) H. J. Kim, K. L. Kearney, L. H. Le, R. T. Pekarek and M. J. Rose*. Platinum-Enhanced Electron Transfer and Surface Passivation through Ultrathin Film Aluminum Oxide (Al_2O_3) on Si(111)-CH_3 Photoelectrodes. *ACS Appl. Mater. Intfc.* **2015**, 7, 8572-8584.
71) J. Seo, H. J. Kim, R. T. Pekarek and M. J. Rose*. Hybrid Organic/Inorganic Band-Edge Modulation of *p*-Si(111) Photoelectrodes: Effects of R, Metal Oxide and Pt on H_2 Generation. *J. Am. Chem. Soc.* **2015**, *137*, 3173-3177.

72) K. A. Thomas Muthia, G. Durgaprasad, C. Joseph, V. M. Lynch and M. J. Rose*. Mononuclear Iron(II) Dicarbonyls Derived from NNS Ligands – Structural Models Related to a 'Pre-Acyl' Active Site of Mono-Iron (Hmd) Hydrogenase. *Eur. J. Inorg. Chem.* **2015**, 1675-1691.
73) F. Li, V. M. Basile, R. T. Pekarek and M. J. Rose*. Steric Spacing of Molecular Linkers on Passivated Si(111) Photoelectrodes. *ACS Appl. Mater. Interfaces* **2014**, *6*, 20557-20568.
74) J. Seo, A. K. Ali and M. J. Rose*. Novel Ligand Architectures for Metalloenzyme Modeling: Anthracene-based Ligands for Synthetic Modeling of Mono-[Fe] Hydrogenase. *Comments Inorg. Chem.* **2014**, *34*, 103-113.
75) S. E. A. Lumsden, G. Durgaprasad, Z.-L. Xie, O. M. Williams, K. A. Thomas Mutiah and M. J. Rose*. Tuning Coordination Modes of Pyridine/Thioether Schiff Base (NNS) Ligands to Mononuclear Manganese Carbonyls. *Dalton Trans.* **2014**, *43,* 10725.
76) Y. I. Cho, D. M. Joseph and M. J. Rose*. 'Criss-Crossed' Dinucleating Behavior of an N4 Schiff Base Ligand: Formation of a μ-OH,μ-O_2 Dicobalt(III) Core via O_2 Activation. *Inorg. Chem.* **2013**, *52*, 13298-13300.

[Postdoctoral]

77) J. R. McKone, S. Ardo, J. D. Blakemore, P. J. Bracher, J. L. Dempsey, T. V. Darnton, M. C. Hansen, W. H. Harman, M. J. Rose, M. G. Walter, S. Dasgupta, J. R. Winkler, and H. B. Gray*. The Solar Army: A Case Study in Outreach Based on Solar Photoelectrochemistry. *Rev. Adv. Sci. Eng.* **2014**, *3*, 288-303.
78) L. E. O'Leary, M. J. Rose, T. X. Ding, E. Johansson, B. S. Brunschwig and N. S. Lewis*. Heck Couplings of Small Molecules to Mixed Methyl/Thienyl Monolayers at Low Defect Density Si(111). *J. Am. Chem. Soc.* **2013**, *135*, 10081.
79) M. J. Rose, J. R. Winkler and H. B. Gray*. Hydrogen Generation Catalyzed by Fluorinated Diglyoxime-Iron Complexes at Low Overpotentials. *J. Am. Chem. Soc*. **2012**, *134*, 8310.
80) M. J. Rose, J. R. Winkler and H. B. Gray*. Four-Iron Cluster and a Buckled Macrocycle Complex from Reduction of [(dmgBF$_2$)Fe(L)$_2$] (L = MeCN, ^{t}Bu^{i}NC). *Inorg. Chem*. **2012**, *51*, 1980.
81) M. J. Rose, D. E. Bellone and H. B. Gray*. Spectroscopic and Magnetic Characterization of an Iodo Co(I) Tripodal Phosphine Complex. *Dalton Trans.* **2012**, 41, 11788.
82) Q. Dong, M. J. Rose*, W.-Y. Wong* and H. B. Gray*. Dual Coordination Modes of Ethylene Linked NP2 Ligands with Cobalt(II) and Nickel(II) Iodides. *Inorg. Chem*. **2011**, *50*, 10213.

[Graduate]

83) M. J. Rose, N. M. Betterley, A. Oliver, and P. K. Mascharak*. Binding and Photorelease of Nitric Oxide (NO) to a Synthetic Model of Iron-Containing Nitrile Hydratase (Fe-NHase). *Inorg. Chem.* **2010**, *49*, 1854-1864.
84) M. J. Rose, A. K. Patra, M. M. Olmstead and P. K. Mascharak*. Structural and Spectroscopic Evidence for Linkage Isomerism of Bound Nitrite in a {Fe-NO}^{6} Nitrosyl derived from a Tetradentate Dicarboxamide Ligand: More Parallels between Heme and Non-heme Systems. *Inorg. Chim. Acta* **2010**, *363,* 2715.
85) N. Fry, M. J. Rose, David L. Rogow, C. Nyitray, Manpreet Kaur and P. K. Mascharak*. Ruthenium Nitrosyls Derived from Tetradentate Ligands containing Carboxamido-N and Phenolato-O Donors: Syntheses, Structures, Photolability and Time-Dependent Density Functional Studies. *Inorg. Chem.* **2010**, *49*, 1487.
86) M. J. Rose, N. M. Betterley, P. K. Mascharak*. Thiolate S-Oxygenation Controls Nitric Oxide (NO) Photolability of a Synthetic Iron Nitrile Hydratase (Fe-NHase) Model Derived from Mixed Carboxamide/Thiolate Ligand. *J. Am. Chem. Soc.* **2009**, *131*, 8340-8341.
87) M. J. Rose, P. K. Mascharak*. Photosensitization of Ruthenium Nitrosyls to Visible Light with an Isoelectronic Series of Heavy-Atom Chromophores: Experimental and DFT Studies on the Effects of O-, S- and Se-Substituted Coordinating Dyes. *Inorg. Chem.* **2009**, *48*, 6904-6917.
88) N. Fry, M. J. Rose, C. Nyitray, and P. K. Mascharak*. Metal Nitrosyls with Phosphine Ligation: Unexpected Ligand Oxidation and Ring Nitration. *Inorg. Chem.* **2008**, *47*, 11604-11610.
89) M. J. Rose and P. K. Mascharak. A Photosensitive {Ru-NO}^{6} Nitrosyl Bearing Dansyl Chromophore: Novel NO Donor with a Fluorometric On/Off Switch. *Chem. Commun.* **2008**, 3933-3935.

90) M. J. Rose, N. Fry, R. Marlow, L. Hinck and P. K. Mascharak*. Ruthenium Nitrosyls bearing Coordinated Fluorophores as NO Donors: a Novel Mode of Fluorometric Delivery of NO to Cells with Visible Light. *J. Am. Chem. Soc.* **2008**, *130*, 8834-8846.
91) M. J. Rose, P. K. Mascharak*. Photoactive Ruthenium Nitrosyls: Effects of Light & Potential as Biological NO Donors. *Coord. Chem. Rev.* **2008**, *252*, 2093-2114.
92) M. J. Rose and P. K. Mascharak*. Fiat Lux: Selective Delivery of High Flux of Nitric Oxide (NO) to Biological Targets using Photosensitive Metal Nitrosyls. *Curr. Opin. Chem. Biol.* **2008**, *12*, 238-244.
93) M. J. Rose, M. M. Olmstead and P. K. Mascharak*. Photosensitization via Dye Coordination: A New Strategy to Synthesize Metal Nitrosyls that Release NO under Visible Light. *J. Am. Chem. Soc.* **2007**, *129*, 5342-5343.
94) M. J. Rose, M. M. Olmstead and P. K. Mascharak*. Photoactive Ruthenium Nitrosyls Derived from Quinoline- and Pyridine-based Ligands: Accelerated Photorelease of NO due to Quinoline Ligation. *Polyhedron* **2007**, *26*, 4713-4718.
95) M. J. Rose, A. K. Patra, E. A. Alcid, M. M. Olmstead and P. K. Mascharak*. Carboxamido and Schiff Base Ruthenium Nitrosyls: Isoelectronic Complexes with Markedly Different Properties of Photolability and Reactivity. *Inorg. Chem.* **2007**, *46*, 2328-2338.
96) M. J. Rose,† I. Szundi,† I. Sen, A. A. Eroy-Reveles, P. K. Mascharak* and Ó. Einarsdóttir*. New Approach for Studying Fast Biological Reactions Involving Nitric Oxide: Generation of NO Using Photolabile Ruthenium and Manganese NO Donors. *Photochem. Photobiol.* **2006**, *82*, 1377-1384. (†equal authorship)
97) D. C. Swinney*, M. J. Rose, A. Y. Mak, I. Lee, L. Scarafia and Y. Xu. Bi-Substrate Kinetic Analysis of an E3–Ligase–Dependent Ubiquitylation Reaction. *Methods Enzymol.* **2005**, *399*, 323-333.
98) A. K. Patra, M. J. Rose, M. M. Olmstead and P. K. Mascharak*. Reactions of Nitric Oxide with a Low-spin Fe(III) Center Ligated to a Tetradentate Di-carboxamide N4 Ligand: Parallels between Heme and Non-Heme Systems. *J. Am. Chem. Soc.* **2004**, *126*, 4780-4781.
99) A. K. Patra, M. J. Rose, K. A. Murphy, M. M. Olmstead and P. K. Mascharak*. Photolabile Ruthenium Nitrosyls with Planar Di-carboxamide Tetradentate N4 Ligands: Effects of In-plane and Axial Ligand Strength on NO Release. *Inorg. Chem.* **2004**, *43*, 4487-4495.

[Industry]

100) M. J. Rose, I. Lee, T. R. Chapman and D. C. Swinney*. Pharmacological Characterization of Clinical Anti-Cholinergic Drugs at M1–M5 Receptor Sub-types. *Mol. Biol. Cell.* **2002**, *443*, 79A.
101) D. C. Swinney*, M. J. Rose, I. Lee, A. Y. Mak. The Mono-Ubiquitination of IκBα S32/36E *in vitro* Shows a Random Bi-Bi Kinetic Mechanism with Respect to IκBα-*ee* and E2UBCH7. *FASEB J.* **2001**, *15*, A26.

Funding

Pending

Department of Energy, Basic Energy Sciences
Solar Photochemistry $575,000 (PI) 2025-2028
Insights to Facet-Selective Charge Transfer from Semiconductor Planewave Symmetry and Molecular Hybridization

National Science Foundation(CHE) $525,000 (PI) 2025-2028
Flexible Scaffolds & Protein Host for [Fe]-Hydrogenase and FeMoco Mimics:
Dynamics as the Thematic 'Third Coordination Sphere'

Welch Foundation $300,000 (PI) 2025-2028
Harnessing the Extreme Spin-Orbit Coupling of Bismuth:
Bi–3*d*(Metal) Complexes for Unique Magnetic & Spectroscopic Properties

Current

Welch Foundation
Catalyst Grant Program $5,000,000 2024-2029
Rose Portion $1,000,000
Artificial Dinitrogen Transferase Enzymes

Department of Energy, Basic Energy Sciences
Solar Photochemistry $475,000 (PI) 2022-2025
Elucidating Design Principles of Semiconductor|Molecule Electronic Coupling for Improved Photoelectrochemical Function

National Science Foundation(CHE) $450,000 (PI) 2021-2025 (NCE)
Scaffold-based Biomimetics of Fe-Hydrogenase and Nitrogenase (FeMoco): Interrogating Dynamics, Protein Matrix Effects, and Carbide Motifs

Welch Foundation $300,000 (PI) 2022-2025
Elucidating Design Principles for Semiconductor|Molecule Electronic Coupling

CNS Spark Grant $200,000 (PI) 2022-2025
Heavy-Atom (Bismuth) Ligation to 3*d* Metals for Molecular Magnets and Data Storage

Past Major Grants

Welch Foundation
WelchX Collaborative Grant $100,000 2023-2024
Rose Portion: $45,000
Detection & Extraction of Hot Carriers in Silicon by Ultrafast Electron Diffraction

W.M. Keck Foundation $1,000,000 (co-PI) 2019-2023
Rose Portion: $400,000
Uncovering Design Principles for Energy Transfer across Organic|Inorganic Interfaces

Welch Foundation $240,000 (PI) 2019-2022
Earth Abundant Elements for Energy-Related Energy Conversions

National Science Foundation $420,000 (PI) 2018-2021
Scaffold-based Synthetic Models of Mono-Iron Hydrogenase: Structure and Dynamics

Welch Foundation $240,000 (PI) 2016-2019
Earth Abundant Metal Catalysts for Energy-Related Chemical Transformations

Cottrell Scholar (RCSA) $100,000 (PI) 2015-2017
Imparting Precious Metal Properties to First-Row Metals with Heavy Atom Ligands, and Connecting Undergraduates to Outreach Activities via 'Undergraduate Outreach Corps'

Office of Naval Research $540,000 (PI) 2013-2017
A Hybrid Molecular/Materials Approach to Semiconductor Surface Passivation and Catalyst Attachment for a Solar Fuels Device

Welch Foundation $180,000 (PI) 2013-2016
Imparting Precious Metal Properties to First-Row Metals for C◎H Activation: Ligation to Inexpensive, Heavy Main Group Donors

ACS Petroleum Research Fund $100,000 (PI) 2013-2016
Imparting Precious Metal Properties to First-Row Metals for C–H Activation: Ligation to Inexpensive, Heavy Main Group Donors

Dreyfus Foundation $25,000 (PI) 2013-2016
H2fromH2O: A Water-Splitting Outreach Kit for High School Chemistry Instructors

Teaching Experience

UT Austin (Instructor)

Inorganic Chemistry, CH 431 (2019-present). Undergraduate Junior-level Inorganic Chemistry

Materials Chemistry, CH XXX (2018-19). Co-listed Grad/UG course in Materials, Crystalline and Nano Chemistry

Organometallics & Catalysis, *CH XXX* (2015, 2017) Co-listed Grad/UG course in modern catalysis

Bio-Inorganic Chemistry, *CH XXX* (2014-2018, 2020, 2024) Graduate course for biological inorganic chemistry and spectroscopy

Advanced Inorganic Lab Techniques, CH 341 (need-to-check). Upper division undergraduate laboratory

Advanced Group Theory Seminar (Spring 2020). Informal advanced topics in group theory (1×/week)

UC Santa Cruz (TA)

Advanced Inorganic Chemistry Laboratory. Syntheses and characterization of metal complexes

Instrumental Analysis. Analytical principles and instrumental analysis

Organic Chemistry. Organic chemistry lab

General Chemistry. General chemistry, lab and lecture

Science in the Community | Outreach

Undergraduate Outreach Corps (2016-present): Funded by Research Corporation for Scientific Advancement, this program aims to involve undergraduates in department-wide (and eventually college-wide) outreach activities.

H2fromH2O, (2010-present): Funded by Dreyfus Foundations and initiated with an NSF ACC/F postdoctoral fellowship. A water-splitting outreach program designed to engage students in chemistry at the middle school and high school level. The program has partnered with organizations such as GirlStart, UTeach and Hot Science Cool Talks (UT).

Pasadena High School, (2010-2012): After-school outreach program with 4-6 HS students using SHArK Kit for discovery of novel mixed metal oxides for photochemical water splitting.

Pasadena High School, (2010-2012): In-class outreach program consisting of laboratory exercises in electrochemical water-splitting to H_2 and O_2 using electrodes and solar hobby kits.

Muir High School in Pasadena, (2009-2010): outreach program consisting of laboratory exercises in light absorption, solar energy and assembling blackberry TiO_2 solar cells.

Santa Cruz County Science Fair, (Judge, Chemistry and Biochemistry; 2008)

Santa Cruz County Science Fair, (Judge, Biology and Biochemistry; 2007)