Michael J. Rose
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Education and Research

University of Texas, Austin – (2012-present) *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 Funding

NSF-CHE (2018-21): Scaffold-based Hydrogenase Biomimetics
Welch Foundation (2016-2019): Earth Abundant Elements for Energy-Related Transformations
Lam Research Corporation (2015-2017): Electroless Metal Deposition on Semiconductor Substrates
Dreyfus Foundation Special Programs (2014-2018): *H2fromH2O*, Water-Splitting Outreach Program
ACS Petroleum Research Foundation (2013-2016): Heavy Atom Ligation
Welch Foundation (2013-2016): Heavy Atom Ligation

Memberships

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

Publications

[Independent Career – In preparation, Submitted or In Revisions]

1) Z.-L. Xie, W. Chai, 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. *Submitted*.
2) J. Seo, S. Kerns, E. R. Sullivan and M. J. Rose*. Functional Biomimetic of [Fe]-Hydrogenase: H_2 Activation, Substrate-Stabilized Fe-Hydride, and Base-Triggered Hydride Transfer. *Submitted*.
3) D. G. Boucher, K. L. Kearney, E. Ertekin and M. J. Rose*. Dipole and Density of States (DOS) Effects of Nitrated Acenes on *p*-Si(111): Benefits for Photoelectrochemical Hydrogen Generation. *Submitted*.

[Independent Career - Published]

4) 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.
5) J. McGale, G. E. Cutsail III, C. Joseph, M. J. Rose and S. DeBeer. Spectroscopy and Mossbauer 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
6) 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.
7) 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*, ASAP. *Invited Complementary Front Cover*; *Editors Choice ACS 365*
8) 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.
9) 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.
10) 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.
11) 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.
12) 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.
13) 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.
14) 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.
15) 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.
16) 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.

17) 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.
18) 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.
19) 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.
20) 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.
21) 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.
22) 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.
23) 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.
24) 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.
25) 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.
26) 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.
27) 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.
28) 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.
29) 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.
30) 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.
31) 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.
32) 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.
33) 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.
34) 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.
35) 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.
36) 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.

37) 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.
38) 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.
39) 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.
40) 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.
41) 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.
42) 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]

43) 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.
44) 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.
45) 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.
46) 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.
47) 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.
48) 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]

49) 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.
50) 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.
51) 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.
52) 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.
53) 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.
54) 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.

55) 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.
56) 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.
57) M. J. Rose, P. K. Mascharak. Photoactive Ruthenium Nitrosyls: Effects of Light & Potential as Biological NO Donors. *Coord. Chem. Rev.* **2008**, *252*, 2093-2114.
58) 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.
59) 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.
60) 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.
61) 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.
62) 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)
63) 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.
64) 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.
65) 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]

66) 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.
67) 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.

Awards and Programs

NSF-sponsored Chemistry Communication Leadership Institute, (2009): a 5-day workshop to promote science and chemistry communication to a broad audience.

Datatrace/Chemtracts Travel Grant, (2008): Conference travel grant.

Graduate Student Association (GSA) Travel Grant, (2007): Conference travel grant.

Datatrace/Chemtracts Travel Grant, (2007): Conference travel grant.

Public Policy and Biological Threats (PPBT) Conference Program, (2006): sponsored by Institute on Global Conflict & Cooperation (IGCC) and funded by Carnegie Foundation.

TA Sabbatical Fellowship, (2006).

Teaching Experience

UT Austin (Instructor)

Organometallics & Catalysis. Co-listed Grad/UG course in modern catalysis

Bio-Inorganic Chemistry. Graduate course for biological inorganic chemistry and spectroscopy

Advanced Inorganic Lab Techniques. Upper division undergraduate laboratory

Advanced Inorganic Chemistry. Graduate course on inorganic principles (co-taught with Dr Humphrey)

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

Presented Talks

ACS San Diego, Spring 2016: Bonding and Function of Nickel-Phosphine H_2 Catalysts to Si(111) Photoelectrodes: C–C Covalent Attachment & Metal-Oxide|Phosphonate Adsorption. (Inorg: Electrochemistry)

ACS San Diego, Spring 2016: Synthetic Modeling of Mono-Iron Hydrogenase (Hmd): Utility of an Anthracene Scaffold for the Facial Display of Complex Biomimetic Donors. (Inorg: Enzymes & Models)

ACS Denver, Spring 2015: Hybrid Organic/Inorganic Band-Edge Modulation: Effect of R, Metal Oxide and Pt on H_2 Generation. (Inorg: Electrochemistry)

ACS Denver, Spring 2015: Iron-Hydride Assisted C–S Bond Cleavage in Synthetic Model Complexes of Mono-[Fe] Hydrogenase. (Inorg: Enzymes & Models)

SW Regional ACS, Nov 2014: Iron-Hydride Assisted C–S Bond Cleavage in Synthetic Model Complexes of Mono-[Fe] Hydrogenase. (Inorg: Bio-inorganic)

ACS San Francisco, Fall 2014: Synthetic Modeling of the Mono-[Fe] Hydrogenase Apo-Active Site: Pyridine and Pyridone Donors Ligated to Fe(II) Dicarbonyls. (Inorg: Enzymes & Models)

ACS San Francisco, Fall 2014: Hybrid Molecular / Materials Approach to Semiconductor Passivation and Catalyst Attachment. (Inorg: Alternative Fuels)

SW Regional ACS, Nov 2013: Synthetic Modeling of Mono-[Fe] Hydrogenase: Relevance of Pyridone and Pyridine Ligands (Inorg: Bio-inorganic)

SW Regional ACS, Nov 2012: Electrocatalytic H_2 Generation from Fluorinated Iron Glyoximes at Low Overpotentials (Inorg: Bio-inorganic)

Pacific Northwest National Lab: (November 2010) Covalent Attachment of Model Compounds and H_2-generating Catalysts to Si(111) Surfaces.

Summer Seminar in Synthetic Inorganic Chemistry (Organizer, Session Leader) (July 2010, Caltech) Towards Mono-Iron (Fe) Catalysts for H_2 Generation and Covalent Attachment to Silicon(111) Surfaces

Bioinorganic Gordon Research Seminar (GRS), (February 2010) Phosphine-based P4N2 Ni/Co Macrocycles and Reductive Chemistry of the Fe-dmgBF$_2$-(MeCN/^{t}Bu^{t}NC)$_2$ System.

Caltech Inorganic/Organometallic Seminar (IOS), Synthetic modeling of Fe-NHase: Insights into the Effect of S-oxygenation on its Photoregulation by Nitric Oxide (NO)

University of California Joint-Campus Nitric Oxide Meeting, (Ford, Borovik, Fukuto, Mascharak Groups; 2008) Visible Light Photosensitization of Ruthenium Nitrosyls: Ligand Design and Coordinated Chromophores

Chemical Biology Bay Area (CBAA) Conference at UCSF, (2008) Synthetic Nitric Oxide Carriers: Trackable agents for light-driven NO delivery to Cells

Chemistry & Biochemistry Department Retreat, (2007) Visible Light-Driven Nitric Oxide (NO) Release from Designed Ruthenium Nitrosyls with Coordinated Chromophores

Conference Posters

1) G. Durgaprasad, Z.-L. Xie, M. J. Rose. Preparation, Identification and Reactivity of Iron-Hydride Species in Organometallic Synthetic Models of Mono-[Fe] Hydrogenase. *Metals in Biology, Gordon Conference*. Jan **2015**.
2) K. Thomas, S. Lumsden, G. Durgaprasad, M. J. Rose. Synthetic Modeling of Mono-[Fe] Hydrogenase: Exploring the Roles of Pyridone and Methylpyridine Ligands in Iron and Manganese Carbonyls. *Iron-Sulfur Enzymes, Gordon Conference*. June **2014**.
3) F. Li, R. Pekarek, K. Kearney, V. Basile, M. J. Rose. Hybrid Molecular/Materials Approach to Semiconductor Passivation and Functionalization for Catalysis at SC/Liquid Junctions. *Solar Fuels, Gordon Conference*. Jan **2014**.
4) K. Thomas, S. Lumsden, G. Durgaprasad, M. J. Rose. Synthetic Modeling of Mono-[Fe] Hydrogenase: Exploring the Roles of Pyridone and Methylpyridine Ligands in Iron and Manganese Carbonyls. *Metals in Biology, Gordon Conference*. Jan **2014**.
5) M. J. Rose. Synthetic Modeling of Mono-Iron [Fe]-Hydrogenase: Dissecting the Role of an Unusual Active Site. *Metals in Biology, Gordon Conference*. Jan **2013**.
6) M. J. Rose, R. Mercado, J. R. Winkler, and H. B. Gray. Electrocatalytic Hydrogen Gereration from Fluorinated Iron Glyoximes at Low Overpotentials. Southwest Regional ACS, Nov **2012**.
7) M. J. Rose, L. E. O'Leary, J. R. Lattimer, B. S. Brunschwig, H. B. Gray and N. S. Lewis. Covalent Attachment of Transition Metal Complexes to Silicon(111) Semiconductor Surfaces for Hydrogen Evolution. *ACS meeting (Denver)*, Fall **2011**.
8) M. J. Rose, D. E. Bellone and H. B. Gray. Syntheses and X-ray structures of tripodal tris(diphenylphosphine) Co(I/II) Complexes, and Strategy for Attachment to a Silicon(111) Semiconductor Surface. *ACS meeting (Anaheim)*, Spring **2011**.
9) M. J. Rose, C. Roske, J. R. Winkler and H. B. Gray. Syntheses and Structures of Diglyoxime Iron Complexes derived from the Perfluorinated Ligand Di(pentafluorophenyl)diglyoxime: Electrochemistry and Potential for Electrocatalytic Dihydrogen (H_2) Generation. *ACS meeting (Anaheim)*, Spring **2011**.
10) M. J. Rose, J. R. Winkler and H. B. Gray. Reductive Chemistry of Iron(II) Complexes derived from Macrocyclic Glyoximes [$(dRgBF_2)_2Fe(solv)_2$] (R = Me, Ph; solv = MeCN, ^{t}Bu^{i}NC). *ACS meeting (San Francisco)*, Spring **2010**.
11) M. J. Rose, B. S. Brunschwig, J. R. Winkler and Harry B. Gray. Phosphine-based P4N2 Ni/Co Macrocycles and Reductive Chemistry of the Fe-dmgBF$_2$-(MeCN/^{t}Bu^{i}NC)$_2$ System. *Metals in Biology Gordon Conf & Gordon Research Seminar Bioinorganic* and *CCI-Solar Annual Retreat*. Winter **2010**.
12) M. J. Rose, N. M. Betterley, and P. K. Mascharak. Thiolate S-Oxygenation Controls Nitric Oxide (NO) Photolability of a Nitrile Hydratase (Fe-NHase) Model derived from a Mixed Carboxamide/Thiolate Ligand. *ACS meeting (San Francisco)*, Spring **2010**.
13) M. J. Rose and P. K. Mascharak. Photosensitization of Ruthenium Nitrosyls to Red Light with an Isoelectronic Series of Heavy-Atom Chromophores: Experimental and DFT Studies on the Effects of O-, S- and Se-substituted Coordinating Dyes. *ACS meeting (San Francisco)*, Spring **2010**.
14) M. J. Rose and P. K. Mascharak. Photosensitization of Ruthenium Nitrosyls to Red Light with Coordinated, Heavy-Atom Chromophores. *Southern California Inorganic Photochemistry (SCIP) Conf*, Summer **2009**.
15) M. J. Rose and P. K. Mascharak. A Novel Set of Fluorogenic Ruthenium NO Donors: a New Mode of Fluorimetric Delivery of NO to Cells. *ACS meeting (Philadelphia)*, Fall **2008**.

16) M. J. Rose and P. K. Mascharak. A Novel Set of Fluorogenic Ruthenium NO Donors: a New Mode of Fluorimetric Delivery of NO to Cells. *ACS meeting (Boston)*, Fall **2007**.
17) M. J. Rose, A. K. Patra, E. A. Alcid, M. M. Olmstead and P. K. Mascharak. Tuning the Photolability of the $\{RuNO\}^6$ Core of Ruthenium Nitrosyls with the Number and Orientation of Carboxamido-N Donors: A Systematic Investigation. *ACS Meeting (San Francisco)*, Fall **2006**.
18) M. J. Rose, A. K. Patra, M. M. Olmstead and P. K. Mascharak. Ruthenium Nitrosyls Derived from N5 Carboxamide or N5 Schiff Base Ligands: Comparison of Stability and Photolability in Aqueous Solution. *ACS Meeting (San Diego)*, **2005**.
19) 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. Pharm. Meeting (San Francisco)*, *Mol. Biol. Cell* **2002**, *443*, 79A.
20) 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.

Commentaries/Synopses

The following journal reports/topics were summarized in short commentaries in the journal *ChemTracts: Inorganic Chemistry* (by M. J. Rose and P. K. Mascharak).

1) *a)* Blue Phosphorescent Emitters: New N-Heterocyclic Platinum(II) Tetracarbene Complexes. *b*) FRET-Based Sensor for Imaging Chromium(III) in Living Cells. *c*) Selective Monitoring of Parts per Million CO by Immobilized Metal Complexes on Glass. **2008**, *21*(1), 37-42
2) *a)* Carbon Dioxide Activation at the Ni,Fe-Cluster of Anaerobic Carbon Monoxide Dehydrogenase. *b)* Reversible Single-Crystal Transformation Through Fe–O(H)Me/Fe–OH_2 Bond Formation/Bond Breaking in a Gas-Solid Reaction at an Ambient Condition. *c)* Porous Semiconducting Gels and Aerogels From Chalcogenide Clusters. *d)* Water-Soluble Porphyrins as a Dual-Function Molecular Imaging Platform for MRI and Fluorescence Zinc Sensing. *e)* Polyoxometalate Embedding of a Tetraruthenate(IV)-oxo-core by Template-Directed Metalation of $[\omega\text{-}SiW_{10}O_{36}]^{8-}$: A Totally Inorganic Oxygen-Evolving Catalyst. **2007**, *20*(9), 387-388; 391-398
3) Structure of a Thiol Monolayer-Protected Gold Nanoparticle at 1.1 Å Resolution. **2007**, *20*(7), 308-309
4) Stable Magnesium(I) Compounds with Mg-Mg Bonds. **2007**, *20*(3), 125-126
5) Coordination-Driven Nanosized Lanthanide "Molecular Lantern" with Tunable Luminescent Properties. **2006**, *19*(11), 458-459
6) *a)* Discrete Sandwich Compounds of Monolayer Palladium Sheets. *b)* Synthesis and Characterization of Silyldichloramines, Their Reactions with F^- Ions, Instability of N_2Cl_2 and NCl_2^-, and Formation of NCl_3. **2006**, *19*(9), 371-374
7) $[Fe(CNXyl)_4]^{2-}$: A Structurally Characterized Homoleptic Isocyanidemetalate Dianion. **2006**, *19*(8), 318-323
8) *a)* Specific, Stable Fluorescence Labeling of Histidine-Tagged Proteins for Dissecting Multi-Protein Complex Formation. *b)* Ruthenium Half-Sandwich Complexes Bound to Protein Kinase Pim-1. *c)* Three-Coordinate Co(I) Provides Access to Unsaturated Dihydro-Co(III) and Seven-Coordinate Co(V). **2006**, *19*(8), 331-336
9) *a)* The Zintl Ion $[Pb10]^{2-}$: Rare Example of a Homoatomic closo Cluster. *b)* Octa-Uranium Rings With Alternating Nitride and Azide Bridges. *c)* Nanoring-Nanosphere Molecule, $\{Mo_{214}V_{30}\}$: Pushing the Boundaries of Controllable Inorganic Structural Organization at the Molecular Level. **2006**, *19*(5), 205-210
10) *a)* Studies of Low-Coordinate Iron Dinitrogen Complexes. *b)* Disruption of Phosphoprotein-Protein Surface Interaction Using Zn(II) Dipicolylamine-Based Artificial Receptors via Two-Point Interaction. *c)* Synthesis of a Stable Compound With Fivefold Bonding Between Two Chromium(I) Centers. **2005**, *18*(8), 471-475

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)