

Curriculum Vitae – Charles William Machan

Current Address

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University of Virginia
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Personal

Born: April 17; Madison, WI.

Education and Training

University of California-San Diego	Molecular Electrochemistry	Postdoc (2013-2016)
Northwestern University	Inorganic Chemistry	Ph.D. (2012)
Washington U. in St. Louis	Chemistry and German	B.A. (2008)

Summary of Professional Experience

08/10/2016-present	Assistant Professor, University of Virginia Department of Chemistry
01/2013-07/2016	Postdoctoral Researcher, University of California San Diego Postdoc Advisor: Clifford P. Kubiak. Specialization: Electrocatalysis and Spectroelectrochemical Characterization Methods.
09/2008-12/2012	Doctoral Candidate, Chemistry Department, Northwestern University. Advisor: Chad A. Mirkin. Research Specialization: Organometallic and Coordination Chemistries of Multidentate Ligands.

Awards and Honors

2012	Edmund W. Gelewitz Award for Outstanding Senior Graduate Student, Northwestern University
2012	Student Travel Award, Alpha Gamma Chapter of PLU
2012	Student Travel Award, Northwestern University, The Graduate School
2011	Student Travel Award, Alpha Gamma Chapter of PLU
2011	Student Travel Award, Northwestern University, The Graduate School
2006-2008	All-Academic UAA Football Selection
2005	Dean's List, Washington University in St. Louis

Synergistic Activities

2018	Reviewer DOE SBIR Proposals
2017	UVA LEAD Chemistry Program, Chemistry Camp
2017	Reviewer ACS PRF New Directions
2016	Grant Review Panelist, NSF, Arlington, VA
2015	CENTC Summer School on Catalysis, University of Washington, July 20 th -24 th .

- 2011-2012 President of Phi Lambda Upsilon (PLU), Chemistry Honors Society, Alpha Gamma Chapter, Northwestern University.
- 2011-2012 Undergraduate Research Mentor, Mirkin Lab.
- 2011 Summer Research Experience for Undergraduates (REU) Mentor, Mirkin Lab.
- 2010-2011 Awards Chair of Phi Lambda Upsilon (PLU), Chemistry Honors Society, Alpha Gamma Chapter, Northwestern University.
- 2010-present Member of Phi Lambda Upsilon (PLU), Chemistry Honors Society, Alpha Gamma Chapter, Northwestern University.
- 2009-present American Chemical Society, Member.
- 2007-present Delta Phi Alpha, German Honors Society, Member.
- 2007-present Alpha Chi Sigma, Chemistry Honors Fraternity, Member.
- 2006-present Phi Delta Theta, Member.

Reviewer: *Dalton Transactions, Journal of the American Chemical Society, ACS Catalysis, ACS Central Science, Chemical Science, Chemical Review, Organometallics, Inorganic Chemistry*

Publications (* - denotes co-first authorship; # - corresponding author)

- Hooe, S.L.; Rheingold, A.L.; **Machan, C.W.** # "Electrocatalytic Reduction of Dioxygen to Hydrogen Peroxide by a Molecular Manganese Complex with a Bipyridine-Containing Schiff Base Ligand" *J. Am. Chem. Soc.* **2017**, DOI: 10.1021/jacs.7b09027.
- Sahu, S.; Cheung, P.L.; **Machan, C.W.**; Chabolla, S.A.; Kubiak, C.P.; Gianneschi, N.C. "Charged Macromolecular Rhenium Bipyridine Catalysts with Tunable CO₂ Reduction Potentials" *Chem. Eur. J.* **2017**, *23*, 8619–8622.
- Huynh, M.R.; Mora, S.J.; Villalba, M.; Tejada-Ferrari, M.E.; Liddell, P.A; Cherry, B.R.; Teillout, A.-L.; **Machan, C.W.**; Kubiak, C.P.; Gust, D.; Moore, T.A.; Hammes-Schiffer, S.; Moore, A.L. "Concerted One-Electron Two-Proton Transfer Processes in Models Inspired by the Tyr-His Couple of Photosystem II" *ACS Cent. Sci.* **2017**, *3*, 372–380.
- Chabolla, S.A.; **Machan, C.W.**; Yin, J.; Dellamary, E.A.; Sahu, S.; Gianneschi, N.C.; Gilson, M.K.; Tezcan, F.A.; Kubiak, C.P. "Bio-inspired CO₂ reduction by a rhenium tricarbonyl bipyridine-based catalyst appended to amino acids and peptidic platforms: incorporating proton relays and hydrogen-bonding functional groups" *Faraday Discuss.* **2017**, *198*, 279–300.
- Machan, C.W.**; Kubiak, C.P. "Electrocatalytic Reduction of Carbon Dioxide with Mn(terpyridine) Carbonyl Complexes" *Dalton Trans.* **2016**, *45*, 17179–17186.
- Machan, C.W.**; Kubiak, C.P. "Interrogating Heterobimetallic Co-Catalytic Responses for the Electrocatalytic Reduction of CO₂ Using Supramolecular Assembly" *Dalton Trans.* **2016**, *45*, 15942–15950.
- Machan, C.W.**; Yin, J.; Chabolla, S.A.; Gilson, M.K.; Kubiak, C.P. "Improving the Efficiency and Activity of Electrocatalysts for the Reduction of CO₂ Through Supramolecular Assembly with Amino Acid-Modified Ligands" *J. Am. Chem. Soc.* **2016**, *138*, 8184–8193.
- Stanton III, C.J.; **Machan, C.W.**; Vandezande, J.E.; Jin, T.; Majetich, G.; Schaefer III, H.F.; Kubiak, C.P.; Li, G.; Agarwal, J. "Re(I) NHC Complexes for the Electrocatalytic Conversion of CO₂" *Inorg. Chem.*, **2016**, *55*, 3136–3144.
- Cheung, P.L.; **Machan, C.W.**; Malkhasian, Y.S.; Agarwal, J.; Kubiak, C.P. "Photocatalytic Reduction of Carbon Dioxide to CO and HCO₂H Using fac-Mn(CN)(bpy)(CO)₃'" *Inorg. Chem.*, **2016**, *55*, 3192–3198.
- Wixtrom, A.I.; Shao, Y.; Jung, D.; **Machan, C.W.**; Kevork, S.N.; Qian, E.A.; Axtell, J.C.; Khan, S.I.; Kubiak, C.P.; Spokoyny, A.M. "Rapid Synthesis of Redox-Active Dodecaborane

- B₁₂(OR)₁₂ Clusters Under Ambient Conditions" *Inorg. Chem. Front.* (Emerging Investigator Issue) **2016**, *3*, 711–717.
11. Clark, M.L.; Rudshteyn, B.; Ge, A.; Chabolla, S.A.; **Machan, C.W.**; Psciuk, B.T.; Song, J.; Canzi, G.; Lian, T.; Batista, V.S.; Kubiak, C.P. "Surface Orientation of Immobilized Cyano-Substituted Bipyridine Re(I) *fac*-Tricarbonyl Electrocatalysts on Au Surfaces" *J. Phys. Chem. C* **2016**, *120*, 1657–1665.
 12. **Machan***, **C.W.**; Stanton III*, C.J.; Vandezande, J.E.; Majetich, G.F.; Schaefer III, H.F.; Kubiak, C.P.; Agarwal, J. "Electrocatalytic Reduction of Carbon Dioxide by Mn(CN)(2,2'-bipyridine)(CO)₃: CN Coordination Alters Mechanism" *Inorg. Chem.* **2015**, *54*, 8849–8856.
 13. **Machan, C.W.**; Chabolla, S.A.; Kubiak, C.P. "Reductive Disproportionation of Carbon Dioxide by an Alkyl-Functionalized Pyridine Monoimine Re(I) *fac*-tricarbonyl Electrocatalyst" *Organometallics* **2015**, *34*, 4678–4683.
 14. **Machan, C.W.**; Sampson, M.D.; Kubiak, C.P. "A Molecular Ruthenium Electrocatalyst for the Reduction of Carbon Dioxide to CO and Formate" *J. Am. Chem. Soc.* **2015**, *137*, 8564–8571.
 15. Vollmer, M.; **Machan, C.W.**; Clark, M.L.; Antholine, W.; Agarwal, J.; Schaefer III, H.F.; Kubiak, C.P.; Walensky, J. "Synthesis, Spectroscopy, and Electrochemistry of (α-diimine)M(CO)₃Br, M = Mn, Re, Complexes: Ligands Isoelectronic to Bipyridyl Show Differences in CO₂ Reduction" *Organometallics* **2015**, *34*, 3–12.
 16. **Machan, C.W.**; Chabolla, S.A.; Yin, J.; Gilson, M.K.; Tezcan, F.A.; Kubiak, C.P. "Supramolecular Assembly Promotes the Electrocatalytic Reduction of Carbon Dioxide by Re(I) Bipyridine Catalysts at a Lower Overpotential" *J. Am. Chem. Soc.* **2014**, *136*, 14598–14607.
 17. Chabolla, S.A.; Dellamary, E.A.; **Machan, C.W.**; Tezcan, F.A.; Kubiak, C.P. "Combined Steric and Electronic Effects of Positional Substitution on Dimethyl-Bipyridine Rhenium(I) Tricarbonyl Electrocatalysts for the Reduction of CO₂" *Inorg. Chim. Acta* **2014**, *422*, 109–113.
 18. **Machan, C.W.**; Sampson, M.D.; Chabolla, S.A.; Dang, T.; Kubiak, C.P. "Developing a Mechanistic Understanding of Molecular Electrocatalysts for CO₂ Reduction Using Infrared Spectroelectrochemistry" *Organometallics* **2014**, *33*, 4550–4559.
 19. Kennedy*, R.D.; **Machan***, **C.W.**; McGuirk, C.M.; Rosen, M.S.; Stern, C.L.; Mirkin, C.A. "General Strategy for the Synthesis of Rigid Higher-Order Platinum(II) Complexes via the Weak-Link Approach: Tweezers, Triple-Layers and Macrocycles" *Inorg. Chem.* **2013**, *52*, 5876–5888.
 20. **Machan, C.W.**; Adelhardt, M.; Sarjeant, A.A.; Stern, C.L.; Sutter, J.; Meyer, K.; Mirkin, C.A. "One-Pot Synthesis of an Fe(II) Bisterpyridine Complex with Allosterically Regulated Electronic Properties" *J. Am. Chem. Soc.* **2012**, *134*, 16921–16924.
 21. **Machan, C.W.**; Lifschitz, A.M.; Sarjeant, A.A.; Stern, C.L.; Mirkin, C.A. "Crystallographic Snapshots of the Bond-Breaking Isomerization Reactions of Ni(II) Complexes with Hemilabile Ligands" *Angew. Chem., Int. Ed.* **2012**, *51*, 1469–1472.
 22. Spokoyny, A.M.; **Machan, C.W.**; Clingerman, D.C.; Rosen, M.S.; Wiester, M.J.; Kennedy, R.D.; Sarjeant, A.A.; Stern, C.L.; Mirkin, C.A. "A Coordination Chemistry Dichotomy for Carborane-Based Ligands" *Nature Chem.* **2011**, *3*, 590–596. Highlight by A. Weller, *ibid.*
 23. **Machan, C.W.**; Spokoyny, A.M.; Jones, M.R.; Sarjeant, A.A.; Stern, C.L.; Mirkin, C.A. "The Plasticity of the Nickel(II) Coordination Environment in Complexes with Hemilabile Phosphino-Thioether Ligands" *J. Am. Chem. Soc.* **2011**, *33*, 3023–3033.

24. Rosen*, M.S.; Spokoyny*, A.M.; **Machan, C.W.**; Stern, C.L.; Sarjeant, A.A.; Mirkin, C.A. "The Chelating Effect as a Driving Force Leading to Selective Formation of Heteroligated Pt(II) Complexes with Bidentate Phosphine-Chalcoether Ligands" *Inorg. Chem.* **2011**, *50*, 1411–1419.
25. Spokoyny*, A.M.; Li*, T.C.; Farha, O.K.; **Machan, C.W.**; She, C.; Marks, T.J.; Hupp, J.T.; Mirkin, C.A. "Electronic Tuning of Nickel-Based Bis(dicarbollide) Redox Shuttles in Dye-Sensitized Solar Cells" *Angew. Chem., Int. Ed.* **2010**, *49*, 5339–5343.

Presentations

University of Virginia (August 2016-Present)

1. "Earth-Abundant Molecular Electrocatalysts for the Reduction of CO₂ and O₂" Symposium for the ACS Harry Gray Award for Creative Work in Inorganic Chemistry by a Young Investigator in honor of Dwight Seferos, 255th ACS National Meeting, New Orleans, LA, March 20, 2018 (invited talk).
2. "Polypyridyl Electrocatalysts for the Reduction of CO₂" Symposium for the ACS Award in Organometallic Chemistry in honor of Clifford P. Kubiak, 255th ACS National Meeting, New Orleans, LA, March 18, 2018 (invited talk).
3. "Developing Molecular Electrocatalysts Relevant to Solar Fuels" Southern Methodist University Chemistry Seminar, February 23, 2018 (invited talk).
4. "Developing Molecular Electrocatalysts Relevant to Solar Fuels" High Point University Chemistry Seminar, February 9, 2018 (invited talk).
5. "Developing Molecular Electrocatalysts Relevant to Solar Fuels" Hampton University Chemistry Seminar, January 25, 2018 (invited talk).
6. "Developing Molecular Electrocatalysts Relevant to Solar Fuels" Solar Energy Research Conference at the Southeast Regional Meeting of the ACS, November 9, 2017 (invited talk).
7. "Metal-Organic Frameworks as Template Shells for Enhanced Electrocatalyst Performance" 3rd MAXNET Energy Workshop, October 26-27, 2017 (talk and poster).
8. "Earth-Abundant Molecular Electrocatalysts for the Reduction of CO₂ and O₂" 254th ACS National Meeting, Washington, DC, August 24, 2017 (talk).
9. "Developing Molecular Electrocatalysts Relevant to Solar Fuels" International Solar Fuels Conference: ISF2, San Diego, CA, July 6-10, 2017 (invited talk).
10. "Developing Molecular Electrocatalysts Relevant to Solar Fuels" Gordon Research Conference on Inorganic Mechanisms, Galveston, TX, March 5-10, 2017 (poster).
11. "Bioinspired Molecular Electrocatalysts for the Reduction of CO₂" International Conference on Artificial Photosynthesis 2017, Kyoto, Japan, March 3, 2017 (invited talk).
12. "Bio-inspired CO₂ reduction by a rhenium tricarbonyl bipyridine-based catalyst appended to amino acids and peptidic platforms: incorporating proton relays and hydrogen-bonding functional groups" Faraday Discussions: Artificial Photosynthesis, Kyoto, Japan, March 2, 2017 (invited talk).
13. "Developing Molecular Electrocatalysts and Materials for Reactions Relevant to Solar Fuels" Davidson College Chemistry Colloquium, January 27, 2017 (invited talk).