

Mitchell R. Anstey, Ph.D.

Davidson College
Department of Chemistry
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PROFESSIONAL EXPERIENCE

Assistant Professor of Chemistry – Davidson College, Davidson, North Carolina 2016 – present

- Teaches introductory chemistry (CHE 115, Principles of Chemistry), Introduction to Inorganic Chemistry (CHE 240), Organometallic Chemistry (CHE 340), Batteries from a Chemical Perspective (CHE 341)
- Mentors students in academics and career preparation
- Leads research efforts in battery science with undergraduate students; collaborates with Sandia National Laboratories, University of Pennsylvania, University of North Carolina - Charlotte
- Supports and Leads initiatives on diversity in STEM disciplines both internally at Davidson College as well as externally through conferences and mentorship of students

Visiting Scientist – University of California, Berkeley, California 2016

- Collaborated with Prof. John Arnold on an investigation into the structural characteristics of anionic lanthanide complexes containing corrole ligands

Principal Member of the Technical Staff – Sandia National Laboratories, Livermore, California 2016

Senior Member of the Technical Staff – Sandia National Laboratories, Livermore, California 2011 – 2015

- Principal Investigator for projects in the areas of energy storage, radiation detection, and material functionalization
- Supervised a team of staff members, postdocs, technicians, and graduate and undergraduate interns
- Maintained external collaborations with UC Berkeley, University of Pennsylvania, San Francisco State University and Washington University (St. Louis)
- Co-organizer for grid-scale energy storage symposium at Materials Research Society Spring 2016 National Meeting

Postdoctoral Appointee – Sandia National Laboratories, Livermore, California 2009 – 2011

- Designed and tested new phosphorus-based compounds for the reversible storage of hydrogen for transportation
- Formulated new crystalline materials for thermal neutron capture devices for radiation detection
- Synthesized metal-organic frameworks (MOFs) for the threshold detection of hydrogen peroxide

EDUCATION

Ph.D. in Chemistry, University of California, Berkeley, California 2004 – 2009

- Research Advisor: Professor Robert G. Bergman
- Doctoral Thesis: "Late-Metal C-H Bond Activation: Reactivity of Strained-Ring Systems and Progress Toward the Isolation of Alkane Sigma-bond Complexes"
- Investigated fundamental catalytic systems via highly unstable metal-alkane σ -bond complexes, a collaboration with Professors Peter Vollhardt and Alex Pines at UC Berkeley
- In collaboration with Professor Chaim Sukenik at Bar-Ilan University in Israel, explored molecular sensing properties of silicon wafers functionalized with long-chain alkanes and organometallic species

B.Sc. in Chemistry, University of Virginia, Charlottesville, Virginia 2000 – 2004

- Research Advisor: Professor W. Dean Harman
- Undergraduate Thesis: "Dearomatization of Rhenium-bound Naphthalenes and Anisoles"
- Investigated the ability of rhenium, osmium, and tungsten to activate arenes through π -coordination

PUBLICATIONS

(\circ bullet denotes MRA as a corresponding author, * indicates student coauthor)

- \circ Whalen, A. C.; Hernandez Brito, C.; Choi, K. H.; Warner, E. J. T.; Thole, D. A.; Gau, M. R.; Carroll, P. J.; Anstey, M. R. "10-Phenyl-10H-phenoxazine-4,6-diol tetrahydrofuran monosolvate." *IUCrData* **2020**, 5, x201276.

- Mallard, H. H.;* Kennedy, N. D.;* Rudman, N. A.;* Greenwood, A. M.;* Nicoleau, J.;* Angle, C. E.;* Torquato, N. A.;* Gau, M. R.; Carroll, P. J.; Anstey, M. R. "2,2'-Oxybis[1,3-bis(4-methoxyphenyl)-2,3-dihydro-1H-benzo[d][1,3,2]diazaborole]." *IUCrData*, **2020**, 5, x201248.
+ Chosen as the cover article
- Anstey, M. R.; Blauch, D. N.; Carroll, F. A.; Gorenssek-Benitez, A. H.; Hauser, C. D.; Key, H. M.; Myers, J. K.; Stevens, E. P.; Striplin, D. R.; Holck, H. W.;* Montero-Lopez, L.;* Snyder, N. L. "#DavidsonTrue: Transitioning to Remote Teaching while Maintaining Our Values as a Liberal Arts College during the COVID-19 Pandemic" *J. Chem. Ed.* **2020**, 97, 2800-2805.
- Anstey, M. R.; Bost, J. L.;* Grumman, A. S.;* Kennedy, N. D.;* Whited, M. T. "Crystal Structures of trans-Acetyldicarbonyl(η^5 -cyclopentadienyl)(1,3,5-triaza-7-phosphaadamantane)molybdenum(II) and trans-Acetyldicarbonyl(η^5 -cyclopentadienyl)(3,7-diacetyl-1,3,7-triaza-5-phosphabicyclo[3.3.1]nonane)molybdenum(II)" *Acta Cryst. E* **2020**, 76, 547.
- Turner, N. A.; Freeman, M. B.; Pratt III, H. D.; Crockett, A. E.; Jones, D. J.; Anstey, M. R.; Anderson, T. M.; Bejger, C. M. "Desymmetrization of Hexasubstituted [3]radialene Anions for Solubility Enhancement in Aqueous Organic Catholytes." *Chem. Commun.* **2020**, 56, 2739.
- Mengesha, W.; Feng, P. L.; Cordaro, J. G.; Anstey, M. R.; Myllenbeck, N. R.; Throckmorton, D. J. "A Method for Calibrating the Relative Gamma Ray Light Yield in Plastic Scintillators." *Rev. Sci. Instr.* **2017**, 035108.
- Armstrong, K. A.;* Hohloch, S.; Lohrey, T. D.; Zarkesh, R. A.; Arnold, J.; Anstey, M. R. "Control of Clustering Behavior in Anionic Cerium(III) Corrole Complexes: From Oligomers to Monomers." *Dalton Trans.* **2016**, 45, 18653.
- Zarkesh, R. A.; Ichimura, A. S.; Monson, T. C.; Tomson, N. C.; Anstey, M. R. "Voltage Clustering in Redox-Active Ligand Complexes: Mitigating Electronic Communication Through Choice of Metal Ion." *Dalton Trans.* **2016**, 45, 9962.
- Feng, P. L.; Mengesha, W.; Anstey, M. R.; Cordaro, J. G. "Distance-Dependent Quenching and Gamma-Ray Spectroscopy in Tin-Loaded Polystyrene Scintillators." *IEEE Trans. Nucl. Sci.* **2016**, 63, 407.
- Chalamala, B. R.; Soundappan, T.; Fisher, G. R.; Anstey, M. R.; Viswanathan, V. V.; Perry, M. L. "Redox Flow Batteries: An Engineering Perspective." *Proceedings of the IEEE*, **2014**, 102, 976–999.
- Cappillino, P. J., Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M.; Anstey, M. R. "Application of Redox Non-Innocent Ligands to Non-Aqueous Flow Battery Electrolytes." *Adv. Energy Mater.* **2014**, 4, 1300566.
+ Chosen as a cover article
- Buckley, H. L.; Anstey, M. R.; Gryko, D. T.; Arnold, J. "Lanthanide Corroles: a New Class of Macrocyclic Lanthanide Complexes." *Chem. Commun.* **2013**, 49, 3104–3106.
- Razgon, A.; Anstey, M. R.; Yakelis, N. A.; Bergman, R. G.; Sukenik, C. N. "Surface Immobilization of an Organo-Iridium Complex Through a Carbon-Metal Bond." *Inorg. Chim. Acta* **2011**, 375, 305–307.
- Jacobs, B. W.; Houk, R. J. T.; Anstey, M. R.; House, S. D.; Robertson, I. M.; Talin, A. A.; Allendorf, A. A. "Ordered Metal Nanostructure Self-Assembly Using Metal-Organic Frameworks as Templates." *Chem. Sci.* **2011**, 2, 411.
+ Chosen as a cover article
- Anstey, M. R.; Corbett, M. T.; Cordaro, J. G. "Improved Synthesis of Bis(borano)hypophosphite Salts." *Inorg. Chem.* **2010**, 49, 81977–8199.
- Calladine, J. A.; Torres, O.; Anstey, M. R.; Ball, G. E.; Bergman, R. G.; Curley, J.; Duckett, S. B.; George, M. W.; Gilson, A. I.; Lawes, D. J.; Perutz, R. N.; Sun, X. Z.; Vollhardt, K. P. C. "Photoinduced N₂ Loss as a Route to Long-Lived Organometallic Alkane Complexes: A Time-Resolved IR and NMR Study." *Chem. Sci.* **2010**, 1, 622.
- Anstey, M. R.; Yung, C. M.; Du, J.;* Bergman, R. G. "Unexpected C-C Bond Cleavage and C-C Bond Formation Observed in the Reaction of a Cationic Iridium Complex with Heteratom-Substituted Cyclopropanes." *J. Am. Chem. Soc.* **2007**, 129, 776-777.
- Ding, F.; Valahovic, M. T.; Keane, J. M.; Anstey, M. R.; Sabat, M.; Trindle, C. O.; Harman, W. D. "Diastereo- and Enantioselective Dearomatization of Rhenium-Bound Naphthalenes." *J. Org. Chem.* **2004**, 69, 2257-2267.

PATENTS

- O'Bryan, G.; Anstey, M. R.; Loyola, B. R. "Surface Treatment of Ultra-High Molecular Weight Polymers." US Patent Application, **2016**.
- Feng, P. F.; Cordaro, J. G.; Anstey, M. R.; Morales, A. M. "Hybrid Liquid Scintillators with Micelle-forming Solvents and Their Preparation and Use for Neutron Discrimination." US Patent 9,029,807 B1, May 12, **2015**.

- Anderson, T. M.; Anstey, M. R.; Tomson, N. C. "Redox-Active Ligand-Based Transition Metal Complex Flow Batteries." US Patent Application US 2014/0239906 A1, August 28th, **2014**.

PRESENTATIONS, INVITED (denotes presenting author, * indicates student coauthor)

- Anstey, M. R.; Choi, D.;* Hernandez, C.;* Thole, D.;* Warner, E.;* Whalen, A. C.* "Redox Flow Batteries and How Chemistry Can Make Them Better." Denison University (virtual), Granville, OH, United States, September 22nd, **2020**.
- Anstey, M. R.; Hernandez, C.;* Thole, D.;* Warner, E.;* Choi, D.;* Blauch, D.; Zarkesh, R. A.; Cappillino, P. J.; Tomson, N. C. "Effects of Charge-Localization in Non-Innocence Ligand Complexes Used for Redox Flow Battery Electrolytes." National Meeting of the American Chemical Society, Philadelphia, PA, United States, March 22nd, **2020** (ACS meeting cancelled).
- Anstey, M. R.; Hernandez, C.;* Thole, D.;* Warner, E.;* Choi, D.;* Blauch, D.; Zarkesh, R. A.; Cappillino, P. J.; Tomson, N. C. "Electrochemical Energy Storage through Ligand-Based Charge Manipulation." University of Virginia, Charlottesville, VA, United States, February 28th, **2020**.
- Anstey, M. R.; Hernandez, C.;* Thole, D.;* Warner, E.;* Choi, D.;* Blauch, D.; Zarkesh, R. A.; Cappillino, P. J.; Tomson, N. C.; Anderson, T. M. "Electrochemical Energy Storage through Ligand-Based Charge Manipulation." NC Photochem, Boone, NC, United States, October 23rd, **2019**.
- Anstey, M. R.; Zarkesh, R. A.; Cappillino, P. J.; Tomson, N. C.; Anderson, T. M. "Redox-Active Ligands: A Design Principle for Flow Battery Electrolytes." Carolina-Piedmont American Chemical Society Local Chapter Meeting, Charlotte, NC, United States, November 15th, **2016**.
- Anstey, M. R.; Zarkesh, R. A.; Cappillino, P. J.; Armstrong, K. C.; Tomson, N. C.; Anderson, T. M. "Redox-Active Ligands: A Design Principle for Flow Battery Electrolytes." Davidson College, Davidson, NC, United States, November 4th, **2016**.
- Anstey, M. R.; Zarkesh, R. A.; Cappillino, P. J.; Tomson, N. C.; Anderson, T. M. "Redox-Active Ligands: A Design Principle for Flow Battery Electrolytes." University of North Carolina, Charlotte, NC, United States, October 13th, **2016**.
- Anstey, M. R.; Zarkesh, R. A.; Gittleson, F. S.; Torquato, N. A.;* Armstrong, K.;* Tomson, N. C.; Anderson, T. M. "Redox Flow Battery Research in the Non-Aqueous Regime" 5th International Conference on Advances in Energy Research, Indian Institute of Technology Bombay, Mumbai, India, December 15th, **2015**.
- Anstey, M. R.; Zarkesh, R. A.; Cappillino, P. J., Pratt III, H. D.; Torquato, N. A.;* Armstrong, K.;* Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Neither Industry Nor Academia: Research at Sandia National Laboratories." Inorganic Department Seminar, University of California, Riverside, CA, United States, September 25th, **2015**.
- Anstey, M. R.; Zarkesh, R. A.; Cappillino, P. J., Pratt III, H. D.; Torquato, N. A.;* Armstrong, K.;* Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Neither Industry Nor Academia: Research at Sandia National Laboratories." Inorganic Department Seminar, University of California, Berkeley, CA, United States, September 3rd, **2015**.
- Anstey, M. R.; Cappillino, P. J., Zarkesh, R. A.; Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Non-Aqueous Flow Battery Electrolytes based on Redox Non-Innocence: New Chemistry and Spectroelectrochemical Methods." MRS National Meeting, Boston, MA, United States, December 1st, **2014**, Y3.06.
- Anstey, M. R.; Cappillino, P. J., Zarkesh, R. A.; Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Redox Non-Innocence: Enhancing the Stability and Performance of Flow Battery Electrolytes." 1st International Symposium on Energy Challenges & Mechanics, Aberdeen, Scotland, United Kingdom, July 9th, **2014**, Session 03d.
- Anstey, M. R.; Cappillino, P. J., Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Application of Redox Non-Innocent Ligand Complexes to Redox Flow Battery Electrolytes." MRS National Meeting, Boston, MA, United States, December 2nd, **2013**, DD1.02.
- Anstey, M. R.; Cappillino, P. J., Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Redox Flow Batteries: Development of the Next Generation of Energy-Dense Electrolytes." Energy, Environmental, & Chemical Engineering Department Seminar, Washington University, St. Louis, MO, United States, April 5th, **2013**.

PRESENTATIONS & POSTERS, SUBMITTED (denotes presenting author, * indicates undergraduate student coauthor)

- Anstey, M. R.; Choi, D.;* Hernandez, C.;* Thole, D.;* Warner, E.;* Whalen, A. C.*; Gau, M. R.; Carroll, P. J.; "Rational Design of Multi-Electron Electrolytes Using Redox Non-Innocence." Department of Energy, Office of Electricity Peer Review (virtual), Albuquerque, NM, United States, September 29-30, **2020**, Poster.

- Warner, E.;* Hernandez, C.;* Thole, D.;* Choi, D.;* Blauch, D. N.; Anstey, M. R. "Group 13 Complexes of 4,6-Dihydroxy-10-Phenylphenoxazine." NC Photochem, Boone, NC, United States, October 23rd, **2019**, Poster.
- Kennedy, N. D.;* Cuthbertson, C.;* Torquato, N.; Blauch, D. N.; Anstey, M. R. "Cooperative Reactivity of a Redox-Active Ditopic Diazaborole." NC Photochem, Boone, NC, United States, October 23rd, **2019**, Poster.
- Anstey, M. R. "Electrochemical Energy Storage through Ligand-Based Charge Manipulation." Department of Energy, Office of Electricity Delivery and Energy Reliability Peer Review, Albuquerque, NM, United States, September 23-26, **2019**, Poster.
- Warner, E.;* Hernandez, C.;* Thole, D.;* Choi, D.;* Blauch, D. N.; Anstey, M. R. "Group 13 Complexes of 4,6-Dihydroxy-10-Phenylphenoxazine." National Meeting of the American Chemical Society, San Diego, CA, United States, September 25-29, **2019**, Poster.
- Hernandez, C.;* Thole, D.;* Warner, E.;* Choi, D.;* Blauch, D. N.; Anstey, M. R. "Synthesis of a Phenoxazine-Based Ligand for Redox Flow Battery Electrolytes." National Meeting of the American Chemical Society, San Diego, CA, United States, September 25-29, **2019**, Presentation.
- Kennedy, N. D.;* Cuthbertson, C.;* Torquato, N.; Blauch, D. N.; Anstey, M. R. "Cooperative Reactivity of a Redox-Active Ditopic Diazaborole." National Meeting of the American Chemical Society, San Diego, CA, United States, September 25-29, **2019**, Presentation.
- Anstey, M. R. "Improving Stability of Battery Additives and Electrolytes Using Redox Non-Innocent Ligand Complexes." Department of Energy, Office of Electricity Delivery and Energy Reliability Peer Review, Santa Fe, NM, United States, September 25-27, **2018**, Presentation.
- Rudman, N. A.;* Torquato, N. A.;* Goodell, J. C.;* Anstey, M. R. "Mixed Valency and Electrostatic Repulsion as Design Principles for Redox Mediators in Batteries." Southeastern Regional Meeting of the American Chemical Society, Charlotte, NC, United States, November 7-11, **2017**, Poster.
- Goodell, J. C.;* Anstey, M. R. "Redox-Switching of Ligand Structure in Aluminum BIAN Complexes." Southeastern Regional Meeting of the American Chemical Society, Charlotte, NC, United States, November 7-11, **2017**, Poster.
- Hernandez, C.;* Anstey, M. R. "Phenoxazine-Based Ligands for Redox Flow Battery Technology." Southeastern Regional Meeting of the American Chemical Society, Charlotte, NC, United States, November 7-11, **2017**, Poster.
- Strasser, A. J.;* Carlson, J. S.; Feng, P. L.; Anstey, M. R. "Improving Ligand Purity and Stability in Organometallic Silicon Scintillators." Southeastern Regional Meeting of the American Chemical Society, Charlotte, NC, United States, November 7-11, **2017**, Poster.
- Anstey, M. R.; Rudman, N. A.;* Hunt, A.;* Goodell, J. C.;* Hernandez, C.;* Torquato, N. A.;* Zarkesh, R. A.; Ichimura, A. S.; Foster, M.; Monson, T.C.; Tomson, N. C. "Redox Non-Innocence and the Related Mechanisms that Impact Electrolyte Stability in Small Molecule-based Battery Systems." Office of Electricity Delivery and Energy Reliability 2016 Annual Peer Review, San Diego, CA, United States, October 9-10, **2017**, Poster.
- Anstey, M. R.; Zarkesh, R. A.; Ichimura, A. S.; Foster, M.; Monson, T.C.; Tomson, N. C. "Consequences of Molecular Design in Redox Flow Battery Electrolyte Performance." Office of Electricity Delivery and Energy Reliability 2016 Annual Peer Review, Washington, D. C., United States, **2016**, Poster.
- Hohloch, S.; Armstrong, K. C.; Garner, M. E.; Booth, C.; Maron, L.; Anstey, M. R.; Arnold, J. "Old Cycles on New Metals: New Frontiers in Macrocyclic-Supported F-Element Chemistry." Wöhler Conference, Berlin, Germany, September 26-28, **2016**, Poster.
- Anstey, M. R.; Zarkesh, R. A.; Cappillino, P. J.; Tomson, N. C.; Anderson, T. M. "Applications of Organometallic Chemistry in Flow Battery Technology: Synthesis and Spectroelectrochemistry." Gordon Research Conferences, Organometallics, Newport, RI, United States, July 12-17, **2015**, Poster.
- Zarkesh, R. A.; Anstey, M. R. "Main Group-based Electrolytes for Flow Batteries." Gordon Research Seminar, Organometallics, Newport, RI, United States, July 11-12, **2015**, Poster.
- Buckley, H. L.; Ward, A. L.; Padilla, R.; Anstey, M. R.; Gryko, D. T.; Arnold, J. "Metal Corrole Complexes From Across the Periodic Table." ACS National Meeting, San Francisco, CA, United States, August 10-14, **2014**, INOR-513, Presentation.
- Arnold, J.; Ward, A. L.; Buckley, H. L.; Lukens, W. W.; Anstey, M. R. "F-Element Chemistry Supported by Corrole Ligands." ACS National Meeting, Dallas, TX, United States, March 16-20, **2014**, NUCL-50, Presentation.
- Cappillino, P. J., Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. Anstey, M. R. "Application of Redox Non-Innocent Ligand Complexes to Non-Aqueous Flow Battery Electrolytes." ACS National Meeting, Dallas, TX, United States, March 16-20, **2014**, INOR-333, Poster.

- Anstey, M. R.; Cappillino, P. J., Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Application of Redox Non-Innocent Ligand Complexes to Redox Flow Battery Electrolytes." Electrical Energy Storage Applications & Technologies International Conference, San Diego, CA, United States, October 24th, **2013**, Poster.
- Anstey, M. R.; Cappillino, P. J., Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. "Redox Non-Innocent Ligands for the Next Generation of Energy-Dense Flow Battery Electrolytes." Organometallic Chemistry Gordon Research Conference, Newport, RI, United States, July 9th, **2013**, Poster.
- Cappillino, P. J., Pratt III, H. D.; Hudak, N. S.; Tomson, N. C.; Anderson, T. M. Anstey, M. R. "Metal Complexes with Redox-Active Ligands as Electrolytes for High-Performance Flow Batteries." ACS National Meeting, New Orleans, LA, United States, April 7-11, **2013**, INOR-323, Poster.
- Cordaro, J. G.; Anstey, M. R.; Klebanoff, L.; Nissen, A. "Synthesis and Thermal Decomposition Properties of Hydrogen-Rich Phosphorus Salts." Pacificchem 2010, International Chemical Congress of Pacific Basin Societies, Honolulu, HI, United States, December 15-20, **2010**, AETECH-56, Presentation.
- Anstey, M. R.; Cordaro, J. G. "Bis(borano)hypophosphite Salts as Reversible Hydrogen Storage Media." ACS National Meeting, San Francisco, CA, United States, March 21-25, **2010**, FUEL-222, Presentation.
- Anstey, M. R.; Yung, C. M.; Du, J.;* Bergman, R. G. "Unexpected C-C Bond Cleavage and C-C Bond Formation Observed in the Reaction of a Cationic Iridium Complex with Heteratom-Substituted Cyclopropanes." ACS National Meeting, New Orleans, LA, United States, April 6-10, **2008**, INOR-303, Poster.

AWARDS AND RECOGNITION

- R&D 100 award recipient for "Triplet Harvesting Plastic Scintillators" project in **2014**
- Awarded the cover of *Advanced Energy Materials* Issue #4 in **2014**
- Awarded the cover of the 1st Symposium on Energy Challenges and Mechanics in Aberdeen, Scotland in **2014**
- Awarded the Early Career Laboratory Directed Research and Development project worth \$500M over 2 years
- Invited research presentations at UC Berkeley, two Materials Research Society meetings, 5th International Conference on Advances in Energy Research in Mumbai, 1st Symposium on Energy Challenges and Mechanics in Scotland, Washington University in St. Louis, and UC Riverside
- Invited article for *Proceedings of the IEEE* on recent redox flow battery developments, published June **2014**

GRANTS AND RESEARCH AWARDS

- Radialene Radicals for Redox Flow Batteries funded by NSF under Chemical Structures, Dynamics, and Mechanisms B; Christopher Bejger (UNCC, lead PI) (\$456K over three years, 2020-2022)
- Davidson Faculty Study & Research Grant (\$4K, 2020)
- Course Redevelopment for Introductory Chemistry funded by Fostering Inclusivity and Respect Together – Resources and Time for Exploration (\$7K, Spring 2020)
- Electrochemical Energy Storage through Ligand-Based Charge Manipulation funded by DOE's Office of Electricity Delivery & Energy Reliability; *Second Renewal* (\$50K over two years, 2019-2021)
- Davidson Faculty Study & Research Grant (\$4K, 2019)
- Electrochemical Energy Storage through Ligand-Based Charge Manipulation funded by DOE's Office of Electricity Delivery & Energy Reliability, *First Renewal* (\$50K over two years, 2017-2019)
- Davidson Faculty Study & Research Grant (\$4K, 2018)
- Organic Glass Scintillators for Fast Neutron and Gamma-Ray Discrimination funded by Sandia National Laboratories (\$7K, 2017)
- Davidson Faculty Study & Research Grant (\$4K, 2017)
- Electrochemical Energy Storage through Ligand-Based Charge Manipulation funded by DOE's Office of Electricity Delivery & Energy Reliability (\$25K, 2016)
- Dual Power Source and Oxygen Detector funded by Sandia National Laboratories (\$20K, 2016)
- Chemistry at the Phase Boundaries in Li-Air Batteries funded by Sandia National Laboratories (\$900K, 2015-2016)
- Flow Battery Materials & Diagnostics project funded by DOE's Office of Electricity Delivery & Energy Reliability (\$150K over three years, 2014-2016)
- Flow Battery Materials project funded by SunEdison, Inc. (\$225K over two years, 2012-2013)
- Early Career LDRD project funded by Sandia National Laboratories (\$500K over two years, 2011-2012)

TEACHING EXPERIENCE

Assistant Professor – Davidson College

2016 – present

- *Principles of Chemistry* (CHE 115)

- *Introduction to Inorganic Chemistry* (CHE 240)
- *Organometallic Chemistry* (CHE 340)
- *Batteries from a Chemical Perspective* (CHE 341)

Teaching Assistant, Inorganic Chemistry 108 – University of California, Berkeley 2006

- Directly supervised a class of 30 undergraduate students in a laboratory setting, instructed students on air- and water-sensitive Chemistry techniques, responsible for grading students' performance and knowledge

Head Teaching Assistant, Chemistry 181 and 182 – University of Virginia 2001 – 2004

- Instructed a class of ~100 students during weekly group work sessions, office hours, and monthly reviews, entrusted to perform multiple course lectures on topics including electrophilic activation of alkenes, elementary substitution reactions, and transition metal coordination geometry

CONTINUING EDUCATION

11th Canadian Chemical Crystallography Workshop (CCCW 2020) – Virtual 2020

- Attended week-long intensive workshop on the theory, application, and software associated with single-crystal X-ray diffraction. The topics ranged from basic theory of how diffraction of a crystal occurs to how to model molecular disorder (manually and using aids like Fragment Database in Olex2). I also helped to develop a MacOS script that will install add-ons into the Olex2 application.

FIRST–Resources and Time for Exploration (FIRST-RATE) – Davidson, NC 2020

- Funded redesign of the introductory chemistry course to infuse inclusive pedagogies that would increase belonging in the student community and enhance learning; methods of assessment designed and implemented; aided by Howard Hughes Medical Institute grant (FIRST)

More Inclusive Learning Environments (MILE) – Davidson, NC 2020

- Partnered with a student observer in the classroom with the shared goal of improving student experiences (learning, course climate/environment, and inclusivity); student partner provided observations and feedback from the student perspective; aided by Howard Hughes Medical Institute grant (FIRST)

Fostering Inclusivity and Respect in Science Together (FIRST) – Davidson, NC 2019

- Joined in monthly journal clubs, book club, seminars, and other educational events centered on building an inclusive mindset around STEM courses and the classroom environment

Quality Enhancement Plan Learning Communities Workshop – Davidson, NC 2018

- Participated in a one-week workshop to learn new methods of supporting underrepresented students distinct from active learning pedagogies; targeting introductory STEM courses to bridge achievement gap

Cottrell Scholars Collaborative New Faculty Workshop – Washington, D.C. 2016

- Accepted as a participant in the CSC workshop; facilitate the transition from independent scientist to faculty member; balancing teaching/research; engaging and mentoring students and employing active pedagogies

LEADERSHIP & SERVICE EXPERIENCE

Premedical Advisory Committee (*ad hoc* member), Davidson College – Charlotte, NC 2020

- Participated in mock interviews and provided feedback to students pursuing pre-health careers

Faculty Representative to Student Association of the ACS, Davidson College – Charlotte, NC 2018 – current

- Worked with faculty members, the leadership of the Library, and College administration to advise on ways that the Library can continue to meet the needs of students and faculty in a changing academic environment

Campus & Religious Life Committee Member, Davidson College – Charlotte, NC 2018 – current

- Worked with faculty members, the leadership of the Library, and College administration to advise on ways that the Library can continue to meet the needs of students and faculty in a changing academic environment

Library Committee Member, Davidson College – Charlotte, NC 2017 – current

- Worked with faculty members, the leadership of the Library, and College administration to advise on ways that the Library can continue to meet the needs of students and faculty in a changing academic environment

Posters Chair, Fall Southeastern Regional Meeting of the American Chemical Society – Charlotte, NC 2017

- Organized the posters for the four-day event; personally, oversaw the selection/rejection process and orchestrated the daily work to move three poster sessions per day through the conference

Symposium Lead, Fall Materials Research Society National Meeting – Boston, MA 2016

- Co-organized the symposium entitled "Redox Activity on the Molecular Level – Fundamental Studies and Applications," determined the scope of the talks, invitations to speakers, led the three-day symposium

Principal Investigator – Sandia National Laboratories 2011 – 2016

- Authored numerous research grant proposals to support teams of individuals both at Sandia and externally with private and academic partners

- Supervises teams in various areas of research to achieve the mission objectives of the national laboratory
- Symposium Lead, Spring Materials Research Society National Meeting – Phoenix, AZ** 2014 – 2015
- Determining the scope of the grid-scale energy storage symposium in Spring 2016, coordinating speakers and invitations, helping the organization’s preparations for the national meeting
- Session Chair, Materials Research Society National Meeting – Boston, MA** 2013
- Session Chair for “DD3: Materials and Technologies for Grid-Scale Energy Storage” at the Fall MRS National Meeting
- Organizer, Green Chemistry and Sustainable Design Seminar – University of California, Berkeley** 2008 – 2009
- Planned new seminar series, round table discussions, on-site visits to relevant clean technology campuses to assist in the green chemistry education of the UC Berkeley graduate population
- Contributor, Berkeley Science Review – University of California, Berkeley** 2008 – 2009
- Co-authored an article detailing the green chemistry movement being made at UC Berkeley, interviewed many of the significant figures in the campus’ green chemistry movement
- Advisor, Undergraduate Research Mentor – University of California, Berkeley** 2005 – 2009
- Instructed and directed two undergraduate students, one is currently pursuing a graduate education in Chemistry at Harvard, another completed her PhD at Wisconsin and postdoctoral study at Berkeley
- Member, Undergraduate/Graduate Mentorship Program – University of California, Berkeley** 2007 – 2009
- Advised rising graduate students in a variety of fields, aided with applications, graduate life, and career paths
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OUTREACH

- Presenter – Davidson College Presbyterian Church Preschool** 2020
- Directed discussion about “what is a scientist?” for preschool children (ages 4-5); demonstrated a chemistry “magic trick” forming a bronze alloy on a penny
- Presenter, Chemistry Magic Show – Davidson Lands Conservancy's World of Wonder** 2019
- Presented a new version of our chemistry magic show for area students with the student chapter of Davidson College’s American Chemical Society
- Organizer, What Did I See To Be Except Myself? – Faculty of the Future Initiative** 2019
- Organized a two-day visit and hosted a panel discussion of faculty member/advocates for underrepresented students in STEM disciplines; highlighted the experience of those faculty members on their path to academia while acknowledging the current experience of our own Davidson students
- Presenter, LaunchLKN Entrepreneurship Meeting – Mooresville, NC** 2018
- Participated in a round table discussion and gave a presentation on the current challenges in energy storage; discussed the landscape of entrepreneurship in the field and future needs that could be met by new technology
- Presenter, Chemistry Magic Show – Ada Jenkins Center** 2017
- Presented a chemistry magic show for the after-school program of the Ada Jenkins Center (grades 2-4) with the student chapter of Davidson College’s American Chemical Society
- Presenter, Future Is Here Festival – Smithsonian Institute** 2014
- Chosen to present at Nerd Nite Global hosted by Smithsonian Magazine, talk was a combination of live demonstrations and visuals to introduce the concept of luminescence to a broad audience
- Presenter, Blue Water Kayak Bioluminescent Kayaking – Marshall, CA** 2013
- Led a group of kayakers on Tomales Bay to view the bioluminescent algae bloom; discussed the chemistry, biology, and ecology of luminescence
- Presenter, Nerd Nite – Oakland, CA** 2012
- Presented a general introduction to luminescence, included both live demonstrations and discussions about the scientific concepts underlying this property and the everyday interactions we have with luminescent materials
- Volunteer, Community Resources in Science (Chemistry in the Classroom) – Berkeley, CA** 2007 – 2009
- Traveled to local elementary schools to demonstrate and discuss simple chemical properties and reactions, focused on hands-on activities and in-class participation with the students to foster interest in science
- Panel Member, Sustainable Products and Solutions Program – University of California, Berkeley** 2008
- Coordinated program focus to easily align Berkeley graduate students with projects, funding, and collaborators
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TECHNICAL ASSETS

Laboratory Expertise

- Synthetic inorganic and organometallic chemistry, standard and air-free chemistry techniques (Schlenk and glovebox), solid-state synthetic methods (i.e. ball-milling), high pressure vessel and high temperature furnace

operations, irradiation methods (laser and mercury-arc lamp) for chemical activation, small and large-scale crystallization methods, basic glassblowing techniques, experience with gas handling manifolds/systems

Analytical Methods

- Trained in Nuclear Magnetic Resonance (NMR) Spectroscopy, Electrochemical Measurements (voltammetry, coulometry, impedance, scanning electrochemical microscopy) Gas Chromatography-Mass Spectrometry (GC-MS), Liquid Chromatography-Mass Spectrometry (LC-MS), High-Pressure Liquid Chromatography (HPLC), Thermal Gravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC), Infrared (IR) Spectroscopy, Raman Spectroscopy, Ultraviolet-Visible Spectroscopy, Powder and Single-crystal X-Ray Diffraction, SQUID Magnetometry, Electron Paramagnetic Resonance Spectroscopy (EPR)

Software

- Olex2 for singly crystal X-ray structure solving, Mercury for visualizing and analyzing 3D chemical structures, Spartan for modeling chemical structures, iNMR and Topspin for NMR data, ChemDraw
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REFERENCES

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