Joseph Mercer Zadrozny

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RESEARCH VISION

My research group focuses on developing novel synthetic design strategies to control the properties of nuclear and electronic spin through molecular and electronic structure. Though fundamental, this insight will have transformative outcomes. For example, designing metal complexes that enable electron paramagnetic resonance imaging to be performed alongside conventional magnetic resonance imaging, or harnessing metal-ion nuclear spins to detect local chemistry, would revolutionize the information that is extractable from modern biomedical imaging techniques. Separately, controlling electronic spin is of use in next generation quantum-based applications, e.g. quantum sensing and quantum computation, where design strategies for the "ideal quantum object" are as-yet unknown. Finally, harnessing spin-design strategies may enable new design strategies for reactive chemistry and controlling bond formation via magnetic resonance. My group tackles all of these challenges through a hybrid synthetic inorganic chemistry and magnetic resonance approach.

CURRENT POSITION

Assistant Professor — Colorado State University, **2017-present**
Department of Chemistry
Research Program: *Spin-Based Solutions to Challenges in Bioimaging and Reactivity*

EDUCATION

Postdoctoral Researcher — Northwestern University, **2013-2017**
Advisor: ***Prof. Danna E. Freedman***
Project: Coordination Chemistry Approaches to Molecular Electronic Spin Qubit Development

Ph.D. Inorganic Chemistry — University of California, Berkeley, **2013**
Advisor: ***Prof. Jeffrey R. Long***
Thesis: Slow Magnetic Relaxation in Multinuclear Coordination Clusters and Low-Coordinate Transition metal Complexes

B.S. *summa cum laude* in Chemistry — Virginia Polytechnic Institute and State University, **2007**
Advisor: ***Prof. Gordon T. Yee***
Project: Tunable, Three-Dimensional Magnetic Coordination Polymers

HONORS AND AWARDS

(8) Cottrell Teacher-Scholar Award — Research Corp for Scientific Advancement, **2021**
(7) NSF CAREER Award — National Science Foundation, **2020**
(6) Pre-Tenure Faculty Excellence in Teaching and Mentoring Award — Colorado State University, **2020**
(5) Doctoral New Investigator Award (PI) — ACS-Petroleum Research Fund, **2019**
(4) Trailblazer Award (PI) — National Institute of Biomedical Imaging and Bioengineering, **2018**
(3) IIN Outstanding Researcher Award (postdoc) — International Institute of Nanotechnology (IIN), **2016**
(2) SciFinder Future Leaders Award (postdoc) — Chemical Abstracts Service (CAS), **2016**
(1) Doctoral Thesis Award in Molecular Magnetism (graduate) — European Institute of Molecular Magnetism, **2016**

FUNDING

(6) Research Corporation for Scientific Advancement, Cottrell Scholar Award: *Harnessing Ligand-Shell Nuclear Spins to Control Molecular Spin Coherence* (PI), $100,000 (USD), 2021-2023, Current.
(5) National Science Foundation, Early CAREER Award: *CAREER: Robust Coherence and High Sensitivity in Metal-Ion Nuclear-Spin Qubits* (PI), $658,000 (USD), 2021-2026, Current.
(4) National Institutes of Health, *A Coordination Chemistry Approach to High-Field Electron Paramagnetic Resonance Imaging* (PI), $533,905 (USD), 2018-2021, Completed – 7 publications.
(3) American Chemical Society Petroleum Research Fund, *Rare Earth Magnetic Control of Organic Reactions* (PI), $110,000 (USD), 2019-2021, Completed.

(2) US Department of Energy, *Toward a Photomagnetic Mechanism for f-Element Separations* (PI), $180,000 (USD), 2020-2021, Completed.
(1) National Science Foundation, *QLC: EAGER: Toward Magnetic Selectivity with Molecular Clock Qubits* (PI), $250,000 (USD), 2018-2020, Completed – 8 publications.

TEACHING

(5) Head Lecturer, Graduate Inorganic Chemistry (CHEM 560, ~20 students)	CSU, 2021-present
(4) Head Lecturer, Advanced Inorganic Chemistry (CHEM 461, ~30 students)	CSU, 2019-present
(3) Head Lecturer, Graduate Inorganic Chemistry (CHEM 560, ~20 students)	CSU, 2017-2019
(2) Head Lecturer, Graduate Group Theory (CHEM 563A, ~15 students)	CSU, 2017-present
(1) Head Lecturer, Graduate Magnetic Resonance (CHEM 563D, ~10 students)	CSU, 2017-present

GROUP / MENTORING

Graduate Students: Cassidy Jackson (PhD Spring 2022), Tyler Ozvat (PhD Spring 2022), Ian Moseley (12/2018 – present), Anthony Campanella (12/2018 – present), Roxanna Martinez (12/2019 – present), Josef Grundy (12/2021 - present), Andrew Bates (12/2021 - present), Jacob Fromm (M.S. 2021), Christina Charles (M.S. 2019), Manuel Peña (M.S. 2018), Blake Gerold (M.S. 2018).

Postdoctoral Researchers: Dr. Okten Ungor (2021-present); Dr. Muhammad Abdullah (2021-2022, now at Global Foundries); Dr. Siyoung Sung (2020 – 2021, now at Intel), Dr. Chun-Yi Lin (Now Asst. Prof. at NCKU 09/2017 – 01/2019).

Undergraduates: Amanda Gin (2021-present), Stephanie Sanchez (2021-present), Jane Bruegger (2021), Fred Anderson (2020-present), Spencer Johnson (06/2018 – 2021), Monique Broussard (06/2018 – present), Jeremiah Choate (05/2019 – 05/2020), Maiele Mignard (2019), Jacob O'Lena (2019), Charles Stump (2018), Bailey Rhodes (2018)

SERVICE

University and Department Service
(7) Faculty Mentor, Chemistry Graduate Student Organization (2018-2020, 2022)
(6) Graduate Recruiting and Admissions Committee (2017-current)
(5) Seminar Chair, Inorganic Division (2017-Current)
(4) Department Safety Committee (2018-2021)
(3) University-Wide Chemical Safety Committee (2020)
(2) Undergraduate Advisor (2018-current)
(1) Hiring Committee for Chemistry Department (2017-2018)

Professional Community Service
(7) Chair of Organizing Committee, 2021 Inaugural Front-Range Inorganic Colloquium
(6) Member of Organizing Committee, 2021 Front-Range Advanced Magnetics Symposium
(5) Proposal reviewer for National Science Foundation, Department of Energy, ACS-Petroleum Research Fund, Los Alamos National Laboratory, Army Research Office.
(4) Proposal Reviewer for National High Magnetic Field Laboratory and Stanford Linear Accelerator User Programs
(3) User committee member for the National High Magnetic Field Laboratory (2019-present)
(2) Secretary for organizational committee for the 2024 International Coordination Chemistry Conference
(1) Referee for *J. Am. Chem. Soc., Chem. Sci., Inorg. Chem., Chem. Commun., Cryst. Eng. Comm., Nat. Chem., Polyhedron, Inorg. Chim. Acta, Dalton Trans., Inorg. Chem. Front., Nat. Commun., npj Quantum Inf., J. Phys. Chem., Phys. Chem. Chem. Phys., ACS Omega, Magnetochemistry, Chem. Soc. Rev.,* among others.

INDEPENDENT SCIENTIFIC PUBLICATIONS

(22) Üngör, Ö.; Sanchez, S.; Ozvat, T. M.; Zadrozny, J. M. "Asymmetry-Enhanced ^{59}Co NMR Thermometry in Co(III) Complexes" *Submitted.*
(21) Kamin, A.; Moseley, I. P.; Oh, J,; Brannan, E.; Gannon, P.; Kaminsky, W.; Zadrozny, J. M.; Xiao, D. J. "Geometry-dependent valence tautomerism, magnetic ordering, and electrical conductivity in 1D iron-tetraoxolene chains" *Submitted.*
(20) Martinez, R.; Jackson, C. E.; van Tol, J.; Zadrozny, J. M. "Impact of Ligand Chlorination on Spin Relaxation in a Series of V(IV) Complexes" *Submitted.*

(19) Campanella, A. J.; Üngör, Ö; Zadrozny, J. M. "Quantum Mimicry With Inorganic Chemistry" *Comments Inorg. Chem.* ***2023*** *Accepted Manuscript.*

(18) Üngor, O.; Ozvat, T. M.; Grundy, J., Zadrozny J. M. "Transition-Metal NMR Thermometry" *in Comprehensive Inorganic Chemistry III* Accepted Manuscript. DOI: 10.1016/B978-0-12-823144-9.00165-5.

(17) Üngör, Ö.; Ozvat, T. M.; Ni, Z.; Zadrozny, J. M. "Record Chemical-Shift Temperature Sensitivity in a Series of Trinuclear Cobalt Complexes" *J. Am. Chem. Soc.* **2022**, *144*, 9132-9137.

(16) Jackson, C. E.; Ngendahimana, T.; Lin, C.-Y.; Eaton, G. R.; Eaton, S. S.; Zadrozny, J. M. "Impact of Counterion Methyl Groups on Spin Relaxation in $[V(C_6H_4O_2)_3]^{2-}$" *J. Phys. Chem. C* **2022**, 126, 7169-7176.

(15) Torres, J. F.; Oi, C. H.; Moseley, I. P.; El-Sakkout, N.; Knight, B. J.; Shearer, J.; Garcia-Serres, R.; Zadrozny, J. M.; Murray, L. J. "Valence Delocalized $S = {}^{7}/_{2}$ cis-(μ-1,2-Dinitrogen)Diiron(I/II) Complex" *Angew. Chem. Int. Ed.* **2022,** 61, e202202329.

(14) Moseley, I. P.; DiVerdi, J.; Ozarowski, A.; Zadrozny, J. M. "Chemical Control of Magnetic Relaxation via Paramagnetic Spin Bath Design" *Cell. Rep. Phys. Sci.* **2022**, *3*, 100802.

(13) Campanella, A. J.; Zadrozny, J. M. "Ligand Design of Zero-Field Splitting in Trigonal Prismatic Ni(II) Cage Complexes" *Dalton Trans.* **2022,** *51*, 3341-3348.

(12) Ozvat, T. M.; Rappé, A. K.; Zadrozny, J. M. "Isotopomeric Elucidation of the Mechanism of Temperature Sensitivity in ^{59}Co-NMR Molecular Thermometers" *Inorg. Chem.* **2022**, *61*, 778-785.

(11) Zhao, Y.; Zhu, H.; Wink. D. J.; Sung, S.; Zadrozny, J. M.; Driver, T. G. "Counterion Control of tert-BuO-Mediated Single Electron Transfer to Nitrostilbenes Constructs N-Hydroxyindoles or Oxindoles" *Angew. Chem. Int. Ed.* **2021** *60,* 19207-19213.

(10) Jackson, C. E.; Moseley, I. P.; Martinez, R.; Sung, S.; Zadrozny, J. M. "A Reaction-Coordinate Approach to Magnetic Relaxation" *Chem. Soc. Rev.* **2021**, *50*, 6684-6699.

(9) Campanella, A. J.; Nguyen, M.-T.; Zhang, J.; Ngendahimana, T.; Antholine, W. E.; Eaton, G. R.; Eaton, S. S.; Glezakou, V.-A.; Zadrozny, J. M. "Ligand Control of Low-Frequency Electron Paramagnetic Resonance Linewidth in Cr(III) Complexes" *Dalton. Trans.* **2021**, *50*, 5342-5350.

(8) Ozvat, T. M.; Johnson, S. J.; Rappé, A. K.; Zadrozny, J. M. "Ligand Control of ^{59}Co Nuclear Spin Relaxation Thermometry" *Magnetochemistry* **2020**, *6*, 58.

(7) Ozvat, T. M.; Sterbinsky, G. E.; Campanella, A. J.; Rappé, A. K.; Zadrozny, J. M. "EXAFS Investigations of Temperature-Dependent Structure in Cobalt-59 Molecular NMR Thermometers" *Dalton Trans.* **2020**, 49, 16380-16385.

(6) Johnson, S. H.; Jackson, C. E.; Zadrozny, J. M. "Programmable Nuclear Spin Dynamics in Ti(IV) Coordination Complexes" *Inorg. Chem.* **2020**, *59*, 7479-7486.

(5) Jackson, C. E.; Lin, C.-Y.; van Tol, J.; Zadrozny, J. M. "Orientation Dependence of Phase Memory Relaxation in the V(IV) Ion at High Frequencies" *Chem. Phys. Lett.* **2020**, *739*, 137034.

(4) Moseley, I. P.; Lin, C.-Y.; Zee, D.; Zadrozny, J. M. "Synthesis and Magnetic Characterization of a Dinuclear Complex of Low-Coordinate Iron(II)" *Polyhedron*, **2020**, *175*, 114171.

(3) Jackson, C. E.; Lin, C.-Y.; Johnson, S. H.; van Tol, J.; Zadrozny, J. M. "Nuclear-Spin-Pattern Control of Electron-Spin Dynamics in a Series of V(IV) Complexes" *Chem. Sci.* **2019**, *10*, 8447-8454.

(2) Ozvat, T. M.; Peña, M. E.; Zadrozny, J. M. "Influence of Ligand Encapsulation on Cobalt-59 Chemical-Shift Thermometry" *Chem. Sci.* **2019**, *10*, 6727-6734.

(1) Lin, C.-Y.; Ngendahimana, T.; Eaton, G. R.; Eaton, S. S.; Zadrozny, J. M. "Counterion Influence on Dynamic Spin Properties in a V(IV) Complex" *Chem. Sci.* **2019**, *10*, 548-555.

PRIOR SCIENTIFIC PUBLICATIONS

(31) Tatum, D.; Zadrozny, J. M.; Yee, G. T. "A New Family of High Tc Molecule-based Magnetic Networks: $V[x\text{-}Cl_nPTCE]_2 \cdot yCH_2Cl_2$ (PTCE = phenyltricyanoethylene)" *Magnetochemistry* **2019**, *5*, 44.

(30) Fataftah, M. S.; Krzyaniak, M. D.; Vlaisavljevich, B.; Wasielewski, M. R.; Zadrozny, J. M.; Freedman, D. E. "Metal-Ligand Covalency Enables Room Temperature Molecular Qubit Candidates" *Chem. Sci.* **2019**, *10*, 6707-6714.

(29) Craven, M.; Nygaard, M. H.; Zadrozny, J. M.; Long, J. R.; Overgaard, J. "Determination of d-Orbital Populations in a Co(II) Single-Molecule Magnet Using Single-Crystal X-ray Diffraction" *Inorg. Chem.* **2018**, *57*, 6913-6920.

(28) Zadrozny, J. M.; Gallagher, A. T.; Harris, T. D.; Freedman, D. E. "A Porous Array of Clock Qubits" *J. Am. Chem. Soc.* **2017**, *139*, 7089-7094.

(27) Graham, M. J.; Zadrozny, J. M.; Fataftah, M. S.; Freedman, D. E. "Forging Solid-State Qubit Design Principles in a Molecular Furnace" *Chem. Mater.* **2017**, *29*, 1885-1897.
(26) Suturina, E. A.; Nehrkorn, J.; Zadrozny, J. M.; Hill, S.; Liu, J.; Atanasov, M.; Weyhermüller, T.; Maganas D.; Schnegg, A.; Bill, E.; Long, J. R.; Neese, F. "Magneto-Structural Correlations in Pseudo-Tetrahedral $[Co^{II}(SPh)_4]^{2-}$ Complexes: Magnetometry, MCD, Advanced EPR and Ab Initio Study" *Inorg. Chem.* **2017**, *56*, 3102-3118.
(25) Yu, C.-J.; Graham, M. J.; Zadrozny, J. M.; Niklas, J.; Krzyaniak, M. D.; Wasielewski, M. R.; Poluektov, O. G.; Freedman, D. E. "Long Coherence Times in Nuclear Spin-Free Vanadyl Qubits" *J. Am. Chem. Soc*. **2016**, *138*, 14678-14685.
(24) Zadrozny, J. M.; Graham, M. J.; Krzyaniak, M. D.; Wasielewski, M. R.; Freedman, D. E. "Unexpected Suppression of Spin-Lattice Relaxation via High Magnetic Field in a High-Spin Iron(III) Complex" *Chem. Commun.* **2016**, *52*, 10175-10178.
(23) Fataftah, M. S.; Coste, S. C.; Vlaisavljevich, B.; Zadrozny, J. M.; Freedman, D. E. "Transformation of the Coordination Complex $[Co(C_3S_5)_2]^{2-}$ from a molecular magnet to a Qubit" *Chem. Sci.* **2016**, *7*, 6160-6166.
(22) Fataftah, M. S.; Zadrozny, J. M.; Coste, S. C.; Graham, M. J.; Rogers, D. M.; Freedman, D. E. "Employing Forbidden Transitions as Qubits in a Nuclear Spin-Free Chromium Complex" *J. Am. Chem. Soc.* **2016**, *138*, 1344- 1348.
(21) Zadrozny, J. M.; Freedman, D. E. "Qubit Control Limited by Spin-Lattice Relaxation in a Nuclear Spin-Free Iron(III) Complex" *Inorg. Chem.* **2015**, *54*, 12027-12031.
(20) Zadrozny, J. M.; Niklas, J.; Poluektov, O. G., Freedman, D. E. "Millisecond Coherence Time in a Tunable Molecular Electronic Spin Qubit" *ACS Cent. Sci.* **2015**, *1*, 488-492.
(19) Zadrozny, J. M.; Greer, S. M.; Hill, S.; Freedman, D. E. "A Flexible Iron(II) Complex in which Zero-Field Splitting is Resistant to Structural Variation" *Chem. Sci.* **2015**, *7*, 416-423.
(18) Bloch, E. D.; Queen, W. L.; Chavan, S.; Wheatley, P. S.; Zadrozny, J. M.; Morris, R.; Brown, C. M.; Lamberti, C.; Bordiga, S.; Long, J. R. "Gradual Release of Strongly-Bound Nitric Oxide from $Fe_2(NO)_2(dobdc)$" *J. Am. Chem. Soc.* **2015**, *137*, 3466-3469.
(17) Zadrozny, J. M.; Niklas, J.; Poluektov, O. G.; Freedman, D. E. "Multiple Quantum Coherences from Hyperfine Transitions in a Vanadium(IV) Complex" *J. Am. Chem. Soc.* **2014**, *136*, 15841-15844.
(16) Fataftah, M. S.;* Zadrozny, J. M.;* Rogers, D. M.; Freedman, D. E. "A Mononuclear Transition Metal Single-Molecule Magnet in a Nuclear Spin-Free Ligand Environment" *Inorg. Chem.* **2014**, *53*, 10716-10721. *Indicates authors contributed equally to the manuscript.
(15) Bloch, E. D.; Hudson, M. R.; Mason, J. A.; Queen, W. L.; Zadrozny, J. M., Chavan, S.; Crocellà, V.; Geier, S. J.; Bordiga, S.; Brown, C. M.; Long, J. R. "Reversible CO Binding and Tunable CO/H_2 Separations in Metal-Organic Frameworks With Exposed Divalent Metal Cations" *J. Am. Chem. Soc.* **2014**, *136*, 10752-10761.
(14) Demir, S.; Zadrozny, J. M.; Long, J. R. "Large Spin Relaxation Barriers for the Low-Symmetry Organolanthanide Complexes $Cp^*_2Ln(BPh_4)$ (Ln = Tb, Dy)" *Chem. Eur. J.* **2014**, *20*, 9524-9529.
(13) Graham, M. J.; Zadrozny, J. M.; Shiddiq, M.; Anderson, J. S.; Fataftah, M.; Hill, S.; Freedman, D. E. "Influence of Electronic Spin and Spin-Orbit Coupling on Decoherence in Mononuclear Transition Metal Complexes" *J. Am. Chem. Soc.* **2014**, *136*, 7623-7626.
(12) Zadrozny, J. M.; Xiao, D. J.; Long, J. R.; Atanasov, M.; Neese, F.; Grandjean, F.; Long, G. J. "Mössbauer Spectroscopy as a Probe of Magnetization Dynamics in the Linear Iron(I) and Iron(II) Complexes $[Fe(C(SiMe_3)_3)_2]^{1-/0}$" *Inorg. Chem.* **2013**, *52*, 13123-13131.
(11) Maurice, R.; Verma, P.; Zadrozny, J. M., Luo, S.; Borycz, J.; Long, J. R.; Truhlar, D. G.; Gagliardi, L. "Single-Ion Magnetic Anisotropy and Isotropic Magnetic Couplings in the Metal-Organic Framework $Fe_2(dobdc)$" *Inorg. Chem.* **2013**, *52*, 9379-9389.
(10) Zadrozny, J. M.; Telser, J.; Long, J. R. "Slow Magnetic Relaxation in the Cobalt(II) Complexes $[Co(EPh)_4]^{2-}$ (E = O, S, Se)" *Polyhedron* **2013**, *64*, 209.
(9) Zadrozny, J. M.; Xiao, D. J.; Atanasov, M.; Long, G. J.; Grandjean, F.; Neese, F.; Long, J. R. "Magnetic Blocking in a Linear Iron(I) Complex" *Nature Chem.* **2013**, *5*, 577-581.
(8) Forshaw, A. P.; Smith, J. M.; Ozarowski, A.; Krzystek, J.; Smirnov, D.; Zvyagin, D.; Harris, T. D.; Karunadasa, H. I.; Zadrozny, J. M.; Schnegg, A.; Holldack, K.; Jackson, T. A.; Alamiri, A.; Barnes, D. M.; Telser, J. "Low-Spin Hexa-Coordinate Mn(III): Synthesis and Spectroscopic Investigation of Homoleptic Tris(pyrazolyl)borate and Tris(carbene)borate Complexes" *Inorg. Chem.* **2013**, *52*, 144-159.
(7) Atanasov, M. A.; Zadrozny, J. M.; Long, J. R.; Neese, F. "A Detailed Theoretical Analysis of Chemical Bonding, Vibronic Coupling, and Magnetic Anisotropy in Linear Iron(II) Complexes with Single Molecule Magnet Behavior" *Chem. Sci.* **2013**, *4*, 139-156.
(6) Zadrozny, J. M.; Atanasov, M.; Bryan, A. M.; Lin, C.-Y.; Rekken, B. D.; Power, P. P.; Neese, F.; Long, J. R. "Slow Magnetization Dynamics in a Series of Two-Coordinate Iron(II) Complexes" *Chem. Sci.* **2013**, *4*, 125-138.

(5) Demir, S.; Zadrozny, J. M.; Nippe, M.; Long, J. R. "Exchange Coupling and Magnetic Blocking in Bipyrimidyl-Radical Bridged Dilanthanide Complexes" *J. Am. Chem. Soc.* **2012**, *134*, 18546-18549.
(4) Zadrozny, J. M.; Liu, J.; Piro, N. A.; Chang, C. J.; Hill, S.; Long, J. R. "Slow Magnetic Relaxation in a Pseudotetrahedral Cobalt(II) Complex with Easy-Plane Anisotropy" *Chem. Commun.* **2012**, *48*, 3927-3939.
(3) Bloch, E. D.; Queen, W. L.; Krishna, R.; Zadrozny, J. M.; Brown, C. M.; Long, J. R. "Hydrocarbon Separations in a Metal-Organic Framework with Open Iron(II) Coordination Sites" *Science* **2012**, *335*, 1606-1610.
(2) Zadrozny, J. M.; Long, J. R. "Slow Magnetic Relaxation at Zero Field in the Tetrahedral Complex $[Co(SPh)_4]^{2-}$" *J. Am. Chem. Soc.* **2011**, *133*, 20732-20734.
(1) Zadrozny, J. M.; Freedman, D. E.; Jenkins, D. M.; Harris, T. D.; Iavarone, A. T.; Mathonière, C.; Clérac, R.; Long, J. R. "Slow Magnetic Relaxation and Charge-Transfer in Cyano-Bridged Coordination Clusters Incorporating $[Re(CN)_7]^{3-/4-}$" *Inorg. Chem.* **2010**, *49*, 8886-8896.

INDEPENDENT SCIENTIFIC PRESENTATIONS

(40) "Quantum Mimicry: A New Paradigm in Synthetic Inorganic Chemistry" *Invited Oral Presentation*, University of Rochester, Chemistry Department Inorganic Chemistry Colloquium, Rochester, NY Feb 8th, 2023.
(39) "Quantum Mimicry: A New Paradigm in Synthetic Inorganic Chemistry" *Invited Oral Presentation*, University of California - Riverside, Chemistry Department Inorganic Seminar Series, Riverside, CA Feb 2nd, 2023.
(38) "Quantum Mimicry: A New Paradigm in Synthetic Inorganic Chemistry" *Invited Oral Presentation*, University of Chicago Chemistry Department Inorganic Seminar Series, Chicago, IL Dec 9th, 2022.
(37) "Quantum Mimicry: A New Paradigm in Synthetic Inorganic Chemistry" *Invited Oral Presentation*, Michigan State University Department of Chemistry Seminar Series, Lansing, MA Nov 11th, 2022.
(36) "V(IV) Complexes as Tiny Magnetic Vessels" *Invited Keynote Presentation*, 50th Southeastern Magnetic Resonance Conference, Tallahassee FL, Nov 5th, 2022.
(35) "Quantum Mimicry: A New Paradigm in Synthetic Inorganic Chemistry" *Invited Oral Presentation*, Massachussetts Institute of Technology Department of Chemistry Seminar Series, Cambridge MA, Nov 2nd, 2022.
(34) "Quantum Mimicry: A New Paradigm in Synthetic Inorganic Chemistry" *Invited Oral Presentation*, University of Washington Department of Chemistry Seminar Series, Seattle WA, Oct 11th, 2022.
(33) "The Intersection of Vibrations, Structure, and Spin" *Invited Oral Presentation,* The 2022 John K. and Dolores Stille Science Symposium, Fort Collins CO, August 6th, 2022.
(32) "Toward Rare-Earth Magnetic Control of Organic Reactions" *Oral Presentation*, 29th Rare Earth Research Conference, Philadelphia PA, June 26-June 30, 2022.
(31) "Tailoring Spins To Act Like Other Spins" *Invited Oral Presentation*, Telluride Science Workshop: From Fundamentals of Molecular Spin Qubit Design to Molecule-Enabled Quantum Information, Telluride CO June 6 2022.
(30) "Controlling Spins With an Eye Toward New Bioimaging Probes" *Invited Oral Presentation*, Inorganic Chemistry Gordon Research Conference (GRC), Newport RI, May 29 2022.
(29) "Teaching Nuclear Spins to Act Like Electronic Spins" *Invited Oral Presentation*, Molecular Magnetism in North America (MAGNA) Meeting, Gainesville FL, May 1 2022.
(28) "Exploring the Low-Frequency Blindspot of Open-Shell Metal Complexes" *Invited Oral Presentation*, ACS National Meeting, San Diego, CA, March 23, 2022.
(27) "Toward Spin-Based Separations Mechanisms for Metal Ions" *Invited Oral Presentation*, ACS National Meeting, San Diego, CA, March 21, 2022.
(26) "Nuclear Spin Quantum Mimics of Electron Spins and Vice Versa" *Invited Oral Presentation*, Gary J. Long 80th Birthday Research Symposium, UCSD, La Jolla, March 19, 2022.
(25) "V(IV) Complexes as Tiny Magnetic Vessels" *Invited Oral Presentation*, 12th International Vanadium Symposium (Virtual), November 3-5, 2021.
(24) "Controlling the Magnetic Universe of Transition Metal Complexes" *Invited Oral Presentation*, Colorado School of Mines, Golden, CO, October 23, 2021.
(23) "Controlling the Magnetic Universe of Transition Metal Complexes" *Invited Oral Presentation*, UC Berkeley (Virtual), October 8, 2021.
(22) "Toward a Photomagnetic Mechanism for f-Element Separations" *Invited Oral Presentation*, 2021 Separation Science Program Meeting (Virtual), August 10, 2021.
(21) "Molecular Approaches to Slow Magnetic Relaxation in Noisy, Magnetic Environments" *Invited Oral Presentation*, APS March Meeting (Virtual), March 18, 2021.

(20) "The Intersection of Magnetism and Interatomic Bonding" *Invited Oral Presentation*, 8th PRSE "Center for Advanced Magnetics" Workshop (Virtual), January 14, 2021.
(19) "Toward Noninvasive Biomedical Thermometry with Cobalt-59 Molecular NMR Thermometers" *Invited Oral Presentation*, 2020 ACS Rocky Mountain Regional Meeting (Virtual), November 12-13, 2020.
(18) "Controlling Exotic Molecular Spins Toward Next-Generation MRI Probes" *Invited Oral Presentation*, 2020 Magnetism and Magnetic Materials Conference (MMM2020, Virtual), November 1-5, 2020.
(17) "Controlling Nuclear/Electronic Spins in Dynamic Environments" *Invited Oral Presentation*, Quantum Spin Coherence Workshop (Virtual), September 15th, 2020.
(16) "Understanding and Controlling Magnetic Relaxation in Highly Magnetic Environments" *Invited Oral Presentation*, Colorado State University Department of Physics, Fort Collins, CO March 9th, 2020.
(15) "Nuclear-Spin-Based Strategies to Control Molecular Spin Coherence" *Invited Oral Presentation*, Molecular Magnetism in North America (MAGNA) Conference, St. Simon's Island, GA, February 21-24, 2020.
(14) "Chemical Control of Magnetic Relaxation" *Invited Oral Presentation*, Boise State University, Boise, ID December 13, 2019.
(13) "Molecular Control of Spin Relaxation in Magnetic Chaos" *Invited Oral Presentation*, University of Massachusetts - Amherst, Amherst, MA October 31, 2019.
(12) "Controlling Spin Relaxation via the Spin Bath and its Edge" *Invited Oral Presentation*, Telluride Workshop on Molecules and Mechanisms for Quantum Information Processing, Telluride, CO September 23 – September 27, 2019.
(11) "Control of Spin Relaxation Times via Manipulation of the Spin Bath and its Edge" *Invited Oral Presentation*, ACS National Meeting, San Diego, CA August 25 – August 29, 2019.
(10) "Control of Spin Relaxation Times via Manipulation of the Spin Bath and its Edge" *Contributed Oral Presentation*, 2019 Rocky Mountain Magnetic Resonance Conference, Denver, CO July 21-25, 2019.
(9) "Controlling Sensitivity to Temperature in 59Co NMR Thermometers" *Invited Oral Presentation*, ACS National Meeting, Orlando, FL March 31 – April 4, 2019.
(8) "Effects of Environmental Engineering on Electronic Spin Qubits" *Invited Oral Presentation*, ACS National Meeting, Orlando, FL March 31 – April 4, 2019.
(7) "Multifrequency and Chemical Tuning Studies of V(IV) Quantum Spins" *Invited Oral Presentation*, APS March Meeting, Boston, MA, March 7, 2019.
(6) "Coordination Chemistry Strategies to Controlling Electronic and Nuclear Spins" *Invited Oral Presentation*, University of Northern Colorado, Greeley, CO, October 12, 2018.
(5) "Counterion Control of Spin Properties in V(IV) Catecholate Complexes" *Contributed Oral Presentation*, 43rd International Conference on Coordination Chemistry, Sendai, Japan, July 30th-August 4th, 2018
(4) "Inorganic Strategies in Quantum Computing and Bioimaging" *Invited Oral Presentation*, University of Denver, Denver, CO, January 26, 2018.
(3) "Some essential concepts in Molecular Magnetism" *Invited Oral Presentation*, 3rd PRSE Center for Advanced Magnetics Workshop, Colorado State University, Fort Collins, CO, January 23, 2018.
(2) "Coordination Chemistry Strategies in Quantum Computing and Bioimaging" *Invited Oral Presentation*, Evergreen State College, Olympia, WA, November 3, 2017.
(1) "Molecular Spin Control Strategies in Magnetic Resonance Imaging" Invited Oral Presentation, 2017 Rocky Mountain Regional ACS Meeting, Loveland, CO, October 25-28, 2017.

PRIOR SCIENTIFIC PRESENTATIONS

(23) "Design of Atomic-Clock Analogues Within Porous Materials" *Contributed Oral Presentation*, 253rd ACS National Meeting, San Francisco, CA, April 2-6, 2017.
(22) "Coordination Chemistry Approaches to Quantum Computation and Sensing" *Invited Faculty Interview Presentations*: University of Nevada-Reno, University of Utah, Rice University, University of California-Davis, and Colorado State University, 2016-2017.
(21) "Millisecond Spin Coherence in a Transition Metal Complex" *Contributed Oral Presentation*, 6th International Meeting on Spins in Organic Semiconductors, Chicago, IL, October 16-20, 2016.
(20) "Building Surface-Compatible Molecular Components of Quantum Computers" *Contributed Oral Presentation*, 252nd ACS National Meeting, Philadelphia, PA, August 21-25, 2016.
(18) "Coordination Chemistry Approaches to Quantum Computing" *Contributed Oral Presentation*, Gordon Research Seminar in Inorganic Chemistry, University of New England, Biddeford, ME, June 18-19, 2016.
(17) "Thermally Driven Decoherence in a High-Spin Iron(III) Complex with Nuclear Spin-Free Ligands" *Contributed Oral Presentation*, 251st ACS National Meeting, San Diego, CA, March 13-17, 2016.
(16) "Extremely Long Coherence Times in a Tunable Transition Metal Complex Qubit" *Contributed Oral Presentation*, 251st ACS National Meeting, San Diego, CA, March 13-17, 2016.

(15) "Spin-based Molecular Qubits for Quantum Computing" *Invited Oral Presentation*, Roosevelt University, Schaumburg, IL, February 29, 2016.
(14) "Coordination Chemistry Approaches to Magnetic Data Storage and Processing" *Invited Oral Presentation*, University of California, Los Angeles, United States, November 23rd, 2015.
(13) "Vanadium(IV) complexes with nuclear spin-free ligands: Application of coordination chemistry principles to quantum information processing" *Contributed Oral Presentation*, 250th ACS National Meeting, Boston, MA, United States, August 16-20, 2015.
(12) "Distortion-Resistant Magnetic Anisotropy in Flexible Iron(II) Complexes" *Contributed Oral Presentation*, 250th ACS National Meeting, Boston, MA, United States, August 16-20, 2015.
(11) "Application of Coordination Chemistry to the Design and Synthesis of Molecular Qubits" *Contributed Poster Presentation*, Gordon Research Conference in Inorganic Reaction Mechanisms, Galveston, TX, United States, March 1-6, 2015.
(10) "Vanadium(IV) Complexes as Tunable, Molecular Qubits" *Contributed Oral Presentation*, 2nd Chicago Regional Inorganic Colloquium, Northwestern University, Evanston, IL, United States, November 22nd, 2014.
(9) "Quantum Decoherence in Mononuclear Transition Metal Complexes" *Contributed Poster Presentation*, Gordon Research Conference in Inorganic Chemistry, University of New England, Biddeford, ME, United States, June 7-13, 2014.
(8) "Quantum Decoherence in Transition Metal Complexes of Nuclear Spin-Free Ligands" *Contributed Oral Presentation*, 1st Chicago Regional Inorganic Colloquium, University of Illinois at Chicago, Chicago, IL, United States, February 8th, 2014.
(7) "Magnetic Bistability in Mononuclear Transition Metal Complexes" *Oral Presentation*, 246th ACS National Meeting, Indianapolis, IN, United States, September 8-12, 2013.
(6) "Slow Magnetic Relaxation in Low-Coordinate Transition Metal Complexes" *Oral Presentation*, 245th ACS National Meeting, New Orleans, LA, United States, April 7-11, 2013.
(5) "Slow Magnetic Relaxation in Low-Coordinate Transition Metal Complexes" *Invited Oral Presentation*, Northwestern University, March 14th, 2013.
(4) "New Applications for Coordination Chemistry in Single-Molecule Magnetism" *Invited Oral Presentation*, 13th International Conference on Molecule-Based Magnets, Orlando, FL, United States, October 7-11, 2012.
(3) "Large Spin Reversal Barriers in Molecules That Contain a Single Transition Metal Ion" *Poster Presentation*, 13th International Conference on Molecule-based Magnets, Orlando, FL, United States, October 7-11, 2012.
(2) "Slow Magnetic Relaxation in Mononuclear Complexes of Co(II)" *Oral Presentation*, Magneto-Structural Correlations Workshop, National High-Magnetic Field Laboratory, Tallahassee, FL, United States, April 23-26, 2012.
(1) "Pentanuclear Cyano-Bridged Clusters Incorporating $[Re(CN)_7]^{3-/4-}$: Single-Molecule Magnetism and Charge Transfer" *Oral Presentation*, 239th ACS National Meeting, San Francisco, CA, United States, March 21-25, 2010.

PROFESSIONAL AND HONOR SOCIETIES

American Chemical Society, American Physical Society, International Electron Paramagnetic Resonance Society, *Phi Beta Kappa*, *National Society of Collegiate Scholars*, *Sigma Xi*