

Alyssa DeLucia

Chemistry PhD

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EDUCATION

Chemistry PhD

December 2023

University of Illinois at Urbana-Champaign, Champaign, IL

Thesis: Modeling Metallo-oxidoreductase Active Site Dynamics with Bis(μ -hydroxo)Dicobalt Complexes

Advisor: Dr. Lisa Olshansky

B.A. in Chemistry (Summa Cum Laude)

May 2018

Rollins College, Winter Park, FL

Thesis: Developing Iron Catalysts for Organic Reactions

Advisor: Dr. Laurel Goj Habgood

RESEARCH EXPERIENCE

Doctoral Research

November 2018 –

University of Illinois at Urbana-Champaign

December 2023

Advisor: Dr. Lisa Olshansky

- Synthesized biomimetic bis(μ -hydroxo)dicobalt complexes in which substituents on various ligands were modified to control the intramolecular hydrogen bonding network and subsequent proton transfer and carboxylate shift capabilities
- Characterized complexes with 1D and 2D NMR, FT-IR, EPR, and UV-vis spectroscopies and X-ray Crystallography, mass spectrometry and elemental analysis
- Elucidated carboxylate shift mechanism of bis(μ -hydroxo)dicobalt complexes through ^1H -NMR spectroscopic kinetic and mechanistic studies
- Trained in variable temperature NMR, Stopped-flow UV-vis spectroscopies, and electrochemical methods
- As a founding member, mentored 5 graduate students, aided in creation of laboratory policies, heavily assisted in setup of new equipment and crafted guidelines for manuscripts and general operating protocols

3M Research and Development Intern

Summer 2022

Corporate Research Analytical Lab

Supervisor: Dr. Wayne Maurer Mentors: Dr. Gereon Yee and Dr. Mark McCormick

- Investigated the reaction mechanism of a redox mediated polymerization process found in numerous 3M structural adhesives primarily using NMR techniques
- Collaborated with product developers to transfer the findings of these fundamental studies into potential changes for the formulation of those structural adhesives
- Disseminated findings through internal written report, poster, and presented to 50 coworkers

Undergraduate Research

Fall 2016 – Spring 2018

Rollins College

Advisor: Dr. Laurel Goj Habgood

- Synthesized and characterized iron-NHC complexes utilizing air-free (Schlenk and glove-box) techniques and FT-IR and ^1H -NMR for structural confirmation
- Analyzed catalytic activity of iron complexes in cross-coupling reactions utilizing gas chromatography and ^1H -NMR for a pedagogical experiment

Georgia Tech Research Experience for Undergraduates

Summer 2017

Georgia Institute of Technology

Advisor: Dr. Joseph Sadighi Mentor: Kevin Omolo

- Synthesized PNP pincer ligands and formation of complexes with palladium and cobalt utilizing air-free techniques and ^1H -NMR, ^{31}P -NMR and FT-IR spectroscopies for characterization

Summer Program for the Advancement of Research Knowledge

Summer 2016

Moffitt Cancer Center

Advisor: Dr. Jin Q. Cheng Mentor: Dr. Yajuan Li

- Screened modified small molecule to determine their ability to inhibit miR-155, a microRNA linked to cancer, on lung cancer cell lines using MTT assays, western blots, luciferase assays, and cell migration assays

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PUBLICATIONS (3 of 4)

Alyssa A. DeLucia^{††}, Khadanand KC^{††}, and Lisa Olshansky. These ^{††} authors contributed equally to the work. Impact of Hydrogen-Bonding Interactions on the Properties of Bis(μ -hydroxo)dicobalt Complexes. *Inorganica Chimica Acta*. Accepted.

Alyssa A. DeLucia and Lisa Olshansky. Carboxylate Shift Dynamics in Biomimetic Bis(μ -hydroxo)dicobalt Complexes. *Inorganic Chemistry*. **2023**. Accepted.

Alyssa A. DeLucia^{††}, Kimberly A. Kelly^{††}, Kevin A. Herrera, Danielle L. Gray, and Lisa Olshansky. These ^{††} authors contributed equally to the work. Intramolecular Hydrogen-Bond Interactions Tune Reactivity in Biomimetic Bis(μ -hydroxo)dicobalt Complexes. *Inorganic Chemistry*. **2021**, 60, 15599–15609.

POSTERS AND PRESENTATIONS

A. DeLucia, “Carboxylate Shift Dynamics in Biomimetic Bis(μ -hydroxo)dicobalt Complexes” *Changwoo Park-Walter Klemperer Inorganic and Materials Allerton Conference, Monticello, IL, 2023*. Presentation.

A. DeLucia, “Modeling Oxidase Metalloenzymes with dicobalt bis(μ -hydroxo) complexes” *American Chemical Society National Meeting and Exposition, Indianapolis, IN, 2023*. ABS #3820889. Presentation.

A. DeLucia, “Carboxylate Shift Dynamics in Biomimetic Bis(μ -hydroxo)dicobalt Complexes” *Gordon Research Conference Metals in Biology, Ventura, CA, 2023*. Poster.

A. DeLucia, K. Kelly, K.C. Khanadand, L. Olshansky. “Modeling Oxidase Metalloenzymes with dicobalt bis(μ -hydroxo) complexes” *Gordon Research Conference Bioinorganic Active Sites that Drive Challenging Chemical Conversions, Newport, RI, 2022*. Poster.

A. DeLucia, K. Omolo, J. Sadighi, L. Habgood. “Synthesis of Transition-Metal Catalysts with Diverse Potential Reactivity” *American Chemical Society National Meeting and Exposition, New Orleans, LA, 2018*. ABS # 2867652. Poster.

SCIENCE EDUCATION OUTREACH AND LEADERSHIP

Women in Chemistry Conference Planning Committee

Summer 2021

University of Illinois at Urbana-Champaign

Science Education Outreach

- St. Elmo Brady Academy Leader at Booker T. Washington STEM Academy Fall 2021
- Encouraging Tomorrow’s Chemists demonstrations at Urbana Middle School Spring 2019/Fall 2020
- Women’s Chemist Committee Day Camp for Girls Station Leader Dec 2020/June 2021

Mentorship

Certified mentor by University of Illinois Graduate College

- Goldwater Ambassador Mentor Summer 2022 – Present
- University of Illinois at Urbana-Champaign ADJUST mentoring program Fall 2021
- Research mentor for 3 undergraduates in Olshansky Lab Fall 2020 – Spring 2023
- Women’s Chemist Committee Mentor for 4 new graduate students Fall 2019

Student Affiliates of American Chemical Society (SAACS)

Fall 2016 – Spring 2018

Chapter President, Rollins College

Teaching Assistant

University of Illinois at Urbana-Champaign

- Inorganic Lecture and Laboratory Spring 2019 – 2020
- General Chemistry, Ranked as Excellent by Students Fall 2018

SELECTED AWARDS

Phillip W. Rhymer Graduate Fellowship for Outstanding Inorganic Preliminary Exam and Research	2021
NSF Graduate Research Fellowships Program Honorable Mention	2020
American Institute of Chemists Outstanding Senior Chemistry Major Award, Rollins College	2018
Goldwater Scholar	2017