Jodi Kraus

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Education

Drexel University | Philadelphia, PA
Bachelor of Science in Chemistry, June 2015

University of Delaware | Newark, DE
Ph.D. in Chemistry, January 2021
Physical Chemistry

Fellowships and Awards

Presidential Postdoctoral Research Fellowship 2022 – present
Princeton University

Helen Hay Whitney Foundation Research Fellowship 2021 – present
Helen Hay Whitney Foundation

National Science Foundation Graduate Research Fellowship 2017 – 2021
National Science Foundation

Graduate Research Scholars Fellowship 2015-2017
University of Delaware

Chemistry-Biology Interface Pre-Doctoral Training Program 2015 – 2021
National Institute of General Medical Sciences, National Institutes of Health

53rd Glenn S. Skinner Memorial Research Award 2019
University of Delaware, Department of Chemistry and Biochemistry

Professional Development Award 2016, 2018
University of Delaware

Norman A. Wiggins Memorial Research Prize 2014
Drexel University, Department of Chemistry

Bruce and Cynthia Maryanoff Endowed Chemistry Prize 2014
Drexel University, Department of Chemistry

Research Experience

Princeton University | Princeton, NJ March 2021 – present
Post-doctoral Fellow, Adviser: Sabine Petry

- Biochemical reconstitution of microtubule nucleation pathways for spindle assembly
- Expression and purification of microtubule-associated proteins using insect cell culture and pull-down from *Xenopus laevis* egg extract
- Development of single molecule microtubule nucleation assays

University of Delaware | Newark, DE July 2015 – January 2021
Graduate Research Assistant, Adviser: Tatyana Polenova

- Investigated the atomic resolution structure and dynamics of actin-associated protein assemblies using Magic Angle Spinning (MAS) solid-state NMR spectroscopy
- Developed quantum chemical methods for the accurate calculation of chemical shift tensors in proteins, with applications to iterative protein structure refinement
- Developed ^{19}F MAS NMR methods for determination of nanometer distances in protein assemblies

Drexel University | Philadelphia, PA July 2013 – June 2015
Undergraduate Research Assistant, Adviser: Reinhard Schweitzer-Stenner
- Examined aggregation behavior of $(AAKA)_n$-based peptides and their formation of hydrogels in different solvent conditions using vibrational and electronic spectroscopies as well as atomic force microscopy
- Developed vibrational spectroscopic methods to probe the degree of backbone hydration in hydrogels

Solvay | Bristol, PA April 2013 – September 2013
Technology Center Inter, Supervisor: James Woods
- Optimized reaction conditions for the synthesis of polymerizable surfactants and phosphate ester monomers
- Quantified optimized products through the use of ^{31}P and ^{13}C solution NMR spectroscopy

Drexel University | Philadelphia, PA June 2011 – June 2013
Undergraduate Research Assistant, Adviser: Elizabeth Papish
- Synthesized metalloenzyme mimics under air-free conditions to study hydrogen bonding interactions near and far from the metal center
- Measured catalytic activity of small copper (I) organometallic complexes
- Characterized metal complexes using infrared spectroscopy, ^{1}H NMR, and mass spectrometry

Teaching and Mentoring Experience

Head Teaching Assistant, Biochemistry Spring 2023
Department of Molecular Biology, Princeton University
- Hosted weekly office hours and review sessions for students
- Wrote and graded problem sets and exams

Instructor, Summer Undergraduate Research Program Summer 2021, Summer 2022
Department of Molecular Biology, Princeton University
- Prepared lectures and class activities focusing on the art of scientific presentations and career development topics for a group of 10 students
- Organized a poster session for students to present their research to other peers

Instructor, Junior Molecular Biology Tutorials Fall 2021, Fall 2022
Department of Molecular Biology, Princeton University
- Prepared lectures and class discussions focused on dissemination of primary scientific literature to a group of 10 junior molecular biology majors
- Provided guidance and feedback for effective scientific writing through critique of a primary research article

Professional Experience

Molecular Biology Postdoctoral Committee 2021 - Present
Princeton University Member

Women in Chemistry 2019 – 2021
University of Delaware Secretary and Fundraising Chair

Center for Biomaterials Research Excellence Student-Invited Seminar Series 2016 – 2021
University of Delaware Organizing Committee

Hunger and Homelessness Prevention Coalition 2012 – 2015
Drexel University Vice President

Food Recovery Network Chapter 2013
Drexel University Co-Founder

Professional Associations

American Biophysical Society
American Society for Cell Biology
American Chemical Society

Conference Presentations

Oral Presentations:
Kraus, J.; Kudryasova, E.; Yehl, J.; Russell, R.W.; Kudryashov, D.; Polenova, T. "MAS NMR Structure of Human Cofilin-2 Reveals Isoform-Specific Conformation and Binding Mode", Frontiers in the Chemistry-Biology Interface Virtual Symposium, May 2020.

Kraus, J.; Guo, C.; Polenova, T. "Atomic Resolution Studies of Cytoskeleton-Associated Protein Assemblies and Approaches for Studying HIV Trafficking Along Cytoskeletal Filaments by MAS NMR", Pittsburgh Center for HIV-Protein Interactions Annual Meeting, September 2019.

Kraus, J.; Yehl, J.; Kudryasova, E.; Kudryashov, D.; Polenova, T. "Investigations into the Atomic Resolution Structure and Intermolecular Interface of Cofilin-2 Bound to F-actin by MAS NMR", 63rd Annual Meeting of the Biophysical Society, Baltimore MD, March 2019.

Kraus, J.; Gupta, R.; Yehl, J.; Lu, M.; Case, D.A.; Gronenborn, A.M.; Akke, M.; Polenova, T.; "Chemical Shift Tensors in Galectin-3C by MAS NMR and Hybrid QM/MM Calculations," 59th Experimental Nuclear Magnetic Resonance Conference, Orlando FL, April 2018.

Selected Poster Presentations:

Kraus, J.; Travis, S.M.; King, M.R.; Petry, S. "Ran GTP Regulates the Augmin Complex via its Microtubule Binding Domains," American Society for Cell Biology Annual Meeting, Washington DC, December 2022.

Kraus, J.; Kudryasova, E.; Yehl, J.; Russell, R.W.; Kudryashov, D.; Polenova, T. "Solid-State NMR Structure of Human Cofilin-2 Bound to ADP-F-actin Reveals Isoform-Specific Changes Upon Binding", Delaware IDeAs Symposium, Newark DE, November 2019.

Kraus, J.; Yehl, J.; Kudryasova, E.; Kudryashov, D.; Polenova, T. "Atomic Resolution Structure and Intermolecular Interface of Cofilin-2 Bound to F-actin by MAS NMR", Gordon Research Conference (Contractile and Motile Systems), New London NH, July 2019.

Kraus, J.; Fritz, M.; Gupta, R.; Quinn, C.M.; Wang, M.; Lu, M.; Case, D.A.; Akke, M.; Gronenborn, A.M.; Polenova, T. "Development of Methods for Accurate Measurement and Calculation of Chemical Shift Tensors by Magic Angle Spinning NMR", Structural Biology Related to HIV/AIDS, National Institutes of Health, Bethesda MD, July 2019.

Kraus, J.; Yehl, J.; Kudryasova, E.; Kudryashov, D.; Polenova, T. "Investigations into the Structure and Intermolecular Interface of Cofilin-2 Bound to F-actin by MAS NMR", American Society for Cell Biology Annual Meeting, Philadelphia PA, December 2017.

Kraus, J.; Gupta, R.; Yehl, J.; Lu, M.; Case, D.A.; Gronenborn, A.M.; Polenova, T. "Accurate Measurement and Calculation of $^{13}C^{a}$ and $^{15}N^{H}$ Chemical Shift Tensors in the Carbohydrate Binding Domain of Galectin-3C Using MAS NMR and QM/MM", Experimental Nuclear Magnetic Resonance Conference, Pacific Grove CA, April 2017.

Invited Review Articles

Kraus, J.; Alfaro-Aco, R.; Gouveia, B.; Petry, S. "Microtubule Nucleation for Spindle Assembly", Trends in Biochemical Sciences, **2022**, *accepted*.

Kraus, J.; Sarkar, S.; Quinn, C.M.; Polenova, T. "Solid-State NMR Spectroscopy of Microcrystalline Proteins", Annual Reports on NMR Spectroscopy, **2021**, 102, 81-151.

Peer-Reviewed Publications

1. **Kraus, J.*;** Travis, S.*; King, M.; Petry, S. Augmin is a Ran Regulated Spindle Assembly Factor, *Journal of Biological Chemistry,* **2023**, DOI: 10.1016/j.jbc.2023.104736.
2. Travis, S.M.; Mahon, B.P.; Huang, W.; Ma, M.; Rale, M.J.; **Kraus, J.;** Taylor, D.J.; Zhang, R.; Petry, S. Integrated model of the vertebrate augmin complex, *Nature Communications,* **2023**, 14, 2072.
3. **Kraus, J.;** Russell, R.W.; Kudryashova, E.; Xu, C.; Katyal, N.; Perilla, J.P.; Kudryashov, D.; Polenova, T. Magic Angle Spinning NMR Structure of Human Cofilin-2 Assembled on Actin Filaments Reveals Isoform-Specific Conformation and Binding Mode, *Nature Communications* **2022***,* 13*,* 2114.
4. **Kraus, J.;** Gupta, R.; Lu, M.; Gronenborn, A.M.; Akke, M.; Polenova, T. Accurate Backbone ^{13}C and ^{15}N Chemical Shift Tensors in Galectin-3 Determined by MAS NMR and QM/MM: Details of Structure and Environment Matter, *ChemPhysChem* **2020**, doi: 10.1002/cphc.202000249.
5. Fritz, M.P.; **Kraus, J.;** Quinn, C.M.; Yap, G.P.A.; Struppe, J.; Sergeyev, I.V.; Gronenborn, A.M.; Polenova, T. Measurement of Accurate Interfluorine Distances in Crystalline Organic Solids: A High-Frequency Magic Angle Spinning NMR Approach, *Journal of Physical Chemistry B* **2019**,123(50), 10680-10690.
6. Russell, R.W.; Fritz, M.P.; **Kraus, J.;** Quinn, C.M.; Polenova, T.; Gronenborn, A.M.; Accuracy and Precision of Protein Structures Determined by Magic Angle Spinning NMR Spectroscopy: for Some 'With a Little Help from a Friend,' *Journal of Biomolecular NMR* **2019**, 73, 333-346.
7. Lu, M.*; Sarkar, S.*; Wang, M.*; **Kraus, J.*;** Fritz, M.P.; Quinn, C.M.; Bai, S.; Holmes, S.T.; Dybowski, C.; Yap, G.P.A.; Struppe, J.; Sergeyev, I.V.; Maas, W.; Gronenborn, A.M.; Polenova, T. ^{19}F Magic Angle Spinning NMR Spectroscopy and Density Functional Theory Calculations of Fluorinated Tryptophans: Integrating Experiment and Theory for Accurate Determination of Chemical Shift Tensors. *Journal of Physical Chemistry B* **2018**, 122, 6148- 6155.
8. **Kraus, J.;** Gupta, R.; Yehl, J.; Lu, M.; Case, D.A.; Gronenborn, A.M.; Akke, M.; Polenova, T. Chemical Shifts of the Carbohydrate Binding Domain of Galectin-3 from Magic Angle Spinning NMR and Hybrid Quantum Mechanics/Molecular Mechanics Calculations. *Journal of Physical Chemistry B* **2018**, 122, 2931-2939.
9. Struppe, J.; Quinn, C.M.; Lu, M.; Wang, M.; Hou, G.; Lu, X.; **Kraus, J.;** Andreas, L.B.; Stanek, J.; Lalli, D.; Lesage, A.; Pintacude, G.; Maas, W.; Gronenborn, A.M.; Polenova, T. Expanding the horizons for structural analysis of fully protonated protein assemblies by NMR spectroscopy at MAS frequencies above 100 kHz. *Solid State Nuclear Magnetic Resonance* **2017**, 87, 117-125.
10. DiGuiseppi, D.; **Kraus, J.;** Toal, S.; Alvarez, N.; Schweitzer-Stenner, R.; Investigating the Formation of a Repulsive Hydrogel of a Cationic 16mer Peptide at Low Ionic Strength in Water by Vibrational Spectroscopy and Rheology. *Journal of Physical Chemistry B* **2016**, 120, 10079-10090.
11. Siek, S.; Dixon, N.A.; Kumar, K.; **Kraus, J.;** Wells, K.R.; Rowe, B.W.; Kelley, S.P.; Zeller, M.; Yap, G.P.A.; Papish. E.T. Synthesis of Biomimetic Zinc Complexes for CO2 Activation and the Influence of Steric Changes in the Ttz Ligands. *European Journal of Inorganic Chemistry* **2016**, 2495-2507.
12. Dixon, N.A.; McQuarters, A.B.; **Kraus, J.;** Soffer, J.B.; Lehnert, N.; Schweitzer-Stenner, R.; Papish, E.T. Dramatic tuning of ligand donor properties in (Ttz)CuCO through remote binding of H^+. *Chemical Communications* **2013**, 49, 5571-5573.