

Dr. Claire Elizabeth Casaday

Education and Awards

Harvard University

Sept 2021 – Aug 2025

Doctor of Philosophy (Ph.D.) in Chemistry

Master of Arts (A.M.) in Chemistry

- GPA: 3.92/4.00
- Thesis: *Resolving Crystallographic Disorder in Heterobimetallic Clusters via Resonant X-ray Diffraction*
- National Science Foundation Graduate Research Fellowship Program Award (NSF-GRFP)
- Derek C. Bok Certificate of Distinction in Teaching (2022)
- Attendee of the 26th National School on Neutron and X-ray Scattering at the Advanced Photon Source and Oak Ridge National Laboratory (2024)
- Relevant coursework: Practical Crystallography, Advanced Inorganic Chemistry I and II, Modern Atomic and Optical Physics I, Advanced Electromagnetism, Science of Materials, and Supramolecular Chemistry

New York University

Sept 2018 – May 2021

Bachelor of Science (B.S.) in Chemistry

- GPA: 3.96/4.00
- Thesis: *Titanium-Catalyzed Valorization of Lignin*
- Summa Cum Laude Latin Honors
- Dean's List: Fall 2018, Spring 2019, Fall 2019, Spring 2020, Fall 2020, Spring 2021
- American Chemical Society Award in Physical Chemistry
- NYU College of Arts and Sciences Alumni Association Award
- Edward J. McNelis Thesis Prize in Chemistry
- NYU Founders Day Award
- NYU Presidential Honors Scholar
- Phi Beta Kappa National Honor Society
- Phi Lambda Upsilon Chemistry Honor Society

Research Experience

Postdoctoral Research Associate

Nov 2025 – Present

Stanford Linear Accelerator Center (SLAC) National Laboratory

- Investigated the structure and chemical dynamics of battery anode materials during electrochemical cycling via *operando* X-ray diffraction and spectroscopy
- Created source code in Python for the analysis of *operando* powder X-ray diffraction experiments
- Commissioned Beamline 10-2a at the Stanford Synchrotron Radiation Light Source (SSRL) for *operando* resonant X-ray diffraction experiments
- Created source code in Python that calculates total atomic scattering factors for elements across the periodic table to aid in the design of resonant X-ray diffraction experiments at Beamline 10-2a
- Collaborated with academic and industrial scientists on the collection and analysis of X-ray absorption spectroscopy and X-ray diffraction datasets at SSRL
- Developed expertise in powder X-ray diffraction collection and analysis, X-ray absorption spectroscopy collection and analysis, *operando* X-ray diffraction and spectroscopy, calculation of scattering properties via density functional theory, electrochemistry, solid state synthesis, and battery cell design and assembly

Doctoral Researcher

Sept 2021 – Aug 2025

Harvard University Department of Chemistry and Chemical Biology

- Investigated crystallographic disorder in the solid-state structures of synthetic heterobimetallic trinuclear clusters via resonant X-ray diffraction
- Developed protocols for single crystal resonant X-ray diffraction experiments using both synchrotron X-ray sources and fixed wavelength Mo K α (0.71073 Å) and Cu K α (1.5406 Å) X-ray sources

- Assessed the effect of diffraction data treatment on the refinement of resonant scattering perturbation terms and their associated uncertainties
- Synthesized, purified, and characterized air- and water-sensitive inorganic clusters via spectroscopy, magnetometry, and microscopy
- Developed expertise in single crystal X-ray diffraction, resonant X-ray diffraction, nuclear magnetic resonance (NMR) spectroscopy, electron paramagnetic resonance (EPR) spectroscopy, superconducting quantum interference device (SQUID) magnetometry, and air-free chemical synthesis

Graduate Student Research Assistant

Sept 2023 – Aug 2025

Laukien-Purcell Instrumentation Center (Harvard University)

- Managed the daily maintenance of the EPR spectrometer and SQUID magnetometer
- Collaborated with users on the experimental design, acquisition, and analysis of EPR and SQUID data
- Worked alongside a Bruker engineer to install and test a new EPR spectrometer featuring a low-temperature cryostat, perpendicular and parallel mode resonators, and electron-nuclear double resonance (ENDOR) capabilities
- Managed the installation of a ^3He cryostat for the SQUID magnetometer
- Modeled electron spin Hamiltonians using the EasySpin toolbox in MATLAB and correlated with experimental EPR and SQUID data

Undergraduate Researcher

Jan 2019 – May 2021

New York University Department of Chemistry

- Investigated the depolymerization and transformation of lignin, a byproduct of industrial papermaking, into chemically useful products by Titanium-based organometallic catalysts
- Synthesized complex natural products that mimicked chemical architectures found naturally in lignin to test the mechanism of degradation by the Ti-based catalysts
- Developed expertise in chemical synthesis, analysis of complex organic molecules via ^1H and ^{13}C NMR, column chromatography, and high-resolution mass spectrometry

Teaching Experience

Chemistry Tutor

Aug 2022 – Present

Cambridge Coaching

- Tutored college students in the topics of organic and general chemistry
- Developed lesson plans and study strategies to best support students in achieving their academic goals

Chemistry Teaching Fellow

Jan 2022 – May 2023

Harvard University Department of Chemistry and Chemical Biology

- Instructed students in the courses of Organic Chemistry I (undergraduate-level course) and Practical Crystallography in Chemistry and Materials Science (graduate-level course)
- Hosted weekly recitation sections reviewing content and practice questions with students
- Graded assignments, exams, and presentations according to rubrics determined by the lead instructor
- Implemented feedback from students to help design and improve the course structure and organization

Harvard Summer Internship Laboratory Mentor

Jan 2022 – Aug 2022

Harvard University Department of Chemistry and Chemical Biology

- Mentored Spanish-speaking high school students on synthetic strategies, characterization techniques, and safety protocols in a laboratory setting
- Developed and delivered lessons on topics in general chemistry in Spanish

Learning Assistant

Jan 2019 – Aug 2021

New York University Learning Center

- Tutored undergraduate students in the following subjects: General Chemistry I and II, Organic Chemistry I and II, Introductory Biology I and II, Calculus I, II, and III, Inorganic Chemistry, Physics I and II, Thermodynamics, Quantum Mechanics, and Spanish I, II, III, and IV
- Led weekly lectures on the topics of Organic Chemistry I and II

Volunteer Tutor

May 2020 – May 2021

Phi Lambda Upsilon Chemistry Honor Society at New York University

- Tutored chemistry students in Organic Chemistry I and II, Quantum Mechanics, and Thermodynamics
- Hosted exam review sessions for chemistry courses

Additional Work Experience

X-ray Radiation Safety Officer

Sep 2021 – Aug 2025

Harvard University Department of Chemistry and Chemical Biology

- Managed the operation and maintenance of the X-ray fluorescence spectrometer
- Instructed new laboratory members on proper and safe usage of the instrument
- Coordinated with the Office of X-ray Safety on upholding radiation safety protocols

Emergency Medical Technician

Good Fellowship Ambulance and EMS Training Institute

Sep 2017 – Aug 2021

- Assessed, stabilized, and treated critically ill or injured patients in pre-hospital environments
- Collaborated with paramedics to support advanced lifesaving interventions
- Ensured safe patient transport to local hospitals

Beach Lifeguard

Cape May Beach Patrol

Aug 2016 – Aug 2020

- Performed ocean rescues on distressed swimmers in danger of drowning
- Administered first aid to beach patrons in the event of an emergency

Publications

- 1) C. E. Casaday, C. E. Juda, S.-L. Zheng, S. J. Teat, T. Chang, Y.-S. Chen, T. A. Betley, *Inorganic Chemistry* **2025**, *64*, 3090-3100.
- 2) C. E. Casaday*, C. E. Juda*, R. M. Clarke, N. P. Litak, B. M. Campbell, T. Chang, S.-L. Zheng, Y.-S. Chen, T. A. Betley, *Angewandte Chemie International Edition* **2023**, *62*, e202313156.
- 3) C. E. Juda, C. E. Casaday, J. J. Teesdale, A. K. Bartholomew, B. Lin, K. M. Carsch, R. A. Musgrave, S.-L. Zheng, X. Wang, C. M. Hoffmann, S. Wang, Y. S. Chen, T. A. Betley, *Journal of the American Chemical Society* **2024**, *146*, 30320-30331.
- 4) J. Oh, S.-L. Zheng, K. M. Carsch, T. P. Latendresse, C. E. Casaday, B. M. Campbell, T. A. Betley, *Journal of the American Chemical Society* **2025**, *147*, 3174-3184.
- 5) R. K. Gwinn, T. P. Latendresse, O. N. Beck, C. Slebodnick, N. J. Mayhall, C. E. Casaday, D. A. Thornton, *Inorganic Chemistry* **2025**, *64*, 2217-2231.
- 6) Z. A. VanOrman, M. Cárdenes Wuttig, A.-P. M. Reponen, T.-S. Kim, C. E. Casaday, D. Cui, T. Deshpande, H. J. Jöbssis, P. Schouwink, E. Oveisi, A. Bornet, C. Reece, S. Feldmann, *Journal of the American Chemical Society* **2025**, *147*, 16536-16544.
- 7) K. Torres, J. Y. Park, V. A. Posey, M. E. Ziebel, C. E. Casaday, K. J. Anderton, D. Cui, B. Tang, T. Taniguchi, K. Watanabe, A. N. Pasupathy, X. Roy, P. Kim, *Nano Letters* **2025**, *25*, 6848-6854.
- 8) Y. Li, G. M. George, A. S. Hajiseyedjavadi, C. E. Casaday, S. N. MacMillan, D. Nordlund, K. M. Lancaster, T. R. Cundari, Y. Dong, *Journal of the American Chemical Society* **2025**, *147*, 26714-26725.
- 9) D. W. Laorenza, V. M. Dev, C. E. Casaday, J. A. Mason, *Chem* **2026**, *12*, 102820.

Conference Presentations

- 1) **Casaday, C. E.**, Preefer, M. B., Betley, T. A., What Can We Learn from X-ray Diffraction Experiments? Microcrystallography for Chemistry and Materials Science Workshop at SLAC, March 2026, Menlo Park, CA (oral presentation).
 - 2) **Casaday, C. E.**, Juda, C. E., Betley, T. A., Resonant Scattering of Heterometallic Clusters, Metallocofactors Gordon Research Seminar, June 2024, Easton, MA (oral presentation).
 - 3) **Casaday, C. E.**, Juda, C. E., Betley, T. A., Resonant Scattering of Heterometallic Clusters, Metallocofactors Gordon Research Conference, June 2024, Easton, MA (poster presentation).
 - 4) **Casaday, C. E.**, Juda, C. E., Clarke, R. M., Betley, T. A., Lewis Acid Supported Cobalt and Nickel Nitrenoids and Oxenoids, American Chemical Society Conference, August 2023, San Francisco, CA (poster presentation).
 - 5) Torres, K., Park, J. Y., Posey, V., Anderton, K., **Casaday, C. E.**, Cui, D., Roy, X., Kim, P., Magnetoresistance and Hall Resistance Hysteresis in the 2D Heavy Fermion Antiferromagnetic CeSiI₃, American Physical Society's March Meeting, March 2024, Minneapolis, Minnesota (oral presentation).
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Technical Skills

- **Structural characterization:** single crystal X-ray diffraction, powder X-ray diffraction, single crystal neutron diffraction, resonant X-ray diffraction (single crystal and powder), scanning electron microscopy
- **Spectroscopic characterization:** X-ray absorption spectroscopy (XAS), X-ray fluorescence (XRF) spectroscopy, electron paramagnetic resonance (EPR) spectroscopy, electron-nuclear double resonance (ENDOR) spectroscopy, scanning electron microscopy energy dispersive spectroscopy (SEM-EDS), nuclear magnetic resonance spectroscopy, UV-Vis spectroscopy, Fourier-transformed infrared spectroscopy (FTIR)
- **Synthetic chemistry:** organic synthesis, solution-state inorganic synthesis, solid-state inorganic synthesis, Schlenk techniques, glovebox maintenance
- **Software:** Topas, APEX, JANA, ChemDraw, EasySpin, Athena, EC-Lab, MestreNova
- **Programming languages:** Python (intermediate), MATLAB (intermediate), Java (intermediate)
- **Languages:** English (native), Spanish (intermediate)