

GORDON G. C. PETERSON, PH.D.

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EDUCATION AND PROFESSIONAL APPOINTMENTS

Haverford College Assistant Professor of Chemistry	July 2024 – Present <i>Haverford, PA</i>
Argonne National Laboratory, Materials Science Division Argonne Scholar, Maria Goeppert Mayer Fellow	Oct. 2022 – Present <i>Lemont, IL</i>
University of Houston McElrath Postdoctoral Research Fellow	Mar. 2020 – Sept. 2022 <i>Houston, TX</i>
University of Wisconsin – Madison Ph.D., Materials Chemistry Dissertation: “The Design of Complex Intermetallic Structures or: How I Learned to Stop Worrying and Love Chemical Frustration”	Aug. 2014 – Feb. 2020 <i>Madison, WI</i>
Cornell University B.A., Chemistry	Aug. 2010 – May 2014 <i>Ithaca, NY</i>

TEACHING AND MENTORSHIP

Adjunct Professor, Introductory Chemistry <i>Dominican University</i> <ul style="list-style-type: none">○ Instructor of record for lab (~18 students) and lecture (~38 students) at Dominican University, a liberal arts college and Hispanic Serving Institution.○ Designed and delivered interactive lectures; wrote and graded quizzes, exams, homework, and classroom activities; led lab activities; managed undergraduate teaching assistants.	Aug. 2023 – Dec. 2023 <i>River Forest, IL</i>
CIRTL Delta Certificate Program <i>Center for the Integration of Research, Teaching and Learning (CIRTL)</i> <ul style="list-style-type: none">○ Designed and taught a unit of General Chemistry at Madison Area Technical College emphasizing active and peer-to-peer learning. Assessed student outcomes and presented the results at the UW-Madison Teaching and Learning Symposium.○ Completed CIRTL coursework (“An Introduction to Evidence-Based Undergraduate STEM Teaching”, “Advanced Learning through Evidence-Based STEM Teaching”, “Effective Teaching in an Internationally Diverse College Classroom”, “Research Mentor Training”) and the Delta program’s Inclusive Teaching Workshop.	Jun. 2018 – Aug. 2020 <i>Madison, WI</i>
Undergraduate and High School Student Research Mentorship <ul style="list-style-type: none">○ R. Kim, Welch Summer Program High School Researcher (Summer 2021)<ul style="list-style-type: none">- Poster presentation at Welch Summer Program colloquium.○ A. Pineda, High School Researcher (Summer 2021)○ L. Huang, Undergraduate Researcher (Summer – Fall 2021)○ Y. Gao, Undergraduate Researcher (FY 2019)○ E. Geisler, Undergraduate Researcher (Summer 2017 – Spring 2018)<ul style="list-style-type: none">- Co-author on manuscript published in <i>Inorganic Chemistry</i>- Poster presentation at UW Chemistry undergraduate research colloquium○ L. Fullerton, High School Researcher (Summer 2016, Summer 2017)	May 2017 – Sep. 2022

Teaching Assistant

Jun. 2014 – May 2018

*University of Wisconsin – Madison**Madison, WI*

Courses: General/Introductory Chemistry (2014, 2015, 2016, 2018), Inorganic Chemistry (2016, 2017)

- Led discussion sections of 15 – 25 undergraduate students; developed worksheets, lectures, group activities; ran hands-on lab activities; graded exams, homeworks and lab reports.

Guest Lecturer

- Delivered lectures on crystallography, symmetry operations, and space groups, for graduate level Physical Inorganic Chemistry at the University of Houston.
- Delivered lectures in the solid-state chemistry unit for undergraduate Inorganic Chemistry at the University of Wisconsin – Madison.

Teaching Assistant

Jun. 2014 – Aug. 2014

*Cornell University**Ithaca, NY*

- Conducted undergraduate labs and graded lab reports and exams for a condensed summer session of General Chemistry II.

Study Group Leader

Jan. 2011 – May 2011

*Cornell University**Ithaca, NY*

- Aided graduate TAs in running lab activities and discussion sections and assisted students in group work.

RESEARCH

Maria Goeppert Mayer Fellow – Argonne National Lab

Supervisors: Dr. Danny Phelan, Dr. Rajeev Assary, Dr. John Mitchell

- Synthesized and experimentally investigated new metallic and semiconducting thermoelectric materials, including crystal growth, structural characterization, and measurement of transport properties.
- Developed machine learning models to predict new thermoelectric materials for experimental investigation transport properties.
- Formed collaborations providing expertise in crystal growth, computational electronic structure characterization, and crystallographic structure determination.
- Granted beamtime at the Cornell High Energy Synchrotron Source for total scattering measurements of disordered thermoelectrics.

McElrath Fellow – University of Houston

Mentor: Prof. Jakoah Brgoch

- Developed openly accessible machine learning tools for the prediction of physical materials properties and visualization of phase diagrams.
- Authored peer-reviewed publications explaining the discovery, characterization, and computational analysis of highly complex Au-rich polar intermetallic compounds.
- Directly mentored undergraduate (1) and high school (2) students in solid-state synthesis, computational techniques, and machine learning.

Graduate Research Assistant – UW Madison

Advisor: Prof. Danny Fredrickson

- Discovered and characterized new polar intermetallic compounds in complex structure types.
- Elucidated design principles for controlling structural features through chemically intuitive forces.
- Authored 3 peer-reviewed publications; delivered presentations at national solid-state chemistry conferences.
- Directly mentored undergraduate (2) and high school (1) students in independent research projects, leading to publication and presentation of undergraduate work.

Undergraduate Research Assistant – Cornell University

Advisor: Prof. Stephen Lee

- Employed molecular orbital theory-based approaches and extended Hückel theory to investigate the electronic structures and stabilities of intermetallic γ -brass phases.

PEER-REVIEWED PUBLICATIONS

10. Chapai, R.; **Peterson, G. G. C.**; Smylie, M. P.; Chen, X.; Jiang, J. S.; Graf, D.; Mitchell, J. F.; Welp, U. Fermi Surface Topology and Magneto-transport Properties of Superconducting $\text{Pd}_3\text{Bi}_2\text{Se}_2$. *Phys. Rev. B.* 2024, *110*, 075152 [[doi: 10.1103/PhysRevB.110.075152](https://doi.org/10.1103/PhysRevB.110.075152)]
9. Hickey, J. C.; Karimaghvaei, A. M.; Flores, M.; **Peterson, G. G. C.**; Brgoch, J. High-Temperature Oxidation-Resistance of Rare-Earth Transition Metal Silicides: Crystal Chemistry Insights from the Sc–Os–Si System. *Chem. Mater.* 2024, *36*, 14, 7026-7035 [[doi: 10.1021/acs.chemmater.4c01270](https://doi.org/10.1021/acs.chemmater.4c01270)]
8. Van Buskirk, J.; **Peterson, G. G. C.**; Fredrickson, D. Machine-Learning-based Investigation of Atomic Packing Effects: Chemical Pressures at the Extremes of Intermetallic Complexity *ChemRxiv.* 2024 [[doi: 10.26434/chemrxiv-2024-97gwk](https://doi.org/10.26434/chemrxiv-2024-97gwk)]
7. Chen, X.; Zhang, J.; Thind, A. S.; Sharma, S.; LaBollita, H.; **Peterson, G. G. C.**; Zheng, H.; Phelan, D. P.; Botana, A. S.; Klie, R. F.; Mitchell, J. F. Polymorphism in the Ruddlesden–Popper Nickelate $\text{La}_3\text{Ni}_2\text{O}_7$: Discovery of a Hidden Phase with Distinctive Layer Stacking. *J. Am. Chem. Soc.* 2024, *146*, 6, 3640-3645 [[doi: 10.1021/jacs.3c14052](https://doi.org/10.1021/jacs.3c14052)]
6. **Peterson, G. G. C.**; Hilleke, K.; Wang, F.; Lotfi, S.; Zurek, E.; Brgoch, J. Twists and Puckers: Tuning Crystal Chemistry in the $\text{La}(\text{Au}_x\text{Ge}_{1-x})_2$ Compositional Series. *J. Am. Chem. Soc.* **2023**, *145*, 39, 21612-21622 [[doi: 10.1021/jacs.3c07936](https://doi.org/10.1021/jacs.3c07936)]
5. Lotfi, S.; Arrieta, R.; **Peterson, G. G. C.**; Delgado, P.*; Brgoch, J. From simple to complex crystal chemistry in the $RE\text{-Au-Tl}$ systems ($RE = \text{La, Ce, Pr, Nd, Ho}$; $Tl = \text{Ge, Sn, Pb}$). *ACS Organic & Inorganic Au.* **2022** [[doi: 10.1021/acsorginorgau.1c00057](https://doi.org/10.1021/acsorginorgau.1c00057)]
4. **Peterson, G. G. C.**; Brgoch, J. Materials Discovery through Machine Learning Formation Energy. *J. Phys. Energy.* **2021**, *3*, 022002 [[doi: 10.1088/2515-7655/abe425](https://doi.org/10.1088/2515-7655/abe425)]
3. **Peterson, G. G. C.**; Berns, V. M.; Fredrickson, D. C. $\text{Mn}_{39}\text{Si}_9\text{N}_x$: Epitaxial Stabilization as a Pathway to the Formation of Intermetallic Nitrides. *J. Am. Chem. Soc.* **2020**, *142*, 19, 8575-8579 [[doi: 10.1021/jacs.0c01716](https://doi.org/10.1021/jacs.0c01716)]
2. **Peterson, G. G. C.**; Geisler, E. E.*; Fredrickson, D. C. Intermetallic Reactivity: $\text{Ca}_3\text{Cu}_{7.8}\text{Al}_{26.2}$ and the Role of Electronegativity in the Stabilization of Modular Structures. *Inorg. Chem.* **2020**, *59*, 7, 5018-5029 [[doi: 10.1021/acs.inorgchem.0c00246](https://doi.org/10.1021/acs.inorgchem.0c00246)]
1. **Peterson, G. G. C.**; Yannello, V. J.; Fredrickson, D. C. Inducing Complexity in Intermetallics through Electron-Hole Matching: The Structure of $\text{Fe}_{14}\text{Pd}_{17}\text{Al}_9$. *Angew. Chem. Int. Ed.* **2017**, *129*, 10279-10284 [[doi: 10.1002/ange.201702156](https://doi.org/10.1002/ange.201702156)]

*undergraduate co-author

PRESENTATIONS

10. **Peterson, G. G. C.**; Rosenkranz, S.; Phelan, D. Resolving Disordered Thermoelectrics with 3D- Δ PDF. Poster presentation at the Argonne Postdoctoral Symposium, Lemont, IL, November 9, 2023
9. **Peterson, G. G. C.**; Rosenkranz, S.; Phelan, D. Resolving Disordered Thermoelectrics with 3D- Δ PDF. Poster presentation at the North American Solid State Chemistry Conference, Calgary, AB, Canada, August 2-4, 2023.
8. **Peterson, G. G. C.**; Van Buskirk, J.; Fredrickson, D. Predicting Chemical Pressure with Machine Learning. Project seeded at the Solid State and Materials Chemistry Data Science Hackathon, Bethlehem, PA, January 19-21, 2023.
7. **Peterson, G. G. C.**; Lotfi, S.; Brgoch, J. Twists and Puckers: Accessing Sub-Hull Crystal Chemistry in the $\text{La}(\text{Au}_x\text{Ge}_{1-x})_2$ Compositional Series. Poster presentation at the Solid State Chemistry Gordon Research Conference and Seminar, New London, NH, July 23-29, 2022.

6. **Peterson, G. G. C.;** Lotfi, S.; Arrieta, R.; Brgoch, J. From Simple to Complex Chemistry in the *RE-Au-Ti* Systems. Talk presented at the Texas Center for Superconductivity at the University of Houston Symposium, Houston, TX, March 7, 2022.
5. **Peterson, G. G. C.;** Brgoch, J. MatLearn: A Tool for Materials Discovery through Machine Learning. Talk presented at the North American Solid State Chemistry Conference, Los Angeles, CA, July 28-30, 2021.
4. **Peterson, G. G. C.;** Brgoch, J. Machine Learning for the Guided Discovery of Intermetallics. Talk presented at the DCMS Materials 4.0 Summer School, Dresden, Germany, August 17-21, 2020.
3. **Peterson, G. G. C.;** Geisler, E. E.; Fredrickson, D. C. Intermetallic Reactivity through Frustration: Origins of Complexity in $\text{Ca}_3\text{Cu}_{7.8}\text{Al}_{26.2}$. Poster presentation at the North American Solid State Chemistry Conference, Golden, CO, July 31-August 2, 2019.
2. **Peterson, G. G. C.;** Gunasekera, N. Can Drawing Molecules Improve Comprehension of Chemical Concepts? Poster presentation at the University of Wisconsin–Madison Teaching and Learning Symposium, Madison, WI, May 16, 2019.
1. **Peterson, G. G. C.;** Yannello, V. J.; Fredrickson, D. C. Inducing Complexity in Intermetallics through Electron-Hole Matching: The Structure of $\text{Fe}_{14}\text{Pd}_{17}\text{Al}_{69}$. Poster presentation at The North American Solid State Chemistry Conference, Santa Barbara, CA, August 16-19, 2017.

INVITED TALKS

2. **Peterson, G. G. C.** Using Active Learning and Gaussian Process Regression for the Prediction of Materials Properties. *Interactive presentation for the North American Solid State Chemistry Conference Machine Learning Workshop*, University of Calgary, Calgary, AB, Canada, July 31-August 1, 2023.
1. **Peterson, G. G. C.** Inducing Complexity in Intermetallics: From Frustrated Interactions to Intriguing Microstructures. *Talk at the Breakthrough Research and Education Workshop*, Madison, WI, Nov. 17, 2017.

HONORS AND AWARDS

Maria Goeppert Mayer Fellowship <i>Argonne National Lab</i>	Jan. 2022
○ Argonne fellowship providing \$735,000 in total funding over 3 years to seed new research.	
Eby Nell McElrath Postdoctoral Fellowship <i>University of Houston</i>	July 2021
○ UH fellowship providing \$48,500 in salary and travel funding.	
Honored Instructor Award <i>University of Wisconsin-Madison</i>	Dec. 2019
○ Student-nominated award recognizing outstanding classroom instructors at UW-Madison.	
GSFLC Outreach Scholarship <i>Graduate Student Faculty Liaison Committee, UW-Madison</i>	June 2019
○ Departmental award supporting graduate student community outreach.	
PPG Summer Fellowship <i>PPG Industries</i>	May 2018
○ Financial award supporting summer research for a UW-Madison graduate student.	
GSFLC Travel Award <i>Graduate Student Faculty Liaison Committee, UW-Madison</i>	April 2018
○ Departmental award supporting graduate student conference travel.	
Magna Cum Laude Graduation Honors <i>Cornell University</i>	May 2014

SERVICE

MSD-DEI Council Member

Dec. 2022 – Present

Argonne Materials Science Division Equity Diversity and Inclusion Council (MEDIC)

Lemont, IL

- Organized a development workshop for Argonne postdocs on discussing DEI.
- Represented early career researchers in guiding the divisions DEI strategic plan.

Discussion Leader

July 2022

Gordon Research Seminar on Solid State Chemistry

New London, NH

Reviewer

Ongoing

European Physical Journal B, Phase Transitions, Communications Chemistry, Swiss National Science Foundation BRIDGE Discovery

WORKSHOPS

ACS Postdoc to Faculty Workshop and Mentor Training Program

July 2023

American Chemical Society

Chicago, IL

Inclusive Teaching Workshop

October 2018

CIRTL Delta Program, UW-Madison

Madison, WI

COMMUNITY OUTREACH

Scientific Mentor

ACT-SO Achievement Program, NAACP of DuPage County

Fall 2023, Lemont, IL

- Scientific mentor for student-driven research project (high school)

Guest Speaker

Institute for Chemical Education

Jun. 2018, Madison, WI

- STEM summer camp presenter: “Crystals, Diffraction, and the Power of X-rays” (elementary)

Argonne Laboratory Computing Resource Center

Dec. 2022, Chicago, IL

- ‘Hour of Code’ activity presenter and discussion leader (middle school)

Volunteer

Westfield Elementary STEM Fest

Mar. 2023, Chicago, IL

- Activity guide (elementary)

National Virtual Science Bowl – Illinois Regional

Jan. 2023, Chicago, IL

- Score keeper (middle school)

UW-Madison Geology Museum

Mar. 2017 – Feb. 2020, Madison, WI

- Tour guide (elementary)

UW Family Science Night Program

May 2019, Madison, WI

- Activity designer and presenter (elementary)

Wisconsin Crystal Growing Contest

May 2017 – 2018, Madison, WI

- Tour guide (K-12)