

# Annalise E. Maughan

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She/Her/Hers

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## Research Vision

My research vision is centered around crystal-chemical control of solid-state materials chemistry for renewable energy and sustainability. My interests lie in understanding the interplay between crystalline structure, electronic states, lattice dynamics, and ionic/electronic transport in functional materials for energy generation and energy storage. Through targeted synthesis of novel materials, I aim to develop materials design principles that enable advancements in renewable energy technologies.

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## Employment

Assistant Professor  
Colorado School of Mines  
Department of Chemistry  
*Joint Appointment: National Renewable Energy Laboratory*

GOLDEN, CO  
July 2021 – Present

Director's Postdoctoral Fellow  
National Renewable Energy Laboratory  
Mentors: Dr. Joe Berry, Dr. Nate Neale  
Research: *Driving Ion Conduction with Molecular Dynamics in Solid-State Electrolytes and Discovery of new chiral hybrid organic-inorganic perovskite semiconductors for spintronics*

GOLDEN, CO  
December 2018 – July 2021

## Education

Ph.D., Chemistry  
Colorado State University Department of Chemistry  
Advisor: Prof. James R. Neilson  
Dissertation: *Defect tolerance, anharmonicity, and organic-inorganic coupling in hybrid organic-inorganic semiconductors*

FORT COLLINS  
September 2013 – December 2018

NSF Research Experience for Undergraduates (REU)  
Harvey Mudd College  
Advisor: Prof. Gerald van Hecke  
Research: *Thermodynamic properties of liquid crystalline cobalt stearate*

CLAREMONT, CA  
Summer 2012

B.S. in Chemistry, ACS Certified; Minor in Mathematics  
Northern Arizona University  
Advisor: Prof. Stephanie K. Hurst  
Research: *Synthesis of new tropylium platinum and palladium sandwich complexes*

FLAGSTAFF, AZ  
2011 – 2013

## Group and Mentoring

### Postdoctoral Scholars

*Current* – Dr. Philip Yox (2022-present)

### Graduate Students

*Current* – Shelby Galinat (2022-present), Amy Louks (2022-present), Lucy Metzroth (2022-present), Sinclair Combs (2021-present), Connor Ray (2021-present), Austin Shotwell (2021-present)

### Undergraduate Students

*Current* – Akhil Gupta (2021-present), Kobi Hobert (2021-present)

*Past* – Jordan Sweeney (NSF REU, Summer 2022)

## Awards and Honors

- Featured in ACS Energy Letters "Women Scientists at the Forefront of Energy", 2021 [[doi](#)]
- Co-PI - Department of Energy Vehicle Technologies Office - National Renewable Energy Laboratory, 2022–2027
- PI - Laboratory Directed Research and Development Core Program - National Renewable Energy Laboratory, 2022–2023
- Key Contributor Award - National Renewable Energy Laboratory, 2019, 2020

- Director's Postdoctoral Fellowship – National Renewable Energy Laboratory, 2018–2021
- Best Poster Award – North American Solid-State Chemistry Conference, 2019
- College of Natural Sciences Dissertation Award – Colorado State University, 2018
- American Chemical Society Chemistry of Materials Lectureship and Best Paper Award, 2018
- College of Natural Sciences Teaching and Mentoring Award – Colorado State University, 2018
- University Distinguished Professor's Scholarship (Top Honor Awarded to a Graduate Student at CSU) – Colorado State University, 2018
- Great Minds in Research, Honorable Mention – Graduate Student Showcase, Colorado State University, 2017
- Top Graduate Student Presentation Award – American Physical Society, Four Corners Meeting, 2017
- Ludo Frevel Crystallography Scholarship – International Centre for Diffraction Data (ICDD), 2017
- College of Natural Sciences Top Scholar Award – Graduate Student Showcase, Colorado State University, 2016
- General Chemistry Graduate Teaching Award – Colorado State University, 2014
- Senior Research Award – Northern Arizona University, 2013
- Scott Savage Award – Northern Arizona University, 2012

## Leadership and Service

Coach Mentor Denver Public School System Coach Mentoring Program Activities: Mentored a high school student from an underserved school in college selection and applications	DENVER, CO Fall 2020 – Spring 2021
NREL Intern Navigator Program Intern Mentor Activities: Led professional development activities for a small group of NREL inter researchers	GOLDEN, CO Spring 2021
Early Career Network Representative EFRC: Center for Hybrid Organic-Inorganic Semiconductors for Energy Led networking and leadership activities aimed at early career members of the EFRC program	GOLDEN, CO 2019–2020
Undergraduate Research Mentor Neilson Group, Colorado State University Students: Alex Milder ( <i>Summer 2017</i> ), Andrew M. Candia ( <i>2016–2017</i> ), Mohammed Almaker ( <i>2015–2016</i> ), Juliette Granger ( <i>2015–2016</i> ), Mitchell M. Bordelon ( <i>2015–2016</i> )	FORT COLLINS, CO 2013–2017

## Teaching

- CHGN 209: Introduction to Chemical Thermodynamics (*Fall 2022*)
- CHGN 125: Molecular Engineering and Materials Chemistry (*Spring 2022*)

## Publications

Citation tracking at: [Google Scholar](#)

Corresponding authorship is denoted by \*. Undergraduate co-authors are denoted by †.

1. S. R. Combs, P. K. Todd, P. Gorai, **A. E. Maughan\***; “Review - Designing Defects and Diffusion in Metal Halide Solid Electrolytes”, *J. Electrochem. Soc.*, **2022**, *169*, 040551. *Editor's Choice*; Invited Submission to *Focus Issue on Women in Electrochemistry*.[\[doi\]](#)
2. **A. E. Maughan†**, Y. Ha, R. T. Pekarek, M. C. Schulze; “Lowering the activation barriers for ionic conductivity through orientational disorder in the cyanide argyrdite  $\text{Li}_6\text{PS}_5\text{CN}$ ”, *Chem. Mater.*, **2021**, *33*, 5127–5136.[\[doi\]](#)
3. E. Amerling, H. Lu, B. W. Larson, **A. E. Maughan**, A. Phillips, E. Lafalce, L. Whittaker-Brooks, J. J. Berry, M. C. Beard, Z. V. Vardeny, J. L. Blackburn; “A Multi-Dimensional Perspective on Electronic Doping in Metal Halide Perovskites”, *ACS Energy Lett.*, **2021**, *6*, 1104–1123.[\[doi\]](#)
4. J. Yang, **A. E. Maughan**, G. Teeter, R. Brunecky, B. Tremolet de Villers, S.-M. Bak, S. D. Han; “Structural Stabilization of P2-type Sodium Iron Manganese Oxides by Electrochemically Inactive Mg Substitution: Insights of Redox Behavior and Voltage Decay”, *ChemSusChem*, **2020**, *13*, 5972–5982.[\[doi\]](#)

5. **A. E. Maughan**, E. M. Mozur, A. M. Candia<sup>†</sup>, J. R. Neilson; “Ferroelastic Phase Transition in Formamidinium Tin (IV) Iodide Driven by Organic–Inorganic Coupling”, *Inorg. Chem.*, **2020**, *59*, 14399–14406.[doi]
6. H. Lu, C. Xiao, R. Song, T. Li, **A. E. Maughan**, A. Levin, R. Brunecky, J. J. Berry, D. B. Mitzi, V. Blum, M. C. Beard; “Highly distorted chiral two-dimensional tin iodide perovskites for spin polarized charge transport”, *J. Am. Chem. Soc.*, **2020**, *142*, 13030–13040.[doi]
7. T. H. Schloemer, J. A. Raiford, T. S. Gehan, T. Moot, S. Nanayakkara, S. P. Harvey, R. C. Bramante, S. Dunfield, A. E. Louks, **A. E. Maughan**, L. Bliss, M. D. McGehee, M. F. A. M. van Hest, M. O. Reese, S. F. Bent, J. J. Berry, J. M. Luther, A. Sellinger; “The molybdenum oxide interface limits the high-temperature operational stability of unencapsulated perovskite solar cells”, *ACS Energy Lett.*, **2020**, *5*, 2349–2360.[doi]
8. E. M. Mozur, M. A. Hope, J. C. Trowbridge<sup>†</sup>, D. M. Halat, L. L. Daemen, **A. E. Maughan**, T. R. Prisk, C. P. Grey, J. R. Neilson; “Cesium Substitution Disrupts Concerted Cation Dynamics in Formamidinium Hybrid Perovskites”, *Chem. Mater.*, **2020**, *32*, 6266–6277.[doi]
9. E. M. Mozur, J. C. Trowbridge<sup>†</sup>, **A. E. Maughan**, M. J. Gorman\*, C. M. Brown, T. R. Prisk, J. R. Neilson; “Dynamical Phase Transitions and Cation–Orientation Dependent Photoconductivity in CH(NH<sub>2</sub>)<sub>2</sub>PbBr<sub>3</sub>”, *ACS Mater. Lett.*, **2019**, *1*, 260–264.[doi]
10. **A. E. Maughan**, A. M. Ganose, D. O. Scanlon, J. R. Neilson; “Perspectives and Design Principles of Vacancy–Ordered Double Perovskite Semiconductors”, *Chem. Mater.*, **2019**, *31*, 1184–1195.[doi]
11. **A. E. Maughan**, A. A. Paecklar, J. R. Neilson; “Bond Valences and Anharmonicity in Vacancy–Ordered Double Perovskite Halides”, *J. Mater. Chem. C*, **2018**, *6*, 12095–12104.[doi]
12. **A. E. Maughan**, A. M. Ganose, M. A. Almaker<sup>†</sup>, D. O. Scanlon, J. R. Neilson; “Tolerance Factor and Cooperative Tilting Effects in Vacancy–Ordered Double Perovskite Halides”, *Chem. Mater.*, **2018**, *30*(11), 3909–3919.[doi]
13. **A. E. Maughan**, Alex M. Ganose, Andrew M. Candia<sup>†</sup>, Juliette T. Granger<sup>†</sup>, David O. Scanlon, J. R. Neilson; “Anharmonicity and Octahedral Tilting in Hybrid Vacancy–Ordered Double Perovskites”, *Chem. Mater.*, **2018**, *30*(2), 472–483.[doi]; **Selected for ACS Editor’s Choice and Cover Article; Selected for 2018 Chemistry of Materials Best Paper Award.**
14. E. M. Mozur, **A. E. Maughan**, Y.–Q. Cheng, A. Huq, N. Jalarvo, L. Daemen, J. R. Neilson; “Orientational Glass Formation in Substituted Hybrid Perovskites”, *Chem. Mater.*, **2017**, *29*(23), 10168–10177.[doi]
15. **A. E. Maughan**, A. M. Ganose, M. M. Bordelon<sup>†</sup>, E. M. Miller, D. O. Scanlon, J. R. Neilson; “Defect Tolerance to Intolerance in the Vacancy–Ordered Double Perovskite Semiconductors Cs<sub>2</sub>SnI<sub>6</sub> and Cs<sub>2</sub>TeI<sub>6</sub>”, *J. Am. Chem. Soc.*, **2016**, *138*(27), 8453–8464.[doi]
16. P. Moetakef, L. Wang, **A. E. Maughan**, K. J. Gaskell, A. M. Larson, B. C. Hodges, E. E. Rodriguez; “Tuning the electronic band structure of microporous titanates with the hollandite structure”, *J. Mater. Chem. A*, **2015**, *3*(40), 20330–20337.[doi]
17. **A. E. Maughan**, J. A. Kurzman, J. R. Neilson; “Hybrid Organic–Inorganic Materials with an Optoelectronically Active Aromatic Cation: (C<sub>7</sub>H<sub>7</sub>)<sub>2</sub>SnI<sub>6</sub> and C<sub>7</sub>H<sub>7</sub>PbI<sub>3</sub>”, *Inorg. Chem.*, **2015**, *54*(1), 370–378.[doi]