

Jeffrey A. ChristiansDepartment of Engineering
Hope College
Holland, MITel: (616) 395-6895
Email: christians@hope.edu**EDUCATION**

- 2015–2018 **National Renewable Energy Laboratory, Golden, Colorado**
Postdoctoral Researcher (2015–2018)
EERE Postdoctoral Fellow (2016–2018)
Advisor: Joseph M. Luther, Senior Scientist, Chemistry & Nanoscience Center
- 2010–2015 **University of Notre Dame, Notre Dame, Indiana**
Ph. D. in Chemical and Biomolecular Engineering
Recipient of the Eli J. and Helen Shaheen award (top graduate student, College of Engineering)
Mesostructured Thin Film Solar Cells: Examining Hole Transfer Mechanisms and Device Stability
Advisor: Prashant V. Kamat, Rev. John A. Zahm, C. S. C. Professor of Science
- 2006–2010 **Calvin College, Grand Rapids, Michigan**
B. S. in Engineering, Chemical Concentration, Major in Chemistry (ACS Accredited)

RESEARCH AND PROFESSIONAL EXPERIENCE

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|--------------|----------------------------|---|
| 2024–Present | Associate Professor | <i>Hope College, Department of Engineering</i> |
| 2022–Present | Director | <i>Hope College Green Revolving Fund</i> |
| 2018–2024 | Assistant Professor | <i>Hope College, Department of Engineering</i> |
| 2021–2022 | Engineering Consultant | <i>Evo Engineering and Design</i> |
| 2015–2018 | Postdoctoral Researcher | <i>National Renewable Energy Laboratory, Dr. Joseph M. Luther</i> |
| 2014–2015 | Teaching Apprentice | <i>University of Notre Dame</i> |
| 2010–2015 | Research Assistant | <i>University of Notre Dame, Prof. Prashant V. Kamat</i> |
| 2010–2012 | Teaching Assistant | <i>University of Notre Dame</i> |
| 2008–2010 | Teaching Assistant | <i>Calvin College</i> |
| 2009 | Research Assistant | <i>Calvin College, Prof. David E. Benson</i> |
| 2008–2009 | Quality Control Technician | <i>Delphi Automotive, Wyoming, MI</i> |

FUNDED FELLOWSHIP AND GRANT SUPPORT

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|-----------|---|
| 2023 | Hope College Green Revolving Fund (\$100,000 with matching funds), <i>private donation to college</i> |
| 2022 | On Campus Low-Carbon Home Retrofit, with ENGS 451/452 (\$50,000), <i>private donation to college</i> |
| 2022 | On Campus PV & EV Charging System, with ENGS 100 (\$50,000), <i>private donation to college</i> |
| 2022-2023 | Research Seed Grant (\$5000 with \$5000 matching funds), <i>Michigan Space Grant Consortium</i> |
| 2022 | Nyenhuis Research Grant, <i>declined</i> (\$3488, student Dirk Visser), <i>Hope College</i> |
| 2021-2024 | NSF: MRI Award Number 2117655, co-PI (\$321,363), <i>National Science Foundation</i> |
| 2021-2024 | NSF: RUI Award Number 2128632 (\$238,828), <i>National Science Foundation</i> |
| 2021 | Nyenhuis Research Grant (\$3488, student Rory Campagna), <i>Hope College</i> |
| 2021 | Undergraduate Fellowship (\$3000, student James Mandeville), <i>Michigan Space Grant Consortium</i> |
| 2020 | Research Seed Grant (\$5000 with \$5000 matching funds), <i>Michigan Space Grant Consortium</i> |
| 2020 | Undergraduate Fellowship (\$3000, student Zachary Wylie), <i>Michigan Space Grant Consortium</i> |
| 2020 | Nyenhuis Research Grant (\$7488, student Cedric Porter), <i>Hope College</i> |
| 2016-2018 | EERE Postdoctoral Research Award (2 yrs, full funding, ~\$300k value), <i>DOE EERE</i> |
| 2014 | CEST/Bayer Predoctoral Research Fellow (1 yr, \$10,250), <i>University of Notre Dame</i> |
| 2014 | Patrick and Jana Eilers Graduate Student Fellow (1 yr, \$7000), <i>University of Notre Dame</i> |
| 2014 | Graduate Student Union Professional Development Award (\$1,050), <i>University of Notre Dame</i> |
| 2014 | Graduate Student Union Conference Presentation Grant (\$300), <i>University of Notre Dame</i> |

OTHER AWARDS AND HONORS

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|------|---|
| 2021 | Towsley Research Scholar, <i>Hope College</i>
<i>Award supporting early career faculty with excellent promise in teaching and research</i> |
| 2020 | 2019 Highest Impact Publication Award, <i>National Renewable Energy Laboratory (NREL)</i> |

Recognizing the field-weighted highest impact publication from the preceding 3 years

- 2015 Eli J. and Helen Shaheen Graduate School Award in Engineering, *University of Notre Dame*
Awarded to the outstanding graduating Ph.D. student in the College of Engineering
- 2015 Advanced Teaching Scholar Certificate, *University of Notre Dame*
Certificate from Notre Dame Learning's Kaneb Center recognizing participation in teaching professional development programs and completion of an independent teaching project
- 2014 Striving for Excellence in Teaching Certificate, *University of Notre Dame*
Certificate awarded in recognition of teaching professional development work
- 2010–2015 Dean's Fellow for Graduate Research, *University of Notre Dame*
Awarded to entering doctoral students in recognition of outstanding performance in undergraduate studies and notable promise in graduate studies and professional life
- 2006–2010 National Merit Scholar, *National Merit Scholar Corporation*

PEER-REVIEWED PUBLICATIONS

Total Google Scholar citations: 12259, h-index: 32 (7/25/2023)

*underline denotes Hope College undergraduate student

38. Wylie, Z. R.; Al Katrib, M.; Campagna, R. M.; Outen, J. E.; Smith, S.; Ruffolo, P.; Bouttemy, M.; Schulz, P.; Christians, J. A. Iodide vacancy controlled δ -phase nucleation in CsPbI₃ perovskites. (In preparation)
37. Surel, J. S.; **Christians, J. A.** Can We Make Color Switchable Photovoltaic Windows? *Chemical Science*, **2023**, 14, 7828-7841, DOI: 10.1039/D3SC01811C. (Invited Perspective)
36. Surel, J. S.; Cutlip, E. V.; Mandeville, J. R.; **Christians, J. A.** Switchable Color Semiconductors: Methylamine Intercalation, Deintercalation, and Retention in 2D Halide Perovskites. *ACS Appl. Energy Mat.*, **2022**, 5, 10, 12029-12038. (Front Cover Article)
35. Wylie, Z. R.; Ruffolo, P.; Campagna, R. M.; **Christians, J. A.** Measuring Phase Changes to Predict Halide Perovskite Solar Cell Degradation. *2021 IEEE 48th Photovoltaic Specialists Conference (PVSC)*, **2021**, pp. 0226-0228, DOI: 10.1109/PVSC43889.2021.9518928. (Conference Proceedings)
34. Pavlovets, I. M.; Brennan, M. C.; Draguta, S.; Ruth, A.; Moot, T.; **Christians, J. A.**; Aleshire, K.; Harvey, S. P.; Toso, S.; Nanayakkara, S. U.; et al. Suppressing Cation Migration in Triple-Cation Lead Halide Perovskites. *ACS Energy Lett.* **2020**, 2802–2810.
33. Cutlip, E. V.; **Christians, J. A.** Interactions Between 2D Halide Perovskite Materials and Methylamine Vapor. *2020 IEEE 47th Photovoltaic Specialists Conference (PVSC)*, Calgary, OR, **2020**, pp 1972-1975, DOI: 10.1109/PVSC45281.2020.9300844. (Conference Proceedings)
32. Kerner, R. A.; Schulz, P.; **Christians, J. A.**; Dunfield, S. P.; Dou, B.; Zhao, L.; Teeter, G.; Berry, J. J.; Rand, B. P. Reactions at Noble Metal Contacts with Methylammonium Lead Triiodide Perovskites: Role of Underpotential Deposition and Electrochemistry. *APL Mater.* **2019**, 7 (4), 041103.
31. Schelhas, L. T.; Li, Z.; **Christians, J. A.**; Goyal, A.; Kairys, P.; Harvey, S. P.; Kim, D. H.; Stone, K. H.; Luther, J. M.; Zhu, K.; Stevanovic, V.; Berry, J. J. Insights into Operational Stability and Processing of Halide Perovskite Active Layers. *Energy Environ. Sci.* **2019**, 12 (4), 1341–1348.
30. Tirmzi, A. M.; **Christians, J. A.**; Dwyer, R. P.; Moore, D. T.; Marohn, J. A. Substrate-Dependent Photoconductivity Dynamics in a High-Efficiency Hybrid Perovskite Alloy. *J. Phys. Chem. C* **2019**, 123 (6), 3402–3415.
29. Schloemer, T. H.; **Christians, J. A.**; Luther, J. M.; Sellinger, A. Doping Strategies for Small Molecule Organic Hole-Transport Materials: Impacts on Perovskite Solar Cell Performance and Stability. *Chem. Sci.* **2019**, 10 (7), 1904–1935.
This perspective article has been widely cited by researchers in the field (276 citations, Google Scholar 7/25/2023)
28. Schloemer, T. H.; Gehan, T. S.; **Christians, J. A.**; Mitchell, D. G.; Dixon, A.; Li, Z.; Zhu, K.; Berry, J. J.; Luther, J. M.; Sellinger, A. Thermally Stable Perovskite Solar Cells by Systematic Molecular Design of the Hole-Transport Layer. *ACS Energy Lett.* **2019**, 4, 473–482.

27. Hazarika, A.; Zhao, Q.; Gaulding, E. A.; **Christians, J. A.**; Dou, B.; Marshall, A. R.; Moot, T.; Berry, J. J.; Johnson, J. C.; Luther, J. M. Perovskite Quantum Dot Photovoltaic Materials beyond the Reach of Thin Films: Full-Range Tuning of A-Site Cation Composition. *ACS Nano* **2018**, 12 (10), 10327–10337.
26. **Christians, J. A.**; Zhang, F.; Bramante, R. C.; Reese, M. O.; Schloemer, T. H.; Sellinger, A.; van Hest, M. F. A. M.; Zhu, K.; Berry, J. J.; Luther, J. M. Stability at Scale: The Challenges of Durable Module Interconnects for Perovskite Photovoltaics. *ACS Energy Lett.* **2018**, 3 (10), 2502-2503.
25. **Christians, J. A.**; Habisreutinger, S. N.; Berry, J. J.; Luther, J. M. Stability in Perovskite Photovoltaics: A Paradigm for Newfangled Technologies. *ACS Energy Lett.* **2018**, 3 (9), 2136-2143.
24. Harvey, S. P.; Li, Z.; **Christians, J. A.**; Zhu, K.; Luther, J. M.; Berry, J. J. Probing Perovskite Inhomogeneity beyond the Surface: TOF-SIMS Analysis of Halide Perovskite Photovoltaic Devices. *ACS Appl. Mater. Interfaces*, **2018**, 10 (34), 28541-28552.
23. Wheeler, L. M.; Sanhira, E. M.; Marshall, A. R.; Schulz, P.; Suri, M.; Anderson, N. C.; **Christians, J. A.**; Nordlund, D.; Sokaras, D.; Kroll, T.; Harvey, S. P.; Berry, J. J.; Lin, L. Y.; Luther, J. M. Targeted Ligand Exchange Chemistry on Cesium Lead Halide Perovskite Quantum Dots for High-Efficiency Photovoltaics. *J. Am. Chem. Soc.* **2018**, 140 (33), 10504-10513.
This paper (291 citations, Google Scholar 7/25/2023) was recognized as one of the most highly cited publications in JACS for 2018-2019.
22. **Christians, J. A.**; Marshall, A. R.; Zhao, Q.; Ndione, P. F.; Sanhira, E. M.; Luther, J. M. Perovskite Quantum Dots: A New Absorber for Perovskite-Perovskite Tandem Solar Cells. *2018 IEEE 7th World Conference on Photovoltaic Energy Conversion (WCPEC) (A Joint Conference of 45th IEEE PVSC, 28th PVSEC & 34th EU PVSEC)*, Waikoloa Village, HI, **2018**, pp. 81-84, doi: 10.1109/PVSC.2018.8547642. (Conference Proceedings)
21. Dunfield, S. P.; Moore, D. T.; Klein, T. R.; Fabian, D. M.; **Christians, J. A.**; Dixon, A. G.; Dou, B.; Ardo, S.; Beard, M. C.; Shaheen, S. E.; Berry, J. J.; van Hest, M. F. A. M. Curtailing Perovskite Processing Limitations via Lamination at the Perovskite/Perovskite Interface. *ACS Energy Lett.*, **2018**, 3 (5), 1192–1197.
20. Dou, B.; Wheeler, L. M.; **Christians, J. A.**; Moore, D. T.; Harvey, S. P.; Berry, J. J.; Barnes, F. S.; Shaheen, S. E.; van Hest, M. F. A. M. Degradation of Highly Alloyed Metal Halide Perovskite Precursor Inks: Mechanism and Storage Solutions. *ACS Energy Lett.*, **2018**, 3, 979–985.
19. Draguta, S.; **Christians, J. A.**; Morozov, Y. V.; Mucunguzi, A.; Manser, J. S.; Kamat, P. V.; Luther, J. M.; Kuno, M. K. A Quantitative and Spatially Resolved Analysis of the Performance-Bottleneck in High Efficiency, Planar Hybrid Perovskite Solar Cells *Energy Environ. Sci.*, **2018**, 11 (4), 960-969.
18. **Christians, J. A.**; Schulz, P.; Tinkham, J. S.; Schloemer, T. H.; Harvey, S. P.; Tremolet de Villers, B. J.; Sellinger, A.; Berry, J. J.; Luther, J. M. Tailored Interfaces of Unencapsulated Perovskite Solar Cells for >1000 Hours of Ambient Operational Stability. *Nature Energy*, **2018**, 3 (1), 68-74.
This paper has been widely cited (789 citations, Google Scholar 7/25/2023) and was awarded the 2019 Highest Impact Publication Award at NREL. It was also highlighted in news media upon publication, see article on PV Magazine, <https://www.pv-magazine.com/2018/01/31/nrel-hits-new-milestone-in-reducing-perovskite-degradation/>
17. Sanhira, E. M.; Marshall, A. R.; **Christians, J. A.**; Harvey, S. P.; Ciesielski, P. N.; Wheeler, L. M.; Schulz, P.; Lin, L. Y.; Beard, M. C.; Luther, J. M. Enhanced Mobility CsPbI₃ Quantum Dot Arrays for Record Efficiency, High Voltage Photovoltaic Cells. *Science Advances*, **2017**, 3 (10) eaao4204.
This paper has been widely cited (883 citations, Google Scholar 7/25/2023) and highlighted in news media upon publication, see article on PV Magazine, <https://www.pv-magazine.com/2017/11/07/nrel-hits-new-efficiency-record-for-quantum-dot-cell/>
16. Dou, B.; Miller, E. M.; **Christians, J. A.**; Sanhira, E. M.; Klein-Stockert, T. R.; Barnes, F. S.; Shaheen, S. E.; Garner, S.; Mallick, A.; Basak, D. van Hest, M. F. A. M. High Performance Flexible Perovskite Solar Cells on Ultra-Thin Glass. Implications of the TCO. *The Journal of Physical Chemistry Letters*, **2017**, 8 (19) 4960-4966.
15. Li, Z.; Xiao C.; Yang, Y.; Harvey, S. P.; Kim, D.; **Christians, J. A.**; Yang, M.; Schulz, P.; Nanayakkara, S. U.; Jiang, C.; Luther, J. M.; Berry, J. J.; Beard, M. C.; Al-Jassim M.; Zhu, K. Extrinsic Ion Migration in Perovskite Solar Cells. *Energy & Environmental Science*, **2017**, 10 (5), 1234-1242.
This paper has been widely cited by researchers in the field (461 citations, Google Scholar 7/25/2023)

14. Schulz, P.; Tjepelt, J. O.; **Christians, J. A.**; Levine, I.; Edri, E.; Sanehira, E. M.; Hodes, G.; Cahen, D.; Kahn, A. High Work Function Molybdenum Oxide Hole Extraction Contacts in Hybrid Organic-Inorganic Perovskite Solar Cells. *ACS Applied Materials & Interfaces*, **2016**, 8, 31491-31499.
13. Schelhas, L. T.[†]; **Christians, J. A.**[†]; Berry, J. J.; Toney, M. F.; Tassone, C. J.; Luther, J. M.; Stone, K. H. Monitoring a Silent Phase Transition in CH₃NH₃PbI₃ Solar Cells via Operando X-ray Diffraction. *ACS Energy Letters*, **2016**, 1, 1007-1012. [†]*These authors contributed equally*
12. Swarnkar, A.; Marshall, A. R.; Sanehira, E. M.; Chernomordik, B. D.; Moore, D. T.; **Christians, J. A.**; Chakrabarti, T.; Luther, J. M. Quantum Dot-Induced Phase Stabilization of α -CsPbI₃ Perovskite for High-Efficiency Photovoltaics. *Science*, **2016**, 354, 6308, 92-95.
This paper has been widely cited (2294 citations, Google Scholar 7/25/2023) and was highlighted in news media upon publication, see article on Materials Today, url: <https://www.materialstoday.com/nanomaterials/news/scientists-join-the-dots-to-perovskite-solar-cell/>
11. Manser, J. S.; **Christians, J. A.**; Kamat, P. V. Intriguing Optoelectronic Properties of Metal Halide Perovskites. *Chem. Rev.* **2016**, 116, 12956-13008. (Invited Review)
This review article has been widely cited by researchers in the field (1433 citations, Google Scholar 7/25/2023)
10. Nenon, D. P.[†]; **Christians, J. A.**[†]; Wheeler, L. M.; Blackburn, J. L.; Sanehira, E. M.; Dou, B.; Olsen, M. L.; Zhu, K.; Berry, J. J.; Luther, J. M. Structural and Chemical Evolution of Methylammonium Lead Halide Perovskites During Thermal Processing from Solution. *Energy & Environmental Science*, **2016**, 9, 2072-2082. [†]*These authors contributed equally*
9. Manser, J.S.; Saidaminov, M. I.; **Christians, J. A.**; Bakr, O. M.; Kamat, P. V. Making and Breaking of Lead Halide Perovskites. *Acc. Chem. Res.* **2016**, 49 (2), 330-338.
This review article has been widely cited by researchers in the field (639 citations, Google Scholar 7/25/2023)
8. **Christians, J. A.**; Manser, J. S.; Kamat, P. V. Multifaceted Excited State of CH₃NH₃PbI₃. Charge Separation, Recombination, and Trapping. *J. Phys. Chem. Lett.* **2015**, 6, 2086-2095. (Perspective)
7. **Christians, J. A.**; Miranda Herrera, P. A.; Kamat, P. V. Transformation of the Excited State and Photovoltaic Efficiency of CH₃NH₃PbI₃ Perovskite upon Controlled Exposure to Humidified Air. *J. Am. Chem. Soc.* **2015**, 137, 1530-1538.
This paper has been widely cited by researchers in the field (1301 citations, Google Scholar 7/25/2023)
6. Kamat, P. V.; **Christians, J. A.**; Radich, J. G., Quantum Dot and Nanowire Solar Cells. Hole Transfer as a Limiting Factor. *Langmuir* **2014**, 30 (20), 5729-5738. (Invited Feature)
5. Kim, J.-P.; **Christians, J. A.**; Choi, H.; Krishnamurthy, S; Kamat, P. V. CdSeS Nanowires. Compositionally Controlled Band Gap and Charge Dynamics. *J. Phys. Chem. Lett.*, **2014**, 5, 1103-1109.
4. **Christians, J. A.**; Leighton Jr., D. T.; Kamat, P. V. Rate Limiting Interfacial Hole Transfer in Solid-State Solar Cells. *Energy Environ. Sci.* **2014**, 7, 1148-1158.
3. **Christians, J. A.**; Fung, R. C. M.; Kamat, P. V. An Inorganic Hole Conductor for Organo-Lead Halide Perovskite Solar Cells. Improved Hole Conductivity with Copper Iodide. *J. Am. Chem. Soc.* **2014**, 136, 758-764.
This paper has been widely cited (>1197 citations, Google Scholar 9/23/2021) and was highlighted in news media upon publication, see article on Phys.org, url: <https://phys.org/news/2014-01-perovskite-solar-cells-cheaper-materials.html>
2. **Christians, J. A.**; Kamat, P. V. Trap and Transfer. Two-Step Hole Injection Across the Sb₂S₃/CuSCN Interface in Solid State Solar Cells. *ACS Nano* **2013**, 7, 7967-7974.
1. Oppenwall, S. R.; Divakaran, A.; Porter, E. G.; **Christians, J. A.**; Denhartigh, A. J.; Benson, D. E. Wide Dynamic Range Sensing with Single Quantum Dot Biosensors. *ACS Nano* **2012**, 6, 8078-86.

PATENTS AND RECORDS OF INVENTION

Kuno, M.; Brennan, M.; Ruth, A.; Pavlovte, I.; **Christians, J. A.**; Moot, T.; Luther, J. M. Compositional microstructuring to harden hybrid metal halide perovskites against cation and anion migration. Non-Provisional Application No. 18/003,776 (Filing Date 12/29/2022).

Wheeler, L. M.; **Christians, J. A.**; Berry, J. J.; Luther, J. M. Energy Harvesting Chromogenic Devices. U.S. Patent No. 10,844,658 B2 (11/24/2020).

OTHER SCIENTIFIC PUBLICATIONS

Rolston, N.; Bennett-Kennett, R.; Schelhas, L. T.; Luther, J. M.; **Christians, J. A.**; Berry, J. J.; Dauskardt, R. H. Comment on "Light-Induced Lattice Expansion Leads to High-Efficiency Perovskite Solar Cells." *Science* **2020**, 368 (6488), eaay8691.

Kamat, P. V.; **Christians, J. A.** Solar Cells versus Solar Fuels: Two Different Outcomes. *J. Phys Chem. Lett.* **2015**, 6, 1917-1918. (Editorial)

Christians, J. A.; Manser, J. S.; Kamat, P. V. Best Practices in Perovskite Solar Cell Efficiency Measurements. Avoiding the Error of Making Bad Cells Look Good. *J. Phys Chem. Lett.* **2015**, 6, 852-857. (Viewpoint Article)

INVITED PRESENTATIONS AND LECTURES

Christians, J. A. The Future of Solar Energy. *Calvin College, Executive Breakfast Series*, March **2024**, Grand Rapids, MI.

Christians, J. A. Phase Segregation and Structural Instabilities in Halide Perovskites. *ACS Spring 2024*, March **2024**, New Orleans, LA.

Christians, J. A. Phase Segregation and Structural Instabilities in Halide Perovskites. *2023 AIChE Annual Meeting*, November **2023**, Orlando, FL.

Christians, J. A. Research at Hope College: Designing Materials for Energy Applications. *AP Chemistry Guest Lecture*, Grand Rapids Christian High School, May **2022**, Virtual.

Christians, J. A. Research at Hope College: Designing Materials for Energy Applications. *Winterim*, Grand Rapids Christian High School, March **2021**, Virtual.

Christians, J. A.; Berkmen, M.; Munro, A. Thinking About Applying to a Primarily Undergraduate Institution? *Materials Research Society Webinar Series: How to Land a Faculty Position—From Application to Interview (Part 3)*, July **2020**, Virtual Session.

Participated as the keynote speaker for this virtual panel discussion with a live attendance of 163 participants.

Christians, J. A. Cutlip, E. V.; Surel, J. S. Where our Energy Comes from and what the Future Might Look Like. *Hope Academy of Senior Professionals (HASP)*, July **2020**, Virtual Session.

Christians, J. A. Perovskite Solar Cell Stability: From Cells to Modules. *Chemical Engineering and Materials Science Seminar*, Michigan State University, Jan. **2020**, East Lansing, MI.

Christians, J. A. Perovskite Solar Cell Stability: From Cells to Modules. *ND Energy Seminar*, University of Notre Dame, Sept. **2019**, Notre Dame, IN.

Christians, J. A.; Manser, J. S.; Kamat, P. V. Best Practices in Perovskite Solar Cell Efficiency Measurements. Avoiding the Error of Making Bad Cells Look Good. *StableNextSol COST Action no. MP1307 7th MC Meeting*, Congress Center of Instituto Superior Técnico, Apr. **2017**, Lisbon, Portugal.

Christians, J. A. An Introduction to Perovskite Solar Cells: Fundamentals, Techniques, and Current Trends. *International Workshop on Energy-Driven Materials 2015*, Universidad Autonoma de Nuevo Leon, Oct. **2015**, Monterrey, Mexico.

Led a 4 hour workshop on halide perovskite solar cells for graduate students, postdocs, and faculty.

Christians, J. A. The Possibilities and Pitfalls of Perovskite Solar Cells. *Engineering Department Seminar*, Calvin College, Apr. **2015**, Grand Rapids, MI.

Christians, J. A. Solar Paint, Notre Dame, and Surviving Graduate School. *Engineering Department Seminar*, Calvin College, Oct. **2013**, Grand Rapids, MI.

Christians, J. A. Painting the Future: Bringing Solar Power to the People. *ND Spark Conference*, Mendoza College of Business, *University of Notre Dame*, Apr. **2013**, South Bend, IN.

REFEREED CONFERENCE PROCEEDINGS

Christians, J. A.; Surel, J. S.; Cutlip, E. V.; Mandeville, J. R. Photovoltaic Windows and Chromogenic Perovskites. *Hybrid & Organic Photovoltaics (HOPV)*, **2024**, Valencia, Spain. (Oral)

Outen, J. E.; Campagna, R. M.; Wylie, Z. R.; Ruffolo, P.; Nelson, R.; Smith, S.; Grover, B.; **Christians, J. A.** Perovskite to Non-Perovskite Phase Changes Using in situ Measurements *AIChE National Meeting*, **2022**, Phoenix, AZ. (Oral)

- Surel, J. L.; Cutlip, E. V.; Mandeville, J. R.; Christians, J. A. 2D Halide Perovskites As Color-Changing Semiconductors *AIChE National Meeting*, **2022**, Phoenix, AZ. (Oral)
- Surel, J. L.; Cutlip, E. V.; Christians, J. A. Thermal Stability of 2D/3D Halide Perovskites *IEEE 49th Photovoltaic Specialists Conference*, **2022**, Philadelphia, PA. (Oral)
- Outen, J. E.; Campagna, R. M.; Wylie, Z. R.; Ruffolo, P.; Christians, J. A. Passivating Surface Iodide Defects Slows the CsPbI₃ Phase Transformation. *IEEE 49th Photovoltaic Specialists Conference*, **2022**, Philadelphia, PA. (Poster)
- Christians, J. A.; Wylie, Z. R.; Ruffolo, P.; Campagna, R. M.;** Measuring Phase Changes to Predict Halide Perovskite Solar Cell Degradation. *IEEE 48th Photovoltaic Specialists Conference*, **2021**, Virtual Session. (Oral)
- Christians, J. A.; Wylie, Z. R.; Ruffolo, P.** In Situ Measurement of Halide Perovskite Phase Changes. *13th International Conference on Hybrid and Organic Photovoltaics*, **2021**, Virtual Session. (Oral)
- Christians, J. A.; Surel, J. S.; Cutlip, E. V.** Exploring Halide Perovskite Structural Tunability to Design Materials for Dynamic Photovoltaic Windows. *2020 MRS Fall Meeting & Exhibit*, **2020**, Virtual Session. (Oral)
- Christians, J. A.; Cutlip, E. V.** Interactions between 2D Halide Perovskite Materials and Methylamine. *12th International Conference on Hybrid and Organic Photovoltaics*, **2020**, Virtual Session. (Poster)
- Christians, J. A.; Cutlip, E. V.** Interactions between 2D Halide Perovskite Materials and Methylamine. *nanoGE Online Meetup Conferences: Contemporary Stability Challenges in Hybrid Perovskite Photovoltaics*, **2020**, Virtual Session. (Poster)
- Christians, J. A.; Cutlip, E. V.** Exploring Halide Perovskite Structural Tunability to Design Materials for Dynamic Photovoltaic Windows. *2020 MRS Spring Meeting & Exhibit*, **2020**, Phoenix, AZ. (Poster, rescheduled due to COVID-19)
- Christians, J. A.; Marshall, A. R.; Zhao, Q.; Ndione, P.; Sanehira, E. M.; Luther, J. M.** Perovskite Quantum Dots. A New Absorber for Perovskite-Perovskite Tandem Solar Cells. *IEEE 7th World Conference on Photovoltaic Energy Conversion*, **2018**, Waikoloa, HI. (Oral)
- Christians, J. A.; Schulz, P.; Schloemer, T. H.; Harvey, S. P.; Tremolet de Villers, B. J.; Sellinger, A.; Berry, J. J.; Luther, J. M.** Designing Perovskite Solar Cell Interfaces to Exceed 1000 Hour Unencapsulated Ambient Operational Stability. *2018 MRS Spring Meeting & Exhibit*, **2018**, Phoenix, AZ. (Oral)
- Christians, J. A.; Schulz, P.; Tinkham, J. S.; Schloemer, T. H.; Harvey, S. P.; Tremolet de Villers, B. J.; Sellinger, A.; Berry, J. J.; Luther, J. M.** Engineering Perovskite Solar Cell Interfaces to Realize >1000 Hr, Unencapsulated Ambient Stability. *2017 AIChE Annual Meeting*, **2017**, Minneapolis, MN. (Oral)
- Christians, J. A.; Schelhas, L. T.; Berry, J. J.; Toney, M. F.; Tassone, C. J.; Luther, J. M.; Stone, K. H.** Monitoring the Cubic-Tetragonal Phase Transition in Working CH₃NH₃PbI₃ Solar Cells. *2017 MRS Spring Meeting & Exhibit*, **2017**, Phoenix, AZ. (Oral)
- Christians, J. A.; Nenon, D. P.; Wheeler, L. M.; Luther, J. M.** Processing Methylammonium Lead Halide Perovskites from Solution-Structural and Chemical Evolution. *2016 MRS Fall Meeting & Exhibit*, **2016**, Boston, MA. (Poster)
- Christians, J. A.** Charge Carrier Dynamics in Thin Film Solid-State Solar Cells. Tailoring Solution-Processed Semiconductors for Energy Applications. *2014 AIChE Annual Meeting*, **2014**, Atlanta, GA. (Poster)
- Christians, J. A.; Kamat, P. V.** Organometal Halide Perovskite Solar Cells Featuring Inorganic Hole Conductors. *2014 AIChE Annual Meeting*, **2014**, Atlanta, GA. (Oral)
- Christians, J. A.; Kamat, P. V.** Semiconductor Quantum Dot and Perovskite Photovoltaics. Tracking the Hole Transport in Thin Film Solid State Solar Cells. *2014 MRS Spring Meeting & Exhibit*, **2014**, B7.01, San Francisco, CA. (Oral)
- Christians, J. A.; Leighton Jr., D. T.; Kamat, P. V.** Determination of the Limiting Mechanism of Hole Transfer in Sb₂S₃/CuSCN Solid-State Solar Cells. *6th AIChE Midwest Regional Conference*, **2014**, Chicago, IL. (Oral)
- Christians, J. A.; Kamat, P. V.** Hole Transfer Dynamics of Sb₂S₃ Solar Cells. *246th ACS National Meeting & Exposition*, **2013**, 359, Indianapolis, IN. (Poster)

Christians, J. A.; Den Hartigh, A. J.; Benson, D. E. Analysis of Single Molecule Biosensors. *West Michigan Regional Undergraduate Science Research Conference*, **2009**, Grand Rapids, MI. (Poster)

MENTORED STUDENT CONFERENCE PROCEEDINGS

Campagna, R.; Smith, S.; Nelson, R.; **Christians, J. A.** Mechanistically Studying the Degradation of Cesium Lead Iodide Perovskite Phases due to Temperature and Humidity, *2023 AIChE Annual Meeting*, **2023**, Orlando, FL. (Poster)

Smith, S.; Campagna, R.; Outen, J.; **Christians, J. A.** Surface Halide Vacancies Influence the Phase Transition in CsPbI₃, *2023 AIChE Annual Meeting*, **2023**, Orlando, FL. (Poster)

Nelson, R.; Campagna, R.; Smith, S.; **Christians, J. A.** Studying the Phase Change Mechanism in Cesium Lead Iodide Perovskites as it Relates to Temperature and Humidity, *2022 AIChE Annual Meeting*, **2022**, Phoenix, AZ. (Poster)

Grover, B.; **Christians, J. A.** Mixed Halide Perovskite Phase Stability, *2022 AIChE Annual Meeting*, **2022**, Phoenix, AZ. (Poster)

Hill, Gracie; Tafarello, I.; **Christians, J. A.** Building Performance Analysis of the Hope College Concert Hall, *2022 AIChE Annual Meeting*, **2022**, Phoenix, AZ. (Poster)

Visser, D.; Bunnell, A.; DeYoung, P.; **Christians, J. A.** Space Solar Cells. Radiation Damage of Halide Perovskite Semiconductors. *MSGC 2022 Fall Conference*, **2022**, Ann Arbor, MI. (Poster)

Surel, J. L.; Cutlip, E. V.; Mandeville, J. R.; **Christians, J. A.** Exploring Halide Perovskite Structural Tunability to Design Materials for Dynamic Photovoltaic Windows. *21st Annual Celebration of Undergraduate Research and Creative Activity at Hope College*, **2022**, Holland, MI. (Poster)

Outen, J.; Campagna, R.; Wylie, Z.; Ruffolo, P.; **Christians, J. A.** Understanding the Role of Iodide Vacancy Passivation in Cesium Lead Iodide Perovskite Phase Stability. *21st Annual Celebration of Undergraduate Research and Creative Activity at Hope College*, **2022**, Holland, MI. (Poster)

Mandeville, J. R.; Surel, J. L.; Cutlip, E. V.; **Christians, J. A.** Manipulating Methylamine Deintercalation in 2D Halide Perovskites via an Organic Spacer. *21st Annual Celebration of Undergraduate Research and Creative Activity at Hope College*, **2022**, Holland, MI. (Poster)

Campagna, R.; Wylie, Z. R.; Outen, J.; Ruffolo, P.; **Christians, J. A.** Mechanistically Studying the Degradation of Cesium Lead Iodide Perovskite Phases Due to Temperature and Humidity. *21st Annual Celebration of Undergraduate Research and Creative Activity at Hope College*, **2022**, Holland, MI. (Poster)

Outen, J.; Campagna, R.; Wylie, Z.; Ruffolo, P.; **Christians, J. A.** Studying the Fundamental Mechanics Behind Cesium Lead Iodide Perovskite Phase Degradation due to Surface Defects. *2021 AIChE Annual Meeting*, **2021**, Boston, MA. (Poster)

Campagna, R.; Wylie, Z. R.; Outen, J.; Ruffolo, P.; **Christians, J. A.** Mechanistically Studying the Degradation of Cesium Lead Iodide Perovskite Phases Due to Temperature and Humidity. *2021 AIChE Annual Meeting*, **2021**, Boston, MA. (Poster)

Surel, J. L.; Mandeville, J. R.; Cutlip, E. V.; **Christians, J. A.** Exploring Halide Perovskite Structural Tunability to Design Materials for Dynamic Photovoltaic Windows. *2021 AIChE Annual Meeting*, **2021**, Boston, MA. (Poster)
Presentation awarded **1st place** in the National Student Conference category, Materials Engineering & Sciences I

Mandeville, J. R.; Surel, J. L.; Cutlip, E. V.; **Christians, J. A.** Manipulating Methylamine Deintercalation in 2D Halide Perovskites via Chain Length. *2021 AIChE Annual Meeting*, **2021**, Boston, MA. (Poster)

Mandeville, J. R.; Surel, J. L.; **Christians, J. A.** Properties and Stability of Perovskite Crystals for Application in Solar Cells. *MSGC 2021 Fall Conference*, **2021**, Grand Rapids, MI. (Poster)

Cutlip, E. V.; Surel, J. L.; **Christians, J. A.** Exploring Halide Perovskite Structural Tunability to Design Materials for Dynamic Photovoltaic Windows. *20th Annual Celebration of Undergraduate Research and Creative Activity at Hope College*, **2021**. (Virtual Poster)

Wylie, Z. R.; Ruffolo, P.; **Christians, J. A.** Vapor Initiated Crystal Phase Transition of Cesium Halide Perovskites. *20th Annual Celebration of Undergraduate Research and Creative Activity at Hope College*, **2021**. (Virtual Poster)

- Surel, J. L.; Cutlip, E. V.; Christians, J. A. Exploring Halide Perovskite Structural Tunability to Design Materials for Dynamic Photovoltaic Windows. *2020 AIChE Annual Meeting, 2020*. (Virtual Poster)
Presentation awarded **1st place** in the National Student Conference category, Materials Engineering & Sciences I
- Wylie, Z. R.; Ruffolo, P.; Christians, J. A. Vapor Initiated Crystal Phase Transition of Cesium Halide Perovskites. *2020 MSGC Virtual Fall Conference, 2020*. (Virtual Poster)
- Cutlip, E. V.; Christians, J. A. Interactions Between 2D Halide Perovskites and Methylamine. *47th IEEE Photovoltaics Specialists Conference, 2020*. (Virtual Poster)
- Porter, C. B.; Hallock, C. D.; Christians, J. A. Improved Surface Passivation of Halide Perovskite Quantum Dots using 5-AVA. *19th Annual Celebration of Undergraduate Research and Creative Activity at Hope College, 2020*, Holland, MI. (Virtual Poster)
- Cutlip, E. V.; Christians, J. A. Interactions Between 2D Halide Perovskites and Methylamine. *19th Annual Celebration of Undergraduate Research and Creative Activity at Hope College, 2020*, Holland, MI. (Virtual Poster)
- Wylie, Z. R.; Christians, J. A. Vapor Initiated Crystal Phase Transition of Cesium Halide Perovskites. *19th Annual Celebration of Undergraduate Research and Creative Activity at Hope College, 2020*, Holland, MI. (Virtual Poster)
- Wylie, Z. R.; Christians, J. A. Vapor Initiated Crystal Phase Transition of Cesium Halide Perovskites. *2019 AIChE Annual Meeting, 2019*, Orlando, FL. (Poster)
- Hallock, C. D.; Porter, C. B.; Christians, J. A. Improved Surface Passivation of Halide Perovskite Quantum Dots Using 5-AVA. *2019 AIChE Annual Meeting, 2019*, Orlando, FL. (Poster)

TEACHING EXPERIENCE

- | | |
|--------------|--|
| 2018–Present | Instructor: <i>Hope College</i> |
| | <ul style="list-style-type: none"> ▪ ENGS 100-Lab: Introduction to Engineering Laboratory ▪ ENGS 210: Engineering Computing ▪ ENGS 340: Applied Thermodynamics ▪ ENGS 346: Fluid Mechanics ▪ ENGS 348: Heat Transfer ▪ ENGS 375: Phase Equilibrium & Separations I |
| 2014–2015 | Instructor: <i>University of Notre Dame</i> |
| | <ul style="list-style-type: none"> ▪ Introduction to Engineering Systems I & II |
| 2010–2012 | Teaching Assistant, <i>University of Notre Dame</i> |
| | <ul style="list-style-type: none"> ▪ Nanoscience and Technology ▪ Introduction to Chemical Engineering ▪ Physical Chemistry for Chemical Engineers ▪ Chemical Engineering Laboratory II |
| 2009–2010 | Teaching Assistant, <i>Calvin College</i> |
| | <ul style="list-style-type: none"> ▪ Organic Chemistry Laboratory I & II ▪ General Chemistry Laboratory I & II |
| 2008 | Private Tutor, <i>Grand Valley State University</i> |
| | <ul style="list-style-type: none"> ▪ Organic Chemistry I & II |

RESEARCH MENTORING EXPERIENCE

Mentored research students while at Hope College

- | | |
|--------------|---|
| 2024-present | Ian McGovern |
| 2024-present | Brian Tran |
| 2024-present | Peter Lillich |
| 2024-present | Laurel Wasiniak |
| 2024-present | Avery Almy |
| 2021-2024 | Rory Campagna ('24) (<i>Pursuing Ph.D. Food Science, Penn. State</i>) |
| 2022-2024 | Samuel Smith |
| 2022-2024 | Bryce Grover |
| 2022 | Riley Nelson |
| 2022 | Gracie Hill ('24) |
| 2022 | Isabella Tafarello ('24) |

2022-present	Dirk Visser
2022	Mark Krudy ('24)
2021-2022	James Mandeville ('22) (<i>Pursuing Ph.D. Chemical Engineering, U. Mass. Amherst</i>)
2021-2022	Jonathan Outen ('22)
2020-2022	Josephine Surel ('22) (<i>Pursuing Ph.D. Applied Physics, Oxford</i>)
2020-2021	Peter Ruffolo ('23)
2019-2021	Elizabeth Cutlip ('22)
2019-2021	Zachary Wiley ('21), (<i>Pursuing Ph.D. Chemical Engineering, U. Washington</i>)
2019-2020	Cedric Porter ('21), (<i>Pursuing M.D.</i>)
2019	Claire Hallock ('20), (<i>Pursuing Ph.D. Chemistry, UT Austin</i>)

Mentored students through Hope College Green Revolving Fund

2024-present	Kathryn Mahoney
2024-present	Jordan Craft
2024-present	Nicholas Migaldi
2024-present	Ian Fredrickson
2023-present	Amy Drelicharz
2023-present	Ellie Haak
2023-present	Peter Lillich
2023-2024	Mark Krudy ('24)
2023-2024	Owen Aaberg ('24)

Mentored research students from prior appointments

2017	Mokshin Suri, undergraduate, <i>University of Texas at Austin</i>
2014	Mark Wilson, teacher, <i>John Adams High School, South Bend, IN</i>
2014	Pierre Alexander Miranda Herrera, undergraduate, <i>Tec de Monterrey</i>
2013–2014	Mia Eppler, undergraduate, <i>University of Notre Dame</i>
2013	Ken Poling, teacher, <i>Penn High School, Mishawaka, IN</i>
2013	David O'Shaughnassey, undergraduate, <i>University College Cork</i>
2012–2013	Raymond Fung, undergraduate, <i>University of Waterloo</i>
2012	Owen Abe, undergraduate, <i>University of Maryland</i>

SERVICE & COMMUNITY OUTREACH

2024	Engineering Showcase admissions event Led work to organize and host ~40 prospective students for an all-day introduction to Hope's engineering program
2023	Hope College Critical Issues Symposium speaker, "Climate Change"
2022-2023	Engineering Department Search Committee (2x)
2022	Organized ExploreHope high school program, "Research in Photovoltaics"
2022-2023	Assisted with design of Dye-Sensitized Solar Cell Laboratory in Calvin University CHEM230L
2022	Guest Editor, IEEE Journal of Photovoltaics
2022-present	Chair of the Subcommittee on Conservation – Hope College Green Team
2021-2022	Expert Consultant, <i>EVO Engineering and Design</i>
2022	NSF Reviewer
2021	Expert Consultant, <i>Stellarix Consultancy Services</i>
2021	Guest Speaker, Hope College Chapel
2021	Carbon Neutral Subcommittee, Hope College Green Team
2021-2022	Area 6 Chair, 2022 IEEE 49th Photovoltaic Specialists Conference
2021	NSF Reviewer
2021	Hope College Admissions Summer Open House Panelist
2021	Guest Associate Editor for Energy Materials, <i>Frontiers in Materials</i>
2020-2021	Holland Michigan Strategic Development Team part of a team of 8 tasked with advising the city of Holland on the Holland Community Energy Plan
2020-2021	Area 6 co-chair, 2021 IEEE 48th Photovoltaic Specialists Conference
2020-present	Member of the Hope College Green Team
2020-present	Member of the NREL Postdoc Academic Advisory Panel
2020-present	Member of the Engineering Department Promotions Committee
2020	Hope College Admissions Summer Open House Panelist (5x)

2020	Organized inaugural Engineering Showcase admissions event Led work to organize and host ~40 prospective students for an all-day introduction to Hope's engineering program
2019-2020	Klesis Mentoring Program
2018	Area 6 co-chair, 2018 IEEE 45th Photovoltaics Specialists Conference
2016–2017	Hands On Photovoltaic Experience at NREL mentor (2x)
2015	Northern Indiana Regional Science and Engineering Fair, senior science fair judge
2015	Outstanding Reviewer: Journal of Physical Chemistry Letters
2014	Facilitator for Elkhart Memorial High School solar cell experiment
2014	Imagination, Innovation, Discovery and Design at Notre Dame (I2D2) assistant
2014	Research Experience for Teachers mentor
2013	Student representative to the College of Engineering Advisory Council
2013	Lakeshore High School student laboratory tour guide
2012–2013	Siemens Competition Students laboratory tour guide (2x)
2012–2015	Maintained and updated Kamat group website and Social media outreach
2012	Notre Dame Chemical and Biomolecular Engineering Department website committee
2012	Project Infinite Green laboratory tour guide
2012	ACS Graduate Student/Postdoc Summer Institute
2011–2014	Research Experience for Teachers laboratory tour guide (4x)
2011	Northern Indiana Regional Science and Engineering Fair, middle school science fair judge