

Zachary A. VanOrman, Ph.D.

Assistant Professor of Chemistry

Hope College, Holland, MI

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2025 – Assistant Professor of Chemistry, Hope College, Holland MI.

EDUCATION AND RESEARCH EXPERIENCE

- 2024 - 2025 Research Scientist**, EPFL, Switzerland
Faculty Advisor: Prof. Sascha Feldmann
Project: Chiroptical and magneto-optical spectroscopy of halide perovskites
- 2022 - 2024 Postdoctoral Fellow**, Rowland Institute, Harvard University, USA
Faculty Advisor: Prof. Sascha Feldmann
Project: Ultrafast spectroscopy and synthesis of metal-doped perovskite nanocrystals
- 2022 Ph.D. in Chemistry**, Florida State University, Tallahassee, FL, USA
Faculty Advisor: Prof. Lea Nienhaus
Dissertation: Dimensionality Tuning of Triplet Sensitizers for Triplet-Triplet Annihilation-Based Upconversion
- 2018 B.S. in Chemistry**, *cum laude*, Hillsdale College, Hillsdale, MI, USA
- 2017 Research Experience for Undergraduates (REU)**, University of Alabama, USA
Faculty Advisor: Prof. Shanlin Pan
Project: Nanostructured semiconductor electrodes for solar energy harvesting and conversion

PATENTS

- VanOrman, Z.A.**, Wuttig, M.C., Feldmann, S. Room Temperature Ambient Synthesis of Metal-Doped Halide Perovskite Nanocrystals. **Patent Pending**: US20250171686A1.

PUBLICATIONS (* denotes co-first authorship)

- Reponen, A.P.M.; Mattes, M.; **VanOrman, Z.A.**; Estaque, L.; Pieters, G.; Feldmann, S. Broadband Transient Full-Stokes Luminescence Spectroscopy with High Sensitivity. **2025**, *Nature*, 643 675-682.
- VanOrman, Z.A.**; Wuttig, M.C.; Kim, T.S.; Reponen, A.P.M.; Casaday, C.; Cui, D.; Deshpande, T.; Jöbsis, H.J.; Schouwink, P.; Oveisi, E.; Bournet, A.; Reece, C.; Feldmann, S. Metal Doping of Strongly Confined Halide Perovskite Nanocrystals under Ambient Conditions, **2025**, *Journal of the American Chemical Society*, 147, 16536-16544. <https://doi.org/10.1021/jacs.5c03629>.
- VanOrman, Z.A.**; Savinson, B.; Deshpande, T.; Gilley, I.W.; Scopelliti, R.; Reponen, A.P.M.;

- Kanatidis, M.G.; Sargent, E.H.; Voznyy, O.; Feldmann, S. Narrow-Linewidth Emission and Weak Exciton-Phonon Coupling in 2D Layered Germanium Halide Perovskites. **2025**, *Advanced Materials*, 2419879. <https://doi.org/10.1002/adma.202419879>.
4. Jöbssis, H.J.; Gao, L.; Reponen, A.P.M.; **VanOrman, Z.A.**; Rijpers, R.P.P.P.M; Wang, H.I.; Feldmann, S.; Hutter, E.M. The Effect of Charge Carrier Cooling on the Ultrafast Carrier Dynamics in Cs₂AgBiBr₆ Thin Films, **2025**, *ACS Energy Letters*, 10, 1050-1056. <https://doi.org/10.1021/acseenergylett.4c02439>.
 5. Mastej, K.O.; Batnaran, B.; Reponen, A.P.M.; **VanOrman, Z.A.**; Banger, K.; Hayward, M.A.; Deringer, V.L.; Feldmann, S. An Experimental Data Library for the Full CsPb(Cl_xBr_{1-x})₃ Compositional Series. **2025**, *Chemical Communications*, 61, 6146-6149. <https://doi.org/10.1039/d5cc00735f>.
 6. **VanOrman, Z. A.**; Kitzmann, W. R.; Reponen, A. P. M.; Deshpande, T.; Jöbssis, H. J.; Feldmann, S. Chiral Light-Matter Interactions in Solution-Processable Semiconductors. **2025**, *Nature Reviews Chemistry*, 9, 208-223. <https://doi.org/10.1038/s41570-025-00690-x>.
 7. Luo, W.; Kim, S.; Lempesis, N.; Merten, L.; Kneschaurek, E.; Dankl, M.; Carnevali, V.; Agosta, L.; Slama, V.; **VanOrman, Z.A.**; Siczek, M.; Bury, W.; Gallant, B.; Kubicki, D. J.; Zalibera, M.; Piveteau, L.; Deconinck, M.; Guerrero-León, L. A.; Frei, A. T.; Gaina, P. A.; Carteau, E.; Zimmermann, P.; Hinderhofer, A.; Schreiber, F.; Moser, J.-E.; Vaynzof, Y.; Feldmann, S.; Seo, J.-Y.; Rothlisberger, U.; Milić, J. V. From Chalcogen Bonding to S- π Interactions in Hybrid Perovskite Photovoltaics. **2024**, *Advanced Science*, 2405622. <https://doi.org/10.1002/advs.202405622>.
 8. Kitzmann, W.R.; Freudenthal, J.; Reponen, A.P.M.; **VanOrman, Z.A.**; Feldman, S. Fundamentals, Advances, and Artifacts in Circularly Polarized Luminescence (CPL) Spectroscopy. **2023**, *Advanced Materials*, 2302279. <https://doi.org/10.1002/adma.202302279>.
 9. **VanOrman, Z. A.**; Weiss, R.; Bieber, A. S.; Nienhaus, L. Mechanistic Insight into CdSe Nanoplatelet-Sensitized Upconversion: Size and Stacking Induced Effects. **2023**, *Chemical Communications*, 59, 322-325. <https://doi.org/10.1039/D2CC04694F>.
 10. Sullivan, C. M.; Bieber, A.S.; Drozdick, H.K.; Moller, G.; Kuszynski, J.E.; **VanOrman, Z.A.**; Wieghold, S.; Strouse, G.F.; Nienhaus, L. Surface Doping Boosts Triplet Generation Yield in Perovskite Sensitized Upconversion. **2023**, *Advanced Optical Materials*, 11, 2201921. <https://doi.org/10.1002/adom.202201921>.
 11. ***VanOrman, Z. A.**; *Weiss, R.; Sullivan, C. M.; Nienhaus, L. A Sensitizer of Purpose: Generating Triplet Excitons with Semiconductor Nanocrystals. **2022**, *ACS Materials Au*, 2, 641-654. <https://doi.org/10.1021/acsmaterialsau.2c00047>.
 12. **VanOrman, Z. A.**; Weiss, R.; Medina, M.; Nienhaus, L. Scratching the Surface: Passivating Perovskite Nanocrystals for Future Device Integration. **2022**, *Journal of Physical Chemistry Letters*, 13 (4), 982–990. <https://doi.org/10.1021/acs.jpcllett.1c04130>.
 13. Conti, C. R.; Bieber, A. S.; **VanOrman, Z. A.**; Moller, G.; Wieghold, S.; Schaller, R. D.; Strouse, G. F.; Nienhaus, L. Ultrafast Triplet Generation at the Lead Halide Perovskite/Rubrene Interface. **2022**, *ACS Energy Letters*, 617–623. <https://doi.org/10.1021/acsenergylett.1c02732>.
 14. ***VanOrman, Z. A.**; *Bieber, A. S.; Drozdick, H. K.; Weiss, R.; Wieghold, S.; Nienhaus, L. Mixed Halide Perovskite Triplet Sensitizers: Interplay between Band Alignment, Traps, and Phonons. **2021**, *Journal of Chemical Physics*, 155 (23), 234706. <https://doi.org/10.1063/5.0077439>. **Editor Featured Article.**

15. **VanOrman, Z. A.**; Lackner, J.; Wieghold, S.; Nienhaus, K.; Nienhaus, G. U.; Nienhaus, L. Efficiency of Bulk Perovskite-Sensitized Upconversion: Illuminating Matters. **2021**, *Applied Physics Letters*, *118* (20), 203903. <https://doi.org/10.1063/5.0050185>. **Editor's Pick**
16. **VanOrman, Z. A.**; Nienhaus, L. Bulk Metal Halide Perovskites as Triplet Sensitizers: Taking Charge of Upconversion. **2021**, *ACS Energy Letters*, *6* (10), 3686–3694. <https://doi.org/10.1021/acsenerylett.1c01794>. **Editor's Choice**.
17. **VanOrman, Z. A.**; Conti, C. R.; Strouse, G. F.; Nienhaus, L. Red-to-Blue Photon Upconversion Enabled by One-Dimensional CdTe Nanorods. **2021**, *Chemistry of Materials*, *33* (1), 452–458. <https://doi.org/10.1021/acs.chemmater.0c04468>.
18. **VanOrman, Z. A.**; Nienhaus, L. Feeling Blue No More: How TIPS-Naphthalene Enables Efficient Visible-to-UV Upconversion. **2021**, *Matter*, *4* (8), 2625–2626. <https://doi.org/10.1016/j.matt.2021.06.024>.
19. Wieghold, S.; Luo, Y.; Bieber, A. S.; Lackner, J.; Shirato, N.; **VanOrman, Z. A.**; Rosenmann, D.; Nienhaus, K.; Lai, B.; Nienhaus, G. U.; Rose, V.; Nienhaus, L. Impact of Transition Metal Doping on the Structural and Optical Properties of Halide Perovskites. **2021**, *Chemistry of Materials*, *33* (15), 6099–6107. <https://doi.org/10.1021/acs.chemmater.1c01645>.
20. **VanOrman, Z. A.**; Nienhaus, L. Recent Advancements in Halide Perovskite Nanomaterials and Their Optoelectronic Applications. **2021**, *InfoMat*, *3* (9), 962–986. <https://doi.org/10.1002/inf2.12187>.
21. **VanOrman, Z. A.**; Drozdick, H. K.; Wieghold, S.; Nienhaus, L. Bulk Halide Perovskites as Triplet Sensitizers: Progress and Prospects in Photon Upconversion. **2021**, *Journal of Materials Chemistry C*, *9* (8), 2685–2694. <https://doi.org/10.1039/D1TC00245G>.
22. Wieghold, S.; **VanOrman, Z. A.**; Nienhaus, L. Halide Perovskites: A Progress Report on Photon Interconversion. **2020**, *Advanced Optical Materials*, 2001470. <https://doi.org/10.1002/adom.202001470>.
23. ***VanOrman, Z. A.**; *Bieber, A. S.; Wieghold, S.; Nienhaus, L. Perovskite-Sensitized Upconversion Bingo: Stoichiometry, Composition, Solvent, or Temperature? **2020**, *Journal of Chemical Physics*, *153* (8), 084703. <https://doi.org/10.1063/5.0021973>.
24. Wieghold, S.; Bieber, A. S.; **VanOrman, Z. A.**; Rodriguez, A.; Nienhaus, L. Is Disorder Beneficial in Perovskite-Sensitized Solid-State Upconversion? The Role of DBP Doping in Rubrene. **2020**, *Journal of Physical Chemistry C*, *124*, 18132–18140. <https://doi.org/10.1021/acs.jpcc.0c05290>.
25. **VanOrman, Z. A.**; Bieber, A. S.; Wieghold, S.; Nienhaus, L. Green-to-Blue Triplet Fusion Upconversion Sensitized by Anisotropic CdSe Nanoplatelets. **2020**, *Chemistry of Materials*, *32* (11), 4734–4742. <https://doi.org/10.1021/acs.chemmater.0c01354>.
26. **VanOrman, Z. A.**; Nienhaus, L. Kitchen Spectroscopy: Shining a (UV) Light on Everyday Objects. **2020**, *Matter*, *2* (6), 1348–1351. <https://doi.org/10.1016/j.matt.2020.04.026>.
27. ***VanOrman, Z. A.**; *Bieber, A. S.; Wieghold, S.; Nienhaus, L. A Perspective on Triplet Fusion Upconversion: Triplet Sensitizers Beyond Quantum Dots. **2019**, *MRS Communications*, *9* (3), 924–935. <https://doi.org/10.1557/mrc.2019.115>.
28. Wieghold, S.; Bieber, A. S.; **VanOrman, Z. A.**; Nienhaus, L. Influence of Triplet Diffusion on Lead Halide Perovskite-Sensitized Solid-State Upconversion. **2019**, *Journal of Physical Chemistry Letters*, *10* (13), 3806–3811. <https://doi.org/10.1021/acs.jpcclett.9b01526>.
29. Wieghold, S.; Bieber, A. S.; **VanOrman, Z. A.**; Daley, L.; Leger, M.; Correa-Baena, J.-P.;

- Nienhaus, L. Triplet Sensitization by Lead Halide Perovskite Thin Films for Efficient Solid-State Photon Upconversion at Subsolar Fluxes. **2019**, *Matter*, *1* (3), 705–719. <https://doi.org/10.1016/j.matt.2019.05.026>.
30. Wieghold, S.; Tresback, J.; Correa-Baena, J.; Hartono, N.; Sun, S.; Liu, Z.; Layurova, M.; **VanOrman, Z. A.**; Bieber, A.; Thapa, J.; Lai, B.; Cai, Z.; Nienhaus, L.; Buonassisi, T. Halide Heterogeneity Affects Charge Carrier Dynamics in Mixed-Ion Lead Perovskite Thin Films. **2019**, *Chemistry of Materials*, *31* (10), 3712–3721. <https://doi.org/10.1021/acs.chemmater.9b00650>.

AWARDS

Academic Recognition

Russel H. Johnson Dissertation Award, Florida State University Chemistry and Biochemistry, 2023.
Highest award bestowed by FSU Chemistry Department.

Physical Chemistry Graduate Student Award, FSU, 2022.

Cheryl and Joel Rosenfield Award, FSU, 2021.

Poster Awards

“Best Poster” awarded by ACS Energy Letters, Internet Conference for Quantum Dots, 2020.

Travel awards

Departmental Travel Award, Florida State University Chemistry and Biochemistry, 2022.

Philip Schlenoff Endowed Excellence Award for Graduate Student Travel, Florida State University Chemistry and Biochemistry, 2022.

Philip Schlenoff Endowed Excellence Award for Graduate Student Travel, Florida State University Chemistry and Biochemistry, 2021.

PRESENTATIONS AND POSTERS

Oral Presentations

1. NanoGe Materials for Sustainable Development Conference, Lausanne, 2024.
2. Materials Research Society Fall Meeting, Boston, 2024.
3. American Chemical Society Spring Meeting, New Orleans, 2024.
4. Materials Research Society Fall Meeting, Boston, 2023.
5. Summer Idea Smash Symposium, Harvard School of Engineering and Applied Sciences, 2023.
6. JAWSCHEM, online, 2021.
7. NanoGe Spring Meeting, online, 2021.
8. Materials Research Society Spring/Fall Meeting, online, 2021.
9. Materials Research Society Spring/Fall Meeting, online, 2020.
10. Internet Meetup on Photon Conversion, online, 2020.
11. Florida Inorganic and Materials Symposium, Gainesville, 2019.
12. Chemistry Seminar, Hillsdale College, 2019.

Poster Presentations

13. Colloidal Semiconductor Nanocrystal Gordon Research Conference, Les Diablerets, 2024.
14. American Chemical Society Spring Meeting, New Orleans, 2024
15. Electron Donor-Acceptor Interactions Gordon Research Conference, Newport, 2022. **Funded by Schlenoff Travel Grant.**
16. American Chemical Society Spring Meeting, San Diego, 2022. **Funded by Schlenoff Travel Grant.**
17. NanoGe QDSchool, online, 2021.
18. NanoFlorida Spring Meeting, online, 2020.
19. Internet Conference for Quantum Dots, online, 2020.

TEACHING & ADVISING EXPERIENCE

Teaching Assistant

Responsibilities included developing new class materials, leading class discussions, supervising labs, grading all assignments, and meeting with students individually.

- Physical Chemistry II Lab Summer 2022, Florida State University. 3 students.
- Physical Chemistry II Spring 2022, Florida State University. 46 students.
- Physical Chemistry II Lab Spring 2022, Florida State University. 26 students.
- General Chemistry I, Fall 2021, Florida State University. 245 students.
- Physical Chemistry II Lab, Spring 2020, Florida State University. 11 students.
- Physical Chemistry II, Spring 2020, Florida State University. 37 students
- General Chemistry II, Fall 2019, Florida State University. 225 students.
- General Chemistry II Lab, Spring 2019, Florida State University. 49 students.
- General Chemistry I Lab, Fall 2018, Florida State University. 52 students.
- Organic Chemistry II, Spring 2018, Hillsdale College. 20 students.
- General Chemistry I, Fall 2017, Hillsdale College. 55 students.
- General Chemistry II, Spring 2017, Hillsdale College. 55 students.

Guest lecturer

- Kinetics and Dynamics of Chemical Reactions, Fall 2024, 2 guest lectures. Assisted in preparation of course materials, delivering lecture to 3rd year students.
- General Chemistry I, Fall 2023, 2 guest lectures. Prepared course materials and led lectures on states of matter and physical/chemical properties.

Advising Experience

1 Ph.D. student at EPFL (2024-), 1 Ph.D. student at Harvard (2023-2024), 2 master's students at Harvard (2023-2024), 1 undergraduate student at Harvard (2023), and 4 undergraduate students at Florida State (2018-22).

PROFESSIONAL SERVICE

Committee Experience

Lead organizer for seminar series "News in Nanocrystals"

- Assisted in organizing free seminar series developed during the pandemic featuring lead speakers

- in the field, managed website with 1500 registered users.
- Safety Correspondence Committee (COSEC), EPFL
- Lead and organized safety training sessions and enforced lab safety protocols.

Educational Outreach

STEM Exploration Festival, 2022, Somerville, MA.
Kitchen Spectroscopy, 2019-21, Tallahassee, FL.
Scientific Demonstrations, 2015-18, Hillsdale MI.

Academic Service

Scientific reviewer for:

Science Advances (American Association for the Advancement of Science)
Nature Communications (Nature Publishing Group)
Nature Synthesis (Nature Publishing Group)
Journal of the American Chemical Society (American Chemical Society)
Inorganic Chemistry (American Chemical Society)
Physical Review Applied (American Physical Society)
Journal of Materials Chemistry C (Royal Society of Chemistry)
Physical Chemistry Chemical Physics (Royal Society of Chemistry)