

KAMERON R. HANSEN

4166 Henry Eyring Building (HEB)
315 S 1400 E, Salt Lake City, UT 84112
917-609-4598
kameron.hansen@utah.edu

EDUCATION

Aug 2019 – Sept 2022 **University of Utah**
Ph.D., Chemistry, September 2022 (GPA 3.98)

Sept 2017 – Dec 2018 **Columbia University**
M.S., Chemical Physics, December 2018 (GPA 3.64)

Aug 2009 – April 2017 **Brigham Young University**
B.S., Physics, minor in Mathematics, April 2017 (GPA 3.88)
Started B.S. in Physics in June 2014

2005-2009 **Solon High School, Solon, IA**

RESEARCH AND WORK EXPERIENCE

2022-2023 **University of Utah, Postdoctoral Scholar**
Department Chemistry
Supervisor: Dr. Luisa Whittaker-Brooks

- Led scientific projects, from idea conception to manuscript submission
- Mentored three undergraduate students
- Built optical experiments

2019-2022 **University of Utah, NSF Graduate Research Fellow**
Department Chemistry
Supervisor: Dr. Luisa Whittaker-Brooks

- Researched perovskite semiconductors for photovoltaic applications
- Wrote grant proposals and carried out original research ideas

2019-2020 **Systems Engineering Consultant**
iotaMotion
Supervisor: Dr. Chris Kaufmann

- Developed algorithms for the real-time processing of auditory nerve signals

2017-2018 **Columbia University, Teaching Assistant**
Department of Physics and Department of Chemistry
Supervisor: Dr. Laura Kaufman

- Teaching assistant for Chemistry UN3079, Physical Chemistry I
- Teaching assistant Physics UN1291, General Physics I Lab

2017-2018 **Columbia University, Graduate Research Assistant**
Department of Physics and Department of Chemistry

Supervisor: Dr. Xiaoyang Zhu

- Designed, built, and operated ultrafast photoemission experiments
- Fabricated 2D semiconductor devices

2014-2017 **Brigham Young University, Teaching Assistant**

Department of Physics and Astronomy

Supervisor: Dr. Grant Hart

- Teaching assistant for Physics 230, Computational Physics Lab 1
- Teaching assistant for Physics 121, Intro to Newtonian Mechanics
- Teaching assistant for Physics 220, Intro to Electricity and Magnetism
- Tutored student athletes in physics and linear algebra

2015-2017 **Brigham Young University, Undergraduate Research Assistant**

Department of Physics and Astronomy

Supervisor: Dr. John Colton

- Synthesized quantum dots inside ferritin and fabricated dye-sensitized solar cells
- Tested reflectance of Al thin films in the X-UV range at Lawrence Berkeley National Laboratory

July-Sept. 2015 **General Atomics, Undergraduate Research Assistant**

Inertial Confinement Fusion Group & Princeton Plasma Physics Laboratory

Supervisor: Dr. Greg Randall

- Awarded SULI internship by the Department of Energy
- Used EBSD to measure dislocation density in high-pressure shocked tantalum samples

April-Nov 2010 **University of Iowa, Undergraduate Research Assistant**

Carver College of Medicine

Supervisors: Dr. Val Sheffield, Dr. Wei Ying Yue, and Dr. Seongjin Seo

- Studied the effect of microRNA-21 on the growth of schwannoma cells
- Studied the role Bardel-Beidel syndrome proteins play in intracellular trafficking

PUBLICATIONS

1. **Hansen, K.R.**, McClure, C. E., Parker, M.A., Xie, Z.Y., Nie, W.Y., Colton, J.S., Whittaker-Brooks, L. (2023). Stochastic Charge-Transfer Excitons in 2D Metal-Halide Perovskites. Under review at *Nat. Comm.*
2. Colton, J.S., **Hansen, K.R.** Two-Dimensional Metal Halide Perovskites: A Machine-Generated Literature Overview. *Springer-Nature*. (1st ed. release in March 2024)
3. **Hansen, K. R.**, Wong, C. Y., McClure, C. E., Romrell, B., Flannery, L., Powell, D., . . . Whittaker-Brooks, L. (2023). Mechanistic Origins of Excitonic Properties in 2D Perovskites: Implications for Exciton Engineering. *Matter*.
4. **Hansen, K. R.**, Colton, J. S., & Whittaker-Brooks, L. (2023). Measuring the exciton binding energy: learning from a decade of measurements on halide perovskites and transition metal dichalcogenides. *Advanced Optical Materials*.

5. **Hansen, K. R.**, Romrell, B., McClure, C. E., Eggleston, M., Berzansky, A., Lin, J. W., ... & Colton, J. S. (2023). Ruddlesden–Popper Perovskite Alloys: Continuous and Discontinuous Tuning of the Electronic Structure. *The Journal of Physical Chemistry C*, 127(19), 9344-9353.
6. **Hansen, K. R.** (2023). *Electroabsorption Spectroscopy of Two-Dimensional Metal-Halide Perovskites*. (Ph.D.). University of Utah.
7. **Hansen, K. R.**, McClure, C. E., Colton, J. S., & Whittaker-Brooks, L. (2022). Franz-Keldysh and Stark Effects in Two-Dimensional Metal Halide Perovskites. *PRX Energy*, 1(1), 013001.
8. **Hansen, K. R.**, McClure, C. E., Powell, D., Hsieh, H. C., Flannery, L., Garden, K., . . . Nordlund, D. (2022). Low Exciton Binding Energies and Localized Exciton–Polaron States in 2D Tin Halide Perovskites. *Advanced Optical Materials*, 2102698.
9. Flannery, L., **Hansen, K. R.**, Ogle, J., Powell, D., Garden, K., & Whittaker-Brooks, L. (2022). Voltage Bias Stress Effects and Electronic Stability of π -Conjugated Crosslinked Tin Halide Perovskites. *ACS Applied Energy Materials*, 5(12), 14720-14731.
10. Pham, M. T., Amerling, E., Ngo, T. A., Luong, H. M., **Hansen, K. R.**, Pham, H. T., . . . Nguyen, T. D. (2022). Strong Rashba-Dresselhaus Effect in Nonchiral 2D Ruddlesden-Popper Perovskites. *Advanced Optical Materials*, 10(1), 2101232.
11. **Hansen, K. R.**, & Whittaker-Brooks, L. (2022). Finding the FAIRness in perovskite photovoltaics research. *Matter*, 5(8), 2461-2464.
12. Powell, D., Zhang, X., Nwachukwu, C. I., Miller, E. J., **Hansen, K. R.**, Flannery, L., . . . Whittaker-Brooks, L. (2022). Establishing Self-Dopant Design Principles from Structure–Function Relationships in Self-n-Doped Perylene Diimide Organic Semiconductors. *Advanced Materials*, 34(42), 2204656.
13. Powell, D., Rhodes, Z., Zhang, X., Miller, E. J., Jonely, M., **Hansen, K. R.**, . . . Whittaker-Brooks, L. (2022). Photoactivation Properties of Self-n-Doped Perylene Diimides: Concentration-dependent Radical Anion and Dianion Formation. *ACS Materials Au*, 2(4), 482-488.
14. Amerling, E., **Hansen, K. R.**, & Whittaker-Brooks, L. (2021). Resolving buried optoelectronic features in metal halide perovskites via modulation spectroscopy studies. *Journal of Materials Chemistry A*, 9(42), 23746-23764.
15. Powell, D., **Hansen, K. R.**, Flannery, L., & Whittaker-Brooks, L. (2021). Traversing Excitonic and Ionic Landscapes: Reduced-Dimensionality-Inspired Design of Organometal Halide Semiconductors for Energy Applications. *Accounts of Chemical Research*, 54(23), 4371-4382.
16. Liu, F., Ziffer, M. E., **Hansen, K. R.**, Wang, J., & Zhu, X. (2019). Direct determination of band-gap renormalization in the photoexcited monolayer MoS₂. *Physical Review Letters*, 122(24), 246803.
17. Liu, F., Wang, F., **Hansen, K. R.**, & Zhu, X. Y. (2019). Bimodal Bandgaps in Mixed Cesium Methylammonium Lead Bromide Perovskite Single Crystals. *The Journal of Physical Chemistry C*, 123(23), 14865-14870.
18. Randall, G. C., **Hansen, K. R.**, Jackson, B., & Fullwood, D. T. (2019). Lower-bound dislocation density mapping in microcoined tantalum using high-resolution electron backscatter diffraction. *Materials Characterization*, 153, 318-327.

19. **Hansen, K. R.**, Peterson, J. R., Perego, A., Shelley, M., Olsen, C. R., Perez, L. D., . . . Colton, J. S. (2018). Lead sulfide quantum dots inside ferritin: synthesis and application to photovoltaics. *Applied Nanoscience*, 8(7), 1687-1699.
20. Olsen, C. R., Embley, J. S., **Hansen, K. R.**, Henrichsen, A. M., Peterson, J. R., Colton, J. S., & Watt, R. K. (2017). Tuning Ferritin's band gap through mixed metal oxide nanoparticle formation. *Nanotechnology*, 28(19), 195604.
21. Olsen, C. R., Smith, T. J., Embley, J. S., Maxfield, J. H., **Hansen, K. R.**, Peterson, J. R., . . . Watt, R. K. (2017). Permanganate-based synthesis of manganese oxide nanoparticles in ferritin. *Nanotechnology*, 28(19), 195601.
22. **Hansen, K. R.** (2017). *Ferritin encapsulated PbS, PbSe, and MoS2 Nanocrystals for Photovoltaic Applications*. (Bachelor of Science). Brigham Young University,
23. Perego, A., Olsen, C. R., **Hansen, K. R.**, Colton, J. S., & Watt, R. K. (2016). Fabrication of Dye-Sensitized Solar Cells Using Native and Non-Native Nanocrystals in Ferritin as the Dye. *Utah Academy of Sci.*, 93.
24. Nelson, R. F., **Hansen, K. R.**, Gantz, B. J., & Hansen, M. R. (2015). Calvarium Thinning in Patients with Spontaneous Cerebrospinal Fluid Leak. *Otology & Neurotology*, 36(3).
25. Cioffi, J. A., Yue, W. Y., Mendolia-Loffredo, S., **Hansen, K. R.**, Wackym, P. A., & Hansen, M. R. (2010). MicroRNA-21 Overexpression Contributes to Vestibular Schwannoma Cell Proliferation and Survival. *Otology & Neurotology*, 31(9).

TALKS

1. "A Symmetry Mode Analysis of Metal Halide Perovskites" I. Burkholder, **K.R. Hansen**, J.S. Colton, B. Campbell. Abstract: E01. 00003, American Physical Society Four Corners Meeting, Logan, UT. Oct. 20, 2023.
2. "Screening of the Electron-Hole Interaction in Two-Dimensional Perovskites" **K.R. Hansen**, J.S. Colton, C.E. McClure, L. Whittaker-Brooks. Abstract Y41. 00002, American Physical Society March Meeting, Las Vegas, NV. Mar 10, 2023.
3. "Ion migration in 2D and 3D Metal Halide Perovskites studied using Electrochemical Impedance Spectroscopy on an Interdigitated Electrode Geometry" C. McClure, **K.R. Hansen**, C. Lindsay, C. Shirley, J. Colton. Abstract Y41. 00003, American Physical Society March Meeting, Las Vegas, NV. Mar 10, 2023.
4. "Alloy-based tuning of the bandgap and exciton binding energy in perovskites". J.S. Colton, **K.R. Hansen**, M. Eggleston, C. McClure, B. Romrell, C. Shirley, L. Whittaker-Brooks. Abstract Y41. 00001, American Physical Society March Meeting, Las Vegas, NV. Mar 10, 2023.
5. "Developing Exciton Tunability in Two-Dimensional Metal-Halide Perovskites", **K.R. Hansen**, J.S. Colton, C.E. McClure, L. Whittaker-Brooks, Abstract F69.03, American Physical Society March Meeting, Chicago IL. Mar 15, 2022.

6. "Precise Exciton Binding Energies in Two-Dimensional Metal Halide Perovskites", J.S. Colton, **K.R. Hansen**, C.E. McClure, L. Whittaker-Brooks, Abstract F69.02, American Physical Society March Meeting, Chicago IL. Mar 15, 2022.
7. "Dielectric Spectroscopy on 2D and 3D Metal Halide Perovskites Using an Interdigitated Electrode Geometry", C.E. McClure, **K.R. Hansen**, J.S. Colton, Abstract F69.03, American Physical Society March Meeting, Chicago IL. Mar 15, 2022.
8. "Dielectric spectroscopy on 2D and 3D metal halide perovskites using an interdigitated electrode geometry", C.E. McClure, **K.R. Hansen**, D. King, J.S. Colton, Brigham Young University Student Research Conference, Provo UT. Mar 5, 2022.
9. (invited) "Two-Dimensional Metal Halide Perovskites: A New Material for Solar Energy", J.S. Colton, **K.R. Hansen**, L. Whittaker-Brooks, E. McClure, D. King, Idaho State University Physics Department Colloquium, Virtual. Dec 6, 2021.
10. (invited) "Two-Dimensional Metal Halide Perovskites: A New Material for Solar Energy", J.S. Colton, **K.R. Hansen**, L. Whittaker-Brooks, E. McClure, D. King, Utah State University Physics Department Colloquium, Logan UT. Nov 16, 2021.
11. (invited) "Tuning the Excitonic Properties of 2D Perovskites" **K.R. Hansen**. BYU Condensed Matter Seminar. Provo, UT. Oct 21, 2021.
12. "Dielectric spectroscopy on 2D and 3D metal halide perovskites using an interdigitated electrode geometry," C.E. McClure, **K.R. Hansen**, J.S. Colton, Abstract E06.02, Four Corners Section of the American Physical Society Meeting, Virtual. Oct 8, 2021.
13. "Simulating the Electroabsorption Spectrum of 2D Perovskite Multiple Quantum Wells," **K.R. Hansen**, C.E. McClure, J.S. Colton, L. Whittaker-Brooks, Abstract E06.03, Four Corners Section of the American Physical Society Meeting, Virtual, Oct 9, 2021.
14. "Zinc oxide nanoparticle growth in ferritin," S. King, J.S. Colton, R. Watt, C. Lindsay, C. Lewis, **K.R. Hansen**, Brigham Young University Student Research Conference, Provo UT, Feb 27, 2021.
15. "Time-Resolved ARPES on TMDC monolayers." **K.R. Hansen**, F. Liu, X.Y. Zhu. Quantum Complex Matter. Rome, Italy. June 15, 2018.
16. (invited) "Ferritin-based nanocrystals for solar energy harvesting", J.S. Colton, R. Watt, J. Embley, S. Erickson, **K.R. Hansen**, D. Henrichsen, H. Hogg, C. Olsen, A. Perego, R. Peterson, M. Shelley, Utah Valley University Physics Department Colloquium, Orem UT, Mar 27, 2018.

17. "Ferritin-based nanocrystals for solar energy harvesting", J.S. Colton, R. Watt, J. Embley, S. Erickson, **K.R. Hansen**, D. Henrichsen, H. Hogg, C. Olsen, A. Perego, R. Peterson, M. Shelley, BIT's 4th Annual World Congress of Smart Materials, Osaka, Japan, Mar 8, 2018.
18. "Tunability and Stability of Lead Sulfide Quantum Dots in Ferritin," J.R. Peterson, **K.R. Hansen**. Abstract L27.04, American Physical Society March Meeting, New Orleans, LA, Mar 15, 2017.
19. "Nanocrystals Inside Ferritin Inside Photovoltaic Cells," **K.R. Hansen**, J. Colton, R. Watt, J.R. Peterson, C. Olsen, A. Perego, L. Perez, and H. Longstaff, Abstract L25.03, American Physical Society March Meeting, New Orleans, LA, Mar 15, 2017.
20. "Efficiency of Dye-Sensitized Solar Cells Using Ferritin-Encapsulated Quantum Dots With Various Staining Methods," L. Perez, J.S. Colton, **K.R. Hansen**, J.R. Peterson, Abstract C12.03, American Physical Society March Meeting, New Orleans, LA, Mar 13, 2017.
21. "Fabrication of Dye-Sensitized Solar Cells Using Nanocrystals in Ferritin as the Dye," A. Perego, **K.R. Hansen**, J. R. Peterson, J. Colton, R. Watt, Brigham Young University Student Research Conference, Provo UT, Mar 4, 2017.
22. "Tunability and Stability of Lead Sulfide Quantum Dots," J.R. Peterson, J.S. Colton, **K.R. Hansen**, M. Shelley, A. Perego, C. Olsen, L. Perez, Brigham Young University Student Research Conference, Provo UT, Mar 4, 2017.
23. "Characterizing PbS, PbSe, and MoS₂ Quantum Dots in Ferritin," H. Longstaff, J. Colton, R. Watt, **K.R. Hansen**, J.R. Peterson, M. Shelley, Brigham Young University Student Research Conference, Provo UT, Mar 4, 2017.
24. "Using Ferritin Quantum Dots to Harvest Solar Energy," **K.R. Hansen**, J. Colton, R. Watt, P. Minson, J.R. Peterson, A. Perego, C. Olsen, Joint Meeting of the Four Corners and Texas Sections of the American Physical Society, Las Cruces, NM, Oct 22, 2016.
25. "Lead Sulfide Quantum Dot Band Gap Investigations," J.R. Peterson, J.S. Colton, **K.R. Hansen**, L. Perez, C. Olsen, Joint Meeting of the Four Corners and Texas Sections of the American Physical Society, Las Cruces, NM, Oct 21, 2016.
26. (invited) "Quantum dots inside ferritin to harvest solar energy," **K.R. Hansen**, J. Colton, R. Watt, P. Minson, J.R. Peterson, A. Perego, Brigham Young University Physics Department colloquium, Provo UT, Sep 7, 2016.
27. "Lead Sulfide (PbS) Quantum Dots inside Ferritin," **K.R. Hansen**, J. Colton, R. Watt, and C. Olsen, Brigham Young University Student Research Conference, Provo UT, Mar 19, 2016.
28. "Bio-Inorganic Nanoparticles for Improved Solar Energy Harvesting," C. Olsen, J. Embley, **K.R. Hansen**, J.R. Peterson, A. Henrichsen, A. Perego, J. Colton, and R. Watt, Brigham Young University Student Research Conference, Provo UT, Mar 19, 2016.

29. "Using EBSD for Strain Analysis in Laser Shocked Ta Samples," **K.R. Hansen**, G. Randall, D. Wall, B. Jackson. American Physics Society Four Corners, Tempe, AZ. Oct 16, 2015.

AWARDS

- 2023 Cheves T. Walling Graduate Research Award
2019 NSF Graduate Research Fellowship
2016 Best Engineering paper in the 2016-2017 Journal of the Utah Academy
2016 B John Garrick Scholarship, BYU Department of Physics and Astronomy
2016 Samuel G. Bikman Mentorship, BYU College of Physical and Mathematical Sciences
2015 Science Undergraduate Laboratory Internship, US Department of Energy

VOLUNTEER/SERVICE

- 2017-2018 **STEM Volunteer in Queens, New York**
 - Taught STEM classes at an after school program at Sunnyside Elementary School
- 2011-2013 **Volunteer Mission in Taichung, Taiwan**
 - Served as Operations Manager for 170 other volunteers
 - Used Mandarin Chinese to manage a free English-language program with 20 locations in Taiwan
- 2009 **Eagle Scout Project in Iowa City, Iowa**
 - Organized a city-wide food drive in Iowa City, IA
 - Donated canned goods to Iowa City's Ronald McDonald house and Women's Shelter