Krista Carlson

Department of Chemical and Materials Engineering, University of Nevada, Reno
1664 N. Virginia Street, MS 0388
Reno, NV 89557
kc@unr.edu; 775-784-6771

Education

Ph.D.	Glass Science, Alfred University	2008
B.S.	Glass Engineering Science, Alfred University	2004

Positions Held

Associate Professor — 2021 - Present
Department of Chemical and Materials Engineering
University of Nevada, Reno, Reno, NV

Adjunct Associate Professor — 2021 - Present
Department of Materials Science and Engineering
University of Utah, Salt Lake City, UT

Assistant Professor — 2016 - 2021
Department of Materials Science and Engineering
University of Utah, Salt Lake City, UT

Director, Roger and Dawn Crus Center for Metallurgy Student Research — 2018 - 2021
Department of Materials Science and Engineering
University of Utah, Salt Lake City, UT

Undergraduate Academic Advisor/Outreach Coordinator — 2013 - 2016
Department of Materials Science and Engineering
University of Utah, Salt Lake City, UT

Assistant Director, Roger and Dawn Crus Center for Renewable Energy — 2012 - 2018
Department of Materials Science and Engineering
University of Utah, Salt Lake City, UT

Consultant, Materials Selection 2011 - 2012
Inotec Inc., Salt Lake City, UT

Development Scientist 2008 - 2010
Corning Inc., Corning, NY

National Science Foundation Graduate Research Fellow 2004 - 2008
Alfred University, Alfred, NY

Teaching Activities at the University of Nevada, Reno

- MSE 474/674 Non-Crystalline Solids (3 credits) 2021 – Present
- MSE 791 Advanced Non-Crystalline Solids (3 credits) 2021 – Present

Teaching Activities at the University of Utah

- MSE 5098/5099 Senior Design/Thesis (5 credits) 2019 - 2021
- MET E 2300 Strength of Materials (2 credits) 2019 - 2021
- MET E 5050/6050 Non-Crystalline Solids (3 credits) 2017 - 2021
- MET E 7800 Graduate Seminar (1 credit) 2019 - 2020
- MET E 1640 Introduction to Metallurgical Engineering II (3 credits) 2019
- MET E 3530 Experimental Techniques in Metallurgy (2 credits) 2018
- MET E 1620 Introduction to Physical Metallurgy (2 credits) 2016 - 2018

Professional Honors and Awards

- Faculty Teacher of the Year award in the Department of Metallurgical Engineering 2020
- Finalist in the Department of Energy (DOE) Office of River Protection (ORP) Grand Challenge 2016

Funded Awards Summary (Details Provided in Next Section)

1.	DOE ORP (PI Carlson)	$500k	2021
2.	DOE INL (PI Carlson, co-PI Michael Simpson)	$143k	2020
3.	COVID-19 Research Seed Grant (PI Carlson)	$25k	2020

4.	DOE INL (PI Carlson, co-PI Michael Simpson)	$84k	2020
5.	DOE NEUP (PI Carlson, co-PI Ilya Zharov)	$799k	2019
6.	NSF AISL (co-PI Carlson, PI Nalini Nadkarni)	$977k	2019
7.	CMES Funding Incentive Seed Grant (PI Carlson)	$23k	2019
8.	USAID USPCAS-W (PI Carlson)	$63k	2018
9.	USTAR STIG (PI Carlson, co-PI Steven Naleway)	$75k	2018
10.	NSF CBET (co-PI Carlson, PI Swomitra Mohanty)	$419k	2017
11.	DOE ORP (PI Carlson)	$100k	2017
12.	Ceramic and Glass Industry Foundation (PI Carlson)	$5k	2017
13.	Research Instrumentation Fund-Facility (PI Carlson)	$63k	2017
14.	DOE NEUP (PI Carlson, co-PI Michael Simpson)	$799k	2016
TOTAL		$4.08M	
TOTAL AS PI		**$2.68M**	

Funded Awards Details

1. **Agency:** Department of Energy Office of River Protection (**DOE ORP)**
   Investigators: PI Krista Carlson
   Title: Volatile radioiodine capture using engineered membranes: Bridging laboratory studies to pre-pilot-scale testing (Contract No.)
   Description: The aim of this effort is to engineering viable Ag-functionalized xerogels into a form that has the potential to be implemented in a plant capture system.
   Award Date: 09/01/2021 – 08/31/2024 **Award Amount:** $500k

2. **Agency:** Department of Energy Idaho National Laboratory
   Investigators: PI Krista Carlson, co-PI Michael Simpson
   Title: Development of a Treatment Option for Electrorefiner Salt (Contract No. 244567)
   Description: Contracted project to scale the results of a prior project on the minimization of salt deliquescence.
   Award Period: 12/11/2020 – 09/30/2021 **Award Amount:** $143k

3. **Agency:** Special Emphasis: Emerging COVID-19/SARS-CoV-2 Research Seed Grant Program
   Investigators: PI Krista Carlson
   Title: Synthesis of Easily Sterilizable and Reusable Xerogel Filters for N95 Respirators
   Description: Synthesis of a silica xerogel filter that provides N95 filter efficiency, but unlike the single-use respirators or current filters for reusable respirators, our xerogel filters can be repeatedly sterilized for reuse.
   Award Period: 5/1/2020 – 04/30/2021 **Award Amount:** $25k

4. **Agency:** Department of Energy Idaho National Laboratory
   Investigators: PI Krista Carlson, co-PI Michael Simpson
   Title: Testing of Approaches for Decreasing the Hygroscopic Characteristic of Electrorefiner Salt (Contract No. 232632)
   Description: Contracted project to examine different approaches to mitigate the possibility of salt deliquescence which will minimize the risk of canister corrosion.
   Award Period: 2/1/2020 – 09/30/2020 **Award Amount:** $84k

5. **Agency:** Department of Energy Nuclear Energy University Program **(DOE NEUP)**
   Investigators: PI Krista Carlson, co-PI Ilya Zharov
   Title: Metal-Functionalized Membranes for Radioiodine Capture (DE-NE0008900)
   Description: The main focus of this project is to examine high surface area membranes functionalized with metal nanoparticles to immobilize radioiodine.
   Award Period: 10/1/2019 – 09/30/2022 **Award Amount:** $799k

6. **Agency:** National Science Foundation Advancing Informal STEM Learning **(NSF AISL)**
   Investigators: PI Nalini Nadkarni, co-PIs Krista Carlson, Julie Risien, John Besley, Dennis Schatz
   Title: The STEM Ambassador Program: Supporting Scientists' Engagement with Public Audiences (NSF #1906408)
   Description: This project is developing ways to translate the STEM Ambassador Program currently at the University of Utah to other institutions (http://www.stemap.org).
   Award Period: 07/01/2019 – 06/30/2021 **Award Amount:** $977k

7. **Agency:** College of Mines and Earth Sciences **(CMES)** Funding Incentive Seed Grant Program
   Investigators: PI Krista Carlson
   Title: Refractory Metallic Glasses of Binary Alloys
   Description: An internal seed grant to fabricate and characterize binary refractory metal alloys that have undergone different rates of quenching from the melt. It is hypothesized that a melt comprised of metal elements which display a greater level of covalent-like bonding will have a greater glass forming ability.
   Award Period: 07/01/2019 – 06/30/2020 **Award Amount:** $23k

8. **Agency:** U.S. Agency for International Development U.S. Pakistan Center for Advanced Studies in Water (**USAID USPCAS-W)** at the University of Utah
   Investigators: PI Krista Carlson
   Title: 1) Characterization of an electrocatalytic point-of-use water disinfection device and 2) Visualization of the electrocatalytic inactivation of viruses
   Description: Both projects were seed grants funded through the parent USAID USPCAS-W project being conducted at the University of Utah. The first project studied a titanium dioxide-based device for the destruction of waterborne pathogens in drinking water. The goal of the second project is to use in situ liquid transmission electron microscopy (TEM) quantitative electrochemistry to visualize how an n-type doped titanium dioxide water disinfection device physically destroys viruses.
   Award Period: 12/1/2017 – 12/15/2019 **Award Amount:** $63k

9. **Agency:** Utah Science Technology and Research Science and Technology Initiation Grant (**USTAR STIG)**
   Investigators: PI Krista Carlson, co-PI Steven Naleway
   Title: Improving Dental Bone Grafts with Tunable Alloplastic Cements
   Description: In this project, microspheres made from biocompatible glasses were formed to examine the effect of morphology on in vitro biomineralization.
   Award Period: 1/1/2018 – 12/31/2019 **Award Amount:** $75k

10. **Agency:** National Science Foundation Chemical, Bioengineering, Environmental and Transport Systems (**NSF CBET)**
    Investigators: PI Swomitra Mohanty, co-PI Krista Carlson
    Title: Engineered Metal Functionalized TiO_2 Nanotube Sensing Platform for Assessment of Pneumonia Volatile Biomarkers (NSF #1706283)
    Description: This project is investigating the use of titanium dioxide nanotubes functionalized with different metals to sense biomarkers present in the breath of patients with pneumonia.
    Award Date: 07/01/2019 – 06/30/2021 **Award Amount:** $419k

11. **Agency:** Department of Energy Office of River Protection (**DOE ORP)**
    Investigators: PI Krista Carlson
    Title: Aerogel-Based Vapor Sorbent Membranes with Engineered Interconnected Porosity for Volatile Radionuclide Capture (ORP-DE-EM0004744)
    Description: The aim of this project was to engineer these viable Ag- functionalized aerogels into a morphology that has the potential to be implemented in a plant capture system.
    Award Date: 05/01/2017 – 05/01/2019 **Award Amount:** $100k

12. **Agency:** Ceramic and Glass Industry Foundation
    Investigators: PI Krista Carlson
    Title: The Hidden World of Glass
    Description: This project created content for students in non-traditional high schools (e.g., juvenile detention centers) to address the lack of hands-on activities in classrooms and provides students with real-world applications to complement their basic science classes.
    Award Date: 12/01/2017 – 11/30/2018 **Award Amount:** $5k

13. **Agency:** University of Utah Research Instrumentation Fund-Facility
    Investigators: PI Krista Carlson
    Title: Electrokinetic analyzer for surface analysis on materials independent of sample morphology on samples with a wide range of morphologies
    Description: Funding to purchase an Anton Paar SurPASS 3 surface potential analyzer for solid samples.
    Award Date: 2017 **Award Amount:** $63k

14. **Agency:** Department of Energy Nuclear Energy University Program (DOE NEUP)
    Investigators: PI Krista Carlson, co-PI Michael Simpson

Title: Immobilization of High-Level Waste Salt in Dechlorinated Zeolite Waste Forms (DE-NE0008563)
Description: This project investigated the dechlorination of waste salt from pyroprocessing using zeolites. The zeolites containing fission products were then processed into chemically and mechanically robust waste forms via sintering or melting techniques.
Award Period: 10/1/2016 – 12/31/2019 **Award Amount:** $799k

Graduate Students

1. **Jerry Howard**, PhD candidate (expected graduation Spring 2026, Materials Science and Engineering) Project: Design and Development of High-Temperature Metallic Glasses and Understanding the Correlation Between Processing Conditions and Corrosion Behavior Using *In Situ* TEM (Funding source: NSF GRFP)

2. **Muhammad Ali**, PhD candidate (expected graduation Spring 2024, Metallurgical Eng.) Project: Gas flow through high specific surface area membranes (Funding source: DOE NEUP)

3. **Karthikeyan Baskaran**, PhD candidate (expected graduation Spring 2023, Materials Science and Eng.) Project: Understanding phase separation in silica-based sol-gels (Funding source: DOE NEUP)

4. **Hammad Malik**, PhD candidate (expected graduation Spring 2022, Metallurgical Eng.) Project: Electronic band structure engineering of electrocatalytic ceramics for water treatment (Funding source: USPCAS-W)

5. **Farhana Tonny**, MS (graduated Spring 2021, Metallurgical Eng.) Project: Microstructure of phase-separating silica xerogels

6. **Levi Gardner**, PhD (graduated Spring 2020, Metallurgical Eng.) Project: Immobilization of high-level waste salt in dechlorinated zeolite waste forms (Funding source: DOE NEUP)

7. **Bonan Wang**, MS (graduated Fall 2018, Chemical Eng.) Project: Aerogel-based vapor sorbent membranes with engineered interconnected porosity for volatile radionuclide capture (Funding source: DOE ORP)

Undergraduate Student Researchers

1. Avery Shumway (2020 – 2021)
2. Sydney Sullivan (2019 – 2021)
3. Rachel D'Agostini (2019 – 2021)
4. Zahra Saifee (2019 – 2020)
5. Hawken Knight (2018 – 2020)
6. Andrew Strianese (co-advised with Dr. Darryl Butt, 2018)
7. Jenna Young (2018, 2020 – 2021)

8. Kai Barrera (2017 – 2020)
9. Jerry Howard (2017 – 2021)
10. Maximilian Hagan (2017 – 2019)
11. Casey Elliot (2016 – 2017)
12. Alec Mittelstadt (2016 – 2018)
13. Alexander Reifsnyder (2016 – 2019)
14. Aaron Thorum (2016 –2017)

Refereed Journal Publications

31 publications (mentees underlined)

1. K. Baskaran, M. Ali, K. Gingrich, D. Porter, **B. Riley**, S. Chong, S. Naleway, I. Zharov, **K. Carlson**, *A review of sol-gel-derived polymer-inclusive silicates tailored for energy and environmental applications,* ACS Applied Materials & Interfaces (invited review, under review).

2. H. Malik, R. Polson, B. VanDevener, J. Howard, R. Straubinger, S. Mohanty, **K. Carlson**, *Touchdown FIB sample preparation for an in situ S/TEM annealing study,* Microscopy and Microanalysis (2021) under review (MAM-21-109).

3. J. Alexander, K. Baskaran, A. Harward, **K. Carlson**, S. Naleway, *Bioinspired aligned magnetic features in aerogels for humidity sensing*, Materials Chemistry and Physics 270 (2021) 124852.

4. L. Gardner, A. Harward, J. Howard, G. Fredrickson, T. Yoo, M. Simpson, **K. Carlson**, *Deliquescence of eutectic LiCl-KCl diluted with NaCl for interim waste salt storage*, Nuclear Technology (2021) DOI: 10.1080/00295450.2021.1889923

5. J. Howard, **K. Carlson**, D. Chidambaram, *High temperature metallic glasses – a review*, Physical Review Materials (2021), DOI: 10.1103/PhysRevMaterials.5.040301.

6. M. Mroz, M. Ali, J. Howard, **K. Carlson**, S. Naleway, *Biotemplating of a highly porous cellulose-silica composite from Apium graveolens by a low-toxicity sol-gel technique,* JOM (2021) DOI:10.1007/s11837-021-04658-2

7. S. Hedge, H. Malik, **K. Carlson**, S. Mohanty, K. Kelly, *Detecting benzene vapor via a low-cost nanostructured TiO_2 sensor*, IEEE Sensors Journal (2021) DOI: 10.1109/JSEN.2021.3067897

8. L. Gardner, M. Wasnik, B. Riley, M. Simpson, **K. Carlson**, *Short Communication: Effect of Reduced Dehalogenation on the Performance of Y Zeolite-Based Sintered Waste Forms*, Journal of Nuclear Materials 545 (2021) 152753.

9. **K. Carlson**, L. Gardner, J. Moon, B. Riley, J. Amoroso, D. Chidambaram, *Molten salt reactors and electrochemical reprocessing: Synthesis and chemical durability of potential waste forms for metal and salt waste streams*, International Materials Review (2021), DOI:10.1080/09506608.2020.1801229.

10. H. Malik, K. Barrera, S. Mohanty, **K. Carlson,** *Enhancing Electrochemical Properties of TiO_2 Nanotubes via Engineered Defect Laden Crystal Structures,* Materials Letters 273 (2020), 127956

11. H. Malik, S. Sarkar, S. Mohanty, **K. Carlson,** *Modelling and synthesis of Magnéli Phases in ordered titanium oxide nanotubes with preserved morphology*. Scientific Reports 10 (2020) Article number: 8050

12. L. Gardner, M.Wasnik, B. Riley, M. Simpson, **K. Carlson**, *Synthesis and characterization of sintered H-Y zeolite-derived waste forms for dehalogenated electrorefiner salt,* Ceramics International (2020). DOI: 10.1016/j.ceramint.2020.04.075

13. J. Howard, L. Gardner, A. Geleil, Z. Saifee, I. Nelson, J. Colombo, S. Naleway, **K. Carlson,** *Synthesis and characterization of novel calcium phosphate glass-derived cements for vital pulp therapy.* Journal of Materials Science: Materials in Medicine (2020). DOI: 10.1007/s10856-019-6352-5

14. H. Guo, M. Dang, L. Liu, Q. Tong, C. Zhao, **K. Carlson**, Y. Gong, J. Hoffman, *Alkali barium glasses for hermetic compression seals: Compositional effect, processing, and sealing performance*, Ceramics International (2019) DOI: 10.1016/j.ceramint.2019.07.290

15. M. Wasnik, T. Livingston, **K. Carlson**, M. Simpson, *Kinetics of Dechlorination of Molten Chloride Salt using Protonated Ultra-stable Y Zeolite*, Industrial & Engineering Chemistry Research, 58 (2019) 15142-15150.

16. I. Nelson, L. Gardner, **K. Carlson**, S. Naleway, *Freeze casting of iron oxide subject to a tri-axial nested Helmholtz-coils driven uniform magnetic field for tailored porous scaffolds*, Acta Materialia 173 (2019) 106-116.

17. M. Wasnik, A. Smith, **K. Carlson**, M. Simpson, *Dechlorination of Molten Chloride Waste Salt from Electrorefining via Ion-Exchange using Pelletized Ultra-Stable H-Y Zeolite in a Fluidized Particle Reactor*, Journal of Radioanalytical and Nuclear Chemistry (2019) DOI: 10.1007/s10967-019-06476-y.

18. S. Panhwar, S. Hassan, R. Mahar, **K. Carlson**, M. Rajput & M. Talpur, *Highly Sensitive and Selective Electrochemical Sensor for Detection of Escherichia coli by using L-Cysteine Functionalized Iron Nanoparticles*. Journal of The Electrochemical Society (2019) DOI: 10.1149/2.0691904jes.

19. B. Wang, A. Reifsnyder, I. Zharov, **K. Carlson**, *Silica aerogel membranes fabricated using removable nitrocellulose scaffolds*, Microporous & Mesoporous Materials, 278 (2019) 435-442.

20. L. Gardner, C. Elliott, B. Riley, M. Simpson, **K. Carlson**, *Viscosities and working region predictions for bismuth aluminoborosilicate glasses*, International Journal of Applied Glass Science, (2018) DOI: 10.1111/ijag.12973

21. M. Beeman, U. Nze, H. Sant, H. Malik, S. Mohanty, B. Gale, **K. Carlson**, *Electrochemical detection of E. coli O157:H7 in water after electrocatalytic and ultraviolet treatments using a polyguanine-labeled secondary bead sensor*, Sensors, 18 (2018) 1497.

22. S. Hassan, **K. Carlson,** S. Mohanty, Sirajuddin, A. Canlier, *Ultra-rapid catalytic degradation of 4nitrophenol with ionic liquid recoverable and reuseable ibuprofen derived silver nanoparticles*, Environmental Pollution, 17 (2017) 32595-2.

23. M. Muqeet, H. Malik, R. Mahar, F. Ahmed, Z. Khatri, **K. Carlson**, *Cationization of cellulose nanofibers for the removal of sulfate ions from aqueous solutions,* Industrial & Engineering Chemistry Research, 56 (2017) 14078-14088.

24. **K. Carlson,** M. Misra, S. Mohanty, *Developments in Micro- and Nanotechnology for Foodborne Pathogen Detection*, Foodborne Pathogens and Disease, (2017) DOI: 10.1089/fpd.2017.2309.

25. **K. Carlson**, C. Elliott, S. Walker, M. Misra, S. Mohanty, *An effective, point-of-use water disinfection device using immobilized 'black' TiO_2 nanotubes as an electrocatalyst,* Journal of the Electrochemical Society, 163 (2016) H395-H401.

26. J. Huber, **K. Carlson**, O. Conroy-Ben, M. Misra, S. Mohanty, *Development of a field enhanced photocatalytic device for biocide of coliform bacteria*, Journal of Environmental Sciences, (2016) doi:10.1016/j.jes.2015.08.023.

27. W. Carlson, **K. Carlson**, *Axisymmetric evaluation of analytic potentials around thin disks,* Ferroelectrics Letters, 43 (2015) No 4-6.

28. **K. Carlson**, L. Flick, M. Hall, *DNA adsorption onto calcium aluminate and silicate surfaces*, Colloids and Surfaces B: Biointerfaces, 117 (2014) 538-544.

29. Y. Smith, R. Samara, **K. Carlson**, B. Samara, M. Misra, *Self-ordered titanium dioxide nanotube arrays: Anodic synthesis and their photo/electro-catalytic applications*, Materials, 6 (2013) 2892-2957.

30. **K. Carlson**, M. Hall, *Streaming potential measurements performed on silicate and calcium aluminate based glass microspheres*, Colloids and Surfaces A: Physicochemical and Engineering Aspects, 325 (2008) 101-106.

31. P. Ehrmann, **K. Carlson**, J. Campbell, C. Click, R. Brow, *Neodymium fluorescence quenching by hydroxyl groups in phosphate laser glasses*, Journal of Non-Crystalline Solids, 349 (2004) 105-114.

Conference Proceedings

4 proceedings

1. M. Wasnik, L. Gardner, **K. Carlson**, and M. Simpson, "*Electrorefiner Salt Dechlorination in Ultra-Stable HY Zeolite*," Proceedings of Global 2017, 2017.
2. M. Wasnik, **K. Carlson**, and M. Simpson, "*Waste Minimization of Electrorefiner Waste Salt via Dechlorination: A New Approach*," Proceedings of the Annual Meeting of the American Nuclear Society, 2017.
3. M. Wasnik, **K. Carlson**, and M. Simpson, "*Ion Exchange of LiCl-KCl in H-Y Zeolite for Dechlorination of Electrorefiner Salt Waste Forms*," Proceedings of the Annual Meeting of the American Nuclear Society, 2017.
4. **K. Carlson**, J. Tamllos, A. Timmerman, M. Misra, S. Mohanty, *Development of titanium dioxide nanotube based arrays for the electrocatalytic degradation and electrochemical detection of emerging pharmaceuticals in water*, WIT Transactions on Ecology and the Environment, 209 (2016) 53-63.

Presentations (*indicates presenter)

46 presentations (mentees underlined)
10 invited presentations

1. **K. Carlson***, I. Zharov, B. Riley. Metal-Functionalized Membranes for Radioiodine Capture. MRWFD Campaign Off-Gas Capture and Waste Form Development Deep Dive. Presented virtually 2021.
2. B Van Devener, H.Malik*, S. Mohanty, **K. Carlson**. *In Situ TEM Study of Titania Nanotubes for Use as Novel Electrochemistry Based Water Purification Devices*, Microscopy and Microanalysis, Oral presentation, Presented virtually 2020.
3. **K. Carlson***, *Point-of-use titanium dioxide-based reactor for the disinfection of waterborne pathogens*, CHE/MSE 455/655: Electrochemical Engineering, University of Nevada Reno, Invited lecture, Presented 2020.
4. J. Howard*, L. Gardner, Z. Saifee, S. Naleway, **K. Carlson**, *Quick Setting Dental Pulp Capping Materials Made from Sodium Silicate and Calcium Phosphate Glasses*, TMS 2020. Oral Presentation, Presented 2020.
5. T. Yin*, **K. Carlson**, S. Naleway, *Microsphere calcium phosphate cements to improve injectability and 3D-printability of dental biomaterials*, TMS 2020. Poster, Presented 2020.
6. T. Yin*, **K. Carlson**, S. Naleway, *Improving calcium phosphate cement injectability and 3D-printability using microspheres for dental biomaterials*. International Mechanical Engineering Congress & Exposition. Poster, Presented 2019.
7. S. Naleway*, J. Howard, I. Nelson, J. Colombo, **K. Carlson**, *Dental materials through microstructural control of phosphates*. TMS 2019. Poster, Presented 2019.

8. J. Howard*, I. Nelson, J. Colombo, S. Naleway, **K. Carlson**, *Calcium phosphate microspheres: A novel approach to calcium phosphate cements*, TMS 2019. Poster, Presented 2019.
9. **K. Carlson***, *Aerogel membranes with engineered pore structures for radioiodine capture,* University of Nevada Reno. Invited talk, Presented 2019
10. **K. Carlson***, *Aerogels with enhanced gas permeability and mechanical strength for use as membranes in radioiodine capture*, MS&T 2019. Invited talk, Presented 2019
11. H. Malik*, S. Mohanty, **K. Carlson**, *Thermally tailoring the crystal structure and defect disorder in Titanium Oxide Nanotubes for Enhanced Electrocatalysis while maintaining the nanostructure*, MS&T 19. Oral presentation, Presented 2019.
12. L. Gardner*, M. Wasnik, B. Riley, M. Simpson, **K. Carlson**. *Synthesis and Characterization of Waste Forms for Dehalogenated Waste Salt Immobilization,* MS&T 19. Oral presentation, Presented 2019.
13. L. Gardner*, J. Howard, S. Naleway, **K. Carlson**. *Microstructure evolution in quick-setting dental pulp-capping materials made from calcium phosphate and sodium silicate glass microspheres,* MS&T 19. Oral presentation, Presented 2019.
14. J. Howard*, L. Gardner, Z. Saifee. **K. Carlson.** *Calcium phosphate microspheres: A novel approach to calcium phosphate cements*, University of Utah Undergraduate Research Symposium 2019. Poster, Presented 2019.
15. Z. Saifee*, J. Howard, **K. Carlson**. *Application of Calcium Phosphates in Dental Pulp Capping*, University of Utah Undergraduate Research Symposium 2019. Poster, Presented 2019.
16. J. Howard*, L. Gardner, Z. Saifee, **K. Carlson**. *Calcium phosphate microspheres: A novel approach to calcium phosphate cements*, 2019 Materials Advantage Poster Competition, University of Utah Chapter. Poster, Presented 2019.
17. Y. Saffary*, L. McKinnon, C. Willis, **K. Carlson**, S. Mohanty. *Analysis of Pneumonia Associated Volatile Organic Compounds from Bacteria Culture Using Synthesized TiO_2 Nanotube Array Sensor and Gas Chromatography/Mass Spectrometry*. AIChE Annual Meeting. Oral Presentation, Presented 2019.
18. L. McKinnon*, Y. Saffary, **K. Carlson**, S. Mohanty. *Modeling Fermi Levels in Metal Functionalized TiO_2 Sensors for Applications in Volatile Organic Biomarker Detection Associated with Pneumonia*. AIChE Annual Meeting. Oral Presentation, Presented 2019.
19. Y. Saffary*, L. McKinnon, C. Willis, **K. Carlson**, S. Mohanty. *Detection of Pneumonia Volatile Organic Biomarkers Via Nanotube Sensing Platform*. The Electrochemical Society. Oral Presentation, Presented 2019.
20. S. Naleway,* J. Howard, I. Nelson, J. Colombo, **K. Carlson**. *Dental materials through microstructural control of phosphates,* TMS 2019. Oral Presentation, Presented 2019.
21. S. Mohanty, **K. Carlson***, Utah Environmental Health Association (UEHA) Fall Conference. *Electrocatalytic Disinfection of Waterborne Pathogens*, Invited talk, Presented 2018

22. M. Misra, S. Mohanty, **K. Carlson***, International Conference on Advanced Semiconductor Materials and Devices (ICASMD - 2018). Centre for Material for Electronics Technology. *Semiconductor-based Electrocatalytic Water Disinfection,* Invited talk, Presented 2018
23. **K. Carlson***, M. Misra, S. Mohanty, Recent Advances in Renewable Energy and Hygiene Devices (RAREHD-2018). Yashavantrao Chavan Institute of Science. *Electrocatalytic Water Disinfection Using Black Titania*, Invited talk, Presented 2018
24. **K. Carlson***, M. Misra, S. Mohanty, Division of Drinking Water Webinar, *Point-of-Use Titanium Dioxide-Based Reactor for the Disinfection of Waterborne Pathogens*, Invited talk, Presented 2018
25. J. Howard*, L. Gardner, J. Colombo, **K. Carlson.** *Preventing Root Canals Using Functionalized Glass Microspheres*, MS&T 2018. Poster, Presented 2018.
26. J. Howard*, J. Young, S. Naleway, J. Colombo, **K. Carlson.** *Microsphere Formation and Biocompatibility,* 2018 Materials Advantage Poster Composition, University of Utah Chapter. Poster, Presented 2018.
27. H. Malik*, Swomitra Mohanty, **K. Carlson**. *Electrocatalytic disinfection using nanostructured titanium suboxide,* MS&T 18. Oral presentation, Presented 2018.
28. L. Gardner*, B. Riley, M. Simpson, **K. Carlson**. *Viscosities, activation energies and working region predictions for bismuth aluminoborosilicate glasses,* MS&T 18. Presented 2018.
29. L. Gardner*, M. Simpson, **K. Carlson**. *Viscosities and working region predictions for bismuth aluminoborosilicate glasses,* Waste Management conference 2018 (WM18). Presented 2018.
30. M. Wasnik*, L. Gardner, **K. Carlson**, and M. Simpson, *Immobilization of Dechlorinated Electrorefiner Salt in Zeolite Waste Forms*, Material Recovery and Waste Form Development (MRWFD) Working Group Meeting. Presented 2018.
31. B. Wang*, A. Reifsnyder, **K. Carlson**, *Fabrication of Engineered Aerogel with Micro-Scale Interconnected Porosity for Volatile Halide Capture*, MS&T 17. Presented 2017.
32. L. Gardner*, M. Wasnik, M. Simpson, **K. Carlson**. *Sintering Behavior of Glass Binders for the Immobilization of High-Level Waste Salt,* MS&T 17. Presented 2017.
33. M. Simpson*, M. Wasnik, **K. Carlson**, "*Development of Dechlorinated Salt Waste forms using H-Y Zeolite*,' Global 2017, Oral presentation, Presented 2017
34. M. Wasnik*, M. Simpson, **K. Carlson.** *Ion Exchange of LiCl-KCl in H-Y Zeolite for Dechlorination of Electrorefiner Salt Waste Forms*, American Nuclear Society, Presented 2017.
35. M. Wasnik*, M. Simpson, **K. Carlson.** *Waste Minimization of Electrorefiner Waste Salt via Dechlorination: A New Approach*, American Nuclear Society. Presented 2017.
36. **K. Carlson***, M. Misra, S. Mohanty, USPCAS-W May 2017 Mission. *Entrepreneurship and water technologies*, Invited talk, Presented 2017
37. **K. Carlson***, M. Misra, S. Mohanty, USPCAS-W May 2017 Mission. *Point-of-use sensing and mitigation of pathogens in drinking water*, Invited talk, Presented 2017

38. **K. Carlson***, L. Gardner, M. Simpson, *Hierarchical Waste Forms for the Immobilization of High-Level Waste Salt*, PACRIM12, Oral presentation, Presented 2017
39. **K. Carlson***, S. Mohanty, M. Misra, *Chemical free oxidation of biological contaminants,* American Water Works Association, Water Quality Technology Conference, Oral presentation, Presented 2015
40. **K. Carlson***, J. Huber, M. Misra, and S. Mohanty, *Voltage Assisted Photocatalytic Flow through Cell for Inactivation of Biological Pathogens Using Titania Nanotube Arrays,* The Electrochemical Society, Oral presentation, Presented 2015.
41. S. Walker*, J. Tamllos, **K. Carlson**, M. Misra, S. Mohanty, *Photoelectrocatalytic Degradation of Organics in Water Using TiO_2 Nanotubes*, AICHE Annual Meeting, 2015. Presented 2015.
42. C. Elliott*, **K. Carlson**, M. Misra, S. Mohanty, *Optimization of Titanium Dioxide Nanotubes for Bacterial Inactivation*, AICHE Annual Meeting, Presented 2015.
43. J. Huber*, **K. Carlson**, M. Misra, S. Mohanty, *Electrocatalytic Inactivation of E. coli in Point of Use Drinking Water Applications Using TiO_2 Nanotubes*, AICHE Annual Meeting, Presented 2015.
44. J. Huber*, C. Elliott, **K. Carlson**, M. Misra, S. Mohanty, *Solar-driven Water Purification via Photocatalytic Oxidation of Chemical Pollutants and E. Coli with Titanium Dioxide Nanotube Arrays*, COMS NanoUtah, Presented 2014.
45. **K. Carlson***, L. Flick, M. Hall, Glass and Optical Materials Division Conference, *DNA Adsorption to Glass Surfaces,* Oral presentation, Presented 2008.
46. **K. Carlson***, M. Hall, Glass and Optical Materials Division Conference, *Surface Corrosion of Calcium Aluminate Based Glasses*, Oral presentation, Presented 2008.

Disclosures and Patents Issued

1. **K. Carlson**, J. Colombo, S. Naleway. US Patent Application (00846-U6701.PCT) *Quick set cements for dental pulp capping and related methods of use,* 2020.

2. **K. Carlson**, A. Reifsnyder. US Patent Application (00846-U6222.PCT) *Aerogel membrane with tunable reticulated channels*, 2018.

3. **K. Carlson**, S. Mohanty, J. Huber, M. Misra. US Patent Application (846-U5727.PCT) *Water treatment device*, Washington, DC: U.S. Patent and Trademark Office. 2015.

4. **K. Carlson**, S. Hart, K. Nguyen, L. Zhang. US Patent No: 2011/0062849 A1. *Glass and display having anti-glare properties*, Washington, DC: U.S. Patent and Trademark Office. 2011.

5. **K. Carlson**, S. Hart, K. Nguyen, R. Sabia, D. Sternquist, L. Zhang. US Patent No: 2010/0246016 A1. *Glass having anti-glare surface and method of making*, Washington, DC: U.S. Patent and Trademark Office. 2010.

Student Awards

- Jerry Howard, National Science Foundation Graduate Research Fellowship, 2021
- Jerry Howard, Graduate Dean's Fellowship, University of Nevada, Reno, 2021
- Jerry Howard, awarded a Nuclear Energy University Program fellowship, 2021
- Jerry Howard, Oblad Medal of Excellence award, 2021
- Jerry Howard, Outstanding Undergraduate Researcher Award in the College of Mines and Earth Sciences, 2021
- Jerry Howard, 1st place in the Material Advantage Undergraduate Student Speaking Contest, MS&T 2020
- Levi Gardner, College of Mines and Earth Sciences Outstanding Teaching Assistant Award, 2020
- Jerry Howard, University of Utah nominee for the Barry Goldwater Scholarship, 2020
- Alexander Reifsnyder, Outstanding Undergraduate Researcher Award in the College of Mines and Earth Sciences, 2019
- Levi Gardner, Roy G. Post Foundation Scholarship – Graduate Category, 2018
- Levi Gardner, ACerS NETD Outstanding Student Researcher Award, 2018
- Levi Gardner, MS&T NETD Best Student Presentation Award, 2017

Media Exposure

- The Water Center. From Pakistan To a PhD Program at The U: A USPCASW Success Story. 10/18/2017. https://water.utah.edu/2017/10/18/from-pakistan-to-a-phd-at-the-u/
- TVC News. 04/2015. http://www.tvc.utah.edu/news.php
- Continuum Magazine. 11/01/2014. https://continuum.utah.edu/features/marketing-innovation/

Department, College, and University Service

Department Service

- Director of Crus Center of Metallurgy Student Research (2016 – present)
- Advisor for Undergraduate Research Opportunities Program (2016 – present)
- Participation in University of Utah ACCESS program (2018 – present)
- Outreach and recruitment (2016 – present)
- Advisor for Materials Advantage (2018 – present)

College Service

- OEO/Title IX Liaison for CMES (2020 – present)
- Committee member of the Fostering Undergraduate Research Working Group (FURWG) – Chair, Barbara Nash. Assess the current state of undergraduate research in CMES and

make recommendations for increasing the level of participation of undergraduate research. (2018)
- Committee member on the College Mission Statement Committee (2017)
- Participation in department open houses and awards banquets (2016 – present)

University Service
- Member of the Student Course Feedback committee – Chair, Jeffrey Bates (2017 – 2018)
- College representative on the Undergraduate Council (2016 – 2019)
- Served on pre-oral committees for PhD candidates in the Department of Chemistry

Professional External Service

Membership in Professional Societies
- The American Ceramics Society (ACerS)
  - Secretary of Energy Materials and Systems Division (formally the Nuclear & Environmental Technology Division) (2019 – present)

Reviewer for Academic Journals
- Environmental Science & Technology
- Journal of the Electrochemical Society
- Colloids and Surfaces A: Physicochemical and Engineering Aspects
- Separation and Purification Technology
- Nuclear Technology
- International Journal of Nanomedicine

Grant reviewer
- DOE IRP, DOE NEUP

Conferences
- Lead organizer – ACerS MS&T22 symposium "Energy Materials for Sustainable Development"
- Co-organizer – ACerS MS&T22 symposium "Ceramics for Next Generation Nuclear Energy Systems"
- Lead organizer – ACerS Bio-4 symposium "Point-of-care sensors and diagnostic devices"

Community Outreach Service

- Ambassador in the NSF funded STEMAP, which is a research and public engagement training program funded by the National Science Foundation (NSF)
- Partnered with the Initiative to bring Science Programs to the Incarcerated in Utah (INSPIRE) program, directed and managed by Prof. Nalini Nadkarni (Department of Biology) to do materials science experiments with the Girls Transition Center (GTC), which is a secure residential treatment program for young women (ages 12 – 17).