GEORGE J. NELSON

301 Sparkman Drive
Huntsville, AL 35899

george.nelson@uah.edu
(256) 824-5082

Education:

Georgia Institute of Technology, Atlanta, Georgia

Ph.D. in Mechanical Engineering, awarded December 2009

Advisors: Prof. William Wepfer and Dr. Comas Haynes

Master of Science in Mechanical Engineering, awarded May 2006

Advisors: Prof. Jianmin Qu and Dr. Comas Haynes

Bachelor of Science in Mechanical Engineering, Cum Laude, awarded May 2003

Appointments:

University of Alabama in Huntsville (UAH)
Mechanical and Aerospace Engineering Department

Associate Professor — 8/17 to Present
Assistant Professor — 8/12 to 8/17

University of Tennessee
Shull Wollan Center, Joint Institute for Neutron Science

Research Associate Professor (Sabbatical Appointment) — 8/19 to Present

University of Connecticut
Department of Mechanical Engineering

Assistant Research Professor — 10/09 to 7/12

Awards and Honors:

- Shull Wollan Center for Neutron Sciences Visiting Researcher Fellowship (2019-2020)
- UAH Tau Beta Pi Outstanding Professor Award, Mechanical and Aerospace Engineering (2016)
- National Science Foundation Faculty Early Career Development (CAREER) Award (2015)
- Tau Beta Pi, Eminent Engineer (2015)
- UAH Distinguished Research Award (2015)
- UAH College of Engineering Outstanding Faculty Member (2015)
- UAH College of Engineering Faculty Research Award (2015)
- UAH College of Engineering Outstanding Junior Faculty Member (2015)
- Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Award (2013)

Publications: (†Equal Contribution, *Undergraduate researcher at time of publication)

Journal Papers Under Review

37. V. M. Fontalvo, G. J. Nelson, H. A. Gomez and M. E. Sanjuan, "A Techno-economic Study for Fuel Cell Hybrid Systems in Stationary Applications," *Under Review*, 2021.

Published Journal Papers

36. H. J. Gonzalez Malabet, D. Juarez Robles, V. De Andrade, P. P. Mukherjee, and G. J. Nelson, "*In Operando* XANES Imaging of High Capacity Intermetallic Anodes for Li-ion Batteries," *Journal of the Electrochemical Society*, 2020, 167(4) Article 040523.

35. S. Y. Shin, T. Rajendra* and G. J. Nelson, "Mesoscale Transport-Geometry Interactions in Lithium Ion Cathode Active Materials: Particle Scale Galvanostatic Simulations Based on X-ray Nanotomography Data," *Journal of Power Sources*, 2020, 454, Article 227891.
34. P. Patel and G. J. Nelson, "The Influence of Structure on the Electrochemical and Thermal Response of Li-Ion Battery Electrodes," *ASME Journal of Energy Resources Technology,* 2020, 142(5), Article 050906.
33. G. M. Cavalheiro, T. Iriyama, G. J. Nelson, S. Huang and G. Zhang, "Effects of Non-Uniform Temperature Distribution on Degradation of Lithium-ion Batteries," *ASME Journal of Electrochemical Energy Conversion and Storage*, 2020, 17(2), Article 021101.
32. Z. Lu, X. Liu, B. Zhang, Z. Gan, S. Tang, L. Ma, T. Wu, G. J. Nelson, Y. Qin, C. H. Turner and Y. Lei, Structure and Reactivity of Single Site Ti Catalysts for Propylene Epoxidation," *Journal of Catalysis, Journal of Catalysis*, 2019, 377, 419-428.
31. T. Rajendra*, A. Mistry, P. P. Patel, L. J. Ausderau, X. Xiao, P. P. Mukherjee and G. J. Nelson, "Quantifying Transport, Geometrical, and Morphological Parameters in Li-Ion Cathode Phases Using X-ray Microtomography," *ACS Applied Materials and Interfaces,* 2019, 11 (22), 19933-19942.
30. V. M. Fontalvo, G. J. Nelson, H. A. Gomez and M. E. Sanjuan, "An Enhanced Fuel Cell Dynamic Model with Electrochemical Phenomena Parameterization as Test Bed for Control System Analysis," *ASME Journal of Electrochemical Energy Conversion and Storage*, 2019, 16(1), Article 031007.
29. D. Juarez-Robles, H. J. Gonzalez-Malabet, M. L'Antigua*, X. Xiao, G. J. Nelson and P. P. Mukherjee, "Elucidating Lithium Alloying Induced Degradation Evolution in High Capacity Electrodes," *ACS Applied Materials and Interfaces*, 2019, 11(1), 563–577.
28. R. S. Longchamps, Z. K. van Zandt, H. Z. Bilheux, I. Dhiman, L. J. Santodonato, Y. Ulyanova, S. Singhal and G. J. Nelson, "Neutron Imaging and Electrochemical Characterization of a Glucose Oxidase-based Enzymatic Electrochemical Cell," *ASME Journal of Electrochemical Energy Conversion and Storage*, 2018, 15(1), Article 011007. (*Invited Article for Special Issue on Emerging Investigators in Electrochemical Energy Conversion and Storage)*
27. L. J. Ausderau, H. J. Gonzalez-Malabet, J. R. Buckley, V. De Andrade, Y. Liu and G. J. Nelson, "Elemental and Chemical Mapping of High Capacity Intermetallic Li-ion Anodes with Transmission X-ray Microscopy," *JOM*, 2017, 69(9), p. 1478-1483. (Invited Paper)
26. G. J. Nelson, L. J. Ausderau, J. R. Buckley, S. Y. Shin*, A. Mistry, P. P. Mukherjee, V. De Andrade, "Transport-Geometry Interactions in Li-ion Cathode Materials Imaged Using X-ray Nanotomography", *Journal of the Electrochemical Society*, 2017, 164(7), p. A1412-A1424.
25. G. J. Nelson, Z. K. van Zandt and P. D. Jibhakate, "Direct X-ray Imaging as a Tool for Understanding Multiphysics Phenomena in Energy Storage", *ASME Journal of Electrochemical Energy Conversion and Storage*, 2016, 13(3), Article 030802.
24. E. E. Looney†,*, G. J. Nelson†, Z. K. van Zandt, Y. Ulyanova, S. Singhal, L. Santodonato and H. Bilheux, "*Ex Situ* and *In Situ* Neutron Imaging of Enzymatic Electrochemical Cells", *Electrochimica Acta*, 2016, 213, p. 244-251.
23. Z. K. van Zandt and G. J. Nelson, "Solid Oxide Cell Microstructural Performance for Hydrogen and Carbon Monoxide Reactant Streams", *ASME Journal of Electrochemical Energy Conversion and Storage*, 2016, 13(1), Article 011009.
22. G. J. Nelson, "An Analytical Approach to Solid Oxide Cell Electrode Geometric Design," *Journal of Power Sources*, 2015, 300, p. 365-375.

21. M. B. DeGostin, A. Nakajo, B. N. Cassenti, A. A. Peracchio, G. J. Nelson, W. K. S. Chiu, "Geometric Sensitivity of Electrochemical Fin Shape on Three Dimensional Microstructure Network Conductivity Analysis," *Journal of Power Sources*, 2015, 291, p. 181-194.
20. G. J. Nelson, A. Nakajo, B. N. Cassenti, M. B. Degostin, K. R. Bagshaw, A. A. Peracchio, G. Xiao, S. Wang, F. Chen and W. K. S. Chiu, "A Rapid Analytical Assessment Tool for Three Dimensional Electrode Microstructural Networks with Geometric Sensitivity," *Journal of Power Sources,* 2014, 246, p. 322-334.
19. B. N. Cassenti, G. J. Nelson, M. B. DeGostin and W. K. S. Chiu, "Exact Solutions for One-Dimensional Transport in Extended Surface Models of SOFC Electrodes," *Journal of Power Sources*, 2014, 265, p. 282-290.
18. W. M. Harris, J. J. Lombardo, G. J. Nelson, B. Lai, S. Wang, J. Vila-Comamala, M. Liu, M. Liu and W. K. S. Chiu, "Three-Dimensional Visualization of Nickel Sulfide Formation in Ni-YSZ Solid Oxide Fuel Cell Anodes Subjected to Hydrogen Sulfide," *Scientific Reports*, 2014, 4, Article 5246.
17. A. P. Cocco†, G. J. Nelson†, W. M. Harris, A. Nakajo, J. J. Lombardo, T. D. Myles, A. M. Kiss and W. K. S. Chiu, "Three Dimensional Microstructural Imaging Methods for Energy Materials," *Physical Chemistry Chemical Physics,* 2013, 15(39), p. 16377-16407. (*Feature Article*, *Front Cover*)
16. G. J. Nelson, B. N. Cassenti, A. A. Peracchio and W. K. S. Chiu, "An Analytical Method for Dye-Sensitized Solar Cell Geometric Design," *Electrochimica Acta*, 2013, 90, p. 475-481.
15. A. M. Kiss, T. D. Myles, K. N. Grew, A. A. Peracchio, G. J. Nelson and W. K. S. Chiu, "Carbonate and Bicarbonate Ion Transport in Alkaline Anion Exchange Membranes," *Journal of the Electrochemical Society*, 2013, 160(9), p. F994-F999.
14. W. M. Harris, J. J. Lombardo, M. B. DeGostin, G. J. Nelson, H. Luebbe, J. A. Schuler, J. Van herle, J. C. Andrews, Y. Liu, P. Pianetta, Y. K. Chen, J. Wang and W. K. S. Chiu, "Influence of Poisoning Phases in the Neodymium Nickelate Solid Oxide Fuel Cell Cathode," *Solid State Ionics*, 2013, 237, p. 16-21.
13. M. E. Lynch, D. Ding, W. M. Harris, J. J. Lombardo, G. J. Nelson, W. K. S. Chiu and M. Liu, "Flexible Multiphysics Simulation of Porous Electrodes: Conformal to 3D Reconstructed Microstructures," *Nano Energy,* 2013, 2(1), p. 105-115.
12. G. J. Nelson, K. N. Grew, J. R. Izzo, Jr., J. J. Lombardo, W. M. Harris, A. Faes, A. Hessler-Wyser, J. Van herle, S. Wang, Y. S. Chu, A. V. Virkar and W. K. S. Chiu, "Three-Dimensional Microstructural Changes in the Ni-YSZ Solid Oxide Fuel Cell Anode During Operation," *Acta Materialia,* 2012, 60(8), p. 3491-3500.
11. G. J. Nelson, B. N. Cassenti, A. A. Peracchio and W. K. S. Chiu, "Microstructural Effects on Electronic Charge Transfer in Li-Ion Battery Cathodes," *Journal of the Electrochemical Society,* 2012, 159(5), p. A598-A603.
10. G. J. Nelson, B. N. Cassenti, A. A. Peracchio and W. K. S. Chiu, "Two-Dimensional Charge Transfer and Space Charge Effects in Extended Surface Solid Oxide Fuel Cell Electrodes," *Journal of Power Sources,* 2012, 205, p. 48-56.
9. F. Abdeljawad, G. J. Nelson, W. K. S. Chiu and M. Haataja, "Redox Instability, Mechanical Deformation, and Damage Accumulation in Solid Oxide Fuel Cell Anodes: A Continuum Simulation Approach," *Journal of Applied Physics*, 2012, 112(3), Article 036102.
8. T. D. Myles, G. J. Nelson, A. A. Peracchio, W. K. S. Chiu, R. J. Roy, B. L. Murach and G. A. Adamson, "Species Transport in a High Pressure Oxygen Generating Proton Exchange Membrane Electrolyzer," *International Journal of Hydrogen Energy*, 2012, 37(17), p. 12451-12463.
7. W. K. S. Chiu, A. V. Virkar, F. Zhao, K. L. Reifsnider, G. J. Nelson, F. Rabbi and Q. Liu, "HeteroFoaMs: Electrode Modeling in Nano-structured Heterogeneous Materials for Energy Systems," *Journal of Fuel Cell Science and Technology*, 2012, 9, Article 011019.

6. W. M. Harris, G. J. Nelson, A. M. Kiss, J. R. Izzo, Jr., W. K. S. Chiu, Y. Liu, M. Liu, Y. S. Chu and S. Wang, "Nondestructive Volumetric 3-D Chemical Mapping of Nickel-Sulfur Compounds at the Nanoscale," *Nanoscale*, 2012, 4(5), p. 1557-1560.
5. G. J. Nelson, A. A. Peracchio and W. K. S. Chiu, "Analytical Investigations of Varying Cross Section Microstructures on Charge Transfer in SOFC Electrodes," *Journal of Power Sources*, 2011, 196, p. 4695-4705.
4. G. J. Nelson, W. M. Harris, J. R. Izzo, Jr., K. N. Grew, W. K. S. Chiu, Y. S. Chu, J. Yi, J. C. Andrews, Y. Liu and P. Pianetta, "Three Dimensional Mapping of Nickel Oxidation States using Full Field X-ray Absorption Near Edge Structure Nanotomography," *Applied Physics Letters*, 2011, 98, Article 173109. (*Featured in APS Science 2011*)
3. G. J. Nelson, W. M. Harris, J. J. Lombardo, J. R. Izzo, Jr., W. K. S. Chiu, P. Tanasini, M. Cantoni, J. Van herle, C. Comninellis, J. C. Andrews, Y. Liu, P. Pianetta and Y. S. Chu, "Comparison of SOFC Cathode Microstructure Quantified using X-ray Nanotomography and Focused Ion Beam - Scanning Electron Microscopy," *Electrochemistry Communications*, 2011, 13(6), p. 586-589.
2. T. D. Myles, A. M. Kiss, K. N. Grew, A. A. Peracchio, G. J. Nelson and W. K. S. Chiu, "Calculation of Water Diffusion Coefficients in an Anion Exchange Membrane Using a Water Permeation Technique," *Journal of the Electrochemical Society*, 2011, 158(7), p. B790-B796.
1. G. J. Nelson and C. L. Haynes, "Continuum-level Solid Oxide Electrode Constriction Resistance Effects," *Journal of Power Sources*, 2008, 185(2), p. 1168-1178.

<u>*Peer Reviewed Conference Proceedings and Abstracts*</u>

64. H. J. Gonzalez Malabet and G. J. Nelson, "X-ray Imaging of Metallic Anodes for Lithium Ion Batteries and Beyond," *2020 TMS Annual Meeting and Exhibition*, San Diego, California, February 23-27, 2020. (Invited Talk)
63. T. R. Rajendra, P. Patel, S. Y. Shin and G. J. Nelson, "Analysis of Structure-Transport Interactions in Lithium Ion Batteries Supported by X-ray Imaging," *NASA Aerospace Battery Workshop*, Huntsville, Alabama, November 19-21, 2019.
62. G. J. Nelson, "Multiscale Analysis of Battery Materials Using X-Ray Microscopy," *236th ECS Meeting,* Atlanta, Georgia, October 13-17, 2019. (Invited Talk)
61. G.M. Cavalheiro, T. Iriyama, G.J. Nelson, S. Huang, G. Zhang," Effects of Non-Uniform Temperature Distributions on Lithium- Ion Battery Degradation," *2019 ASME InterPACK Conference*, Anaheim, California, October 7-9, 2019.
60. J. R. Buckley, R. T. White and G. J. Nelson, "Experimental Validation of the X-ray Determined Pore Size Distribution of Porous Hybrid Motor Grains," *2019 AIAA Propulsion and Energy Forum*, Indianapolis, Indiana, August 19-22, 2019.
59. P. Patel and G. J. Nelson, "The Influence of Structure on the Electrochemical and Thermal Response of Li-Ion Battery Electrodes," *2019 ASME Energy Sustainability Conference*, Bellevue, Washington, July 14-17, 2019.
58. T. Rajendra, Prehit Patel and G. J. Nelson, "Mutliscale Analysis of Lithium Ion Battery Materials Using X-ray Tomography," *2019 TMS Annual Meeting and Exhibition*, San Antonio, TX, March 10-14, 2019. (Invited Talk)
57. T. Rajendra*, A. Mistry, X. Xiao, P. P. Mukherjee and G. J. Nelson, "Characterization of Transport Parameters in NMC Cathode Phases using X-ray Microtomography Data," *2018 ASME International Mechanical Engineering Congress and Exposition*, Pittsburgh, Pennsylvania November 9-15, 2018.

56. P. Patel, T. Rajendra* and G. J. Nelson, "Tuning Electrode Structure to Improve the Rate Capability of Energy Dense Lithium Ion Batteries," *2018 ASME International Mechanical Engineering Congress and Exposition*, Pittsburgh, Pennsylvania November 9-15, 2018.
55. R. Chow, J. Perry and G. J. Nelson, "Electrolyzer Exergy Analysis for an Environmental Control and Life Support System," *2018 ASME International Mechanical Engineering Congress and Exposition*, Pittsburgh, Pennsylvania November 9-15, 2018.
54. J. N. Adams, L. J. Ausderau and G. J. Nelson, "Structural Changes in Alloy Anodes for Li-Ion Batteries," *2018 ASME Energy Sustainability Conference*, Orlando, Florida, June 26-30, 2018.
53. H. J. Gonzalez-Malabet, L. Ausderau, D. Juarez-Robles, X. Xiao, V. De Andrade, Y. Liu, P. P. Mukherjee, and G. J. Nelson, "Characterization and Chemical Mapping of High Capacity Intermetallic Li-Ion Anodes Using X-Ray Microscopy Techniques," *233rd ECS Meeting, Seattle, Washington*, May 13-17, 2018.
52. D. Juarez-Robles, H. J. Gonzalez-Malabet, L. Ausderau, X. Xiao, G. J. Nelson, and P. P. Mukherjee, "Electrochemical and Microstructural Analysis of Cu_6Sn_5 Alloy Electrodes," *233rd ECS Meeting, Seattle, Washington*, May 13-17, 2018.
51. H. J. Gonzalez-Malabet, J. N. Adams, L. J. Ausderau and G. J. Nelson, "Multiscale X-ray Imaging Studies of High Capacity Anode Degradation," *2018 Gordon Research Conference: Batteries*, Ventura, California, February 25-March 2, 2018.
50. S. Brockington, A. Case, E. Cruz, M.Luna, F. D. Witherspoon, L. Ausderau, J. Buckley and G. Nelson, "Fast, Fiber-Coupled Imaging of X-Ray Events," *59th Annual Meeting of the APS Division of Plasma Physics*, Milwaukee, Wisconsin, October 23-24, 2017.
49. J. R. Buckley and G. J. Nelson, "Pore Size Distribution and Surface Area Characterization of a Porous Hybrid Motor Grain," *53rd AIAA/SAE/ASEE Joint Propulsion Conference*, Atlanta, Georgia, July 10-12, 2017.
48. S. Y. Shin, P. P. Mukherjee and G. J. Nelson, "Multiphysics Analysis of Lithium Ion Cathode Active Materials Based on 3D Imaging Data," *2017 ASME Energy Storage Forum*, Charlotte, North Carolina, June 26-30, 2017.
47. H. J. Gonzalez-Malabet, L. J. Ausderau, J. R. Buckley, X. Xiao, Y. Liu and G. J. Nelson, "Structure and Composition Changes in Copper-Tin Alloy Anodes Observed with X-ray Microtomography and Nanotomography," *2017 ASME Energy Storage Forum*, Charlotte, North Carolina, June 26-30, 2017.
46. G. J. Nelson, "Transport in Battery Electrodes: Scaling Behavior Assessed Based on Real and Simulated Microstructures," *CHT-17: International Symposium on Advances in Computational Heat Transfer,* Napoli, Italy, May 28-June 1, 2017. (Invited Talk)
45. G. J. Nelson, "A numerical investigation of active surface accessibility in Li-ion battery cathodes," *2016 ASME International Mechanical Engineering Congress and Exposition*, Phoenix, Arizona, November 11-17, 2016.
44. P. D. Jibhakate and G. J. Nelson, "Fabrication and Characterization of Nanostructured Cathodes for Li-Ion Batteries," *Proceedings of IMECE2016: 2016 ASME International Mechanical Engineering Congress and Exposition*, Phoenix, Arizona, November 11-17, 2016.
43. R. S. Longchamps, Z. K. van Zandt, H. Z. Bilheux, I. Dhiman, L. J. Santodonato, Y. Ulyanova, S. Singhal and G. J. Nelson, "*In Operando* Neutron Imaging of Enzymatic Electrochemical Cells," *PRiME 2016: Pacific Rim Meeting on Electrochemical and Solid-State Science*, Honolulu, Hawaii, October 2-7, 2016.

42. K. A. Clem, G. J. Nelson, B. L. Mesmer, M. D. Watson and J. L. Perry, "Exergy Based Analysis for the Environmental Control and Life Support Systems of the International Space Station," *2016 AIAA Space and Astronautics Forum and Exposition*, Long Beach, California, September 13-16, 2016.
41. J. R. Buckley and G. J. Nelson, "Computed Tomography Characterization of a Porous Hybrid Motor Grain with added Contrast Agent," *52nd AIAA/SAE/ASEE Joint Propulsion Conference*, Salt Lake City, Utah, July 25-27, 2016.
40. E. E. Looney, G. J. Nelson, Z. K. van Zandt, Y. Ulyanova, S. Singhal, L. Santodonato and H. Bilheux, "Observation of Enzymatic Electrochemical Cells using Neutron Radiography and Tomography," *2016 14th ASME Fuel Cell Science, Engineering and Technology Conference*, Charlotte, North Carolina, June 26-30, 2016.
39. Z. K. van Zandt and G. J. Nelson, "A Non-Dimensional Analysis of the Transport-Reaction-Microstructure Interaction in Solid Oxide Cell Electrodes," *2016 14th ASME Fuel Cell Science, Engineering and Technology Conference*, Charlotte, North Carolina, June 26-30, 2016.
38. L. J. Ausderau, J. R. Buckley, V. De Andrade and G. J. Nelson, "X-Ray Nanotomography of Cu_6Sn_5 Anode Material for Li-Ion Batteries," *229th ECS Meeting*, San Diego, California, May 29-June 2, 2016.
37. G. J. Nelson, L. J. Ausderau, J. R. Buckley, A. Mistry, P. P. Mukherjee, V. De Andrade, "Transport-Geometry Interactions in Li-ion Cathode Materials Imaged Using X-ray Nanotomography," *229th ECS Meeting*, San Diego, California, May 29-June 2, 2016.
36. G. J. Nelson and Z. K. van Zandt, "A Multiphysics Study of Chemical Potential Distributions As Drivers for Solid Oxide Cell Mechanical Degradation," *229th ECS Meeting*, San Diego, California, May 29-June 2, 2016.
35. G. J. Nelson, L. J. Ausderau, J. R. Buckley, and Z. K. van Zandt, "3D Spectroscopic X-ray Imaging of Li-ion Battery Electrode Materials", *2016 Gordon Research Conference: Batteries*, Ventura, California, February 21-25, 2016.
34. G. J. Nelson, "Comparison of SOFC Performance Predictions Based on Analytical and Distributed Charge Transfer Models," *2015 ASME International Mechanical Engineering Congress and Exposition*, Houston, Texas, November 13-19, 2015.
33. A. Nakajo, A. M. Kiss, A. P. Cocco, W. M. Harris, M. B. DeGostin, F. Greco, G. J. Nelson, A. A. Peracchio, B. N. Cassenti, A. Deriy, S. Wang, Y. C. K. Chen-Wiegart, J. Wang, J. Van herle, W. K. S. Chiu, "Characterization of Cracks and Their Effects on the Effective Transport Pathways in Ni-YSZ Anodes after Reoxidation using X-Ray Nanotomography," Fourteenth International Symposium on Solid Oxide Fuel Cells (SOFC-XIV), Paper No. 231, Glasgow, Scotland, July 26-31, 2015 (*ECS Transactions* 68(1): p. 1069-1081, 2015).
32. M. B. DeGostin, A. Nakajo, G. J. Nelson, B. N. Cassenti, A. A. Peracchio, W. K. S. Chiu, "Closed Form Solutions to Investigate Ionic Conductivity in Porous Fuel Cell Electrode Microstructures," *Proceedings of the 1st Thermal and Fluid Engineering Summer Conference*, New York, New York, August 9-12, 2015.
31. J. R. Buckley, M. D. Denny, and G. J. Nelson, "Computed Tomography Characterization of a Porous Hybrid Motor Grain," *51st AIAA/SAE/ASEE Joint Propulsion Conference*, Orlando, Florida, July 27-29, 2015.
30. G. J. Nelson, "Multiscale Assessment of Charge and Mass Transfer in Solid Oxide Cells," *CHT-15: International Symposium on Advances in Computational Heat Transfer,* Piscataway, New Jersey, May 25-29, 2015. (Invited Talk)
29. Z. K. Van Zandt and G. J. Nelson, "Parametric Studies of Microstructural Performance Effects in Solid Oxide Cells," *2014 ASME International Mechanical Engineering Congress and Exposition*, Montreal, Canada, November 14-20, 2014.

28. A. Nakajo, M. Cantoni, M. B. DeGostin, A. P. Cocco, G. J. Nelson, A. A. Peracchio, B. N. Cassenti, W. K. S. Chiu, J. Van herle, "Degradation of LSM-YSZ Cathode during Exposure Tests Analyzed by Focused Ion Beam-Scanning Electron Microscopy," *65th Annual Meeting of the International Society of Electrochemistry*, Lausanne, Switzerland, August 31-September 5, 2014.
27. G. J. Nelson, "X-ray Nanotomography Techniques for Li-ion Battery Electrode Materials," *17th U.S. National Congress on Theoretical and Applied Mechanics*, East Lansing, Michigan, June 15-20, 2014.
26. G. J. Nelson, "Performance Impacts of Tailored Surface Geometry in Li-Ion Battery Cathodes," *Proceedings of IMECE2013: 2013 ASME International Mechanical Engineering Congress and Exposition*, San Diego, California, November 15-21, 2013.
25. W. M. Harris, J. J. Lombardo, B. Lai, G. J. Nelson, S. Wang, J. Vila-Comamala, M. Liu, M. Liu and W. K. S. Chiu, "Examining Effects of Sulfur Poisoning on Ni/YSZ Solid Oxide Fuel Cell Anodes Using Synchrotron-Based X-ray Imaging Techniques," *2013 ASME International Mechanical Engineering Congress and Exposition*, San Diego, California, November 15-21, 2013.
24. G. J. Nelson, B. N. Cassenti, A. A. Peracchio and W. K.S. Chiu, "An Analytical Method to Assess Microstructure in Li-Ion Battery Cathodes," *2012 ASME International Mechanical Engineering Congress and Exposition*, Houston, Texas, November 9-15, 2012.
23. A. Nakajo, G. J. Nelson, M. B. DeGostin, T. D. Myles, A. A. Peracchio and W. K. S. Chiu, "Characterization of Solid Oxide Fuel Cell Materials Based on Microstructural Skeletonization," *2012 ASME International Mechanical Engineering Congress and Exposition*, Houston, Texas, November 9-15, 2012.
22. A. M. Kiss, T. D. Myles, K. N. Grew, A. A. Peracchio, G. J. Nelson and W. K. S. Chiu, "Carbonate and Bicarbonate Ion Transport in Alkaline Anion Exchange Membranes," *PRiME 2012: Pacific Rim Meeting on Electrochemical and Solid-State Science*, Honolulu, Hawaii, October 7-12, 2012.
21. J. J. Lombardo, B. Lai, W. M. Harris, G. J. Nelson, S. Wang, M. Liu, M. Liu and W. K. S. Chiu, "The Role of Sulfur in the Porous Cermet Solid Oxide Fuel Cell Anode Microstructure," *2012 ASME Summer Heat Transfer Conference*, San Juan, Puerto Rico, July 8-12, 2012.
20. A. P. Cocco, W. M. Harris, G. J. Nelson, J. J. Lombardo and W. K. S. Chiu, "X-Ray Methods for Composition-Sensitive 3D Mapping of Solid Oxide Fuel Cell Electrode Microstructures," *Proceedings of the 45th Power Sources Conference*, Las Vegas, Nevada, June 11-14, 2012.
19. A. M. Kiss, T. D. Myles, K. N. Grew, A. A. Peracchio, G. J. Nelson and W. K. S. Chiu, "Predicting Carbonate Species Ionic Conductivity in Alkaline Anion Exchange Membranes," *Proceedings of the 45th Power Sources Conference*, Las Vegas, Nevada, June 11-14, 2012.
18. G. J. Nelson, A. A. Peracchio, B. N. Cassenti and W. K. S. Chiu, "Investigation of the Impact of Sintering on SOFC Charge Transfer," *2011 ASME International Mechanical Engineering Congress and Exposition*, Denver, Colorado, November 11-17, 2011.
17. G. J. Nelson, J. R. Izzo, Jr., J. J. Lombardo, W. M. Harris, A. P. Cocco, W. K. S. Chiu, K. N. Grew, A. Faes, A. Hessler-Wyser, J. Van herle, Y. S. Chu and S. Wang, "X-ray Imaging and Analysis of 3D Microstructural Changes in Aged Ni-YSZ Anodes," Twelfth International Symposium on Solid Oxide Fuel Cells (SOFC-XII), *219th ECS Meeting,* Paper No. 860, Montreal, Canada, May 1-6, 2011 (*ECS Transactions* 35 (1): p. 1323-1327, 2011).
16. G. J. Nelson, A. A. Peracchio, B. N. Cassenti and W. K. S. Chiu, "Analytical Models for SOFC Electrodes with Variable Cross-Section Microstructures," Twelfth International Symposium on Solid Oxide Fuel Cells (SOFC-XII), *219th ECS Meeting*, Paper No. 985, Montreal, Canada, May 1-6, 2011 (*ECS Transactions* 35(1): p. 1315-1321, 2011).
15. G. J. Nelson, W. M. Harris, J. J. Lombardo, J. R. Izzo, Jr., W. K. S. Chiu, P. Tanasini, M. Cantoni, J. Van herle, C. Comninellis, J. C. Andrews, Y. Liu, P. Pianetta and Y. S. Chu, "Comparison of X-ray

Nanotomography and FIB-SEM in Quantifying the Composite LSM/YSZ SOFC Cathode Microstructure," Twelfth International Symposium on Solid Oxide Fuel Cells (SOFC-XII), *219th ECS Meeting*, Paper No. 706, Montreal, Canada, May 1-6, 2011 (*ECS Transactions* 35(1): p. 2417-2421, 2011).

14. G. J. Nelson, W. M. Harris, J. R. Izzo, Jr., K. N. Grew, W. K. S. Chiu, Y. S. Chu, J. Yi, J. C. Andrews, Y. Liu and P. Pianetta, "3D Imaging of Nickel Oxidation States using Full Field X-ray Absorption Near Edge Structure Nanotomography," Twelfth International Symposium on Solid Oxide Fuel Cells (SOFC-XII), *219th ECS Meeting*, Paper No. 859, Montreal, Canada, May 1-6, 2011 (*ECS Transactions* 35(1): p. 1315-1321, 2011).
13. W. M. Harris, G. J. Nelson, J. J. Lombardo, A. P. Cocco, J. R. Izzo, Jr., W. K. S. Chiu, P. Tanasini, J. Van herle, C. Comninellis, J. C. Andrews, Y. Liu, P. Pianetta and Y. S. Chu, "Analysis of Solid Oxide Fuel Cell LSM-YSZ Composite Cathodes with Varying Starting Powder Sizes**,"** *2011 ASME International Mechanical Engineering Congress and Exposition*, Denver, Colorado, November 11-17, 2011.
12. W. M. Harris, G. J. Nelson, J. R. Izzo, Jr., K. N. Grew, W. K. S. Chiu, Y. S. Chu, J. Yi, J. C. Andrews, Y. Liu and P. Pianetta, "Full Field Imaging of Nickel Oxidation States in Solid Oxide Fuel Cell Anode Materials by XANES Nanotomography," *2011 Energy Sustainability Conference & Fuel Cell Conference,* Washington, D.C., August 7-10, 2011.
11. A. M. Kiss, T. D. Myles, K. N. Grew, A. A. Peracchio, G. J. Nelson and W. K. S. Chiu, "Calculating Hydroxide Conductivity in Alkaline Anion Exchange Membranes," *220th ECS Meeting*, Boston, Massachusetts, October 9-14, 2011.
10. T. D. Myles, G. J. Nelson, A. A. Peracchio, W. K. S. Chiu, R. J. Roy, B. L. Murach and G. A. Adamson, "Species Transport in the High Differential Pressure Oxygen Generating Electrolyzer Membrane," *220th ECS Meeting*, Boston, Massachusetts, October 9-14, 2011.
9. G. J. Nelson, K. N. Grew, J. R. Izzo, Jr., A. A. Peracchio and W. K. S. Chiu, "Nondestructive Imaging and Analysis of Solid Oxide Fuel Cell Anodes," *2010 ASME International Mechanical Engineering Congress and Exposition*, Vancouver, British Columbia, November 12-18, 2010.
8. J. R. Izzo, Jr., K. N. Grew, G. J. Nelson, A. A. Peracchio and W. K. S. Chiu, "X-ray 3-D Imaging of Solid Oxide Fuel Cell Electrodes for Phase Reconstruction and Analysis," *2010 European Fuel Cell Forum*, Lucerne, Switzerland, June 29-July 2, 2010.
7. G. J. Nelson, C. L. Haynes and W. J. Wepfer, "A Fractal Approach for Modeling SOFC Electrode Mass Transport," *2009 ASME International Mechanical Engineering Congress and Exposition*, Lake Buena Vista, Florida, November 13-19, 2009.
6. G. J. Nelson, C. L. Haynes and W. J. Wepfer, "Performance Metrics for Solid Oxide Fuel Cell Cross-section Design," *2009 ASME International Fuel Cell Science, Engineering and Technology Conference*, Newport Beach, California, June 8-10, 2009.
5. G. J. Nelson, C. L. Haynes and C. J. Miller, "Dilute Ethanol Fueled SOFCs: A Symbiotic Solution Strategy," *2009 ASME International Fuel Cell Science, Engineering and Technology Conference*, Newport Beach, California, June 8-10, 2009.
4. G. J. Nelson and C. L. Haynes, "Parametric Studies of Constriction Resistance Effects upon Solid Oxide Cell Transport," *2006 ASME International Mechanical Engineering Congress and Exposition*, Chicago, Illinois, November 5-10, 2006.
3. M. Radovic, E. Lara-Curzio and G. J. Nelson, "Fracture Toughness and Slow Crack Growth Behavior of Ni-YSZ and YSZ as a Function of Porosity and Temperature," *Proceedings of the 30th International Conference on Advanced Ceramics and Composites*, Cocoa Beach, Florida, January 22-27, 2006.
2. J. A. Salem, E. Lara-Curzio, M. Radovic and G. J. Nelson, "Using the Double Torsion Test Method to Determine the Fracture Toughness of Thin Ceramic Films"*, Proceedings of The 30th Annual*

International Conference on Advanced Ceramics and Composites, Cocoa Beach, Florida, January 22-27, 2006.

1. G. J. Nelson and C. L. Haynes, "Localized Constriction Resistance Effects upon SOFC Transport Phenomena," *2005 ASME International Mechanical Engineering Congress and Exposition*, Orlando, Florida, November 5-11, 2005.

Presentations and Invited Talks:

25. 2020 TMS Annual Meeting and Exhibition, 2/2020.
24. 236th Electrochemical Society Meeting, 10/2019.
23. SNS-HFIR User Group Meeting, Oak Ridge National Laboratory, 6/2019.
22. Universidad del Norte, Department of Mechanical Engineering, 6/2019.
21. Argonne National Laboratory, Advanced Photon Source User Science Presentation, 4/2019.
20. National Renewable Energy Laboratory, Thermal Sciences Group, 10/2018.
19. Air Force Research Laboratory, Aerospace Systems Directorate, 3/2018.
18. University of Missouri, Department of Chemical Engineering, 11/2017.
17. CHT-17: International Symposium on Advances in Computational Heat Transfer, 5/2017.
16. Boeing, Battery Community of Practice Seminar, 2/2017.
15. Oak Ridge National Laboratory, Computational Sciences Division, 1/2017.
14. University of Alabama in Birmingham, Materials Science and Engineering, 11/2016.
13. NASA Glenn Research Center, Photovoltaic and Electrochemical Systems Branch, 9/2015.
12. CHT-15: International Symposium on Advances in Computational Heat Transfer, 5/2015.
11. University of Alabama, Electrical and Computer Engineering, 3/2014.
10. University of Alabama in Huntsville, Engineering Advisory Board Meeting, 3/2013.
9. University of Alabama in Huntsville, Fall 2012 Materials Science Symposium, 12/2012.
8. CFD Research Corporation, 10/2012.
7. University of Alabama in Huntsville, Mechanical and Aerospace Engineering, 4/2012.
6. University of North Texas, Mechanical and Energy Engineering, 3/2012.
5. University of Iowa, Mechanical and Industrial Engineering, 2/2012.
4. Texas A&M University, Mechanical Engineering, 2/2012.
3. Colorado School of Mines, Division of Engineering, 11/2011.
2. Connecticut Center for Clean Energy Engineering Joule Fellows, 7/2010.
1. University of Connecticut, Department of Mechanical Engineering, 7/2009.

Research Funding ($2.6M Total, $2.3M Total Share):

Federal and State

16. *Quantification of Property Degradation of Energy Storage Materials*, Department of Justice; Award Dates: 9/2020-9/2021; PI: K. Hazeli; Co-PI: G. J. Nelson, J. Mayeur; Amount: $100,000 (Co-PI Share)
15. *Advanced Systems Sciences Models for Space and Earth Systems: Exergy Analysis of Lunar Power Systems*, NASA Marshall Space Flight Center; Award Dates: 5/2020-5/2021; PI: B. L. Mesmer; Co-PI: G. J. Nelson; Amount: $126,814 (Co-PI Share)
14. *Advanced Technology Innovation in Propulsion and Power Systems*, Missile Defense Agency; Award Dates: 1/2020-1/2021; PI: R. A. Frederick; Co-PI: J. Cassibry, G. J. Nelson; Amount: $100,000 (Co-PI Share).

13. *Shull Wolan Visiting Researcher Fellowship,* Joint Institute for Neutron Sciences; Award Dates: 8/2019-7/2020; PI: G. J. Nelson; Amount $36,000.
12. *Quantification of Property Degradation of Energy Storage Materials*, Department of Justice; Award Dates: 9/2019-9/2020; PI: K. Hazeli; Co-PI: G. J. Nelson, J. Mayeur; Amount: $109,000 (Co-PI Share)
11. *Collaborative Research: Sodiation Driven Multiscale Chemical-Structural Interactions in Alloy Electrodes*, National Science Foundation; Award Dates: 9/2018-8/2021; PI: G. J. Nelson, P. P. Mukherjee (Purdue University); Amount: $232,934 (PI Share)
10. *Innovative Propulsion and Power Technology Support*, Missile Defense Agency; Award Dates: 4/2015-1/2020; PI: R. A. Frederick; Co-PI: J. Cassibry, D. Lineberry, G. J. Nelson, R. Tyson; Amount: $400,000 (Co-PI Share).
9. *Advanced Systems Sciences Models for Space and Earth Systems*, NASA Marshall Space Flight Center; Award Dates: 5/2013-3/2020; PI: P. A. Farrington; Co-PI: B. L. Mesmer, D. Utley, L. Burns; Amount: $69,254 (Co-PI Share).
8. *SBIR: Fast Fiber-Coupled Imaging of X-rays Events*; NASA SBIR Phase I subcontract for HyperV Technologies Corporation; PI: G. J. Nelson; Award Dates: 8/2016-12/2016; Amount: $10,000.
7. *CAREER: In Situ Observation of Coupled Transport and Degradation in Battery Electrodes*, National Science Foundation; Award Dates: 5/2015-4/2020; PI: G. J. Nelson; Amount: $502,491, $6,000 (REU Supplement).
6. *Mini-Symposium: Multiphysics Coupling in Energy Storage,* National Science Foundation; Award Dates: 9/2015-8/2016; PI: G. J. Nelson; Co-PI: P. P. Mukherjee (Texas A&M University), W. K. S. Chiu (University of Connecticut), I. Avdeev (University of Wisconsin-Milwaukee); Amount: $5,046.
5. *Collaborative Research: Mesoscale Investigation of Microstructure-Transport Interaction of High-Capacity Electrodes for Energy Storage*, National Science Foundation; Award Dates: 9/2014-8/2018; PI: G. J. Nelson, P. P. Mukherjee (Texas A&M University); Amount: $202,413 (PI Share), $5,280 (REU Supplement).
4. *UAH Innovative Propulsion Technology Consortium*, Missile Defense Agency; Award Dates: 4/2014-3/2015; PI: R. Tyson; Co-PI: J. Cassibry, R. A. Frederick, D. Lineberry, G. J. Nelson, N. Slegers; Amount: $45,000 (Co-PI Share).
3. *Assessing Solid Oxide Electrolyzer Degradation Driven by Gas Composition*, National Aeronautics and Space Administration; Award Dates: 1/2013-2/2016; PI: G. J. Nelson; Amount: $47,839 (External) $77,643 (Internal).
2. *Assessing Microstructural Evolution Mechanisms in Thermoelectric Materials*, Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Enhancement Award; Award Dates: 5/2013-12/2014; PI: G. J. Nelson; Amount: $5,000 (External) $9,953 (Internal).
1. *In Situ Imaging and Analysis of Solid Oxide Fuel Cell Anodes during Degradation*, National Science Foundation; Award Dates: 10/2011-9/2014; PI: W. K. S. Chiu, Co-PI: G. J. Nelson; Amount: $296,489.

<u>*University*</u>

8. *Cycling and X-ray Diffraction Studies of Battery Electrode Materials*, University of Alabama in Huntsville Research and Creative Experiences for Undergraduates (RCEU) Program; PI: G. J. Nelson (Faculty Advisor); 5/2019-8/2019; Amount: $3,200.

7. *Multiscale Imaging of Lithium Batteries using X-ray and Neutron Methods,* University of Alabama in Huntsville Individual Investigator Distinguished Research Program; PI: G. J. Nelson; Award Dates: 6/2018-5/2019; Amount: $40,441.
6. *Inkjet Printing of Composite Electrodes for Battery Application*, 2017 University of Alabama in Huntsville Research and Creative Experiences for Undergraduates (RCEU) Program; PI: G. J. Nelson (Faculty Advisor); 5/2017-8/2017; Amount: $3,200.
5. *Affordable Additive Manufacturing of Electrochemical Energy Conversion Devices,* 2015 University of Alabama in Huntsville Research and Creative Experiences for Undergraduates (RCEU) Program; PI: G. J. Nelson (Faculty Advisor); 5/2015-8/2015; Amount: $3,200.
4. *In Situ Neutron Imaging of Enzyme-Based Electrochemical Cells*, University of Alabama in Huntsville New Faculty Research Program; Award Dates: 1/2015-12/2015; PI: G. J. Nelson; Amount: $10,000.
3. *X-ray Diffraction System for Characterization of Energy Materials*, University of Alabama in Huntsville Research Infrastructure Fund; Award Dates: 1/2015-1/2016; PI: G. J. Nelson, Co-PI: Yu Lei; Amount: $92,850.
2. *Analytical and Numerical Investigation of Oxidation Resistant Heating Elements*, University of Alabama in Huntsville Industry/University Graduate Student Research Program; Award Dates: 1/2014-5/2014; PI: G. J. Nelson; Amount: $12,147.
1. *Effects of Humidity and Temperature on Bio-Battery Performance*, University of Alabama in Huntsville Research Infrastructure Fund; Award Dates: 4/2013-3/2014; PI: G. J. Nelson, Co-PI: D. B. Landrum; Amount: $13,427.

Student Advising and Mentoring Activities:

Current Graduate Students

- Joseah Amai, Ph.D., Dissertation on: Microstructural evolution in sodium ion battery electrodes
- Hernando Gonzalez, Ph.D., Dissertation on: Microstructure, performance, reliability in battery electrode materials
- Prehit Patel, Ph.D., Dissertation on: Modeling and analysis of transport in heterogeneous materials

Prior Graduate Students

- Joseph Buckley, Ph.D. Dissertation: *Network Based Pressure Drop Modeling of Heterogeneous Porous Hybrid Rocket Motor Grains* (2021)
- Jacob Adams, M.S., Thesis: *Microstructural Evolution of Tin Alloy Anodes for Lithium Ion Batteries* (2020)
- Prehit Patel, M.S. Thesis: *The Influence of Structure on the Electrochemical and Thermal Response of Li-ion Battery Electrodes* (2019)
- Raymond Chow, M.S., Thesis: *Exergy analysis of electrolyzers for oxygen generation and life support systems* (2018)
- Logan Ausderau, M.S. Thesis: *X-Ray Tomography of High Capacity Anode Materials for Lithium Ion Batteries* (2016)
- Ryan Longchamps, M.S. Thesis: *In operando* neutron imaging of enzymatic electrochemical cells (2017)
- Piyush Jibhakate, M.S. Thesis: *Fabrication and Characterization of Nano/Micro-Sized Cathodes for Li-Ion Batteries* (2016)

- Zachary van Zandt, M.S. Thesis: *Numerical and Non-Dimensional Analysis of the Effects of Microstructure on Solid Oxide Cell Performance* (2015)

Current Undergraduate Researchers
- Megan Flannagin, Project: Testing and characterization of battery electrodes
- Austin Gabhart, Project: Testing and characterization of battery electrodes; Thermodynamic analysis of power systems for space applications
- Alex L'Antigua, Project: Testing and characterization of battery electrodes

Prior Undergraduate Researchers
- Jacob Adams, Project: Image processing and microstructural characterization of alloy anodes for Li-ion batteries
- Elizabeth Andrew, Project: Thermodynamic analysis of environmental control and life support system components
- Gabrielle Andrew, Project: Thermodynamic analysis of environmental control and life support system components
- Hayden Arceneaux, Project: Thermodynamic analysis of environmental control and life support system components
- Logan Grumbach, Project: Environmental chamber calibration for enzymatic electrochemical cell testing
- Kyle Hileman, Project: Cost effective thermal imaging of batteries for instructional labs
- Matthew L'Antigua, Project: Image processing and segmentation methods for tomographic data
- Ryan Longchamps, Projects: *In operando* neutron imaging of enzymatic electrochemical cells, Characterization of inks for printing dye-sensitized solar cells
- Erin Looney, Honor's Thesis: *Enzymatic Fuel Cells: Review of Current Research and Preliminary Characterization Using Neutron Radiography* (2015)
- Sarah Nguyen, Project: Thermodynamic analysis of environmental control and life support system components
- Prehit Patel, Project: Microstructural characterization and modeling of battery electrodes
- Brandon Price, Project: Inkjet Printing of Composite Electrodes for Battery Applications
- Thushananth Rajendra, Project: Image processing and microstructural analysis of Li-ion cathode materials at multiple scales
- Roberto Rivera, Project: Cost effective thermal imaging of batteries for instructional labs
- SeungYoon Shin, Project: Analytical and numerical modeling of transport in electrochemical energy conversion and storage
- Dontavious Truss, Project: Cost effective thermal imaging of batteries for instructional labs

Undergraduate Researchers Mentored at Other Institutions
- Joselyn Baety (Georgia Institute of Technology)
- Kyle Bagshaw (University of Connecticut)
- Matthew Degostin (University of Connecticut)
- Cameron Miller (Georgia Institute of Technology)

Courses Taught, University of Alabama in Huntsville:
- MAE 695 Electrochemical Energy Conversion and Storage
- MAE 695 Conduction and Diffusion

- MAE 495 Electrochemical Energy Conversion and Storage
- MAE 455 Design of Thermal Systems
- MAE 450 Introduction to Heat Transfer
- MAE 450L/451 Introduction to Heat Transfer Laboratory
- MAE 341 Thermodynamics I

Professional Service Activities:

American Society of Mechanical Engineers

- Associate Editor: ASME Journal of Electrochemical Energy Conversion and Storage, 2017-Present
- Guest Editor: ASME Journal of Electrochemical Energy Conversion and Storage, 2015-2016
- ASME Energy Conversion and Storage Segment Leadership Team, 2018-Present
- Advanced Energy Systems Division Executive Committee: Chair, 2017-2018, Vice Chair 2016-2017, Secretary/Treasurer 2015-2016, Member 2012-Present
- Electrochemical Energy Storage and Conversion Technical Committee: Chair 2014-2015, Vice Chair 2013-2014, Member 2012-Present
- Heat Transfer Division K-15 Transport Phenomena in Manufacturing and Materials Processing Technical Committee: Member 2011-Present
- Executive Advisory Committee ASME Advanced Clean Energy Summit, 2019-Present
- Technical Program Co-Chair ASME 2019 Energy Sustainability Conference
- Executive Advisory Committee ASME 2018 Power and Energy Conference
- General Program Chair ASME 2017 International Fuel Cell Science, Engineering and Technology Conference
- Technical Program Chair ASME 2016 International Fuel Cell Science, Engineering and Technology Conference
- Technical Program Co-Chair ASME 2015 International Fuel Cell Science, Engineering and Technology Conference
- Track Organizer 2014 International Mechanical Engineering Congress and Exposition, Track 7: Energy
- Topic Organizer International Mechanical Engineering Congress and Exposition 2013-Present (8 Topics Total)
- Session Organizer International Mechanical Engineering Congress and Exposition 2009-Present (16 Sessions Total), ASME Energy Sustainability Conference and ASME Fuel Cell Science, Engineering and Technology Conference 2011-Present (15 Sessions Total)
- Member 2002-Present

The Electrochemical Society

- 236th ECS Meeting, Electrochemistry in Space Symposium Co-Organizer
- 236th ECS Meeting, Session Chair (2 Sessions)
- 229th ECS Meeting. Session Chair (1 Session)
- Member 2011-Present

National Science Foundation

- Review Panelist 2015-2020 (5 Panels)

Reviewer

- Journals: Applied Physics A; ASME Journal of Electrochemical Energy Conversion and Storage; ASME Journal of Fuel Cell Science and Technology; ASME Journal of Manufacturing Science and Engineering; ASME Journal of Nanotechnology in Engineering and Medicine; International Journal of Heat and Mass Transfer; Journal of the Electrochemical Society; JOM (Journal of the Minerals, Metals & Materials Society); Journal of Power Sources; Solid State Ionics
- Conferences: ASME Fuel Cell Science, Engineering and Technology Conference; ASME International Energy Sustainability Conference; ASME International Mechanical Engineering Congress and Exposition, Advanced Energy Systems; International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems

University Service

- UAH Faculty Senate: Member 2020-Present
- UAH Faculty Senate Undergraduate Curriculum Committee: Member 2020-Present
- UAH ACT Committee: Member 2020
- UAH Charger Innovation Fund Advisory Council: Member 2016
- UAH University Distinguished Research Award: Review Panelist 2016
- UAH Admitted Student Day: Guest Lecturer 2016
- College of Engineering Be an Engineering Student (BEST) Summer Camp: Activity Coordinator 2015-Present
- College of Engineering Honeywell Project: Activity Coordinator 2014
- College of Engineering First Year Experience 101: Guest Lecturer 2015-Present
- Mechanical and Aerospace Engineering Faculty Search Committee: Member 2013-2020
- Mechanical and Aerospace Engineering Graduate Committee: Member 2013-Present