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EDUCATION

Ph.D. in Chemical Engineering, Florida State University, Tallahassee, FL..... May 2017
Supervisor: Dr. Daniel T. Hallinan

M.S. in Chemical Engineering, Florida State University, Tallahassee, FL..... April 2016

M.S. in Advanced Materials, Ulm University, Ulm, Germany..... June 2012

M.S. in Biomedical Engineering, Southeast University, Nanjing, China..... June 2012
(Double-degree program)

B.S. in Biomedical Engineering, Southeast University, Nanjing, China..... June 2009
Minor: Medical Electronics

Research & Leadership Summary

- Spearhead the development of innovative materials and advanced characterization methods for emerging all solid-state and grid-scale redox flow batteries, addressing key challenges in energy density, stability, safety and scalability.
- Advance CO₂ electrochemical conversion research, focusing on sustainable energy generation for CO₂ batteries and enhancing the efficiency of conversion processes.
- Serve as Associate Editor for Frontiers in Energy Research, overseeing manuscript evaluation and editorial decision-making to promote scientific excellence.
- Lead four U.S. Department of Energy (DOE) programs on sulfide solid-state electrolyte, redox flow batteries, and membranes development across four national labs, four universities, and six industrial partners.
- Active member, symposium organizer, and session chair for the Materials Research Society (MRS), the Electrochemical Society (ECS), and the American Chemical Society (ACS), among others.
- Active reviewer for prestigious journals in the green energy field, including Nature Energy, Nature Sustainability, Nature Communications, Science Advances, Advanced Materials, and Advanced Functional Materials, contributing to the advancement of renewable energy research.

PROFESSIONAL EXPERIENCE

Oak Ridge National Laboratory, Oak Ridge, TN, R&D Staff ...Feb, 2020—Present

- Develop standalone argyrodite sulfide solid-state electrolyte separators to enable use of Li metal anode (DOE VTO BMR program, PI, leading a team of 5 members)

- Develop polymer composite membranes for next-generation sodium metal non-aqueous redox flow batteries (DOE OE LDES program, PI, leading a team of 5 members)
- Develop cost-effective redox active materials for redox flow batteries (DOE LDRD program, PI, leading a team of 7 members)
- Develop a new structure redox flow battery based on co-axial tubular structure (DOE AMMTO program, PI, leading a team of 7 members)
- Improve interfacial stability of high-capacity electrodes (e.g. Si and low Co DRX cathodes) to promote cycle and calendar life

Oak Ridge National Laboratory, Oak Ridge, TN, Postdoc AssociateJuly, 2017—Jan, 2020
Supervisor: Dr. Jagjit Nanda

- Developed plasmon-enhanced Raman spectroscopy to study electrode/electrolyte interface and interphase
- Developed solid polymer-inorganic composite electrolytes for non-aqueous redox flow batteries
- Developed high-capacity silicon anodes and electrolytes for next-generation lithium-ion batteries
- Explored structure-property relationship of metastable electrodes using inelastic neutron scattering and neutron pair distribution functions

Oak Ridge National Laboratory, Oak Ridge, TN, *ASTRO Program*Sept, 2016—Feb, 2017

- Developed transparent Raman pouch cells for *in operando* study of the surface chemistry on electrode
- Developed single-layer gold nanoparticle thin films for surface-enhanced Raman spectroscopy (SERS)
- Performed *in situ* SERS study of solid-electrolyte interphase formation at amorphous silicon surface and electrolyte degradation at high-voltage cathode surface

Argonne National Laboratory, Chicago, IL, *Beamline User*2014—2017

- Studied the local structure of self-assembled gold nanoparticle single-layer using Beamline 8-ID-E (GISAXS)
- Explored the local dynamics of the inorganic/polymer composites using Beamline 8-ID-I (XPCS)

National High Magnetic Field Laboratory, Tallahassee, FL, *Research Assistant*...2013—2016

- Synthesized solid-state polymer electrolytes based on anionic polymerization
- Fabricated lithium-polymer pouch cell for ^7Li solid-state NMR and MRI research
- Explored the salt concentration-dependent diffusion of the Li cation in solid-state polymer electrolytes

Center for Materials Research and Technology, Tallahassee, FL, *Facility User* ...2014—2016

- Designed photomask using AutoCAD
- Used photomask/lithography to develop interdigitated micro-electrodes to study the electronic properties of the gold nanoparticle thin films
- Developed master masks to create PDMS nanolithography stamps

Florida State University, Tallahassee, FL, *Research Assistant*2013—2017

- Successfully developed two strategies for assembling nanoparticle single-layer films
- Successfully developed a transparent pouch cell allowing *in situ* Raman study on the solid-state interphase in a lithium-ion battery

Institute of Optoelectronics, Ulm, Germany, *Research Assistant*2009—2010

- Facilitated to design/fabricate v-groove wafer by anisotropically etching CVD-SiO₂
- Assisted in depositing GaN layer with a controlled thickness on etched SiO₂ substrate by HVPE method

PUBLICATIONS AND PATENTS

Peer-reviewed publications (86 in total, 34 first/corresponding-author; Citation: 3344 H-index 32; i10-index 59)

After joining ORNL (71 in total, 27 leading-authors)

1. Karunarathna MS, Rahman MA, Yang G, Gainaru C, Demchuck Z, Bowland CC, Meyer HM, Ghezawi N, Saito T. Tough and circular glass fiber composites via a tailored dynamic boronic ester interface. *Materials Horizons*. 2025. (just accepted)
2. Li Y, Kim C, Williams E, Su Y, Nanda J, Yang G*. Tailoring Binder Molecular Weight to Enhance Slurry-Cast NMC Cathodes for Sulfide Solid-State Batteries. *Energy & Environmental Materials*. 2024:e12858.
3. Li Y, Cho Y, Cai J, Kim C, Zheng X, Wu W, Musgrove AL, Su Y, Sacchi RL, Chen Z, Nanda J. and Yang G* Effects of catholyte aging on high-nickel NMC cathodes in sulfide all-solid-state batteries. *Materials Horizons*. 2025.
4. Wu W, Lehmann M, Li Y, Cheng L, Yang G*. Optimizing Nonaqueous Sodium–Polysulfide Redox-Flow Batteries: The Role of Solvation Effects with Glyme Solvents. *ACS Energy Letters*. 2024 Nov 8;9(12):5795-800.
5. Yang G*, Browning K, Meyer III HM, Li Y, Neale NR, Veith GM, Nanda J. Mitigating Calendar Aging in Si-NMC Batteries with Advanced Dual-Salt Glyme Electrolytes. *Chemistry of Materials*. 2024 Oct 29;36(21):10902-11.
6. Lehmann M, Saito T, Kamaludeen M, Yang G*. Development of Tailored Hydrocarbon-Based Pentablock Copolymer Membranes for Sodium-Polysulfide Flow Batteries. *Batteries & Supercaps*. 2024:e202400401.
7. Li Y, Lehmann M, Cheng L, Zawodzinski TA, Nanda J, Yang G*. Integrated electro-and chemical characterization of sulfide-based solid-state electrolytes. *Materials Advances*. 2024;5(23):9138-59.
8. Tao L, Xia D, Sittisomwong P, Zhang H, Lai J, Hwang S, Li T, Ma B, Hu A, Min J, Hou D, Yang G. Solvent-Mediated, Reversible Ternary Graphite Intercalation Compounds for Extreme-Condition Li-Ion Batteries. *Journal of the American Chemical Society*. 2024 Jun 7.
9. Brechtel J, Ullman AM, Li K, Yang G, Nanda J, Nawaz K, Sacchi RL. Phase change electrolytes for combined electrochemical and thermal energy storage. *Energy Reports*. 2024 Jun 1;11:3931-40.

10. Chen J, Yuan Y, Ziabari AK, Xu X, Zhang H, Christakopoulos P, Bonnesen PV, Ivanov IN, Ganesh P, Wang C, Jaimes KP, Yang G. AI for Manufacturing and Healthcare: a chemistry and engineering perspective. *arXiv preprint arXiv:2405.01520*. 2024 May 2.
11. Amin R, Dixit M, Li M, Essehli R, Neumayer S, Bai Y, Bisht A, Guang Y, Belharouak I. Origin of deactivation of aqueous Na–CO₂ battery and mitigation for long-duration energy storage. *Journal of Power Sources*. 2024 Jul 30;609:234643.
12. Wang Y, Hao H, Naik KG, Vishnugopi BS, Fincher CD, Yan Q, Raj V, Celio H, Yang G, Fang H, Chiang YM. Mechanical Milling–Induced Microstructure Changes in Argyrodite LPSCl Solid-State Electrolyte Critically Affect Electrochemical Stability. *Advanced Energy Materials*. 2024 Apr 13;2304530.
13. Mills A, Kalnaus S, Tsai WY, Su Y, Williams E, Zheng X, Vaidyanathan S, Hallinan DT, Nanda J, Yang G.*, Elucidating Polymer Binder Entanglement in Free-standing Sulfide Solid-State Electrolyte Membranes. *ACS Energy Letters*. 2024 May 10;9:2677-84.
14. Byeon, Y.W., Yang, S., Yang, G., Kim, D.M., Avvaru, V.S., Ogunfunmi, T., Scott, M., Helms, B.A., Urban, J. and Kim, H., 2024. Conductive carbon embedded beneath cathode active material for longevity of solid-state batteries. *Journal of Materials Chemistry A* 2024 12(14):8359-69.
15. Araño KG, Armstrong BL, Yang G, Kumara C, Ward TZ, Meyer III HM, Rogers AM, Toups E, Veith GM. Elucidating the Role of Carbon Conductive Additive in the Processing and Electrochemical Behavior of Surface-Modified Si Anodes. *Energy & Fuels*. 2024 Mar 15;38(7):6446-58
16. Yang G*, Zhang Y, Bilheux JC, Self E, Westover A, Chen J, Bilheux H, Nanda J. Tracking the Initial Capacity Loss in Solid-State Batteries using in-situ Neutron Tomography and Raman Imaging. *Research Square* 2024
17. Rahman MA, Karunarathna MS, Bowland CC, Yang G, Gainaru C, Li B, Kim S, Chawla V, Ghezawi N, Meyer HM, Naskar AK. Tough and recyclable carbon-fiber composites with exceptional interfacial adhesion via a tailored vitrimer-fiber interface. *Cell Reports Physical Science*. 2023 Dec 20;4(12).
18. Chen J, Keum J, Wang Y, Wang H, Lokitz B, Yang G, Kumar R, Advincula R. Interface-Enhanced Conductivities in Surfactant-Mediated Ion, Solution-Grown, Ionic Crystalline Complexes. *Frontiers in Nanotechnology*.;2023, 5:1293801.
19. Araño KG, Yang G*, Armstrong BL, Aytug T, Chambers MS, Self EC, Meyer III HM, Quinn J, Browning JF, Wang C, Veith GM. Carbon Coating Influence on the Formation of Percolating Electrode Networks for Silicon Anodes. *ACS Applied Energy Materials*. 2023 Oct 17;6(21):11308-21.
20. Hao H, Liu Y, Greene SM, Yang G, Naik KG, Vishnugopi BS, Wang Y, Celio H, Dolocan A, Tsai WY, Fang R. Tuned Reactivity at the Lithium Metal–Argyrodite Solid State Electrolyte Interphase. *Advanced Energy Materials*. 2023 Dec;13(46):2301338.
21. Mills A, Tsai WY, Brahmabhatt T, Self EC, Armstrong BL, Hallinan DT, Nanda J, Yang G.*, Navigating the complexities of solvent and binder selection for solution processing of sulfide solid-state electrolytes. *MRS Communications*. 2023 Dec;13(6):1063-70.
22. Patil S, Koirala KP, Crafton MJ, Yang G, Tsai WY, McCloskey BD, Wang C, Nanda J, Self EC. Enhanced Electrochemical Performance of Disordered Rocksalt Cathodes Enabled by a Graphite Conductive Additive. *ACS Applied Materials & Interfaces*. 2023 Aug 11;15(33):39253-64.

23. Mills, A., Yang, G.*, Tsai, W.Y., Chen, X.C., Sacchi, R.L., Armstrong, B.L., Hallinan, D.T. and Nanda, J., 2023. Adverse Effects of Trace Non-polar Binder on Ion Transport in Free-standing Sulfide Solid Electrolyte Separators. ***Journal of the Electrochemical Society***, 2023, 170(8), p.080513.
24. Lehmann, M.L., Self, E.C., Saito, T. and Yang, G.*, 2023. Composite Membrane for Sodium Polysulfide Hybrid Redox Flow Batteries. ***Membranes***, 2023, 13(8), p.700.
25. Zhao, X., Bhagia, S., Gomez-Maldonado, D., Tang, X., Wasti, S., Lu, S., Zhang, S., Parit, M., Rencheck, M.L., Korey, M. and Jiang, H., 2023. Bioinspired design toward nanocellulose-based materials. ***Materials Today***, May 2023
26. Castro-Pardo, S., Puthirath, A.B., Fan, S., Saju, S., Yang, G., Nanda, J., Vajtai, R., Tang, M. and Ajayan, P.M., 2024. VO₂ phase change electrodes in Li-ion batteries. ***Journal of Materials Chemistry A***, 2024, 12(5), pp.2738-2747.
27. Araño KG, Armstrong BL, Boeding E, Yang G, Meyer III HM, Wang E, Korkosz R, Browning KL, Malkowski T, Key B, Veith GM. Functionalized Silicon Particles for Enhanced Half-and Full-Cell Cycling of Si-Based Li-Ion Batteries. ***ACS Applied Materials & Interfaces***. 2023 Feb 15.
28. Gao S, Li Z, Zhang Z, Li B, Chen XC, Yang G, Saito T, Tian M, Yang H, Cao PF. Constructing a multi-functional polymer network for ultra-stable and safe Li-metal batteries. ***Energy Storage Materials***. 2023 Jan 1;55: 214-24.
29. Tyler JL, Sacchi RL, Lehmann ML, Yang G, Zawodzinski TA, Nanda J. Nafion Inhibits Polysulfide Crossover in Hybrid Nonaqueous Redox Flow Batteries. ***The Journal of Physical Chemistry C***. 2022 Dec 13.
30. Self EC, Tsai WY, Westover AS, Browning KL, Yang G, Nanda J. Benchmarking Solid-State Batteries Containing Sulfide Separators: Effects of Electrode Composition and Stack Pressure. ***Journal of The Electrochemical Society***. 2022 Oct 10;169(10):100510.
31. Demchuk Z, Zhu J, Li B, Zhao X, Islam NM, Bocharova V, Yang G, Zhou H, Jiang Y, Choi W, Advincula R. Unravelling the influence of surface modification on the ultimate performance of carbon fiber/epoxy composites. ***ACS Applied Materials & Interfaces***. 2022 Sep 28;14(40):45775-87.
32. Lehmann ML, Yang G, Nanda J, Saito T. Unraveling Ion Transport in Trifluoromethanesulfonimide Pentablock Copolymer Membranes in Nonaqueous Electrolytes. ***Macromolecules***. 2022 Aug 24;55(17):7740-51.
33. Lehmann ML, Tyler L, Self EC, Yang G, Nanda J, Saito T. Membrane design for non-aqueous redox flow batteries: Current status and path forward. ***Chem***. 2022 Apr 29.
34. Yang G*, Cao PF, Self EC, Lehmann M, Chen XC, Zhao S, Ge S, Zhu C, Saito T, Delnick FM, Nanda J. Selective Plasticization of Poly (ethylene oxide)(PEO) Block in Nanostructured Polystyrene– PEO– Polystyrene Triblock Copolymer Electrolytes. ***Journal of The Electrochemical Society***. 2022 May 4;169(5):050506.
35. Hao H, Wang Y, Katyal N, Yang G, Dong H, Liu P, Hwang S, Mantha J, Henkelman G, Xu Y, Boscoboinik JA. Molybdenum Carbide Electrocatalyst in Situ Embedded in Porous Nitrogen-Rich Carbon Nanotubes Promotes Rapid Kinetics in Sodium-Metal–Sulfur Batteries. ***Advanced Materials***. 2022 Jul;34(26):2106572.
36. Sahore R, Yang G, Chen XC, Tsai WY, Li J, Dudney NJ, Westover A. A bilayer electrolyte design to enable high-area-capacity composite cathodes in polymer electrolytes based solid-state lithium metal batteries. ***ACS Applied Energy Materials***. 2022 Feb 9;5(2):1409-13.

37. Wang M, Ye H, Zhai C, Yang G. Stress-Dependent Chemo-Mechanical Performance of Amorphous Si Anodes for Li-Ion Batteries upon Lithiation. **ACS Applied Energy Materials**. 2021 Dec 13;4(12):14718-26.
38. Zhang Y, Yang G, Lehmann ML, Wu C, Zhao L, Saito T, Liang Y, Nanda J, Yao Y. Separator effect on zinc electrodeposition behavior and its implication for zinc battery lifetime. **Nano Letters**. 2021 Dec 6;21(24):10446-52.
39. Chen S, Tao R, Guo C, Zhang W, Liu X, Yang G, Guo P, Sun G, Liang J, Lu SY. A new trick for an old technology: Ion exchange syntheses of advanced energy storage and conversion nanomaterials. **Energy Storage Materials**. 2021 Oct 1;41:758-90.
40. Jafta CJ, Prevost S, He L, Li M, Sun XG, Yang G, Belharouak I, Nanda J. Quantifying the chemical, electrochemical heterogeneity and spatial distribution of (poly) sulfide species using Operando SANS. **Energy Storage Materials**. 2021 Sep 1;40:219-28.
41. Gilmer DB, Han L, Lehmann ML, Siddel DH, Yang G, Chowdhury AU, Doughty B, Elliott AM, Saito T. Additive manufacturing of strong silica sand structures enabled by polyethyleneimine binder. **Nature Communications**. 2021 Aug 26;12(1):5144.
42. Chen S, Tao R, Tu J, Guo P, Yang G, Wang W, Liang J, Lu SY. High performance flexible lithium-ion battery electrodes: ion exchange assisted fabrication of carbon coated nickel oxide nanosheet arrays on carbon cloth. **Advanced Functional Materials**. 2021 Jun;31(24):2101199.
43. Yang G*, Frisco S, Tao R, Philip N, Bennett TH, Stetson C, Zhang JG, Han SD, Teeter G, Harvey SP, Zhang Y. Robust solid/electrolyte interphase (SEI) formation on Si anodes using glyme-based electrolytes. **ACS Energy Letters**. 2021 Apr 5;6(5):1684-93.
44. Hopkins EJ, Frisco S, Pekarek RT, Stetson C, Huey Z, Harvey S, Li X, Key B, Fang C, Liu G, Yang G. Examining CO₂ as an additive for solid electrolyte interphase formation on silicon anodes. **Journal of the Electrochemical Society**. 2021 Mar 18;168(3):030534.
45. Yang G*, Lehmann ML, Zhao S, Li B, Ge S, Cao PF, Delnick FM, Sokolov AP, Saito T, Nanda J. Anomalously high elastic modulus of a poly (ethylene oxide)-based composite electrolyte. **Energy Storage Materials**. 2021 Mar 1;35:431-42.
46. Yang G*, Tao R, Jafta CJ, Shen C, Zhao S, He L, Belharouak I, Nanda J. Investigating multiscale spatial distribution of sulfur in a CNT scaffold and its impact on Li-S cell performance. **The Journal of Physical Chemistry C**. 2021 Jun 11;125(24):13146-57.
47. Yang G*, Li X, Cheng Y, Wang M, Ma D, Sokolov AP, Kalinin SV, Veith GM, Nanda J. Distilling nanoscale heterogeneity of amorphous silicon using tip-enhanced Raman spectroscopy (TERS) via multiresolution manifold learning. **Nature communications**. 2021 Jan 25;12(1):578.
48. Burdette-Trofimov MK, Armstrong BL, Nelson Weker J, Rogers AM, Yang G, Self EC, Armstrong RR, Nanda J, Veith GM. Direct measure of electrode spatial heterogeneity: influence of processing conditions on anode architecture and performance. **ACS Applied Materials & Interfaces**. 2020 Dec 2;12(50):55954-70.
49. Delnick FM, Yang G, Self EC, Meyer III HM, Nanda J. Investigation of complex intermediates in solvent-mediated synthesis of thiophosphate solid-state electrolytes. **The Journal of Physical Chemistry C**. 2020 Dec 2;124(50):27396-402.
50. Merrill LC, Chen XC, Zhang Y, Ford HO, Lou K, Zhang Y, Yang G, Wang Y, Wang Y, Schaefer JL, Dudney NJ. Polymer–Ceramic Composite Electrolytes for Lithium Batteries: A Comparison between the Single-Ion-Conducting Polymer Matrix and Its Counterpart. **ACS Applied Energy Materials**. 2020 Sep 16;3(9):8871-81.

51. Wagh P, Islam SZ, Deshmane VG, Gangavarapu P, Poplawsky J, Yang G, Sacci R, Evans SF, Mahajan S, Paranthaman MP, Moyer B. Fabrication and characterization of composite membranes for the concentration of lithium containing solutions using forward osmosis. ***Advanced Sustainable Systems***. 2020 Dec;4(12):2000165.
52. Lehmann ML, Yang G*, Nanda J, Saito T. Well-designed crosslinked polymer electrolyte enables high ionic conductivity and enhanced salt solvation. ***Journal of The Electrochemical Society***. 2020 Mar 19;167(7):070539.
53. Brahmabhatt T, Yang G*, Self EC, Nanda J. Cathode–sulfide solid electrolyte interfacial instability: challenges and solutions. ***Frontiers in Energy Research***. 2020 Oct 22;8:570754.
54. Bennett TH, Pamu R, Yang G, Mukherjee D, Khomami B. A new platform for development of photosystem I based thin films with superior photocurrent: TCNQ charge transfer salts derived from ZIF-8. ***Nanoscale Advances***. 2020;2(11):5171-80.
55. M.L. Lehmann, Guang Y*, J Nanda and T. Saito, Well-designed Crosslinked Polymer Electrolyte Enables High Ionic Conductivity and Enhanced Salt Solvation. ***Journal of The Electrochemical Society***, 167, 2020
56. J Nanda*, Guang Y*, T Hou, D Voylov, X Li , R.E. Ruther, M Naguib, G. M. Veith, A. Sokolov, K Persson, Unravelling the nanoscale heterogeneity of solid electrolyte interphase on electrochemically cycled amorphous silicon (*corresponding&Senior author, ***Joule***), 06/2019
57. M.L. Lehmann^, G Yang^*, D Gilmer, E. C. Self, R.E. Ruther, S Ge, B Li, A.P. Sokolov, F.M. Delnick, J Nanda*, T Saito*, Crosslinking of Poly (ethylene oxide) membranes enables mechanical robustness and improved sodium-ion conductivity with plasticization (*corresponding author, ***Energy Storage Materials***, in press), 06/2019
58. Peng-Fei Cao#, G Yang#, B Li, Y Zhang, S Zhao, S Zhang, A Erwin, Z Zhang, A.P. Sokolov, J Nanda, and Tomonori Saito. Rational design of a multifunctional binder for high-capacity silicon-based anodes. ***ACS Energy Letter***, 4, 2019 (#co-first author)
59. G Yang, R Sacci, I Ivanov, R Ruther, K Hays, Y Zhang, P Cao, G M Veith, N J Dudney, T Saito, D T. Hallinan, J Nanda, Probing electrolyte solvents at direct solid/liquid interface by surface-enhanced Raman spectroscopy. ***Journal of the Electrochemical Society***, 166, 2019
60. G Yang, I Ivanov, R E. Ruther, R L. Sacci, V Subjakova, D T. Hallinan, and J Nanda. Solvation structure of lithium-ion battery electrolytes using gap mode surface-enhanced Raman spectroscopy. ***ACS Nano***, 12, 2018
61. G Yang, K Kim, W Wang, B Chen, H Mattoussi, and D T Hallinan Jr. Scaling Laws for polymer chains grafted onto nanoparticles (Cover Article). ***Macromolecular Chemistry and Physics***, 8, 2018
62. G Yang, J Nanda, B Wang, G Chen, and D T Hallinan Jr. Self-assembly of large gold nanoparticles for surface-enhanced Raman spectroscopy. ***ACS Applied Materials & Interfaces***, 9, 2017
63. Runming T, Guang Y, Ethan C, Jiyuan L, John RD, Shuang M, Chi-Linh DT, Jixing L, Yiman Z, Sheng Z, Hailong L. Ionic Liquid-Directed Nanoporous TiNb2O7 Anodes With Superior Performance for Fast-Rechargeable Lithium-Ion Batteries. ***Small*** e2001884, 2020
64. Cao PF, Li B, Yang G, Zhao S, Townsend J, Xing K, Qiang Z, Vogiatzis KD, Sokolov AP, Nanda J, Saito T. Elastic Single-Ion Conducting Polymer Electrolytes: Toward a Versatile Approach for Intrinsically Stretchable Functional Polymers. ***Macromolecules***, 53, 2020.

65. Yin Y, Arca E, Wang L, Yang G, Schnabel M, Cao L, Xiao C, Zhou H, Liu P, Nanda J, Teeter G. Non-Passivated Silicon Anode Surface. *ACS Applied Materials & Interfaces*, 2020
66. Burdette-Trofimov MK, Armstrong BL, Rogers AM, Heroux L, Doucet M, Yang G, Phillip ND, Kidder MK, Veith GM. Understanding Binder-Silicon Interactions During Slurry Processing. *The Journal of Physical Chemistry C*, 2020
67. T Hou, G Yang, N Rajput, J Self, S Park, J Nanda, K Persson. The influence of FEC on the solvation structure and reduction reaction of LiPF₆/EC electrolytes and its implication for solid electrolyte interphase formation. *Nano Energy* (in press), 2019
68. R D. McAuliffe, G Yang, J Nanda, and G M. Veith. Synthesis of metal chloride films: Influence of growth conditions on crystallinity. *Thin Solid Films*, 689, 2019
69. R Rose, G Yang, F M. Delnick, Z Tang, M Lehmann, T Saito, Y Meng, T A. Zawodzinski, and J Nanda. Mechanically Robust, Sodium-Ion Conducting Membranes for Nonaqueous Redox Flow Batteries. *ACS Energy Letter*, 3, 2018
70. L, Valentina, A S. Westover, A K. Kercher, N Phillip, G Yang, G M. Veith, G Ceder, and N.J. Dudney. Resolving the amorphous structure of lithium phosphorus oxynitride (Lipon). *Journal of the American Chemical Society*, 140, 2018
71. P Zhang, N Chen, D Chen, S Yang, X Liu, L Wang, P Wu, N. Phillip, G Yang, and S Dai. Ultra-Stable and High Loading Cobalt@ Ordered Mesoporous Carbon Catalysts: All-in-One Deoxygenation of Ketone into Alkylbenzene. *ChemCatChem*, 10, 2018

Before joining ORNL (15 in total, 7 leading-authors)

72. G Yang, L Hu, T D. Keiper, P Xiong, and D T. Hallinan Jr. Gold nanoparticle monolayers with tunable optical and electrical properties. *Langmuir*, 32, 2016
73. G Yang, D T. Hallinan Jr. Gold nanoparticle monolayers from sequential interfacial ligand exchange and migration in a three-phase system. *Scientific Reports*, 6, 2016
74. G Yang, D T. Hallinan Jr. Self-assembly of large-scale crack-free gold nanoparticle films using a ‘drain-to-deposit’ strategy. *Nanotechnology*, 27, 2016
75. G Yang, W S. Chang, and D T. Hallinan Jr. A convenient phase transfer protocol to functionalize gold nanoparticles with short alkylamine ligands. *Journal of Colloid and Interface Science*, 460, 2015
76. G Yang, Y Zhou, Z Guo, Y Wan, Q Ding, T Bai, C Wang, and N Gu. Microwave-assisted one-step patterning of aqueous colloidal silver. *Nanotechnology*, 23, 2012
77. G Yang, B Wang, K Tawfiq, and G Chen. Electropolishing of surfaces: theory and applications. (invited review) *Surface Engineering*, 2016
78. G Yang, B Wang, K Vu, K Tawfiq, and G Chen. Role of bacterial adhesion in their subsurface deposition and transport: a critical review (invited review) *Reviews of Adhesion and Adhesives*, 3, 2015
79. T Liu, T Keiper, X Wang, G Yang, D Hallinan, J Zhao, and P Xiong. Molecular Patterning and Directed Self-Assembly of Gold Nanoparticles on GaAs. *ACS Applied Materials & Interfaces*, 9, 2017
80. P Samuthira, X Chelsea Chen, J Chen, B S. Lokitz, R E. Ruther, G Yang, K Lou, J Nanda, F M. Delnick, and N J. Dudney. Facile and scalable fabrication of polymer-ceramic composite electrolyte with high ceramic loadings. *Journal of Power Sources*, 390, 2018
81. S. Chandrashekar, O. Oparaji, G Yang, and D T Hallinan Jr. Visualizing salt concentration in lithium polymer electrolyte using time-resolved ⁷Li magnet resonance imaging. *Journal of The Electrochemical Society*, 163, 2016

82. H Wei, G Yang, B Wang, R Li, G Chen, and Z Li. E. coli interactions, adhesion and transport in alumino-silica clays. *Colloids and Surfaces B: Biointerfaces*, 154, 2017
83. K Vu, G Yang, B Wang, K Tawfiq, G Chen. Bacterial interactions and transport in geological formation of alumino-silica clays. *Colloids and Surfaces B: Biointerfaces*, 125, 2015
84. T D. Renfro, W Xie, G Yang, and G Chen. Rhamnolipid surface thermodynamic properties and transport in agricultural soil. *Colloids and Surfaces B: Biointerfaces*, 115, 2014
85. W Xie, K Vu, G Yang, K Tawfiq, and G Chen. Escherichia coli growth and transport in the presence of nanosilver under variable growth conditions. *Environmental technology*, 35, 2014
86. Z Guo, Y Wan, M Wang, L Xu, X Lu, G Yang, K Fang, and Ning Gu. High-purity gold nanobipyramids can be obtained by an electrolyte-assisted and functionalization-free separation route. *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, 414, 2012

Invited Book Chapters

87. Yang G, Nanda J. Interfacial chemistry on silicon anode. Lithium-ion Batteries Enabled by Silicon Anodes. 2021 Aug 26;156:129.
88. Zhao X, Lu S, Li W, Zhang S, Li K, Nawaz K, Wang P, Yang G, Ragauskas A, Ozcan S, Webb E. Epoxy as Filler or Matrix for Polymer Composites. Epoxy-Based Composites. 2022 May 25:Ch-1.

Patents (6 in total, 3 after joining ORNL; 4 ORNL invention disclosure not listed)

- Yang, Nanda, Hallinan, Mills, and Chen, "Fabrication of thin film sulfide solid-state electrolyte through slurry processing route "US Provisional Patent Application Serial No. 63/455,305. (2023)
- Yang G, Nanda J, Veith GM, inventors; UT Battelle LLC, assignee. Non-carbonate electrolytes stabilize silicon anodes. United States patent application US 17/713,449.(2022 Oct 6)
- Yang G, Nanda J, Saito T, Delnick FM, inventors; UT Battelle LLC, assignee. Mechanically robust solid electrolyte compositions for alkali and beyond alkali metal batteries. United States patent application US 17/397,233. (2022 Feb 10)
- D T Hallinan Jr., G Yang. Gold Nanoparticle Monolayers from Sequential Interfacial Ligand Exchange and Migration in a Three-Phase System. US9911520B2 (Mar 06, 2018)
- D T Hallinan Jr., G Yang. Alkylamine-gold monolayers having tunable electrical and optical properties. US Provisional Patent Application U.S. 62/252,944 (Nov 09, 2015)
- Yang G, Gu N, Liu J. A microwave device with adjustable multiple parameters for nanoparticles self-assembly. Chinese Patent, application number: 201110005046-9

CONFERENCE PRESENTATIONS

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- (Invited) Yang, Guang, et al. "Innovating Sustainable, Cost-Effective, and Durable Redox Flow Battery Membranes." Electrochemical Society Meeting Abstracts 245. No. 3. The Electrochemical Society, Inc., 2024.

- (Invited) Yang G, Lehmann M, Self E, Sacchi RL, Saito T, Nanda J. Development of Cost-Effective Membranes for Redox-Flow Batteries. Electrochemical Society Meeting Abstracts 243 2023 Aug 28 (No. 3, pp. 755-755). The Electrochemical Society, Inc. 2023
- (Invited) Yang G, Nanda J. Multiscale Interfacial Heterogeneity Explored by Advanced Spectroscopy and Imaging for Batteries Beyond Lithium-Ion. Electrochemical Society Meeting Abstracts 243 2023 Aug 28 (No. 46, pp. 2496-2496). The Electrochemical Society, Inc. 2023
- (Invited) Yang G, Nanda J. Investigating multiscale interfaces and interphases using advanced spectroscopy for electrochemical energy storage (Conference Presentation). Enhanced Spectroscopies and Nanoimaging (p. PC122030E). SPIE. 2022
- Yang G, Self E, Brahmabhatt T, Mills A, Tsai WY, Hallinan D, Chen X, Delnick F, Nanda J. Development of Argyrodite-Based Sulfide Electrolytes for Next-Generation Solid-State Li Batteries. Electrochemical Society Meeting Abstracts 242 2022 Oct 9 (No. 4, pp. 537-537). The Electrochemical Society, Inc. 2022
- (Invited) Yang G, Zhang Y, Self E, Brahmabhatt T, Bilheux JC, Bilheux H, Nanda J. Initial Capacity Loss Mechanism of All-Solid-State Lithium Sulfide Battery Unraveled by in Situ Neutron Tomography. Electrochemical Society Meeting Abstracts 241 2022 Jul 7 (No. 2, pp. 205-205). The Electrochemical Society, Inc. 2022
- Lehmann M, Tyler J, Self E, Yang G, Nanda J, Saito T. Unraveling Ion Transport in Pentablock Copolymer Membranes for Non-Aqueous Redox Flow Batteries. Electrochemical Society Meeting Abstracts 240 2021 Oct 19 (No. 1, pp. 109-109). ECS Meeting, 2021
- J Nanda, G Yang, G.M. Veith, D.T. Hallinan Jr. and A.P. Sokolov. (Invited) Solid-Electrolyte Interface and Interphase Depicted By Plasmon-Enhanced Raman Spectroscopy. ECS Meeting, May 2019, Dallas, TX
- P Cao, G Yang, J Nanda and T Saito. Design of Multifunctional Binder for High-Capacity Silicon-Based Anodes. ECS Meeting, May 2019, Dallas, TX
- M Lehmann, G Yang, P Cao, E.C. Self, F.M. Delnick, J. Nanda, T. Saito. Design of Mechanically Robust Polymer Membranes for Non-Aqueous Flow Battery. ECS Meeting, May 2019, Dallas, TX
- E. C. Self, F. M. Delnick, G Yang, M. Lehmann, D. B. Gilmer, R. E. Ruther, T Saito, and J Nanda. Sodium Thiophosphate Cathodes and Polymeric Membranes for High Energy Density Redox Flow Batteries. ECS Meeting, May 2019, Dallas, TX
- G Yang, J Nanda, Exploring the Solid-Electrolyte Interface and Interphase by Surface-Plasmon Resonance Spectroscopy. AIChE Annual Conference, Oct 2018, Pittsburgh, PA
- G Yang, R E. Ruther, M Lehmann, E C. Self, Z Tang, C Chen, F M. Delnick, T A. Zawodzinski, T Saito, J Nanda, Poly(Ethylene Oxide) Membranes of Mechanical Robustness and Improved Sodium-Ion Conductivity with Plasticization. MRS Fall Meeting, Nov 2018, Boston, MA
- G Yang, R L. Sacchi, I N. Ivanov, R E. Ruther, K A. Hays, Y Zhang, P Cao, G M. Veith, N J Dudney, T Saito, D T Hallinan, J Nanda, Investigating Molecular Structures at Interface Using Nanogap Surface-Enhanced Raman Spectroscopy. MRS Fall Meeting, Nov 2018, Boston, MA
- J Nanda, G Yang, D N. Voylov, A P. Sokolov, and G M. Veith, Investigation of Solid Electrolyte Interphase on Amorphous SiO_x/Si Films Using Tip Enhanced Raman Spectroscopy. ECS Meeting, Oct 2018, Cancun, Mexico.

- J Nanda, G Yang, D Voylov, D T. Hallinan, R E. Ruther, A P. Sokolov, R L. Sacchi, I Ivanov, and G Veith. Investigating lithium-ion solvation structure and solid electrolyte interphase using multiscale vibrational spectroscopic and imaging techniques. ACS Meeting, Mar 2018, Washington DC
- G Yang, I N Ivanov, R E Ruther, R L Sacchi, V Subjakova, D T Hallinan, J Nanda, Probing Electrode-Electrolyte Interfaces Using Nano-Gap Surface-Enhanced Raman Spectroscopy and Imaging. ECS Meeting, May 2018, Seattle, CA.
- G Yang, D N Voylov, M Naguib, R E Ruther, G M Veith, N V Lavrik, VBocharova, A P Sokolov, J Nanda, Probing the Nanoscale Heterogeneity of SEI on Silicon Anode Using Tip Enhanced Raman Spectroscopy (TERS). ECS Meeting, May 2018, Seattle, CA.
- Yang, G., Nanda J, Wang B, Chen G, Hallinan, D T. Gold nanoparticle monolayer assembled in three-phase system-overcoming size limitations. American Physical Society March meeting, Mar 2017, New Orleans, LA.
- Yang, G., Hallinan, D T. Using polymer-grafted nanoparticle monolayers to investigate chain conformations and scaling. American Institute of Chemical Engineers Annual meeting, Nov 2016, San Francisco, CA. (*Invited Talk*).
- Yang, G., Hallinan, D T. Three-phase self-assembly of gold nanoparticle monolayers – overcoming ligand size limitations. American Institute of Chemical Engineers Annual meeting, Nov 2016, San Francisco, CA.
- Yang, G., Hallinan, D T. Large-scale crack-free gold nanoparticle monolayers with adjustable electrical and optical properties. American Institute of Chemical Engineers Annual meeting, Nov 2016, San Francisco, CA.
- Yang, G., Hallinan, D T. Functionalizing gold nanoparticles with short alkylamine ligands using a two-step phase transfer protocol. American Institute of Chemical Engineers Annual meeting, Nov 2016, San Francisco, CA.
- Liu, T, Keiper, T, Wang, X, Yang, G., Hallinan, D T, Zhao, J, Xiong, P. Directed self-assembly of gold nanoparticles on GaAs via patterns of organic self-assembled monolayers. Florida Inorganic and Materials Symposium, Sep 2016, Gainesville, FL.
- Hallinan, D.; Yang, G. Nanoparticle Synthesis and Assembly – A Route to Understanding and Engineering Nanostructured Polymers, Center for Nanophase Material Science User Meeting, 2015, Oak Ridge, TN. (*Invited Talk*)
- Yang, G., Hallinan, D T. Scaling behavior of linear poly(ethylene oxide) investigated using polymer-tethered gold nanoparticles. The Florida Section of the American Chemical Society Annual Meeting, May 2015, Tampa, FL.
- Yang, G., Hallinan, D T. Monolayer alkylamine-gold nanoparticle films with tunable electrical and optical properties. American Institute of Chemical Engineers Annual meeting, Nov 2015, Salt Lake City, UT.
- Yang, G., Chang, W-S, Hallinan, D T. Functionalizing gold nanoparticles with short alkylamine ligands via phase transfer. American Institute of Chemical Engineers Annual meeting, Nov 2015, Salt Lake City, UT.
- Hallinan, D.; Yang, G. Electrochemical stability of model polymer electrolyte/electrode interfaces. Bulletin of the American Physical Society, Mar 2015, San Antonio, TX.
- Yang, G., Chang, W-S, Hallinan, D T. Functionalization of gold Nanoparticles with short alkylamine ligands using a convenient phase transfer protocol. NanoFlorida Conference, May 2015, Tallahassee, FL.

- Yang, G, Hallinan, D T. Designing composite polymer electrolyte interfaces for stable electrodes. American Institute of Chemical Engineers Annual meeting, 2014, Nov, Atlanta, GA.
- Yang G, Wan Y, Gu N. Microwave-assisted evaporation induced self-assembly of colloidal nanoparticles. IEEE 6th Asia-Pacific Conference on Transducers and Micro-Nano Technology (APCOT), 2012, Nanjing, China.

TRAINING

- >15-year hands-on experience on material characterizations via confocal micro-Raman spectroscopy and imaging, AFM, TEM, SEM, XPS, SAXS, UV-vis-NIR, and FTIR
- >5-year hands-on experience in battery-related sample preparation and operation for inelastic neutron scattering (INS) spectroscopy, neutron PDF and neutron tomography
- >10-year hands-on experience in Finite-difference time-domain (FDTD) simulation on optical properties of nanostructures
- 2-year working knowledge and experience in molecular dynamics (MD) simulation and Density Functional Theory (DFT) calculation for analyzing vibrational spectroscopy
- >5-year working knowledge of using basic machine learning method to process large spectroscopic dataset
- 9-year hands-on experience in inorganic metallic nanoparticle synthesis, surface functionalization, self-assembly and characterization
- 8-year hands-on experience in thermal and mechanical properties of polymer measured using TGA, DSC and DMA
- 9-year hands-on experience on polymer electrolyte synthesis, solid-state lithium cell assembly and electrochemical performance evaluation
- Polymer dynamic study using synchrotron XPCS soft polymer sample preparation using cryomicrotome and staining for TEM
- 5-year hands-on experience on RF magnetron sputtering device to fabricate thin film electrodes
- Hands-on experience to assist in setting up and maintaining safe lab environments
- 9-year hands-on experience on argon-filled glovebox operation and maintenance
- 2-year hands-on experience in designing photomask by AutoCAD and using lithography to develop micrometer-sized patterns on a silica wafer
- 5-year cleanroom experience
- 4-year dry room experience

STUDENTS AND POSTDOCS MENTORED

Wenda Wu, ORNL, Postdoc, 2024 – present

Chanho Kim, ORNL, Postdoc, 2024 – present

Adam Hsieh, Georgia Institute of Technology, Ph.D student, co-mentoring with Nian Liu, 2024-present

Andre Adam, University of Kansas, GRO fellow, co-mentoring with Xianglin Li, 2025

Fuead Hasan, UNC Charlotte, GRO fellow, co-mentoring with Christopher Bejger, 2025

Kevin Llopart, University of Tennessee, Ph.D student, co-mentored with Robert Sacci 2023-present

Michelle Lehmann, University of Tennessee, Ph.D student, co-mentored with Tomonori Saito and Jagjit Nanda 2018-2021 (currently TP staff in my team)

Yuanshun Li, University of Tennessee, Ph.D student, co-mentored with Thomas A. Zawodzinski 2024 (applying for Postdoc with us)

Anna Mills, Florida State University Ph.D. Student, co-mentored with Daniel Hallinan and Jagjit Nanda, 2022-2024 (currently R&D Scientist at A123)

Ella Williams, Freed-Hardeman University, undergraduate student, SULI summer intern for two summers at ORNL (applying for a Ph.D program with us)

TECHNICAL SKILLS

- Professional level in Microsoft Word, PowerPoint, Excel, Matlab, Lumerical Solution (Finite-Difference Time-Domain Simulation), Photoshop, ImageJ, COMSOL
- Entry level in C++, Visual Basic, LabView, AutoCAD and Pro/Engineer (Creo)

TEACHING EXPERIENCE

Department of Chemical & Biomedical Engineering, Florida State University, FL2016
Teaching Assistant for ‘Graduate Transport Phenomenon (ECH5934)’

- Assisted in developing classroom lessons, course projects and teaching materials
- Provided weekly instruction and guidance through the tutoring for 5 graduate students

Department of Chemical & Biomedical Engineering, Florida State University, FL.....2015-2017
Lab Instructor for ‘Unit Operations Lab (ECH4404L)’

- Mentored 40 Seniors for ‘Distillation Column’ and ‘Gas Separation’
- Delivered effective feedback to improve the design of the experimental setup
- Facilitated the multimedia education for TA training purpose

Department of Chemical & Biomedical Engineering, Florida State University, FL2014—2015
Teaching Assistant for ‘Process Analysis and Design (ECH3301)’

- Provided weekly instruction and guidance during recitation for 80+ juniors
- Aided in designing recitation materials
- Facilitated homework & quiz grading and exam proctoring

Department of Chemical & Biomedical Engineering, Florida State University, FL2012—2014
Teaching Assistant for ‘Chemical Engineering Thermodynamics (ECH3101)’, ‘Mass & Energy Balance I (ECH3023)’ and ‘Mass & Energy Balance II (ECH3024)’

Department of Biomedical Engineering, Southeast University, Nanjing, China2010
Teaching Assistant for ‘Electrophysiological Technologies’

- Designed a course project for 30+ first-year graduate students

- Facilitated the classroom teaching materials preparation and homework grading

HONORS AND AWARDS

RSC Emerging Investigator selectee	2025
ARPA-E Early Career Researcher Award.....	2024
UT-Battelle Out Standing Scholarly Output	2022
Oak Ridge National Laboratory ASTRO Scholarship	2016
Florida State University Short-term Research Grant at ORNL	2016
Florida State University Congress of Graduate Student Presentation Grant.....	2014-2017
Outstanding Thesis Award at Southeast University	2012
Outstanding Master Graduate Student	2012
University of Ulm Academy-fund scholarship	2010
Ministry of Science, Research and the Arts Baden-Wuerttemberg scholarship	2009
Second-class scholarship for graduated student of SEU	2009
Gold medal of Texas Instruments Cup Analog Circuit Design Competition	2008
The third place of Business Plan Competition in Jiangsu Province	2008
National Aid Scholarship	2008
Top 8 in the pentathlon of the track and field meet of SEU	2007
Outstanding Individual of Provincial Social Practice	2007
University Excellent Student	2006
China Merchants Bank Scholarship	2006

PROFESSIONAL SERVICES

American Chemical Society (ACS) Spring, “High-Energy Battery Frontiers: Innovating Materials and Technologies” Symposium organizer	2025
Beyond Lithium XIV Conference (with six DOE national labs, NASA, and IBM), co-organizer	2024
Associate Editor for Electrochemical Energy Conversion and Storage, <i>Frontiers in Energy Research</i>	2022
The electrochemical Society (ECS241) Meeting A02 Symposium, Lithium Ion Batteries Symposium organizer.....	2022
Guest Editor for <i>Frontiers in Energy Research</i> , special issue “Solid-State Electrolytes for Next-Generation Energy Storage”	2020
Oak Ridge National Laboratory 6 TH ORPA Symposium	
Chair, Physical Sciences Computational.....	2018
2018 MRS Fall Meeting Session ET07.07: Surface and Interface Engineering for Energy Materials	
Session Chair.....	2018
2018 MRS Fall Meeting Session CM03.18: In Situ/Operando Analysis of Electrochemical Materials and Interfaces	

Session Chair.....	2018
2018 MRS Fall Meeting Session CM03.19: Mechanics of Battery Materials	
Session Chair.....	2018

Active journal reviewer for Nature Communications, Nature Sustainability, Science Advances, Joule, Energy & Environmental Science, Advanced Materials, Advanced Energy Materials, Advanced Functional Materials, Materials Horizons, ACS Applied Materials & Interfaces, Langmuir, Journal of The Electrochemical Society, Journal of Applied Physics A, etc

SCIENCE OUTREACH ACTIVITIES

ORNL Traveling Science Fair (Greensboro, NC).....	2019
Aero-propulsion, Mechatronics, and Energy Open House (Tallahassee, FL).....	2014-2016
Challenger Learning Center Science and Engineering Program (Tallahassee, FL).....	2013-2015
Tallahassee Scientific Society/Leon County Library Science Lab (Tallahassee, FL).....	2014
SAIL High School Science and Robotics Lab Tour (Tallahassee, FL)	2013

PROFESSIONAL MEMBERSHIPS

- Member of the Electrochemical Society (ECS)
- Member of American Chemical Society (ACS)
- Member of American Institute of Chemical Engineers (AIChE)
- Member of American Physical Society (APS)

LANGUAGE SKILLS

- English (full professional proficiency)
- Mandarin (native)
- German (elementary proficiency)

PERSONALITY

- Excellent communication (oral and written) to teammates and management audiences
- Productivity and results oriented
- Highly self-motivated and optimistic