Scott A. Roberts, Ph.D.

Thermal/Fluid Component Sciences Dept.
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Education

2004 - 2009 **Doctor of Philosophy in Chemical Engineering**
University of Minnesota
Advisor: Prof. Satish Kumar
Thesis: Stability of microscale fluid interfaces: A study of fluid flows near soft substrates and pattern formation under electrostatic fields

2000 - 2004 **Bachelor of Science in Chemical Engineering**, *Highest Distinction*
University of Kansas
Awarded with University and Departmental Honors

Professional Experience

Sandia National Laboratories

- Currently hold DOE Q (Top Secret) security clearance, additional accesses available upon request

2021 - Present Distinguished Research and Development Chemical Engineer, Thermal/Fluid Component Sciences Department (1513)

2023 Manager (acting), Thermal/Fluid Component Sciences Department (1513)

2016 - 2021 Principal Research and Development Chemical Engineer, Thermal/Fluid Component Sciences Department (1513)

2015 Manager (acting), Computational Thermal and Fluid Mechanics Department (1541)

2011 - 2015 Senior Research and Development Chemical Engineer,
Thermal and Fluid Processes Department (1514) (2011-2013)
Fluid Sciences and Engineering Department (1513) (2013-2014)
Thermal/Fluid Component Sciences Department (1513) (2015)

2010 - 2011 Postdoctoral Appointee, Thermal and Fluid Processes Department (1514)
Mentors: Prof. P. Randall Schunk and Dr. Rekha R. Rao

University of Texas at El Paso

2024 - Present Research Professor (Joint Appointment),
Metallurgical, Materials and Biomedical Engineering Department

University of Minnesota - Twin Cities

2004 - 2009 Graduate Research Assistant,
Department of Chemical Engineering and Materials Science
Advisor: Prof. Satish Kumar

ExxonMobil

Summer 2004 Research Intern, ExxonMobil Process Research

Summer 2003 Process Engineering Intern, ExxonMobil Chemicals

University of Kansas

2002 - 2003 Research Associate, Department of Chemical and Petroleum Engineering
Advisor: Prof. Kyle Camarda

Awards / Honors

Sandia National Laboratories

2023 Employee Recognition Award - Polyurea Nanocomposite Design and Testing

2023 Employee Recognition Award - DetNet HPC software as a service for component design and surveillance

2019 National Nuclear Security Administration (NNSA) Defense Programs Award of Excellence - Thermally Activated Battery Simulator (TABS)

2018 Employee Recognition Award - Collaborative Design of Thermal Battery Simulation Software Team (Team Representative)

2018 Employee Recognition Award - High-Flux Concentrating Solar Reactor for Testing Advanced Materials Under Extreme Environments Team

2016 Nominee - Outstanding Mentor Award, Sandia Post-Doctoral Development

2014 R&D 100 Award - Goma 6.0

2013 Employee Recognition Award - Thermal Battery Code Integration Team

2012 Employee Recognition Award - Novel Railgun Design Team

University of Minnesota - Twin Cities

2009 National Research Council Postdoctoral Fellowship (declined) - NIST

2008 Doctoral Dissertation Fellowship - University of Minnesota

2004, 2005 NSF Graduate Fellowship - Honorable Mention

2004 National Tau Beta Pi Fellowship - King Fellow

University of Kansas

2004 AIChE National Student Design Competition A. E. Marshall Award (2nd Place)

2004 Ted Ventrone Inherent Safety Award - AIChE Safety & Health Division

2004 Carl & Sammie Locke Outstanding Senior in the School of Engineering

2002-2004 Outstanding Sophomore, Junior, and Senior in Chemical Engineering

2004 Outstanding Service to the C&PE Department Award

2003 National Tau Beta Pi Scholarship

2002 Tau Beta Pi Engineering Honor Society

Scouting

2025 James E. West Fellowship, Scouting America

2001 Founders' Award, Order of the Arrow, Boy Scouts of America

1997 Eagle Scout Award, Boy Scouts of America

Professional Activities

Conference, Minisymposium, and Session Organization

2023 Local Organizing Committee - 17th US National Congresses on Computational Mechanics

2023 Scientific Committee - 22nd Computational Fluids Conference (CFC2023)

2019 Conference Co-Organizer - FEF (Finite Elements in Flow Problems), Chicago, IL

2021 Co-Chair for Scientific and Engineering Digital Twins Track and Organizer for Credible Image-based Simulations for Digital Twins Minisymposium, Mechanistic Machine Learning and Digital Twins for Computational Science, Engineering & Technology Conference, San Diego, CA

2021 Organizer - Minisymposium on Image Processing, Discretization, and Simulation of As-Built Geometries, 16th US National Congress on Computational Mechanics

2021 Organizer - Minisymposium on Image-Based Simulation, 14th World Congress on Computational Mechanics

2021 Session Chair - Battery Modeling Session, TMS 2021 Annual Meeting

2019 Organizer - Minisymposium on Image-Based Simulation, 15th US National Congress on Computational Mechanics

2018 Organizer - Minisymposium on Energy Conversion and Storage Applications of Coupled Multiscale Physics Numerical Techniques, 13th World Congress on Computational Mechanics

2017 Organizer - Minisymposium on Complex Multi-Physics Coupling Techniques: Advances and Applications, 14th US National Congress on Computational Mechanics

2018 Co-organizer - Minisymposium on Complex Fluids and Non-Newtonian Fluid Mechanics: Methods and Applications, 13th World Congress on Computational Mechanics

2011-2019 Co-organizer - Minisymposium on Computational Fluid Mechanics for Free and Moving Boundaries, 11th - 15th US National Congresses on Computational Mechanics, 11th World Congress on Computational Mechanics

2009 Session volunteer - 62nd Annual Meeting of the American Physical Society Division of Fluid Dynamics

Session chair - (2020) Cathode session, ECS PRiME; (2018) Additive Manufacturing Session, USACM Workshop on Meshfree and Particle Methods: Application and Theory; (2017) Poster Session, 2017 Annual Meeting of the Society of Rheology

Journal Editor / Referee

2021-Present Associate editor - Journal of Electrochemical Energy Converstion and Storage

2022-2024 Guest editor - Energy Storage Materials, special issue on Accelerating Scientific Discovery in Materials for Energy Storage using Artificial Intelligence

2018 Guest editor - Computers and Fluids, special issue on computational methods and applications in free and moving boundary problems

2012 Guest editor - Computers and Fluids, special issue on Computational Fluid Mechanics for Free and Moving Boundaries

Ongoing	Referee: *Joule, Advanced Energy Materials, Nature Communications, Journal of Fluid Mechanics, npj Computational Materials, Journal of the Electrochemical Society, Electrochimica Acta, Physics of Fluids, Journal of Rheology, Computational Materials Science, Journal of Non-Newtonian Fluid Mechanics, International Journal for Numerical Methods in Engineering, International Journal for Numerical Methods in Fluids, AIChE Journal, Computers and Fluids, Batteries and Supercapacitors, Tribology International, Journal of Coatings Technology and Research, IEEE Transactions on Plasma Science, Journal of Physical Chemistry C, Progress in Energy, RSC Advances, Electrochemical Science Advances, iScience*

Professional / External

2019-Present	External Advisory Board Member, Chemical and Petroleum Engineering Department, University of Kansas (Steering Committee 2021-2024, Chair 2023-2024)
2005-2014	School of Engineering Recent Graduate Advisory Board, University of Kansas (Chair 2006-2009)
2023	Reviewer for NSF GOALI proposals
2020	NASA Space Technology Research Institutes Panel Reviewer
2018	Reviewer for Netherlands Organization for Scientific Research
2016-2017	Reviewer for DOE SBIR/STTR Proposals
2017-Present	Career mentor, University of Kansas School of Engineering
2004	Intern Engineer - Kansas State Board of Technical Professions
Ongoing	Member: American Institute of Chemical Engineers, American Physical Society, Society of Rheology, International Society of Coating Science and Technology, United States Association for Computational Mechanics

Sandia National Laboratories

2023-2025	DoD Future Solutions Working Group (FSWG) Chair for Modeling and Simulation Focus Group
2022-2025	Leading "Transform Engineering" pursuit area for Thermal, Fluid, and Aero Sciences Group (1510)
2022	Strategic planning for the Component Sciences, Engineering, and Production Center (7500)
2018-Present	University of Minnesota Recruiting Team
2015-2019	Chief Editor, 5th-10th Hypervelocity Gun Weapon System Conference Proceedings
2017,2019	Technical reviewer, Laboratory Directed Research and Development Program
2016-2017	Peer reviewer for component design under high-rigor RPP-12, modeling SME
2012-2019	Executive Board (2017-2019), President (2015-2016), Vice-President (2014), Treasurer (2013), Sandia Labs Softball Association

University of Minnesota

2007-2009	Sport Clubs Advisory Council
2006-2009	University of Minnesota Cycling Team (Officer 2007-2009)
2005-2009	CEMS Council of Graduate Students (Communication Chair 2006-2009)

University of Kansas

2003-2004	Vice-President, Tau Beta Pi Engineering Honor Society, KU Student Chapter
2003	Chemical Engineering TORP Faculty Search Committee
2002-2004	President, American Institute of Chemical Engineers, KU Student Chapter
2002-2004	Department of Chemical & Petroleum Engineering Advisory Board

2001-2004 KU Student Ambassador

Personal

2025-Present Vice President (Softball), Chief Umpire (Softball), and Board of Directors, Eastdale Little League

2024-Present Cubmaster, Pack 241, Boy Scouts of America

2021-2024 Charted Organization Representative, Pack 241, Boy Scouts of America

2013-2015 Assistant Scoutmaster, Troop 220 Boy Scouts of America

2006-2007 Sunday School Teacher - Centennial United Methodist Church

2001 Lodge Chief, Order of the Arrow

2000-2004 Assistant Scoutmaster, Troop 71, Boy Scouts of America

Teaching, Advising, and Mentoring

Sandia National Laboratories Post-doctoral Appointees

2024-2025 Hannah Stroud, Hruby Fellow, fluid-structural interactions of rough ablating surfaces

2023-2025 Christopher Larsson, mesoscale modeling of thermal protection systems

2023-2025 Daniel Okegbu, mesoscale modeling of thermal protection systems

2021-2024 Troy Shilt, multi-physics modeling and machine learning

2021-2023 Peter Creveling, mesoscale modeling of thermal protection systems

2020-2022 Jeffrey Horner, mesoscale battery modeling

2020-2022 Martín Di Stefano, mesoscale modeling of thermal protection systems

2019-2022 Michael Krygier, mesoscale modeling and uncertainty quantification

2017-2020 Ishan Srivastava, granular battery modeling

2016-2021 Mark Ferraro, mesoscale battery modeling

2017-2019 Lincoln Collins, ablation modeling

2015-2017 Neal Bitter, railgun modeling

2014-2016 Hector Mendoza, mesoscale battery modeling

- Ph.D. Students

2024-Present Samantha Bernstein, mentor/committee, ablation modeling, U. Texas

2022-Present John Hickman, mentor, stabilized methods for multi-physics simulations, U. Illinois

2019-2024 Collin Foster, mentor/committee, thermal protection system imaging and modeling, U. Illinois

2019-2025 Julia Meyer, mentor/committee, mesoscale battery modeling, Purdue

2018-2022 Chance Norris, mentor/committee, mesoscale battery modeling, Purdue

2017-Present James Hartley, mentor/committee, photovoltaic module modeling, U. New Mexico

2014-2015 Bradley Trembacki, mentor/committee, mesoscale battery modeling, U. Texas

- Masters Students

2014-2015 Emilee Reinholz, mentor/committee, mesoscale battery modeling, U. New Mexico

- Dissertation Committees (non-mentor/advisor)

- 4 Ph.D. Committees: Sean Skweres (Purdue), Taejin Jang (2023, U. Texas), Cedric Williams (2022, Notre Dame), Tuan-Tu Nguyen (2021, Université de Picardie - Jules Verne)
- 1 M.S. Committee: Abishek Venkatakrishnan (2012, U. New Mexico)

- Interns

2012-Present	9 Graduate student summer interns: Samantha Bernstein (2024), Sean Skweres (2023), Aidan Gould (2022-2024), Hannah Stroud (2022), Benjamin Ng (2020), Mitchell Gosma (2019-2024), Cedric Williams (2019), Adam Watts (2019), Tyson Watkins (2012, 2013)
2011-2023	5 Undergraduate student summer interns: Kate Reza (2023), Ryan Henderson (2022), Daniel Shaw (2018), Jason Harrington (2015), Eric Benner (2011)
2015-2018	3 Undergraduate student year-round interns: Julian Medina (2017-2018), Rebecca Thomas (2017), Shaun Harris (2015-2016)
2015-2022	7 Military academy summer interns: Blakeley Cremer (2023), Jeremy Chen (2022), Erin Shea (2021), Gabrielle Milanesa (2018), Lillian Usadi (2018), John "Mike" Hanling (2017), Will Wan (2015)

University of Minnesota - Twin Cities

2009	Instructor - Chemical Engineering Process Design (ChEn 4501W)
2006-2009	Lecturer - Finite Element Methods of Computer-aided Analysis (ChEn 8902)
2005-2007	Teaching Assistant - Undergraduate Process Design (ChEn 4501W), Graduate Physical Rate Processes (ChEn 8301), Undergraduate Numerical Methods (ChEn 4201)
2005-2007	Tutor - Undergraduate courses in Physical Chemistry (I & II), Material & Energy Balances, Transport Phenomena, and Thermodynamics

Publications

Refereed Journal Articles:

53. A. T. Gould, L. N. Collins, O. Betancourt, S. A. Roberts, and T. I. Zohdi. "Voxel-Based Simulation and Optimization Framework for Thermal Protection System Materials." *Journal of Thermophysics and Heat Transfer* (2026). DOI: 10.2514/1.T7473

52. H. R. Stroud, C. M. Stack, L. N. Collins, M. F. Barone, and S. A. Roberts. "Orientation of Rough Features Impacts Augmentation of Surface Quantities in Hypersonic Flows." *AIAA Journal* (2026). DOI: 10.2514/1.J067022

51. S. B. Skweres, P. J. Creveling, D. E. Sommer, S. A. Roberts, and M. D. Sangid. "Uncertainty quantification for competing failure mechanisms in unidirectionally reinforced carbon–carbon composites." *Materials & Design* 265 (2026), p. 116019. DOI: 10.1016/j.matdes.2026.116019

50. J. Hickman, S. A. Roberts, and A. Masud. "Stabilized method for contact mechanics and dissipative interfacial kinematic processes." *Computer Methods in Applied Mechanics and Engineering* 451 (2026), p. 118660. DOI: 10.1016/j.cma.2025.118660

49. J. S. Horner, D. J. Kemmenoe, G. J. Bourdon, S. A. Roberts, E. R. Arata, J. Ray, and A. M. Grillet. "Predictive dynamic wetting, fluid-structure interaction simulations for braze run-out." *Computers & Fluids* 290 (2025), p. 106567. DOI: 10.1016/j.compfluid.2025.106567

48. N. van de Werken, Z. M. Wilson, J. D. Engerer, S. A. Roberts, and L. N. Collins. "Advancing Ablative TPS with Novel Fiber Architectures." *Journal of DoD Research & Engineering* 7(4) (2024)

47. J. M. Meyer, P. P. Mukherjee, L. N. Collins, and S. A. Roberts. "Transient Chemo-Mechanical Model of Lithium Plating Impacted by External Pressure." *Advanced Energy Materials* 15(16) (2024). DOI: 10.1002/aenm.202404175

46. S. Kench, I. Squires, A. Dahari, F. Brosa Planella, S. A. Roberts, and S. J. Cooper. "Li-ion battery design through microstructural optimization using generative AI." *Matter* (2024). DOI: 10.1016/j.matt.2024.08.014

45. D. Shin, P. J. Creveling, S. A. Roberts, and R. Dingreville. "Deep material network for thermal conductivity problems: Application to woven composites." *Computer Methods in Applied Mechanics and Engineering* 431 (2024), p. 117279. DOI: 10.1016/j.cma.2024.117279

44. J. S. Horner and S. A. Roberts. "Theoretical design and performance of three-dimensional, pillared FeS2 cathodes." *Electrochimica Acta* 501 (2024), p. 144758. DOI: 10.1016/j.electacta.2024.144758

43. J. Ray, J. S. Horner, I. Winter, D. J. Kemmenoe, E. R. Arata, M. Chandross, S. A. Roberts, and A. M. Grillet. "A data-driven multiscale model for reactive wetting simulations." *Computers & Fluids* (2024), p. 106259. DOI: 10.1016/j.compfluid.2024.106259

42. C. Norris, A. Ayyaswamy, B. S. Vishnugopi, C. Martinez, S. A. Roberts, and P. P. Mukherjee. "Uncertainty quantification and propagation in lithium-ion battery electrodes using Bayesian convolutional neural networks." *Energy Storage Materials* 67 (2024), p. 103251. DOI: 10.1016/j.ensm.2024.103251

41. J. A. Actor, X. Hu, A. Huang, S. A. Roberts, and N. Trask. "Data-driven Whitney forms for structure-preserving control volume analysis." *Journal of Computational Physics* 496 (2023), p. 112520. DOI: 10.1016/j.jcp.2023.112520

40. C. W. Foster, L. N. Collins, F. Panerai, and S. A. Roberts. "Assessing thermophysical properties of parameterized woven composite models using image-based simulations." *Composites Science and Technology* 241 (2023), p. 110136. DOI: 10.1016/j.compscitech.2023.110136

39. C. Martinez, D. S. Bolintineanu, A. Olson, T. Rodgers, B. Donohoe, K. M. Potter, S. A. Roberts, R. Pokharel, S. Forrest, and N. W. Moore. "Automated segmentation of porous thermal spray material CT scans with predictive uncertainty estimation." *Computational Mechanics* 72(3) (2023), pp. 525–551. DOI: 10.1007/s00466-023-02345-4

38. J. M. Meyer, K. L. Harrison, P. P. Mukherjee, and S. A. Roberts. "Developing a model for the impact of non-conformal lithium contact on electro-chemo-mechanics and dendrite growth." *Cell Reports Physical Science* 4(4) (2023), p. 101364. DOI: 10.1016/j.xcrp.2023.101364

37. J. S. Horner, G. Whang, I. V. Kolesnichenko, T. N. Lambert, B. S. Dunn, and S. A. Roberts. "A pseudo-two-dimensional (P2D) model for FeS2 conversion cathode batteries." *Journal of Power Sources* 544 (2022), p. 231893. DOI: 10.1016/j.jpowsour.2022.231893

36. T. Jang, L. Mishra, S. A. Roberts, B. Planden, A. Subramaniam, M. Uppaluri, D. Linder, M. P. Gururajan, J.-G. Zhang, and V. R. Subramanian. "BattPhase—A Convergent, Non-Oscillatory, Efficient Algorithm and Code for Predicting Shape Changes in Lithium Metal Batteries Using Phase-Field Models: Part I. Secondary Current Distribution." *Journal of The Electrochemical Society* 169(8) (2022), p. 080516. DOI: 10.1149/1945-7111/ac86a7

35. S. J. Cooper, S. A. Roberts, Z. Liu, and B. Winiarski. "Methods—Kintsugi Imaging of Battery Electrodes: Distinguishing Pores from the Carbon Binder Domain using PT Deposition." *Journal of The Electrochemical Society* 169(7) (2022), p. 070512. DOI: 10.1149/1945-7111/ac7a68

34. D. S. Ashby, J. S. Horner, G. Whang, A. S. Lapp, S. A. Roberts, B. Dunn, I. V. Kolesnichenko, T. N. Lambert, and A. A. Talin. "Understanding the Electrochemical Performance of FeS2 Conversion Cathodes." *ACS Applied Materials & Interfaces* (2022). DOI: 10.1021/acsami.2c01021

33. M. Parmananda, C. Norris, S. A. Roberts, and P. P. Mukherjee. "Probing the Role of Multiscale Heterogeneity in Graphite Electrodes for Extreme Fast Charging." *ACS Applied Materials & Interfaces* (2022). DOI: 10.1021/acsami.1c25214

32. C. Norris, M. Parmananda, S. A. Roberts, and P. P. Mukherjee. "Probing the Influence of Multiscale Heterogeneity on Effective Properties of Graphite Electrodes." *ACS Applied Materials & Interfaces* 14(1) (2022), pp. 943–953. DOI: 10.1021/acsami.1c19694

31. K. L. Harrison, L. C. Merrill, D. M. Long, S. J. Randolph, S. Goriparti, J. Christian, B. Warren, S. A. Roberts, S. J. Harris, D. L. Perry, and K. L. Jungjohann. "Cryogenic electron microscopy reveals that applied pressure promotes short circuits in Li batteries." *iScience* 24(12) (2021), p. 103394. DOI: 10.1016/j.isci.2021.103394

30. J. S. Horner, G. Whang, D. S. Ashby, I. V. Kolesnichenko, T. N. Lambert, B. S. Dunn, A. A. Talin, and S. A. Roberts. "Electrochemical Modeling of GITT Measurements for Improved Solid-State Diffusion Coefficient Evaluation." *ACS Applied Energy Materials* 4(10) (2021), pp. 11460–11469. DOI: 10.1021/acsaem.1c02218

29. A. Mistry, A. Verma, S. Sripad, R. Ciez, V. Sulzer, F. Brosa Planella, R. Timms, Y. Zhang, R. Kurchin, P. Dechent, W. Li, S. Greenbank, Z. Ahmad, D. Krishnamurthy, A. M. Fenton, K. Tenny, P. Patel, D. Juarez Robles, P. Gasper, A. Colclasure, A. Baskin, C. D. Scown, V. R. Subramanian, E. Khoo, S. Allu, D. Howey, S. DeCaluwe, S. A. Roberts, and V. Viswanathan. "A Minimal Information Set To Enable Verifiable Theoretical Battery Research." *ACS Energy Letters* 6 (2021), pp. 3831–3835. DOI: 10.1021/acsenergylett.1c01710

28. M. C. Krygier, T. LaBonte, C. Martinez, C. Norris, K. Sharma, L. N. Collins, P. P. Mukherjee, and S. A. Roberts. "Quantifying the unknown impact of segmentation uncertainty on image-based simulations." *Nature Communications* 12(1) (2021), p. 5414. DOI: 10.1038/s41467-021-25493-8

27. L. Mishra, A. Subramaniam, T. Jang, K. Shah, M. Uppaluri, S. A. Roberts, and V. R. Subramanian. "Perspective—Mass Conservation in Models for Electrodeposition/Stripping in Lithium Metal Batteries." *Journal of The Electrochemical Society* 168(9) (2021), p. 092502. DOI: 10.1149/1945-7111/ac2091

26. I. Srivastava, S. A. Roberts, J. T. Clemmer, L. E. Silbert, J. B. Lechman, and G. S. Grest. "Jamming of bidisperse frictional spheres." *Physical Review Research* 3(3) (2021), p. l032042. DOI: 10.1103/physrevresearch.3.l032042

25. K. L. Harrison, S. Goriparti, L. C. Merrill, D. M. Long, B. Warren, S. A. Roberts, B. R. Perdue, Z. Casias, P. Cuillier, B. L. Boyce, and K. L. Jungjohann. "Effects of Applied Interfacial Pressure on Li-Metal Cycling Performance and Morphology in 4 M LiFSI in DME." *ACS Applied Materials & Interfaces* 13(27) (2021), pp. 31668–31679. DOI: 10.1021/acsami.1c06488

24. A. Mistry, A. A. Franco, S. J. Cooper, S. A. Roberts, and V. Viswanathan. "How Machine Learning Will Revolutionize Electrochemical Sciences." *ACS Energy Letters* (2021), pp. 1422–1431. DOI: 10.1021/acsenergylett.1c00194

23. T. G. Voskuilen, H. K. Moffat, B. B. Schroeder, and S. A. Roberts. "Multi-fidelity electrochemical modeling of thermally activated battery cells." *Journal of Power Sources* 488 (2021), p. 229469. DOI: 10.1016/j.jpowsour.2021.229469

22. I. Srivastava, D. S. Bolintineanu, J. B. Lechman, and S. A. Roberts. "Controlling Binder Adhesion to Impact Electrode Mesostructures and Transport." *ACS Applied Materials & Interfaces* 12(31) (2020), pp. 34919–34930. DOI: 10.1021/acsami.0c08251

21. J. Y. Hartley, M. Owen-Bellini, T. Truman, A. Maes, E. Elce, A. Ward, T. Khraishi, and S. A. Roberts. "Effects of Photovoltaic Module Materials and Design on Module Deformation Under Load." *IEEE Journal of Photovoltaics* 10(3) (2020), pp. 838–843. DOI: 10.1109/jphotov.2020.2971139

20. X. Zhang, Q. J. Wang, K. L. Harrison, S. A. Roberts, and S. J. Harris. "Pressure-Driven Interface Evolution in Solid-State Lithium Metal Batteries." *Cell Reports Physical Science* 1(2) (2020), p. 100012. DOI: 10.1016/j.xcrp.2019.100012

19. B. L. Trembacki, D. R. Noble, M. E. Ferraro, and S. A. Roberts. "Mesoscale Effects of Composition and Calendering in Lithium-Ion Battery Composite Electrodes." *Journal of Electrochemical Energy Conversion and Storage* 17(4) (2020). **Invited**. DOI: 10.1115/1.4045973

18. M. E. Ferraro, B. L. Trembacki, V. E. Brunini, D. R. Noble, and S. A. Roberts. "Electrode Mesoscale as a Collection of Particles: Coupled Electrochemical and Mechanical Analysis of NMC Cathodes." *Journal of The Electrochemical Society* 167(1) (2020), p. 013543. DOI: 10.1149/1945-7111/ab632b

17. B. L. Trembacki, A. Vadakkepatt, S. A. Roberts, and J. Y. Murthy. "Volume-Averaged Electrochemical Performance Modeling of 3D Interpenetrating Battery Electrode Architectures." *Journal of The Electrochemical Society* 167(1) (2019), p. 013507. DOI: 10.1149/2.0072001jes

16. X. Zhang, Q. J. Wang, K. L. Harrison, K. Jungjohann, B. L. Boyce, S. A. Roberts, P. M. Attia, and S. J. Harris. "Rethinking How External Pressure Can Suppress Dendrites in Lithium Metal Batteries." *Journal of The Electrochemical Society* 166(15) (2019), A3639–A3652. DOI: 10.1149/2.0701914jes

15. B. L. Trembacki, A. N. Mistry, D. R. Noble, M. E. Ferraro, P. P. Mukherjee, and S. A. Roberts. "Editors' Choice—Mesoscale Analysis of Conductive Binder Domain Morphology in Lithium-Ion Battery Electrodes." *Journal of The Electrochemical Society* 165(13) (2018), E725–E736. DOI: 10.1149/2.0981813jes

14. S. A. Roberts, H. Mendoza, V. E. Brunini, and D. R. Noble. "A verified conformal decomposition finite element method for implicit, many-material geometries." *Journal of Computational Physics* 375 (2018), pp. 352–367. DOI: 10.1016/j.jcp.2018.08.022

13. B. L. Trembacki, D. R. Noble, V. E. Brunini, M. E. Ferraro, and S. A. Roberts. "Mesoscale Effective Property Simulations Incorporating Conductive Binder." *Journal of The Electrochemical Society* 164(11) (2017), E3613–E3626. DOI: 10.1149/2.0601711jes

12. S. A. Roberts, H. Mendoza, V. E. Brunini, B. L. Trembacki, D. R. Noble, and A. M. Grillet. "Insights Into Lithium-Ion Battery Degradation and Safety Mechanisms From Mesoscale Simulations Using Experimentally Reconstructed Mesostructures." *Journal of Electrochemical Energy Conversion and Storage* 13(3) (2016). DOI: 10.1115/1.4034410

11. A. M. Grillet, T. Humplik, E. K. Stirrup, S. A. Roberts, D. A. Barringer, C. M. Snyder, M. R. Janvrin, and C. A. Apblett. "Conductivity Degradation of Polyvinylidene Fluoride Composite Binder during Cycling: Measurements and Simulations for Lithium-Ion Batteries." *Journal of The Electrochemical Society* 163(9) (2016), A1859–A1871. DOI: 10.1149/2.0341609jes

10. E. L. Reinholz, S. A. Roberts, C. A. Apblett, J. B. Lechman, and P. R. Schunk. "Composition and Manufacturing Effects on Electrical Conductivity of Li/FeS2 Thermal Battery Cathodes." *Journal of The Electrochemical Society* 163(8) (2016), A1723–A1729. DOI: 10.1149/2.1191608jes

9. H. Mendoza, S. A. Roberts, V. E. Brunini, and A. M. Grillet. "Mechanical and Electrochemical Response of a LiCoO2 Cathode using Reconstructed Microstructures." *Electrochimica Acta* 190 (2016), pp. 1–15. DOI: 10.1016/j.electacta.2015.12.224

8. S. A. Roberts, V. E. Brunini, K. N. Long, and A. M. Grillet. "A Framework for Three-Dimensional Mesoscale Modeling of Anisotropic Swelling and Mechanical Deformation in Lithium-Ion Electrodes." *Journal of The Electrochemical Society* 161(11) (2014), F3052–F3059. DOI: 10.1149/2.0081411jes

7. S. A. Roberts and P. R. Schunk. "A reduced-order model for porous flow through thin, structured materials." *International Journal of Multiphase Flow* 67 (2014), pp. 25–36. DOI: 10.1016/j.ijmultiphaseflow.2014.07.013

6. C. C. Roberts, S. A. Roberts, M. B. Nemer, and R. R. Rao. "Circulation within confined droplets in Hele-Shaw channels." *Physics of Fluids* 26(3) (2014), p. 032105. DOI: 10.1063/1.4867695

5. S. A. Roberts, D. R. Noble, E. M. Benner, and P. R. Schunk. "Multiphase hydrodynamic lubrication flow using a three-dimensional shell finite element model." *Computers & Fluids* 87 (2013), pp. 12–25. DOI: 10.1016/j.compfluid.2012.08.009

4. S. A. Roberts and R. R. Rao. "Numerical simulations of mounding and submerging flows of shear-thinning jets impinging in a container." *Journal of Non-Newtonian Fluid Mechanics* 166(19-20) (2011), pp. 1100–1115. DOI: 10.1016/j.jnnfm.2011.06.006

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Refereed Computer Science Conference Papers:

1. C. Martinez, K. M. Potter, M. D. Smith, E. A. Donahue, L. Collins, J. P. Korbin, and S. A. Roberts. "Segmentation Certainty Through Uncertainty: Uncertainty-Refined Binary Volumetric Segmentation Under Multifactor Domain Shift." In: *2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*. IEEE, 2019. DOI: 10.1109/cvprw.2019.00066

Patents:

2. C. Martinez, K. M. Potter, E. Donahue, M. D. Smith, C. L. Snider, J. P. Korbin, S. A. Roberts, and L. N. Collins. "Uncertainty-Refined Image Segmentation Under Domain Shift." U.S. pat. 12,169,962 B2. National Technology & Engineering Solutions of Sandia, LLC. 2024

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Technical Reports:

36. J. Wagner, J. Murray, J. Tencer, A. Diaz, J. Needels, P. Blonigan, T. Shilt, J.-P. Heinzen, L. Collins, P. Creveling, J. Murray, E. Mussoni, S. Skweres, C. Larsson, D. Okegbu, J. Engerer, D. Lowry, S. Swan, S. Roberts, I. Nelson, Z. Wilson, C. Murzyn, A. Overacker, L. McLaughlin, K. Armijo,

K. Casper, S. Babiniec, R. Wagnild, A. Plumadore, E. Jans, R. Nevett, C. Pehrson, M. D. Zetter, R. Spillers, K. Wakefield, C. Goldenstein, D. Londrico, P. McCormick, B. Morreale, E. Robertson, S. Kearney, B. Hernandez-Sanchez, J. Gilvey, T. Minton, S. Hamoodi, N. Clemens, P. Varghese, G. Kale, M. Stocke, C. Cramer, C. Downing, B. Lyon, S. Bullock, A. Murchie, C. Jowolowsky, K. Lynch, L. Treadwell, N. van de Werken, and J. Hargis. *Enabling Rapid Flight Integration of Advanced Hypersonic Thermal Protection System (TPS) Materials: Grand Challenge LDRD Final Report*. Tech. rep. SAND2025-15351. Sandia National Laboratories, 2025

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4. S. A. Roberts and P. R. Schunk. *A non-linear elastic constitutive framework for replicating plastic deformation in solids*. Sandia Report SAND2014-0241. Sandia National Laboratories, 2014. DOI: 10.2172/1148928

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Other Publications:

21. S. A. Roberts et al. *DOE-IN-2026-0222-REF*. 2026

20. H. R. Stroud, C. M. Stack, L. N. Collins, and S. A. Roberts. "An Automated Framework for High Fidelity Modeling of Hypersonic Flows Over Mesoscale Roughness Features." In: *AIAA SCITECH 2025 Forum*. American Institute of Aeronautics and Astronautics, 2025. DOI: 10.2514/6.2025-1137

19. N. W. Moore, W. M. Scherzinger, K. N. Long, M. C. Krygier, and S. A. Roberts. "Nonlinear Hugoniot for Idealized Composites under Weak Shock Compression." In: *AIP Conference Proceedings: Shock Compression of Condensed Matter*. 2023

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17. T. G. Voskuilen, H. K. Moffat, N. W. Porter, and S. A. Roberts. "Coupled Thermal-Electrochemical Full Battery Modeling of LiSi/FeS2 Batteries." In: *Proceedings of the 49th Power Sources Conference*. 2023

16. H. A. Padilla II, L. D. Jacobs, E. Piekos, S. Roberts, C. Apblett, and I. Barney. "Accelerating Thermal Battery Design with Set-Based Concurrent Engineering." In: *Proceedings of the 49th Power Sources Conference*. 2023

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11. B. B. Schroeder, E. Allcorn, J. C. Hewson, H. K. Moffat, E. S. Piekos, B. L. Trembacki, T. G. Voskuilen, S. A. Roberts, "Supporting Credibility of Single Cell Thermal Battery Modeling through V&V/UQ Activities." Proceedings of the 48th Power Sources Conference (2018).

10. T. G. Voskuilen, C. F. Jove-Colon, H. K. Moffat, B. B. Schroeder, B. L. Trembacki, S. A. Roberts, "Multi-Physics Cost and Complexity Reduction Strategies for Modeling Thermally Activated Batteries." Proceedings of the 48th Power Sources Conference (2018).

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3. A. M. Grillet, D. E. Wesolowski, A. N. Allen, C. C. Roberts, L. A. Mondy, B. McKenzie, R. P. Grant, S. A. Roberts, M. J. Martinez, J. R. Clausen, "Electrolyte Mobility within Molten Salt Batteries." Proceedings of the 46th Power Sources Conference (2014).

2. R. R. Rao, L. A. Mondy, M. C. Celina, D. R. Noble, S. A. Roberts, K. Thompson, J. Tinsley, "A Conformal Decomposition Finite Element Method for Polyurethane Foam Expansion." Proceedings of the Polymer Processing Society 29th Annual Meeting (2013).

1. S. A. Roberts, K. N. Long, J. S. Rath, L. A. Mondy, A. M. Grillet, "Modeling separator deformation and electrolyte flow in thermally-activated batteries." Proceedings of the 45th Power Sources Conference (2012).

Invited Seminars and Talks

36. **S. A. Roberts**, "X-Ray to Exascale: Image-Based Multiphysics Modeling of Batteries and Thermal Protection Systems," Texas Materials Institute, University of Texas at Austin, Austin, TX, November 2025.

35. **S. A. Roberts**, "Recent Advancements in Ablation Tools and Understanding at Sandia National Laboratories," 14th Ablation Workshop, Laurel, MD, November 2024.

34. **S. A. Roberts**, J. S. Horner, J. Meyer, P. P. Mukherjee, "Mesoscale Modeling and Homogenization of Woven Carbon Fiber Composites," **(keynote)** TMS 2024 Annual Meeting, Orlando, FL, March 2024.

33. **S. A. Roberts**, J. S. Horner, "Mechanical influences of engineered battery composite electrodes on electrochemical performance," Distinguished Guest Seminar, Department of Mechanical Engineering, Colorado School of Mines, Golden, CO, October 2023.

32. **S. A. Roberts**, J. S. Horner, "Architecting electrode design in 3D for conversion chemistries," 4th Battery Manufacturing Days, Virtual, September 2023.

31. **S. A. Roberts**, J. S. Horner, "Enabling Rechargeable Conversion Cathodes by Modeling the Coupling Between Structure, Electrochemistry, & Mechanics," 243rd Electrochemical Society Meeting, Boston, MA, June 2023.

30. **S. A. Roberts**, "Multiscale Modeling to Inform TPS Design and Manufacturing," William Maxwell Reed Seminar Series, Department of Mechanical & Aerospace Engineering, University of Kentucky, joint with NASA Advanced Computational Center for Entry System Simulation (ACCESS), Virtual, April 24, 2023.

29. **S. A. Roberts**, "Multi-physics modeling to engineer better composite battery materials," Purdue University School of Mechanical Engineering, West Lafayette, IN, April 20, 2023.

28. **S. A. Roberts**, "Extending P2D models for higher fidelity battery understanding," Guest lecture for course on battery modeling at the University of Alabama, Virtual, April 13, 2023.

27. **S. A. Roberts**, J. S. Horner, "Enabling high-energy-density cathodes by coupling electrochemistry and mechanics across length scales," TMS 2023 Annual Meeting, San Diego, CA, March 21, 2023.

26. **S. A. Roberts**, "The role of experimentally informed multi-physics simulation in national security," University of Illinois, Champaign, IL, February 28, 2023.

25. **S. A. Roberts**, N. Anderson, M. Arienti, K. Armijo, P. Blonigan, K. Casper, L. Collins, P. Creveling, P. Delgado, M. Di Stefano, J. Engerer, T. Fisher, C. Foster, M. Gosma, M. Hansen, B. Hernandez-Sanchez, R. Hess, S. Kieweg, K. Lynch, E. Mussoni, K. Potter, J. Tencer, N. van de Werken, Z. Wilson, J. Wagner, R. Wagnild, "Overview of Ablation Research at Sandia National Laboratories," 12th Ablation Workshop, Lexington, KY, November 9, 2022.

24. **S. A. Roberts**, J. S. Horner, "Enabling high-energy-density cathodes by coupling electrochemistry and mechanics across length scales," 3nd International Battery Manufacturing Days ARTISTIC Project, June 17, 2022.

23. **S. A. Roberts**, H. Padilla, I. Barney, "Accelerated Thermal Battery Design Through Digital Engineering Tools," Salishan Conference on High-Speed Computing, April 28, 2022.

22. **S. A. Roberts**, "Closing the Design Cycle: Image Processing for As-Built Process Simulations," HPC4EI Virtual Event: Focus on Materials, April 8, 2022.

21. **S. A. Roberts**, J. S. Horner, "Interplay between mechanics and electrochemistry in FeS2 electrode performance," 2022 TMS Annual Meeting, March 2022.

20. **S. A. Roberts**, "Credible, Automated Meshing of Images: Towards Image-Based Digital Twins," Seagate-Minnesota AI/ML Distinguished Speaker Series, December 3, 2021.

19. **S. A. Roberts**, "Energy Storage for National Security Applications," Purdue Undergraduate Engineering Seminar, November 17, 2021.

18. **S. A. Roberts**, M. E. Ferraro, J. S. Horner, J. M. Meyer, B. Ng, "Mesoscale Mechanics: Simulating the Role of Stress on Electrode Electrochemical Performance," 2nd International Battery Manufacturing Days ARTISTIC Project, June 22, 2021.

17. **S. A. Roberts**, M. E. Ferraro, J. S. Horner, J. M. Meyer, B. Ng, "Mesoscale Mechanics: Simulating the Role of Stress on Electrode Electrochemical Performance, " 2021 TMS Annual Meeting, March 18, 2021.

16. **S. A. Roberts**, "Use of ML in Image-Based Simulation: CNNs for 3D Image Segmentation and Uncertainty Quantification," New Mexico Machine Learning Symposium, January 26, 2021.

15. **S. A. Roberts**, M. E. Ferraro, C. Norris, C. Martinez, I. Srivastava, B. L. Trembacki, "Electrode Mesoscale Morphology: How 3D Imaging Combined with Predictive Simulation Improves Performance Insight," ARTISTIC Project First Battery Manufacturing Days, Virtual Webinar, June 30, 2020.

14. **S. A. Roberts**, D. S. Bolintineanu, M. E. Ferraro, J. B. Lechman, D. R. Noble, I. Srivastava, B. L. Trembacki, "Impact of Inter-Particle Interactions on Electrochemical Performance of Lithium-Ion Battery Electrodes," TMS 2020 Annual Meeting, San Diego, CA, February 26, 2020.

13. **S. A. Roberts**, M. E. Ferraro, J. B. Lechman, A. Mistry, P. P. Mukherjee, D. R. Noble, I. Srivastava, B. L. Trembacki, "Impact of Mesoscale Morphology on Electrode Performance through Multi-Physics Simulations," Electrochemical Conference on Energy and the Environment, Glasgow, Scotland, July 23, 2019.

12. **S. A. Roberts**, D. S. Bolintineanu, M. E. Ferraro, J. B. Lechman, A. Mistry, P. P. Mukherjee, D. R. Noble, I. Srivastava, B. L. Trembacki, "Elucidating the Role of Mesoscale Morphology on Lithium-Ion Battery Mechanical and Electrochemical Performance through Mesoscale Simulation," TMS 2019 Annual Meeting, March 12, 2019.

11. **S. A. Roberts**, "Interplay Between Electrode Morphology and Mechanical Stress in Battery Performance and Safety," Energy Storage Systems Safety and Reliability Forum, March 6, 2019.

10. **S. A. Roberts**, "Modeling Mesoscale Coupled Physics using Image Data: Batteries, Composites, and More," University of Notre Dame (South Bend, IN), Center for Shock Wave-processing of Advanced Reactive Materials, October 25, 2018.

9. **S. A. Roberts**, "Modeling Mesoscale Coupled Physics using Image Data: Batteries, Composites, and More," Purdue University (West Layfayette, IN), Mechanical Engineering Department, October 24, 2018.

8. **S. A. Roberts**, "Modeling Mechano-Electrochemical Phenomena from the Mesoscale to the Macroscale," Princeton University (Princeton, NJ), Arnold Research Group, July 23, 2018.

7. **S. A. Roberts**, "Modeling Mechano-Electrochemical Phenomena from the Mesoscale to the Macroscale." Gordon Research Conference: Batteries, Ventura, CA, February 2018.

6. **S. A. Roberts**, B. L. Trembacki, M. E. Ferraro, H. Mendoza, A. M. Grillet, "Predicting Mechanical Stresses in Lithium-Ion Battery Electrodes using Mesoscale Simulations." 2017 Materials Research Society Spring Meeting, Phoenix, AZ, April 2017.

5. **S. A. Roberts**, "Performance, degradation, and safety modeling for battery systems," University of Texas (Austin, TX), Mechanical Engineering Department, November 21, 2014.

4. **S. A. Roberts**, Northeast High School (Arma, KS), Commencement Address, May 18, 2014.

3. **S. A. Roberts**, "Fluid modeling in industrial manufacturing processes: From shampoos to nanolithography," Sandia National Laboratories (Albuquerque, NM), Engineering Sciences Center, March 10, 2011.

2. **S. A. Roberts**, "Fluid Film Interfaces: Understanding and Controlling Stability," Sandia National Laboratories (Albuquerque, NM), Engineering Sciences Center, August 3, 2009.

1. **S. A. Roberts**, "Fluid Film Interfaces: Understanding and Controlling Stability," Lawrence Livermore National Laboratory (Livermore, CA), Atmospheric, Earth, & Energy Division, May 13, 2009.

Conference Presentations

126. **S. Jordan**, S. A. Roberts, K. Shah, "Microstructure Modeling of Transport and Kinetics in Solid State Batteries with LLZO Solid Electrolyte," Electrochemical Society Annual Meeting, May 2023

125. **D. Shin**, P. J. Creveling, S. A. Roberts, R. Dingreville, "Thermal Conductivity Homogenization of Composites via Deep Material Network," TMS 2024 Annual Meeting, Orlando, FL, March 2024.

124. **S. Skweres**, P. J. Creveling, S. A. Roberts, M. Sangid, "Mesoscale thermomechanical modeling of woven carbon-carbon composites," TMS 2024 Annual Meeting, Orlando, FL, March 2024.

123. **S. Skweres**, P. J. Creveling, S. A. Roberts, M. Sangid, "Mesoscale thermomechanical modeling of woven carbon-carbon composites," Conference on Composites, Materials, & Structures, St. Augustine, FL, January 2024.

122. **S. A. Roberts**, M. A. Di Stefano, H. Stroud, L. N. Collins, "Application of Mesoscale Pyrolysis and Ablation Modeling to Improve Macroscale Material Thermal Response Models," Hypersonic Technology & Systems Conference, Logan, UT, October 2023.

121. **L. Tuttle**, C. Wilson, B. Hernandez-Sanchez, S. A. Roberts, "Research in the Capabilities for Nuclear Intelligence Program," Hypersonic Technology & Systems Conference, Logan, UT, October 2023.

120. **B. Lance**, S. A. Roberts, L. Tuttle, "Silica Phenolic Performance Model Validation with Uncertainty Quantification in Reentry," Hypersonic Technology & Systems Conference, Logan, UT, October 2023.

119. N. van de Werken, **Z. Wilson**, S. A. Roberts, J. D. Engerer, and L. N. Collins, "Advancing Ablative TPS with Novel Fiber Architectures," (poster) Hypersonic Technology & Systems Conference, Logan, UT, October 2023.

118. **I. Nelson**, B. Hernandez-Sanchez, P. J. Creveling, K. Casper, S. A. Roberts, L. Tuttle, J. D. Engerer, "Silica Phenolic Fabrication & Ablation Characterization Under Extreme Environments," (poster) Hypersonic Technology & Systems Conference, Logan, UT, October 2023.

117. **J. Hickman**, S. A. Roberts, A. Masud, "Diffusion-Reaction Stabilization with Emphasis on Phase Transition in Multiscale Modeling with Embedded Incompatible Internal Interfaces," 2023 SES Annual Technical Meeting, Minneapolis, MN, October 2023.

116. **P. J. Creveling**, L. N. Collins, D. Sommer, S. A. Roberts, "Mesoscale Modeling and Homogenization of Woven Carbon Fiber Composites," American Society for Composites 38th Annual Technical Conference, Boston, MA, September 2023.

115. **J. Hickman**, S. A. Roberts, A. Masud, "VMS with Built-In A Posteriori Error Estimate," 17th U.S. National Congress on Computational Mechanics, Albuquerque, NM, July 2023.

114. **J. D. Horner**, G. Bourdon, D. Kemmenoe, S. A. Roberts, E. Arata, J. Ray, I. Winter, M. Chandross, A. M. Grillet, "Predicting and Mitigating Runout in Active Braze Processes," 17th U.S. National Congress on Computational Mechanics, Albuquerque, NM, July 2023.

113. **S. A. Roberts**, A. Baca, S. Bernard, W. Brooks, A. C. Fate, E. Heintzelman, E. S. Piekos, T. G. Voskuilen, "Development of a Cloud-Based Tool for Predicting Thermal Battery Performance: TABS v6," 49th Power Sources Conference, National Harbor, MD, June 2023.

112. **Tyler G. Voskuilen**, H. K. Moffat, N. Porter, S. A. Roberts, "Coupled Thermal-Electrochemical Full Battery Modeling of LiSi/FeS2 Batteries," 49th Power Sources Conference, National Harbor, MD, June 2023.

111. **H. Padilla**, L. Jacobs, E. S. Piekos, S. A. Roberts, C.Apblett, I. Barney, "Accelerating Thermal Battery Design with Set-Based Concurrent Engineering," 49th Power Sources Conference, National Harbor, MD, June 2023.

110. **N. W. Moore**, W. M. Scherzinger, K. N. Long, M. C. Krygier, S. A. Roberts, "Analytical and Mesoscale Models for Shock Compression of Particle Mixtures with Linear and Nonlinear Hugoniot," 23rd Biennial Conference of the APS Topical Group on Shock Compression of Condensed Matter (SCCM23), Chicago, IL, June 2023.

109. **L. N. Collins**, M. J. Martinez, S. A. Roberts, "Silica Melt Formation, Flow, and Wetting Behavior," (poster) 22nd Computational Fluids Conference, Cannes, France, April 27, 2023.

108. **L. N. Collins**, M. A. Di Stefano, P. J. Creveling, C. Foster, S. A. Roberts, "Mesoscale Ablation Modeling," 12th Ablation Workshop, Lexington, KY, November 9, 2022.

107. **C. Foster**, L. N. Collins, S. A. Roberts, F. Panerai, "High temperature morphoogy of phenolic resin pyrolysis," 12th Ablation Workshop, Lexington, KY, November 9, 2022.

106. **S. A. Roberts**, B. Donohoe, C. Martinez, M. Krygier, B. Hernandez-Sanchez, C. Foster, L. Collins, B. Greene, D. Noble, C. Norris, K. Potter, C. Roberts, K. Neal, S. Bernard, B. Schroeder, B. Trembacki, T. LaBonte, K. Sharma, T. Ganter, J. Jones, M. Smith, "Credible, Automated Meshing of Images: Image Processing for As-Built Process Simulations," 15th World Congress on Computational Mechanics, Virtual, August 2022.

105. **B. Winiarski**, L. Zhao, S. A. Roberts, S. Cooper, "Plasma FIB-SEM-based Kintsugi Imaging of Battery Electrodes," Microscopy and Microanalysis, Virtual, August 2022.

104. **S. A. Roberts**, J. S. Horner, "Modeling Coupled Electrochemistry and Mechanics for Conversion Cathodes," (poster), Batteries Gordon Research Conference, Ventura, CA, June 2022.

103. **J. S. Horner**, G. Whang, I. V. Kolesnichenko, B. S. Dunn, T. N. Lambert, S. A. Roberts, "Pseudo-Two-Dimensional Modeling of Lithium-Ion Conversion Cathode Materials," 241st Electrochemical Society Meeting, Vancouver, BC, Canada, June 2022.

102. **J. Meyer**, S. A. Roberts, K. L. Harrison, P. P. Mukherjee, "Chemo-Mechanical Model of Lithium Dendrite Growth Impacted by External Pressure," 240th Meeting of the Electrochemical Society, Virtual, October 2021.

101. **M. C. Krygier**, T. LaBonte, C. Martinez, C. Norris, K. Sharma, L. N. Collins, P. P. Mukherjee, S. A. Roberts, "Quantifying the Unknown: Impact of Segmentation Uncertainty on Image-Based Simulations," 16th U.S. National Congress on Computational Mechanics, Virtual, July 2021.

100. **D. R. Noble**, S. A. Roberts, M. Staten, C. McBride, C. R. Wilson, "A New Strategy for Automated Tetrahedral Mesh Generation for Producing Credible Discretizations from 3D Image Data," 16th U.S. National Congress on Computational Mechanics, Virtual, July 2021.

99. **L. N. Collins**, C. Foster, S. A. Roberts, "Assessing Ideal Geometric Models of Woven Composites Using Image-Based Simulations," 16th U.S. National Congress on Computational Mechanics, Virtual, July 2021.

98. **C. A. Norris**, T. L. LaBonte, C. Martinez, S. A. Roberts, P. P. Mukherjee, "Uncertainty in 3D Image-Based Effective Property Simulations using Bayesian Convolutional Neural Networks," 16th U.S. National Congress on Computational Mechanics, Virtual, July 2021.

97. **T. Jang**, L. Mishra, K. Shah, P. Mittal, A. Subramaniam, M. P. Gururajan, S. A. Roberts, V. R. Subramanian, "Robust 2D Simulation of Morphological Evolution in Lithium-Metal Batteries," 239th Meeting of the Electrochemical Society, Virtual, June 2021.

96. **J. Meyer**, P. P. Mukherjee, S. A. Roberts, K. Harrison, "Chemo-Mechanical Model for Internal Stress Impact on Lithium Dendrite Growth," 239th Meeting of the Electrochemical Society, Virtual, June 2021.

95. **J. S. Horner**, G. Whang, D. Ashby, B. S. Dunn, A. A. Talin, S. A. Roberts, "Determination of Lithium Diffusion Coefficient in FeS2 through Improved Galvanostatic Intermittent Titration Technique (GITT) Modeling," 239th Meeting of the Electrochemical Society, Virtual, June 2021.

94. **C. Martinez**, B. Donohoe, M. Smith, S. A. Roberts, "CT Segmentation of Woven Composite Materials Over Shifted Domains Via Deep Learning," 14th World Congress on Computational Mechanics, Virtual, January 2021.

93. **M. E. Ferraro**, T. Koehler, S. A. Roberts, J. Torczynski, "A Discrete Element Method for Rectified Bubble Motion," APS Division of Fluid Dynamics, Virtual, November 2020.

92. **S. A. Roberts**, B. Ng, M. E. Ferraro, J. S. Horner, K. L. Harrison, "Mesoscale Electrochemical-Mechanical Analyses of Solid-State Non-Planar Conversion Cathodes," ECS PRiME, Virtual, October 2020.

91. B. W. Lance, **M. D. Carlson**, S. A. Roberts, D. Amogne, "Diffusion Bonded Hydrogen Pre-Cooler Pressure Fatigue," ASME Pressure Vessels and Piping Conference, Virtual, July 2020. Proceedings available.

90. **M. E. Ferraro**, T. Koehler, S. A. Roberts, B. Halls, D. Obenauf, J. Torczynski, "A Discrete Element Approach to Rectified Bubble Motion," ASME Fluids Engineering Division Summer Meeting, Virtual, July 2020.

89. **K. Irick**, J. D. Engerer, B. W. Lance, S. A. Roberts B. B. Schroeder, "Full Function Sampling of Uncertain Correlations," ASME Verification and Validation Symposium, Virtual, May 2020. Proceedings available.

88. **L. Guerin**, B. B. Schroeder, J. Mullins, K. Neal, S. A. Roberts, "Model Calibration in Latent Response Space Using Principal Component Analysis," ASME Verification and Validation Symposium, Virtual, May 2020.

87. **J. Y. Hartley**, A. Maes, S. A. Roberts, J. Stein, M. Owen-Bellini, L. Schelhas, N. Bosco, "Multi-scale, Multi-physics Modeling for PV Reliability," Photovoltaics Reliability Workshop, Denver, CO February 2020.

86. **S. A. Roberts**, D. S. Bolintineanu, M. E. Ferraro, J. B. Lechman, C. Martinez, D. R. Noble, C. Norris, I. Srivastava, B. L. Trembacki, "Impact of Inter-Particle Interactions on Electrochemical Performance of Lithium-Ion Battery Electrodes" (poster), Batteries Gordon Research Conference, Ventura, CA, February 2020.

85. **I. Srivastava**, D. S. Bolintineanu, J. B. Lechman, S. A. Roberts, "Tuning Binder Adhesion towards Mesostructural and Transport Enhancements in Lithium-ion Batteries" (poster), Batteries Gordon Research Conference, Ventura, CA, February 2020.

84. **L. N. Collins**, C. W. Williams, S. A. Roberts, "Image-based mesoscale ablation modeling," 11th Ablation Workshop, Minneapolis, MN, September 2019.

83. **K. M. Potter**, C. Martinez, S. A. Roberts, "Volumetric Anomaly Detection in X-ray CT Scans through Uncertainty Quantification," Research Challenges and Opportunities at the interface of Machine Learning and Uncertainty Quantification Workshop, Los Angeles, CA, July 2019.

82. **B. L. Trembacki**, D. R. Noble, S. A. Roberts, "A Comparison of Image-Based Meshing Methods on Geometry and Transport Properties of Lithium-Ion Battery Electrode Reconstructions," 15th US National Congress on Computational Mechanics, Austin, TX, July 2019.

81. **L. N. Collins**, S. A. Roberts, "Effective Properties of Woven Composites from Image-Based Mesostructures," 15th US National Congress on Computational Mechanics, Austin, TX, July 2019.

80. **D. R. Noble**, S. A. Roberts, M. L. Staten, C. L. Mcbride, C. R. Wilson, "Producing Credible Discretizations by Combining Conformal Decomposition and Incremental Mesh Improvement," 15th US National Congress on Computational Mechanics, Austin, TX, July 2019.

79. **C. Martinez**, K. M. Potter, M. D. Smith, S. A. Roberts, "Deep Learning with Per-Voxel Uncertainty Quantification for Volumetric Segmentation of Battery Electrode Images," 15th US National Congress on Computational Mechanics, Austin, TX, July 2019.

78. **K. M. Potter**, C. Martinez, S. A. Roberts, "Volumetric Anomaly Detection in X-ray CT Scans through Uncertainty Quantification," 15th US National Congress on Computational Mechanics, Austin, TX, July 2019.

77. **J. Y. Hartley**, A. Maes, M. Owen-Bellini, T. Truman, E. Elce, A. Ward, T. Khraishi, S. A. Roberts, "Effects of Photovoltaic Module Materials and Design on Module Deformation Under Load" (poster). IEEE Photovoltaics Specialists Conference, Chicago, IL, June 2019.

76. **C. Martinez**, K. M. Potter, M. D. Smith, E. A. Donahue, L. Collins, J. P. Korbin, S. A. Roberts, "Segmentation Certainty through Uncertainty: Uncertainty-Refined Binary Volumetric Segmentation under Multifactor Domain Shift" (poster). 2019 Women in Computer Vision Workshop, IEEE Computer Vision and Pattern Recognition Conference, Long Beach, CA, June 2019.

75. **C. Norris**, A. Mistry, S. A. Roberts, P. P. Mukherjee, "Microstructural Variability in Graphite Electrodes, " 235th ECS Meeting, Dallas, TX, May 2019.

74. **I. Srivastava**, D. S. Bolintineanu, J. B. Lechman, S. A. Roberts, "Discrete element simulations of carbon-binder domain in Li-ion battery electrodes using Brownian and granular dynamics," FEF-2019, Chicago, IL, April 2019.

73. **C. Norris**, A. Mistry, S. A. Roberts, P. P. Mukherjee, "Microstructural Screening for Porous Li-Ion Battery Electrodes," FEF-2019, Chicago, IL, April 2019

72. **J. A. Brown**, W. W. Erikson, M. A. Cooper, S. Guo, S. A. Roberts, D. S. Bolintineanu, "Thermo-Mechanical Damage Evolution of Energetic Materials in Elevated Temperature Environments," TMS 2019 Annual Meeting, San Antonio, TX, March 2019.

71. **J. Y. Hartley**, A. Maes, S. A. Roberts, "Finite Element Models to Predict Module-Level Degradation Mechanisms and Reliability." 11th PV Performance Modeling and Monitoring Workshop , Weihai, China, December 2018.

70. **S. A. Roberts**, D. S. Bolintineanu, M. E. Ferraro, J. B. Lechman, D. R. Noble, I. Srivastava, B. L. Trembacki, "Application of the Conformal Decomposition Finite Element Method for Rapid

Turnaround Analysis of Tomographic Imaging and Particle Simulation Based Mesostructures." USACM Workshop on Meshfree and Particle Methods: Application and Theory, Santa Fe, NM, September 2018.

69. **L. N. Collins**, S. A. Roberts, "Mesoscale modeling of TPS materials: Effective property calculations and sensitivity analysis," 10th Ablation Workshop, Burlington, VT, September 2018.

68. **W. W. Erikson**, M. A. Cooper, S. Guo, S. A. Roberts, and D. S. Bolintineanu, "CT Scan Characterization of Thermally Damaged Energetic Materials." 16th International Detonation Symposium, Cambridge, MD, July 2018.

67. **S. A. Roberts**, I. Srivastava, B. L. Trembacki, M. E. Ferraro, J. B. Lechman, D. R. Noble, "Combination of Discrete and Finite Element Methods for Coupled Electrochemical-Mechanical Simulations of Lithium-Ion Battery Electrodes." 13th World Congress on Computational Mechanics, New York, NY, July 2018.

66. **M. E. Ferraro**, B. L. Trembacki, V. E. Brunini, D. R. Noble, S. A. Roberts, "Coupled Electrochemistry and Mechanics in Mesoscale Simulation of Lithium-Ion Cathodes." 13th World Congress on Computational Mechanics, New York, NY, July 2018.

65. **L. N. Collins**, S. A. Roberts, "Mesoscale Multiphysics Modeling of Ablation in Composite Thermal Protection System Materials Using the Conformal Decomposition Finite Element Method." 13th World Congress on Computational Mechanics, New York, NY, July 2018.

64. **J. Y. Hartley**, S. A. Roberts, "Effects of Solar Cell Materials and Geometries on Thermally Induced Interfacial Stresses" (poster). 7th World Conference on Photovoltaic Energy Conversion, Waikoloa, HI, June 2018.

63. **S. A. Roberts**, C. F. Jove-Colon, H. K. Moffat, M. L. Neilsen, E. S. Piekos, B. B. Schroeder, B. L. Trembacki, T. G. Voskuilen, "TABS: A Thermal Battery Desktop Design Tool." 48th Power Sources Conference, Denver, CO, June 2018.

62. **B. B. Schroeder**, E. Allcorn, J. C. Hewson, H. K. Moffat, E. S. Piekos, B. L. Trembacki, T. G. Voskuilen, S. A. Roberts, "Supporting Credibility of Single Cell Thermal Battery Modeling through V&V/UQ Activities." 48th Power Sources Conference, Denver, CO, June 2018.

61. **T. G. Voskuilen**, C. F. Jove-Colon, H. K. Moffat, B. B. Schroeder, B. L. Trembacki, S. A. Roberts, "Multi-Physics Cost and Complexity Reduction Strategies for Modeling Thermally Activated Batteries." 48th Power Sources Conference, Denver, CO, June 2018.

60. **B. L. Trembacki**, D. R. Noble, M. E. Ferraro, V. E. Brunini, S. A. Roberts, "Effective Transport Property Simulation on Three-Phase Mesoscale Electrode Reconstructions across Manufacturing Parameters." 233rd Electrochemical Society Meeting, Seattle, WA, May 2018.

59. S. A. Roberts, **B. L. Trembacki**, M. E. Ferraro, A. N. Mistry, V. E. Brunini, P. P. Mukherjee, D. R. Noble, "Advances and Application of Conformal Mesoscale Modeling to Battery Electrodes." 233rd Electrochemical Society Meeting, Seattle, WA, May 2018.

58. **M. E. Ferraro**, B. L. Trembacki, V. E. Brunini, D. R. Noble, S. A. Roberts, "Coupled Electrochemistry and Mechanics in Mesoscale Simulation of NMC Cathodes." 233rd Electrochemical Society Meeting, Seattle, WA, May 2018.

57. **J. Y. Hartley**, S. A. Roberts, N. Bosco, L. Schelhaus, "Thermal-mechanical modeling of PV modules and components" (poster). NREL Pholtovoltaic Reliability Workshop, Golden, CO, February 2018.

56. **W. W. Erikson**, M. A. Cooper, S. Guo, J. B. Lechman, D. R. Noble, S. A. Roberts, "Microstructure Analysis of Thermally Damaged AP Composite Propellant." JANNAF 48th CS, 36th APS, 36th EPSS, 30th PSHS and PIB Joint Meeting, Newport News, VA, December 2017.

55. **C. C. Roberts**, M. B. Nemer, M. E. Stavig, A. Headley, R. Solich, S. A. Roberts, "Molten Salt Batteries: Mechanics and Electrolyte Transport." 2017 Annual Meeting of the American Institute of Chemical Engineers, Minneapolis, MN, November 2017.

54. **S. A. Roberts**, A. Headley, K. N. Long, A. D. Martinez, C. C. Roberts, M. E. Stavig, "Thermal and mechanical response of battery insulation materials." 89th Annual Meeting of the Society of Rheology, Denver, CO, October 2017.

53. **R. R. Rao**, K. Butler, J. R. Clausen, S. A. Roberts, J. Wagner, Z. Liu, C. Aidun, "Continuum modeling of nanoparticles transport in the vasculature." 89th Annual Meeting of the Society of Rheology, Denver, CO, October 2017.

52. **S. A. Roberts**, H. Mendoza, B. L. Trembacki. M. E. Ferraro, V. E. Brunini, D. R. Noble, "Use of the Conformal Decomposition Finite Element Method for Coupled Electrochemical-Mechanical Simulations of Lithium-Ion Battery Electrodes." 14th US National Congress on Computational Mechanics, Montreal, Canada, July 2017.

51. **V. E. Brunini**, D. R. Noble, B. L. Trembacki, M. E. Ferraro, S. A. Roberts, "Coupled Electrochemistry and Solid Mechanics of Li-ion Battery Electrodes." 14th US National Congress on Computational Mechanics, Montreal, Canada, July 2017.

50. **T. G. Voskuilen**, J. C. Hewson, H. K. Moffat, S. A. Roberts, "Multi-Physics Coupling Challenges and Approaches for Modeling Thermally Activated Batteries." 14th US National Congress on Computational Mechanics, Montreal, Canada, July 2017.

49. **R. R. Rao**, J. R. Clausen, J. B. Lechman, J. Wagner, S. A. Roberts, M. E. Ferraro, C. J. Brinker, K. Butler, Z. Liu, "Towards modeling biodistribution of nanoparticles in vivo." 2016 Annual Meeting of the Society of Rheology, Tampa, FL, February 2017.

48. **A. M. Grillet**, T. Humplik, E. K. Stirrup, D. A. Barringer, S. A. Roberts, C. Snyder, M. Janvrin and C. A. Apblett, "Conductivity degradation of polyvinylidene fluoride binder during cycling: Measurements and simulations for lithium-ion batteries." 2016 Annual Meeting of the American Institute of Chemical Engineers, San Francisco, CA, November 2016.

47. **T. G. Voskuilen**, J. C. Hewson, H. K. Moffat, and S. A. Roberts, "Multi-Physics, Multi-Plateau Reaction Model for LiSi/FeS2 Batteries." 47th Power Sources Conference, Orlando, FL, June 2016.

46. **B. L. Trembacki**, S. R. Harris, E. S. Piekos, and S. A. Roberts, "Uncertainty Quantification, Verification, and Validation of a Thermal Simulation Tool for Molten Salt Batteries." 47th Power Sources Conference, Orlando, FL, June 2016.

45. **S. L. Hodson**, E. S. Piekos, R. A. Sayer, S. A. Roberts, C. C. Roberts, "Thermal Characterization of Molten Salt Battery Materials." 47th Power Sources Conference, Orlando, FL, June 2016.

44. S. A. Roberts, **B. L. Trembacki**, H. Mendoza, K. N. Long, V. E. Brunini, A. M. Grillet, "Mesoscale Modeling of Lithium-Ion Battery Electrodes: Computational Requirements and the Role of Polymeric Binders." 229th Electrochemical Society Meeting, San Diego, CA, May 2016.

43. **A. M. Grillet**, T. Humplik, E. K. Stirrup, D. Barringer, H. Mendoza, S. A. Roberts, C. M. Snyder, C. A. Apblett, K. R. Fenton, K. N. Long, "The Role of Composite Binder on Mechanics and Performance of Lithium Ion Battery Electrodes." 229th Electrochemical Society Meeting, San Diego, CA, May 2016.

42. T. Humplik, **A. M. Grillet**, D. A. Barringer, E. K. Stirrup, K. N. Long, H. Mendoza, S. A. Roberts, C. Snyder, C. A. Apblett, K. R. Fenton, "The Role of Polymer Composite Binder on Mechanics and Performance of Lithium Ion Battery Electrodes." 2015 Annual Meeting of the American Institute of Chemical Engineers, Salt Lake City, UT, November 2015.

41. **E. L. Reinholz**, S. A. Roberts, P. R. Schunk, and C. A. Apblett, "Mesoscale Modeling and Simulation of Composition, Manufacturing, and Microstructure Effects on Electrical Conduction in Thermal Battery Cathodes." 228th Electrochemical Society Meeting, Phoenix, AZ, October 2015.

40. T. Humplik, **A. M. Grillet**, D. A. Barringer, E. K. Stirrup, K. N. Long, H. Mendoza, S. A. Roberts, C. Snyder, C. A. Apblett, K. R. Fenton, "The Role of Polymer Composite Binder on Mechanics and Performance of Lithium Ion Battery Electrodes." 87th Annual Meeting of the Society of Rheology, Baltimore, MD, October 2015.

39. **S. A. Roberts**, C. C. Roberts, M. B. Nemer, R. R. Rao, "Drop Circulation in Hele Shaw Flow." 13th US National Congress on Computational Mechanics, San Diego, CA, July 2015.

38. **R. R. Rao**, D. R. Noble, J. T. Tinsley, L. A. Mondy, C. C. Roberts, "A Hybrid ALE-CDFEM Approach to Modeling Foaming in Punch Molds." 13th US National Congress on Computational Mechanics, San Diego, CA, July 2015.

37. **H. Mendoza**, S. A. Roberts, V. E. Brunini, K. N. Long, A. M. Grillet, "Anisotropic Mechanical Deformation of Lithium-Ion Electrode Networks using Reconstructed Microstructures." 227th Electrochemical Society Meeting, Chicago, IL, May 2015.

36. **T. Humplik**, E. K. Stirrup, D. E. Wesolowski, A. N. Allen, R. P. Grant, B. McKenzie, C. C. Roberts, S. A. Roberts, L. A. Mondy, A. M. Grillet, " Ionic Permeability within Thermally-Activated Batteries." 227th Electrochemical Society Meeting, Chicago, IL, May 2015.

35. **A. M. Grillet**, C. C. Roberts, S. A. Roberts, D. E. Wesolowski, A. N. Allen, L. A. Mondy, B. McKenzie, R. P. Grant, B. Shelden, M. J. Martinez, J. R. Clausen, "Ion transport in porous battery electrodes." 86th Annual Meeting of the Society of Rheology, Philadelphia, PA, October 2014.

34. **S. A. Roberts**, D. R. Noble, and R. R. Rao, "Improving mass conservation in a stabilized level-set approach for high-density-ratio flows." 11th World Congress on Computational Mechanics, Barcelona, Spain, July 2014.

33. **J. R. Clausen**, S. A. Roberts, M. J. Martinez, K. N. Long, "Developing a Coupled Thermal-Mechanical-Porous Model for Electrolyte Flow in a Molten Salt Battery." 11th World Congress on Computational Mechanics, Barcelona, Spain, July 2014.

32. **S. A. Roberts**, K. N. Long, J. R. Clausen, and M. J. Martinez, "Towards a Coupled Multiphysics Model of Molten Salt Battery Mechanics." 46th Power Sources Conference, Orlando, FL, June 2014.

31. **S. A. Roberts**, K. N. Long, V. E. Brunini, A. M. Grillet, "Three-Dimensional Mesoscale Modeling of Anisotropic Mechanical Deformation in Lithium-Ion Electrodes" 225th Electrochemical Society Meeting, Orlando, FL, May 12, 2014.

30. **K. N. Long**, S. A. Roberts, C. C. Roberts, A. M. Grillet, "The Mechanics of a Molten Electrolyte Battery Separator Material." ASME 2013 International Mechanical Engineering Congress and Exposition, Houston, TX, November 2013.

29. **S. A. Roberts**, D. R. Noble, R. R. Rao, "Improved Level-Set Algorithm for High Density-Ratio and Variable Density Flows." 12th US National Congress on Computational Mechanics, Raleigh, NC, July 24, 2013.

28. **R. R. Rao**, D. R. Noble, C. C. Roberts, S. A. Roberts, C. Brotherton, M. B. Nemer, "A comparison of the conformal decomposition finite element method to the level set method for microfluidic flows." 12th US National Congress on Computational Mechanics, Raleigh, NC, July 23, 2013.

27. **D. R. Noble**, W. W. Erikson, S. A. Roberts, "A Conformal Decomposition Finite Element Method for Burning Deformable Solids." 12th US National Congress on Computational Mechanics, Raleigh, NC, July 23, 2013.

26. **F. van Swol**, S. A. Roberts, M. E. Chandross, "Reactive Wetting at Planar Interfaces." 87th Colloid and Surface Science Symposium, Riverside, CA, June 23, 2013.

25. **C. C. Roberts**, S. A. Roberts, R. R. Rao, M. B. Nemer, "Drop Circulation and Liquid-Liquid Extraction in Hele-Shaw Flow." 84th Annual Meeting of the Society of Rheology, Pasadena, CA, February 12, 2013.

24. **R. R. Rao**, D. R. Noble, C. Brotherton, C. .C Roberts, S. A. Roberts, "Using the conformal decomposition finite element method to model microfluidic flows and droplet formation." 84th Annual Meeting of the Society of Rheology, Pasadena, CA, February 12, 2013.

23. **J. R. Clausen**, S. A. Roberts, "Artificial Compressibility with Entropic Damping." 2012 Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Diego, CA, November 2012.

22. **C. C. Roberts**, S. A. Roberts, L. M. Gloe, R. R. Rao, M. B. Nemer, "Drop Circulation and Liquid-Liquid Extraction in Hele Shaw Flow" (poster). 2012 Annual Meeting of the American Institute of Chemical Engineers, Pittsburgh, PA, October 29, 2012.

21. **S. A. Roberts**, K. Tjiptowidjojo, P. R. Schunk, "Reduced-order Modeling Techniques for Understanding Printing and Coating Processes." 16th International Coating Science and Technology Symposium, Atlanta, GA, September 11, 2012.

20. **R. R. Rao**, D. R. Noble, C. C. Roberts, S. A. Roberts, M. B. Nemer, "Application of the Conformal Decomposition Finite Element Method to Problems with Capillary Free Surfaces." 10th World Congress on Computational Mechanics, São Paulo, Brazil, July 2012.

19. **S. A. Roberts**, K. N. Long, J. S. Rath, L. A. Mondy, A. M. Grillet, "Modeling separator deformation and electrolyte flow in thermally-activated batteries." 45th Power Sources Conference, Las Vegas, NV, June 13, 2012.

18. **P. R. Schunk** and S. A. Roberts, "Coupled Thin-Film Reynolds Equation and Poroelastic Media: Theoretical and Computational Approach using Finite Element Shells." 4th International Conference on Porous Media, West Layfayette, IN, May 14, 2012.

17. **S. A. Roberts**, D. R. Noble, and J. B. Lechman, "Spreading and wetting of impacting drops: Three-dimensional simulations using Conformal Decomposition Finite Elements." 2011 Annual Meeting of the American Physical Society Division of Fluid Dynamics, Baltimore, MD, November 22, 2011.

16. **S. A. Roberts** and P. R. Schunk, "Reduced-order model development for multiphase flow through patterned, orthotropic, and structured porous materials." 2011 Annual Meeting of the American Institute of Chemical Engineers, Minneapolis, MN, October 17, 2011.

15. S. A. Roberts, **S. Kumar**, "Formation of Topographical Patterns on Liquid Film Multilayer Coatings using Electric Fields." 2011 U. S. Department of Energy Synthesis and Processing Science Principal Investigators Meeting, Arlington, VA, September 2011.

14. **S. A. Roberts**, K. Tjiptowidjojo, P. R. Schunk, and D. R. Noble, "Multiphase Hydrodynamics of Free and Confined Lubricating Films with Fluid-Structural Interactions." 11th US National Congress on Computational Mechanics, Minneapolis, MN, July 25, 2011.

13. S. A. Roberts and **S. Kumar**, "Formation of Topographical Patterns on Liquid Film Multilayer Coatings using Electric Fields." European Coating Symposium, Turku, Finland, June 8, 2011.

12. R. R. Rao, D. R. Noble, **L. A. Mondy**, S. A. Roberts, M. M. Hopkins and T. A. Baer, "Numerical Simulation of Filling Processes with Newtonian and Shear-thinning Fluids." 27th World Congress of the Polymer Processing Society, Marrakesh, Morocco, May 12, 2011.

11. S. A. Roberts, K. Tjiptowidjojo, P. R. Schunk, **D. R. Noble**, "Multiphase hydrodynamics of free and confined thin films with fluid-structural interactions." 16th International Conference on Finite Elements in Flow Problems, Munich, Germany, March 25, 2011.

10. **S. A. Roberts** and S. Kumar, "Electrohydrodynamic Instabilities in Thin Trilayer Liquid Films." 2010 Annual Meeting of the American Institute of Chemical Engineers, Salt Lake City, UT, November 10, 2010.

9. **S. A. Roberts** and P. R. Schunk, "Multiscale Model Development of Pattern Nano-Imprinting Processes." 2010 Annual Meeting of the American Institute of Chemical Engineers, Salt Lake City, UT, November 9, 2010.

8. **S. A. Roberts** and R. R. Rao, "Submerging flows of non-Newtonian impinging jets." 2010 Annual Meeting of the Society of Rheology, Santa Fe, NM, October 25, 2010.

7. **S. A. Roberts** and S. Kumar, "Formation of Topographical Patterns on Liquid Film Coatings using Electric Fields." 15th International Coating Science and Technology Symposium, Saint Paul, MN, September 15, 2010.

6. **S. A. Roberts** and P. R. Schunk, "Multiscale model development of pattern nano-imprinting processes." 15th International Coating Science and Technology Symposium, Saint Paul, MN, September 13, 2010.

5. **S. A. Roberts**, A. M. Grillet, P. R. Schunk, T. A. Baer, and R. R. Rao, "Mounding of a non-Newtonian jet impinging on a solid substrate." XVIth International Workshop on Numerical Methods for Non-Newtonian Flows, Northampton, MA, June 14, 2010.

4. **S. A. Roberts** and S. Kumar, "AC electrohydrodynamic instabilities in bilayer films." 2009 Annual Meeting of the American Physical Society Division of Fluid Dynamics, Minneapolis, MN, November 22, 2009.

3. S. A. Roberts and **S. Kumar**, "AC Electrohydrodynamic Instabilities in Thin Liquid Films." 2009 Annual Meeting of the American Institute of Chemical Engineers, Nashville, TN, November 9, 2009.

2. **S. A. Roberts** and S. Kumar, "AC electrohydrodynamic instabilities in thin liquid films." 2008 Annual Meeting of the American Physical Society Division of Fluid Dynamics, San Antonio, TX, November 23, 2008.

1. **S. A. Roberts** and S. Kumar, "Stability of Creeping Couette Flow of a Power-law Fluid past a Deformable Solid." 2006 Annual Meeting of the American Physical Society Division of Fluid Dynamics, Tampa, FL, November 19, 2006.

Other Presentations

9. S. A. Roberts, "Multiscale Modeling to Inform TPS Design and Manufacturing," NASA-ORNL Advanced Manufactured for Thermal Protection System Workshop, Oak Ridge, TN, March 29, 2023.

8. **A. M. Grillet**, T. Humplik, E. Stirrup, S. A. Roberts, B. L. Trembacki, "The role of polymer composite binder on performance of lithium ion batteries," Shaqfeh Symposium, Stanford, CA, August 2019.

7. **W. W. Erikson**, M. A. Cooper, S. Guo, J. B. Lechman, D. R. Noble, and S. A. Roberts, "Microstructure Analysis of Thermally Damaged AP Composite Propellant." JANNAF JPM / CS / APS / EPTS / PSHS Meeting, Newport News, VA, December 6, 2017.

6. **S. A. Roberts**, "Mesoscale modeling of battery electrodes." Joint Munitions Program All-TCG Technical Review, Fort Walton Beach, FL, October 26, 2017.

5. **S. A. Roberts**, "Thermal Battery Performance Modeling." (Plenary) Joint Munitions Program All-TCG Technical Review, Fort Walton Beach, FL, October 25, 2017.

4. **S. A. Roberts**, "Multiphysics modeling of thermal batteries." (**Invited**) The Future of Munitions Batteries Workshop, Army Research Laboratory, Adelphi, MD, December 7, 2016.

3. S. A. Roberts and **S. Kumar**, "Formation of topographical patterns on liquid film multilayer coatings using electric fields." Industrial Partnership for Research in Interfacial and Materials Engineering 2010 Annual Meeting, University of Minnesota - Twin Cities, June 2, 2010.

2. **S. A. Roberts** and S. Kumar, "Formation of Topographical Patterns on Liquid Film Coatings Using Electric Fields." Industrial Partnership for Research in Interfacial and Materials Engineering 2008 Annual Meeting, University of Minnesota - Twin Cities, May 29, 2008.

1. **S. A. Roberts**, "ACE Performance Testing of Sulfur-Removing FCCU Catalyst Materials and Catalyst Particle Sphericity Analysis Using SEM Imaging." ExxonMobil Process Research Laboratories, Baton Rouge, Louisiana, July 29, 2004.