

Scott A. Roberts, Ph.D.

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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
- 2016 - Present 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 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

- 2019 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
- 2005 NSF Graduate Fellowship - Honorable Mention
- 2004 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
- 2004 Outstanding Senior in Chemical Engineering
- 2004 Outstanding Service to the C&PE Department Award
- 2003 National Tau Beta Pi Scholarship
- 2003 Outstanding Junior in Chemical Engineering
- 2002 Outstanding Sophomore in Chemical Engineering
- 2002 Tau Beta Pi Engineering Honor Society

Other

- 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
- 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
- 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 Conversion and Storage
- 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*, *Journal of Fluid Mechanics*, *Journal of the Electrochemical Society*, *Electrochimica Acta*, *Physics of Fluids*, *Journal of Rheology*, *Journal of Non-Newtonian Fluid Mechanics*, *International Journal for Numerical Methods in Fluids*, *AICHE Journal*, *Computers and Fluids*, *Tribology International*, *Journal of Coatings Technology and Research*, *IEEE Transactions on Plasma Science*, *Journal of Physical Chemistry C*, *Progress in Energy*, *RSC Advances*

Professional / External

- 2019 - Present External Advisory Board Member, Chemical and Petroleum Engineering Department, University of Kansas (Steering Committee 2021-Present)
- 2005 - 2014 School of Engineering Recent Graduate Advisory Board, University of Kansas (Chair 2006-2009)
- 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

- 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

- 2013 - 2015 Assistant Scoutmaster, Boy Scouts of America
- 2006 - 2007 Sunday School Teacher - Centennial United Methodist Church
- 2001 Lodge Chief, Order of the Arrow
- 2000 - 2004 Assistant Scoutmaster, Boy Scouts of America

Teaching, Advising, and Mentoring

Sandia National Laboratories

- Postdoctoral Researchers

- 2021-Present Peter Creveling, mesoscale modeling of thermal protection systems
- 2020-Present Jeffrey Horner, mesoscale battery modeling
- 2020-Present Martín Di Stefano, mesoscale modeling of thermal protection systems
- 2019-Present 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

- 2019-Present Collin Foster, co-advisor, thermal protection system imaging and modeling, U. Illinois
- 2019-Present Mitchell Gosma, co-advisor, thermal protection system modeling, U. Illinois
- 2019-Present Julia Meyer, co-advisor, mesoscale battery modeling, Purdue
- 2018-Present Chance Norris, co-advisor, mesoscale battery modeling, Purdue
- 2017-Present James Hartley, mentor/committee, photovoltaic module modeling, U. New Mexico

- 2019-Present Cedric Williams, committee, mesoscale modeling, Notre Dame
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
2012 Abishek Venkatakrisnan, committee, U. New Mexico

- Interns

- 2012-2019 4 Graduate student summer interns: Benjamin Ng (2020), Cedric Williams (2019), Adam Watts (2019), Tyson Watkins (2012, 2013)
2011-2018 3 Undergraduate student summer interns: 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)
2015-2018 4 Military academy summer interns: 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:

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* 6 (2021) 1422-1431, DOI: [10.1021/acseenergylett.1c00194](https://doi.org/10.1021/acseenergylett.1c00194)
23. T. G. Voskuilen, H. K. Moffat, B. B. Schroeder, S. A. Roberts, "Multi-fidelity electrochemical modeling of thermally activated battery cells," *J. Power Sources* 488 (2021) 229469, DOI: [10.1016/j.jpowsour.2021.229469](https://doi.org/10.1016/j.jpowsour.2021.229469)
22. I. Srivastava, D. S. Bolintineanu, J. B. Lechman, S. A. Roberts, "Controlling Binder Adhesion to Impact Electrode Mesostructure and Transport," *ACS Appl. Mater. Interfaces* 12 (2020) 34919-34930, DOI: [10.1021/acsaami.0c08251](https://doi.org/10.1021/acsaami.0c08251)
21. J. Y. Hartley, M. Owen-Bellini, T. Truman, A. Maes, E. Elce, A. Ward, T. Khraishi, S. A. Roberts, "Effects of Photovoltaic Module Materials and Design on Module Deformation Under Load," *Journal of Photovoltaics*, 10 (2020) 838, DOI: [10.1109/jphotov.2020.2971139](https://doi.org/10.1109/jphotov.2020.2971139)
20. X. Zhang, Q. J. Wang, K. L. Harrison, S. A. Roberts, S. J. Harris, "Pressure-Driven Interface Evolution in Solid-State Lithium Metal Batteries," *Cell Reports Phys. Sci.* 1 (2020) 100012. DOI: [10.1016/j.xcrp.2019.100012](https://doi.org/10.1016/j.xcrp.2019.100012)
19. B. L. Trembacki, D. R. Noble, M. E. Ferraro, S. A. Roberts, "Mesoscale Effects of Composition and Calendering in Lithium-Ion Battery Composite Electrodes," *J. Electrochem. En. Conv. Stor.* 17 (2020) 041001. DOI: [10.1115/1.4045973](https://doi.org/10.1115/1.4045973) (**Invited**)

18. M. E. Ferraro, B. L. Trembacki, V. E. Brunini, D. R. Noble, S. A. Roberts, “Electrode Mesoscale as a Collection of Particles: Coupled Electrochemical and Mechanical Analysis of NMC Cathodes,” *J. Electrochem. Soc.*, 167(1) (2020) 013543. DOI: [10.1149/1945-7111/ab632b](https://doi.org/10.1149/1945-7111/ab632b)
17. B. L. Trembacki, A. Vadakkepatt, S. A. Roberts, J. Y. Murthy, “Volume-Averaged Electrochemical Performance Modeling of 3D Interpenetrating Battery Electrode Architectures,” *J. Electrochem. Soc.*, 167(1) (2020) 013507. DOI: [10.1149/2.0072001jes](https://doi.org/10.1149/2.0072001jes)
16. X. Zhang, Q. J. Wang, K. L. Harrison, K. Jungjohann, B. L. Boyce, S. A. Roberts, P. M. Attia, S. J. Harris, “Rethinking How External Pressure Can Suppress Dendrites in Lithium Metal Batteries,” *J. Electrochem. Soc.*, 166(15) A3639-A3652 (2019). DOI: [10.1149/2.0701914jes](https://doi.org/10.1149/2.0701914jes)
15. B. L. Trembacki, A. N. Mistry, D. R. Noble, M. E. Ferraro, P. P. Mukherjee, S. A. Roberts, “Mesoscale Analysis of Conductive Binder Domain Morphology in Lithium-Ion Battery Electrodes,” *J. Electrochem. Soc.*, 165(13) (2018) E725-E736. DOI: [10.1149/2.0981813jes](https://doi.org/10.1149/2.0981813jes)
14. S. A. Roberts, H. Mendoza, V. E. Brunini, D. R. Noble, “A verified conformal decomposition finite element method for implicit, many-material geometries,” *J. Comp. Phys.*, 375 (2018) 352-367. DOI: [10.1016/j.jcp.2018.08.022](https://doi.org/10.1016/j.jcp.2018.08.022)
13. B. L. Trembacki, D. R. Noble, V. E. Brunini, M. E. Ferraro, S. A. Roberts, “Mesoscale Effective Property Simulations Incorporating Conductive Binder,” *J. Electrochem. Soc.*, 164(11) (2017) E3613-E3626. DOI: [10.1149/2.0601711jes](https://doi.org/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,” *J. Electrochem. En. Conv. Stor.*, 13 (2016) 031005. DOI: [10.1115/1.4034410](https://doi.org/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, C. A. Apblett, “Conductivity degradation of polyvinylidene fluoride binder during cycling: Measurements and simulations for lithium-ion batteries,” *J. Electrochem. Soc.*, 163(9) (2016) A1859-A1871. DOI: [10.1149/2.0341609jes](https://doi.org/10.1149/2.0341609jes)
10. E. L. Reinholz, S. A. Roberts, C. A. Apblett, J. B. Lechman, “Composition and Manufacturing Effects on Electrical Conductivity of Li/FeS₂ Thermal Battery Cathodes,” *J. Electrochem. Soc.*, 163(8) (2016) A1723-A1729. DOI: [10.1149/2.1191608jes](https://doi.org/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,” *Electrochim. Acta*, 190 (2016) 1-15. DOI: [10.1016/j.electacta.2015.12.224](https://doi.org/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,” *J. Electrochem. Soc.*, 161 (2014) F3052-F3059. DOI: [10.1149/2.0081411jes](https://doi.org/10.1149/2.0081411jes)
7. S. A. Roberts and P. R. Schunk, “A reduced-order model for porous flow through thin, structured materials,” *Int. J. Multiphase Flow*, 67 (2014) 25-36. DOI: [10.1016/j.ijmultiphaseflow.2014.07.013](https://doi.org/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,” *Phys. Fluids* 26 (2014) 032105-11. DOI: [10.1063/1.4867695](https://doi.org/10.1063/1.4867695)
5. S. A. Roberts, D. R. Noble, and E. M. Benner, P. R. Schunk, “Multiphase hydrodynamic lubrication flow using a three-dimensional shell finite element method,” *Comput. Fluids*, 87 (2013) 12–25. DOI: [10.1016/j.compfluid.2012.08.009](https://doi.org/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,” *J. Non-Newtonian Fluid Mech.* 166 (2011) 1100–1115. DOI: [10.1016/j.jnnfm.2011.06.006](https://doi.org/10.1016/j.jnnfm.2011.06.006)
3. S. A. Roberts and S. Kumar, “AC electrohydrodynamic instabilities in trilayer liquid films,” *Phys. Fluids* 22 (2010) 122102–15. DOI: [10.1063/1.3520134](https://doi.org/10.1063/1.3520134)
2. S. A. Roberts and S. Kumar, “AC electrohydrodynamic instabilities in thin liquid films,” *J. Fluid Mech.* 631 (2009) 255–279. DOI: [10.1017/S0022112009006843](https://doi.org/10.1017/S0022112009006843)
1. S. A. Roberts and S. Kumar, “Stability of creeping Couette flow of a power-law fluid past a deformable solid,” *J. Non-Newtonian Fluid Mech.* 139 (2006) 93–102. DOI: [10.1016/j.jnnfm.2006.07.006](https://doi.org/10.1016/j.jnnfm.2006.07.006)

Refereed Computer Science Conference Papers:

1. 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,” *The IEEE Conference on Computer Vision and Pattern Recognition (CVPR) Workshops* (2019). DOI: [10.1109/CVPRW.2019.00066](https://doi.org/10.1109/CVPRW.2019.00066).

Patents:

1. C. Martinez, K. M. Potter, E. Donahue, M. D. Smith, C. L. Snider, J. P. Korbin, S. A. Roberts, L. Collins, “Uncertainty-Refined Image Segmentation Under Domain Shift,” US Patent Pending 16/887,311.

Technical Reports:

13. P. Miller, S. A. Roberts, R. Polsky, “Pre-Symptomatic COVID Screening,” Sandia Report, SAND2020-10359 (2020). DOI: [10.2172/1673817](https://doi.org/10.2172/1673817)
12. C. Martinez, D. S. Bolintineanu, A. Olson, T. Rodgers, B. Donohoe, K. M. Potter, S. A. Roberts, N. W. Moore, “Automated Segmentation of Porous Thermal Spray Material CT Scans with Geometric Uncertainty Estimation.” Sandia Report, SAND2020-9099 (2020). DOI: [10.2172/1660793](https://doi.org/10.2172/1660793)
11. J. M. Emery, ..., S. A. Roberts, ..., “Sandia’s Nuclear Weapon Digital Twin – A Roadmap.” Sandia Report, SAND2019-14882 (2019).
10. A. Shia, B. B. Schroeder, and S. A. Roberts, “Creating Machine Learning Surrogates to Generate Thermal Battery Designs.” Sandia Report, SAND2019-3733 (2019).
9. S. A. Roberts, S. R. Harris, A. C. Hetzler, E. S. Piekos, B. B. Schroeder, and B. L. Trembacki, “Establishing the Credibility of the Thermally Activated Battery Simulator, Full-Battery Version 4: Verification, Validation, and Uncertainty Quantification.” Sandia Report, SAND2017-3397 (2017).
8. A. M. Grillet, S. A. Roberts, C. Snyder, H. Mendoza, T. Humplik, C. A. Apblett, F. El Gabaly, V. E. Brunini, D. A. Barringer, E. K. Stirrup, B. L. Trembacki, T. Beecham, M. R. Janvrin, “Mechanics of Battery Degradation.” Sandia Report, SAND2016-9668 (2016).
7. SIERRA Thermal/Fluid Development Team, “SIERRA Multimechanics Module: Aria User Manual - Version 4.40.” Sandia Report, SAND2016-4159 (2016). DOI: [10.2172/1262728](https://doi.org/10.2172/1262728)
6. T. R. Watkins, P. R. Schunk, and S. A. Roberts, “Technique for the Estimation of Surface Temperatures from Embedded Temperature Sensing for Rapid, High Energy Surface Deposition.” Sandia Report, SAND2014-15497 (2014). DOI: [10.2172/1148576](https://doi.org/10.2172/1148576)
5. K. N. Long, C. C. Roberts, S. A. Roberts, and A. M. Grillet, “The Mechanics of Pressed-Pellet Separators in Molten Salt Batteries.” Sandia Report, SAND2014-3606 (2014). DOI: [10.2172/1177059](https://doi.org/10.2172/1177059)

4. S. A. Roberts and P. R. Schunk, “A non-linear elastic constitutive framework for replicating plastic deformation in solids.” Sandia Report, SAND2014-0241 (2014). DOI: [10.2172/1148928](https://doi.org/10.2172/1148928)
3. P. R. Schunk, P. A. Sackinger, R. R. Rao, K. S. Chen, T. A. Baer, D. A. Labreche, A. C. Sun, M. M. Hopkins, S. R. Subia, H. K. Moffat, R. B. Secor, R. A. Roach, E. D. Wilkes, D. R. Noble, P. L. Hopkins, P. K. Notz, S. A. Roberts, “GOMA 6.0 - A Full-Newton Finite Element Program for Free and Moving Boundary Problems with Coupled Fluid/Solid Momentum, Energy, Mass, and Chemical Species Transport: User’s Guide.” Sandia Report, SAND2013-1844 (2013). DOI: [10.2172/1089869](https://doi.org/10.2172/1089869)
2. R. Rao, B. Shelden, C. Brotherton, S. Domino, L. Erickson, A. Grillet, L. Hughes, C. Jove-Colon, J. Lechman, M. Loewenberg, H. Moffat, M. Nemer, D. Noble, T. O’Hern, C. Roberts, S. Roberts, G. Wagner, N. Wyatt, “Multiscale Models of Nuclear Waste Reprocessing: From the Mesoscale to the Plant-Scale.” Sandia Report, SAND2012-9145 (2012). DOI: [10.2172/1055918](https://doi.org/10.2172/1055918)
1. P. R. Schunk, S. A. Roberts, M. E. Chandross, G. S. Grest, H. Fan, E. D. Reedy, J. V. Cox, K. Tjiptowidjojo, S. Cheng, “Nanomanufacturing: Nano-Structured Materials Made Layer-by-Layer.” Sandia Report, SAND2011-8080 (2011). DOI: [10.2172/1038208](https://doi.org/10.2172/1038208)

Other Publications:

14. D. A. Howey, S. A. Roberts, V. Viswanathan, A. Mistry, M. Beuse, E. Khoo, S. C. DeCaluwe, V. Sulzer, “Free Radicals: Making a Case for Battery Modeling.” *Electrochem. Soc. Interface* 29 (2020) 30, DOI: [10.1149/2.F03204IF](https://doi.org/10.1149/2.F03204IF) (**Invited**)
13. W. W. Erickson, M. A. Cooper, S. Guo, S. A. Roberts, and D. S. Bolintineanu, “CT Scan Characterization of Thermally Damaged Energetic Materials.” *Proceedings of the 16th International Detonation Symposium* (2018).
12. S. A. Roberts, C. F. Jove-Colon, H. K. Moffat, M. L. Nielsen, E. S. Piekos, B. B. Schroeder, B. L. Trembacki, T. G. Voskuilen, “TABS: A Thermal Battery Desktop Design Tool.” *Proceedings of the 48th Power Sources Conference* (2018).
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).
9. W. W. Erickson, M. A. Cooper, S. Guo, J. B. Lechman, D. R. Noble, S. A. Roberts, “Microstructure Analysis of Thermally Damaged AP Composite Propellant.” *Proceedings of the JANNAF 48th CS, 36th APS, 36th EPSS, 30th PSHS and PIB Joint Meeting* (2017).
8. T. G. Voskuilen, J. C. Hewson, H. K. Moffat, and S. A. Roberts, “Multi-Physics, Multi-Plateau Reaction Model for LiSi/FeS₂ Batteries.” *Proceedings of the 47th Power Sources Conference* (2016).
7. 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.” *Proceedings of the 47th Power Sources Conference* (2016).
6. S. L. Hodson, E. S. Piekos, R. A. Sayer, S. A. Roberts, C. C. Roberts, “Thermal Characterization of Molten Salt Battery Materials.” *Proceedings of the 47th Power Sources Conference* (2016).

5. 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." *ECS Transactions*, 69(1) (2015) 37-43. DOI: [10.1149/06901.0037ecst](https://doi.org/10.1149/06901.0037ecst)
4. S. A. Roberts, K. N. Long, J. R. Clausen, M. J. Martinez, E. S. Piekos, A. M. Grillet, "Towards a Coupled Multiphysics Model of Molten Salt Battery Mechanics." *Proceedings of the 46th Power Sources Conference* (2014).
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

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 Lafayette, 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

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, CO, 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, CO, 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 Photovoltaic Reliability Workshop, Golden, CO, February 2018.
56. **W. W. Erickson**, 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. M. 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. M. 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 Lafayette, 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

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.
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