

EDUCATION

University of Virginia PhD Candidate, Mechanical & Aerospace Engineering, GPA: 3.882	Charlottesville, Virginia January 2019 - Present
Clemson University, Calhoun Honors College Bachelor of Science, Mechanical Engineering	Clemson, South Carolina August 2010 – May 2015
Esslingen University of Applied Sciences INTAP Automotive Engineering Exchange Program	Esslingen, Germany September – December 2013

RESEARCH

Graduate Research Assistant, University of Virginia
Department of Mechanical and Aerospace Engineering
Advisor: Dr. Xiaodong (Chris) Li

January 2019 – Present

- Discovering materials and methods for low-cost carbon fiber production and high performance, multifunctional polymer nanocomposite materials resulting in ten publications and a pending patent
- Designed and fabricated several systems for fiber melt and gel spinning, continuous fiber bath treatment applications, carbon fiber synthesis and testing, and reaction injection molding
- Trained and experienced operating scanning electron microscopes, Fourier transform infrared spectrometer, Raman spectrometer, differential scanning calorimeter and thermogravimetric analyzer, various universal mechanical testing machines, and atomic force microscope
- Led laboratory space establishment, organization, safety, and sustainability efforts
- Drafted several NSF and US Department of Energy grant applications with two awarded totaling > \$5M
- Prepared internal and external reports and presentations on grant-funded project progress
- Engaged with US Department of Energy program managers in Vehicle Technologies Office and Fuel Cell Technologies Office to initiate and coordinate projects
- Collaborated with researchers from Oak Ridge, Savannah River, and Argonne national laboratories
- Leading project team diversity assessment and strategy implementation for team diversification

Undergraduate Research Assistant, Clemson University
Clemson University International Center for Automotive Research
Advisor: Dr. Robert Prucka

May-August 2012

- Developed a vehicle dynamics learning module for graduate students
- Designed wheel force transducers for the MTS 7-post Vehicle Dynamics “Shaker” Rig

PUBLICATIONS

- [1] **K.R. Brown**, C.A. Love-Baker, Z. Xue, X. Li, *Ultra-High Molecular Weight Polyethylene Micro-Ribbon Fibers Gel Spun Using Orange Terpenes*, Polym. Eng. Sci. 64 (2024) 1743–1755. doi: 10.1002/PEN.26656.
- [2] **K.R. Brown**, C. Love-Baker, T.M. Harrell, X. Li, *Effect of tension during sulfonation stabilization for UHMWPE-derived carbon fibers*, J. Polym. Res. (2023) 3012. 30 (2023) 1–14. doi: 10.1007/S10965-023-03829-W.
- [3] **K.R. Brown**, T.M. Harrell, L. Skrzypczak, A. Scherschel, H.F. Wu, X. Li, *Carbon fibers derived from commodity polymers: A review*, Carbon N. Y. 196 (2022) 422–439. doi: 10.1016/J.CARBON.2022.05.005.
- [4] **K.R. Brown**, X. Li, *Continuous Fiber Bath Treatments at Pilot Scale: A Novel Testbed System*, Poster presented at SAMPE 2022, Charlotte, NC.
- [5] A. Sushchenko, A. Scherschel, C. Love-Baker, T.M. Harrell, Ryan Cordier, **K.R. Brown**, X. Li, *Evaluating consumer 3D printing nozzles as a low cost alternative for mesophase pitch-derived carbon fiber production*, Carbon (2024). doi: 10.1016/j.carbon.2024.119088

PUBLICATIONS (CONT.)

- [6] C.A. Love-Baker, T.M. Harrell, Alexander Scherschel, Z. Gao, N. Song, **K.R. Brown**, F. Vautard, Ilia Ivanov, J. Klett, Xiaodong Li, *Unveiling the microstructural evolution of carbon fibers derived from polyamide-6*, J. Polym. Res. 2023 302. 30 (2023) 1–13. doi: 10.1007/S10965-023-03455-6.
- [7] A. Scherschel, C.A. Love-Baker, A. Sushchenko, T.M. Harrell, **K.R. Brown**, X. Li, *Compatibility of Mesophase Pitch and Linear Low-Density Polyethylene for Low-Cost Carbon Fiber*, J. Polym. Res. 2023. doi: 10.1007/s10965-023-03466-3
- [8] T.M. Harrell, C.A. Love-Baker, **K.R. Brown**, C.H. Bumgardner, X. Li, *Extracting single fiber transverse and shear moduli from off-axis misalignment fiber tensile testing*, Composites Part A. (2022). doi: 10.1016/j.compositesa.2022.107204.
- [9] C.A. Love-Baker, T.M. Harrell, **K.R. Brown**, C.H. Bumgardner, X. Li, *Analyzing the effect of misalignment on single-filament carbon fiber tensile testing via stereoscopic computer vision imaging*, Meas. Sci. Technol. 32 (2021) 065904. doi: 10.1088/1361-6501/ABECEB.
- [10] Z. Gao *et al.*, *Graphene reinforced carbon fibers*, *Sci. Adv.*, vol. 6, no. 17, 2020, doi: 10.1126/sciadv.aaz4191.
- [11] J. Zhu *et al.*, *Unveiling Carbon Ring Structure Formation Mechanisms in Polyacrylonitrile-Derived Carbon Fibers*, *ACS Appl. Mater. Interfaces*, vol. 11, no. 45, 2019, doi: 10.1021/acsami.9b15833.

Submitted

- [1] Z. Xue, **K.R. Brown**, X. Li, *Graphene Reinforced UHMWPE Fibers*, Submitted to Small, March 2024
- [2] A. Scherschel, T.M. Harrell, A. Sushchenko, E. Knight, **K.R. Brown**, X. Li, *Tuning Microstructure of Mesophase Pitch Carbon Fiber by Altering the Carbonization Ramp Rate*, Under Review, Advanced Engineering Materials

PATENTS

- [1] X. Li, Z. Gao, J. Zhu, Y. Murty, **K.R. Brown**, C. Bumgardner, System and method of accelerating polymer fiber stabilization via irradiation treatment, US20220235516A1, 2020, *Pending*.

GRANTS

Low-Cost, High-Performance Carbon Fiber for Compressed Natural Gas Storage Tanks

Department of Energy, Fuel Cell Technologies Office, Award DE-EE0009239 – \$2,701,552 Awarded July 2020

- Led grant application drafting team and authored several proposal documents including technical volume

Low-Cost, Multifunctional Composites from Recycled Materials for Lighter and Smarter Vehicles

Department of Energy, Vehicle Technologies Office, Award DE-EE0010602 - \$2,500,00 awarded May 2023

- Led grant application drafting team and authored several proposal documents including technical volume
- Prepared award negotiation documentation

PROFESSIONAL EXPERIENCE

University of Virginia

Charlottesville, VA

Mechanical Design Lead for UVA Cavalier Autonomous Racing

May 2020 – August 2022

- Provided professional motorsports engineering perspective to Cavalier Autonomous Racing
- Advised on competitive autopilot race strategy, vehicle dynamics, and decision mapping

Team Penske

Mooresville, NC

NASCAR Design Engineer

June 2015 – December 2018

- Designed vehicle components and systems to achieve racing performance goals
- Utilized additive manufacturing and composite materials in component design
- Developed innovative manufacturing tools, fixtures, patterns, and molds
- Conducted finite element analysis to optimize strength-to-weight ratio and system function of parts
- Organized and performed physical component testing to evaluate designs

This work resulted in one NASCAR Cup Series championship, and two NASCAR Xfinity Series championships.

- Michelin Americas Research Center** **Greenville, SC**
Tire Design Engineering Co-Op January – June 2014
- Conducted finite element analysis on tire tread designs to analyze rolling resistance and wet traction
 - Evaluated simulations and presented results to tire design engineering team
- Laurens Proving Grounds Test Engineer Co-Op May – August 2013
- Administered test component design and data analysis for objective test engineering team
 - Created data analysis tools for team using Visual Basic for Applications
- Competitor Analysis Engineering Co-Op August - December 2012
- Analyzed data collected from physical tire testing and visual assessment of sample population
 - Organized tire sample testing and led technicians in data collection efforts

TEACHING

- Guest Lecturer, University of Virginia** Spring 2020,'21,'22
Course: Introduction to Engineering (ENGR 1624)
- Provided a case study in practical, high-performance design engineering
 - Taught the power of computer aided design as a communication tool
- Invited Speaker, UVA Darden School of Business** April 2022
Course: Additive Manufacturing 101
- Designed and lead a two-hour course featuring a lecture and hands-on demonstration to teach the basic concepts of additive manufacturing and the safe and effective operation of desktop 3D printers

MENTORING

- Mentor, Virginia Motorsports Education Experiential Learning** January 2019 – Present
- Providing academic and professional development support for students interested in careers in the automotive and motorsports engineering fields, as well as graduate school
 - Advising on student competition vehicle engineering design
- Research Mentor, Li Lab Undergraduate Research Assistants** February – May 2020
- Oversaw projects for two Li Lab undergraduate research assistants
 - Mentored assistants with their engineering design and fabrication efforts

SERVICE

- Ad Hoc Reviewer** November 2022 – Present
- Journal of Applied Physics A, reviewed 4 manuscripts since November 2022
 - Journal of Materials Science, reviewed 1 manuscript since February 2024
- Lab Sustainability Coordinator** January 2019 – Present
- Organizing Li Lab participation in UVA Green Labs Initiative events such as the “Shut the Sash” challenge to reduce energy waste
- UVA Engineering for COVID Team** March - December 2020
- Designed and 3D printed custom camera mounts for UVA hospital COVID unit
 - 3D printed face shields for healthcare providers in Virginia and beyond

HONORS AND AWARDS (2014-PRESENT)

- Best Poster and Best Presentation Awards – *University of Virginia Engineering Research Symposium* 2024
- SAE Doctoral Engineering Scholarship 2023
- SAMPE University Research Symposium Semi-Finalist 2022
- UVA Society of P.R.I. recognition for community service 2020
- James H. Sams Outstanding Senior Award– *Clemson Mechanical Engineering Department* 2015
- E. Wayne Kay Scholarship – *Society of Manufacturing Engineers* 2014

HONORS AND AWARDS (2010-2014)

- Fresenius Medical Care Scholarship 2013
- Frank H. Slocum Jr. Endowed Scholarship in Motorsports and Automotive Studies 2013
- Mark Van Bellamy Brooks Endowed Scholarship - *Robert H. Brooks Sports Science Institute* 2012
- Earl and Myrtle Walker Scholarship – *Society of Manufacturing Engineers* 2011
- North Carolina Young Entrepreneurs Award – *National Federation of Independent Business* 2010