

## Camden Chatham

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- SKILLS** Planning and organization, Project management, Strong interpersonal skills, Time management, Conflict resolution, Communication with people of technical and non-technical backgrounds.
- Engineer in Training Certification in the State of Georgia. License #EIT026227
- Experience with Microsoft Office and LaTeX
- Gallup StrengthsFinder: Belief, Developer, Relator, Responsibility, Discipline.
- EDUCATION** **Virginia Polytechnic Institute and State University, Blacksburg, Virginia.**  
Doctor of Philosophy in Macromolecular Science and Engineering, May 2020 (anticipated).  
Preliminary exams passed September 2018; **Current GPA: 3.89**
- Georgia Institute of Technology, Atlanta, Georgia**  
Bachelor of Science in Polymer/Fiber Engineering with highest honors, May 2012.  
Overall GPA: 3.66
- EXPERIENCE** **DREAMS Lab at Virginia Tech, Blacksburg, Virginia.**  
*PhD Candidate and Materials for Additive Manufacturing Researcher (August 2015 – Present)*  
Part of the interdisciplinary research team at the Design, Research, and Education for Additive Manufacturing Systems (DREAMS) laboratory. Collaborates with mechanical engineers, chemical engineers, material scientists, and synthetic chemists to tailor-make novel polymeric materials suitable for additive manufacturing. Designs, scopes, and manages projects for undergraduate researchers. Largely interested in the characterization of materials and in connecting molecular structure to processing behavior and final part characteristics.
- FAI Materials Testing Laboratory, Marietta, Georgia.**  
Polymer Engineer I. (August 2012 – February 2015)  
Responsible for the proposal, quoting, and completion of projects related to material characterization and failure analysis, including acting as project manager for multi-person projects. Interpreted standard test methods and works with clients to create test methods to conduct material property evaluations relevant to the needs of the client. Wrote formal reports at the conclusion of each project. Responded to requests for quotes. Managed student interns. Planned and facilitated monthly, company-wide staff meetings to discuss actions to move FAI toward its goals. Contributed to the FAI quality system by writing and reviewing standard operating procedures.
- Common projects include:  
Physical Testing: Instron universal tensile machine, durometer hardness, mount and polish specimens for optical microscopy, edge crush test, coefficient of friction determination  
Thermal Testing: Mettler DSC, Mettler TGA, Tinius Olsen Plastometer  
Characterization Testing: Perkin-Elmer 2000 System FT-IR, Amray 1850 FE Field Emission microscope and SEM-EDXS, inherent and intrinsic viscosity
- Huntington Learning Center, Woodstock, Georgia.**  
Math and Science Subject Tutor (January 2013-July 2015)  
Facilitated learning by communicating background and applications related information to help students further understand math and science and empower their independent success. Worked in both one-on-one environments for tutoring high school level math and science courses and in one-to-four environments for Huntington's math foundational skills program.

## PROJECTS

### **Powder Bed Fusion of Poly(phenylene sulfide)** (active project)

Utilizing my knowledge of both powder bed fusion process physics and intrinsic polymer properties to additively manufacture complex parts from the high-performance thermoplastic, poly(phenylene sulfide) (PPS). I have successfully demonstrated that parts can be fabricated from PPS at processing temperatures less than predicted through literature printing models. The current phase of this project focuses on determining the lifespan and reuse of PPS powder at a variety of processing temperatures.

### **Fused Filament Fabrication of Semi-crystalline Polymer Blends** (June-December 2017)

*Journal Article Submitted*

Demonstrated printing with a semi-crystalline polymer blend of poly(ethylene terephthalate) (PET) and polypropylene (PP) using different concentrations of maleic anhydride-graft-polypropylene (MA-g-PP) as a compatibilizing material. Neither the PET nor PP homopolymer demonstrated the ability to fabricate dimensionally accurate and mechanically robust parts through fused filament fabrication additive manufacturing, however, the blends containing 5% and 10% MA-g-PP demonstrated suitable printability while maintaining regions of crystallinity.

### **Solvay Additive Manufacturing Cup** (November 2017-January 2018)

Participated with team of five graduate students to rapidly determine optimal processing conditions for printing semi-crystalline poly(ether ether ketone) (PEEK) via fused filament fabrication additive manufacturing. Entries were judged based on geometric accuracy, ultimate tensile, and impact properties.

### **Society of Manufacturing Engineers Digital Manufacturing Challenge** (March 2017)

*First Place Winning Team*

Worked with an interdisciplinary team of four graduate and undergraduate engineering students to design and fabricate a customized golf club grip aimed at encouraging more people to stay active through playing golf. The grip was customized to a particular person's grip through 3D scanning, converted to an stl file, and printed using a fused filament fabrication style additive manufacturing machine. The filament was a thermoplastic polyurethane made by the team as part of the project.

### **Georgia Tech Polymer/Fiber Engineering Senior Design Project** (January-May 2012).

Worked with a group of four students and Technical Polymers, LLC on a semester-long research project to determine suitable, economically viable flame retardant filler material compatible with Nylon for use in automotive applications. This project began with a literature review for ideas to solve the problem and finished with the creation of a decision matrix based on test results. Project involved aspects of research, testing, and long term project management.

## PUBLICATIONS

Chatham, C. A.; Long, T. E.; Williams, C. B. A Review of the Process Physics and Material Screening Methods for Polymer Powder Bed Fusion Additive Manufacturing. *Prog. Polym. Sci.* **SUBMITTED 2019**

Chatham, C. A.; Zawaski, C. E.; Bobbitt, D. C.; Moore, R. B.; Long, T. E.; Williams, C. B. Semi-Crystalline Polymer Blends for Material Extrusion Additive Manufacturing Printability : A Case Study with Poly(Ethylene Terephthalate) and Polypropylene. *Macromol. Mater. Eng.* **SUBMITTED 2019**.

Gilmer, E. L.; Miller, D.; Chatham, C. A.; Zawaski, C.; Fallon, J. J.; Pekkanen, A.; Long, T. E.; Williams, C. B.; Bortner, M. J. Model Analysis of Feedstock Behavior in Fused Filament Fabrication: Enabling Rapid Materials Screening. *Polymer (Guildf)*. **2017**, 1–11.

## PRESENTATIONS

C. A. Chatham, I. Y. Ho, T. E. Long, C. B. Williams, "Benefits of low-temperature powder bed fusion for manufacturing with poly(phenylene sulfide)" Polymers in Additive Manufacturing Consortium All-Hand Meeting, Blacksburg, VA, September 20, 2018

C. A. Chatham, T. E. Long, C. B. Williams, "Powder bed fusion of poly(phenylene sulfide) (PPS) at temperatures significantly below  $T_m$ " Solid Freeform Fabrication Symposium, Austin, TX, August 15, 2018

C. A. Chatham, J. M. Surrine, V. Meenakshisundaram, T. E. Long, C. B. Williams, "Toward Science-Based Manufacturing of Powder Bed Fusion Additive Manufacturing" MII Technical Conference and Review, Blacksburg, VA, April 17, 2018

C. A. Chatham, C. B. Williams, "Rapid Prototyping to Additive Manufacturing: Materials Development and the Maturing of 3D Printing" Virginia Tech Graduate Student Association 2017 Research Symposium, Blacksburg, VA, March, 23, 2017

C. A. Chatham, J. M. Surrine, T. E. Long, C. B. Williams, "Powder bed fusion of poly(phenylene sulfide) via science based manufacturing" National Security Campus University Polymer Consortium, Kansas City, MO, May 16, 2017

C. A. Chatham, J. J. Fallon, E. L. Gilmer, A. Cohen, M. J. Bortner, C. B. Williams, "Additively manufactured golf grips" SME Webinar, October 27, 2017

C. A. Chatham, J.M. Surrine, T. E. Long, & C. B. Williams, "Toward Science Based Manufacturing," 43<sup>rd</sup> PolyMAC Conference, Kansas City, MO, June 17, 2016

#### POSTERS

C. A. Chatham, C. E. Zawaski, D.C. Bobbitt, T. E. Long, C. B. Williams, "MATERIAL EXTRUSION ADDITIVE MANUFACTURING OF SEMI-CRYSTALLINE POLY(ETHYLENE TEREPHTHALATE) VIA BLENDING WITH POLYPROPYLENE" Macromolecules Innovation Institute Technical Conference, Blacksburg, VA, April 17, 2018

C. A. Chatham, C. E. Zawaski, D.C. Bobbitt, T. E. Long, C. B. Williams, "EXTRUSION ADDITIVE MANUFACTURING OF SEMI-CRYSTALLINE PET/PP BLENDS" SPE ANTEC, Orlando, FL, May 7, 2018

C. A. Chatham, T. E. Long, C. B. Williams, "Processing Poly(phenylene sulfide) by Powder Bed Fusion Additive Manufacturing" Southeast Polymer Forum, Blacksburg, VA, June 5, 2017

C. A. Chatham, V. Meenakshisundaram, T. E. Diller, T. E. Long, C. B. Williams, "A calorimetric approach to measuring optical absorption efficiency in polymer powder bed fusion (PBF) additive manufacturing (AM)" Solid Freeform Fabrication Conference, Austin, TX, August 7, 2017

C. A. Chatham, T. E. Long, & C. B. Williams, "Using Polymer Characterization to Inform Machine Parameters in Powder Bed Fusion." Virginia Tech & University of Tennessee-Knoxville National Science Foundation joint research symposium, Knoxville TN, April 2016.

C. A. Chatham & C. B. Williams, "Laser Induced Morphology in Powder Bed Fusion." Macromolecules Innovation Institute Technical Conference, Blacksburg, VA, October 11, 2016.

C. A. Chatham, C. Zawaski, J. Kubalak, D. Rau, & C. B. Williams, "DreamVendor." SxSW Technology Expo, Austin, TX, March 2016.

#### HONORS

Eagle Scout (June 2005), Georgia Tech's AATCC Outstanding College Graduate (May 2012)