Cecile A. Grubb

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Education

Doctor of Philosophy in Materials Science and Engineering May 2025
University of Tennessee Knoxville
Advisors: Dr. David Harper and Dr. David Keffer

Master of Science in Chemistry June 2014
Emphasis: Polymers and Coatings
University of Oregon

Bachelor of Science in Chemistry June 2013
Western Washington University

Professional Preparation

Research Assistant Professor **Jan. 2026 - Present**
Composite Materials & Engineering Center (CMEC)
Biological Systems Engineering (BSE)
Washington State University, Pullman, WA

Doctoral Research Fellow – Sustainable Automotive Materials **Nov. 2021 – Nov. 2025**
Volkswagen Group of America, Knoxville, TN

Graduate Student Researcher – Teaching and Learning Institute **Oct. 2022 – Jun. 2023**
University of Tennessee, Knoxville, TN

Research Associate – Plastics and Composites Engineering **Dec. 2014 – Mar. 2021**
Western Washington University, Bellingham, WA

Research and Development Graduate Intern **Oct. 2013 – Jun. 2014**
Momentive Specialty Chemicals, Springfield, OR

Research Interests

Sustainable and Bio-Based Composites

- Development of natural fiber composites for structural and automotive use, emphasizing mechanical performance and lightweighting
- Life cycle modeling to evaluate carbon footprint, end-of-life, and material substitution
- Reversible thermoset design for recyclable, high-performance composite applications

Polymer and Composites Recycling

- Mechanical, chemical, and enzymatic recycling of natural fiber and wood-based composites
- Reactive extrusion of thermoplastics and hybrid bio-composites for circular material flows
- Reprocessing of post-consumer waste streams, including ocean plastic-derived olefins and recovered automotive epoxy systems

Advanced Materials Development and Manufacturing

- Adaptation of papermaking and nonwoven processes for scalable production of pulp fiber-reinforced composites
- Formulation and processing of aerospace resin systems for hot-melt prepreg, high-pressure RTM, and nanocomposite direct ink writing (DIW) applications
- Industry-partnered research on materials development, pilot-scale testing, and process troubleshooting

Research Skills

- **Polymer Analysis:** Differential Scanning Calorimetry (DSC), Thermogravimetric Analysis (TGA), Dynamic Mechanical Analysis (DMA), Gel Permeation Chromatography (GPC), Rheology, Mechanical Testing
- **Composites and Polymer Processing:** Compression Molding, Extrusion, Injection Molding, Additive Manufacturing, Prepreg Manufacturing, High Pressure-Resin Transfer Molding
- **Spectroscopic Analysis:** Nuclear Magnetic Resonance (NMR) Spectroscopy, Fourier Transform Infrared (FTIR) Spectroscopy, Ultraviolet-Visible (UV-Vis) Spectroscopy
- **Microscopy:** Scanning Electron Microscopy (SEM), Optical Microscopy
- **Data Analysis:** OriginLab, JMP, Design of Experiments (DOE), Principal Components Analysis
- **Life Cycle Analysis**: Sphera LCA for Experts (GaBi), Argonne GREET model

Awards

JEC Composite Innovation Awards – Finalist
JEC World, Automotive & Road Transportation - Parts (2026)

2025 Volunteer of Distinction – Excellence in Research
Office of the Provost, University of Tennessee Knoxville (2025)

SAMPE 2024 Young Professional Emerging Leadership Award
Society for the Advancement of Material and Process Engineering (2024)

SPE ANTEC 2024 Student Poster Award – Honorable Mention
Society of Plastics Engineers Annual Technical Conference (2024)

SPE ACCE 2023 Materials Innovation Award – Prototype Category
Society of Plastics Engineers Automotive Composites Conference & Exhibition (2023)

Automotive & Composites Division ACCE Scholarship
Society of Plastics Engineers (2022)

Materials Science and Engineering Graduate Fellowship
University of Tennessee Knoxville (2021)

Publications

C.Grubb, M. Mokhtarnejad, J. Hess, J. Misasi, D. Keffer, M. Kardos, H. Mainka, D. Harper, "Impact of Multiple Mechanical Recycling Cycles on the Structure and Performance of Paper Fiber-Reinforced Polypropylene Composites". *Composites Part A: Applied Science and Manufacturing,* under review, November 2025.

C. Grubb, M. Kardos, J. Chen, M. Mokhtarnejad, W. Henken, M. Jin, D. Keffer, D. Harper. (2025). "Life Cycle Assessment of Paper-Based Composites as Replacement for Injection Molded Polypropylene Automotive Door Component". *Sustainable Materials and Technologies*, *45*, e01725. https://doi.org/10.1016/j.susmat.2025.e01725

W. Henken, S. Young, V. Chwala, **C. Grubb**, R. Bergee, M. Selim, J. McKay, H. Mainka, M. Kardos, D. Penumadu. (2025). "Multi-scale stochastic study of glass fiber sizing effects in automotive structural sheet molding compounds". *Composites Part B: Engineering*, *306*, 112795. https://doi.org/10.1016/j.compositesb.2025.112795

A. Ho, C. Kilgore, A. Giffin, **C. Grubb**, J. Lind. (2025). "A Tale of Two Calculus Courses". *PRIMUS*, *35*(7). https://doi.org/10.1080/10511970.2025.2518535

C. Grubb, M. Mokhtarnejad, J. Greene, J. Misasi, D. Keffer, M. Kardos, H. Mainka, & D. Harper. (2024). Development of an automotive-relevant recycling process for paper fiber-reinforced polypropylene composites. *Recycling, 9*(6), 126. https://doi.org/10.3390/recycling9060126

C. Grubb, M. Kardos, C. Webb, H. Mainka, D. Keffer, & D. Harper. (2024). Manufacturing and characterization of polypropylene-paper composites for automotive applications. *SAMPE Journal, 60*(6). https://doi.org/10.33599/sj.v60no6.01

C. Grubb, D. Keffer, C. Webb, M. Kardos, H. Mainka, & D. Harper. (2024). Paper fiber-reinforced polypropylene composites from nonwoven preforms: A study on compression molding optimization from a manufacturing perspective. *Composites Part A: Applied Science and Manufacturing, 185*, 108339. https://doi.org/10.1016/j.compositesa.2024.108339

Conference Presentations

(*indicates peer-reviewed)

D. Harper, **C. Grubb**, M. Moczadlo, E. Howard, C. Webb, M. Mokhtarnejad, D. Keffer, M. Kardos, H. Mainka "Advancing the Use of Molded Natural Fiber Composites in Auto Applications", *Sustainable Pulp & Paper 2024*, Technical Presentation. 2024.

D. Harper, **C. Grubb**, M. Moczadlo, E. Howard, C. Webb, M. Mokhtarnejad, D. Keffer, M. Kardos, H. Mainka "Advancing the Use of Molded Natural Fiber Composites in Auto Applications", *Frontiers in Biorefining*, Technical Presentation. 2024.

C. Grubb, M. Mokhtarnejad, J. Greene, J. Misasi, D. Harper "Mechanical Recycling of Paper-Based Composites for Automotive Applications", *Society for the Advancement of Material and Process Engineering*, Poster Presentation. 2024.

C. Grubb, M. Mokhtarnejad, M. Kardos, J. Misasi, N. Hoekstra, H. Mainka, D. Keffer, D. Harper "Investigating the Effects of Shear Rate and Temperature on Injection Molding of Paper Fiber-Reinforced Polypropylene Composites". *Annual Technical Conference of the Society of Plastics Engineers*, Technical Presentation. 2024.

C. Grubb, M. Mokhtarnejad, D. Harper "Investigating the Effects of Shear Rate and Temperature on Injection Molding of Paper Fiber-Reinforced Polypropylene Composites". *Annual Technical Conference of the Society of Plastics Engineers*, Poster Presentation. 2024.

E. Howard, **C. Grubb**, D. Harper "A Study on Additives to Improve Mechanical Recycling of a Low Carbon Footprint Composite Using Polypropylene and Paper". *Annual Technical Conference of the Society of Plastics Engineers*, Poster Presentation. 2024.

M. Moczadlo, **C. Grubb**, D. Harper "Making a Low Carbon Footprint Composite Using PP, Paper and Nanofibrillated Cellulose". *Annual Technical Conference of the Society of Plastics Engineers*, Poster Presentation. 2024.

C. Grubb, M. Kardos, C. Webb, H. Mainka, D. Keffer, D. Harper "Manufacturing and Characterization of Polypropylene-Paper Composites for Automotive Applications". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2023.*

M. Kardos, **C. Grubb**, H. Mainka, D. Harper "Novel Cellulose Composites for Automotive Applications". *Society of Plastics Engineers (SPE) Automotive Composites Conference & Exhibition*, Technical Presentation. 2023.

J. Davishahl, **C. Grubb** "Engineering Faculty Experiences Teaching Social Justice to First Year Students". *Frontiers in Educations*, Conference Proceedings. 2021.

C. Owen, **C. Grubb**, J. Misasi "Impacts of Degraded Surface Removal on Mechanical Recycled Marine Debris". *Annual Technical Conference of the Society of Plastics Engineers*, Conference Proceedings. 2021.*

J. Covarrubias, C. Owen, E. Impink, M. House, **C. Grubb**, N. Hoekstra, J. Misasi "Some Properties of 100% Recycled Ocean Plastic Olefins". *Annual Technical Conference of the Society of Plastics Engineers*, Conference Proceedings. 2021.*

C. Dojan, K. Hjestrom, **C. Grubb**, J. Misasi "Direct Ink Writing of Benzoxazine Nanocomposites". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2021.*

L. Hamernik, **C. Grubb**, J. Misasi "Synthesis & Characterization of a High-Performance Reversible Epoxy Curative". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2021.*

M. Standiford, **C. Grubb**, N. Larson "Development of Unidirectional Carbon Prepreg using a Solvent Dip Process". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2021.*

E. Smith, **C. Grubb**, J. Misasi, N. Larson "Developing a Procedure for Prepreg Tack Characterization:" *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2019.*

L. Ghanbari, **C. Grubb**, C. Croshaw, J. Misasi "Influence of Continuous Reactor B-Staging on the Thermomechanical Behavior of a Benzoxazine Matrix". *The Waterborne Symposium,* Conference Proceedings. 2019.*

B. Donegan, **C. Grubb**, J. Misasi "The Effect of Degree of Cure on Benzoxazine Flammability and Thermomechanical Properties". *Society for the Advancement of Material and Process Engineering,* Conference Proceedings. 2018.*

C. Grubb, G. Hill, J. Misasi "Balancing Infusion Viscosity and Flame Retardancy of an RTM Benzoxazine". *Society for the Advancement of Material and Process Engineering,* Conference Proceedings. 2018.*

G. Lindskog, **C. Grubb**, D. Peebles, N. Larson "Manufacturing and Characterization of Basalt Fiber-Phenolic Resin Composites". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2017.*

C. Carpenter, **C. Grubb**, J. Misasi "The Effects of Reactive Diluents on Flame Properties of Benzoxazines". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2017.*

G. Hill, **C. Grubb**, J. Misasi "The Effects of Continuous Reactive Blending on Benzoxazine/Polyethylene Glycol Blends". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2017.*

M. Seely, **C. Grubb**, J. Misasi, M. Peyron "Use of Dynamical Mechanical Testing and Chromatography to Assess the Degree of Cure of Phenolic Prepreg". *Society for the Advancement of Material and Process Engineering*, Conference Proceedings. 2017.*

C. Grubb, N. Larson "Development of Adequate Safety Protocol, Features and Fail-Safes for a Laboratory Scale Manufacturing Process". *American Society for Engineering Education,* Conference Proceedings. 2016.*

M. Peyron, D. Gill, **C. Grubb**, Z. Zywiak, S. Anderson, A. Hoch "Co-Printing Test Specimens as Surrogates for Complex Part Characterization". *The Composites and Advanced Materials Expo*. Conference Proceedings. 2016.*

Invited Talks

C. Grubb (2024) *Industry PhD with Focus on Automotive Sustainability*. SAMPE Club meeting at Western Washington University, Bellingham, WA.

C. Grubb (2017) *Degree of Cure Analysis for Complex Resin Systems*. Joint Center for Aerospace Technology Innovation Annual Symposium, Seattle, WA.

Funded Grant Proposals

University of Tennessee Knoxville Student-Faculty Research Award (2022) *Bio-Based Materials Research and Curriculum Development*. $4,970. **C. Grubb** (Principal Investigator), D. Harper (Co-Principal Investigator

NASA Phase I STTR (2019) *Resin Additive Manufacturing Processed Thermal Protection Systems*. $53,458. J. Cushing (Author), N. Hoekstra (Collaborator), M. Peyron (Collaborator), **C. Grubb** (Collaborator), J. Misasi (Collaborator)

Joint Center for Aerospace Technology Innovation (2019) *Modified Epoxy Prepreg System for Improved Out Life*. $95,915. N. Hoekstra (Principal Investigator), **C. Grubb** (Co-Principal Investigator), J. Misasi (Co-Principal Investigator)

Joint Center for Aerospace Technology Innovation (2018) *Demonstration of Benzoxazine Prepregs for Aircraft Interior Composites*. $88,878. J. Misasi (Principal Investigator), **C. Grubb** (Co-Principal Investigator), N. Larson (Co-Principal Investigator)

Joint Center for Aerospace Technology Innovation (2017) *Scalable Formulation of Aerospace Interior Resins*. $88,878. J. Misasi (Principal Investigator), **C. Grubb** (Co-Principal Investigator)

Air Force Phase II STTR (2016) *Optimized Additive Manufacturing for High Dielectric Strength*. $225,000. R. Muhlbauer (Author), N. Hoekstra (Collaborator), M. Peyron (Collaborator), **C. Grubb** (Collaborator), J. Misasi (Collaborator), D. Gill (Collaborator), J. Lund (Collaborator)

Joint Center for Aerospace Technology Innovation (2016) *Transitioning New and Re-Invented Thermoset Resins from the Lab into Aerospace Composites*. $99,500. M. Peyron (Principal Investigator), T. Chawla (Co-Principal Investigator), D. Rider (Co-Principal Investigator), **C. Grubb** (Collaborator)

Western Washington University Student Technology Fee Grant (2016) *Upgrading 3D-Printing Materials Manufacturing Capabilities for Engineering Students and Makers at WWU*. $28,300. J. Misasi (Principal Contact), N. Hoekstra (Co-Author), **C. Grubb** (Co-Author)

Air Force Phase I STTR (2015) *Optimized Additive Manufacturing for High Dielectric Strength*. $45,000. R. Muhlbauer (Author), N. Hoekstra (Collaborator), M. Peyron (Collaborator), **C. Grubb** (Collaborator)

Joint Center for Aerospace Technology Innovation (2015) *Characterization of Prepreg Materials using Destructive and Non-Destructive Testing.* $99,900. N. Larson (Principal Investigator), D. Rider (Co-Principal Investigator), **C. Grubb** (Co-Author)

Professional Society Memberships

Society for the Advancement of Materials and Process Engineering (SAMPE)

- *Secretary for North American Sustainability Technical Committee (July 2024 – present)*
- *Internal Vice President for UTK SAMPE Club (AY 2023-24)*
- *President for UTK SAMPE Club (AY 2022-23)*
- *Treasurer for UTK SAMPE Club (AY 2021-22)*

Society of Plastics Engineers (SPE)

Teaching Experience

(*indicates quarter system)

ENGR 101 *"Engineering, Design & Society"* (2 cr)* **W21**

Course introduces students to the fields of engineering and design and explores the relationship between engineering, design, technology, and society. Topics include societal impact of technology, the relevance of social justice in the engineering and design profession, ethical decision making, and social mindfulness in design.

MSCI 322 *"Polymers and Composites"* (1 cr) * **F20**

Course introduces students to the fundamental chemical and physical properties of polymers and polymeric composites. Topics include polymerization mechanisms, multiscale structures, viscoelasticity, solubility, thermal and mechanical properties, and processing methods.