**EDUCATION**

**Ph.D. in Materials Engineering May 2020**

Purdue University; West Lafayette, IN

GPA: 4.0/4.0

NSF Graduate Research Fellowship Program (GRFP) Fellow (2017-2020)

Thesis: “Tannic Acid: A Key to Reducing Environmental Impacts of Epoxy”

Advisors: Dr. Jeffrey Youngblood and Dr. John Howarter

**B.S. in Biomedical Engineering May 2015**

Ohio State University; Columbus, OH

GPA: 3.6/4.0

Focus: Biomaterials, Cell & Tissue Engineering

Minor Degrees: Women’s Studies and Gender Studies

**PROFESSIONAL EXPERIENCES**

Oak Ridge National Lab February 2022 - Present

Manufacturing Demonstration Facility

**Associate R&D Staff**

Mentors: Dr. Soydan Ozcan and Dr. Vlastimil Kunc

* **Current Projects**
	+ Circular Economy of Composites
		- AOP Title: Development of Value Added, Recycled Feedstocks for Additive Manufacturing and Fiber Reinforced Composites
	+ Hub and Spoke with University of Maine
		- AOP Title: Innovative High Feed Rate Additive Manufacturing Using Sustainable Nano/Micro Cellulose Reinforced Thermoplastic Composites: Phase II

University of Tennessee, Knoxville August 2023 - Present

Department of Mechanical, Aerospace, and Biological Engineering

**Joint Faculty Assistant Professor**

* **Current Projects**
	+ Development of Technologies for Automotive Circularity
	+ Advanced Mixed Plastic Separation and Sorting Technologies

Oak Ridge National Lab June 2020 – January 2022

Manufacturing Demonstration Facility

**Postdoctoral Research Associate**

Mentor: Dr. Vlastimil Kunc

* **Projects**
	+ Circular Economy of Composites
		- AOP Title: Development of Value Added, Recycled Feedstocks for Additive Manufacturing and Fiber Reinforced Composites
	+ Hub and Spoke with University of Maine
		- AOP Title: Innovative High Feed Rate Additive Manufacturing Using Sustainable Nano/Micro Cellulose Reinforced Thermoplastic Composites: Phase II

Purdue University  August 2015 – May 2020

School of Materials Engineering

**Graduate Research Assistant**

Advisors: Dr. Jeffrey Youngblood and Dr. John Howarter

* **Projects:**
	+ Utilization of celluloses, tannins, and lignins as a hardeners, flame retardants, and toughening agents for fiber reinforced epoxy printed circuit boards.

**AWARDS**

1. **Outstanding Young Manufacturing Engineer,** 2024 – Society of Manufacturing Engineers
2. **Editor’s Choice** **Award** Journal of Construction Engineering and Management, 2024
3. Certificate of Achievement, Composites Science & Technology Section, ORNL, 2024
4. Service Core Value Award - ESTD Division, ORNL, 2023
5. **Top 10 People Under 40**, Lafayette Chamber of Commerce; Tippecanoe Connect, 2019
6. Purdue Graduate School – Graduate Service Award, 2019
7. Purdue College of Engineering – Graduate Service Award, 2018
8. Ohio State College of Engineering – Leadership Award, 2015
9. Ohio State College of Engineering – Diversity Enhancement Award, 2015

**LEADERSHIP, SERVICE AND OUTREACH**

* 2020-Pres. **Co-Chair &** **Steering Committee**, IACMI Circular Economy Working Group
* 2020-2022 **Executive Board**, Oak Ridge Postdoctoral Association
* 2018-Pres. **Founding Chair**, TMS PRIDE
* 2017-2019 **Volunteer & Teacher**, Lafayette Jefferson High School Outreach
* 2016-2018 **Board of Organizers**, Diversity in Materials (DMMM3) Conf., Santa Barbara, CA
* 2016 **Participant**, Diversity in the Minerals, Metals, and Mat. Profession (DMMM2)
* 2015-Pres. **Member**, TMS Diversity Committee, 2015-Present
* 2015-2018 **Executive Board**, Purdue Materials Engineering Graduate Student Association

**ACTIVE FEDERALLY FUNDED PROJECTS (CURRENT FY24)**

1. Carbon Capture to Reach Carbon Neutral Vehicles: CO2-Derived Platform Molecules for Polyurethane Foams
	1. Role: Overall Project P.I.
	2. Funding: $1M/3FY
	3. Sponsor: U.S. DOE – IEDO
2. Recyclability for Utility and Distributed Wind Roadmaps
	1. Role: Blades Task Lead
	2. Funding: $1.350M/2FY
	3. Sponsor: U.S. DOE – WETO
3. Enabling Durable Automotive Plastics Circularity in the United States
	1. Role: Overall Project P.I.
	2. Funding: $750K/5FY
	3. Sponsor: American Chemistry Council
4. Recycling of Polymers for Large Format Additive Manufacturing
	1. Role: Overall Project P.I.
	2. Funding: $40K/1FY
	3. Sponsor: U.S. DOE - AMMTO
5. Composite and Fiber Waste Streams for Value Added Recycled Composites
	1. Role: Overall Project P.I.
	2. Funding: $40K/1FY
	3. Sponsor: U.S. DOE – AMMTO

**REFEREED JOURNAL ARTICLES**

1. Schweizer, K., Bhandari, S., … Korey, M., et al., “Recycling large-format 3D printed polymer composite formworks used for casting precast concrete – technical feasibility and challenges” *Accepted for Publication in Journal of Composites for Construction* (2024).
2. Walker, R., Korey, M., et al., “Recycling Machining Waste for LFAM Applications” *Composites Science: Part B* (2024). DOI: <https://doi.org/10.1016/j.compositesb.2024.111291>
3. Henao, Y., …. Korey, M., “Life cycle assessment and life cycle cost analysis of repurposing decommissioned wind turbine blades as high-voltage transmission poles” *Journal of Construction Engineering and Management* (2024). DOI: <https://doi.org/10.1061/JCEMD4.COENG-13718>
4. Armstrong, K., Kamath, D., … Korey, M., et al., “Lifecycle cost, energy, and carbon emissions of molds for precast concrete: Exploring the impacts of material choices and additive manufacturing” *Resources, Conversation and Recycling* (2023). DOI: <https://doi.org/10.1016/j.resconrec.2023.107117>
5. Zhao, X., Bhagia, S., … Korey, M., et al., “Bioinspired design towards nanocellulose-based materials” *Materials Today* (2023). DOI: <https://doi.org/10.1016/j.mattod.2023.04.010>
6. Korey, M., et. al. “Recycling Polymer Composite Granulate/Regrind Using Big Area Additive Manufacturing” *Composites: Part B* (2023). DOI <https://doi.org/10.1016/j.compositesb.2023.110652>
7. Copenhaver, K., Smith, T., … Korey, M., et al., “Recyclability of additively manufactured bio-based composites” (2023). DOI: <https://doi.org/10.1016/j.compositesb.2023.110617>
8. Rencheck, M., Korey, M. et al. “Towards the applications of mechanophore incorporated feedstocks for additive manufacturing” *Materials Today Communications* (2023) DOI: <https://doi.org/10.1016/j.mtcomm.2023.105525>
9. Wang, L., Kelley, P., … Korey, M., et al. “Multifunctional polymer composite coatings and adhesives by incorporating cellulose nanomaterials” *Matter* (2023) DOI: <https://doi.org/10.1016/j.matt.2022.11.024>
10. Copenhaver, K., Li, K., … Korey, M., et al. “Pretreatment of lignocellulosic feedstocks for cellulose nanofibril production” *Cellulose* (2022) DOI: <https://doi.org/10.1007/s10570-022-04580-z>
11. Zhao, X., Copenhaver, K., Wang, L., Korey, M., et. al. “Recycling of natural fiber composites: challenges and opportunities” *Resources, Conservation, and Recycling* (2021) <https://doi.org/10.1016/j.resconrec.2021.105962>
12. Zhao, X., Korey, M., et al. “Plastic waste upcycling toward a circular economy” *Chemical Engineering Journal* (2021). DOI: <https://doi.org/10.1016/j.cej.2021.131928>
13. Korey, M., Johnson, A.D., Webb, B. Youngblood, J. Howarter, J. “Tannic Acid Based Pre-Polymer Systems for Enhanced Intumescence in Epoxy Thermosets.” *Green Materials* (2020). DOI: <https://doi.org/10.1680/jgrma.19.00061>
14. Skordalou, G., Korey, M., Youngblood, J., Demadis, K. “Pleiotropic action of pH-responsive poly(pyridine/PEG) copolymers in the stabilization of silicic acid or the enhancement of its polycondensation” *Reactive and Functional Polymers* (2020). DOI: <https://doi.org/10.1016/j.reactfunctpolym.2020.10477> 5
15. Korey, M. Mendis, G. Youngblood, J. Howarter, J. “Tannic Acid: a Sustainable Crosslinking Agent for High Glass Transition Epoxy Materials” *Journal of Polymer Science: Part A* (2018). <https://doi.org/10.1002/pola.29028>
16. Korey, M., Youngblood, J. “Current characterization methods for cellulose nanomaterials: 4. Elemental Analysis.” *Chem Soc Rev* (2018). <https://doi.org/10.1039/C6CS00895J>
17. Mendis, G., Weiss, S. Korey, M. “Phosphorylated lignin as a halogen-free flame-retardant additive for epoxy.” *Green Materials* (2016). <https://doi.org/10.1680/jgrma.16.00008>

**PUBLISHED CONFERENCE PROCEEDINGS**

1. Oliver, G., Korey, M., “Challenges and Barriers to Global Automotive Circularity” *Accepted for Publication in Polyurethanes Technical Conference Proceedings* (2024).
2. Lee, E., … Korey, M., “Development of CO2-Derived Polyols for Use in Automotive Polyurethane Foams” *Accepted for Publication in Polyurethanes Technical Conference Proceedings* (2024).
3. Korey, M., Sproul, E., et al., “Development of Wind Turbine Blade Recycling Baselines in the United States” *43rd Risø International Symposium on Materials Science: Composite for wind energy: Manufacturing, operation and end-of-life* (2023).
4. Sproul, E., Korey, M., et al., “Life Cycle Assessment of Wind Turbine Blade Recycling Approaches in the United States” *Accepted for Publication in: 43rd Risø International Symposium on Materials Science: Composite for wind energy: Manufacturing, operation and end-of-life* (2023).
5. Korey, M. Clarkson, C., Wang, C., Andler, J., Handwerker, C. “Critical Incident Assessment as a tool to reflect on student’s emotional response during international experiences” *American Society for Engineering Education* (2020). [https://doi.org/ 10.18260/1-2--34355](https://doi.org/%2010.18260/1-2--34355)
6. Wang, C., Clarkson, C., Korey, M., Andler, J., Handwerker, C., “Lessons learned from the IGERT sustainable electronics program: cultivating self-determination in an interdisciplinary group” *American Society for Engineering Education* (2020). [https://doi.org/ 10.18260/1-2—34912](https://doi.org/%2010.18260/1-2%E2%80%9434912)
7. Korey, M., Johnson, A.D., Webb, W., Howarter, J., “Tannic Acid – A Novel Intumescent Agent for Epoxy Systems” In: Gaustad G. et. al. (eds) REWAS 2019, The Minerals, Metals & Materials Series. Springer, Cham. <https://doi.org/10.1007/978-3-030-10386-6_10>

**PUBLISHED DEPARTMENT OF ENERGY REPORTS**

1. Eberle, A., … Korey, M., et al., (2023). *Materials Used in U.S. Wind Energy Technologies: Quantities and Availability for Two Future Scenarios*. United States Department of Energy. Technical Report Number: NREL/TP-6A20-81483
2. Khalifa, S., … Korey, M., et al., (2024). *Road Map for Recycling Wind Energy Systems in the United States*. United States Department of Energy. *Under Review.*
3. Wang, P., … Korey, M., et al. (2024) *Distributed Wind Recycling Roadmap.* United States Department of Energy. *Under Review.*

**OTHER PUBLICATIONS**

1. Britton, B., Carter, J., Korey, M., Roccoforte, L. “Material goals towards equity along the STEM & LGBTQIA+ spectra” *JOM* (2021). DOI: <https://doi.org/10.1007/s11837-021-04829-1>
2. Korey, M. “What’s the T, Cis? Discussing Gender Identity and Sexual Orientation in TMS” *JOM* (2019). <https://doi.org/10.1007/s11837-019-03565-x>
3. Korey, M., Murphy, A., Pasebani, S., Sepehrband, P., Vermaak, N. “Diversity Breakfast Raises Awareness for Inclusive Engineering Workplaces” *JOM* (2018). <https://doi.org/10.1007/s11837-018-3227-z>
4. Robinson, L., et. al. “Diversity Summit Continues Progress on Solutions” *JOM* (2017). <https://doi.org/10.1007/s11837-016-2250-1>

**PATENTS & PATENT APPLICATIONS**

1. Korey, M., Youngblood, J., Howarter, J., Burgos, N. (2023) U.S. Patent 11,697,702
2. Korey, M., Tekinalp, H., Wang, P., Ozcan, S. (2022) U.S. Provisional Patent Application 63/416,621.
3. Korey, M., Howarter, J., Youngblood, J. (2021) US Patent 10,899,922

**TECHNICAL COLLABORATIONS IN PROGRESS**

1. Additive Engineering Systems (Akron, OH) – Topic: Recycling BAAM Waste
2. American Chemistry Council (Washington, DC) – Topic: Developing The Automotive Circular Economy
3. Autodesk (San Rafael, CA) – Topic: Design for Sustainability & Demonstration Re-manufacturing
4. Carbon Rivers, LLC (Knoxville, TN) – Topic: Size Reduction and Fiber Length Engineering
5. Greentex America (Hallandale Beach, FL) – Topic: Mechanical Recycling of Composites Waste
6. Rational Packaging (Springfield, TN) – Topic: Recycling Packaging Waste
7. Techmer PM (Clinton, TN) – Topic: Recycling Black Wood Fiber PLA

**INVITED PRESENTATIONS AND PANEL DISCUSSIONS**

1. Korey, M. *Recycling of Wind Turbine Blades* (2nd Wind Blade Materials & Recycling Forum 2024)
2. Korey, M. *Sustainability and Applications of Advanced Materials* (SAMPE 2024)
3. Korey, M. *Critical Technologies for Sustainable Vehicle Production* (ITB Group 2024)
4. Korey, M. *Denmark Technological University* (2023)
5. Korey, M. *Lehigh University* *Materials Science and Engineering Seminar Series* (2021)
6. Korey, M. *Lawrence Livermore National Lab* *Seminar Series* (2020)

**CHAIRED CONFERENCE SYMPOSIA**

2019 Materials Science & Technology, “Activating Allies: Navigating the Intersectional Landscape of Diversity & Inclusion” Symposium

2019 The Minerals, Metals, and Materials Society (TMS), “Diversity in STEM and Best Practices to Improve It ” Symposium

2018 Diversity in the Minerals, Metals, and Materials Professions, “Creating a More Inclusive Field: Building Your Diversity Toolbox”

2018 Diversity in the Minerals, Metals, and Materials Professions, “Breakout Session on Intersection of Race & Ethnicity and LGBTQ+ Topics”

**TEACHING EXPERIENCE**

***Guest Lecturer***

Course: ME 599/610 – Lifecycle Analysis – Embodied Energy – Sustainability

 Other Professors: Uday Vaidya

* Taught several consecutive lectures on organic chemistry and the development of lifecycle analysis for chemical recycling pathways for plastics
* Developed course tests and exam questions for the midterm examination

***Course Developer and Lecturer***

 Purdue University

Course: MSE 597 – Design for Global Sustainability III – Policy and Advocacy

 Other Professors/Lecturers: PI: Carol Handwerker, Ronald Hammond

* Taught lectures on the topics of advocating & the structure of the federal government

***Workshop Developer***

Purdue University

Course: NSF IGERT Puerto Rico Workshop Orientation

Other Professors and Collaborators: PI: Carol Handwerker, Caitlyn Clarkson, Joseph Andler, Congying Wang

Collaborated with representatives in industry and academia in Puerto Rico (UPR Rio Piedras and UPR Mayaguez) to develop course topics

* Course ended in week-long trip to Puerto Rico where students interacted with collaborators and toured Puerto Rico to understand the resiliencies designed into the infrastructure

***Graduate Teaching Assistant***

 Purdue University

Course: MSE 525 – Introduction to Polymer Physics, Chemistry, and Synthesis

 Professor: Dr. John Howarter, Associate Professor

 Average Rating: 4.95/5.00

* Helped teach lectures on the fundamental science of polymer synthesis, characterization, and mechanics
* Held 4 review sessions before exams throughout the semester to help students succeed on in-class exams

***Undergraduate Teaching Assistant***

Course: ENGR 1100 – Ohio State Biomedical Engineering Survey

 Professor: Lindsay Tolchin, Senior Academic Advisor

* Helped teach introductory biomedical engineering topics to incoming first-year students at Ohio State.
* Assisted with grading for the course, course scheduling for incoming students, and answered academic questions about the program.

**MENTORSHIP EXPERIENCE**

***Research Experience for Teachers (RET) Mentor***

Program: NSF IGERT Fellowship RET

* Developed 3 research projects for high school teachers from different parts of Indiana on the topic of sustainable thermosetting monomers for enhanced flame retardancy in circuit boards.
* Developed and helped implement semester-long sustainable electronics curricula at Penn High School in Mishawaka, IN, Newton North High School in Morocco, IN and Lafayette Jefferson High School in Lafayette, IN with local high school teachers.
* 1 peer-reviewed publication and gave 1 presentation on the RET research

***Undergraduate Research (MSE 499) Mentor***

 Program: MSR 499 Mentor

* Mentored 5 undergraduate researchers through the research process
* Successfully published 2 peer-reviewed publications, 2 posters at a national conference, and 1 conference proceeding with Undergraduate Researchers

**NATIONAL FELLOWSHIPS AWARDED**

***National Science Foundation (NSF)***

***Graduate Research Fellowship Program (GRFP) Fellow***

August 2017 – August 2020

* Awarded NSF GRFP Fellowship for work in sustainable polymer design; specifically, on the chemical functionalization of tannic acid for increased compatibility in epoxy and functionality (flame retardancy)

***Interdisciplinary Graduate Education and Research Traineeship (IGERT) Fellow***

August 2016 – July 2017

* Awarded NSF IGERT Fellowship for work in sustainable thermosetting chemistry for circuit boards
* Traveled to India to work with local companies to develop sustainable practices (both employees and products)
* Mentored 2 high school teachers for 6 weeks through the research experience for teachers (RET) program