

SPRING 2024

MSE 690 SEMINAR SERIES

MONDAY, FEBRUARY 26TH | 3:30 REFRESHMENTS | 3:45PM SEMINAR |
ARMS 1010



HEATHER LIDDELL

Assistant Professor
Mechanical Engineering
and Environmental &
Ecological Engineering
Purdue University

“The Role of Lightweighting in Decarbonizing the Electric Vehicle Fleet: Life-Cycle Opportunities and Tradeoffs for Automotive Materials Development”

Abstract:

This seminar will explore the opportunity space for lightweight structural materials to reduce life-cycle emissions in battery electric vehicles, with an outlook from today to 2050. The analysis leverages a dataset of over 250 model year 2018-2023 battery electric vehicle models sold in the U.S. to quantify opportunities for emissions reductions across the light-duty vehicle fleet. I will discuss impacts of materials selection and sourcing and the sensitivity of results to vehicle characteristics such as size and drive range. Study results show that lightweighting of electric vehicles can contribute meaningfully to an overall strategy to meet economy-wide decarbonization goals, even under rapid electric grid transition scenarios. However, net emissions impacts depend on specific material selection and manufacturing decisions, and benefits are not universal to all lightweighting scenarios. These results will be put in context to discuss broader implications and emerging R&D opportunities for environmentally conscious automotive materials development.

Biography:

Heather Liddell joined Purdue in 2023 as an Assistant Professor with a joint appointment in Mechanical Engineering and Environmental & Ecological Engineering. Her two main areas of research interest are (1) failure analysis and adhesion in coatings and multi-material systems and (2) manufacturing sustainability, including environmental life cycle assessment. Prior to joining Purdue in August 2023, Dr. Liddell served as a U.S. Department of Energy contractor, where she worked closely with DOE’s Industrial Efficiency and Decarbonization Office to develop strategies for resource-efficient and decarbonized manufacturing in the United States. Liddell holds BS and MS degrees in mechanical engineering, and a PhD in materials science, all from the University of Rochester. She completed her postdoctoral training at the U.S. Naval Research Laboratory.

