

**Two PhD positions are available, starting in Fall 2021**, in the Department of Mechanical & Industrial Engineering at Louisiana State University, in the field of ultrasonic processing of polymer composite materials.

Project title: *Understanding Ultrasonic Processing of Layered Polymer Composites Across Length Scales*

In the search for energy and cost-efficient manufacturing and assembly techniques for thermoplastic composites, processing through ultrasonic vibrations is a promising candidate that can achieve consolidation and bonding in a fraction of the time required by traditional methods. The challenges in the use of ultrasonic processing for polymer composites are due, in part, to the difficulty in experimentally capturing the detailed processes occurring at the interface, stemming from ultra-fast cycle times and geometrical constraints to the region of interest. This 5-year project, funded by the National Science Foundation, will address those challenges by elucidating processing-structure-performance relationships and establishing novel experimental and modeling solutions.

The first PhD position will focus on experimental multi-scale characterization of ultrasonic-assisted manufacturing of polymer composites. It will involve design and application of novel characterization techniques to understand complex, physical processes occurring during ultrasonic-assisted processing.

#### **General requirements and qualifications for PhD position 1:**

- Bachelor's Degree and Master's Degree (preferred) in Mechanical, Aerospace, Chemical Engineering, or Materials Science and related fields.
- Knowledge of composite materials, manufacturing methods and material characterization techniques (e.g., X-ray diffraction, micro-computed tomography, DMA, DSC).
- Fundamental knowledge of thermoplastic or vitrimer matrices preferred.
- Excellent communication (written and oral), initiative and self-motivation.

The second PhD position will focus on multiphysics modeling of ultrasonic-assisted manufacturing of polymer composites. It will involve establishment of a multiphysics finite element framework based on experimental outcomes to simulate the process and predict mechanical performance.

#### **General requirements and qualifications for PhD position 2:**

- Bachelor's Degree and Master's Degree (preferred) in Mechanical, Aerospace, Chemical Engineering, or Materials Science and related fields.
- Knowledge of composite materials, process modeling in composites manufacturing, and finite element analysis software (e.g., ANSYS Workbench and user-defined sub-routines).
- Fundamental knowledge of thermoplastic or vitrimer matrices preferred.
- Excellent communication (written and oral), initiative and self-motivation.



**To apply to either PhD position:**

Send an email to Dr. Genevieve Palardy ([gpalardy@lsu.edu](mailto:gpalardy@lsu.edu)) stating your interest and include the following attachments in one PDF file: resume, past transcript(s) and one publication (journal or conference, if any).

**Application deadline:** April 15<sup>th</sup> 2021 or until filled

**Starting date:** Fall 2021

**Our website:** <https://faculty.lsu.edu/palardy/>