**Project Title:** Mechanical Characterization of Self-Healing Composites – A Tow Level Approach

**Advisor:** Andrew Lauer (PhD student in MatSE), Prof. Nancy Sottos (MatSE)

**Project Description:**
Our Research Group has developed many innovative methods for creating polymer materials that heal themselves. Self-healing composites are created by incorporating these polymers with carbon fiber reinforcements (Figure 1). These autonomous materials can be applied to nearly any situation where composites are used – examples include aeronautics, automobiles and other transportation, and civil infrastructure. This project aims to better characterize the performance and properties of these materials both before and after a healing event has taken place. As an undergraduate research assistant, your project will be to help further develop a test for characterizing self-healing of matrix/fiber interfaces at a tow-level. Your tasks will involve: manufacturing of self-healing material samples, mechanical testing (Figure 2), and evaluation of damaged regions (Figure 3).

![Figure 1](image1.png)  
**Figure 1:** Example self-healing composite as used in this study – green indicates healable epoxy and red indicates microcapsules containing healing agent.

![Figure 2](image2.png)  
**Figure 2:** Samples used in this study. They are a modification of commonly used compact tension fracture samples.

![Figure 3](image3.png)  
**Figure 3:** Reconstruction of fracture damage using Confocal Scanning Laser Microscopy.

**Student background and expected research activities:**
We are seeking a driven, enthusiastic student who is interested in **smart materials**, **plastic and composite manufacturing**, and **mechanical testing**. A student with previous laboratory or manufacturing experience is desired, but there are no minimum qualifications required. You should demonstrate the ability to work in a precise and detail oriented manner, a willingness to follow detailed instructions, and a strong desire learn about self-healing materials. Comfort operating laboratory equipment and handling chemicals is a must.

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