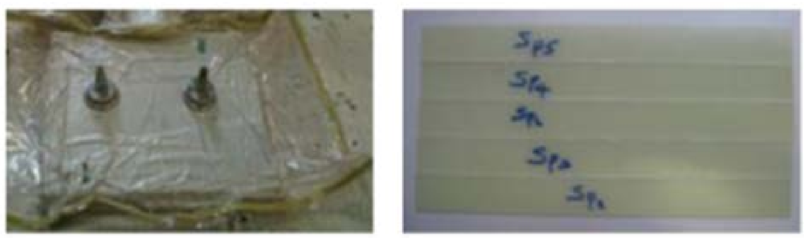
2017

Research Area 2: Advanced Lightweight and Tailorable Materials

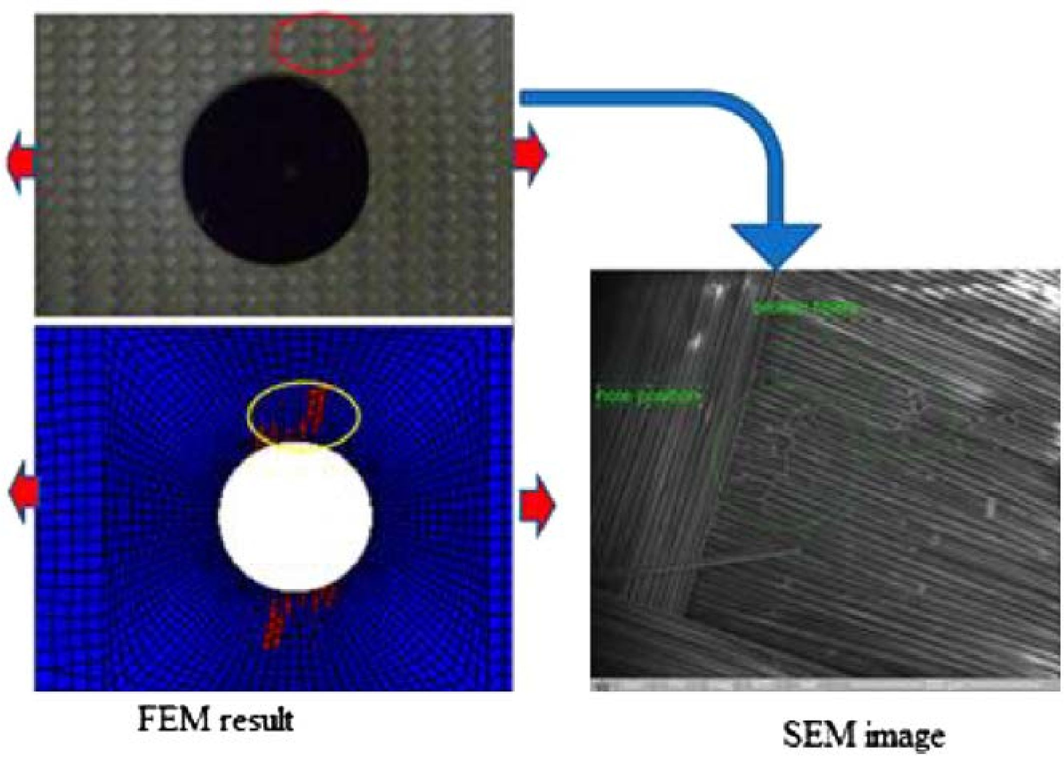
VLSJ Lab, Mechanical Engineering Department, Georgia Southern University

2. Advanced Lightweight and Tailorable Materials

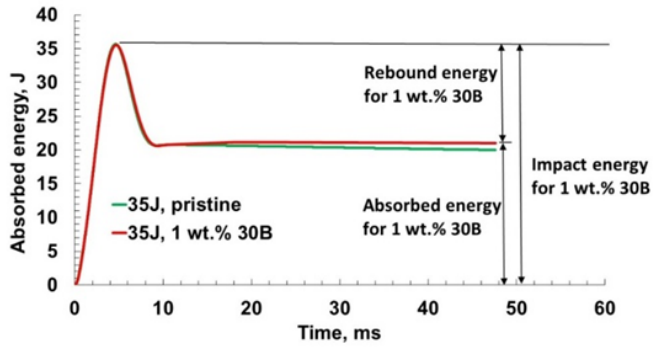
This research activity focusing on developing physical based modeling and simulation strategy for novel lightweight materials and the resulting structures. The novelty of the research activity is the implementing mechanism of novel lightweight materials(eg. Metallic alloys, foams, composites, and polymeric materials) and Tailored materials in vehicle and engineering applications based on multi- disciplinary approach: it covers material development and characterization, material performance optimization, materials interactions, interface design and perform parametric study to identify the factors that affect their performance. The research topic will give an indication of the performance of lightweight materials for vehicle and other engineering applications under different loading and environmental conditions: strain rate effect, impact, fatigue, and accelerating aging.



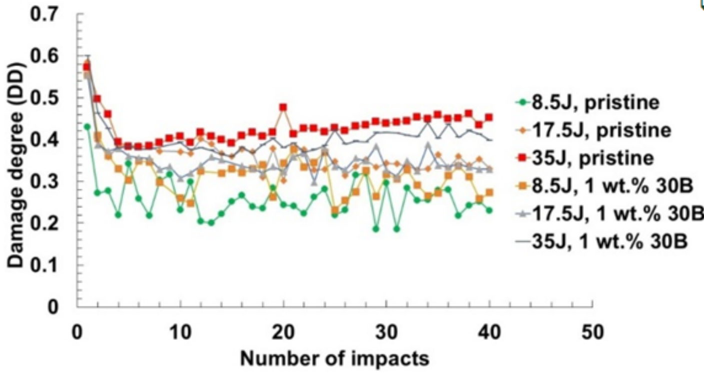
Laminate production:



Comparison of FEM and SEM results of angle-ply laminate subjected to 95% of average failure. [12]



$$DD = \begin{cases} \frac{E_a}{E_I} & up\ to\ penetration \\ \frac{E_a}{E_I} \equiv 1 & after\ penetration \end{cases}$$



Nanoclay-modified GFRP w.r.t. Pristine GFRP

- $\frac{E_a}{E_I}$ is higher for low energy impacts
- $\frac{E_a}{E_I}$ is lower for high energy impacts

Evaluation of progressive damage of nano-modified composite laminates under repeated impacts [2, conference]