Welcome , and thank you for taking the time to view my portfolio. The goal of this portfolio is to give you a deeper insight into my experiences and skills i have gained over my recent history

Research Summary: Experimental investigation of basalt reinforced polymer matrix composite with reinforced Sic particles.

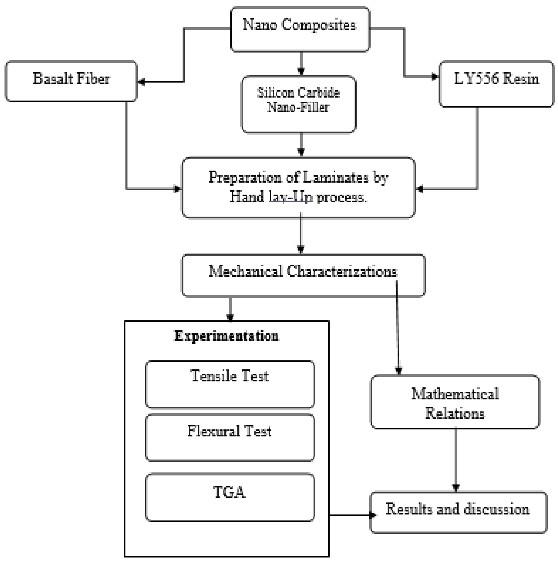
Composite Materials Overview:

Composite materials result from the combination of dissimilar materials to create specialized composites with enhanced properties such as mechanical strength, toughness, and electrical characteristics, not achievable with individual constituents.

Project Objectives:

This project focuses on assessing the impact of SiC particles on mechanical properties (tensile and flexural strength) and conducting Thermogravimetric analysis to measure composite weight loss at various temperatures.

METHODOLOGY



Methodology of problem

Methodology:

We prepared basalt fibre-reinforced polymer (BFRP) composites with an epoxy matrix, consisting of four layers of fiber, using a hand lay-up compression molding method.

Significance:

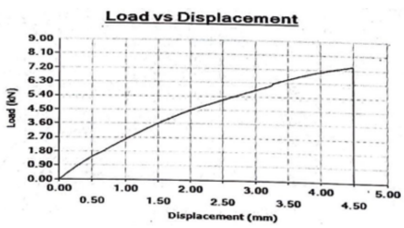
The outcomes of this study hold potential for industries seeking material replacements with improved characteristics to meet specific requirements and enhance overall performance.

Tensile Testing:

We conducted tensile tests on the composite samples using a universal testing machine (UTM) and plotted load-displacement curves. These curves were

Basalt with 0% SiC

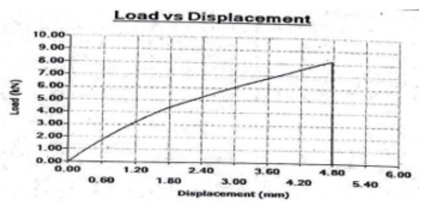
Specimen-1



generated directly from the machine for both basalt composites, one without silicon carbide filler and the other with silicon carbide filler. The outcomes reveal that the tensile strength of the composite with silicon carbide surpasses that of the composite without silicon carbide filler.

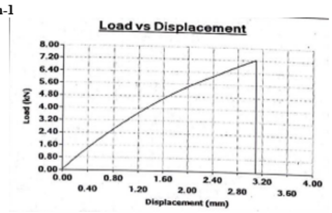
Basalt with 4%SiC

Specimen-1



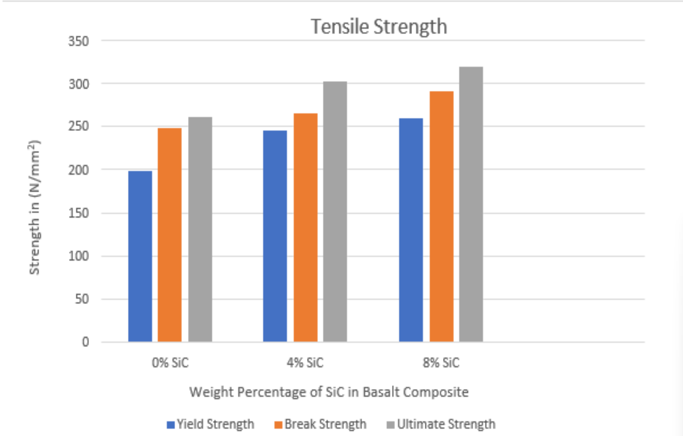
Basalt with 8%SiC

Specimen-1



Tensile Test Results:

	0%SiC	4%SiC	8% SiC
Tensile Strength at Yield (N/mm^2)	199.045	245.285	259.453
Ultimate Tensile Strength (N/mm^2)	260.68	302.11	318.61
Strength at Break (N/mm^2)	248.603	265.14	290.65
Modulus Of Elasticity (N/mm^2)	5232.72	6182.41	10630.53
Max. Displacement. (mm)	4.9	5.7	3.48



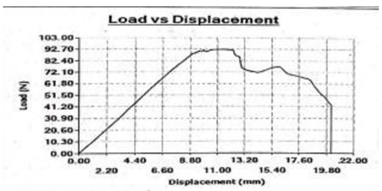
Flexural Testing:

In the flexural testing process, we utilized a universal testing machine (UTM) to assess the composite samples, from which we generated load-displacement curves. These curves were directly obtained from the machine for both basalt composites: one without silicon carbide filler and the other with silicon carbide filler. The test aimed to evaluate the flexural properties of various composite samples. Our findings indicate a notable increase in flexural strength as the percentage of silicon carbide in the composite rises.

Load Vs Displacement Graphs

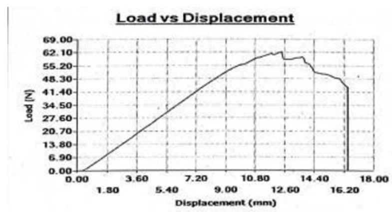
Basalt with 0%SiC

Specimen-1



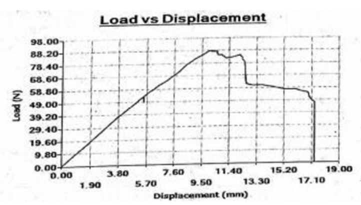
Basalt with 4%SiC

Specimen-1



Basalt with 8%SiC

Specimen-1

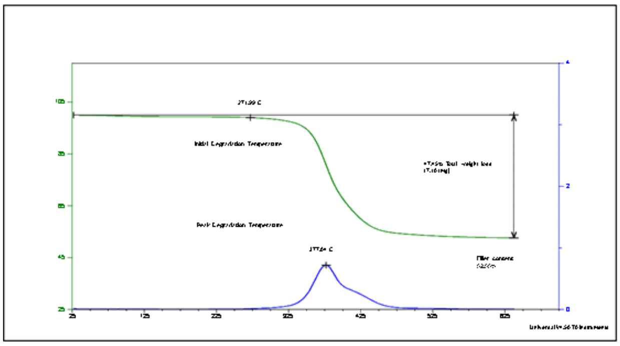


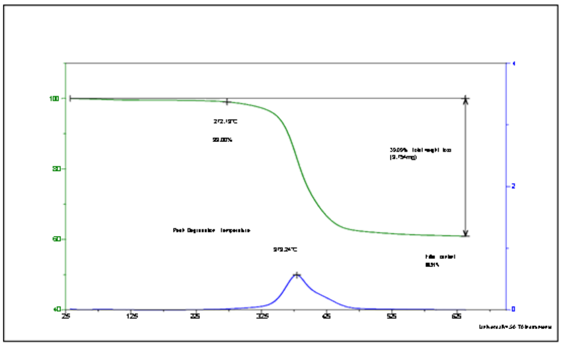
Flexural Test Results:

	0% SiC	4% SiC	8% SiC
Flexural Strength (N/mm^2)	202.947	225.153	240.277
Flexural Modulus (N/mm^2)	12420.253	14249.97	15503.707

THERMOGRAVIMETRIC ANALYSIS

In summary, the TGA analysis of Basalt fiber samples with varying SiC composite percentages revealed distinct decomposition profiles. The addition of SiC nano-fillers influenced the decomposition process, resulting in altered degradation temperatures and rates. These findings provide valuable insights into the thermal behavior of these composite materials under nitrogen atmosphere, highlighting their potential applications in high-temperature environments.





Conclusion:

- In our study of basalt fiber-reinforced epoxy resin composites, we explored tensile strength, flexural strength, and TGA characteristics.
-
- We observed that increasing the silicon carbide content enhanced both flexural modulus and strength. The composite with 8% silicon carbide exhibited notable flexural strength, reaching 240.27 MPa, likely due to effective void filling by SiC particles.
- The tensile strength was robust, measuring up to 318 N/mm² in some samples, but it decreased as silicon carbide content increased. This decrease is attributed to increased brittleness induced by higher SiC percentages.
- Thermogravimetric analysis revealed no decomposition up to 270°C in all specimens, and as SiC composition increased, weight loss decreased, primarily due to silicon carbide's thermal properties.
- These findings shed light on the performance of these composite materials, indicating their potential for various applications while highlighting the influence of silicon carbide on their mechanical and thermal properties.