Comparing Kevlar Fiber influence on PP/sisal/SiO_2 nanoparticle fillers/Kevlar hybrid nanocomposites with plain nanocomposite for enhanced mechanical properties

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Abstract

This study aims to evaluate how SiO_2 fiber additions affect the mechanical properties of hybrid nanocomposites composed of polypropylene (PP), sisal, and Kevlar fibers. Different concentrations of SiO_2 are integrated into these composites to systematically analyze their tensile, flexural, and impact strengths. Utilizing G-power calculations with 80% power and $\alpha = 0.05$ ensures robust statistical analysis, which indicates significant variations in mechanical properties across SiO_2 compositions ($p < 0.05$). The results reveal that higher SiO_2 fiber content significantly enhances the mechanical performance of the composites, suggesting potential applications in advanced materials engineering. This

study underscores the importance of SiO_2 in improving the mechanical properties of PP/sisal/Kevlar fiber hybrid nanocomposites.

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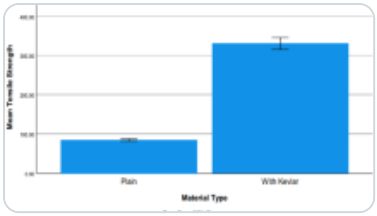

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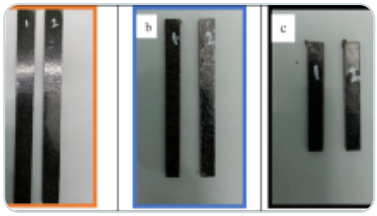

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Data availability

No datasets were generated or analysed during the current study.

Code availability

Not applicable.

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Contributions

T.S and R.S. contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

S.J.A. and A.P. wrote the paper with input from all authors.

J.G. Analyse the results.

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Ethics declarations

Ethics approval

Not applicable.

Consent to participate

Not applicable.

Consent to publication

Not applicable.

Competing interests

The authors declare no competing interests.

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