Comprehensive insights on mechanical properties of natural-synthetic fibres with nano-graphene composite

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Interactions

Aims and scope

Submit manuscript

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Abstract

The primary purpose of this research was to look into the effect of silane treatment on the tensile and impact strength of composites constructed from Jute/kenaf/glass fibers with Nano-graphene filler. The research wanted to know how critical parameters in the treatment process, including silane concentration, immersion duration, and Nano-filler, may affect the composite characteristics. They used Response Surface Methodology (RSM) with Central Composite Designs (CCD) to perform their trials and enhance these aspects. The researchers built quadratic models that accurately predicted the tensile and impact strength of the Nano-composite during the Silane treatment. The researchers determined the best conditions for obtaining maximum tensile strength by varying silane concentration, immersion duration, and Nano-filler. The best ranges for silane

concentration and immersion duration were determined to be 15% wt. and 30 min, respectively. The impact strength of the composite increased by 36.20% under these conditions, while the use of 15% silane treatment for 30 min resulted in a 19.22% enhancement in tensile strength compared to the smallest values obtained by RSM optimization. These findings highlight the practical importance of Silane treatment, notably in increasing tensile and impact strength and strengthening the interfacial adhesive characteristics of natural fibres and polymer matrices.

Data availability

No datasets were generated or analysed during the current study.

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Contributions

S.J.A. 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. T.S. and A.P. wrote the paper

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Ethics declarations

Ethical approval

Not applicable.

Consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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