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# Significance of Hemp Fiber on Mechanical and Thermal Performance of Polypropylene Nanocomposite Developed by Compression Mould Technique

SPECIAL ISSUE MANUSCRIPT Published: 22 March 2024

(2024) [Cite this article](#)

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## Abstract

The growth of green polycomposite is tolerated in different kinds of engineering applications and preserves specific qualities. This investigation is to synthesize the polymer-based composites adopted with polypropylene (PP) lamina as prime matrix, combined with NaOH-treated natural hemp fiber considered as reinforcement. This composite was prepared through the compression molding process, and the natural hemp fiber (HF) interacted with a 7% sodium hydroxide (NaOH) solution to enrich the adhesive quality and limit the absorption behavior, which is adopted with polypropylene matrix

with the applied compressive force of 100 psi. Finally, the synthesized polypropylene composite is accomplished with 0, 5, 10, 15, and 20wt% of chemically processed hemp fiber. The American Society for Testing and Materials measures its tensile, impact strength, and thermal performance. Amid the various compositions, the 20wt% NaOH-treated hemp fiber has excellent tensile strength, impact strength, and thermal stability. It is comparable to polypropylene composite without natural fiber exposed by 41 MPa and 15 kJ/m<sup>2</sup> of tensile and impact strength. It owns enriched thermal stability and low thermo-gravimetric loss of 145 °C and 3%, respectively.

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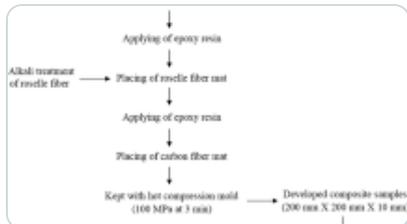
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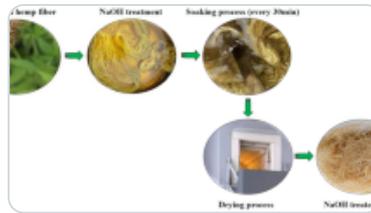
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## Data availability

All the data required are available within the manuscript.

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## Funding

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The authors did not receive support from any organization for the submitted work. No funding was received to assist with the preparation of this manuscript. No funding was received for conducting this study. No funds, grants, or other support were received.

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## Ethics declarations

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## Conflict of interest

The authors have no relevant financial or non-financial interests to disclose. The authors have no competing interests to declare relevant to this article's content. All authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript. The authors have no financial or proprietary interests in any material discussed in this article.

## Ethical approval

This is an observational study. Significance of hemp fiber on mechanical and thermal performance of polypropylene nanocomposite developed by compression mold technique: Research Ethics Committee has confirmed that no ethical approval is required.

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### Cite this article

Venkatesh, R., Devanathan, C., Dillikannan, D. *et al.* Significance of Hemp Fiber on Mechanical and Thermal Performance of Polypropylene Nanocomposite Developed by

Compression Mould Technique. *J. Inst. Eng. India Ser. D* (2024).

<https://doi.org/10.1007/s40033-024-00687-8>

Received

03 February 2024

Accepted

27 February 2024

Published

22 March 2024

DOI

<https://doi.org/10.1007/s40033-024-00687-8>

## Keywords

[Compression mold](#)

[Hemp fiber](#)

[NaOH treatment](#)

[Polypropylene](#)

[Properties](#)