Review of: "Investigation of Mechanical Properties of Sisal Fiber and Sugar Palm Fiber Reinforced Hybrid Composites"

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Potential competing interests: No potential competing interests to declare.

The manuscript presents a significant contribution to the field of composite materials, especially in the utilization of natural fibers like sisal and sugar palm for sporting goods applications. However, a major revision is needed to address several critical aspects. Firstly, it is essential to delve deeper into the fiber-matrix interface characterization, as this greatly influences the composite's mechanical properties under dynamic conditions. The rationale behind the chosen fiber proportions and orientations needs to be clarified, with a stronger focus on optimizing these factors for enhanced performance. Environmental durability studies, including the effects of UV, moisture, and thermal exposures, are crucial for understanding the long-term applicability of these materials. A detailed cost-benefit analysis comparing these composites to traditional materials, considering not only economic but also environmental impacts, would greatly enrich the study. Additionally, exploring the efficacy of different surface treatments and their effects on fiber-matrix adhesion, assessing the anisotropy of mechanical properties, and understanding the impact of water absorption on durability are important. The manuscript would benefit from a discussion on the recyclability and end-of-life options of these composites, scalability of production processes, and their machinability. Lastly, providing real-world application data, including comparative performance in sporting goods, will significantly strengthen the manuscript by demonstrating the practical value and potential of these hybrid composites.

Comments:

1. How does the interface between the fiber and matrix affect the mechanical properties of the composite, especially under dynamic loading conditions such as impacts or vibrations?
2. How does the orientation of fibers within the composite material influence its overall mechanical performance, particularly in terms of tensile, compressive, and impact strengths?
3. Can authors detail the environmental aging studies performed on these composites, especially regarding UV, moisture, and thermal exposures, and their effects on mechanical properties over time?
4. What was the rationale behind choosing the specific proportions of sisal and sugar palm fibers in the hybrid composites, and how do these proportions optimize the composite properties?
5. How do different fiber orientations and hybrid compositions influence the predominant failure modes (e.g., fiber pull-out, matrix cracking) under various loading conditions?
6. Can authors provide a comprehensive cost-benefit analysis comparing these natural fiber composites to traditional and other biocomposite materials, considering not only material and production costs but also performance and

environmental impact?

7. How effective are the NaOH treatments in enhancing the fiber-matrix adhesion, and are there alternative treatments that could offer improved or additional benefits?
8. Given the anisotropic nature of fiber-reinforced composites, how do the directional properties vary with fiber orientation and composition, and what implications does this have for design and application?
9. How does water absorption affect the long-term mechanical properties and durability of these composites, and what measures can be taken to mitigate these effects?
10. How do the thermal properties of the hybrid composites change with varying fiber compositions, and what implications does this have for applications in varying temperature environments?
11. What options are available for recycling or responsibly disposing of these composites at the end of their lifecycle, and how does this compare to synthetic fiber composites?
12. How scalable are the manufacturing processes for these hybrid composites, especially in terms of maintaining consistent quality and properties on an industrial scale?
13. How does the inclusion of natural fibers affect the machinability of these composites, and what techniques are recommended for cutting, shaping, and finishing these materials?
14. Can authors provide data or case studies on the performance of these hybrid composites in actual sporting goods applications, particularly in terms of impact resistance, durability, and player safety?