

Prediction and Prevention of Interlaminar Fracture and Cracks in Nanofiller Reinforced Jute-Kevlar Hybrid Nanocomposite

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Overview: In most aerospace, automotive and marine applications, the use of synthetic fibers like carbon, kevlar, and glass were commonly noticed, which leads to the high cost and non-biodegradability of the composite. The basic objective of the work is to reduce the cost and to make the composite eco-friendly by replacing few high-cost synthetic fibers (Kevlar) with low-cost natural fiber (Jute) in the composite.

Processing and development of fumed silica nanofiller reinforced Jute-Kevlar hybrid nanocomposite.

Investigation of Mode I and Mode II interlaminar fracture behaviour of the prepared hybrid nanocomposite.

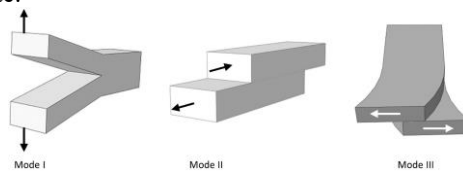


Figure 1. Modes of failure

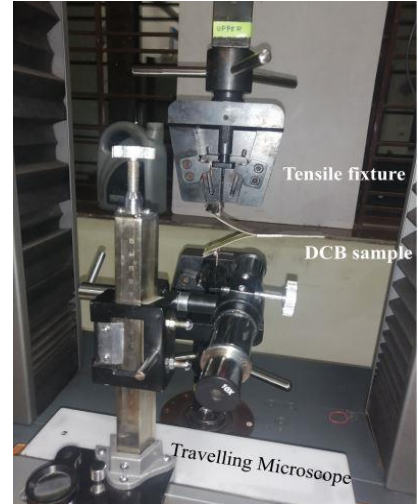


Figure 2. DCB specimen mounting on tensile fixture

Experimental set-up and results

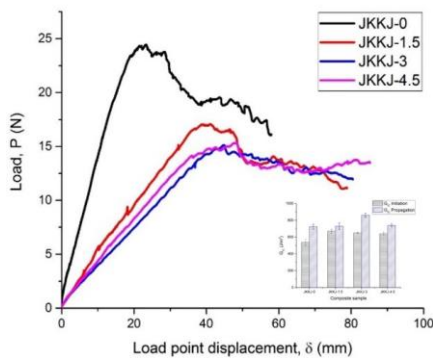


Figure 3. P vs. δ plot

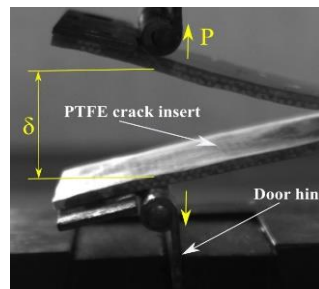


Figure 4. Loading of DCB specimen

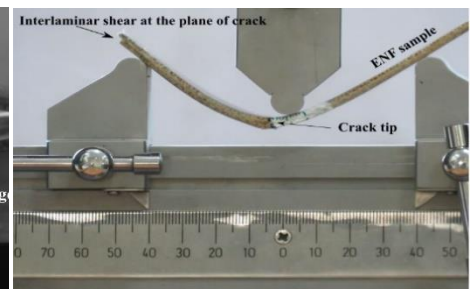


Figure 5. Mode II fracture of ENF specimen

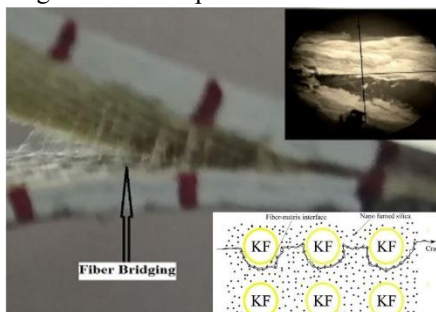


Figure 6. Fiber bridging and crack propagation in nanofiller modified composite

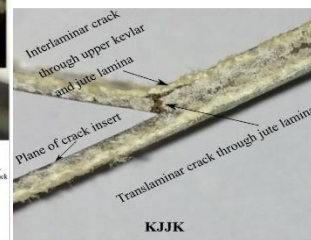


Figure 7. Interlaminar crack followed by translaminar crack

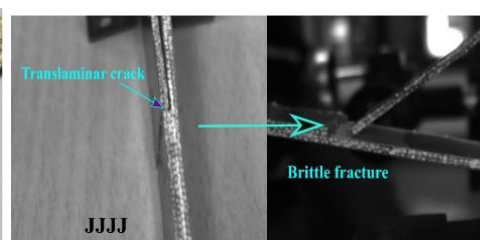


Figure 8. Translaminar crack

References

- Maharana, Sunil Manohar, Arun Kumar Pradhan, and Mihir Kumar Pandit. "Performance Evaluation of Mechanical Properties of Nanofiller Reinforced Jute-Kevlar Hybrid Composite." *Journal of Natural Fibers* (2020): 1-15.
- Maharana, Sunil Manohar, Mihir Kumar Pandit, and Arun Kumar Pradhan. "Influence of fumed silica nanofiller and stacking sequence on interlaminar fracture behaviour of bidirectional jute-kevlar hybrid nanocomposite." *Polymer Testing* 93 (2021): 106898.