

Preparation and characterization of natural silk fiber-reinforced polypropylene and synthetic E-glass fiber-reinforced polypropylene composites: a comparative study

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ABSTRACT

Bombyx mori silk fiber-reinforced polypropylene (PP) matrix and E-glass fiber-reinforced PP matrix composites were fabricated using compression molding. The prepared silk/PP composite tensile strength (TS), bending strength (BS), and impact strength (IS) were 55.1 MPa, 56.3 MPa, and 17 kJ/m², respectively. E-glass fiber-reinforced PP matrix composites were fabricated in the same way and TS, BS, and IS values of these composites were 128.7 MPa, 141.6 MPa, and 19 kJ/m², respectively. Environmental degradation of the composites showed that silk/PP composites degrade faster. Other degradation studies like thermal aging and soil degradation tests also gave similar result.

KEYWORDS:

silk fiber; E-glass fibers; polypropylene; composites

REFERENCES

1. Li, Y., Mai, Y.-W., Ye, L. Sisal fibre and its composites: A review of recent developments (2000) *Composites Science and Technology*, 60 (11), pp. 2037-2055. Cited 757 times.
2. Hill, C.A.S., Abdul Khalil, H.P.S. Effect of fiber treatments on mechanical properties of coir or oil palm fiber reinforced polyester composites (2000) *Journal of Applied Polymer Science*, 78 (9), pp. 1685-1697.
3. Rajulu, A.V., Babu Rao, G., Devi, L.G. Tensile properties of natural fabric hildegardia populifolia/polycarbonate toughened epoxy composites (2004) *Polymer Composites*, 25 (6), pp. 563-568.
4. Rodríguez, E., Petrucci, R., Puglia, D., Kenny, J.M., Vázquez, A. Characterization of composites based on natural and glass fibers obtained by vacuum infusion (2005) *Journal of Composite Materials*, 39 (3), pp. 265-282.
5. Han, S.O., Lee, S.M., Park, W.H., Cho, D. Mechanical and thermal properties of waste silk fiber-reinforced poly(butylene succinate) biocomposites (2006) *Journal of Applied Polymer Science*, 100 (6), pp. 4972-4980.