

# Chapter 4

## Effect of Bamboo Hybridization and Staking Sequence on Mechanical Behavior of Bamboo–Glass Hybrid Composite

**Piyush P. Gohil**

*The M. S. University of Baroda, India*

**Vijaykumar Chaudhary**

*CHARUSAT, India*

**Kundan Patel**

*CHARUSAT, India*

**Ronak Ramjiyani**

*CHARUSAT, India*

### **ABSTRACT**

*The advancement of polymer composites containing natural fibers as a manageable option material for certain designing applications, especially aviation and car applications, is a well-known area of investigation. Nevertheless, the high mechanical properties connected with synthetic fibers they are awesome and lavish contrasted with natural fibers. The utilization of natural plant fibers and mixes of natural and synthetic fibers for making ease building materials has produced much interest recently. In the present work, bamboo–glass hybrid polyester composites were produced and their mechanical properties like elasticity and flexural quality were assessed for different weight fraction and distinctive stacking sequence. The outcomes observed that bamboo–glass mixture composites offered the benefits of both natural and synthetic fibers. It is also observed that hybridization started a material with general intermediate properties between pure glass and pure bamboo. However, the significance of controlling the stacking grouping to upgrade properties was evident.*

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## **INTRODUCTION**

A composite material is made by joining two or more materials to give a special blend of properties, one of which is comprised of solid, long fibers and the other, a binder or “matrix” which holds the fibers set up. Composites help us to accomplish the coveted properties by consolidating distinctive materials in a reasonable manner. When all is said in done they have high specific strength and high specific modulus which makes them valuable in different modern applications including such attributes (Callister Jr, W.D. 2006).

Composites are extensively named Synthetic fiber reinforced composites and natural fiber reinforced composites. Synthetic fiber reinforced composites have applications in different zones because of their positive properties when contrasted and the ordinary materials; also they can be uniquely designed according to the necessities of the buyer (Nunna, S. et al. 2012). It was observed that materials made of renewable assets like natural fibers inserted in a polymer network called biopolymers give us great different options for synthetic fiber composites.

In late decades, the utilization of natural fibers as an option reinforcement material in polymer composites has pulled in the consideration of numerous analysts and researchers because of the unmistakable points of interest of these materials. Natural fibers which have favorable circumstances of being prudent to fabricate, eco-accommodating, innocuous to wellbeing, lightweight, high firmness and particular quality give a conceivable distinct option for the synthetic fibers (Athijayamani, Aet al. 2010; Ku, Het al. 2011; Malkapuram, Ret al. 2008). The sorts of natural fibers that have been concentrated on incorporate flax, hemp, jute, sisal, kenaf, coir, kapok and henequen. Natural fibers offer different favorable circumstances over man-made glass and carbon fibers, including ease and low thickness; moreover, natural fibers display particular ductile properties tantamount to those of glass fibers, are non-abrasive toward gear, are non-aggravating to the skin, show low vitality utilization, represent a low wellbeing hazard, and are renewable, recyclable and biodegradable. These composite materials are suitable for applications in the aviation, relaxation, development, games, bundling and car businesses, especially the last. The utilization of natural fiber composites has as of late experienced huge development in the car business because of the benefits of renewability, diminished outflow of toxins and enhanced fuel proficiency as a result of the light weight of the segments. In spite of their good properties, natural fibers have disservices, for example, an absence of warm solidness, quality corruption, water ingestion and poor effect properties. Attributable to the unfriendly impacts of composite materials on the earth, their high cost and other unfavorable properties, specialists have started to investigate natural fiber-based hybrid composites. Hybrid composites, which are gotten by joining synthetic and natural fibers, have been created to defeat the previously stated defi-

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