

Abstract

Manufacturing Hybrid Jute/Glass Fiber Laminates by Leveraging Prepreg Resin Bleed [†]

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There is a growing shift toward a circular economy, aiming to maximize recycling, minimize waste streams, and favor renewable over fossil-based materials. In this context, the composites industry—particularly in sectors such as automotive, marine, and aeronautics, where composition control is critical to mechanical performance and structural integrity—relies on semi-products with tightly controlled material properties.

Most thermoset-based prepreps used in these sectors show minimal variation in resin content. However, some commercial prepreps exhibit significant resin bleed during curing under heat and pressure (e.g., in an autoclave or hot press).

This work explores the manufacture of a hybrid jute/glass-fiber laminate using a commercial glass-fiber prepreg and plain-weave jute fabric, with no additional resin, thereby maximizing resin utilization and minimizing waste. By leveraging resin bleed and strategic lamina placement, the goal is to achieve effective impregnation of the jute layers.

The composition of the resulting laminate was evaluated using a modified calcination method. Physical and mechanical properties—including density, tensile, and flexural behavior—were estimated via micromechanics and classical laminate theory and compared with experimental results.

Further characterization included Charpy impact strength and Mode I interlaminar fracture toughness via double-cantilever beam (DCB) testing. These results establish baseline values for comparison in future developments of this research.

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