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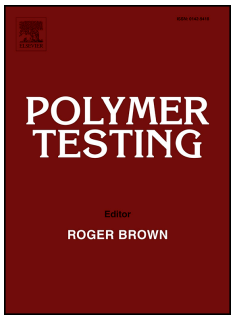

Tunable effect of polyvinyl butyral nanofiber veil on fracture toughness of glass reinforced phenolic composites manufactured with out of autoclave method

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ACCEPTED MANUSCRIPT

Tunable effect of polyvinyl butyral nanofiber veil on fracture toughness of glass reinforced phenolic composites manufactured with out of autoclave method

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Abstract

This study proves the ability of polyvinyl butyral (PVB) nanofiber to improve the mode I and mode II interlaminar fracture toughness of out of autoclave phenolic-based composites. For investigation fracture behavior of glass-phenolic composites, a mode-I and mode II fracture test were carried out standard UD laminated and nanoweb interleaved specimens. PVB nanoweb with 25µm thickness was placed in the laminate mid-planes which was subsequently subjected to a double cantilever beam and end-notched flexure tests. It was found that PVB nanofiber thanks to its excellent adhesion property with phenolic resin and unique features of nanoscales, has a tunable effect on improving mode I and mode II interlayer fracture toughness. PVB nanoweb provided the best all-round performance with fracture toughness improvements of 61 % and 34.5 % mode I and mode II, respectively; while, the maximum bending load has been improved.

Keywords: A. Nanofiber, B. Laminates, C. Fracture toughness, D. Mechanical testing

1. Introduction

Promising application areas for phenolic-based composites are being rapidly developed as a result of phenolic resin resistance to ignition, low smoke generation, high-temperature resistance

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