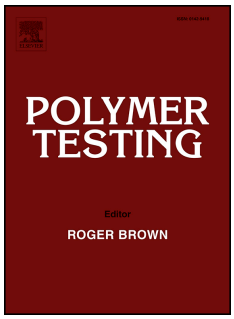
Accepted Manuscript



Assessment of the thermomechanical performance of continuous glass fiber-reinforced thermoplastic laminates

M. Nikforooz, J. Montesano, M. Golzar, M.M. Shokrieh

PII: S0142-9418(18)30029-1

DOI: 10.1016/j.polymertesting.2018.02.023

Reference: POTE 5347

To appear in: *Polymer Testing*

Received Date: 7 January 2018

Accepted Date: 20 February 2018

Please cite this article as: M. Nikforooz, J. Montesano, M. Golzar, M.M. Shokrieh, Assessment of the thermomechanical performance of continuous glass fiber-reinforced thermoplastic laminates, *Polymer Testing* (2018), doi: 10.1016/j.polymertesting.2018.02.023.

Material Properties

Assessment of the thermomechanical performance of continuous glass fiber-reinforced thermoplastic laminates

Nikforooz, M[1] , Montesano, J[3], Golzar, M[1*], Shokrieh, MM[2],

[1] Department of Mechanical Engineering, Tarbiat Modares University, Jalaale-al Ahmad Ave., P.O. Box 14115-143, Tehran, Iran
[2] Composite Research Laboratory, Center of Excellence in Experimental Solid Mechanics and Dynamics, School of Mechanical Engineering, Iran University of Science and Technology (IUST), Narmak, 16846-13114 Tehran, Iran
[3] Department of Mechanical & Mechatronics Engineering, University of Waterloo, 200 University Ave. West, Waterloo, Canada N2L3G1
* Corresponding author (m.golzar@modares.ac.ir; Tel. +98-21-82884320)

Abstract

The effects of temperature on the static tensile behavior of continuous E-glass/polyamide laminates were studied in order to assess the feasibility of using the material system for structural applications. Uniaxial tensile tests were conducted on $[0]_8$, $[90]_8$, $[0_2/90_2]_s$ and $[0_4/90_4]_s$ laminates at multiple temperatures above and below the glass transition temperature, which was measured using different methods. Optical and scanning electron microscopy were performed on the tested samples, and the effects of temperature on failure modes were investigated. The $[0]_8$ and $[90]_8$ laminates displayed three reduction stages in modulus versus temperature, where the largest reduction was in the glass transition region as a result of notable softening of the polyamide matrix, as confirmed by fractographic analysis. However, the $[0_2/90_2]_s$ and $[0_4/90_4]_s$ laminates displayed the largest modulus reduction prior to the glass transition temperature with little reduction beyond, which was attributed to matrix softening coupled with in situ ply constraining effects.

Keywords: (Thermomechanical behavior; Continuous glass/polyamide; Fractography; Mechanical properties)