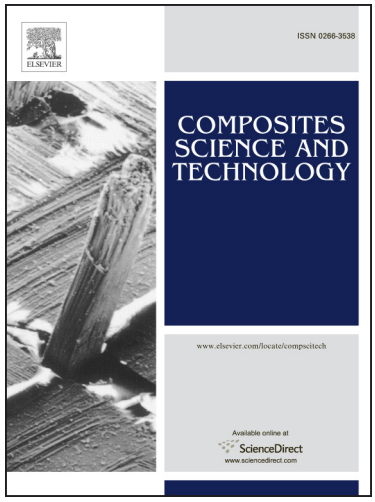

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Effect of Surface Silanization of Carbon Fiber on Mechanical Properties of Carbon Fiber Reinforced Polyurethane Composites

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Abstract

A combined process for surface silanization of carbon fibers (CFs) was developed to improve the interfacial adhesion of carbon fiber reinforced polyurethane (PU) composites. The effect of each step of surface modification on the properties of CFs and the resulting CF/PU composites was investigated systematically. The change of surface composition of CFs was investigated by X-ray photoelectron spectroscopy. The morphologies of modified-CFs as well as the fracture surfaces of CF/PU composites were characterized by scanning electron microscopy. Silane molecules were grafted successfully on the surface of CFs as a uniform polysiloxane coating, which improved the tensile strength of CFs by 12.4%, the interfacial shear strength between CFs and PU by 47.88%, and the tensile strength of the resulting CF/PU composites by 18.3%.

Keywords: A. Carbon fibres; A. Coupling agents; A. Polymer-matrix composites (PMCs); B. Interfacial strength; B. Mechanical properties

1. Introduction

The study of polyurethane (PU) is one of the most rapidly developing branches in the field of polymer technology due to its significant industrial importance and wide range of applications, such as adhesives, coatings, foams, resins, and elastomers [1, 2].

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