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Effect of alkali treatment on Alfa fibre as reinforcement for polypropylene based eco-composites: mechanical behaviour and water ageing

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Abstract

This paper aims at investigating the effect of alkali treatment and water ageing on several short Alfa fibre reinforced polypropylene composites. For this purpose, different composites with untreated and treated fibres were elaborated by extrusion and injection moulding processes and subjected to water ageing. The obtained results showed that the alkali treatment enhances significantly the Young's modulus and tensile strength of the Alfa fibre reinforced polypropylene composites and reduces their loss during water ageing. The acoustic emission analysis showed that the use of alkali treatment plays a major role in the improvement of the fibre-matrix interface of both unaged and aged composites.

Keywords: Natural fibre composite; Alfa fibre; Alkali treatment; Mechanical properties; Water ageing; Acoustic emission.

1. Introduction

For over a decade, the interest in using natural fibres as a reinforcement in polymer composite materials has increased for both environmental and economical reasons. In fact, natural fibres are cheaper and have shown many efficient properties such as biodegradability, renewability and low density [1, 2]. Natural fibres used as reinforcement of composite materials, also constitute an interesting alternative to glass fibres because of their easy-processing as well as their competitiveness in mechanical and dynamical properties [3-8].

However, natural fibres present some disadvantages, such as the variable quality of the fibre according to its origin, their water sensitivity, the adhesion between fibre and matrix which requires appropriate use of physical and chemical treatments. In addition

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