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Rachasit Jeencham, Nitinat Suppakarn, Kasama Jarukumjorn

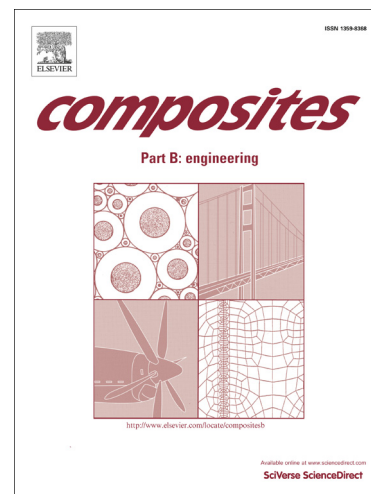
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**Effect of Flame Retardants on Flame Retardant, Mechanical, and Thermal Properties of Sisal
Fiber/Polypropylene Composites**

Rachasit Jeenchan , Nitinat Suppakarn, Kasama Jarukumjorn*

School of Polymer Engineering, Institute of Engineering, Suranaree University of Technology,

Nakhon Ratchasima 30000, Thailand

Tel.: +6644224437; Fax: +6644224605. E-mail address: kasama@sut.ac.th

Abstract

A flame retardant efficiency of flame retardants; ammonium polyphosphate (APP), magnesium hydroxide ($Mg(OH)_2$), zinc borate (Zb), and combination of APP with $Mg(OH)_2$ and Zb in sisal fiber/polypropylene (PP) composites was investigated using a horizontal burning test and a vertical burning test. In addition, maleic anhydride grafted polypropylene (MAPP) was used as a compatibilizer to enhance the compatibility in the system; i.e. PP-fiber and PP-flame retardants. Thermal, mechanical, and morphological properties of the PP composites were also studied. Adding the flame retardants resulted in improved flame retardancy and thermal stability of the PP composites without deterioration of their mechanical properties. APP and combination of APP with Zb effectively enhanced flame retardancy of the PP composites. No synergistic effect was observed when APP was used in combination with $Mg(OH)_2$. SEM micrographs of PP composites revealed good distribution of flame retardants in PP matrix and good adhesion between sisal fiber and PP matrix.

Keywords: A. polymer-matrix composites, B. thermal properties; B. mechanical properties; flame retardants

1. Introduction

Natural fiber reinforced polymer composites (NFCs) have received much interest in terms of their industrial applications due to environmental and economical concerns. The advantages of natural fibers are light weight, high specific strength, low cost, biodegradability, and absence of toxic by products [1-4]. Among various polymer matrices, polypropylene (PP) has been widely used to produce NFCs because of its low density, low cost, high water resistance, chemical resistance, and ease of processing.

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