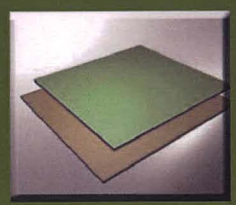
ADVANCES IN COMPOSITE MATERIALS



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IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Iskandar Idris Yaacob, Md Abdul Maleque & Zahurin Halim: Advances in Composite Materials.

ISBN: 978-967-418-231-1

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

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Chapter 020

The Effects of Chemical and Mechanical Treatments on Coir Fiber to Mechanical Properties of Coir-Albumen – Concrete

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Keywords: Coir fiber, chemical treatments, mechanical treatments, environmental friendly.
Abstract: Recently, natural fibers have created a center of attention to be incorporated in concrete medium. A number of researchers have been performed to investigate the significant of incorporating natural fibers including coir fibers in concrete. Surface modification on coir fibers such as alkaline treatment, acid treatment and ball mill treatment are made in view of their use as reinforcement in the concrete medium. Besides, it is believed that, utilization of egg albumen in this project as a binder can improve the adhesion between fiber and matrix. Among all modifications, the alkaline treated fiber concrete shows better property compared to acid and ball mill treated fiber concrete. In this chapter, the effects of chemical and mechanical treatments on coir fiber to coir-albumen concrete are investigated in terms of its physical and mechanical properties.

Introduction

Natural fibers are widely used in producing biocomposite due to the composition of cellulose, hemicellulose and lignin [1]. Among the numerous natural fibers, coir fiber has shown a great potential in the composite field [2]. Coir has also been investigated as reinforcement in different composite [3]. Coir is a versatile, renewable, cheap, and biodegradable lignocellulosic fiber obtained from coconut trees which grow abundantly in tropical countries such as India, Philippines, Sri Lanka, Malaysia and Thailand [4]. It can be used for making a wide variety of products [5]. Coir fibers are available in lengths of 125-300mm.The cross section of the fibers is nearly circular with diameter ranging from 200-250 μm [6]. They are pale when immature but later become hardened and yellowed due to deposition of lignin on their walls. The chemical constituents of coir fibers are included in Table 1. Due to the hardwearing quality, durability and other advantages, coir is used for making a wide variety of floor-furnishing materials, yarn, rope, etc. [7]. Coir was selected to fabricate composites to substitute wood and other materials due to its biodegradable character since it is reported that it would be decomposed in 20–30 years in the nature, thus it can be claimed as an environmentally friendly material [8].

Table 20.1: Percentage Composition of Chemical Constituents in Coir Fiber [9]

Chemical Constituents	Percentage Composition (wt %)
Cellulose	36-43
Hemicellulose	41-45
Lignin	0.15-0.25
Pectin	3-4
Wax	-