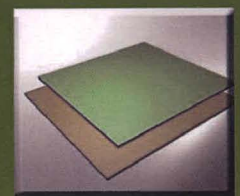


ADVANCES IN COMPOSITE MATERIALS



Iskandar Idris Yaacob
Md Abdul Maleque
Zahurin Halim



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Mechanical Behaviour of Biopolymer Cotton Albumen Clay (BCAC) Composites

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Keywords: Concrete, composite, albumen, empty fruit bunch, fibre.

Abstract: This study concerns on fabricating of composites cotton reinforced egg albumen mixed with clay particles used as filler. Two types of clay particles were used in this research which is montmorillonite and ball clay. Composites were prepared by dispersing clay into albumen matrix with various weight percentages varying from 0 wt% to 10 wt%, prior to the wetting of cotton layers through hands lay-up technique. Mechanical, thermal and morphology study of composites were performed by using fracture test, tensile test and Scanning electron Microscopy (SEM) respectively. A significant increase has been observed in the mechanical properties such as tensile strength and impact strength with the addition of the clay particles.

Introduction

The developments of the biodegradable composite have inspired wide ranging research and polymer/clay composites is one of the latest revolutionary steps of the composite technology. These biocomposites which composed of plant fibers and biodegradable polymers have become very attractive materials; natural fibers such as cotton were in fact use as thermoplastic reinforcement [1]. Preparations of blends or composites using inorganic or natural fibers are among the routes to improve some of the properties of biodegradable composite. Nano-clay is normally added as filler to improve the properties of the composite.

Clay minerals are aluminum silicates of a layered type classified as phyllosilicates. Montmorillonite is among the most commonly used layered silicates because it is environmentally friendly and readily available in large quantities with relatively low cost. Montmorillonite crystal lattice consists of 1 nm thin layers with an octahedral alumina sheet sandwiched between two tetrahedral silica sheets. The aspect ratio is about 100. The stacking of the platelets leads to a Van der Waals gap or gallery between the layers. The layers are negatively charged and this charge is balanced by alkali cations such as Na⁺, Li⁺ or Ca²⁺ in the gallery between the aluminosilicate layers [2]. The improvement in the albumen composite properties obtained when the clay is exfoliated and the major problem in preparing these composites is to separate the layers of the clay because they are initially agglomerated. The aim of this work is to study the mechanical properties of the cotton albumen incorporated with clay with different percentages [3].