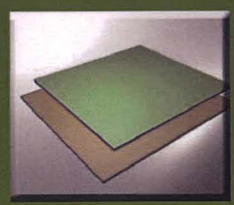
ADVANCES IN COMPOSITE MATERIALS



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Chapter 032

Investigation on the Effect of Water Immersion on Cotton Albumen Composite

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Keywords: Natural fiber; composite; water immersion; cotton; albumen; biodegradable.

Abstract: This chapter investigated the effect of water immersion on cotton albumen composite (CAC). The cotton albumen composites were fabricated by hands lay-up technique with 10 w w % of fiber content and cured for 14 days at room temperature. The samples were then immersed in water bath at room temperature from half an hour up to 7 hours. The decreasing of tensile and impact strength were observed for all samples that being immersed in water even after half an hour of water immersion. Increasing in moisture content caused by the formation of hydrogen bonding between the water molecules and cellulose fiber. This leads to dimensional variation of composites products and poor interfacial bonding between the fiber and matrix, causes a decrease in the mechanical properties.

Introduction

Currently, natural fiber reinforced biopolymers have been successfully used in engineering application as replacement for synthetic fiber. Natural fibers which are abundantly available in agricultural industries are widely used in current technologies because of their several advantages such as high strength structure, lightweight, low density, low price and easily decomposed. Both fiber and matrix are from natural resources which are renewable resources that contribute to development of sustainable technology. It also helps to reduce depleting of petroleum resource and controlling pollution due to biodegradable characteristic.

In this chapter, albumen is used as the matrix which is a protein based biomaterial. The degradation of protein based biomaterials has been proved to be among the fastest in degradation rate which can be completely decomposed after 50 days when buried in farmland soil [1]. A wide variety of proteins have been produced at huge scale for instance, wheat gluten, soy and pea proteins from vegetables resources; egg albumen, fish myofibrillars and wool keratin proteins from animal resources [2].

Cotton used in this research is a type of lignocellulosic fibers. In some researches, these lignocellulosic fibers have been used as reinforcement in polymer matrix as well as with other synthetic fibers in hybrid conditions in some researches [3]. Cotton swells in a high humidity environment, in water and in concentrated solutions of certain acids, salts and bases. The swelling effect is usually attributed to the sorption of highly hydrated ions. The moisture regain for cotton is about 7.1~8.5% and the moisture absorption is 7~8% [4]. However, it is