

ABSTRACT

Natural fiber have been developed as composite reinforcing materials, because they are relatively inexpensive and have high strength. The development of natural fiber composites increases every year. Research on natural fiber composites for biomedical applications has been carried out both at home and abroad. The research conducted focuses more on the composite feasibility of the human body. One type of natural fiber that has the potential for biomedicine is abaca fiber which is a type of plant that has high cellulose content.

In this study, abaca fiber was modified by alkali using 6% NaOH with variation without alkali, alkali time for 4 hours, 12 hours, and 36 hours. The ratio of abaca fiber volume fraction to the matrix is 20%: 80%. Fabrication of abaca/carbon/PMMA hybrid composite is done in one layer, using a cold press machine, pressure of 2.18 MPa, for 60 minute. Mechanical testing is carried out by tensile testing of specimen according to ASTM D638-01 standards. Abaca/carbon/PMMA hybrid composite faults were characterization using SEM which was support by macro optic, to determine the correlation of changes in composite fault structure.

The tensile test results show that the abaca/carbon/PMMA hybrid composite increases with the duration of the abaca fiber alkali time. In variation without alkali the tensile strength value is 73.03 MPa, and the modulus of elasticity is 5.27 GPa. In the 4 hour alkali variation the tensile strength value is 87.45 MPa, and the modulus of elasticity is 5.57 GPa. In the 12 hour alkali variation the tensile strength value is 92.13 MPa, and the modulus of elasticity is 5.78 GPa. In the variation of 36 hours alkali has produced the highest tensile strength reaching 100.31 MPa, and modulus of elasticity is 5.87 and. Macro optic and SEM test results showed that the correlation of changes in tensile strength and hybrid abaca/carbon/PMMA composite fracture structure without alkali, 4 hours alkali, 12 hours alkali, showed that over the long duration of alkali abaca fiber, the more decreased the pullout and void. At 36 hours alkali shows that the interface is good between fiber and matrix, so there is no pullout or void fiber.

Keywords: abaca, carbon, alkali, PMMA, tensile test, optic, SEM.