

## INTISARI

Serat alam telah dikembangkan sebagai bahan penguat komposit. Perkembangan komposit serat alam sudah banyak diaplikasikan diberbagai bidang industri seperti *automobile*, perkapalan, industri transportasi dan biomedis. Serat *abaca* adalah jenis serat alam yang berpotensi di bidang biomedis karena memiliki kandungan selulosa yang tinggi. Tujuan dari penelitian ini adalah untuk mengetahui pengaruh fraksi volume serat dengan matriks terhadap kuat tarik komposit hibrid *abaca*/karbon/PMMA dan mengetahui korelasi perubahan nilai kuat tarik terhadap komposit *abaca*/karbon/PMMA.

Serat *abaca* dialkalisasi dengan NaOH 6% selama 36 jam dipotong 6 mm. Serat karbon direndam dengan nitrogen cair selama 10 menit dan dipotong 10 mm kemudian serat dicampur PMMA dengan rasio *abaca* dan karbon 1:1 dengan variasi fraksi volume serat dan matriks 15%, 20%, 30%, 35%. Proses fabrikasi menggunakan mesin pres dingin dengan tekanan 4,37 MPa pada suhu ruangan selama 60 menit. Seluruh spesimen komposit diuji tarik sesuai standar ASTM D638-01 dilanjutkan pengamatan patahan menggunakan *Scanning Electron Microscopy* (SEM).

Hasil penelitian komposit hibrid *abaca*/karbon/PMMA menunjukkan bahwa peningkatan kuat tarik telah dipengaruhi oleh meningkatnya fraksi volume yang mengarah pada peningkatan antarmuka serat dan matriks sehingga mencapai nilai optimum pada fraksi volume 30% mencapai 121.28 MPa dan modulus elastisitas 6.10 GPa. Hasil korelasi perubahan struktur patahan komposit pada fraksi volume 30% menunjukkan ikatan serat dan matriks yang baik sehingga mengurangi *fiber pull-out*.

**Kata Kunci:** *Abaca*, Karbon, PMMA, Fraksi Volume, Sifat Tarik, Sifat SEM.

## **ABSTRACT**

*Natural fiber has been developed as a composite reinforcing material. The development of natural fiber composites has been widely applied in various industrial fields such as automobile, shipping, transportation and biomedical industries. Abaca fiber is a type of natural fiber that has potential in the biomedical field because it has a high cellulose content. The purpose of this study was to determine the effect of the volume fraction of fibers with a matrix on the tensile strength of hybrid abaca / carbon / PMMA composites and determine the correlation of changes in the tensile strength values of abaca / carbon / PMMA composites.*

*Abaca fiber was alkalized by soaking in 6% NaOH for 36 hours. Carbon fiber was soaked with liquid nitrogen for 10 minutes and cut into 10 mm pieces then mixed into PMMA with abaca:carbon ratio 1:1 and variation of volume fiber fraction and matrix 15%, 20%, 30%, 35%. Fabrication process is done with a cold press machine with a pressure of 4.37 MPa at room temperature for 60 minutes. All composite specimens were tested in accordance with ASTM D638-01 standards. After that, Scanning Electron Microscopy (SEM) was carried out on the fracture of specimens that had been tested for tensile.*

*The result of this study is the tensile strength test result is affected by increasing volume fraction leading to an increase in interface fibers and matrix and the highest result is at 30% volume fraction with 121.28 Mpa and 6.10 GPa elastic modulus. The result of SEM test in 30% volume fraction shows that fiber pull out in composite is detected because the fibers are fully mixed with PMMA matrix.*

**Keywords:** *Abaca, Carbon, PMMA, Volume Fraction, Drag Properties, SEM Properties.*

