

ABSTRAK

STUDI SIFAT TARIK KOMPOSIT SERAT *BRAIDS* TKKS/PLA YANG MENGALAMI *DEGRADASI* DALAM LARUTAN *SIMULATED BODY FLUID SOLUTION* (SBF)

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Abstrak : Tandan kosong kelapa sawit (TKKS) adalah limbah dari perkebunan kelapa sawit. Tandan kosong kelapa sawit biasanya dijadikan sebagai pupuk dan media tumbuh jamur. Tandan buah segar mengandung 25-34% tandan kosong. Serat TKKS dapat dimanfaatkan sebagai serat alami untuk penguat komposit dan aplikasi biomedis (Biomaterial). *PolyLactic acid* (PLA) telah banyak digunakan sebagai material biomedis karena sifat *biodegradable* dan *biocompatiblenya* sebagai *scaffold*. *Scaffold* berfungsi untuk merangsang tumbuh regenerasi sel dan jaringan baru, yang dapat ter-*degradasi* secara klinis dan biomekanik. Kerusakan pada tendon/ligamen sering terjadi akibat beban yang berlebihan sehingga diperlukan *scaffold biodegradable* dari PLA untuk memperbaikinya. Namun PLA memiliki sifat mekanik yang lebih rendah dari tendon/ligamen sehingga diperlukan *reinforcement* berupa serat alam yang tidak beracun untuk makhluk hidup. Sebelum digunakan serat TKKS diberi perlakuan menggunakan larutan alkali NaOH 5%/3 jam. Selanjutnya komposit PLA/TKKS dibuat dengan metode *hand lay-up* dengan serat *braids* dengan fraksi volume serat 16% dan untuk volume fraksi PLA sebanyak 84%. Serat TKKS dilakukan pengamatan kadar air dan sifat kimia, kemudian komposit PLA/TKKS direndam dengan larutan *simulated body fluid* (SBF) selama 10, 20 dan 30 hari kemudian diuji tarik, dan dilakukan pengamatan *scanning electron microscope* (SEM). Hasil dari pengujian mekanik terlihat bahwa komposisi PLA/TKKS mengalami *degradasi* ditandai dengan menurunnya kekuatan tarik pada rendaman 30 hari dalam larutan SBF.

Kata kunci : Serat *braids* tandan kosong kelapa sawit, *polylactid acid*, *simulated body fluid*, Sifat tarik, Tendon dan *scaffold*.

ABSTRACT

STUDY OF TENSILE PROPERTIES OF TKKS/PLA BRAIDS FIBER COMPOSITE WHICH EXPERIENCED DEGRADATION IN SIMULATED BODY FLUID SOLUTION (SBF)

By

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Abstract : Palm oil empty bunches (TKKS) are waste from oil palm plantations. Empty oil palm bunches are usually used as fertilizer and a medium for growing mushrooms. Fresh fruit bunches contain 25-34% empty bunches. TKKS fiber can be used as a natural fiber for composite reinforcement and biomedical applications (Biomaterials). Polylactic acid (PLA) has been widely used as a biomedical material because of its biodegradable and biocompatible properties as a scaffold. Scaffolds function to stimulate the growth of new cell and tissue regeneration, which can be degraded clinically and biomechanically. Damage to tendons/ligaments often occurs due to excessive loads, so biodegradable scaffolds made from PLA are needed to repair them. However, PLA has lower mechanical properties than tendons/ligaments, so reinforcement is needed in the form of natural fibers that are non-toxic to living creatures. Before use, EFB fiber is treated using an alkaline solution of 5% NaOH/3 hours. Furthermore, the PLA/TKKS composite was made using the hand lay-up method with fiber braids with a fiber volume fraction of 16% and a PLA volume fraction of 84%. The TKKS fiber was observed for water content and chemical properties, then the PLA/TKKS composite was soaked in a simulated body fluid (SBF) solution for 10, 20 and 30 days, then tensile tested, and scanning electron microscope (SEM) observations were carried out. The results of mechanical testing showed that the PLA/TKKS composition experienced degradation, marked by a decrease in tensile strength after 30 days of immersion in the SBF solution.

Keywords: Fiber braids empty palm fruit bunches, polylactic acid, simulated body fluid, tensile properties, degradation, tendons and scaffolds.