

Optimasi Medium Pertumbuhan Kultur Mikroalga Campuran, Modifikasi Permukaan Serat dan Pelapisan Silika Diatom *Phaeodactylum* sp. Pada Serat Flax *Linum usitatissimum* L.

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INTISARI

Silika diatom menjadi objek studi biomaterial karena memiliki sifat fisik yaitu kemampuan dalam bertahan terhadap pemanasan tinggi. Kemampuan alami diatom untuk melakukan *biofouling* dan mineralisasi silika pada substrat berpotensi meningkatkan performa kekuatan serat. Penelitian ini bertujuan untuk mengetahui konsentrasi silika optimum dalam pertumbuhan sel *Phaeodactylum* sp. pada sistem kultur campuran, dan mineralisasi silika sel pada permukaan serat flax *Linum usitatissimum* L. Penelitian ini dilakukan dengan kultivasi sel di dalam medium f/2 dengan variasi silika 6, 10, 30, 50, 70, dan 90 ppm. Pertumbuhan sel diatom pada konsentrasi silika optimum digunakan untuk melapisi serat flax modifikasi selama 14 hari dalam sistem kultur campuran. Selain itu, modifikasi permukaan serat flax dilakukan dengan perendaman di dalam larutan NaOH 6% selama 24 jam pada suhu ruang. Pertumbuhan sel diatom terbaik diperoleh pada konsentrasi silika 30 ppm. Sel diatom dapat tumbuh secara simultan dengan sel mikroalga *Chlorella* sp. dalam sistem kultur campuran. Berdasarkan analisis SEM/EDX (*Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy*) pada mikrostruktur permukaan serat flax menunjukkan bahwa sel diatom mampu melapisi permukaan serat dan mendeteksi adanya mineralisasi silika.

Kata kunci: silika, diatom, serat flax, pelapisan

Optimization of The Mixed Microalgae Culture Growth Medium, Fibre Surface Modification, and Coated Silica Diatom *Phaeodactylum* sp. on The Flax Fibres *Linum usitatissimum* L.

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ABSTRACT

Diatom silica has become the object of biomaterial study, because it has a physical properties to survive in the high temperature. Natural ability of diatoms for making biofouling and mineralized silica on the substrate is prospective for improving the fibers strength performance. This study was aimed to determine the optimum silica concentration in the cell growth of *Phaeodactylum* sp. in the mixed culture system and to mineralize silica cells on the surface of the flax fiber *Linum usitatissimum* L. This research was carried out by cultivating the cells in the medium f/2 with various silica concentration of 6, 10, 30, 50, 70, and 90 ppm. Diatom cell growth in mixed culture at optimum silica concentration was used for coating on modified flax fibers for 14 days. Flax fibers surface modification was carried out by immersion in 6% NaOH solution for 24 hours at room temperature. The optimum diatom cell growth was obtained at a concentration of 30 ppm silica. Diatom cells growth simultaneously with cell microalgae *Chlorella* sp. in the mixed culture system. Based on Scanning Electron Microscopy with Energy Dispersive X-ray Spectroscopy analysis on the surface of the microstructure flax fibers showed that diatom cell was able to coat the surface of the fibers by silica mineralization.

Keywords: silica, diatoms, flax fibres, coating