STABILITAS PIGMEN FIKOSIANIN DARI *Spirulina platensis* TERMODIFIKASI FORMALDEHIDA SEBAGAI KANDIDAT SENSITIZER ALAMI

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ABSTRAK

Penggunaan pigmen alami sebagai penangkap cahaya (*sensitizer)* dalam teknologi *photovoltaic* tengah berkembang. Salah satu pigmen alami yang berpotensi sebagai *sensitizer* adalah fikosianin dari mikroalga *Spirulina platensis*. Fikosianin memiliki sifat yang kurang stabil terhadap lingkungan, sehingga perlu dilakukan modifikasi untuk meningkatkan kestabilannya. Pada penelitian ini dilakukan upaya modifikasi untuk menstabilkan fikosianin terhadap cahaya dan termal menggunakan teknik *crosslink*. Perubahan sifat yang dianalisis meliputi karakteristik, stabilitas cahaya dan stabilitas termal. Adapun tahap penelitian meliputi modifikasi, karakterisasi, dan pengujian stabilitas cahaya dan termal. Fikosianin hasil pemurnian (PC) dimodifikasi dengan cara *crosslinking* menggunakan formaldehida, menghasilkan fikosianin-formaldehida (PC-F). Karakterisasi PC-F dilakukan menggunakan spektrofotometri UV-Vis, FTIR dan SDS-PAGE. Stabilitas terhadap cahaya putih menggunakan lampu putih 18 W, lampu kuning 14 W, lampu UV A 8 W, lampu UV B dan dilakukan pada waktu penyinaran yang berbeda. Stabilitas termal dilakukan pada suhu 25 ℃, 40 ℃, 50 ℃, 60 ℃ dengan waktu inkubasi selama 30 menit. Spektra UV-Vis PC-F memiliki tiga puncak pada daerah 611 nm, 360 nm dan 273 nm yang mengalami pergeseran panjang gelombang dari spektra UV-Vis PC. Perbedaan lain antara PC dan PC-F terdapat pada spektrum FTIR yaitu hanya muncul satu puncak pada daerah 1658.78 cm^{-1} untuk gugus amida I. SDS PAGE PC-F menunjukkan satu pita yang menandakan trimer $(\alpha\beta)_3$ fikosianin dengan berat molekul 30,56 kDa. PC dengan modifikasi formaldehida (PC-F) menunjukkan penurunan absorbansi yang lebih besar dibandingkan PC pada penyinaran cahaya putih, UV A dan UV B masing – masing sebesar 6,28%, 16,12% dan 61,90%, namun penurunan absorbansi PC-F pada cahaya kuning lebih kecil dibandingkan PC yaitu sebesar 3,95%. PC-F meningkatkan kestabilan termal, namun belum menunjukkan peningkatan terhadap kestabilan cahaya putih, UV A dab UV B.

Kata Kunci: Fikosianin, Formaldehida, *Spirulina platensis*, Stabilitas Cahaya, Stabilitas Termal.

ABSTRACT

Natural pigments as sensitizers in photovoltaic technology is developing. One of the natural pigments that has the potential as a sensitizer is phycocyanin from *Spirulina platensis* microalgae. However, phycocyanin has properties that are less stable to the environment, so it needs to be modified to improve its stability. In this study an attempt was made to modify to change the nature of phycocyanin to light and thermal stability using the crosslink technique. Changes in the analyzed properties include characteristics, light stability and thermal stability. The research phase includes modification, characterization, and testing of light and thermal stability. Purification results of phycocyanin (PC) were modified by crosslinking using formaldehyde, resulting in phycocyanin-formaldehyde (PC-F). PC-F characterization was performed using UV-Vis, FTIR and SDS-PAGE spectrophotometry. Stability to white light using 18 W white lights, 14 W yellow lights, UV A 8 W lamps, UV B lamps and performed at different irradiation times. Thermal stability is carried out at 25 ℃, 40 ℃, 50 ℃, 60 ℃ with an incubation time of 30 minutes. UV-Vis PC-F spectra have three peaks in the 611 nm, 343 nm and 271 nm regions which experience wavelength shifts from PC UV-Vis spectra. Another difference between PC and PC-F is found in the FTIR spectra, namely that only one peak appears in the region of 1658.78 cm^{-1} for the amide group I. SDS PAGE PC-F shows a band indicating the trimer $(\alpha\beta)_3$ of phycocyanin with molecular weight is 30,56 kDa. PC with formaldehyde (PC-F) modification showed a greater decrease in absorbance compared to PC in irradiation of white light, UV A and UV B respectively by 6.28%, 16.12% and 61.90%, but decreased absorbance of PC -F in yellow light is smaller than a PC which is 3.95%. PC-F increases thermal stability, but has not shown an increase in white light stability, UV A and UV B.

Keyword: *Spirulina platensis*, phycocyanin, formaldehyde, photostability, thermal stability.

DAFTAR ISI

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