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**PEMBUATAN *DYE-SENSITIZED SOLAR CELL* DENGAN
MEMANFAATKAN *FOTOSENSITIZER* EKSTRAK KOL MERAH
(*Brassica oleracea* var. *capitata* f. *rubra*)**

ABSTRAK

Telah dilakukan penelitian mengenai pembuatan *Dye Sensitized Solar Cell* dengan memanfaatkan ekstrak kol merah (*Brassica oleracea* var. *capitata* f. *rubra*). *Dye-Sensitized Solar Cell* (DSSC) merupakan salah satu kandidat potensial sel surya, proses absorpsi cahaya dilakukan oleh molekul zat warna dan proses separasi muatan oleh semikonduktor TiO₂. Zat warna alami yang digunakan diisolasi dalam campuran asam asetat:metanol:air dan dilakukan *screening* fitokimia. Karakterisasi ekstrak kol merah dilakukan dengan spektrometer *UV Vis* dan spektrometer FTIR. Karakterisasi lapis tipis TiO₂ dilakukan menggunakan metode difraksi sinar-X dan SEM (*Scanning Electron Microscopy*). Konstruksi sel surya yang digunakan adalah sistem *sandwich*. Efisiensi kinerja DSSC diperoleh melalui pengukuran voltase dan arus yang dihasilkan pada kondisi yang berbeda yakni di bawah pancaran sinar matahari dan di dalam ruangan. Hasil karakterisasi komponen DSSC menunjukkan bahwa *fotosensitizer* ekstrak kol merah merupakan senyawa fenolik golongan flavonoid. Adanya kandungan antosianin ditunjukkan dengan panjang gelombang maksimum 525 nm dan diperkuat dengan munculnya gugus hidroksil, benzena dan karbonil pada serapan inframerah. Lapis tipis TiO₂ menunjukkan morfologi permukaan dengan ukuran rongga sekitar 220 nm, dan ketebalan penampang lintang sekitar 300 nm. Sedangkan difraktogram lapis tipis TiO₂ menunjukkan bahwa TiO₂ memiliki fasa kristalin anatase dengan ukuran kristal sebesar 17,366 nm. Voltase maksimum dan kuat arus maksimum yang dihasilkan pada kondisi di bawah pancaran sinar matahari dan di dalam ruangan masing-masing sebesar 0,627 V; 0,065.10⁻³ A dan 0,152 V; 0,014.10⁻³ A. Efisiensi yang dihasilkan sistem sel surya dalam penelitian ini masing-masing sebesar 0,003 % dan 0,000113 %. Hasil karakterisasi arus dan voltase memperlihatkan kemampuan konversi energi cahaya menjadi energi listrik.

Kata kunci: Dye Sensitized Solar Cell, TiO₂, antosianin.

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**THE PRODUCTION OF DYE SENSITIZED SOLAR CELL WITH USE OF
FOTOSENSITIZER OF THE RED CABBAGE EXTRACT**

ABSTRACT

It has been done a research about the production of dye sensitized solar cell with use of fotosensitizer of the red cabbage extract. Dye Sensitized Solar Cell (DSSC) is one of potential candidates of solar cell, in which, the light absorption process is conducted by a dye molecules and charge separation process by the TiO_2 semiconductor. Natural coloring substance used was isolated in the mixture of acetat acid:methanol: H_2O and then the phytochemical screening was done. Characterization of red cabbage extract was determined using UV Vis spectrometry and FTIR Spectroscopy. The characterization of thin layer of TiO_2 was conducted using X-ray diffraction and SEM (Scanning Electron Microscopy) methods. The solar cell was constructed in sandwich system. DSSC performance efficiency was obtained from measurement of resulted voltage and current at different conditions, which are, under the sunlight and indoor. The characterisation of DSSC component showed that the fotosensitizer from red cabbage extract was included in the flavonoid groups of phenol. The content of anthocyanin showed on the maximum wavelength as long as 525 nm and it was proven from the FTIR spectroscopy result, in which, the produced spectrum showed the spectra of hydroxyl, carbonyl and benzene. The surface morphology of TiO_2 thin layer showed the porous surface of TiO_2 with the measurement of 220 nm and the thickness of 300 nm. At the diffractogram of the thin layer of TiO_2 shows the relatively high intensity of diffraction pattern as the anatase crystal with the measurement of 17.366 nm. The maximum voltage and electric current resulted in condition of under sunlight and indoor systems were 0.627 V; 0.065×10^{-3} A and 0.152 V; 0.014×10^{-3} A respectively. The efficiency produced from the solar cell system for each condition are 0.003% and 0.000113%. The characterization of current and voltage show that the solar cell for the former had energy conversion ability from light into electricity.

Key words: Dye Sensitized Solar Cell, TiO_2 , antocyanin.