Exploration Study of the Potential of Microalgae Spirulina maxima as a Source of Renewable Electric Energy Based on Dye Sensitized Solar Cell

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Indonesia has huge potential on energy resources from biomass. One of them is marine microalgae plant such as Spirulina maxima. It has phycocyanin and carotenoid pigments that commonly used for dye in Dye Sensitized Solar Cell (DSSC). DSSC is a method to produce electricity using solar energy. This study aims to observed the effect of pigments contained in Spirulina maxima as a dye in DSSC, discover differences of the light absorption between the paste dye and powder dye, measure the potential currents, voltages and efficiency that can be generated from each DSSC. This study was divided into 2 stages, the preparation stage of S. maxima microalgae as a dye and the stage of making DSSC. There were 4 types of DSSC namely DSSC with dye S. maxima in the form of 2% powder from ethanol`s volume and 12.5% from ethanol`s volume, DSSC with S. maxima dye in paste form, and DSSC with commercial dye SQ2 as control. FTIR Characterization (Fourier Transformed Infrared Spectroscopy) was performed on S. maxima in the form of powder and paste, optical characterization was also performed with IPCE on each DSSC, and characterization for electrical produced by DSSC with I-V measurements. As the result, pigment phycocyanin and carotenoid in S. maxima has a potential as a dye because of its carboxyl and out of all three DSSC(powder2%, powder12.5% and paste) the best was powder 2%. The best efficiency observed so far was 0.04, this was due to the preparation of dye and very large layer resistance.