

ABSTRACT

Entering the 21st century, supplies of primary energy (oil and gas) depleting, while increasing energy needs. One solution to overcome this problem is to optimize renewable-energy sources. In Indonesia, a potential source of renewable energy is solar energy. Tools used to convert the sun's radiant energy into electrical energy, commonly known as photovoltaic panels or solar cells. Photoelectrochemical solar cells are developed, one of them dye-sensitized solar cell (DSSC). In manufacturing solar cells do not require material with a high-purity level. DSSC which has been developed using TiO_2 as a semiconductor material. The highest efficiency using TiO_2 semiconductor layer by 11%. TiO_2 be an option from the semiconductor layer due to TiO_2 is a material that is relatively inexpensive, non-toxic, and available lots in nature. However, TiO_2 has a wide bandgap (3.2 eV-3.8 eV). Besides pure TiO_2 has a small absorption efficiency, by 5%. Therefore, it is necessary efforts to improve the efficiency of solar cells made of TiO_2 . This study has been conducted on the provision of dopant TiO_2 layer and the metal insert in the space between the TiO_2 particles. Provision of dopant on the TiO_2 layer using CuO as an addition to the spectrum material absorption and the addition of the metal in the space between the metal particles using copper (Cu) as a result of excitation of electron transport enhancer TiO_2 . CuO material used is made of a simple wet chemical method, with 0.2 M $\text{Cu}(\text{NO}_3)_2 \cdot 3\text{H}_2\text{O}$ and precursors NaOH with a variety of molarity (0.5 M, 0.75 M and 1.5 M). The Insertion of Cu using electroplating method with the source voltage or current source. The results showed that the influence of the CuO precursor molarity generated affects the purity and the shape of the CuO , and obtained the best molarity as forming CuO was 0.75 M NaOH . Make optimum efficiency of solar cells by 0, 029% TiO_2 obtained by the addition of 1.8% CuO dopant. 10x increases in efficiency of solar cells are optimum worth of 0.352% obtained by adding copper metal particles using a source current of 10 mA for 120 seconds when electroplating.

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Keywords: solar cell, TiO_2 , precursor NaOH , simple wet chemical method, spray method, electroplating method.