

Effect Insertion Cu Metals With Variation Of Mass Of The Titania Active Layer To Morphological Structure, Resistance, And Solar Cells Performance

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ABSTRACT

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This study aims to determine the effect of insertion of the copper (Cu) with a variety of mass of the structure morphology and composition of the surface layer of titania, absorbance of titania, resistance of titania and solar cell performance based on titania. Solar cell performance is voltage of a solar cell.

Preparation of titania-copper layer (TiO₂-Cu) to form a paste made using a sol-gel method. Pasta titania-copper deposited on a transparent electrode (Indium Tin Oxide) with a doctor blade method. There were five variations of mass Cu was pasted on a layer of titania, namely 0,050 grams (Sample 1); 0,075 grams (sample 2); 0,100 grams (3 samples); 0.0125 (sample 4) and 0.0150 (sample 5). Each variation of the mass of Cu is inserted in one gram of TiO₂. SEM and EDS characterization performed on a layer of titania-copper to know the structure morphology and composition of the titania-copper. Absorbance layer was characterized by using UV-Visible spectrometer. Resistance of titania was measured by using a Wheatstone bridge. While the performance of solar cells made by measuring the voltage of the solar cell.

Insertion of Cu on titania does not affect the structure of the titania coating morphology when seen from the results of SEM characterization. Granules (grain) formed on the second layer of relatively similar. Based on the results obtained SEM average grain size was 193.038 nm. EDS results showed that the composition of the sample 5 containing Ti element as much as 59.98%, O elements as much as 40.05% and Cu element as much as 0.07%. The absorbance of TiO₂ occurs from 200 nm- wavelength of 382 nm and 649 nm - 800 nm with a peak absorbance at a wavelength of 708 nm and 341 nm, while the absorbance of the active layer Ti-O₂Cu occur than the wavelength of 200 nm-381 nm and 649 nm- 800 nm with a peak absorbance at a wavelength of 707 nm, 338 nm and 293 nm. From the results obtained can be seen that with the addition of Cu in the active layer of TiO₂ improve the absorbance properties of the active layer of titania in which the absorption layer has TiO₂Cu more than a layer of TiO₂ absorption peak. Insertion of Cu on titania coating can reduce the electrical resistance of the layer. A layer of titania without the insertion of copper has a resistance value of 3190.602 Ω. While the resistance value obtained for the variation of the mass of Cu 0.05 grams; 0.75 grams; 0.1 grams; 0,125 grams and 0.15 grams respectively are 3184.78 Ω; 3184.71 Ω; 3183.84 Ω; 3182.64 Ω; 3182.41 Ω. The influence of the mass variation of the copper that is inserted in the active layer Ti-O₂ the voltage generated by the titania-based solar cells that is the greater mass of Cu is pasted on the active layer of TiO₂, the greater the voltage measured. For the mass of Cu 0.05 grams; Cu 0.075 g; Cu 0.1 grams; Cu 0.125 g; Cu 0.15 grams, voltages measured successively is V = 0,367 volts; V = 0.466 volts; V = 0.583 volts; V = 0.651 volts; and V = 0.681 volts.

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