ABSTRACT

This final task presents the effects of growing of TiO_2 comapct layer (CL-TiO_2) as supporters of electron transport material (ETM) with the aim to increase the efficiency of solar cells based on perovskite. The process of growing of CL-TiO_2 is done by dip-coating method with different time variations i.e., 15 minutes, 30 minutes, and 45 minutes with the aim of obtaining different thicknesses. CL- TiO_2 which are grown using basic ingredients of TiCl4 with concentrations of 0.04 M and then dipanasakan at a temperature of 500 °C. CL- TiO_2 are characterized by the morphology of the surface properties, the value of the transmission and the value of each sheet resistance using SEM, UV Vis spectrophotometer, and four point probe. Morphological characterization was done by way of comparing the morphology of CL-TiO_2 that is formed with the morphology of the surface of mesoporous TiO_2 (MS). CL-TiO_2 with established time 15 minutes have a more surface structures and particles that are smaller than the MS-TiO_2. Characterization of tranmisi value using FTO layers as reference shows the CL-TiO_2 with a soaking time of 15 minutes and 30 minutes has a good transparency, i.e., above 80%. Results karaterisasi rating sheet resistance, use the FTO as a reference indicates the occurrence of a rise in the value of sheet resistance after FTO coated with CL-TiO_2, but his only range 5-6% and it is not badly electron transfer process.

CL-TiO_2 layers mentioned above then applied on perovskite-based solar cells with the configuration of the Substrate/ FTO/ CL-TiO_2/ MS-TiO_2/ Perovskite ($CH_3NH_3PbI_3$)/ Spiro-OMeTAD/ Ag. Solar cells using perovskite-based CL-TiO_2 has a better electrical performance compared with solar cells without using CL-TiO_2. The best results are obtained on a solar cell with growing of a CL-TiO2 for 15 minutes with the maximum voltage (V_{max}), maximum current (I_{max}) and efficiency of 0.162 V, 0.015 mA, and 0.006%.

Key words : CL-TiO_2, solar cell, perovskite, dip-coating.