

Parinee Suvannasri 2012: A Microstructural and Compositional Study of TiO<sub>2</sub> and CIGS Films on Efficiencies of Solar Cell Containing Light Absorbing Thin Films. Master of Science (Physics), Major Field: Physics, Department of Physics. Thesis Advisor: Mr.Wiwat Wongkokua, Ph.D. 111 pages.

This thesis studied TiO<sub>2</sub> and CIGS microstructures which had an impact on efficiency of dye sensitized solar cells and polymer solar cells. Microstructures and film constituents were studied by various techniques such as scanning electron microscopy, transmission electron microscopy, X-ray diffraction, X-ray fluorescence spectroscopy, atomic force microscopy and UV-VIS spectroscopy. Then the efficiency was examined by current-voltage characteristics. Dye sensitized solar cells have 10 wt% and 1 wt% of CIGS in TiO<sub>2</sub> paste were fabricated. In the case of 10 wt% CIGS-TiO<sub>2</sub> paste, the electrical property was improved significantly with the higher number of layers of CIGS-TiO<sub>2</sub> paste. Moreover, the electrical property of the full-plate screening of CIGS paste onto TiO<sub>2</sub> and Pt films is lower than the half-plate screening. For inorganic-organic hybrid polymer solar cells, addition of 2.5 wt% CIGS into ITO/TiO<sub>2</sub>/MEH-PPV:CIGS/Au structure results in lower electrical property compared with ITO/TiO<sub>2</sub>/MEH-PPV/Au structure. The property tends to be betterer if a ratio of CIGS rises to 5 wt%, but it is lower slightly in case of 10 wt%.

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