INFLUENCE OF IN2O3-ZNO WORKING ELECTRODES ON PHOTOELECTRONIC PROPERTIES OF THE DYE-SENSITIZED SOLAR CELLS

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The optoelectronic characteristics of dye-sensitized solar cell devices using In2O3-doped ZnO films coated on ITO-film substrates as photo-anode electrodes and natural dye as the sensitizer had been studied. The effects of In2O3 doping amount on structural, optical and electronic characteristics of these devices were investigated. The XRD measurement of ZnO and In2O3-doped ZnO films exhibited porous and granular nanostructure with wurzite structure.

The shunt resistance of the doped films is higher than that of the un-doped film, while the series resistance of the doped films is lower than that of the un-doped film. However, The photoelectronic properties of the In2O3-doped DSSC devices revealed better than those of the un-doped device. The doped DSSC device with In2O3 doping amount of 5.0wt% was measured to be the highest conversion efficiency and fill factor of 1.17% and 47.62%, the lowest series resistance of 245 Ohm. Figure 1 shows the Jsc–V curve of In2O3-doped ZnO for the DSSCs. Figure 2 shows the relationship of conversion efficiency(%) of In2O3-doped ZnO DSSCs with various doping amount of In2O3.

Figure 1: Jsc–V curve of In2O3-doped ZnO for the DSSCs

Figure 2: Relationship of conversion efficiency(%) versus In2O3-doped ZnO DSSCs with various doping amount of In2O3