

The study on Improvement of the efficiency of dye-sensitized solar cell with mesoporous  $\text{TiO}_2$  /  $\text{TiO}_2$  nanoparticle mixed electrodes depending on mixing ratios

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For improve the efficiency of DSSC, the amount of dye adsorbed and lower contact resistance are necessary. To obtain larger surface area for adsorbing more dye molecules, mesoporous  $\text{TiO}_2$  (meso- $\text{TiO}_2$ ) is used for DSSC, but due to the large size difference between meso- $\text{TiO}_2$  and P25 (nano- $\text{TiO}_2$ ), there is larger contact resistance. More empty space declines the transfer rate of electron between  $\text{TiO}_2$ . To reduce contact resistance, addition of nano- $\text{TiO}_2$  into meso- $\text{TiO}_2$  electrode could reduce the contact resistance. Furthermore, added nano- $\text{TiO}_2$ s adsorb dyes, total amount of adsorbed dyes could be increased. The result is that 65wt% of meso- $\text{TiO}_2$  with 35wt% of nano- $\text{TiO}_2$  electrode shows the highest efficiency.

The characterization of electrodes and DSSC was done by X-ray diffraction (XRD),  $\text{N}_2$ -sorption isotherm, UV-Vis spectrometer, Scanning Electron Microscopy (SEM), Impedance measurement, solar simulator, incident photon to charge carrier efficiency (IPCE) and Diffuse Reflectance UV-Visible Spectra (DRS).