Sel surya tersensitasi zat warna berbasis TiO2 yang dimodifikasi dalam bentuk tabung = Dye sensitized solar cell base on TiO2 modified in tubular form

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Abstrak

[Dye Sensitized Solar Cell (DSSC) dalam konfigurasi tabung telah berhasil dibuat. DSSC dirakit menggunakan Inner Wall Conductive Glass Tube (IWCGT) yang mengandung SnO2-F (Fluorine Tin Oxide) sebagai lapisan konduktif. IWCGT dipreparasi menggunakan tehnik penguapan dan spray nebulizer, menghasilkan kaca transparan berpenghantar yang memiliki hambatan jenis antara 11-80 /cm2.
Sol TiO2 dilapiskan pada IWCGT dengan tehnik dip coating, dilanjutkan dengan kalsinasi pada suhu 500° C dan 550° C. Terhadap TiO2 hasil sintesis dilakukan karakterisasi menggunakan UV-Vis Diffuse Reflectance Spectrometry (DRS), Xray Diffraction (XRD), Fourier Transform Infra Red (FTIR) dan spektrofotometer Raman. Lapisan tipis yang diimobilisasi pada IWCGT dikarakterisasi menggunakan Field Emission Scanning Electron Microscope (FE-SEM) dan sistem elektrokimia. Berdasar spektrum UV-Vis dapat diketahui TiO2 yang dihasilkan memiliki energi celah (band gap) sebesar 3,01 dan 3,04 eV. Hasil pengukuran spektroskopi Raman dan XRD menunjukkan bahwa film yang dihasilkan didominasi oleh TiO2 dalam bentuk anatase dan mempunyai ukuran kristal sebesar 9,79 nm (kalsinasi pada suhu 500° C) dan 10,59 nm (kalsinasi pada suhu 550° C). Hasil FE-SEM menunjukkan bahwa lapisan TiO2 yang dipreparasi dengan bantuan template PEG memiliki ketebalan sebesar 496,56 nm. Sistem DSSC dalam konfigurasi tabung yang disiapkan dengan menggunakan TiO2 dan zat warna Rhodamin B, Klorofil dan campuran keduanya mampu menghasilkan efisiensi () antara 0,03 – 0,91%.;Dye Sensitized Solar Cell (DSSC) dalam konfigurasi tabung telah berhasil dibuat. DSSC dirakit menggunakan Inner Wall Conductive Glass Tube (IWCGT) yang mengandung SnO2-F (Fluorine Tin Oxide) sebagai lapisan konduktif. IWCGT dipreparasi menggunakan tehnik penguapan dan spray nebulizer, menghasilkan kaca transparan berpenghantar yang memiliki hambatan jenis antara 11-80 /cm2.
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conductive layer, which was prepared by evaporation and spray nebulizer method. The IWGCT has a transparent
conductive oxide with high optical transmittance and low sheet resistance, that is 11-80 /cm2. TiO2 film, immobilized on the IWCGT, was successfully prepared by a dip-coating technique from titania sol-gel, followed by heat treatment at 500° C and 550° C. The TiO2 was characterized by diffuse reflectance UV-Vis
spectroscopy and XRD, photoelectrochemical system (PES) and field emission scanning electron microscopy (FE-SEM). Characterization results indicated that the prepared TiO2 has band gap of 3,01 and 3,04 eV (DRS UV-Vis); predominantly by anatase phase (XRD and Raman); having crystallite size of 9.79 nm (at 500° C calcinations) and 10.59 nm (at 550° C calcinations), and having 496,56 nm film thickness. By employing rhodamine B, chlorophyll and its mixture, as the dyes, the tubular DSSC reached efficiency () in the range of 0.03 to 0.91 %.;A dye sensitized solar cell (DSSC) having tube geometry has been successfully
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