

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. 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%.

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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 IWGCT, was successfully prepared by a dip-coating technique from titania sol-gel,
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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
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