

PENGARUH DOPING AL PADA ZNO MENGGUNAKAN METODE LPD TERHADAP EFISIENSI DYE SENSITIZED SOLAR CELLS (DSSC)

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ABSTRACT

ZnO is doped with aluminum to increase the efficiency of Dye Sensitized Solar Cells (DSSC). Synthesis of the ZnO layer was carried out using the Liquid Phase Deposition (LPD) method at a temperature of 80 °C for 10 hours with a doping variation of 0% aluminum; 1.0%; 1.5%; 2.0%; and 2.5%. The samples were characterized using XRD and UV-Vis Spectroscopy while the efficiency of DSSC was measured by analyzing the I-V curve. XRD diffraction pattern of ZnO layer without and with 1.5% Al doping showed an identical diffraction pattern, namely there were peaks at 2θ : 34° and 36° which indicated the diffraction characteristics of ZnO. The UV-Vis spectrum shows strong absorption at a wavelength of 280-380 nm which corresponds to an energy gap of 3.51; 3.50; 3.3; 3.11 and 3.06 eV for 0% doping; 1.0%; 1.5%; 2.0% and 2.5%, respectively. The efficiency of the sample DSSC was measured using a digital multimeter and an additional device with a light intensity of 500-1500 Lux. The highest efficiency was produced by the ZnO layer photoanode which was doped with 1.5% aluminum, which was 1.51%, while the lowest was the photoanode without doping which was 0.33%. So that the administration of 1.5% doping was able to increase the efficiency by 463% compared to DSSC without doping.

Keywords: ZnO, Al Doping, LPD, DSSC.

ABSTRAK

Telah dilakukan pendopingan aluminium pada ZnO untuk meningkatkan efisiensi Dye Sensitized Solar Cells (DSSC). Sintesis lapisan ZnO dilakukan menggunakan metode Liquid Phase Deposition (LPD) pada suhu 80 °C selama 10 jam dengan variasi doping aluminium sebesar 0%; 1,0%; 1,5%; 2,0%; dan 2,5%. Sampel dikarakterisasi menggunakan XRD dan Spektroskopi UV-Vis sedangkan efisiensi DSSC diukur dengan menganalisis kurva I-V. Pola difraksi XRD lapisan ZnO tanpa dan dengan doping Al 1,5 % memperlihatkan pola difraksi yang identik, yaitu terdapat puncak pada 2θ : 34° dan 36° yang menunjukkan karakteristik difraksi ZnO. Spektrum UV-Vis memperlihatkan absorpsi kuat pada panjang gelombang 280-380 nm yang berkaitan dengan energi gap 3,51; 3,50; 3,3; 3,11 dan 3,06 eV untuk doping 0%; 1,0%; 1,5%; 2,0% dan 2,5%, berturut-turut. Efisiensi DSSC sampel diukur menggunakan multimeter digital dan perangkat tambahan dengan intensitas cahaya 500-1500 Lux. Efisiensi tertinggi dihasilkan fotoanoda lapisan ZnO yang didoping aluminium 1,5%, yaitu sebesar 1,51% sedangkan terendah yaitu fotoanoda tanpa doping yaitu 0,33%. Sehingga pemberian doping 1,5% mampu meningkatkan efisiensi sebesar 463% dibandingkan DSSC tanpa doping.

Kata kunci: ZnO, Doping Al, LPD, DSSC.



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