

INTISARI

PENGARUH KONSENTRASI P3HT:PCBM PADA *REDUCED GRAPHENE OXIDE* TERHADAP *EXTERNAL QUANTUM EFFICIENCY* (EQE) SEL SURYA ORGANIK *BULK HETEROJUNCTION*

Oleh

PUTU EKAYANI SRI TUSSNIARI
18/437318/PPA/05733

Sel surya organik (SSO) telah dibuat menggunakan material *reduced graphene oxide* (rGO), polimer *poly-3-hexylthiophene* (P3HT) dan *phenyl-C61-butyric acid methylester* (PCBM). Material rGO, P3HT dan PCBM masing-masing bertindak sebagai *hole transport layer* (HTL), donor dan akseptor lapisan aktif. Kajian diawali dengan sintesis rGO dengan metode Hummer dengan variasi temperatur reduksi 60°, 70°, 80°, dan 90 °C. Hasil karakterisasi menggunakan spektroskopi Raman, spektroskopi UV-Vis, spektroskopi *Fourier Transform Infrared* (FTIR) dan *High Resolution Transmission Electron Microscopy* (HR-TEM) menunjukkan bahwa rGO dengan temperatur reduksi 90 °C memiliki serapan paling tinggi. Selanjutnya dibuat *blending* rGO/P3HT:PCBM dengan variasi konsentrasi 2, 4, 6 dan 8 mg/mL dengan perbandingan P3HT:PCBM adalah 1:1. Kemudian dilakukan pengukuran EQE menggunakan spektrofotometer UV-Vis dan *Keithley 2401A*. Nilai energi gap dari spektrofotometer UV-Vis menggunakan metode *Tauc* adalah sekitar 2,279 eV. Pengukuran nilai EQE SSO pada panjang gelombang 550-650 nm dengan konsentrasi 2, 4 dan 6 mg/mL masing-masing sebesar 56,9 %, 60,9 % dan 66 %. Nilai EQE tertinggi didapatkan pada konsentrasi 8 mg/mL yaitu sebesar 69,7 %. Hal ini menunjukkan bahwa konsentrasi *blending* rGO/P3HT:PCBM mempengaruhi nilai EQE pada SSO. Semakin tinggi konsentrasi, nilai EQE yang dihasilkan semakin meningkat pula.

Kata Kunci : SSO, rGO, P3HT:PCBM, Energi gap, EQE

ABSTRACT

INFLUENCES OF P3HT:PCBM CONCENTRATION ON REDUCED GRAPHENE OXIDE ON THE EXTERNAL QUANTUM EFFICIENCY (EQE) ORGANIC SOLAR CELLS BULK HETEROJUNCTION

By

PUTU EKAYANI SRI TUSSNIARI
18/437318/PPA/05733

Organic solar cells (OSC) have been made using reduced graphene oxide (rGO) materials, poly-3-hexylthiophene (P3HT) polymer and phenyl-C61-butyric acid methylester (PCBM). The rGO, P3HT and PCBM materials act as a hole transport layer (HTL), donor and acceptor of active layer, respectively. The study began with the synthesis of rGO using the Hummer method with a reduction temperature variation of 60°, 70°, 80°, and 90°C. The results of characterization using Raman spectroscopy, UV-Vis spectroscopy, Fourier Transform Infrared (FTIR) spectroscopy and High Resolution Transmission Electron Microscopy (HR-TEM) show that rGO with a reduction temperature of 90 °C has the highest absorption. Furthermore, rGO/P3HT:PCBM blending was made with various concentrations of 2, 4, 6 and 8 mg/mL with a ratio of PCBM:P3HT of 1:1. Then, EQE measurements used a UV-Vis spectrophotometer and Keithley 2401A. The value of gap energy with UV-Vis spectrophotometer using the Tauc method is about 2.279 eV. Measurement of the SSO EQE value at a wavelength of 550-650 nm with a concentration of 2, 4 and 6 mg/mL is 56.9 %, 60.9 % and 66 %, respectively. The highest EQE value was obtained at a concentration of 8 mg/mL is 69.7%. This shows that the blending concentration of rGO/P3HT:PCBM affects the EQE value at SSO. The higher the concentration, the resulting increased EQE value as well.

Keywords : OSC, rGO, P3HT:PCBM, Gap Energy, EQE