



## INTISARI

### SINTESIS *REDUCED GRAPHENE OXIDE* DAN APLIKASINYA PADA KINERJA SUPERKAPASITOR

Oleh

**HARIS SUHENDAR**  
**12/331165/PA/14470**

*Reduced graphene oxide (rGO)* telah disintesis secara kimia dari bahan serbuk *graphite*. Serbuk *graphite* dioksidasi menggunakan senyawa oksidator kuat untuk mendapat *graphite oxide*, proses ini disebut dengan Metode Hummer. *Graphite oxide* didispersi menggunakan vibrator ultrasonik untuk mengelupas lapisan *graphite oxide* dan mejadi grapehne oxide. Gugus *epoxy* pada *graphite oxide* di reduksi menggunakan senyawa *hydrazine 80 wt %* pada suhu  $70^{\circ}$ ,  $80^{\circ}$ , dan  $90^{\circ}$  sehingga diperoleh *reduced graphene oxide*. Kemudian rGO yang direduksi pada suhu yang berbeda digunakan dalam fabrikasi *nanofiber Polyvinyl Alcohol (PVA)/rGO* dengan menggunakan *electrospinning* yang beroperasi pada tegangan 15 kV. Hasil sintesis rGO dan PVA/rGO kemudian dikarakterisasi menggunakan spektroskopi *Uv-Vis*, *FTIR*, dan *Scanning Electron Microscopy (SEM)*. Dari spektrum *Uv-Vis* menunjukkan bahwa absorbansi rGO menurun dengan meningkatnya suhu reduksi. Kemudian data absorbansi nanofiber PVA/rGO dihitung konstanta optiknya menggunakan Metode *Kramers-Kronig*. Nilai indeks bias bagian real dan imajiner hasil perhitungan menunjukkan pada daerah energi rendah diperoleh peningkatan nilai konstanta optik dengan penambahan rGO pada PVA *nanofibers*. Kemudian rGO digunakan dalam fabrikasi superkapasitor dengan menggunakan PVA sebagai *binder* dan diperoleh massa superkapasitor sebesar 0,03 gram. Dari pengukuran *cyclic voltametry* diperoleh nilai kapasitansi kapasitor sebesar 2,45 F/gr.

**Kata kunci** : *Reduced graphene oxide, Nanofibers, Superkapasitor, Sifat Optik*



## ABSTRACT

### ***SYNTHESIS OF REDUCED GRAPHENE OXIDE AND ITS APPLICATION TO SUPERCAPACITOR PERFORMANCE***

By

**HARIS SUHENDAR**  
**12/331165/PA/14470**

*Reduced graphene oxide* (rGO) has been synthesized chemically from *graphite* powder. *Graphite* powder was oxidized with strong oxidator agent molekul to get *graphite* oxide (GO), this process was called by Hummer's Methode. *Graphite* oxide was dispersed in water with ultasonic vibrator to exfoliated *graphite* oxide layers, and become *graphene oxide*. Epoxy group in GO structure was reduced by hydrazine 80 wt% at temperature 70°, 80°, and 90°C. We synthesized Polyvinyl Alcohol (PVA)/rGO at different reduction temperature become nanofibers by electrospun PVA/rGO solution at voltage 15 kV. The product of *reduced graphene oxide* and PVA/rGO nanofibers was characterized by using Uv-Vis, FTIR spectrometer, and Scanning Electron Microscopy (SEM). From Uv-Vis characterization showed that the absorbance of rGO is decrease with increasing the reduction temperature. Then we calculated the optical constant (refractive index) of PVA/rGO nanofibers by using Kramers-Kronig methode. At low energy, refractive index and ekstention coefficient are increase as adding rGO into PVA nanofibers. Then *reduced graphene oxide* was fabricated into supercapacitors with PVA as a binder and mass of supercapacitors is 0,03 gram. From cyclic voltametry measurement result that the capacitance spesific of supercapacitor is 2.45 F/g.

**Keyword :** Reduced graphene oxide, Nanofibers, Supercapacitor, Sifat Optik