Karakteristik Karbon yang Didapatkan dari Tandan Kosong Kelapa Sawit Menggunakan Katalis Ferosen = Characteristic of Carbon Derived from Oil Palm Empty Fruit Bunches Using Ferrocene Catalyst

Adinda Izzatul Islam, author

Abstrak

Penelitian ini mengkaji pengaruh penambahan katalis ferosen terhadap pembentukan grafen oksida tereduksi yang disintesis dari biomassa tandan kosong kelapa sawit. Biomassa diproses melalui karbonisasi, pencucian asam dengan asam fluoride (HF), pirolisis dengan variasi persentase katalis ferosen 8%, 12%, dan 16%, serta ultrasonikasi. Karakterisasi material dilakukan dengan Raman Spectroscopy, FTIR, XRD, SEM-EDS, dan UV-Vis. Hasil Raman menunjukkan penurunan rasio intensitas pita D terhadap pita G, mengindikasikan pengurangan cacat struktur dalam domain karbon sp2. FTIR mengidentifikasi adanya gugus fungsional oksigen yang menunjukkan keberhasilan reduksi. XRD menunjukkan pola difraksi khas pada 2 26° dan 44°, mengindikasikan kristalinitas yang lebih baik. SEM-EDS memperlihatkan morfologi lembaran bertumpuk dengan kerutan, serta rasio atom karbon dan oksigen. UV-Vis digunakan untuk menghitung band gap grafen oksida tereduksi melalui Tauc Plot. Penambahan katalis ferosen mempercepat pirolisis dan meningkatkan kualitas grafen oksida tereduksi dengan menurunkan cacat struktur, meningkatkan kristalinitas, serta mengurangi gugus fungsional oksigen.

.....This study investigates the effect of adding ferrous catalyst on the formation of reduced graphene oxide synthesized from empty fruit bunch biomass of oil palm. The biomass is processed through carbonization, acid washing using hydrofluoric acid (HF), pyrolysis with varying ferrous catalyst percentages of 8%, 12%, and 16%, and ultrasonication. Material characterization is performed using Raman Spectroscopy, FTIR, XRD, SEM-EDS, and UV-Vis. Raman results show a decrease in the intensity ratio of the D band to the G band, indicating a reduction in structural defects within the sp2 carbon domain. FTIR identifies the presence of oxygen-containing functional groups, indicating successful reduction. XRD reveals characteristic diffraction patterns at 2 26° and 44°, indicating improved crystallinity. SEM-EDS shows stacked sheet morphology with wrinkles, as well as the carbon to oxygen atomic ratio. UV-Vis is used to determine the band gap of the reduced graphene oxide through Tauc Plot analysis. The addition of ferrous catalyst not only accelerates the pyrolysis process but also enhances the quality of reduced graphene oxide by reducing structural defects, improving crystallinity, and reducing oxygen-containing functional groups.