

Sintesis Graphene-coated Silica (GCS) sebagai CO₂ Adsorben = Synthesis of Graphene-coated Silica (GCS) as CO₂ Adsorbent

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Abstrak

Gas karbon dioksida (CO₂) merupakan salah satu gas rumah kaca yang saat ini mulai menjadi masalah sejak memasuki era industrial, dimana terjadi peningkatan emisi gas rumah kaca yang tak terkendali. Material berbasis silika dan karbon banyak digunakan karena memiliki permukaan yang luas dan juga gugus silanol untuk mengikat CO₂. Pada penelitian ini, disintesis komposit Graphene-coated silica (GCS) dari GO dan SiO₂. Graphene oxide disintesis menggunakan grafit dengan metode Hummers yang dimodifikasi. Kemudian, SiO₂ disintesis menggunakan TEOS dengan metode sol gel. Pada penelitian ini, Graphene-coated silica (GCS) berhasil disintesis yang dibuktikan dengan hasil karakterisasi menggunakan FTIR, XRD, Spektrofotometer Raman, FESEM, TGA, dan CO₂-TPD. Modifikasi Graphene-coated silica (GCS) berhasil dilakukan yang terlihat dari hasil Raman yang menunjukkan adanya perubahan pada pita D dan G. Pada FESEM terlihat bahwa lapisan graphene yang terlihat melapisi SiO₂. GCS menunjukkan kapasitas Adsorpsi CO₂ 3 kali lebih baik dibandingkan dengan SiO₂ yaitu sebesar 0.0763 mmol/g.

.....Carbon dioxide (CO₂) gas is one of the greenhouse gases which is currently starting to become a problem since entering the industrial era, where there is an uncontrollable increase in greenhouse gas emissions. Silica and carbon based materials are widely used because they have a large surface area and also silanol groups to bind CO₂. In this study, graphene-coated silica (GCS) composites were synthesized from GO and SiO₂ and reducing it with hydrazine hydrate so that it coats the silica particles. Graphene oxide was synthesized using graphite by the modified Hummers method. Then, SiO₂ was synthesized using TEOS with the sol gel method. In this study, Graphene-coated silica (GCS) was successfully synthesized as evidenced by the results of characterization using FTIR, XRD, Raman Spectrophotometer, FESEM, TGA, and CO₂-TPD. Modification of Graphene-coated silica (GCS) was successfully carried out as seen from the Raman results which showed changes in the D and G bands. In FESEM, it was seen that the graphene layer was coating SiO₂. GCS showed 3 times better CO₂ adsorption capacity than SiO₂, which was 0.0763 mmol/g.