Pengaruh surfaktan dalam modifikasi grafit menjadi graphene nanosheets serta aplikasinya sebagai adsorben rhodamine B = Effect of surfactants in modification of graphite into graphene nanosheets and its application as a rhodamine B adsorbent.

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Abstrak

Kopi merupakan salah satu hasil perkebunan yang memiliki nilai ekonomis yang tinggi dan dapat dijadikan sebagai komoditas strategis untuk perkembangan perekonomian negara. Namun, limbah ampas kopi memiliki kandungan senyawa organik yang dapat mencemari lingkungan. Pemanfaatan limbah ampas kopi sebagai prekursor material karbon telah banyak dilakukan karena ampas kopi memiliki kandungan karbon yang cukup tinggi. Pada penelitian ini, limbah ampas kopi yang telah dipirolisis digunakan sebagai prekursor utama dalam modifikasi grafit menjadi graphene nanosheets melalui metode liquid exfoliation dengan bantuan surfaktan anionik (SDS) dan kationik (CTAB). Graphene nanosheets hasil modifikasi telah dikarakterisasi menggunakan spektroskopi raman, XRD, FTIR, dan SEM. Hasil karakterisasi spektroskopi raman terlihat adanya perubahan intensitas pada pita D dan pita G yang mengindikasikan adanya perubahan struktur material grafit. Hal ini didukung dengan hasil karakterisasi XRD yang menunjukkan adanya perubahan ukuran kristalit . Hasil karakterisasi SEM menunjukkan adanya perubahan morfologi dari struktur amorf grafit menjadi lapisan tipis graphene. Analisis BET dilakukan dan menunjukkan adanya perubahan luas permukaan dan ukuran pori dari sampel. Aplikasi graphene nanosheets yang dihasilkan pada adsorpsi senyawa rhodamine b menunjukkan adanya peningkatan adsorpsi sebelum dimodifikasi dan setelah dimodifikasi menjadi graphene, yang semula 18.74 % pada 5 ppm menjadi 54.14 % (G-25 Kopi/SDS), 22.67 % (G-25 Kopi/CTAB), 76.17 % (GS Kopi/SDS), dan 66.56 % (GS Kopi/CTAB).
.....Coffee is one of the plantation products that has high economic value and can be used as a strategic commodity for the development of the country's economy. However, coffee grounds waste contains organic compounds that are harmful to the environment. The use of coffee grounds waste as a carbon material precursor has been widely carried out because coffee grounds have a fairly high carbon content. In this study, coffee grounds from pyrolysis produced graphite coffee grounds. The resulting coffee grounds graphite is then used as the main precursor in the modification of graphite into graphene nanosheets using the liquid exfoliation method with the help of surfactants, in the process two types of surfactants are used, namely anionic (SDS) and cationic (CTAB). The modified graphene nanosheets were then characterized using Raman spectroscopy, XRD, FTIR, and SEM. Raman spectroscopic characterization results prove that there is a change in intensity in the D band and G band which indicates a change in the structure of the graphite material. This is supported by the results of XRD characterization which shows a change in crystallite size. The results of SEM characterization showed that there was a morphological change from the amorphous structure of graphite to a thin layer as in graphene. BET analysis was carried out and showed a change in the surface area and pore size of the sample. The application of graphene nanosheets produced on the adsorption of rhodamine b compounds showed an increase in adsorption before modification and after modification to graphene, which was originally 18.74 % at 5 ppm to 54.14% (G-25 Coffee/SDS), 22.67% (G -25 Coffee/CTAB).), 76.17% (GS Coffee /SDS), and 66.56% (GS Coffee /CTAB).