

Intisari

Sintesis dan Karakterisasi Karbon Dot dari Ampas Kopi dengan Variasi Suhu

Karbonisasi

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Karbon dot memiliki banyak sifat yang menarik, seperti sifat penyerapan cahaya rentang UV-tampak dan emisi *photoluminescence*, sehingga menjadikannya memiliki banyak aplikasi, seperti sensor optik dan *bioimaging*. Penelitian ini memiliki tujuan untuk mensintesis karbon dot dari ampas kopi pada perlakuan pencucian dan tanpa pencucian dengan masing-masing suhu karbonisasi yang berbeda dari 400°C, 450°C, dan 500°C dan mempelajari efek pada sifat fisik seperti diameter dan distribusi partikel dan sifat optik seperti UV-Vis dan *photoluminescence*. Diperoleh bahwa, perlakuan untuk tanpa pencucian menunjukkan hasil intensitas *photoluminescence* yang lebih tinggi dari pada perlakuan pencucian, diindikasikan adanya peran protein, senyawa fenolik, dan asam amino terhadap *photoluminescence* pada karbon dot dari ampas kopi. Disisi lain, penurunan *photoluminescence* diamati seiring peningkatan suhu karbonisasi pada perlakuan pencucian dan tanpa pencucian yang mungkin disebabkan oleh berkurangnya gugus oksigen dan kerusakan permukaan karbon dot. Hasil diameter partikel perlakuan pencucian menunjukkan diameter terkecil 95,3 nm daripada perlakuan tanpa pencucian 106,6 nm, selain itu diamati seiring peningkatan suhu karbonisasi perlakuan pencucian menunjukkan diameter partikel yang semakin besar yang kontras dengan perlakuan tanpa pencucian bahwa seiring peningkatan suhu karbonisasi diameter partikel semakin kecil. Karbon dot diperoleh dengan diameter terkecil pada sampel P-400 sebesar 95,3 nm dengan emisi warna biru kehijauan pada sinar eksitasi 405 nm dan intensitas *photoluminescence* tertinggi pada sampel TP-400 menunjukkan emisi berwarna hijau pada sinar eksitasi 405 nm.

Kata kunci : ampas kopi, karbon dot, karbonisasi, *photoluminescence*.

ABSTRACT

SYNTHESIS AND CHARACTERIZATION OF CARBON DOTS FROM COFFEE GROUNDS WITH VARIATIONS IN CARBONIZATION TEMPERATURE

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Carbon dots have many interesting properties, such as UV-visible light absorption and photoluminescence emission, making them have many applications, such as optical sensors and bioimaging. This study aims to synthesize carbon dots from coffee grounds in washed and unwashed treatments with different carbonization temperatures of 400°C, 450°C, and 500°C, respectively, and study the effects on physical properties such as particle diameter and distribution and optical properties such as UV-Vis and photoluminescence. It was found that the unwashed treatment showed higher photoluminescence intensity results than the washed treatment, indicating the role of proteins, phenolic compounds, and amino acids on photoluminescence in carbon dots from coffee grounds. On the other hand, a decrease in photoluminescence was observed with increasing carbonization temperature in both washed and unwashed treatments, which may be due to the reduction of oxygen groups and damage to the carbon dot surface. The results of the particle diameter of the washing treatment showed the smallest diameter of 95.3 nm compared to the treatment without washing 106.6 nm, in addition it was observed that along with the increase in carbonization temperature the washing treatment showed a larger particle diameter which was in contrast to the treatment without washing that along with the increase in carbonization temperature the particle diameter became smaller. Carbon dots were obtained with the smallest diameter in the P-400 sample of 95.3 nm with a greenish blue emission at 405 nm excitation light and the highest photoluminescence intensity in the TP-400 sample showed green emission at 405 nm excitation light.

Keywords: coffee grounds, carbon dots, carbonization, photoluminescence