Студенттер мен жас ғалымдардың
доцент Казаков Юрий Викторовичты еске алуға арналған
«ТЕХНОЛОГИЯЛЫҚ ЖАНУДЫҢ ПРОБЛЕМАЛАРЫ» атты
конференциясының

ЕҢБЕКТЕР ЖИНАҒЫ

PROCEEDINGS

of Conference of Students and Young Scientists
"PROBLEMS OF TECHNOLOGICAL COMBUSTION"
dedicated to the memory of docent Kazakov Yuriy

СБОРНИК ТРУДОВ

конференции студентов и молодых ученых
«ПРОБЛЕМЫ ТЕХНОЛОГИЧЕСКОГО ГОРЕНИЯ»,
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Алматы 2018

IMPROVED FASTER METHOD FOR OBTAINING GRAPHENE OXIDE

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Recently, graphene and graphene oxides have found independent use as a material for nanoelectronics, a component of polymer and inorganic composite materials, solar batteries, supercapacitors, membranes, adsorbents, quantum dots, fluorescent material for biology and medicine. Methods for obtaining of graphene have been mainly catalytic chemical vapor deposition, heat-treatment of SiC, and the reduction of graphene-oxide. However, there still have room for methods that are simpler and faster. In this contribution, we have synthesized of graphene oxide from graphite in four hours. Firstly, 5 g graphite powder, 2.5 g $NaNO_3$ and 115 mL H_2SO_4 were added in a round-bottom flask by stirring for 30 min to get homogeneous solution. Then the mixture was putted in ice bath and 15 g $KMnO_4$ slowly added. After that 230 mL deionized water was added in this mixture by stirring for 15 min with magnetic stirrer. Then 400 mL H_2O and 50 mL H_2O_2 (37%) were added in this solution and heated around 98°C by sonicating for 1 h. Then resulting solution was filtered through PVDF membrane and washed several times with deionized water up to reach neutral pH.

The obtained samples were investigated by Raman spectroscopy "Solver Spectrum" (NT-MDT). Raman spectra were obtained by excitation with a blue laser with a wavelength of 473 nm, the signal accumulation time was 30 seconds. The spectral resolution of the grating was 4 cm^{-1}. The obtained peaks characterize the presence of graphene oxides in the composition of the sample, which exhibit D, G and G' bands (D and G bands around 1363 and 1588 cm^{-1} and G' bands around 2725 cm^{-1}).

In summary, we have demonstrated a simple, fast and scalable method for producing graphene oxide. Detailed observation revealed that the produced samples consisted of graphene oxide with domains of a few micrometers in size. In addition, we can say that the resulting graphene oxide can be use to make high-performance carbon-based energy storage and conversion devices, next-generation water filters and various nanocomposites.