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GRAPHENE OXIDE AMINO ACID BASED NANOSTRUCTURES: SYNTHESIS, CHARACTERIZATION AND SENSITIVITY TO Co-60 IRRADIATION

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Graphene-based nanostructures have been recognized as a promising material for a variety of applications ranging from bio- and life-sciences to materials science. In this paper, we present results of the study on the synthesis, functionalization and sensitivity to irradiation of graphene oxide and amino acid based hybrid nanostructures in the gamma radiation field. Modified Hummers method was used for the fabrication of graphene oxide. Structural properties of the obtained material had been investigated by the scanning electron microscopy (SEM). The morphology of the graphene layers was preserved and high oxygen content had been found by the energy dispersive X-ray spectroscopy (EDS), verifying successful process of oxidation. In the second phase, a reduction of graphene oxide was conducted in the presence of sodium borohydride or ascorbic acid and related changes in optical properties induced by the reduction process have been monitored by UV-vis absorption spectroscopy. In the final phase, stable intermediate forms of the reduced graphene oxides (rGO) with preserved hydrophilicity have been isolated for conjugation with selected amino acids: tryptophan and phenylalanine. The UV-vis spectra of graphene oxide and reduced graphene oxide water solutions before and after functionalization with amino acids were recorded. The observed changes in characteristic absorption bands of graphene oxide after conjugation proved that the amino acids interacted with the graphene oxide and reduced graphene oxides while maintaining its initial optical properties. Photoluminescence emission spectra of amino acids before and after conjugation have shown that the presence of graphene materials influenced the emission intensity of amino acids and the appearance of new emission maxima. Taking into account possible applications of the obtained graphene-based hybrid nanostructures research was carried out regarding its behavior during irradiation in Co-60 gamma radiation field.



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