

Nanocomposites and nanomaterials

Features of the structure and electronic properties in conducting polymers doped by carbone nanoclusters

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Study of the structure and properties of new allotropic modifications of carbon is very important for the development of nanomaterials science. Materials based on carbon nanoclusters attract attention due to its unique features – a large surface area, flexibility, excellent electrical and thermal conductivity, chemical stability, providing prospects for their use in various fields, including the development of sensors, photodetectors, energy-saving and energy-transformation devices, photovoltaic solar cells.

In our work the influence of carbon nanoclusters of different structure (fullerene, multiwall carbon nanotubes and graphene oxide) on the structure, electrical and optical properties of the hybrid composites based on conjugated polymers – polyphenylacetylene, polyaniline, poly(3,4-ethylenedioxythiophene) and poly(orthotoluidine) has been studied, using methods of optical spectroscopy, cyclic voltammetry, electron paramagnetic resonance spectroscopy, scanning electron microscopy, atomic force microscopy, infrared spectroscopy and Fourier transform X-ray microanalysis. It has been found that carbone nanoclusters may affect structure and electronic properties of conducting polymers due to charge separation [1], delocalization of carriers or creation of quantum dots in hybrid nanostructures [2].

The obtained results are the new approaches for the search of new nanostructures based on conducting polymers, carbon nanoclusters and nanoporous media to be used in intelligent electronic devices.

1. *Aksimentyeva O. I., Konopelnyk O. I., Dyakonov V. P., Shapovalov V. V. , Horbenko Yu. Yu. Charge separation in polyphenylacetylene – fullerene nanostructures // Fullerenes and nanostructures in condensed matter. - Minsk: Edit. Center of BSU.-2011.-P. 184-189.*
2. *Olenych I. B., Aksimentyeva O. I., Monastyrskii L. S., Horbenko Yu. Yu., Partyka M. V., Luchechko A. P., Yarytska L. I. Effect of graphene oxide on the properties of porous silicon // Nanoscale Research Letters.-2016.-11, N 1.-doi: 10.1186/s11671-016-1264-5.*