Nanooptics and nanophotonics

Nanocomposites of polyaniline with graphene as the transport layer of polymer light-emitting diodes

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Interpolymer complexes of polyaniline (PAni) and poly(amidosulfonic acids) (PA) PAni·PA could be prepared in the form of highly stable aqueous dispersions, and PAni·PA films are transparent for visible light [1]. The stability of PAni·PA dispersions exceeds that of poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate), PEDOT:PSS, based dispersions. Also, the possibility of preparing stable aqueous dispersions of graphene capable of producing highly conducting transparent films was shown earlier [2]. In this report we present results of using nanocomposites based on PAni·PA and graphene (PAni·PA-G) as a material of the hole transport layer in polymer light-emitting diodes (PLEDs). Poly(2-methoxy-5-(2´- ethylhexyloxy)-1,4-phenylene vinylene), MEH-PPV, was used as a light-emitting material. The prepared PLEDs had the following heterostructure: ITO/PAni·PA-G/MEH-PPV/LiF/Al. The functional characteristics of these PLEDs were compared with that of the traditional PEDOT:PSS based PLEDs: ITO/PEDOT:PSS/MEH-PPV/LiF/Al. It was established that the PLEDs based on PAni·PAMPSA/G nanocomposites possessed higher functional characteristics – current density, brightness, current and luminous efficiency – than the PLEDs based on the individual interpolymer complex PAni·PA. It was shown that PAni·PAMPSA/G nanocomposites could be used instead of PEDOT/PSS as hole transport layers for creation of effective organic optoelectronic devices.

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2. *Posudievsky O. Yu., Khazieieva O. A., Koshechko V. G., Pokhodenko V. D.* Preparation of graphene oxide by solvent-free mechanochemical oxidation of graphite // J. Mater. Chem.–2012.–**22.**–P. 12465–12467.