

Immobilization of polymeric luminophor on nanoparticles surface

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Materials with luminophor properties are widely used in the production of lighting devices, sensors, detectors, bioassays or diagnostic systems. One of the priorities is the development of polymer luminophors with reduced toxicity. Such polymers can extend the luminophor utilization in biotechnology and medicine, including the development of biomarkers. That's why it is of considerable interest in the development of composites based on polymeric luminophor and nanoparticles as a carrier. The aim of this study was to develop a method of immobilization of the monomeric luminophor on a surface of nanoparticles and investigation of the structure of the grafted layer.

The monomer 2,7-(2-hydroxy-3-methacryloyloxypropoxy)naphthalene (2,7-NAF.DM) was used to attaching. The oxidized multiwalled nanotubes and pyrogenic silica were utilized as carriers. In order to improve monomer-nanoparticles interaction, nanotubes and silica were activated via attaching of the vinyltriethoxysilane. Liquid-phase adsorption and chemisorption were applied for 2,7-NAF.DM immobilization on the surface of nanoparticles. As expected, vinyl groups on the nanoparticles surface provide better affinity between the carrier and luminophor (2,7-NAF.DM). The modification process was carried out from toluene solution of monomer using AIBN as a polymerization initiator with heat and ultrasonic stimulation. The structure of the grafted surface layer was studied by means of thermal (DSC, TGA) and spectral analysis. Obtained results confirm the chemisorption of luminophor on the nanotubes and silica nanoparticles. After chemisorption the microstructure of 2,7-NAF.DM molecules is not changed, as opposed to a mechanical mixture or adsorption modification via an impregnation with the polymer solution.

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