

Nanocomposites and nanomaterials

New photopolymerizable systems based on functionalized TiO₂ nanoparticles: Preparation and Thermal Properties

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In last time is a general interest and need for surface modifications for tailoring the properties of materials devices and providing their additional functionalities. One of the interesting results concerning the photopolymerizable systems was photoinitiation of polymerization of macrophotoinitiator (MPI) from the surface of nanoparticles. Surface modification of mineral particle by polymers of diverse nature is one of the known techniques used for compatibilization of components in composite materials and is addressed to improve poor adhesion between polymer matrix and hydrophilic surface of bioceramics resulting [1].

For this, multifunctional macroinitiators with the photoinitiating benzoin derivatives fragments and highly reactive and polar carboxylic and anhydride groups were synthesized. This synthesis is grounded on tethering of benzoin derivatives to copolymer of maleic anhydride with methyl methacrylate [2]. Chemical structure of MPI and content of tethered benzoin moieties were determined using FTIR-, NMR- and UV- spectroscopies. The molecular weights of the MPIs were analyzed using gel permeation chromatography (GPC) and size exclusion chromatography (SEC). Thermal behavior of polymer materials and modified particles has been investigated using thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC).

As a result the improvements in the physico-mechanical properties of the filled polymer composites on the basis of mineral nanofillers have been achieved.

1. Allen N.S. Photoinitiators for UV and visible curing of coatings mechanisms and properties // Journal of Photochemistry and Photobiology A: Chemistry. -1996.-**100**.-P. 101-107.

2. Ohar H, Dolynska L, Tokarev V. Synthesis and application of macrophotoinitiators obtained via benzoin tethering with copolymers of maleic anhydride // Chem. Chem. Technol. – 2013.-**7**.-P. 125-130.