

## Thematic area of your work

### Modification of urethaneureasilsesquioxanes with zinc acetates

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Hybrid organic-inorganic nanocomposites are widely used in optics, electronics and membrane technology due to the inherent peculiar properties: thermal and mechanical stability as well as optical transparency [1,2]. Using sol-gel method, nanocomposites can be obtained in terms of factors of spatial restriction, allowing to control their structure and level of porosity [3].

In order to study the influence of self-association of bisilane precursors on the hybrid organic-inorganic polymers' structure formation the organic-inorganic precursor based on macrodiisocyanate PEG 1000, 1,6-hexametylenediisocyanate, which has been subjected to interaction with benzidine followed by subsequent interaction with APTES - 3-(aminopropyl) triethoxysilane has been synthesized. Sol-gel hydrolytic polycondensation was carried out in the presence of zinc acetate at different molar ratios of precursor and Zn acetate:- 1:1; 1:2; 1:3; 1:6. Non-modified hybrid was served as a reference sample. The resulting composites were subjected to extraction with water and acetone with following determination of their density. The changes in the structure were controlled by means of IR spectra. The contribution of individual types of associates to the total absorption of obtained zinc-containing polymers has been determined by computer processing of IR spectra with decomposition of the strips contour onto constituent - Lorentz functions (programs Fityk).

A comparative thermogravimetric analysis of obtained nanocomposites in terms of 5% mass losses has shown that the matrix loses the pointed amount at 289°C, while the composites at 235- 260°C, indicating the formation of a high porous structures. The dependence of glass transition temperature on Zn acetate content was studied by DSC method.

1. *Kyung-Min Kim, Yoshiki Chujo.* Organic-inorganic hybrid gels having functionalized silsesquioxanes // *J. Mater. Chem.*- 2003.- 13, P. 1384-1391.
2. *Chattopadhyay D.K., Raju K.V.S.N.* Structural engineering of polyurethane coatings for high performance applications // *Prog. Polym. Sci.* - 2007.- 32, P. 352-418
3. *Serov V.G., Robota L.P., Litviakov V.I., Zub Yu.L., Dudurko O.A., Savelyev Yu. V.* // *Voprosy khimii i khimicheskoi technologii.* -2009.- № 3, P. 94-97