

# Nanocomposites and nanomaterials

## **An influence of interfacial interactions on sorption and mechanical properties of organic-inorganic nanocomposites based on sodium silicate**

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It is well-known fact that bonding at the interface determines the structure of interfacial region, supramolecular structure and mechanical properties of the organic-inorganic polymer nanocomposites (OIC).

In this work the effect of isocyanate groups content in the macrodiisocyanate (MDI) of organic phase on interfacial interactions, sorption and mechanical properties of OIC has been studied. Hybrid polymer composites, consisting of a polyuretan organic phase and mineral inorganic phase were prepared by the joint polycondensation of the MDI with unmodified or polyacrylic acid modified aqueous sodium silicate [1]. For the synthesis of MDI with NCO groups content from 6 to 10 % the poly(propylene glycol) of  $M_w$  1000 and tolylene diisocyanate (mixture of 2,4/2,6 isomers with ratio of 65/35 wt%) were used. The interface interactions between NCO groups of organic phase and silanol groups of inorganic phase is studied by FTIR. Morphology studies of OIC containing 40 wt % of unmodified sodium silicate by SEM shown a formation of nanoheterogeneous structure of the composite in which inorganic phase is well-dispersed in continuous elastomeric matrix [2]. It is stated out that the increasing NCO groups content in organic phase is caused to increasing hydrophobic urethane-silicate layer content at the interface, decreasing water sorption ability and improving mechanical characteristics of composites obtained using both unmodified and polyacrylic acid modified sodium silicate.

1. Mamunya Ye. P., Shtompel V. I., Lebedev Ye. V., Pissis P., Kanapitsas A., Boiteux G. Structure and water sorption of polyurethane nanocompositers based on organic and inorganic components // European Polymer. J.-2004.- **40**. - P.2323 - 2331.
2. Malysheva T. L., Ye. V. Lebedev An influence of sodium silicate modified by polyacrylic acid on the properties of organic-inorganic composites // Polimernyi jurnal.-2013.- **35**, N 3.- P. 415-420.

