# Nanochemistry and Nanobiotechnology

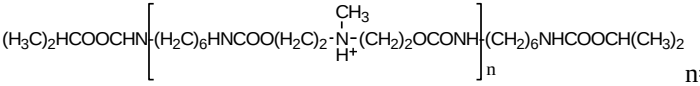
## New functionalized nanofillers and based polyurethane nanocomposites

**A. N. Gonchar, Yu. V. Savelyev**

*Institute of Macromolecular Chemistry NAS of Ukraine, Kharkovskoe shosse 48, 02160, Kiev, e-mal:* lexgon@ukr.net

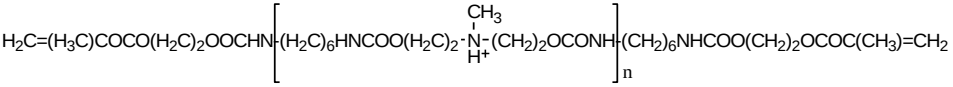
An actual trend in the field of surface modification is creating new nanofillers for polymers in order to improve strength properties of materials based on them. Natural inorganic structures such as montmorillonite (MMT) are commonly used for making polymer nanocomposites.

Surface modification of MMT nanoparticles, by chemical adsorption of organic cations, opens opportunities for compatibility of silicate nanoparticles with a polymer. To create nanocomposites based on different polyurethane types a synthesis method of a new modificator based on oligouretane ammonium chloride (OUACl) which contains urethane groups was developed:



n=1,8

The new modificator provides a full exfoliation of a nanofiller in a polyurethane matrix, which increases strength of polyurethane materials. By analogy with OUACl, olygourethane methacrilate ammonium chloride (OUMAACl) was synthesized. Beside urethane groups, which provide a stable physical bond with a polyurethane matrix, there are reactive groups, which can form a chemical bond with a polymer matrix:



n=1,8

Unlike classical surfactants used in MMT modifications new modificators provide a high affinity of modificated MMT with polymere matrix due to the possibility of physical and chemical bonding. WAXS study of modificated MMT and urethane based nanocomposites with modificated MMT prove a new type of modificator intercalation into the interlayer space MMT and full expholiation of modificated silicate in the polymere matrix. Thus by modifying MMT with our new modificators the full exfoliation of nanofiller in the polymere matrix was reached and the strength of polymer materials was reached by 40% for linear polyurethanes and by 250% for cross-linked polyurethaneacrylates.