

Nanocomposites and nanomaterials

New montmorillinite modifier for creation of polyurethane acrylate/organoclay nanocomposites *in situ* polymerization

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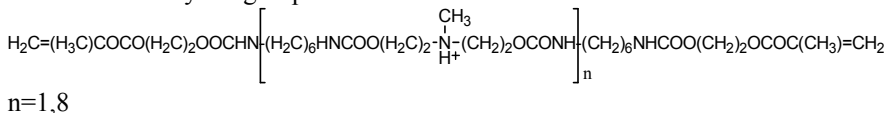
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An actual trend in the field of surface modification is the creating of new nanofillers for improvement strength and barrier properties of based materials. Natural inorganic structures such as montmorillonite (MMT) are commonly used to produce polymer nanocomposites. Surface modification of MMT nanoparticles by chemical adsorption of organic cations has opened the opportunities for compatibility of silicate nanoparticles with polymer.

In order to create polymer nanocomposites with high performance properties on the basis of polyurethane acrylates the method of montmorillonite modification with a new modifier oligourethane methacrylate ammonium chloride (OUMAAC) has been developed. Synthesized new modifier comprises both urethane and reactive methacrylate groups.



Intercalation of modifier into the interlayer space of MMT was confirmed by X-ray analysis; the content of organic component in the MMT modified with OUMAAC (MMT/M) was determined by thermogravimetric analysis. The new modifier – OUMAAC provides high affinity of MMT/M with polymer matrix due to the possibility of physical and chemical bonds formation. The physic-mechanical tests of the polymer nanocomposite with MMT/M concentration of about 3% have shown the strength increase in almost 3 times as compared to polyurethane acrylate matrix. Study of vapor permeability and water absorption of nanocomposites based on polyurethane acrylate and MMT modified with OUMAAC has shown the improved in 2.23 times gas barrier properties as compared to the original matrix.

New method of MMT modification is universal and can be applied to MMT of various origins (deposits).