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SYNTHESIS AND PROPERTIES OF OPTICALLY TRANSPARENT COMPOSITE ON THE BASIS OF BUTYL METHACRYLATE COPOLYMER WITH STYRENE

At the nanometer scale, qualitatively new effects, properties and processes determined by quantum mechanics, dimensional quantization in small structures and other phenomena and factors arise [1, 2]. The polymer-metal nanocomposites as the composition materials possessing whole complex of unique properties are of particular interest.

The purpose of this work was the preparation of optically transparent nanocomposites differing with high light transmission and the best physical-mechanical properties. The object of the investigation was the copolymerization reaction of butyl methacrylate (BMA) with styrene (St), and the obtained copolymer has been modified with nanoparticles of $Cu(CH_3COO)_2$.

The copolymerization reactions of BMA with St were carried out in ampoules in a benzene solution in the presence of 0.2 mol % of AIBN of the total quantity of comonomers at 70°C. The modification of co-BMA+St with nanoparticles of $Cu(CH_3COO)_2$ was carried out by means of device with rollers of small form №58 (plant "Kostroma").

The compositions of copolymers have been calculated on the basis of data of elemental and IR spectral analyses.

The copolymers are powders of white color, well soluble in benzene, chloroform and carbon tetrachloride.

The copolymers of BMA+St combining the advantages have higher physical-mechanical and heat-physical properties in comparison with polystyrene and polymethylmethacrylate, which do not give dangerous fragments during strikes. These qualities allow their using in making of details for optical devices and contact lenses.

Table 1. Physical-mechanical characteristics of the synthesized copolymer

Name of indices	p-St	BMA+St
Vicat heat resistance, °C	103	120
Brinell hardness, kg/mm^2	14	17
Specific impact strength, $kg \cdot cm/cm^2$	18	19
Tensile strength, MPa	39.0	70
Refraction index	1.5890	1.5870
Adhesion strength, MPa	-	5.4

Composition of copolymer of BMA:St 0.5:0.5.

The copolymer obtained on the basis of monomers of BMA+St, modified by nanoparticles of $Cu(CH_3COO)_2$ show higher optical transparency(n_D^{20}=1,5940) than the copolymer (1.5870). A light transmission of the obtained composite (90%) is higher than in the copolymer BMA+St (88%).

REFERENCES

1 Pool, Ch., Nanotechnology/ Ch. Pool. Tekhnosfera, Moscow, Russia. 2006, c. 336.

2 Gusev, A.I., Nanomaterials, nanostructures, nanotechnologies/ A.I.Gusev. Fizmatlit, Moscow, Russia. 2005, c. 416.