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**STUDY OF THE EFFECT OF TITANIUM DIOXIDE NANOPARTICLES
ON THE STRUCTURAL PARAMETERS OF STYRENE ACRYLIC
POLYMER**

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Among the directions for slowing down combustion processes, the introduction of nanoparticles into flame retardant finishing compositions as thermophysical additives is promising. Nanoparticles of metal compounds showed good results in reducing flammability, since these substances are resistant to temperatures up to 1000°C (hydroxides, carbon nanotubes, etc.) or decompose at temperatures below 400 – 500°C (hydroxides, salts). Metal oxides are also able to catalyze coke formation processes and form a protective layer on the surface of a burning polymer.

The most studied metal oxides include titanium dioxide, which in addition to thermal properties has a number of defining characteristics: non-toxicity, good electrical, chemical, thermal and photocatalytic properties.

For impregnation of nanoparticles, polymers or polymer blends are most often used. Due to the combination of various functional features, the formed nanocomposites are capable of providing excellent, often synergistic, material properties.

It is known that the introduction of fillers in polymers significantly changes the properties of polymer composite materials. In this regard, the study of the influence of fillers on the structural characteristics of the polymer films is of particular importance.

The goal of the work is to study the effect of nanosized titanium dioxide on the structural characteristics of styrene acrylic polymer Lacrytex 430.

A polymer nanocomposite was created by introducing previously prepared suspensions of titanium dioxide in various concentrations into an aqueous dispersion of a styrene acrylic polymer. Structural parameters of polymer films filled with titanium dioxide were determined by sol-gel analysis through the equilibrium swelling of nanocomposites in solvents.

According to the results of the study, it was found that the introduction of titanium dioxide nanoparticles into the styrene acrylic polymer Lacrytex 430 does not lead to an improvement in the structural parameters of nanocomposites. At a concentration of nano-TiO₂ up to 2 wt%, the average molecular chain length and the degree of crosslinking remain unchanged. Increasing the concentration of titanium dioxide reduces the studied parameters. As can be seen from the data obtained, the TiO₂ content above 3 wt% increases the average molecular length, reduces the crosslinking density, which may be a consequence of the agglomeration of particles of titanium dioxide in the polymer.

Based on the results of studying the interaction between the nanofiller and the polymer matrix, it was found that titanium dioxide does not change the structural parameters of the polymer at a concentration of 1 – 2 wt%.