

Interfacial interactions and surface phenomena in the technology of organosilicate compositions and coatings

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Keywords: *organosilicate coatings, polyorganosyloxane, layered hydrosilicates, organo-inorganic hybrides, adsorption of polymers, dispersion, MCA of the components, suspension.*

Abstract

During prolonged mechanochemical treatment in the system "polyorganosiloxane (POS) – silicate – solvent", along with the increase in the degree of dispersion of silicates and concentration of defects in their structure, there takes place a rupture of individual bonds in POS, and as a consequence, between the silicate and polymer components there occur physical and chemical interaction, the intensity of which may be different depending on the nature of the silica and film formers used, and the ratio of polymer / silicate in the formulation of organosilicate (OS) material. The kinetic feature of the mechanically induced chemical reaction of silicates with POS is determined by the fact that there occurs inoculation of the polymer onto the surface of silicates. The process is limited by the diffusion of POS through inhomogeneous by structure adsorbed and boundary polymer layers at the interface with the solid body. Differences in the structure are due to dissimilar macromolecular and supramolecular structures involved in the creation of the alternating layers of composition. This reaction is characterized by internal diffusion resistance, slowing the interaction of the POS with modified surface of silicates. The contribution of physical adsorption in the share of POS held by the silicate should greatly exceed the contribution of mechanically stimulated chemisorption. There appear the interfacial chemical bonds in the process of mechanochemical preparation of OS composition, but this type of interaction is not predominant.