FORMATION TECHNOLOGY OF THIN –FILM NANOSCALE SYSTEMS

Yauheni V. Auchynnikau
Yanka Kupala State University of Grodno

The structure and morfology of thin films of fluorine-containing oligomers was investigated. The general formula was following R_f-R_1 (Rf-fluorine-containing radical, R_1-functional group -COOH, -$CONH_2$, $(-COO)_2Mo$) for fluorine-containing oligomers. A film received из1-2 of % mas. A solution of active substance in a freon. The covers subjected to power effect (heat treatment, irradiation). A film heat treated at T=373-573K. A film of fluorine-containing oligomers irradiated with a soft X-radiation. A structure of films studied by a method of IR-spectroscopy.

The structure of a film depends on a structure of functional group, kind of power effect. The nature of a substrate renders influence to a structure of films. The oligomers form boundary layers. The boundary layers are guided perpendicularly surfaces. The orientation of molecules varies with increase of a thickness of a film. The molecules of fluorine-containing oligomers are guided in parallel to a substrate. The structure will be formed as "sandwich". Power effect results in additional ordering of molecules. The overmolecular structures will be formed at power effect.

The globulars texture change morfology and topography of films. Film apply on nonmetallic substrates. The substrate did not render an orienting operation on molecules. Power effect results in formation only of overmolecular structures in this case. The appearances of orientation render essential influence to mechanical properties (factor of friction, adhesion, strength etc.). By fluorine-containing oligomers treated a surface of carbon steel, electrolytic chromium. A film of fluorine-containing oligomers increase microhardness of treated materials. Values of a specific surface determined depending on a kind of power effect and structure of molecules. The factor of friction depends essentially on intensity of power effect.

New theory for the formulation and experimental studies of structural, phase transformations in nanostructured thin-film coatings, formed on the basis of fluorine-containing oligomers depending on the technological parameters of obtaining (the oligomer concentration in solution, the nanomodifier concentration in the coating, the radiation dose, the composition of the oligomer and the type of substrate), optimized compositions of nanostructured coatings for various tribosystems in conjunction with the operating conditions.