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OBTAINING FUNCTIONAL COATINGS BASED ON MODIFIED PHENOL FORMALDEHYDE OLIGOMERS

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Oligomers of phenol-formaldehyde resins are widely used as binders in the development of materials with improved parameters of deformation-strength and tribological characteristics. The advantage of oligomers is their increased resistance to the effects of thermo-oxidizing media, high-temperature gas flows, due to the characteristic structure of the matrix and the chemical composition of the oligomer macromolecules.

Taking into account the high activity of imido-compounds in the processes of interaction with oligomeric resins and thermo-heat resistance of its own cross-linked structure, structural transformations in the modification of oligomers phenol-formaldehyde resins were investigated.

As modifiers used reactive oligomers of the class of N,N'-bis-imido compounds of different composition, structure and reactivity (unsaturated dicarboxylic acids, dianhydrides aromatic and cycloaliphatic tetracarboxylic acids with several aromatic diamines). Model compounds for the study was prepared by introducing powdered imidocomponents in the synthesized or standard solution of phenol-formaldehyde resin with subsequent drying and dispersing in a ball mill. Block samples for research were formed by cold and hot pressing at a pressure of 50–70 MPa. The thermomechanical analysis carried out by the method of pulse loading with a constant component in the

penetration mode revealed the following regularities. The process of structuring the oligomer of phenol-formaldehyde resin leads to the appearance of highly elastic properties of the oligomer structured by modifiers, characterized at the initial stage of curing by significant plastic deformations of the sample, in the volume of which the formation of a spatial net occurs, and then there is a transition from a structure with high elasticity to the structure of non-elastic resin. The introduction of modifying additives of imide-containing reagents into the model composition of the oligomer significantly changes the character of thermomechanical analysis curves. As shown by the studies, modifying compounds affect the structure of composite binders at two levels – intermolecular, increasing the degree of crosslinking of the oligomer phenol-formaldehyde resin at the site of methylol groups and interphase, due to its own structuring of the modifier particles to form a crosslinked high-strength structure. Such a mechanism of modifying action of imido-containing compounds provides the implementation of the advantages of both components of the composite binder – maintaining the required level of parameters of adhesion characteristics and increase the parameters of heat resistance by increasing the degree linking in the system of the resulting polymer as in the formation of functional coatings, and in the production of composite materials for constructional purposes.

LIGHT TRANSFORMING PROTECTION SHIELD

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To diminish degradation of Silicon Solar Cells (SSC) they are protected by optically transparent glass shields and polymeric film Ethylene Vinyl Acetate (EVA) serving as encapsulant, sealing the shield with the surface of Solar Cell. The EVA film degrades due to UV solar radiation.