

- **Nanocomposites and nanomaterials**

The Effect of Nanodisperse Fillers on the Viscoelastic Properties of Antifriction Solid Lubricant to Be Used in the Cold Plastic Deformation of Titanium Alloys

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The viscoelastic properties of the epoxy polymer (EP) samples without and with the additions of nanodisperse fillers (polysiloxane particles (PSP) produced by the sol-gel method, silicon dioxide of the A-380 grade), with and without introduction of the antifriction fillers (graphite, molybdenum disulphide MoS₂) have been investigated.

The viscoelastic characteristics: tangent of mechanical losses ($\tan\delta$) and dynamic elastic modulus (E) were measured on a dynamic analyzer Q800 (TA Instruments, USA) in the voltage distortion mode at a frequency of 10 Hz.

It has been defined that the EP modification by PSP in 1 and 3 wt % results in a decrease of the glass transition temperature T_g of the composite and the density of its linkage. The EP filling with graphite leads to blocking the mobility of some part of the structure units and removal of them from the relaxation process, which increases the elastic modulus value of the composite by a factor of 1.7.

Among the samples of composites under study the sample of the composite containing graphite and 3 wt % PSP is characterized by a lower T_g , highest density of the linkage of the polymer mesh, minimal $\tan\delta$ (1.02) and the maximal value of the E (4.44 GPa).

The use of this composite as an antifriction solid lubricant made it possible to raise the contact pressure during cold plastic deformation of titanium alloys to 2.2 GPa.