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## CONTENTS

## ABSTRACTS OF PUBLISHED ARTICLES

UDC 678.067:539.538

**Antifriction polymer composites modifying at different scale levels.** Rybin V. V., Anisimov A. V., Bahareva V. E. – Problems of Materials Science, 2009, N 1 (57), pp. 9–16.

Methods of antifriction carbon plastics modifying at different scale (hierarchical) levels are proposed, molecular, nano, micro and micro levels namely. For each scale level optimal modifying agents were chosen. It was found that composite wear process has nano scale level. All the processes take place in the surface layers from 10nm to 500 nm depth, carbon plastic wear products being nanoparticles of 50–100nm size.

Key words: modifying, scale level, hierarchical level, nanomodifying, micromodifying, macromodifying, fluoroplastic, molybdenum disulfide, babbit, carbon

UDC 678.067:539.538:621.822.5

**Development of fluoroplastic macromodifyed carbon plastics for sliding bearings of working wheels of rotation blade hydro turbines**. Bahareva V. E., Anisimov A. V., Savelov A. S., Pekler K. V., Iliin C. J., Morkin O. V. – Problems of Materials Science, 2009, N 1 (57), pp. 17–25.

The problem of work life of bearings in working wheels of rotation blade hydro turbines with diameter up to 1500 mm is one of the most acute in hydropower engineering. These bearings are to be used with water lubrication at contact pressures 50–80 MPa and sliding velocities 0.001–0.005 m/sec for 10–15 years preserving friction coefficient below 0.1. For production of such bearings phenol carbon plastic ФУТ macro modified by fluoroplastic is proposed ensuring friction coefficient decreasing for 2–3 times, increasing of wear resistance and working life. Mechanical technology of production is developed for manufacturing of large-sized low rate highly loaded bearings. Composition and structure of friction surface were investigated. It was found that fluoroplastic protector promotes formation of nanosized fluoroplastic particle layer at the carbon plastic surface, these particles working as lubricant with low friction coefficient.

Key words: bearings in working wheels of rotation blade hydro turbines, macro modified carbon plastic, fluoroplastic protector, binary supports, electron microscopy, sliding friction coefficient.

UDC 678.067:621.891

**Investigation of carbon plastics modified with fluoroplastic.** Dobytchin M.N., Kurbatkin I. N., Morozov A. V., Nikulin A. V., Satchek B. J., Savelov A. S., Anisimov A. V.– Problems of Materials Science, 2009, N 1 (57), pp. 26–32.

The results of complex tests of epoxy carbon plastic modified with fluoroplastic are presented including tribotechnical tests, analysis of chemical composition and friction surface structure. Testing method of dry friction at contact pressure 2 MPa and sliding velocity 0.1 m/sec using tribometer of CENTER FOR TRIBOLOGY Inc., USA, UMT-2 model is described in detail.

For investigation of structure and composition of friction surface method of optical electronic microscopy and X-ray microanalysis were used. It was shown that durable work of friction pairs modified carbon plastic – metal produces secondary structure films on conjugated surfaces, these films containing fluoroplastic tribo modifier.

Key words: modified carbon plastic, friction pair, counterbody, fluoroplastic inserts, tribometer, friction transport.

UDC 678.067:621.891

**Technological formation of a friction surface as the factor of increase of interface efficiency.** Lyssenkov P. M. – Problems of Materials Science, 2009, N 1 (57), pp. 33–37.

Results of analytical research of technological methods for increase of friction interfaces efficiency are submitted. Utility of technology for binary friction surfaces formation on nonmetallic composite materials in a micrometric dimensional range and on metal-plastic compositions at a macro-level are shown. The development of the general theory of the wearing process for binary and more complex friction surfaces is named as a perspective scientific direction.

Key words: friction interface, efficiency, technology, binary surface, wearing.

UDC 678.067:539.538

**Antifriction carbon plastics modifying with highly dispersed metals and carbon metal compounds**. Nikitin V. A., Letenko D. G., Bahareva V. E., Anisimov A. V., Savelov A. S., Karlova E. P. – Problems of Materials Science, 2009, N 1 (57), pp. 38–45.

This work presents the results of tribotechnical properties investigations of polymer composites at the base of carbon plastics modified with mezodispersed metal powders as well as composite modifying agents made of mezodispersed metal powders and fulleroid carbon particles. Topological and structural features of modifying agents and friction surfaces were detected with the help of optical and electron microscopy and X-ray diffraction measurement.

Key words: tribotechniques, polymer composites, mezodispersed metal modifying agents, fulleroid carbon particles, nanomodification.

UDC 678.5:621.762

**Analysis of factors influencing sedimentation stability of polymer and metal powder suspensions**. Letenko D. G., Nikitin V. A., Kostereva T. A., Savelov A. S. – Problems of Materials Science, 2009, N 1 (57), pp. 46–51.

The results of investigation of concentration influence on sedimentation stability of epoxy resin suspension are presented for metal powder filler as well as nanomodifying agent. The results of viscosity measuring of epoxy resin – acetone solutions and these based suspensions are given. The estimation of concentrate retaining in small (ml) volumes is fulfilled; recommendations on improving of liquid phase suspension concentrates stability are developed; sedimentation methods of metal powder fractioning are tested.

Key words: polymer composites, tribotechniques, carbon fulleroid particles, nano-modifying.

UDC 678.5:669.28:539.538

**Modification of antifrictional epoxy carbon plastics witn molybdenum disulfide.** Kuznetsov A. A., Semenova G. K., Bahareva V. E., Savelov A. S., Lishevitch I. V., Karlova E. P. – Problems of Materials Science, 2009. N 1 (57), pp. 52–56.

Crystalline structure of different molybdenites (molybdenum disulfide $MoS_2$) is investigated by the X-ray structural method (wide angle X-ray dissipation). Molybdenite properties are given. It is shown that most effective tribomodifying agent for antifrictional carbon plastics is highly dispersed $MoS_2$ with lamellar structure. Optimal content of $MoS_2$ in carbon plastic is found to be 3%. Two types of molybdenites are recommended as modifying agents – Russian (ДМИ-7) and product of Dow Corning, USA (Molicote).

Key words: molybdenite, molybdenum disulfide, highly dispersed, lamellar crystalline structure, wide angle X-ray dissipation, X-ray structural method, electronic microscopy, sliding friction coefficient, linear wear intensity.

UDC 661:66

**Carbon nanomodifying agents**. Neganov V. A., Makarov I. A., Blishko I. V., Savelov A. S., Lyshevitch I. V., Sargsyan A. S. – Problems of Materials Science, 2009, N 1 (57), pp. 57–65.

Methods of production, structure and properties of globular nanocarbon GNC and it's different modifications (with amine groups GNC-35–$NH_2$ and with Ni atoms – GNC-350–Ni) are discussed. It was found that carbon nanomodifying agents influence strength and tribotechnical properties of carbon plastics of УГЭТ and ФУТ types. The advantages of using functional derivatives of nanocarbon GNC-35–$NH_2$ and GNC-350–Ni are shown. It was afforded that production of globular nanocarbon with methane oxidation in chlorine flame method may be used as commercial technology nanomaterials production.

Key words: globular nanocarbon GNC, methane oxidation, electron microscopy, X-ray-structural analysis, nanodimensions, primary carbon globule, sliding friction coefficient, linear wear intensity, modifying with amine groups GNC-35–$NH_2$, modifying with nickel GNC-350–Ni.

UDC 678.5:539.538

**The influence of highly dispersed and nanodimensial inorganic additives on physical-structural properties of epoxy matrice and triboplastics.** Kryzanovskyi V. K., Nikitina I. V., Yasnogorodskaya O. G., Bahareva V. E.,. Savelov A. S., Blishko I. V. – Problems of Materials Science, 2009, N 1 (57), pp. 66–76.

The results of investigation of nanomodified epoxy polymers are discussed in the article. Epoxy phenol block(co)olygomer ЭНБС was used as a model compound. Polymers based on the ЭХД resin cured with dichloride diamine diphenyl methane (ДХ) and reinforced by carbon fabrics were used as commercial subject. The investigation resulted in determining of the influence of different in composition, dispersity and content nanomodifiers on physical-chemical, mechanical and inversion polymer properties, the absence of chemical interaction with epoxy polymers being approved. It was shown that ЭХД + ДХ resin modification by carbon nanofillers with amine groups and Ni atoms at the particle surface favours to form more uniform and dense topological structure in highly network polymer, leading to increased heat resistance, strength, hardness and elasticity of such materials and improving tribotechnical properties of carbon plastics based on the binders discussed.

Key words: triboplastics, epoxy matrice, nanoparticles, olygomer matrice, epoxy phenol block(co)olygomer, curing agent dichloride diamine diphenyl methane, fullerene, GNC-globular nanodispersed carbon, X-ray structural carbon, IR-spectroscopy, differential thermal analysis, thermorelaxation, IR-Fourier

UDC 678.067: 621.822

**Carbon plastic ФУТ using in ЦНС pumps for systems of maintaining plast pressure and oil dumping.** Velijanin V. S., Malishev I. V., Lobyntseva I. V. – Problems of Materials Science, 2009, N 1 (57),
pp. 77–80.

The summary of using experience is discussed for ФУТ carbon plastic working in bearing unit of MPP system pumps with different consumption-pressure features: output range from 25 to 240 $m^3$/hrs; pressure range from 700 m to 2100; sliding velocity range from 12,5 m/sec to 38 m/sec in pumping media: fresh water, waste water, usable water, "сеноман", oil. Total amount of pumps with ФУТ carbon plastic bearing counts over 80 units, all these pumps working in systems of MPP and oil dumping.

ФУТ material showed apparent advantage compared to materials with improves corrosion-erosion resistance, hardness and wear resistance due to gradual wear without critical damages of the pump main units which occur in case of hard alloy bearings making pump repair impossible at the working place.

Key words: ФУТ carbon plastic, pump, embedded sliding bearing, systems of MPP and oil dumping, companion babbit sliding bearing.

UDC 678.067:669.15–194.56:621.891

T**he influence of structure and mechanical properties of austenite steel counterbodies on tribotechnical features of ФУТ carbon plastic.** Anisimov A. V., Vihareva T. V., Kalinin G. J., Motovilina G. D., Savelov A. S. – Problems of Materials Science, 2009, N 1 (57), pp. 81–87.

The results of tribotechnical tests with the help of express method are shown for phenol carbon plastics against counter bodies made of austenite steel: usual 08Х18Н10Т and new high strength НС-5Т and 04Х20Н6Г11М2АФБ. It was found that maximum possible working pressures for tribocontact in pairs ФУТ – НС-5Т and ФУТ – 04Х20Н6Г11М2АФБ 3–5 times higher compared to usual 08Х18Н10Т pair. Austenite nitrogen containing steels НС-5Т and 04Х20Н6Г11М2АФБ may be recommended as counter bodies for sliding friction units with antifriction carbon plastics.

Friction surface tests along with investigations of steel near surface layer microstructure showed that after tests steels containing nitrogen have deformed surface layer with depth limited to 2–3 grains of austenite, depending on the presence of reinforcing carbide formations.

Key words: austenite steels, tribotechnical tests, micro structure, near surface layer, tribocontact, friction pair, counter body.

UDC 678.067:621.822.5

**Technology of glue assembling of sliding bearings made of antifriction carbon plastics.** Sytov V. A., Verstakov A. E., Voronin A. E., Churikova A. A. Anisimov A. V. – Problems of Materials Science, 2009, N 1 (57), pp. 88–91.

Design of multilayer sliding bearing construction is developed with antifriction properties afforded by carbon plastic and damping ability supported by rubber. Combined bearing with rubber hydro clamps is developed and successfully used at Yumagusinsk HES, where rubber works as shock absorbing and antifriction element. It was found that glue assembling technology is a reliable and economically approved method of pars connection. Connection security is achieved by using epoxy rubber glues of ЭКАН-3 and КДС-174-1 types and acrylonitrilic rubber of 8470 type.

Key words: combined bearing, glue assembling technology, rubber-carbon plastic bearing, hydro clamps, shaft guiding bearing, epoxy-rubber glue.

UDC 678.067:621.891:621.822.2

**Tribotecnical testing of antifrictional carbon plastic of ФУТ type at model conditions of friction in stop bearing.** Ivanov V. G., Korkosh S. V., Anisimov A. V. – Problems of Materials Science, 2009, N 1 (57), pp. 92–96.

Results of tribotechnical tests of phenolic carbon plastic of ФУТ type against 20Х13 steel are discussed. Test conditions were as follows: water media, sliding velocity 12 m/sec, contact pressure at the range from 2 to 6 MPa, overlap coefficient of tribopair elements 0,5. The investigation was held at working conditions for stop bearings with the help of face friction machine in FSUE CRISM “Prometey”. It was found that ФУТ type carbon plastic is serviceable at these condition up to *P*V = 72 MPa□m/sec. Correct choice of bearing design is emphasized as well as ensuring of heat removal conditions.

Key words: stop bearing, overlap coefficient, friction coefficient, linear wear.

UDC 621.822.5:539.538:678.067

**Antifriction carbon fiber-reinforced plastics in plane bearings.** Nikolaev G. I., Bakhareva B. E., Lobyntseva I. V., Anisimov A. V. – Problems of Materials Science, 2009, N 1 (57), pp. 97–110.

In CRISM CM "Prometey" is generated the new class of antifriction polymeric composites - the carbon fiber-reinforced plastics exceeding under the characteristics conventional antifriction polymeric materials. Carbon fiber-reinforced plastics on the composition and working conditions are divided into two groups - phenolic - for high-speed (up to 40 m\s) and epoxy - for low-speed and highly loading (up to 60 МПа) unit of a friction. They intended for production of plane bearings of vessels, water turbines and pumps, working in water-lubricated and any other liquids. Field experience of plane bearings from carbon

fiber-reinforced plastics has shown their tall serviceability in clusters of a friction of ship gears and systems, water turbines, in basic engineering industry, accessories of pipelines, contact electrical networks of railways, actuating mechanisms of various assignment, centrifugal, pinion and piston pumps.

Keywords: a carbon fiber-reinforced plastic, unit of a friction, shipbuilding, the water turbinebuilding, the pumpbuilding.

UDC 678.067:678.073:539.538

**Heat resistant antifriction carbon plastic based at polyphenylene sulfide binder.** Lyshevitch I. V., Bahareva V. E., Sargsyan A. S., Skobeleva E. L. – Problems of Materials Science, 2009, N 1 (57), pp. 111–115.

The possibility of application of antifriction heat resistant carbon plastic based at semicrystalline polyphenylene sulfide is discussed for tribopairs working either at elevated temperatures or in overheated water at temperatures above 180–200□C. Technology of melt impregnation at impregnating machine developed in cooperation with Physical-Technical Institute A. F. Ioffe was used for production of carbon plastic. Physical-mechanical, temperature and antifriction properties of carbon plastic were tested. Carbon plastic temperature features were tested with the help of differential scanning calorimetry method. Antifriction carbon plastic properties were investigated by express method at friction machine *ИИ*-5018. The friction surface of antifriction carbon plastics with different polymer binders was tested with the help of electron microscopy method. It was shown that polyphenylene sulfide application as heat resistant binder is very promising in development of heat resistant antifriction polymer composites.

Key words: polyphenylene sulfide, heat resistant thermoplastics, melt impregnation, differential scanning calorimetry (DSC), tr.

UDC 678.067:678.073:539.538

**Engineering thermoplastics as a basic material of selflubricating polimer composits for antifriction purposes.** Kuznetsov A. A., Semenova G. K., Svidchenko E. A. – Problems of Materials Science, 2009, N 1 (57), pp. 116–126.

Analysis of home and foreign literature surely enables to predict rapid growth of the market for antifriction PCM based on thermoplastic matrice. Structure and properties of such promising thermoplastics as terephthalate polyesters, polyamides 6, 66, 46, polyphthalimides, polyarylamides, polyacetals, pocycarbonate, polyphenylene oxide, fluoroplastics, polysulfones, polyester ketones, liquid crystalline polymers, polyimides are discussed.

Key words: polymers, composites, matrix, engineering thermoplastics, super engineering thermoplastics, polyarylenes, polyheteroarylenes, thermoplastic polyfluoroolifines.

UDC 678.067:539.538

**Influence of polymer matrix on tribotechnical characteristics of organic plastics.** Vettegren V. I., Fadin Ju. A., Savitskii A. V., Liyshkov A. I. – Problems of Materials Science, 2009, N 1 (57), pp. 127–131.

Dry friction coefficients between steel and polymer matrixes, fibers, one and two dimensions fibers composites were measured. It was found that friction coefficient of rest $\mu_0$ is more than friction coefficient of slides $\mu_s$ for matrixes and fibers which glass temperature $T_g$ is less than that is one in room temperature $T_R$. In otherwise case $\mu_0 \approx \mu_s$. The value of dry friction coefficient $\mu_c$ of fibers composite determines by friction coefficient of fibers ends and their concentration at $T_g > T_R$.

Key words: antifriction polymer composites, dry friction coefficients.

UDC 678.067:678.073:539.538:539.55

**Comparative investigation of viscoelastic and tribological properties of carbon plastics based on thermoresistant polymer binders.** Judin V. E., Bahareva V. E., Sargsyan A. S., Svetlichnyi V. M., Kudriavtsev V. V., Lyshevitch I. V. – Problems of Materials Science, 2009, N 1 (57), pp. 132–140.

Viscoelastic properties (elasticity and loss moduli, viscosity of interlayer destruction) of carbon plastics were investigated as well as their tribological properties (coefficient of friction and wear resistance) for dry friction at wide temperature range. Amorphous and semicrystalline thermoplastics with increased thermal and heat resistance were used as carbon plastic binders, linear semicrystalline polyphenylene sulfide and polyimides developed at Institute of highmolecular compounds of RASc. It was found that increasing of heat resistance and crystallization ability of polymeric binder improves tribological properties of carbon plastics at elevated temperatures (about 150□C) especially.

Key words: carbon plastic, polyphenylene sulfide, polyimide, amorphous and semicrystalline thermoplastics, heat resistance, viscosity of interlayer destruction, elasticity and loss moduli.

UDC 678.067:539.538

**Triboluminescence of polymers and composites** Vettegren V. I., Savitskij A. V., Shcherbakov I. P., Mamalimov R. I. – Problems of Materials Science, 2009, N 1 (57), pp. 141–145.

Tribo- and photoluminescence are shown possible to study the mechanism of wear process of polymers and polymeric composites. It was established, that the analysis of triboluminescence flashes form allows to observe of cracks dynamics at wear, and also to define a chemical structure of matrixes. The analysis of photoluminescence spectra of powders format at wear, allows studying a structure the products of destruction of composites at wear.

Key words: antifriction polymeric composites, dynamics of cracks at wear process, a chemical structure of products of destruction of composites.

UDC 678.067:620.18

**Mass-spectrometry investigation of mechanical and themal stability of polymer composites.** Pozdnyakov O. F., Baskin B. L., Bahareva V. E.., Lyshevitch I. V., Sedletskyi R.V., Ginzburg B. M., Pozdnyakov A. O. – Problems of Materials Science, 2009, N 1 (57), pp.146–153.

Example using of fracto emission (FEMC) is described for investigation of processes occurring during thermo-mechanical treatment of polymer composites (PCM). The results of different nature PCM investigation are discussed, spheroplastics (SP), carbon fibers (CF) and carbon plastics, including antifriction phenol carbon plastics (ФУТ). It was found that fracto emission method combined with thermo destruction spectra analysis gives valuable information about processes of formation, localization and development of damages in PCM.

Key words: mass-spectrometry, fracto emission , submicro fracture, sphero plastics, antifriction carbon plastic, carbon fibers, thermo destruction spectra, thermo stability.

UDC 678.067:539.538:620.187

**Antifriction composite friction surface tests with electron and atomic microscopy methods.** Sosnov E. A., Anisimov A. V., Bahareva V. E., Trifonov S. A., Maligin A. A., Blishko I. V., Kirik E. V., Savelov A. S. – Problems of Materials Science, 2009, N 1 (57), pp. 154–160.

Serial tests of tribotechnical properties, friction surface morphological features and thermo-oxidation stability were held for organic plastic АРЕТ based at the synthetic heat resistant fiber "Оксалон" (polyphenylene-1,3,4-oxidiazole) and epoxy matrix. Advantages and disadvantages of АРЭТ organic plastic compared to УГЭТ carbon plastic are shown. АРЭТ organic plastic can work in dry friction units at sliding velocities up to 1,0 m/sec, whereas УГЭТ carbon plastic works in dry friction units at sliding velocities up to 0,1 m/sec only. Organic plastic swells water while working thus differing from УГЭТ carbon plastic. This feature restricts АРЭТ using in water lubricated friction units.

Key words: organic plastic, carbon plastic thermo-oxidation stability, morphological features, atomic microscopy, dry friction.

UDC 678.067:678.742.2:539.538

**Friction of silver-containing ultra-high molecular weight polyethylene nanocomposites.** Krasnov A. P., Mit V. A., Afonicheva O. V., Said-Galiev E. E., Nikolaev A. Yu., Vasilkov A. Yu., Podshibihin V. L., Naumkin A. Yu., Volkov I. O. – Problems of Materials Science, 2009, N 1 (57), pp. 161–169.

Silver-containing composites prepared in process of complex modification of ultra-high molecular weight polyethylene (UHMWPE) GUR-1050 were developed and investigated. In the process of complex modification UHMWPE is exposed in environment of supercritical carbon dioxide with subsequent nanoporous polymer producing. Then, combination of obtained nanoporous UHMWPE with silver-organic compound with subsequent thermal treatment and producing of silver-containing nanocomoposite is carried out. Influence of silver amount in composite from trace up to 0.4% on modification of tribological indexes and surface properties was investigated. Results testify that composites containing nanosilver in amounts of 0.2 and 0.4% possesses the best tribological indexes in comparison with initial UHMWPE samples containing trace amounts of nanosilver.

Key words: nanocomposites, ultra-high molecular weight polyethylene, nanoporosity, nanosilver, tribological properties.

UDC 678.067:661.66

**Metalcarbon fibres and polymeric compositions on their basis.** Safonova A. M., Shpilevskaja L. E., Smetanina O. V. – Problems of Materials Science, 2009, N 1 (57), pp. 170–180.

The complex research of physical and chemical properties (output of the end-product, X-ray phase composition, the contents of metals, density, durability, specific electrical resistivity, specific magnetization, wettability with polymeric binders) of metalcarbon fibres (MeCF) with the metals of the iron subgroup were carried out. These MeCF were produced in identical temperature-time conditions of carbonization process in an interval 400–900□C. It is shown, that the introduction of nickel, cobalt and iron into the structure of carbon fibres allows to give them the new properties and to expand the fields of their application. The perspectivity of use of MeCF as the filler of polymeric matrixes to produce the carbon plastics with antifrictional, conductive and magnetic properties is shown.

Key words: carbon fibres, metalcarbon fibres, carbonization, temperature of thermal processing, X-ray analysis, durability, specific magnetization, specific electrical resistivity, friction coefficient, composite materials.

UDC 678.067:621.822:621.891

**Nonmetallic bearings for a crankshaft of the engine of Internal combustion**. Lysenkov M. P. – Problems of Materials Science, 2009, N 1 (57), pp. 181–185.

Results of analytical researches of an opportunity of a using of nonmetallic sliding bearings in supports of crankshaft in engines of internal combustion are submitted. Tribotechnical advantages of metal–nonmetal friction pairs in comparison with metal–metal pairs are shown. The perspective innovative project focused on practical use of nonmetallic bearings is offered.

Key words: innovative project, engine of internal combustion, friction pair, technology, binary surface, tearing, repair.

UDC 678.067:620.178

**Testing planning for investigation tribotecnical characteristic of phenolic carbon plastics.** Dobytchin M. N., Morozov A. V., Nikulin A. V., Satchek B. J., Anisimov A. V. – Problems of Materials Science, 2009, N 1 (57), pp. 186–193.

Results of tribotechnical tests of phenolic carbon plastics (basic ФУТ type and ФУТ-Б type modified by babbit Б-83) by tribometer of CENTER FOR TRIBOLOGY Inc., USA, UMT-2 model are presented. Steel 20Х13 was used as counterbody, overlap coefficient $K$ = 0,84.

With the help of regression analysis the results of the planned full factor experiment of $2^2$ type with variation of two parameters ($P$ and $V$) at two levels made it possible to receive analytical dependences of friction coefficient ($f$) and wear intensity ($I$) from mode parameters ($P$ and $V$).

Key words: passive experiment, testing planning, loading parameter, mathematical model, optimization parameter.

UDC 678:621.891:51

**Mathematical model of friction and wear for polycrystalline solid bodies.** Vasiliev J. N., Fugol V. A. – Problems of Materials Science, 2009, N 1 (57), pp. 194–209.

Mathematical model of friction and wear of polycrystalline solid bodies working at dry friction conditions and at friction with boundary lubricator is developed with the help of thermodynamic analysis of contact formation and violation circular process in a closed system. In circular process at closed system the work brought to the system equals the heat dissipated to the environment. For calculation of friction with boundary lubricator the contact gap was considered to be micro pore with labile wall which adsorption from gaseous phase is described by Dubinin–Radushkevitch equation. Counter pressure of lubricating layer was calculated by integration of Pointing equation describing equilibrium condition for two phases at different pressures and equal temperatures. Comparison of experimental and calculated data confirms the adequacy of the proposed model.

Key words: closed thermo-dynamic system, quantitative theory of sliding and rolling friction and friction with boundary lubricator, chemical and mechanical equilibrium at the contact, adsorption at the contact gap, micro pore, friction calculation equation for independent data.

UDC 621.892

**Definition of characteristics of wear resistance of polymeric materials on the example polyamide ПА-6 and composite Ф4К15М5.** Kozyrev Yu. P., Sedakova E. B. – Problems of Materials Science, 2009, N 1 (57), pp.210–214.

Researches of wear of polyamide and a polymeric composite in a wide range of loadings are carried out. Comparative multifactorial research of wear resistance of antifrictional materials is executed on the basis of analysis of factors used in empirical law wear process. Ranges of loadings, with prevalence fatigue or adhesive mechanism of wear process are designated. Analytical research of fragments of wear of the materials is carried out.

Key words: antifrictional polymeric materials, wear resistance, fatigue wear, adhesive wear, wear factor, tribotechnical tests.