

**CORRELATION BETWEEN THE VELOCITIES OF PARTICLE SPIN AND
PARTICLE SETTLING AND THE OPTIMAL STREAM VELOCITY IN
GRAVITY SEPARATION**

E.Barsky

, Jerusalem College of Engineering, Jerusalem, Israel
eugene@jce.ac.il

ABSTRACT

It is generally accepted that the optimal flow velocity for gravity classification is the final particle settling velocity or, which is the same, the particle spin velocity. However, we have found differences between the settling velocities and the spin velocities of the very same particles. Here we present the results of experiments in a cascading gravitational classifier comprising eleven stages. The feed material was introduced at each stage successively, from the first to the eleventh. The optimal flow velocity was determined for each case. From these experiments it follows that the value of the optimal flow velocity depends to a greater extent on the point of introduction of the feed (i.e., on the design of the device) than it does on the interaction between the solid phase and the flow.

**INVESTIGATION OF Si-SiO₂/OBLIGO-β-NAPHTHOL/METAL
HETEROSTRUCTURES**

**A.A.Bayramov, N.N.Mursakulov, Sh.M.Hasannli, N.A.Safarov, B.A.Mamedov,
N.N.Abdulzade, U.F.Samedova, X.M.Mamedova, R.K.Guseynov**
Institute of Physics of National Academy of Sciences of Azerbaijan, Baku, Azerbaijan
azad.bayramov@yahoo.com

ABSTRACT

In Si-SiO₂/polymer/metal heterostructures, where oligo-β-naphthol has been used as polymer, the conductivity mechanisms have been investigated. From the received results the features of a charge transfer in the investigated samples it is possible to explain within the framework of models of the hopping transfer on trap levels, Schottky emission and field tunnel emission. Different mechanisms of a charge transfer act in different temperature intervals and various values of electric field intensity. In a polymeric film the charge transfer is carried out on range of the deep electronic located states near to a Fermi level. At low temperatures it is realised also hopping conduction of charge carriers on trap states near Fermi level.

**PROCESS OF HEAT TRANSFER DURING VULCANIZATION
OF THE CONCRETE BASED ON LIQUID POLYBUTADIENE BINDER**

Yu.Borisov , S. Matreninskiy, R. Sapelkin

*Voronezh State University of Architecture and Civil Engineering, Voronezh, Russia,
nau@box.vsi.ru*

ABSTRACT

An effective method of arrangement of the concrete based on liquid polymer binder coatings by electric curing with application of heating wire is introduced. A mathematical model of temperature field spreading within vulcanized rubber concrete depending on boundary conditions: the type of heat-generating device, its temperature and ambient temperature, is developed.



SCIENTIFIC ISRAEL
Technological Advantages

**NANOFIBREREINFORCEMENT OF CEMENT STONE STRUCTURES
WITH THE HELP OF ETTRINGIT CRYSTALS AS A SPECIE
OF CONCRETE FRACTURE STRENGTH INCREASING**

E. M. Chernyshov, D. N. Korotkikh

*Voronezh State University of Architecture and Civil Engineering, Russia, Voronezh,
vgasupb@mail.ru*

ABSTRACT

Nanoreinforcement of cement stone structure as efficient mean of increasing of fracture strength of concrete is considered.

**HUMIDITY STATE OF CEMENT AND SILICATE CONCRETE
IN CONNECTION WITH THEIR STRUCTURE**

E. M. Chernyshov, G. S. Slavcheva

*Voronezh State University of Architecture and Civil Engineering, Russia, Voronezh,
vgasupb@mail.ru*

ABSTRACT

The results of experimental researches of processes of interaction of cement and silicate concretes of dense and macroporous structure with aqueous steam and water are discussed. Influence of parameters of structure on laws and intensity of interaction is shown.

**OPTIMAL COMPOSITION, STRENGTH AND DURABILITY
OF SILICATE POLYMER CONCRETE**

O.Figovsky¹, D. Beilin¹, Yu Borisov², Yu. Zemlyanushnov³

¹ *Polymate Ltd- International Nanotechnology Research Center. Migdal HaEmek, Israel*

polymate@bofrig.com

² *Voronezh State University of Architecture and Civil Engineering, Russia, Voronezh,*

vgasupb@mail.ru

² *Moscow State University of Civil Engineering, Moscow, Russia*

ABSTRACT

It has been known that [acid-resistant](#) concretes on the liquid glass basis have high porosity (up to 18—20 %), low strength and insufficient water resistance. Therefore they cannot be used as materials for load-bearing elements. Such acid resistant materials are silicate polymer concrete on a basis of soda liquid glass and monomeric additives. Significant increasing of silicate matrix strength and density was carried out by incorporation of special liquid organic [alkali-soluble](#) silicates additives such as tetrafururyloxisilane (TFS), which in the hydration process forms the active nanosilica particles SiO₂, [orthosilicic acid](#), [furfuryl alcohol](#) (FA) and other [chemical species](#) making oligomer nanofilms on a surface of silicate matrix grains. TFS is a sort of a microcrystallizing nucleator in the production stage, it favorable for [blocking of superficial pores](#) of silicate matrix and reduces concrete shrinkage deformation. It was demonstrated that introduction of nanostructured agent TFS dramatically increases strength, durability and shock resistance of silicate polymer concrete in aggressive media. This effect is attributable to hardening of contacts between silicate binder gel globes and modification of alkaline component owing to "inoculation" of the furan radical. The optimal concrete composition with the raised strength, durability, density and crack resistance was obtained. We investigated permeability (filtration and diffuse) and stability of the concrete in various aggressive environments as well. Experimental results point to the fact that filtration permeability is absence as TFS additive liquidates the filtering defects in the concrete having form of open microcracks. Samples of the polymer concrete withstand water pressure equal 0.6 MPa. Coefficients of corrosion resistance were obtained at exposition of the concrete samples into hydrochloric and sulfuric acids environment during from 3 to 18 months at concentration from 1 up to 20 %. Under these conditions after 3 monthly expositions in the hydrochloric acid coefficients of corrosion resistance of the silicate polymer concrete samples were 0.97-1.04, and after 18 monthly expositions 0.8-1.12 at concentration 1-20 % correspondingly. The same coefficients for the sulfuric acid environment were 0.92-1.08 and 0.86-1.10 correspondingly.

NANO-STRUCTURAL CONCEPT OF PAPERMAKING

M. Ioelovich

PolymateLtd.-INRC, Migdal HaEmek, Israel,

bd895892@zahav.net.il

ABSTRACT

In this paper contribution of cellulose nano-fibrils and nano-particles to papermaking has been studied. Cellulose fibers have peculiar nanostructured architecture. Wet beating of cellulose at pulping stage of the papermaking process leads to detaching of nano-fibrillar bundles from fiber surface and forming dispersion of swollen nano-fringed fibers. At a drying stage, the nano-scale fibrils come together and join the adjacent fibers by means of strong bonds. As a result, the fibrous web having local interfiber contacts is formed. Thus, detaching of nano-scale fibrils at the fiber beating process and following bonding of the nano-fibrils at drying of the wet paper sheet promotes obtaining the dense and strong paper caused by hydrogen bonds. Additive of nano-cellulose particles to the pulp composition improves mechanical properties of the final paper.

PHYSICO-CHEMISTRY OF NANOSTRUCTURED MATTERS

M. Ioelovich

Polymate Ltd.-INRC, , Migdal HaEmek, Israel, bd895892@zahav.net.il

ABSTRACT

Nanostructured matters have peculiar physico-chemical properties depending on specific surface or dispersity degree of nano-phases. The pronounced and eminent representative of such matters is cellulose. This natural polymer is built from superfine fibrils having diameters in the nano scale, and each such nanofibril contains ordered nanocrystallites and low-ordered nano-domains. In this paper, physico-chemistry of the nano-scale phases is discussed on the example of cellulose. In particular, the ability of nano-scale crystallites to undergo co-crystallization and aggregation, as well as to undergo phase transformation through dissolution, alkalization, and chemical modification of the nanostructured matter has been the subject of investigation.

FORECASTING OF DURABILITY OF THE BITUMEN SUPERFICIAL ROAD COVERING LAYER BY NEURAL NETWORKS SYSTEM

Y. I. Kalgin, E. B. Tyukov

*Voronezh State University of Architecture and Civil Engineering Russia, Voronezh, :
dmitry_ouhin@mail.ru*

ABSTRACT

Application of neural networks system for forecasting durability of road coverings is considered. The offered technique allows to estimate influence of any additive on property of bitumen layer of road coverings and to obtain the most authentic forecast of its safety.

NEW FIREPROOF COMPOSITIONS FOR TEXTILE MATERIALS

A.M. Karateev , Ya.A. Taranukha

*National technical university «Kharkov polytechnical institute», Kharkov, Ukraine
karateev@kpi.kharkov.ua*

ABSTRACT

New fire-resistant compositions were developed for natural and polyester combined textile materials using multifunctional bromo containing fire protection agents: bis (acrylic ether)dibromopentaerythritol and endo-oxo-bicyclo-[2,2.1]-hept-2-en,1-methoxy,propoxy,5,6-imide,2,4,6-tribromobenzole that in conditions of thermic and catalytically initiated polymerization form network polymers and hold preliminary applied "heat shield" of water soluble polyphosphatammonia on the textile surface. Formation of interlaced polymers is affected by complex onium catalysts mixture: $R_4N \cdot MeHal_{x+1}$, $R_4P \cdot MeHal_{x+1}$, where R_4N^+ , R_4P^+ - cations of tetraammonium and tetraphosphonium salts and $MeHal_{x+1}$ – anions of metal halogenides, Me – Fe^{3+} , Zn^{2+} .

**INVESTIGATION OF RUBBER POLYMER CONCRETE
DURABILITY BY THERMAL FLUCTUATION METHOD**

Y. B. Potapov, V. V. Platoshkina, T. V. Makarova

*Voronezh State University of Architecture and Civil Engineering, Voronezh, Russia
valeria-npm@mail.ru*

ABSTRACT

The present paper deals with definition of durability of solids by thermal fluctuation method: case study rubber polymer concrete.

**FEATURES OF CONDUCTIVITY ANISOTROPY OF INTERCALATED
NANODIMENSIONAL RELAXOR $TlInS_2<Ge>$**

**R.M.Sardarly¹, O.A.Samedov¹, A.A.Bayramov², G.R.Safarova¹,
F.T.Salmanov¹**

¹*Institute of Radiation Problems of a National Academy of Sciences of Azerbaijan, Baku,
Azerbaijan*

sardarli@yahoo.com

²*Institute of Physics of National Academy of Sciences of Azerbaijan, Azerbaijan
: azad.bayramov@yahoo.com*

ABSTRACT

The temperature dependence of conduction of the intercalated by silver layered relaxor $TlInS_2<Ge>$ ferroelectrics was investigated. It is shown, that in temperature range relaxational like behavior of dielectric and polar properties of a crystal, the conduction is carried out by means of hops of charge carriers on the located states laying in a narrow energy strip near to a Fermi level. The energy of activation of extrinsic charge carriers is determined. The density of the located states, average lengths of charge carriers hops, a difference between energy states, concentration of deep traps is calculated. It is established, that doping of Ag^+ ions in Van der Waals bond of $TlInS_2<Ge>$ results in reduction of conduction anisotropy.

**THE INFLUENCE OF WATER-ALCOHOL SOLUTIONS ON THE RADICAL
POLYMERIZATION OF POTASSIUM STYRENE SULPHONATE**

G.Z.Yeligbayeva,

The Kazakh National Technical University, Almaty, Kazakhstan

Gulzhakh@yandex.ru

ABSTRACT

The free radical polymerisation of potassium styrene sulphonate was examined in water-ethylene glycol and water-ethanol solutions. The kinetics of process and the molecular weight were measured using dilatometric and viscosimetric methods respectively. The polymerization rate, polymer molecular weight and activation energy were settled and main process equations were established for two above-mentioned solutions. The obtained data as well as data of inhibiting polymerization discovered tend to increase the effective reaction ability of monomer at transfer from water-ethylene glycol medium to water-ethanol. Infrared spectroscopy was used to monitor the olefinic stretching and explained observed phenomena