

RADIATION REFLECTION AND ABSORPTION OF MATERIALS BASED ON POLYVINYL ALCOHOL HYDROGELS

L. Pinchuk¹, V. Goldade², V.Kestelman³

¹A. Belyi Metal-Polymer Research Institute, Gomel, Belarus, ²Francisk Skorina Gomel State University, Gomel, Belarus, ³ KVN International, King of Prussia, PA , USA
mpri-otdel8@mail.ru; victor.goldade@gmail.com; kvnint@verizon.net; kvnint@gmail.com

ABSTRACT

Regularities of reflection and absorption of microwave radiation by water during its freezing-thawing have been experimentally established. Characteristics of microwave energy attenuation by polyvinyl alcohol hydrogels, as well as changes of named parameters due to structure transformation induced by conversion of hydrogels into cryogels at subzero treatment, are given. Facilities of the decrease of cryogels radio-transparency by modifying them with water solutions of ferroelectrics have been shown.

HIGH POWER OPTICS AND ITS NEW MANIFESTATIONS

V. Apollonov

Prokhorov General Physics Institute of RAS, Moscow, Russia.
vapollo@kapella.gpi.ru

ABSTRACT

The advent of the laser has placed stringent requirements on the fabrication, performance and quality of optical elements employed within systems for most practical applications. Their high power performance is generally governed by three distinct steps, firstly the absorption of incident optical radiation (governed primarily by various absorption mechanisms); secondly, followed by a temperature increase and response governed primarily by thermal properties and finally the elements thermo-optical and thermomechanical response, e.g., distortion, stress birefringent fracture, etc. All of which needs to be understood in the design of efficient, compact, reliable and useful for many applications high power systems, under a variety of operating conditions, pulsed, continuous wave, rep-rated or burst mode of varying duty cycles.

HIGH REPETITION RATE P-P LASERS FOR SPACE DEBRIS ELIMINATION

V. Apollonov

Prokhorov General Physics Institute RAS, Moscow, Russia
vapollo@kapella.gpi.ru

ABSTRACT

Studies show that the number of debris in Low Earth Orbit is exponentially growing despite future debris release mitigation measures considered. Especially, the already existing population of small and medium debris is today a concrete threat to operational satellites. Ground based DF-laser solution which can remove at low expense and in a non-destructive way hazardous debris around selected space assets appears as one highly promising answer.

REVIEW OF CURRENT SITUATION WITH TRICLOSAN'S HARMFUL DISINFECTION BY-PRODUCTS PATHWAYS INTO ENVIRONMENT

O. Lygina¹, A. Lyubchik¹, N. Neng², A. Sharipova³, M. Issakhov⁴, J. Nogueira², I. Fonseca¹,
S. Aidarova³, N. Bekturganova³, S. Lyubchik¹

¹ Universidade Nova de Lisboa, Lisboa, Portugal, ² University of Lisbon, Lisboa, Portugal, ³ Kazakh National Technical University named after K.I. Satpayev, Almaty, Kazakhstan, ⁴ Kazakh National University named after Al-Farabi, Almaty, Kazakhstan
sve_lyubchik@yahoo.com

ABSTRACT

Review of the current state of the art on the pathways of the harmful disinfection by-products of the triclosan into environment is given. Several case studies of the Waste Water Treatment Plan's (WWTP) liquid and solid stocks contained by triclosan were executed. Results on environmental monitoring from are presented and discussed. Work strategy was defined at different processing conditions at WWTPs and their locations, which were carefully selected, aiming at North, West and South rural, industrial, urban, countryside and coastline zones of the Portugal. In order to get a representative view on situation in the sector and obtain relevant data on environmental monitoring, it was decided to collect all of the 26 samples (wastewater and sludges from 13 WWTPs) simultaneously at the same season (early autumn) ones per project year, thus of total of two times in September 2011 and 2012, (i.e. before EU directive to ban triclosan for usage in Europe comes into the force, and one year after the date, when triclosan was banned in EU). Uniform sampling procedure at WWTPs was ensuring by accomplished work of a high qualified technicians, who used a standardized methodology for the liquid and solid stocks sampling. Sample sorting and collection methodology was based of waste stream phase (solid or liquid), their availability and disposal conditions (reasonably mixed well-homogenized sets). Solid sludges were be pre-treated before analysis, while liquid samples were subjected directly to the triclosan detection by method of the stir bar sorptive extraction liquid desorption followed by high performance liquid chromatography with diode array detection (SBSE-LD/HPLC-DAD) optimized towards detection of the triclosan at the trace and ultra-trace levels. The liquid stocks contaminated by triclosan were subjected to the purification scheme using adsorption. Investigation was focused on treatability study of efficiency of the adsorption process for triclosan removal from model solutions by the developed activated carbons from co-mingled wastes. The effects of solid-to-liquid ratio and triclosan concentration were studied in batch modes on the activated carbons using optimized analytical methods for triclosan detection. First set of the thermodynamic data is discussed aimed at increase of the efficiency of the adsorption process towards triclosan removal from WWTP's stocks.

DYNAMIC SURFACE PROPERTIES OF POLYALLYLAMINE HYDROCHLORIDE/ SODIUM ALKYL SULPHATES AT THE WATER/AIR INTERFACE

S. Aidarova¹, A. Sharipova^{1,2}, N. Bekturganova¹, M. Issakhov², A. Babayev¹

¹ *Kazakh National Technical University, Almaty, Kazakhstan,* ² *Kazakh national university
named after al-Farabi, Almaty, Kazakhstan*
sve_lyubchik@yahoo.com

ABSTRACT

In this paper the dynamic surface properties of mixed adsorption layers of the cationic polyelectrolyte polyallylamine hydrochloride and anionic surfactants sodium alkyl sulphates with different alkyl chain length from C₁₀ to C₁₆ in bulk and at the water/air interface were studied using surface tension and dynamic light scattering methods. It was shown that with increasing the chain length of the surfactant alkyl radicals the PAH-alkylsulphate polycomplexes become first more hydrophobic and then hydrophilized due to the interaction between the components. Based on obtained results one can conclude that in the case of SDS the densest coils of polycomplexes are formed because both types, electrostatic and hydrophobic, interactions are maximal implemented. High hydrodynamic radii of the coiled PAH/STS and PAH/SHS polycomplexes indicate the formation of bulky swollen associates.

NEW CRITERIA FOR ESTIMATION OF LIMESTONES' VULNERABILITY TO SULFATE ATTACK

I. Wasserman

Western Galilee Academic College, Acre, Israel
wassermn@gmail.com

ABSTRACT

The appearance and the apparently long-term durability of ancient and historic stone masonry have shown the valuable advantages of using the stones for construction purposes. A typical contemporary construction practice in the Mediterranean countries is using the hard limestones and marbles as preferable material for external cladding. Accelerated salt crystallization test is internationally standardized and used for estimating the durability of cladding stones intended to be exposed to the environmental hazards. The current study readdressed the factors influencing the stone durability upon sodium sulfate crystallization. The additional criteria, which could simplify the procedure of estimating the vulnerability of limestones to sodium sulfate crystallization, are proposed. These criteria could be identified by the simple laboratory procedures and are less time consuming than the standard sodium sulfate crystallization test.

THE SYSTEMIC APPLICATION OF TRIBOTECHNOLOGY AT ALL LIFE CYCLE STAGES OF MACHINES AND EQUIPMENT

A.V. Dunayev¹, V.V. Ladikov², Yu.G.Lavrov³, I.V.Nikitin⁴, I.F.Pustovoy⁴

¹All-Russian Research Technology Institute of Maintenance and Exploitation of the Machine-Tractor Park, Moscow, Russia, ²LLC «Industry-Service», ³LLC "SUPROTEC LTD», Moscow, Russia, ⁴LLC «RIP»,
dunaev135@mail.ru, ladikov-v@mail.ru, lavrov@suprotec.ru, pustovoy@yandex.ru

ABSTRACT

Considering the need for a system of tribotechnology throughout the manufacture, operational break-in, normal operation, and in place of the current and capital repair of machines and equipment.

PREPARATION OF AMORPHIZED CELLULOSE AND NANO-CELLULOSE BY TREATMENT OF CELLULOSE FIBERS WITH CONCENTRATED SOLUTIONS OF SULFURIC ACID

M. Ioelovich

Designer Energy Ltd., Rehovot, Israel
bd895892@zahav.net.il

ABSTRACT

The effect of the concentration of sulfuric acid (SA) and temperature on structure and properties of cellulose had been studied. Investigations showed that that after cellulose treatment with concentrated solutions of SA the appreciable depolymerization was observed. Solubility of the initial sample at the room temperature increased gradually in the range of the acid concentration from 50 to 60wt.% SA. When SA concentration reached 65wt. %, then cellulose sample dissolved completely. Amorphized cellulose made by regeneration from 65wt. % SA, was characterized by high enzymatic digestibility. At elevated temperature of hydrolysis, 45°C, content of sulfonic groups and cellulose solubility in SA increase, while yield and DP decrease. After hydrolysis of cellulose with hot 50–60 wt. % SA, the crystallinity degree of the obtained CI samples increases. However, when SA concentration reached 65 wt.%, then cellulose dissolved, and the regenerated cellulose had CII polymorph, reduced crystallinity and low DP. Using optimal conditions of the acidic treatment (C=57–60wt.%, T= 45°C; t=1h) in combination with the high-power disintegration permitted obtaining the CI nanocellulose with the increased yield; this nano-product consists of crystalline cellulose particles having sizes 150–200 × 10–20nm.

**SYNTHESIS AND PROPERTIES OF EPOXY-ANHYDRIDE POLYMERS
PRODUCED UNDER THE ACTION OF NOVEL
1-BUTHYL-3-METHYLIMIDAZOLIUM SALTS AS CATALYSTS**

M.S. Fedoseev¹, M.S.Gruzdev², L.F. Derzhavinskaya¹

*¹Institute of Technical Chemistry of Ural Branch of the RAS, Perm, Russia, ²Institute of Solution
Chemistry of the RAS, Ivanovo, Russia
msfedoseev@mail.ru; gms@isc-ras.ru ; lfderzhavinskaya@mail.ru*

ABSTRACT

1-butyl-3-methylimidazolium salts with Br, PO₄, and HSO₄ inorganic anions in a molecule used as curing catalysts of epoxy-anhydride compositions have been investigated by means of FTIR-spectroscopy and differential scanning calorimetry. 1-butyl-3-methylimidazolium bromide having latent properties appears to be the most active among the said salts. Epoxy polymers on the basis of industrial epoxy oligomers of diphenylolpropane diglycidylether (ED-20 resin), of oligodientetraurethane diepoxide (PDI-3AK), of isomethyltetrahydrophthalic anhydride as curing agent and of 1-butyl-3-methylimidazolium bromide as curing catalyst have been synthesized. Technological, physic-mechanical, thermal and thermo-physical properties and water-resistance of polymers have been ascertained. Judging from the set of properties, the produced polymers can be regarded as promising materials.