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PERSONALS

CHRONICLE

A B S T R A C T S

V.A. ZHOVTYANSKY

NON-EQUILIIBRIUM OF DENSE ELECTRIC ARC PLASMA CASED BY RESONANCE RADIATION TRANSFER

The role of resonance radiation of plasma forming atoms in problem of the plasma state deviation from the equilibrium state is evaluated on the example of wall-stabilized electric arc between melting copper electrodes in atmosphere. Unlike known accounting radiation losses out of arc the radiation transfer in plasma was taken into consideration. The results of numerical modeling demonstrate the effects of nonequilibrium between the ground, metastable and resonant levels of copper atoms. The role of radiation transfer is discussed from viewpoint of efficiency of various devices which use the electrical arc plasma as an operating body.

Key words: plasma chemistry technology, electric arc, dense plasma, radiation transfer, partial local thermodynanic equilibrium

S.A. SMIRNOV, V.A. TITOV, V.V. RYBKIN

INFLUENCE OF HETEROGENEOUS PROCESSES ON PARAMETERS OF OXYGEN-CONTAINING PLASMA

The results of interaction studies of non-equilibrium plasma and polymers, including the mechanism of active species formation in a direct-current discharge in oxygen, air, oxygen mixtures with nitrogen and argon, are reported. The formation regularities of gaseous products of reactions of these species with polymer are discussed. The influence of the gaseous products on the physical characteristics of plasma and the rates of the processes involving electrons is considered.

Key words: loading effect, plasma etching, heterogenic reactions, low temperature plasma, oxygen, air, nitrogen-oxygen-argon mixtures

V.N. VASILETS, A.B. SHEKHTER

MEDICAL AND BIOLOGICAL APPLICATIONS OF PLASMA SOURCES OF NITROGEN OXIDES

Nitrogen oxide forming in atmospheric plasma of a gas discharge possesses antibacterial and antiinflammatory properties and ability to stimulate the regeneration processes of damage tissues. In article the plasma sources of nitrogen oxide and medical-biologikal aspects of their applications were considered.

Key words: arc discharge, plasma medicine, nitrogen oxide, regenerative medicine, sterilization, NO therapy

A. CHOUKOUROV, I. GORDEEV, D. ARZHAKOV, A. SEROV, P. SOLAŘ, M. DRÁBIK, O. POLONSKYI, A. ARTEMENKO, J. KOUSAL, O. KYLIÁN, D. SLAVÍNSKÁ, H. BIEDERMAN

NANOSTRUCTURED PLASMA POLYMERS AND THEIR NANOCOMPOSITES

The methods of structuring of plasma polymers at nano-level are reviewed with special attention paid to deposition by magnetron sputtering, both in normal and in glancing angle configuration. Possible applications of such materials are discussed.

V.E. MESSERLE, A.B. USTIMENKO

PLASMA CHEMICAL TECHNOLOGIES OF FUEL PROCESSING

The technologies of plasma pyrolysis, cracking, hydrogenation, thermochemical preparation for combustion, gasification and complex processing of fuels are presented. The application of these technologies to produce the desired products (hydrogen, carbon black, hydrocarbon gases, synthesis gas, valuable components of coal mineral mass) corresponds to the modern ecological and economic requirements of the basic industries.

Key words: fuel, plasma, processing, conversion

M.S. PISKAREV, M.R. BATUASHVILI, M.YU. YABLOKOV, A.S. KECHEK'YAN, A.B. GILMAN, A.A. KUZNETSOV

SURFACE MODIFICATION OF POLY(FLUOROOLEFINE) POLYMER FILMS BY GLOW DC DISCHARGE

The effect of dc discharge treatment on the surface properties of poly(fluoroolefine) polymers was studied. The treatment of the films at the anode and cathode was established to result in the significant enhancement of the surface energy and in the increase of the adhesive bonding strength of the plasma treated films. The efficiency of the plasma treatment was shown to connect with the chemical structure of fluoropolymers. The changes in the composition and structure of the films were studied by means of X-ray photoelectron spectroscopy and Fourier-IR spectroscopy. New oxygen-containing groups were shown to form on the polymer surface as a result of dc discharge treatment.

Key words: poly (fluoroolefines), surface modification, DC glow discharge, cathode, anode, contact wetting angle

Yu.S. AKISHEV, A.B. GILMAN, M.E. GRUSHIN, A.I. DRACHEV, V.B. KARALNIK, A.V. PETRYAKOV, N.I. TRUSHKIN

TIME CHANGE OF SURFACE PROPERTIES OF POLYMERS TREATED BY PLASMA

The process of induced decrease in hydrophilic properties of polypropylene (PP) and polyethylene terephthalate (PET) films modified by plasma was studied. The treatment of modified films with the UV-irradication and the glow discharge products in hydrogen was shown to result in the sample hydrophilic properties that is to ageing. The ageing kinetics of samples was studied. The processes proceeding onto PP and PET films surface were analyzed.

Key words: polypropylene, polyethylene terephthalate, glow discharge, non-equilibrium plasma, UV irradiation, hydrophilicity, ageing

A.E. PETROV, T.G. SHIKOVA, V.A. TITOV, A.D. FEDOROVA

SURFACE MODIFICATION OF POLYMER FILMS IN FLOWING AFTERGLOW OF ATMOSPHERIC PRESSURE AIR DC DISCHARGE

Physical characteristics were experimentally obtained for the atmospheric pressure dc discharge in air flow. The treatment of polymer films in the discharge flowing afterglow was shown to result in surface oxidation of polymers and improvement of their wettability.

Key words: atmospheric pressure glow discharge, polymer, modification, polyethylene, polypropylene, polytetrafluoroethylene, poly(ethylene)terephthalate

A.L. MOSSE, G.E. SAVCHENKO, V.V. SAVCHIN, A.V. LOZHECHNIK

MOBILE PLASMA SET-UP FOR TOXIC WASTE DESTRUCTION

The experimental mobile plasma set-up was developed and created for treatment of toxic wastes of various natures. Technologies of treatment and destruction of model mixtures of reactive mass and precipitates of waste water were tested.

Key words: mobile set-up, toxic wastes, technologies testing

I.L. GLAZKO

IDENTIFICATION AND QUANTITATIVE DETERMINATION OF DIOXANE ALCOHOLS AND THEIR ESTERS

Dioxane alcohols from industrial fraction and their esters obtained by the interesterification of dibutyladipate with dioxane alcohols were identified by the method of the gas chromatography-mass spectrometry. The method of determination of the calibration coefficients was proposed. Calibration coefficients for dioxane alcohols and their esters were determined with respect to standard. Dioxane alcohols fraction and mixture of their esters were qualitative and quantitative analysed.

Key words: dioxane alcohols, esters, interesterification, gas-liquid chromatography, mass spectrometry

Yu.S. PESTOVSKIY

KINETICS AND MECHANISM OF GROWTH OF GOLD NANOPARTICLES IN THE PROCESS OF AUTOMETALLOGRAPHY

The growth of gold nanoparticles by tetrachloroauric acid reduction with hydrogen peroxide was studied by means of atomic force microscopy and spectrophotometry. All the kinetic curves obtained tend to satu-

ration. The process is not accompanied by nucleation. The dependence of the absorbance of the nanoparticles solution on hydrogen peroxide concentration is linear. The average size of the nanoparticles after 10 min of autometallography grows with the hydrogen peroxide concentration increase. In the isystem under study the divergent growth of the nanoparticles can be observed.

Key words: atomic force microscopy, gold nanoparticles, autometallography

A.M. EFREMOV, A.A. DAVLYATSHINA, V.I. SVETTSOV

ELECTRO-PHYSICAL PARAMETERS OF DC GLOW DISCHARGE PLASMA IN HCl-O_2 MIXTIRES

The experimental investigation and the model-based analysis of the influence of initial composition of the HCl-O_2 mixtures on the steady-state plasma parameters (reduced electric field strength, electron energy distribution, rate constants for electron impact processes) in the direct current glow discharge system was carried out. The calculated data on the concentrations of charged particles were obtained

Key words: plasma, modeling, rate, concentration

A.A. SAMAROV, A.G. NAZMUTDINOV, YU.V. MOSHCHENSKIY

INVESTIGATION OF THERMAL STABILITY OF N-ALKYL FORMATES IN AREA OF CRITICAL TEMPERATURES

The rate constants of thermal decomposition of n-butylformate, n-amylformate, n-gexylformate, n-heptylformate and n-octylformate were experimentally determined in the supercritical region at fixed temperatures. The prediction of alkylformates thermal stability in the subcritical region was carried out. Recommendations were given on the conditions of the experimental determination of critical properties.

Key words: formic acid esters, thermal stability, thermal decomposition kinetics

N.N. SMIRNOVA, L.A. SHIRKIN

PERMOLECULAR STRUCTURE FORMING IN AQUEOUS SOLUTIONS OF INTERPOLYELECTROLYTE COMPLEXES OF SULFONATE-CONTAINING POLYPHENYLENPHTHALAMIDES OF DIFFERENT STRUCTURE

The structure forming in dilute aqueous solutions of sulfonate-containing polyphenylenphthalamides obtained on the base of chloranhydrytes of iso- and terephthalic acids and poly-N-(2-aminoethyl) acrylamide was studied by the method of dynamic light scattering. On the base of analysis of distribution character of particles size of forming interpolyelectrolyte complexes it was discovered that along with the ratio between reacting polyelectrolytes and ionization degree of polybase the structure forming in investigated systems is determined with the structure of sulfonate-containing polyphenylenphthalamides.

Key words: sulfonate-containing polyphenylenphthalamides, interpolymer reactions, interpolyelectrolyte complexes

R.A. SMOLIN, N.N. BATYRSHIN, G.G. ELIMANOVA, Kh.E. KHARLAMPIDI

KINETICS OF INTERACTION OF MOLYBDENUM BLUE AND ORGANIC HYDROPEROXIDES

At the treatment of molybdenum blue by organic hydroperoxides and hydrogen peroxide the reaction occurs accompanied by a color change to yellow. In this study the kinetic regularities of interaction of molybdenum blue and ethylbenzene and cumene hydroperoxides were investigated using the method of photocalorimetry. The kinetic and activation parameters of reaction were determined. The mechanism of process including the attack of alkoxy oxygen of a hydroperoxide on atoms of molybdenum connecting molecule fragments of molybdenum blue was offered.

Key words: kinetics, molybdenum blue, hydroperoxides, peroxocomplex

A.S. KATYSHEVA, L.N. MASKAEVA, A.V. CHUKIN, V.F. MARKOV

HYDROCHEMICAL DEPOSITION OF PbS_YSe_{1-Y} SOLID SOLUTIONS FILMS. COMPOSITION. STRUCTURE. MORPHOLOGY

Thin films of PbS_ySe_{1-y} solid solutions ($0 < y < 1$) were received by hydrochemical co-deposition of lead sulfide and lead selenide from citric-ammoniac reaction mixture at temperature of 353 K. The formal-kinetic equation for lead salt transformation rate in PbS_ySe_{1-y} was obtained. The dependences of the crystalline structure, phase composition and morphology of the films on synthesis conditions were studied.

Key words: thin films, substitutional solid solutions, chemical deposition, lead sulfide, lead selenide

E.V. FESIK, V.I. ZARAZHEVSKIY, G.D. MAL'CHIKOV

RHENIUM-CONTAINING CATALYSTS OF NEUTRALIZATION PROCESSES OF EXHAUST GASES OF CAR. II. CATALYTIC SYSTEMS ON OXIDE COMPOSITE CARRIER

Results of researches of catalytic systems (Pd-Rh. Pd-Ni. Pd-Pt. Pd-Ag. Rh-Re. Pd-Re. Pt-Re. Pd-Ag-Rh-Re. Pd-Re)/oxide composite carrier are presented. Samples of grain catalysts were obtained with a method of joint precipitation of components of oxide composite material- carrier and Re, Pt, Pd, Rh, Ag and Ni compounds. Textural-geometrical characteristics of the synthesized samples were investigated. The catalytic activity of laboratory samples was studies in modeling processes of monoxide carbon oxydation and reduction of nitrogen oxides NO_x. The synthesized catalysts were shown to manifest the high catalytic activity in the investigated processes. The catalysts obtained are inferior to similar platinum-containing catalysts.

Key words: rhenium, heterogeneous catalysts, platinum metals, oxide composite carrier, hydrothermal synthesis, catalytic care-neutralizer

M.V. AKSYUTENOK, A.A. MOSKVICHEV, YU.L. GUNKO, O.L. KOZINA, M.G. MIKHALENKO

MODELING OF CHARGE-DISCHARGE PROCESSES ON CADMIUM ELECTRODE OF CADMIUM-NICKEL ACCUMULATOR

The mathematical description of charge and discharge processes of porous cadmium electrode is presented. This description allows calculating the current distribution and concentration of hydroxide ions and cadmium hydroxo complexes as well as estimating the influence of appearing gradients of cadmium hydroxo complexes concentration on mass transfer of active substance in electrode body.

Key words: cadmium electrode, charge, discharge, polarization, concentration, mass transfer

D.L. KOTOVA, DO THI LONG, T.A. KRYSANOVA, M.S. BOLOTOVA, S.Yu. VASILIEVA

ACID ACTIVATION OF CLINOPTILOLITE TUFF OF POLAR URAL UGRA DEPOSIT

The change of the composition, structure and sorption properties of clinoptilolite tuff at its activation with hydrochloric acid (C_{HCl} = 0.50 - 5.0 M) was studied. The influence of acid concentration on the order of cations extraction and on the value of Si/Al parameter was shown. The dealumination at acid activation by 5.0 M HCl was established to result in a slight change in the crystallinity and in the partial amorphization of zeolite phase. The increase in sorption capacity of activated clinoptilolite tuff to ammonium ions and to methylene blue was determined. The changes in regularities of water vapors adsorption were revealed.

Key words: clinoptilolite tuff, acid activation, cation removal, aluminum removal, adsorption

E.M. VOLKOV, V.Yu. ORLOV, T.N. ORLOVA, A.S.LYUTKIN, A.D. KOTOV, N.V. DVORETSKIY

INFLUENCE OF IRON (III) OXIDE ON SYNTHESIS PROCESS OF DIPHENYL ETHERS IN POTASSIUM CARBONATE PRESENCE

The process of diphenyl ethers formation at interaction of nitroclorinebenzenes with phenoxide anion interaction taking into account the iron (III) oxide additions was investigated. The influence of hematite genesis on reaction rate was considered. On the basis of obtained data the assumtion was done on the nature of additions action on the proceeding the process under study.

Key words: aromatic nucleophilic substitution, hematite genesis, diphenyl ether, phenoxide anion, iron(III) oxide

Yu.A. DRUZHININA, I.L. GLAZKO, S.V. LEVANOVA

OBTAINING ESTERS OF DICARBOXYLIC ACIDS FROM WASTE OF CAPROLACTAM PRODUCTION

The esters of dicarboxylic acids C_4-C_6 were obtained from residual product of caprolactam production. Physicochemical properties of dicarboxylic acid esters were determined. It was shown that these esters can be used as plasticizing agents.

Key words: adipinic acid, dicarboxylic acids, esters, esterification

V.A. AVER'YANOV, N.T. SEVOST'YANOVA, S.A. BATASHEV

ACTIVITY AND KINETIC ASPECT OF PALLADIUM-CONTAINED CATALYSTS INFLUENCE ON REACTION OF CYCLOHEXENE HYDROCARBOMETHOXYLATION

The influence of the Pd-containing catalysts $Pd(PPh_3)_2Cl_2$, $PdCl_2$ and $(AcO)_2Pd$ promoted by PPh_3 and p-toluenesulfonic acid on the cyclohexene hydrocarbomethoxylation rate were studied. The first reaction order on $(AcO)_2Pd$, fractional one – on $Pd(PPh_3)_2Cl_2$, and the extreme rate dependence on the $PdCl_2$ concentration was established. The $(AcO)_2Pd$ activity was shown to exceed by a factor 6-7 the $Pd(PPh_3)_2Cl_2$ and $PdCl_2$ activities. The differences in precursors behaviour were interpreted by the hydride mechanism. The presence of the weakly coordinating anions in the precursor was shown to cause the first order on the precursor and high reaction rates while strongly coordinating anions to cause the fractional order and the low rates.

Key words: hydrocarbomethoxylation, cyclohexene, methylcyclohexanecarboxylate, palladiumphosphine complex, kinetic equation

D.A. BEEVA, A.A. BEEV, A.K. MIKITAEV, Z.A. BEEVA

SYNTHESIS OF LINEAR THERMOPLASTIC POLYHYDROXYESTERS

The method of synthesis of polyhydroxoesters of bis-phenol A by sedimental polycondensation was developed and some properties of polyhydroxyesters of various structures were investigated. The opportunity of reception of linear polyesters of high molecular weight with a narrow molecular-mass distribution unlike methods which are used now was shown.

Key words: polycondensation, molecular weight, epichlorohydrin, polyhydroxyether