INFORMATION TECHNOLOGY AND CONTROL SYSTEMS

DEVELOPMENT OF CLOUD APP SIMULATOR

page 4–6

This paper discusses the development of cloud app simulator that allows comparing strategies for cloud app scaling that is defined the specific requirements for possibilities of the simulator. It is conducted formalization of the requirements cloud app simulator and projected its architecture that supports interaction with outside scaling modules and allows calculating of cloud app metrics as the average execution time of network query, processor load and memory. Calculation of metrics is based on interpolation results of real testing load of cloud app. The developed simulator can reduce the effectiveness of the evaluation strategy for cloud app scaling and significantly reduce cash costs for testing by eliminating the use of cloud virtual machines during testing.

Keywords: cloud app simulation, cloud computing, PaaS, cloud app scaling.

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PROCESS CONTROL OF PAPER WEB HEATING ON THE BASIS OF DYNAMIC PROGRAMMING METHOD

page 6–10

This paper deals with the use of dynamic programming method for the creation of optimal process control of paper web heating in the drying part of the paper machine, Results of the synthesized system are given. The main aim of research is to establish the efficiency of dynamic programming method under the influence of various sizes of disturbances on the control object. Using the method of simulation modeling it is conducted experimental researches of developed control system with the implementation of dynamic programming method adapted to this process. The proposed software solution allows effectively control the process of paper web heating in a wide range of disturbances. Dynamic programming method, which was implemented in the work, allows calculating the optimal values of control actions in each drying cylinder, which leads to solving the problem of process control while minimizing control criteria. The proposed solution can be used as part of the overall control process of the paper web drying in the drying part of the paper machine. The results will be used in the future to modify the dynamic programming method to integrate into it elements of prediction of perturbations and real-time correction of control actions.

Keywords: paper web drying, dynamic programming, control system, disturbance, optimal control.

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RESEARCH OF METHODS OF THE DETERMINING THE FUNCTIONAL CONDITION OF ATHLETES AND THEIR IMPLEMENTATION IN COMPUTER CONTROL SYSTEM OF TRAINING PROCESS

page 10–13

Use of information technology in the training process control is discussed, the basic subsystems are considered. The main aim of the study is to develop a method for determining the condition of the athlete used for a computer system. The use of modern technologies in the process of training an athlete can significantly improve the function of control over the state of his body. This requires well-chosen methods of control. In this article, using the developed module, it was studied and tested the reliability of existing tests. But individual performance indicators of the body are not as reliable as for example, a function of several parameters. Therefore, our system has been applied Gerasimov method. Formulas for calculating numerical results of functional tests have been modified to provide the most accurate assessment of the state of the body. Auxiliary subsystems was identified and described. The research results can be applied in the field of sports medicine, as well as in computer systems related to the

training of the athlete. Gerasimov method used in computer control system of the training process will yield positive results for both the control functions in particular, and for the training of the athlete as a whole.

Keywords: computer system, training process, method, control, physiological parameters.

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INFORMATION TECHNOLOGY ANALYSIS OF THE EDUCATIONAL PROCESS SUPPORT WITH ORIENTATION TOWARD EMPLOYERS' REQUIREMENTS

page 14–16

The issue of employers' requirements consideration, when designing educational programs in the higher education institution is discussed in this article. The main research aim is development of formal conception and analysis of employers' requirements that will allow to correct educational programs in the higher education institution and to shorten the distance between the students' academic preparation and the reality of labor-market. For the stated aim achievement it is proposed to realize some appropriate models, methods and information support technique of the educational process in the higher education institution. Some advantages of applying modern information technologies of data collection, extraction and its intellectual analysis are provided regarding employers' requirements definition. The approach to the graduates' competence classes definition according to the specified requirements on the basis of the multi-criteria classification method is presented. The proposed approach enables to implement a transition from verbal vacancy requirements description to ordinal competence evaluation scale, formed during the educational process. The research results can be applied for realization of the information technology of the educational process support.

Keywords: information technology, educational process, employers' requirements, multi-criteria classification, management.

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TECHNOLOGY ORGANIC AND INORGANIC SUBSTANCES

FORECASTING OF PROPERTIES OF JEWELLER ALLOYS ON THE BASIS OF GOLD IN SYSTEM AU-AG-CU

page 17–20

This article gives deep insights into the research of changing properties' consistency of the alloys on the basis of gold in the system Au-Ag-Cu (gold, silver-copper) which are represented on the ground of mathematical models in order to enhance efficiency of the alloys' composition suitable for the jewelry production.

The main aim of the research is the development of the scientific-methodological principles of the patterns' estimation of the mass content's influence of the main alloy components (copper and silver) on the formation of the attributes of the golden alloy using the simplex of the lattice method.

The simple equation has been obtained, which gives the possibility to calculate the chemical composition and indices of alloys' properties (solidus temperature, liquidus, hardness, mechanical durability) on the basis of gold in order to design the jewelry with the stated consumption properties.

The influence of the alloy's components in the system Au-Ag-Cu aimed at the change of the properties' change has been established, precisely the temperature solidus, liquidus, hardness, durability of the jewelry.

Keywords: models, gold, silver, copper, jeweller alloys, temperature, hardness, durability.

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THE INFLUENCE OF STRUCTURAL HETEROGENEITY OF HOLLOW GLASS MICROSPHERES ON PHYSICAL AND CHEMICAL PROCESSES OF THE FORMATION OF MATERIALS AND COATINGS

page 20–25

The physical and chemical processes of formation of new compositions based on hollow glass microspheres are discussed in the article. The aim — to determine the influence of the structural heterogeneity of hollow glass microspheres of sodium silicate composition on the physical and chemical processes of formation of hot aluminum-matrix materials and coatings based on electric-Sv-AMg5 and Sv-08G2S. Researches are performed by electronic and optical microscopy, X-ray diffraction and electron microprobe analysis. The basis of the laws of formation of the new-metal materials and coatings based on new knowledge about the mechanisms of formation of a liquid phase based on the structural heterogeneity of hollow glass microspheres that can predict the physical and chemical processes at the metal — glass boundary surface. The theoretical researches allow us to establish the distinctive features of the structure formation depending on the method of preparing the compositions, and are aimed at improving their competitiveness. The results are used to predict the mechanical properties of the x-ray and metal-glass materials and coatings for their further use for the manufacture of structures of biological protection of ships and floating structures, for the transportation and storage of radioactive substances.

Keywords: hollow glass microspheres, metal-glass materials and coatings, structural heterogeneity, processes.

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USAGE OF SODA-SODA SEMI-FINISHED PRODUCTS FROM RAPE IN CARDBOARD COMPOSITION

page 25–29

This article deals with obtaining and using fibrous semi-finished products from annual plants and some results of our

research in this area are given. The main aim of the study is the use of clean soda-soda process for broken rape delignification for obtaining fiber semi-finished products to using them in the cardboard manufacture. An influence of the main technological parameters is shown in the article: active alkali charge, addition of NaOH to soda solution, cooking duration, infiltration and presence of anthraquinone catalyst on quality parameters obtained fiber semi-finished products and container cardboard. The proposed technological parameters of soda-soda cooking of broken rape allow to delignificate them to obtain semi-chemical pulp and high yield pulp. It is established the feasibility of using rape fiber semi-finished products for KT-25 and KT-50 container cardboard brands. The research results can be considered as an alternative to waste paper for the cardboard production.

Keywords: rape, soda-soda method, active alkali, anthraquinone, delignification, semi-chemical pulp, container cardboard.

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DEVELOPMENT OF ANODE MIXTURE COMPOSITION FROM PROCESSING PRODUCTS OF COAL TO PRODUCE CARBON NANOSTRUCTURES BY THE PLASMA-ARC METHOD

It is discussed the use of coal processing products as a part of the anode mixture and their effect on the production of homogeneous carbon nanostructures by the plasma-arc method. The main aim of this research is to develop a theoretical basis and anode mixture composition, allowing to obtain morphologically uniform carbon nanostructures. It was used arc evaporation method for synthesis of nanostructures. Identification of carbon nanostructures and sizes was carried out by electron microscopy. Carbon nanoparticles, carbon filamentary structure and carbon fiber were obtained using the proposed components that make up the anode mixture, pitch coke, coal tar and coal medium temperature pitch. The carbon content in pitch coke and in the form of aromatics in the coal medium temperature pitch may allow to obtain more ho-

mogeneous morphologically carbon nanostructure. The research results can be used to improve the strength and corrosion resistance of metals. We propose to use the processing products of coal as part of the anode mixture to produce morphologically uniform carbon nanostructures by the plasma-arc method.

Keywords: pitch coke, medium temperature pitch, coal tar, carbon nanoparticles, plasma-arc method.

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RESEARCH OF SELECTIVE LEACHING OF ZINC FROM METALLURGICAL DUST

This article discusses the process of liquid-phase extraction of zinc from metallurgical dust and sludges. The main purpose of this study is to investigate the efficacy and selectivity of the transition of zinc and iron from the solid phase into the liquid in the process of dissolution of zinc-containing material.

To obtain data on selectivity of acid leaching of zinc were conducted experimental kinetic studies, the reaction products were analyzed by photocolorimetry. As the zinc-containing material were used samples of EAF dust with a high content of zinc oxide.

As a result of research we obtained the data on the effectiveness and the selectivity of zinc extraction using an acid of different concentrations, as well as with increasing temperature. It was discovered that the process proceeds in two stages. We associate it with a complex chemical composition of the dust. The speed of zinc extraction in the first stage is much higher than the speed of the further course of process. The selectivity value increases during the dissolution process using a solution of sulfuric acid at a concentration of 0,05–0,1 mol/l. Increasing the concentration of the acid solution, as well as the increase of temperature reduces the selectivity of the zinc extraction.

The research results can be used to improve industrial technologies for the utilization metallurgical zinc-containing dust and sludges. Carrying out the process at a low concentration of the acid solution for a longer period of time will allow to achieve high recovery of zinc, while maintaining high selectivity.

Keywords: sludge, zinc, zinc oxide, zinc ferrite, metallurgical wastes, leaching, selectivity.

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RESEARCH OF THE CHARACTERISTICS OF PARTICLES OBTAINED BY TREATING OF CUSO4 SOLUTION BY THE CONTACT NONEQUILIBRIUM PLASMA

page 36–38

The paper presents the results of a study of the particles obtained from the synthesized cathode dry deposits. It is noted that the amount of the obtained residual particles can vary within wide limits. At the same time there is the predominance of octahedral and cuboktahedral forms of the particles in the dimension characteristic for fine and ultrafine powders. X-ray diffraction analysis showed the prevalence of oxide copper (I) in these forms. The variation of process parameters, especially the reduction of the current density of the process and therefore reduction of the current density at the cathode lead to reducing the size of the resulting particles and improving uniformity of deposits, as evidenced by the results of electron microscopic studies of the synthesized cathode deposits. This allows controlling the process of synthesis of particles by adjusting the process parameters of

plasma chemical treatment, which due to its constructive design isn't cause difficulties and, along with the possibility of using very dilute solutions, is the advantage of this method.

Keywords: ultrafine powders, plasma chemical synthesis, particles, octahedron, cubeoctahedron.

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ANALYSIS OF FOOD AND BIOLOGICAL VALUE OF FISH PROCESSING WASTE

page 39–41

The prospects and necessity of involving the fish protein-containing waste in the production cycle of food production is proved in the article. The main aim is research and evaluation of food and biological value of fish waste generated as a result of production of semi-finished goods or stuffing. These data show that most perspective protein-containing waste is a fish skin, because it is rich in protein and fat, as well as some amino acids specific for collagen. It is found that the amino acid composition of fish skins is defective, however, it can be easily balanced by binding to muscle tissue. We propose to use fish skin in meat systems after appropriate processing to impart plasticity and softness.

Keywords: fish, fish food waste, fish skin, chemical composition, amino acid composition.

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PROCESSES AND EQUIPMENT OF FOOD AND CHEMICAL INDUSTRIES

RESEARCH CALCIUM AND MAGNESIUM CONTENT IN DRINKING WATER FROM FILLING POINTS

page 42–44

The article discusses the impact of the hardness of drinking water on human health and some results of our research in this area are given. The main aim of the study is to determine the content of calcium and magnesium cations in drinking water of filling points and assessing possible effect of such water on the health of Lviv residents. In 10 samples of drinking water taken at different filling points it is determined: total hardness and calcium by complexometric method; magnesium hardness as the difference between total hardness and calcium hardness; total alkalinity in the water samples during titration of HCl solution. It is calculated concentration of calcium and magnesium cations for values of calcium and magnesium hardness. The results show that no sample does not meet the physiological usefulness of drinking water by concentrations of calcium and magnesium cations. The content of these elements in water is lower than the normative value. Comparison of the total hardness and total alkalinity enables suggests that water previously processed on filters with cation exchange loading. Water of all investigated samples is very soft with a total hardness $0–1,4 \, mM/dm^3$. Over consumption of such water there is a danger of population infestation by cardiovascular diseases.

Keywords: calcium, magnesium, drinking water, filling point, human health, cardiovascular diseases.

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