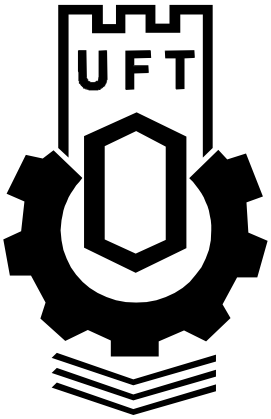
UNIVERSITY OF FOOD TECHNOLOGIES - PLOVDIV



BOOK OF ABSTRACTS

of the 63rd Scientific Conference with International Participation
"**Food Science, Engineering and Technology - 2016**"

Volume III

Corrected version after closing of the conference

October 21- 22, 2016
UFT, Plovdiv, Bulgaria

Organized in cooperation with the Foundation "Scientific Research"
under Contract № DPMNF01/3 signed on August 11, 2016

III. Thematic Field. Fundamentals and Development of Engineering in Food and Biotechnology Industry

Plenary report

New challenges in the development of energy efficiency

N. Kaloyanov
Technical University, Sofia, Bulgaria

Summary

The review report presents current trends in the development of regulatory requirements for energy efficiency in buildings and industrial systems.

An analysis of the relationship between recent changes in the specialized EU directives, their influence in national legislation and the resulted new challenges for engineering solutions is presented.

The emphasis is on systems to provide the necessary parameters of the environment with minimal energy costs and their environmental impact. It demonstrates effective active and passive technologies to meet the requirements for buildings with nearly zero energy consumption and high efficiency technologies for utilization of renewable energy in buildings and industrial applications.

3.1.

Study the influence of sliding speed onto wear intensity of Ti/Tin/CrN-ml nanolaminate coating deposited on 37Cr4 steel pad

R. Minchev
Technical College, Smolyan - Plovdiv University Paisii Hilendarski, Bulgaria

Abstract

Researches on durability are current in industry and are linked to the durability and efficiency of the working parts of the machines. In this work the durability is explored multiple coating (nanolaminat) Ti/TiN/CrN-ml affixed to steel pads 37Cr4 depending on the speed of sliding in conditions of dry friction. Durability is an important indicator of coverage. It shows how this coverage is permanently to a work environment.

3.2

Factors influencing the rate of deposition of different fouling in process equipment for food industry

St. Stefanov, I. Stefanova, S. Atanasova, G. Angelova
University of Food Technologies, Plovdiv, Bulgaria

Abstract

This article discusses the problems with fouling of the equipment in the food industry. It is directly related to ensuring the quality and safety of the food products. A review has been made of the literature data on the fouling factors, the factors that are affecting its structure and quantity, the opportunities for its monitoring and the methods of prevention and removal. Based on the analysis a systematization of the factors has been made, which determine the formation and development of the fouling.

3.3.

Study of thermodynamic parameters of mechanical heat pump system

Sl. Valchev, N. Nenov
University of Food Technologies, Plovdiv, Bulgaria

Abstract

Object of the present study is an experimental determination of the values of thermodynamic parameters of the mechanical heat pump system: isentropic efficiency of mechanical compressor, polytropic index in the process of condensation of water vapor , heat capacity of water vapor. A classic experiment by two significant factors with three levels of variation of one of the factor and five of the other factor in order to obtain adequate regression equation is conducted. It was found experimentally that in heat pump system mechanical compressor has a isentropic efficiency in the range of 0.143 to 0.288. Experimentally determined values of polytropic index in the process of water vapor compression is n = - 0,325 ± 0,006 and heat capacity of water steam in the process at polytropic compression is cn = 1,817 kJ / kgK ± 0,0005 kJ / kgK.

3.4.

Efficiency improvement of a biogas engine-driven CHP plant

I. V. Ion
University of Galati Dunarea de Jos, Galati, Romania

Abstract

Anaerobic digestion applied to the organic waste produced in urban environments could provide a critical solution to growing garbage problems. The biogas yield is estimated using molecular formula analysis and the Anaerobic Digestion Model #1 (ADM1). Thermodynamics analysis of the energy system based on ORC turbo generator is performed using the Cycle-Tempo software.

3.5.

Theoretical research of efficiency of air solar collector with finned absorber

A. Tashev, M. Minchev, D. Atanasov
University of Food Technologies, Plovdiv, Bulgaria

Abstract

The thermal efficiency of air solar collectors is an important indicator, which determines the effectiveness of the entire solar thermal system they are connected to. It depends mainly on the operating conditions (intensity of solar radiation, air temperature, air velocity in the collector, velocity of the wind), but also on the geometry of the air channel. In this study, the influence of the velocity of the heated air and the height of the fins on the efficiency of air solar collector with finned absorber has been evaluated by a mathematical model. From the results obtained, it can be seen that the increase in velocity value from 2 to 10 m/s results in an increase of the optical efficiency of the air solar collector from 65% to 73%. The increase the height of the fins from 15 to 30 mm leads to an increase in the efficiency from 65% to 69%, respectively. The resultant values of the efficiency are presented graphically as a function of the ΔT/G ratio over the entire range of the test.

3.7.

Experimental research on animal fat burning in co-combustion with liquid hydrocarbons

Gh. Lăzăroiu, L. Mihăescu, I. Pîşă, G.-P. Negreanu, V. Berbece
Polytechnic University, Bucharest, Romania

Abstract

The research objective was to determine the possibilities to destruct animal fat by burning.
The experimental research has defined the limits of application for the technology of animal fat co-combustion with liquid hydrocarbons.
For that purpose a boiler has been used that is equipped with a specialized heater and a burner with mechanical pulverizing.
The burning efficiency and the pollutant emissions were determined.

3.8.

Combined microwave convective heating and modelling of heat and mass transfer process

A. Akulich[1], P. Akulich[1], K. Dinkov[2], V. Akulich[1]
[1]Mogilev State University of Food Technologies, Mogilev, Belarus
[2]University of Food Technologies, Plovdiv, Bulgaria

Abstract

The paper discusses the results of mathematical modelling of the interrelated processes of heat and moisture transfer specifying the influence of the operating parameters on the drying dynamics and kinetics of vegetable raw materials in the process of combined convective and impulse electromagnetic microwave action.

3.9.

The heat treatment of grain by microwave fields

A. Ospanov, *A. Vasiliev, D. Budniko D. Karmanov*
Eurasian Technological University, Almaty, Kazakhstan

Abstract

It's necessary to take into account the types of the applied electric technologies, for example infrared (IR) fields, microwave (MW) fields, etc. when designing the thermal processing equipment postharvest rural-agricultural products During the design of the equipment which uses these technologies, it's essential to take into account the penetrating depth of the layer into the material. The penetrating depth depends on the material and its properties, and the parameters of the electromagnetic field. The use of the special programs gives vast possibilities for the design of such equipment. As a result, the use of MW fields allows reducing the cost of the thermal treatment on 15-20% depending on the process and type of the processing material

3.10.

Self-organizing artificial neural network a kohonen to be multifactorial classification of English breakfast tea with different geographical origin of component

M. Sestrimska, *V. Nachev, Ch. Damyaov, T. Titova*
University of Food Technologies, Plovdiv, Bulgaria

Abstract

In this report is proposed self-organizing artificial neural network to be multifactorial classification tea type "English breakfast" of five different commercial brands. Experimental study of tea samples is based on spectral analysis in the visible and near infrared region of the electromagnetic spectrum of light (VIS/NIR spectral analysis). In parallel with the spectral characteristics were measured and the characteristics of colour and pH of the tea samples. Experimental data were analyzed by the method stepwise linear discriminant analysis in order to reduce the dimensionality of the output feature space and to extract the most valuable of informative perspective characteristics of tea samples. Tea samples were classified successfully in five cluster groups, achieved precision work of the neural network of 99.72% (error 0.28%).

3.11.

Physicochemical parameters and granulometric composition of biologically active powered fruit components

Ad. Bogoeva
University of Food Technologies, Plovdiv, Bulgaria

Abstract

For the purposes of the present study, via conventional methods, we determined the physicochemical parameters and granulometric composition of powdered fruit components, i.e. full-fat flour from post-fermentation grape seed, defatted flour from post-fermentation grape seed, and lúcuma flour.

3.12.

The selection of the packaging for foodstuff and forecasting its shelf life

M. Chernov[1], V. Ananiev[2]

[1]Moscow State University of Technology and Management K. G. Razumovsky, Moscow, Russia

[2]Research Centre Print - Moscow State University I. Fedorov, Moscow, Russia

Abstract

Computer program is made for determining the permeability of packaging material by storing foodstuff in the noble, modified or controlled atmospheres. This program allows selecting the packaging type out of variant offered of its geometrical sizes. It works in the operational environment MS Windows. The example of its using for packing and storing of flour products and pastry in the modified atmosphere is shown here.

3.13.

Automated control system of greenhouses

J. Stoychev[1], E. Trushanov[2], G. Terziiski[2]
[1]University of Food Technologies, Plovdiv, Bulgaria
[2]Company Vital, Parvomay, Bulgaria

Abstract

The article examined the possibility of reaching a certain level of safety of food products consumed raw, such as a study of the effect achieved with different modes of processing on raw nuts and flakes spelled. Experiments were carried out with a laboratory setting providing indirect cold plasma. The results of the study show a reduction of the total number of microorganisms by 3-4 log units (99.97 to 99.99% efficiency) for the treatment of the product (5g respectively nuts and 2.5g Fleck spelled) with indirect cold plasma ozone concentration 5 ppm and duration of 15s with a flow rate 0.3 m^3/h. The reduction is sufficient to provide a safe level of total microorganisms in treatment of moderately contaminated product.

3.14.

Certain aspects of ventilation systems as process of control

J. Stoychev
University of Food Technologies, Plovdiv, Bulgaria

Abstract

The work examined some key moments and problems with ventilation of industrial and office buildings. Attention is paid to these issues in terms of management of different systems for ventilation.

3.15.

Self-organizing artificial neural network a Kohonen to be multifactorial classification of English breakfast tea, with different geographical origin of components

M. Sestrimska
University of Food Technologies, Plovdiv, Bulgaria

Abstract

In this report is proposed self-organizing artificial neural network to be multifactorial classification tea type "English breakfast" of five different commercial brands. Experimental study of tea samples is based on spectral analysis in the visible and near infrared region of the electromagnetic spectrum of light (VIS/NIR spectral analysis). In parallel with the spectral characteristics were measured and the characteristics of colour and pH of the tea samples. Experimental data were analyzed by the method stepwise linear discriminant analysis in order to reduce the dimensionality of the output feature space and to extract the most valuable of informative perspective characteristics of tea samples. Tea samples were classified successfully in five cluster groups, achieved precision work of the neural network of 99.72% (error 0.28%).

3.16.

Automation of the processes for the production of ketchup in "Vital" company – Parvomay

G. Dineva[2], G. Terziysky[1]
[1]Company Vital, Parvomay, Bulgaria
[2]University of Food Technologies, Plovdiv, Bulgaria

Abstract

Discussed are technological processes for the production of ketchup in company "Vital" - city. Parvomai and shows a fundamental technological scheme. Displayed and viewed is the automatic control in the production of ketchup in the same company. The following are recommendations for improving the implemented system for automatic control. The proposals are consistent with the company management and steps were taken to implement them.

3.17.

An approach for engineering tuning of PI controller with dynamic object from second order

G. Terziysky
University of Food Technologies, Plovdiv, Bulgaria

Abstract

Proposed is an approach to engineering tuning PI controller with dynamic object from the second row (two aperiodic links with equal time constants).
It is proposed to solve the problem by solving the characteristic equation.
The analysis of the dynamic system of the third row are calculated Adjust PI-regulator.

3.18.

Elaboration of a Microprocessor Unit for Gas Measurement with Sensor MQ-6

N. Katrandzhiev, *N. Karnobatev*
University of Food Technologies, Plovdiv, Bulgaria

Abstract

Environmental pollution with harmful gases, the accumulation of heavy metals, ozone layer expanding hole, climate changes and disasters raised a question regarding the environmental protection. Automobiles as a modern lifestyle necessity are main pollution culprits: up to 80% of air pollution in cities is due to cars emissions. PB, CO, HC, NO, CO_2, and N are components of the internal combustion diesel and gasoline fuel engines exhaust. Emissions from burning Liquefied Petroleum Gas (LPG) do not contain SO_2 leading to acid rain. The LPG CO and NO emissions are relatively low compared to other fuels. LPG burning in internal combustion engines is up to 100% due to its physiochemical properties- uniform gas and air physical state ensures a homogeneous fuel mixture resulting in complete combustion. Based on these LPG benefits, there is a trend of LPG increasing use as fuel for households and industry. Unfortunately LPG use led to many accidents related to gas leakage: fire and explosion du

3.19.

Tendency in the creation of information systems in higher schools in Bulgaria

V. Ruseva, N. Katrandzhiev, R. Gabrova
University of Food Technologies, Plovdiv, Bulgaria

Abstract

The information technology has continuous development and competitions between higher education institutions in Bulgaria, leading to their constant striving and improving. These enhance their quality of service, training and management. Management of different activities and resources in universities takes a lot of time, effort and energy on the part of teachers, administrators and management authorities. In order to improve the work efficiency of the services provided, while reducing costs of any nature, universities are increasingly looking to implement, improve and extend the capabilities of their information systems. This paper presents an overview of some of the existing university systems in Bulgaria and the comparison on their core functionalities. An analysis of the capabilities of different systems opens new horizons to improve and upgrade.

3.20.

Analysis of an ORC turbogenerator fuelled by biogas produced from food wastes

I. V. Ion
University of Galati Dunarea de Jos, Galati, Romania

Abstract

Farm scale biogas plants most often use internal combustion engine-based combined heat and power (CHP) plant. In some cases (during summer) the heat demand is reduced and therefore a solution to increase the CHP plant efficiency must be found. One way could be integration of an organic Rankine cycle (ORC) system to produce electricity and heat using recovered heat from flue gas leaving the engine and an absorption chillier to produce cold water using heat recovered from the engine cooling water. Analysis of a CHP plant that produces 500 kW electric and 410 kW thermal shows that the overall efficiency of the plant may be increased in this way from 74.53% to 83.53% in winter and from 60.44% to 79.57% in summer. The investment costs can be recovered in 1.53 years.

3.21.

Designing a system for gathering, archiving and processing utility usage data

B. Milenkov, N. Katrandzhiev, D. Hristozov
University of Food Technologies, Plovdiv, Bulgaria

Abstract

We implement a computer system that can gather store and process utility usage data.
The core system is implemented in PHP, backed by MySQL database.
All elements are encoded in UTF-8.
The system will permit energy usage and therefore costs to be optimized based on previous usage data.
Energy consumption is the driving factor to the managerial decisions.

3.22.

Region of interest definition by image processing in brown bread porosity evaluation

A. Danev, At. Bosakova-Ardenska, Hr. Andreeva, L. Kostadinova -Georgieva
University of Food Technologies, Plovdiv, Bulgaria

Abstract

It was made a research in the report for a specific brown bread characteristic – porosity of the middle. Two types of analyses were made – physicochemical and computer one (through image processing). A software product with GUI (Graphical User Interface) implemented in C# was developed for brown bread images binarization and calculation of the percentage of white pixels to the total number of pixels in the image. These values correspond with the middle bread porosity obtained by physicochemical method.

3.23.

Powering of resource-constrained devices with energy collection and energy harvesting

I. Kartelov, N. Katrandzhiev
University of Food Technologies, Plovdiv, Bulgaria

Abstract

With the number of interconnected devices, many of which being wireless, exceeding the human population, there is a need to power resource-constrained devices through means other than disposable batteries. Harvesting ambient energy from the vicinity of the device is one solution. If parts of the installed devices could be self-sufficient, powered through ambient energy, the smart integration of electronics in mechanical systems could be achieved. A scenario in which powering circuitry are embedded with electronics is presented, through which the development of new services, data collection, data transfer and data interpretation can be realized.

3.24.

Digitizing the results of the shooting device with a program in Lab VIEW

Hr. Andreeva
University of Food Technologies, Plovdiv, Bulgaria

Abstract

In this article are exposed highlights from the methodology for study of food preferences of children and teenagers in the southern Bulgaria.
The definition of a representative sample as technology development and displaying the results were presented.
An characterization and comparative analysis of the empirical data as the number of participating schools and students with pre-defined in the sample was made.
The results of food preferences of children and teenagers to certain types of foods derived based on the statistical analysis method of Pierson were found.

3.25.

Studies on the hydrodynamics of the combined dust collector on the basis of vortex Flows and outer filtering and the development of the effective methods of cleaning gases from solid particles

A. V. Akulich, V. M. Lustenkov, V. A. Sharshunou, A. A. Akulich
Mogilev State University of Food Technologies, Mogilev, Belarus

Abstract

There has been developed a method for cleaning gas from solid particles and a laboratory model of combined dust collector on the basis of interacting vortex flows and filtration through one-piece filter element according to the principle of outer filtering has been made. Experimental studiers on hydrodynamics of the combined dust collector have been carried out. The dependences of the hydraulic resistance of the combined dust collector and the efficiency of fine particles collection on operating and design parameters have been obtained. The results of the comparison of vortex apparatuses are given and a new method for gas cleaning in a vortex group dust collector is suggested.

Additional Posters

Section IA. "Food Science and Technology"

1.45A

Effect of LED lights on chemical composition of *Cystoseira barbata* (*Phaeophyceae)*

I. Ak, C. Oztaskent

Çanakkale Onsekiz Mart University, Çanakkale, Turkey

Abstract

Brown algae, *Cystoseira barbata* have both economically and ecologically important for countries locate in black sea region. As well as this seaweed is indicator for purity of water, it is also recognized as valuable raw material both for industry and agricultural applications. In this study, *C. barbata* thallus were cultured at yellow, blue, green and red LED light sources to evaluate how the spectral composition of light effects on biochemical composition. The highest lipid, protein, ash and carbohydrate contents of thallus of *C. barbata* were determined at blue (6.15±0.47%), green (17.46±0.72%), red (42.87±0.13%) and nature (50.16±0.23%), respectively ($p<0.05$). The highest sodium alginate content was determined at blue light. According to FAME results, PUFA changed from 17.11 to 22.92%. The red LED increase both SFA and MUFA contents of the seaweed. At the end of the study, it was determined that the blue LED light is suitable for increasing lipid and alginate content.

1.46A

Opportunities for food safety managment in accordance with the requirements of ISO 9001: 2015

M. G. Stefanova[1], *V. Gotcheva*[2]

[1] *University of Economics, Varna, Bulgaria*

[2] *University of Food Technologies, Plovdiv, Bulgaria*

Abstract

The report makes an overview of the opportunities for integration of the quality management requirements based on ISO 9001:2015 in food safety. The aim of the study is to derive the similarities and differences between the legal requirements laid down in Codex Alimentarius and the public standards for quality management and food safety based on a comparative analysis. The methodology used is based on comparison of the requirements, identification of the common elements and the differences, as well as assessment of the compatibility and possibility for integration of these requirements. Based on the study, it may be suggested that the application of an integrated food safety system based on both the legal requirements and the public standards has the potential to improve product quality, to replace the need for separate introduction of the requirements, to demonstrate compliance with the regulated requirements and to improve customer satisfaction.

1.47A

Hemocyanins in a combined treatment with *Erufosine* on breast cancer

V. Uzunova

Institute of Biophysics and Biomedical Engeeniring – Bulgarian Academy of Sciences, Sofia, Bulgaria

Abstract

Erufosine (EPC3) belongs to the group of anti-tumor lipids which shows high selectivity to cancer cells by inhibition of cell proliferation and apoptosis, however, it not harm the normal cells. Hemocyanins (Hcs) are oxygen-carrying proteins isolated from Mollusca and Arthropoda which reveal recently antitumor activity. The aim of the present study is to investigate the combined effect of EPC3 and Hcs on the proliferative activity of breast cancer cell line MDA-MB-231. For the experiments hemocyanins from different sources in combination with Erufosine were used to treat cancer cells. MTT assay was applied to evaluate the cytotoxic effect of used substances. The results show time and concentration dependent cytotoxicity of Hcs in combination with EPC3. Interestingly, when applied alone Hcs did not have cytotoxic effect toward this cell line, but we observed an increase in the cytotoxic effect of EPC3 in combined treatment. The present data revealed the new opportunity of using new products.

1.48A

Technology of confectionery products using germinated seeds *Hippopoe Rhamnoidels* L.

A.M. Zolotareva[1], A.B. Ospanov[2], S.B. Rinchinova[1], B. Nyamdorj[1]

[1]East-Siberian State University of Technologies and Management, Ulan-Ude, Russia

[2] Eurasian Technological University, Almaty, Kazakhstan

Abstract

The technology of confectionery technology using sea-buckthorn seeds is developed. Introduction of sea buckthorn germinated seeds allows creating a cupcake with functional properties due to biologically active substances and the optimum ratio of components, increasing water-holding capacity, yield and improving the organoleptic properties as a result of the harmonization of the recipe and reducing the cost of the finished product. Introduction of germinated sea-buckthorn seeds in a fruitcake causes increase of biological value due to a significant content of biologically active substances of sea buckthorn seed. And also it allows expanding the range of flour confectionery of a functional purpose.

Additional Posters

Thematic Field I. Fundamentals and Development of Engineering in Food and Biotechnology Industry

3.26.

Using mind maps for graphic visualization of experiment in food industry

Iv. Krasteva, V. Gantchovska

European High School of Economics and Management, Plovdiv, Bulgaria

Abstract

The article is presented experiment for monitoring change the colour of marinated pork meet in two different types marinade. Of samples is made parallel laboratory and computer analysis. All steps of the experiment are presented through mind map. Mind maps help to draw up a specific plan of the experiment, for collecting and structuring prior information from scientific sources, describe the stages and presented graphically the results of the experiment.

3.27.

Selecting the optimal program for structural analysis of meat and meat products

Iv. Krasteva

European High School of Economics and Management, Plovdiv, Bulgaria

Abstract

This article describes the testing stages of individual software components.

The aim is to improve the quality and effectiveness of the product.

A program for the study of structure of meat and meat products by analysing the images was created.

3.28.

Creating a user interface suitable for visual communication with the user in program study the structure of marinated meat

Iv. Krasteva, V. Gantchovska

European High School of Economics and Management, Plovdiv, Bulgaria

Abstract

The article presents a user interface, steps in its construction and its graphic design. Its constructed to be completed, its elements are positioned in a convenient place for the user.
Appropriate sizes of shapes and colours were selected, so that it is friendly to use.
The user interface displays the program results graphically and in tables.

Content

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