

NATIONAL CENTRE FOR INFORMATION AND DOCUMENTATION

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# **ADVANCES IN BULGARIAN SCIENCE**



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## INNOVATION POLICY IN SUPPORT OF SMALL AND MEDIUM ENTERPRISES

*Europe is in need of creativity and innovations both due to social and economic reasons. In conditions of knowledge-based economy innovations are closely connected with creation and application of new scientific and technological knowledge.*

*Experience shows that countries increasing their investments in research investigations and education under conditions of crisis have better competitive power after overcoming it. The policy in the sphere of innovations is pursued also through increase of investments in education, development of the home market, regional policies for sustainable development. The links between research investigations and innovations with other spheres of public and economic development are promoted.*

*The innovation and research policy in Bulgaria is being developed in the context of the Lisbon Strategy and Innovation strategy of the Community for creation of a society integrated into the European Research Area.*

*During the recent years some measures have been taken in the direction of advances in the priority areas of the Lisbon Strategy:*

- The activity of the Research Investigations Fund and National Innovation Fund for targeted financing of the priority research and innovation projects has started.*
- The built centers for technology transfer at academic centers, universities and centers of entrepreneurship are functioning.*
- Voucher schemes of financing research and innovation projects, scientific contests for students' technological firms, as well as grant schemes for involving Bulgarian researchers living abroad are introduced as new instruments for stimulation of innovation activity.*
- National road map on the development of the research infrastructure of Bulgaria is developed.*
- Participation of Bulgarian companies and researchers in the framework and operative programs of the Community is broadened.*

*National innovation policy is directed to supporting small and medium enterprises in putting the innovations to use. It refers most of all to such innovations through which SMEs can equally participate in the knowledge-based economy, get access to new markets and provide independence from the networks intended for big companies.*

*Competitive policy of the Research Investigations Fund and National Innovation Fund for targeted financing of the priority research and innovation projects is directed to:*

- Improvement of innovation processes in companies (management innovations, product innovations, process innovations);*
- Creation of preconditions for complete assimilation of contemporary research results of the production enterprises;*
- Inter-institutional integration of enterprises with universities, research units of the Bulgarian Academy of Sciences, Agricultural Academy and others;*
- Intensification of the connection "science – business";*

*Realization of a direct dialogue between SMEs and research centers for getting research services and support in the sphere of innovative processes.*



# NACID

National Centre for Information and Documentation

## MAIN OBJECTIVES

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- The leading institution in the national information infrastructure in Bulgaria in the sphere of education, science and innovations.
- National information center for academic recognition and mobility (ENIC-NARIC center for Bulgaria).
- Contact point to the Directive 2005/36/EC on the recognition of professional qualifications and delegated coordinator for Bulgaria in Internal Market Information (IMI) system.

## PRIMARY FIELDS OF ACTIVITIES:

- Processing and dissemination of bibliographic and reference data and analytical information in support of the policy in the sphere of education, science, technology and innovations.
- Building and maintaining specialized databases.
- Maintaining national stock and DB of dissertations, deposited manuscripts and other scientific publications in Bulgaria.
- Organizing application of ENIC-NARIC network decisions in the field of academic recognition.
- Realizing information assistance in procedures for academic and professional recognition.
- Performing activities resulting from the functions of ENIC-NARIC center.
- Furnishing citizens and contact points in the rest of the member states with information in connection with recognition of professional qualifications and rights for practicing regulated professions in conformity with the Directive 2005/36/EC.
- Performing functions of institutional contact point of the EU's Seventh Framework Programme.

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- *"Who is Who in Bulgarian Science;*
- *"Papers".*

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- Lending of library materials;
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## INTERNATIONAL ACTIVITY

- Represents the Republic of Bulgaria in international organizations on the subject of its activities.
- Joint actions and projects with related national information and documentation centers in the EU.

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## NATIONAL SCIENTIFIC PROGRAMMES WITH EUROPEAN DIMENSIONS

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### MECHANISMS OF ADHERENCE OF PROBIOTIC *LACTOBACILLUS* STRAINS TO HUMAN EPITHELIAL CELLS

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#### **Abstract**

*A large number of lactic acid bacteria from intestinal origin were collected from the feces of healthy volunteers and assessed for adhesion to CACO-2 cells through Gram staining. From the best adherent strains one *L. gasseri* and one *L. plantarum* were selected for further research. The average number of adhered bacteria was 15 per CACO-2 cell in case of *L. gasseri* strain and 17 per cell in case of *L. plantarum* strain. In parallel, 54 technologically important strains belonging to *L. delbrueckii* ssp *bulgaricus* and *L. helveticus* were evaluated for adhesive properties and one *L. bulgaricus* (7 per cell) and one *L. helveticus* (9 per cell) were selected. The treatment by help of different factors revealed that the cell-bonded proteins are responsible for the adhesion of selected *L. gasseri*, *L. plantarum* and *L. helveticus* strains, in contrast to *L. bulgaricus* strain where the treatment with metaperiodic acid led to the conclusion that exopolysaccharides are involved in the adhesion. The cell-wall proteins from the first three strains were isolated, fractionated and assessed for adhesion to CACO-2 cells. These strains showed fair survivability in artificial gastric and intestinal juices - 61%, 47% and 25%. The results lead to the conclusion that it is possible to find strains combining adhesive and technological properties.*

#### **INTRODUCTION**

Probiotics are viable bacterial cell preparations or components of bacterial cells that have beneficial effects on the health and well-being of

the host (1, 2). Many of the probiotic bacteria are lactic acid bacteria and are useful in the treatment of dysfunctions with disturb intestinal microflora and abnormal gut permeability (3). Proposed mechanisms through which the ingested probiotic microbes may subsequently benefit their host include the production of antimicrobial factors, competition for nutrients, degradation of toxins and immunomodulation (4). However, of the main criteria for selecting probiotic strains, adherence to intestinal epithelia is thought to be paramount (5, 6). Indeed, adhesion to epithelial cells and/or mucus appears to mediate colonization of the gastrointestinal tract by lactobacilli and may be a prerequisite for competitive exclusion of enteropathogenic bacteria (7) and immunomodulation of the host (8, 9). Successful probiotic bacteria are usually able to colonize the intestine, at least temporarily, by adhering to the intestinal mucosa (10, 11). Studies have also suggested that adhesive probiotic bacteria could prevent the attachment of pathogens, such as coliform bacteria and clostridia, and stimulate their removal from the infected intestinal tract (12). Laboratory models using human intestinal cell lines such as Caco-2 (13, 14) and HT-29 (15) have been developed to study the adhesion of probiotic lactic acid bacteria and their competitive exclusion of pathogenic bacteria. In this study, a quantitative approach is proposed for assay of the adherence of lactobacilli with intestinal and dairy origin to human epithelial cells. The main objective of the present study was the selection of strains with proved adhe-

sion properties towards human epithelial cells and investigation the nature of adhesive compounds. This approach provides a better insight to the mechanism of competition between probiotic bacteria and pathogens, and thus allows development of more efficient probiotic products.

## MATERIALS AND METHODS

### Bacterial strains

Intestinal and dairy lactobacilli were isolated after plating of 0.1-ml of respective dilutions of fecal or milk/cheese homogenates on MRS agar (Merck, Darmstadt, Germany). The plates were incubated at 37°C for 3 days under anaerobic conditions (10% CO<sub>2</sub>, 80% N<sub>2</sub>, 10% H<sub>2</sub>). The single colonies were purified trice and the species belonging and strain identity were determined by help of species-specific PCR, Amplified Ribosomal DNA Restriction Analysis, sequencing of hyper variable rDNA V6-V8 regions, and Pulsed field gel electrophoresis, according to Dimitrov et al. (16).

### Quantitative assessment of adherence of lactobacilli with intestinal and dairy origin

The intestinal cell culture Caco-2 (7) was used in the adhesion assay. This human colon adenocarcinoma cell line was obtained from the American Type Culture Collection. The cells were cultured in Dulbecco's modified Eagle's minimal essential medium (DMEM) (GIBCO-BRL), containing 25 mM glucose, 20% (vol/vol) heated inactivated fetal calf serum (GIBCO-BRL), and 1% nonessential amino acids (GIBCO-BRL). The cells were grown at 37°C in 5% CO<sub>2</sub>. At approximately 95% confluence, the monolayers were passaged by incubating with a 0.25% trypsin solution (Gibco) for 5 min at 37°C. For the adhesion assay, monolayers of Caco-2 cells were prepared in two-chamber slides (Lab-Tek chamber slide; Nunc Inc.) by inoculating  $2.8 \times 10^5$  viable cells into 2 ml of culture medium. The medium was replaced every two days.

Fifteen-day-postconfluent Caco-2 monolayers were washed five times with 1 ml of sterile PBS before the adhesion assay. One ml of the test bacteria at concentrations between  $1 \times 10^5$  and  $4 \times 10^8$  CFU ml<sup>-1</sup> were added to 1 ml of complete Caco-2 medium. This suspension (2 ml) was added to each chamber of the two-chamber

slide and incubated at 37°C, in a 5% CO<sub>2</sub>-95% air atmosphere, with gentle rocking. After incubation for 60 min, the monolayers were washed twice with sterile PBS (pH 7.2), fixed with methanol, Gram stained, and examined microscopically. Visual counting of adhered cells was adopted in this study, for it allows differentiation of the gram-positive *Lactobacillus* and gram-negative *E. coli*. Each adherence assay was conducted in triplicate, and the number of adherent bacteria was counted on about 1,000 Caco-2 cells, in 60 randomly selected microscopic fields. To stimulate the physiological pH condition of the gastrointestinal tract, all experiments were done at pH 7.

In the study of the competition for adhesion on Caco-2 cells, *Lactobacillus* and *E. coli* were added simultaneously or sequentially to the Caco-2 cultures before counting. In the latter case, free cells of the first bacterium were removed by washing with PBS (pH 7.2) before the second bacterium was added. The lactic acid bacteria have the tendency to form chains and aggregates. It was necessary to disperse the chains and aggregates of the bacterial cells before the adhesion study, to ensure that cells observed under the microscope in the adhesion assay were cells adhered to Caco-2 cells.

### Biochemical treatments of bacterial cells demonstrating the best adherence

*Lactobacillus* strains *L. plantarum* P12, *L. gasseri* G4, *L. helveticus* AC and *L. bulgaricus* 144 demonstrating the best adhesion properties were propagated in MRS broth (Oxoid) at 37°C for 18 h before adherence assays were performed. Bacterial cells and spent culture supernatant were separated by centrifugation at 3000 g for 10 min. The bacterial cells were washed twice in quarter-strength Ringer's solution and resuspended in an equal volume of MRS broth before the adhesion assay was performed, as described above. In another experiment, the bacterial cells were treated with trypsin (2.5 mg/ml, Sigma) for 60 min at 37°C, centrifuged, washed twice in quarter-strength Ringer's solution and resuspended in MRS before the adhesion assay. To determine the involvement of carbohydrates in the adherence properties, bacterial cells were preincubated with metaperiodate (50 mM,

Sigma) for 30 min at 37°C, centrifuged, washed twice and resuspended as before. Alternatively, the CaCo-2 monolayers were washed five times with 2 ml of the chelating agent ethylene diamine tetra-acetic acid (EDTA, 20 mM, Sigma) in PBS following addition of the bacterial cells.

#### Functional assessment of adherence cell-borne factors

In order to determine the cell-wall proteins with adhesive properties, the strains *L. plantarum* P12, *L. gasseri* G4, and *L. helveticus* AC were subjected to procedure for extraction of cell-wall associated proteins (?). The cell-wall extracts were divided into two parts: the first was incubated for two hours onto CaCo-2 monolayer, and the second was a control one. The aliquots from the two parts were loaded onto polyacrylamide gel (SDS-PAGE) and the electrophoretic process was conducted as previously outlined (17). The protein fragments with reduced intensity, compared to the control cell-wall preparation, were extracted from the gel in a preparative scale and were labelled with an Alexa 488 fluorescent dye as per manufacturer's protocol (Molecular Probes, USA). The purified fluorescent conjugate was resuspended in PBS solution and incubated with the CaCo-2 cells for 2 h at 37°C in a humidified atmosphere of 5% CO<sub>2</sub>. The protein-Alexa 488 fluorescent conjugate PBS solution was removed from the walls of the plate and washed five times with 2 ml of PBS. The results from the adhesion degree of the protein-fluorescent dye conjugates were obtained using an inverted fluorescence microscope (Nikon TE2000-S) equipped with standard FITC filters.

## RESULTS AND DISCUSSION

The adhesion is one of the most important properties of probiotic bacteria included in the functional foods. The main objective of the present study was selection of strains with proved adhesion properties towards human epithelial cells and investigation the nature of the adhesive compounds. 180 *Lactobacillus* strains with intestinal and dairy origin were assessed for adhesion by help of human epithelial cell-line CaCo-2. Two intestinal strains *L. plantarum* P12 and *L. gasseri* G4 (19 and 17 bacteria per epithelial cell, respectively) were selected as the best adhesive strains. From dairy strains adhesive properties were demonstrated by *L. helveticus* AC and *L. bulgaricus* B14 (6 and 8 bacteria per epithelial cell, respectively).

The results after adhesion assay presented as adhesive bacteria per average eukaryotic cell are given on Table 1.

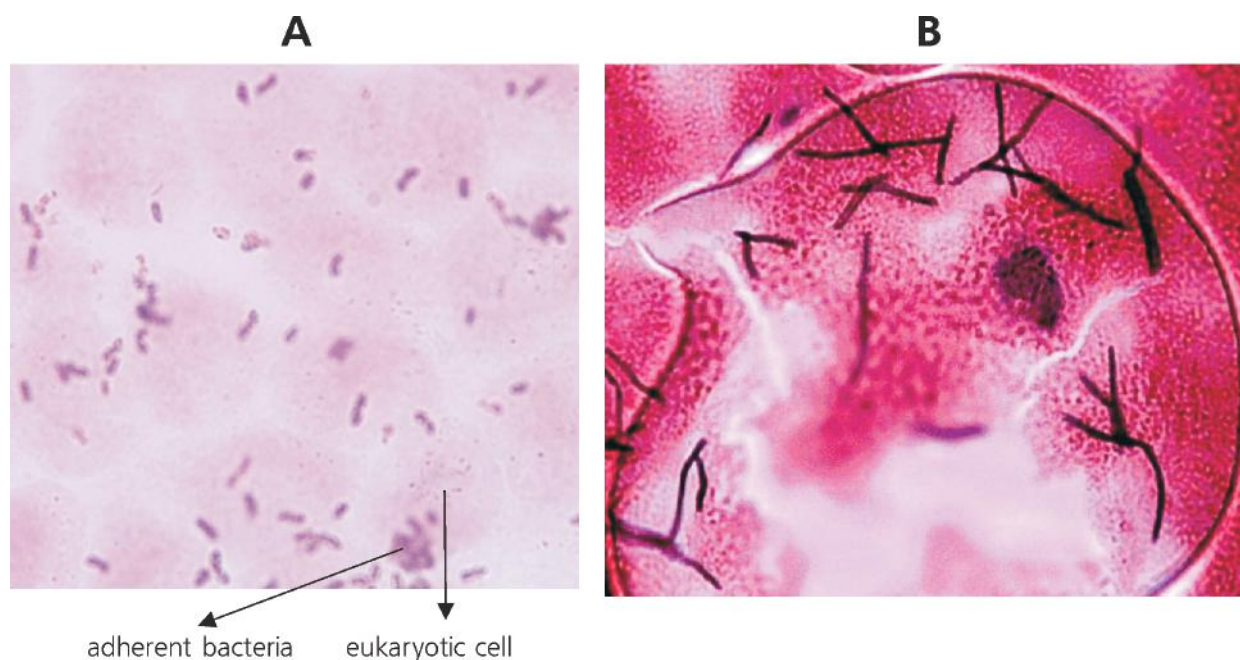
The results in the Table 1 suggest that the strains with the best adhesive properties are from *Lactobacillus gasseri* and *Lactobacillus plantarum* species. As a control well characterized probiotic strain *L. rhamnosus* GG was used and the average number of adherent bacteria per eucariotic cell was 14. Thus, in the present research three better adherent strains were found - one *L. plantarum* and two *L. gasseri*. Among the strains with dairy origin one *L. bulgaricus* strain and one *L. helveticus* strain demonstrated the best adhesive properties. That is why they were selected for the study of the mechanisms of adhesion together with the best

**Table 1.** Number of adherent bacteria from different species per average eukaryotic cell

Species	number of strains	<5 per cell	5 – 10 per cell	10 – 15 per cell	>15 per cell
<i>L. plantarum</i>	24	17	4	2	1
<i>L. casei</i>	26	24	1	1	0
<i>L. gasseri</i>	17	10	3	2	2
<i>L. fermentum</i>	21	19	2	0	0
<i>L. acidophilus</i>	4	3	1	0	0
<i>L. helveticus</i>	46	45	1	0	0
<i>L. delbrueckii ssp. bulgaricus</i>	28	27	1	0	0
<i>L. rhamnosus</i>	14	12	2	0	0

adherent strains *L. gasseri* G4 and *L. plantarum* P12.

On Figure 1 two images are given: weakly adherent bacterial strain on CaCo-2 monolayer (A), and well adherent strain on one eukaryotic cell.



**Fig. 1.** Images of weakly adherent strain on CaCo-2 monolayer (A) and well adherent strain on one eukaryotic cell (B)

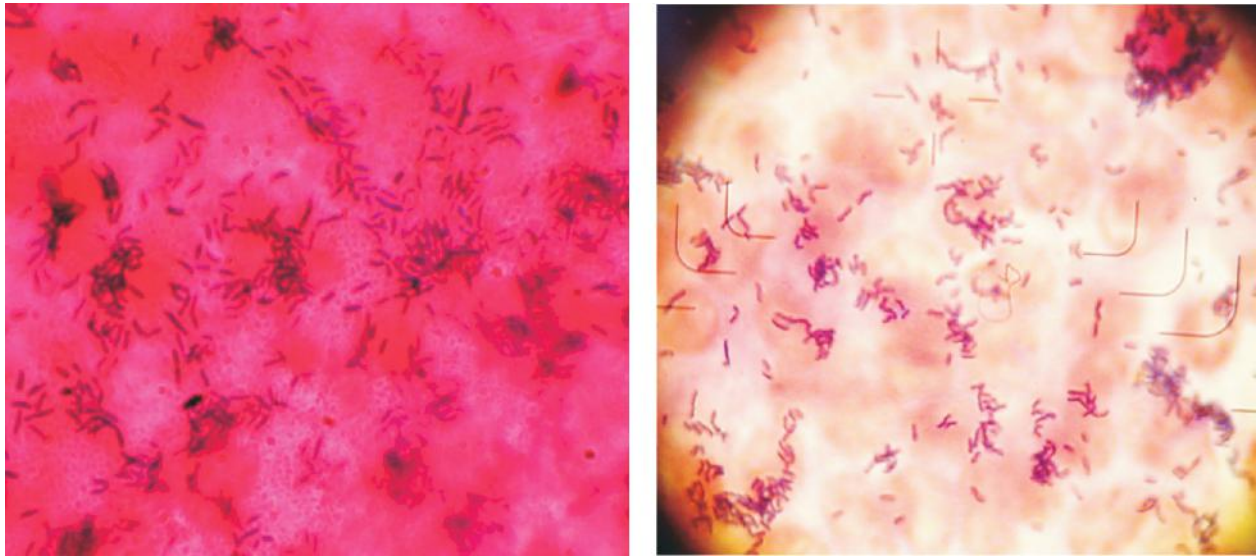
tively onto eukaryotic cells in contrast to the lack of bacteria between the CaCo-2 cells. This proves the specific adhesion to the eukaryotic cells excluding nonspecific interactions between the bacteria and eukaryotic monolayer. The intensive washing procedures after incubation of bacteria on the monolayer helped to eliminate the bacterial between the eukaryotic cells, which could be seen on the images on Figure 1 and Figure 2. On Figure 2 the images after adhesion evaluation of the two strains with the best adhesive properties *L. gasseri* G4 and *L. plantarum* P12 are given. The average number of the adherent bacterial cells onto one eukaryotic cell was higher than those of the probiotic strain *L. rhamnosus* GG used as a control.

The treatment of the adhesive strains with trypsin, lipase, periodic acid and EDTA revealed that the cell-bonded proteins are responsible for the adhesion of selected *L. gasseri* G4, *L. plantarum* P12 and *L. helveticus* AC strains, in contrast to *L. bulgaricus* B14 strain where the

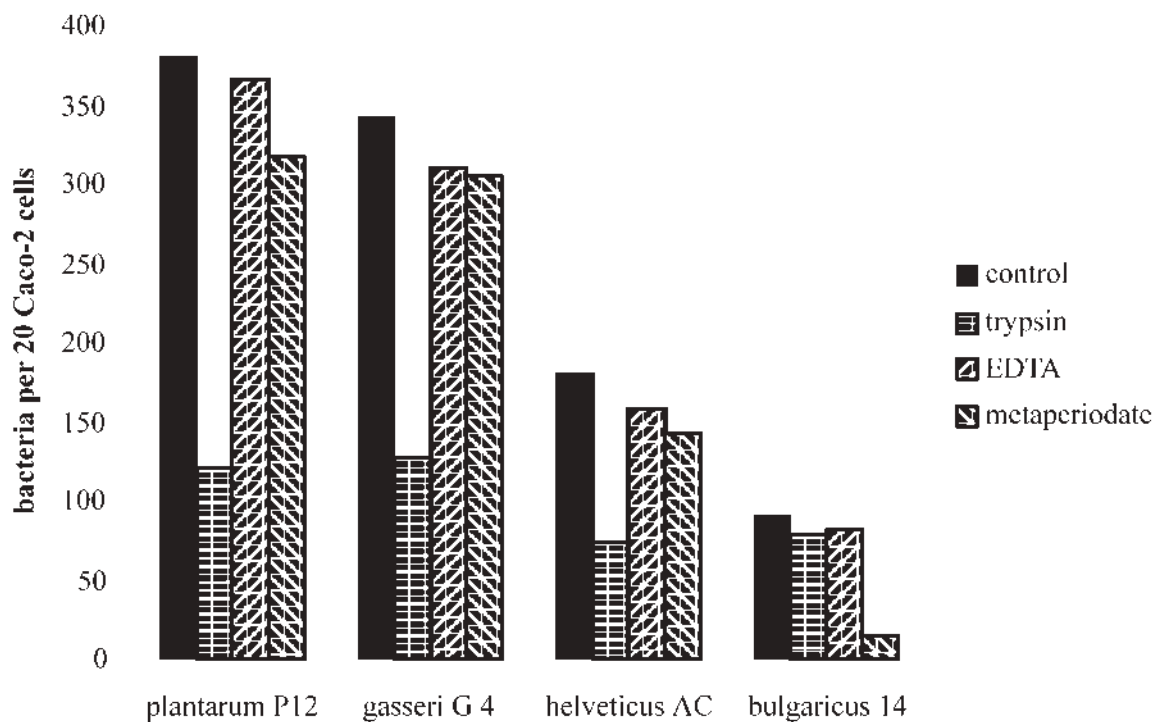
cell-bonded polysaccharides are involved in the adhesion. The results from the adhesion assay after the treatment of bacterial strains with different factors are given on Figure 3. After the treatment with trypsin the number of adherent bacterial cells collapsed in case of the

strains *L. gasseri* G4, *L. plantarum* P12, and *L. helveticus* AC. There were not significant changes of the adhesive properties of *L. bulgaricus* B14 strain after the trypsin treatment. The treatment by metaperiodate, however, decreased significantly the adhesion of *L. bulgaricus* B14 strain suggesting that cell-bonded exopolysaccharides are involved in the adhesion of this strain.

The cell-wall protein extracts from the strains *L. gasseri* G4, *L. plantarum* P12, *L. helveticus* AC, and *L. bulgaricus* B14 were divided into two parts. The first (P1, G1, H1, and B1, respectively) was as a control. The second (P2, G2, H2, and B2, respectively) was incubated over the monolayers as it is outlined in Methods. On Figure 4 the image after SDS-PAGE of the cell-wall proteins is given. The protein bands which relative intensity is sizably decreased after the adhesion are marked with arrows. Considerable decrease of the relative intensity of two cell-wall proteins in case of the strain *L. plantarum* P12 is clearly seen



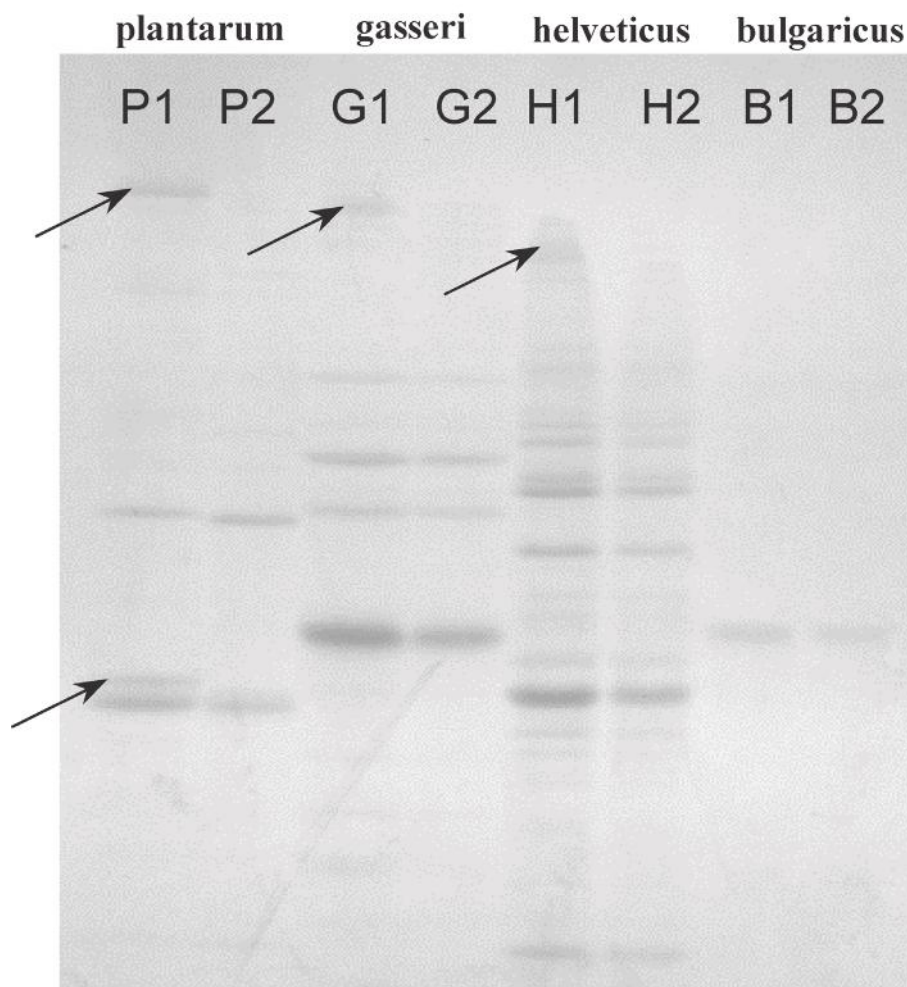
**Fig. 2.** Images of the best adherent strains *L. plantarum* P12 (left) and *L. gasseri* G4 (right)



**Fig. 3.** Results after treatment of the adhesive strains with trypsin, metaperiodic acid and EDTA

comparing to the control. In case of the strains *L. gasseri* G4 and *L. helveticus* AC one cell-wall protein per each strain is involved in the adhesion which relative intensity is decreased after incubating onto the CaCo-2 monolayer. For the strain *L. bulgaricus* B14 there is no change of the cell-wall protein profiles after the adhesion. This

could be explained with the fact that cell-bonded exopolysaccharides are the adhesive factors responsible for the adherence of *L. bulgaricus* B14. The strain *L. plantarum* P12 is the best adhesive strain and it is the one strain with two cell-wall proteins involved in the adherence to the epithelial cells.



**Fig. 4.** Determination of the adhesive cell-wall proteins of the strains: *L. plantarum* P12 (P1-before, P2-after adhesion); *L. gasseri* G4; *L. helveticus* AC; and *L. bulgaricus* B14

## CONCLUSIONS

In summary, this study provided evidence for the considerable adhesion properties of some *Lactobacillus* ssp. strains with intestinal origin and fair adherence of some strains with dairy origin. It is a very rare case to find *L. bulgaricus* strain with such adhesion degree as those found in this study. In addition, determination of the factors mediating the observed adherence abilities of the selected strains provides the adhesion mechanisms. The adhesion of the most of the strains was mediated by cell-wall proteins, and in case of *L. bulgaricus* B14 cell-wall bonded exopolysaccharides were the adhesive factors. This study was supported by Ministry of education, youth and science – project 187/16.02.2008.

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## DESIGN AND SIMULATION OF DIGITAL PLL FOR CONTROL OF SERIES RESONANT INVERTERS

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### Abstract

*The following paper describes implementation of a digital phase locked loop (PLL) for use in induction heating and melting applications. The proposed implementation is applicable for series load resonant inverter and is consisted of: a capturing unit, a regulator and a PWM unit. Additionally, the described implementation can successfully be used for output power regulation of the inverter by changing the phase angle between current and voltage (frequency regulation).*

### INTRODUCTION

In recent years with great advances of power semiconductor switching devices, such as MOSFETs, IGBTs, MCTs and IEGTs, medium and high frequency power inverter appliances used widely in metal heat treatment applications have been developed for industrial heat processing plants. Those inverters employ either serial or parallel load resonant topologies, in which maintaining the resonant frequency is of paramount

importance.

Conventional control of resonant frequency is achieved by use of phase detector and voltage controlled oscillator (VCO). An example of such a circuit is 4046 (fig. 1). However, using analog control circuits has some important disadvantages: susceptibility to temperature variations, parameter variations or construction tolerances, low noise immunity, impossibility of implementing sophisticated control laws and so on.

With fast advance of digital circuits (FPGA, DSP) in last decade, much attention has been paid on digital control of power electronics. Some of the advantages of digital control over the analog one are: 1) possibility of implementing sophisticated control laws, taking care of nonlinearities, parameter variations or construction tolerances by means of self-analysis and auto-tuning strategies, which are very difficult or impossible to implement analogically; 2) the flexibility inherent in any digital controller, which allows the designer to modify the control strategy,



## IMPLEMENTATION

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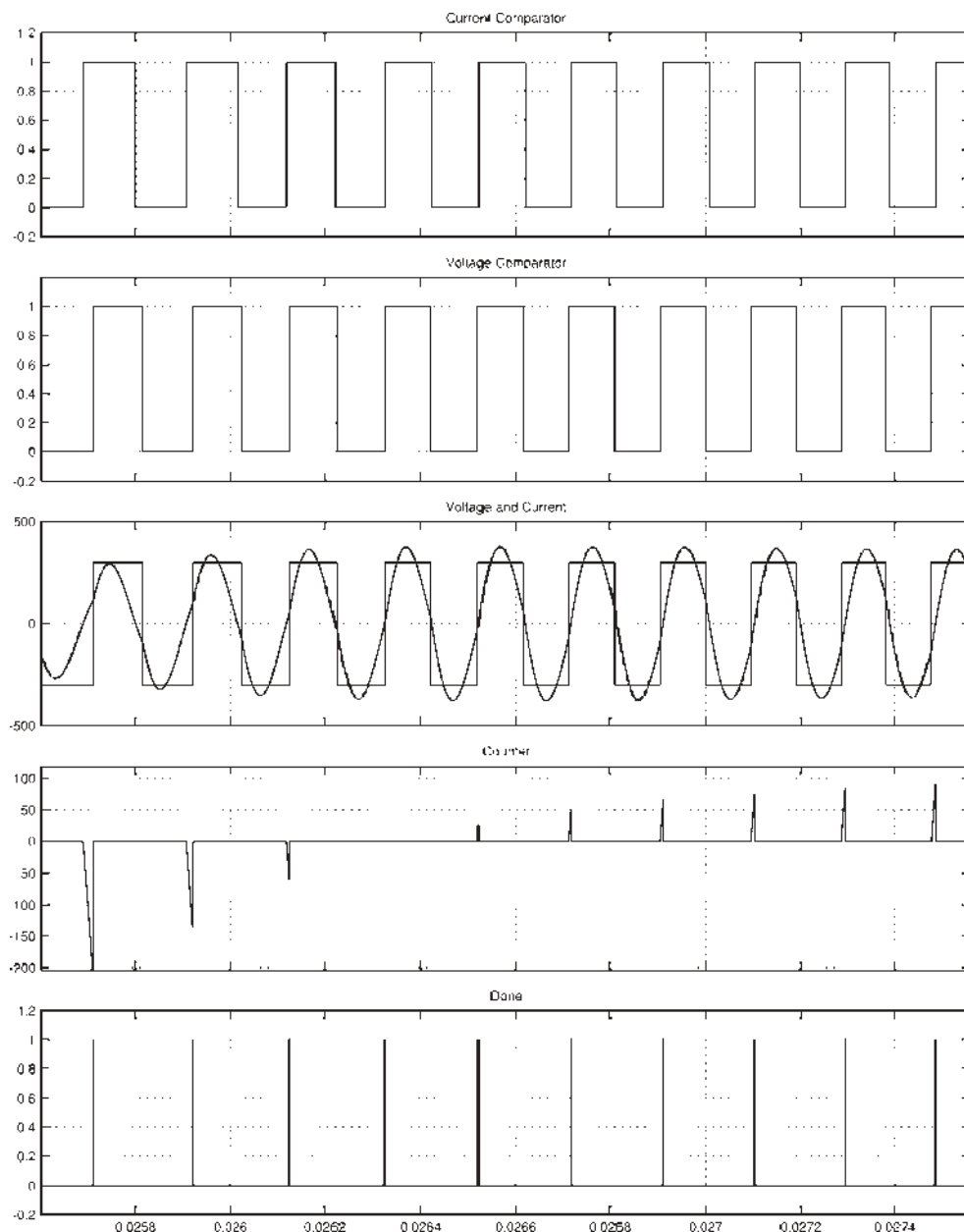
**Fig. 2.** Digital PLL block schematic

The output's signals (voltage and current) are sampled by two comparators and feed into a phase detector unit (CCP) (fig. 3). In the CCP, a counter counts the time difference between rising edges of voltage and current comparators. If the voltage is leading, the counter counts up; if voltage is lagging, the counter counts down (fig. 3). After the counts end, the CCP asserts **done** signal and the count value can be read through **cnt** (fig. 3).

The regulator samples the **done** pin, and on a raising edge calculates the new value for the

PWM. The target signal is used to set the appropriate phase angle between voltage and current. The target value can also be a value from other regulator, used to control the output power by change current and voltage phase difference, and thus eliminating the need of DC-DC converter.

There are theoretically no constraints, bearing in mind that induction heating processes are relatively slow compared to performance of today's programmable devices, of the law which can be implemented inside the regulator block.

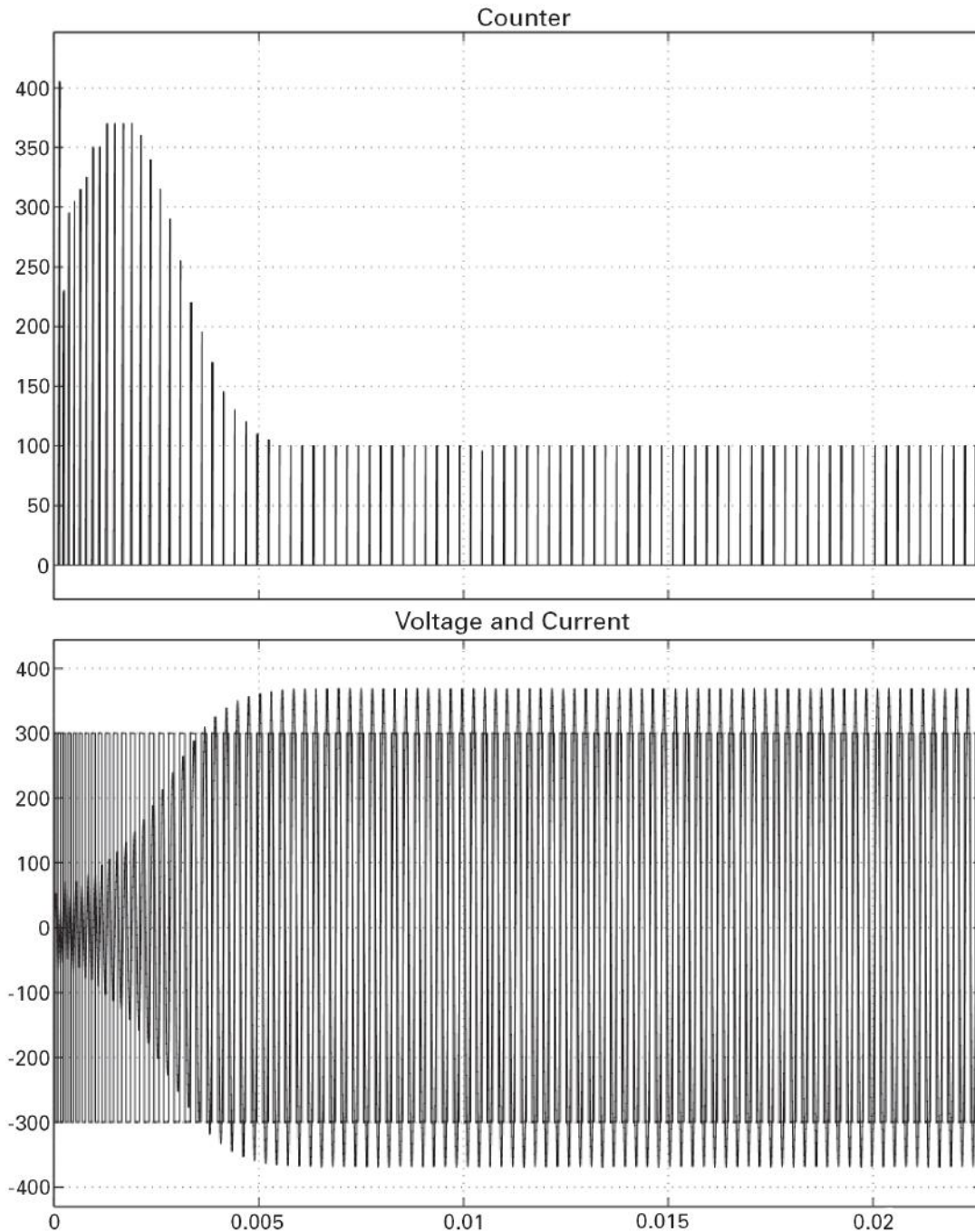


**Fig. 3.** Waveforms of a) output of Current Comparator; b) output of voltage Comparator; c) Voltage and Current of resonant network; d) counter output value and e) done signal

### ANALYSIS RESULTS

The behaviour of the proposed implementation was studied using Simulink. Resonant network was set to:  $R = 1$ ,  $L = 100\mu\text{H}$  and  $C = 10\mu\text{F}$ , hence resonant frequency of 5.03 kHz. Inside the REG block a PID law was implemented with:

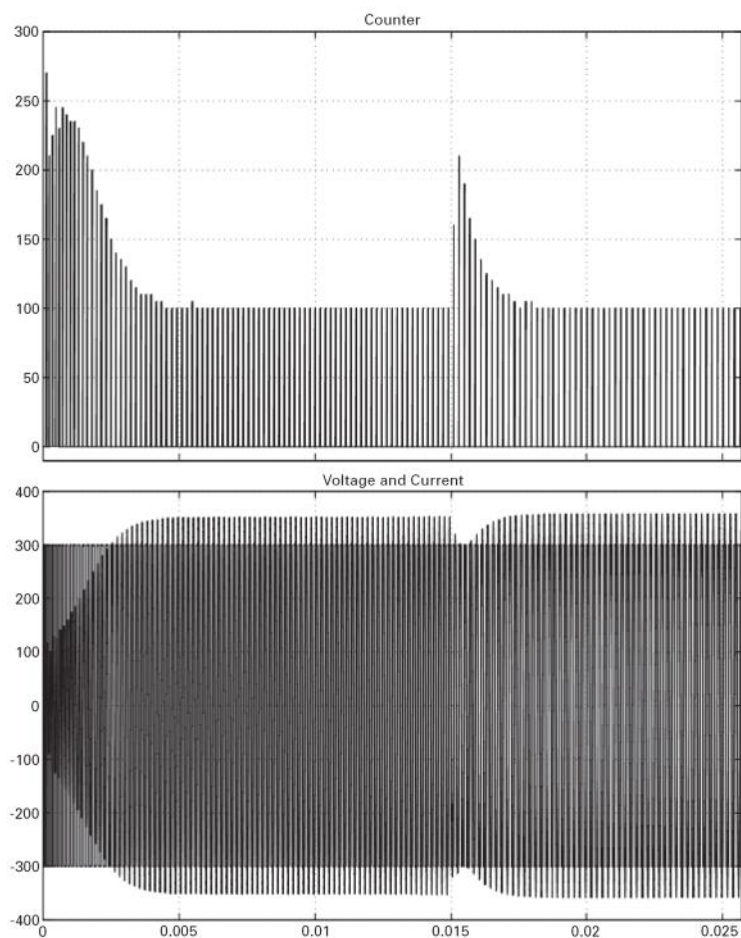
proportional gain = 0.4, integral gain = 75 and differential gain = 0.2. Clock frequency (Clk block in fig. 2) was set to 10 MHz. Upper and lower limits are set to 10 kHz and 1 kHz respectively. Simulation results are shown on figure 4.



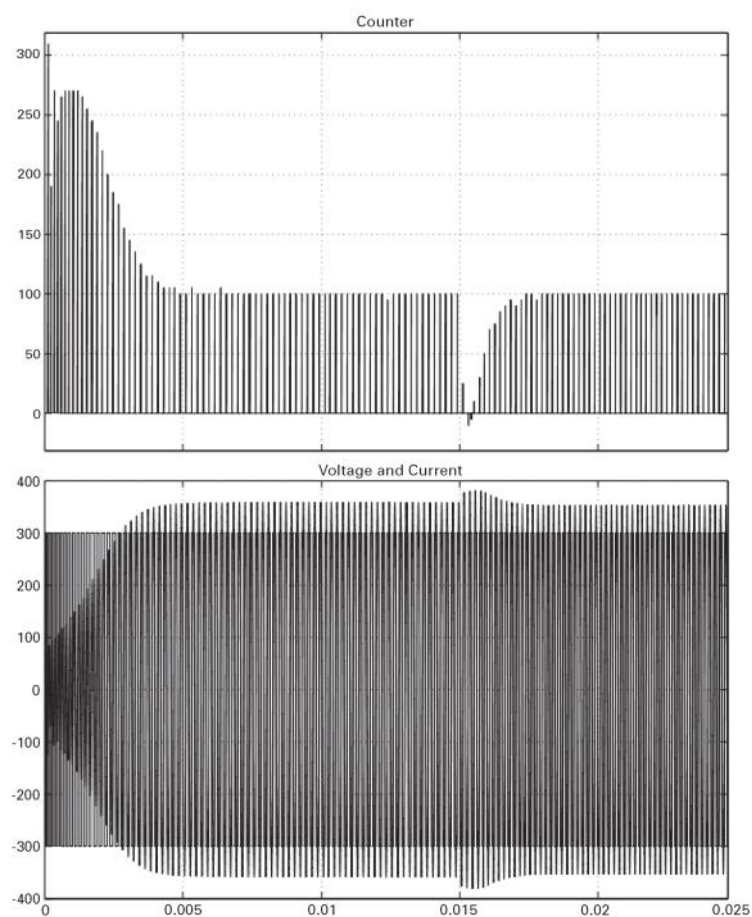
**Fig. 4.** Counter's value and voltage and current

For the sake of estimating the conduct of the circuit under changes in induction additional tri-

als were made and shown in figure 5a and figure 5b.



**Fig. 5a.** Induction change from 100 $\mu$ H to 120 $\mu$ H



**Fig. 5b.** Induction change from 120 $\mu$ H to 100 $\mu$ H

## IMPLEMENTATION

Physical implementation of digital PLL can be based on FPGA or DSP. In the former, as a cheap solution, Spartan 3 family FPGAs can be used. Critical part in the design is the PWM unit, which must have high enough resolution to maintain stable resonance. One way to calculate the minimal resolution of the PWM is by the following equation:

$$\Delta < 0.1 \left( \frac{1}{f} - \frac{1}{f + \frac{f}{2Q}} \right)$$

In low frequency applications, traditional counter-based PWM can be used. With a Spartan 3 -5 grade FPGA, a resolution of 5ns is easily achievable [6]. If high frequency and high Q-factor is demanding, then a tapped delay or another high resolution PWM can be implemented [8][9].

Another possible implementation is by use of Texas Instruments C2000 DSP controllers which have and PWM unit with 180ps resolution [7].

## CONCLUSIONS

An implementation of a digital PLL has been derived and analyzed. The aim of the proposed sweep strategy is to alleviate difficulties associated with analog implementation and give the inherited flexibility of digital control. Stability of the design is determined by the stability of implemented regulation law and resolution of the

PWM. It is not obligatory **REG** block to run at the same clock frequency as the PWM and the **CPP** units, and thus the latter can run at faster clocks. Clock frequency of **PWM** determines the upper limit of the PLL, while **CPP**'s clock - the resolution between current and voltage.

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## BULGARIAN ADDED VALUE TO ERA

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### ORAK ENGINEERING – DEVELOPER OF BUSINESS SOFTWARE SOLUTIONS

**Krasimir Stoyanov**, Chief Executive Officer (CEO) of Orak Engineering

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Orak Engineering develops, implements and supports solutions based on its own created business software platform R5.

The platform provides multifunctional environment to work and concentrate information

More than 13 years Orak Engineering is one of the leading companies on the Bulgarian and international markets. The company has offices and representative offices in 7 cities in Bulgaria, Europe, Asia and North America. The company



flows from disparate businesses as a very high degree of efficiency and utility. The platform offers solutions for retail outlets, restaurants, shops, warehouses and wholesalers, home delivery, supermarkets, gyms, petrol stations, exchanges, hairdressers, hotels, property management, SPA centers, meat and dairy production enterprises.

has over 50 certified employees who provide 24-hour global support and consulting.

There are more than 5 000 installations of Orak Engineering products by now. Its clients are: M-tel, Siemens, Adidas, Royal Holiday, Arena, Planet Bar de Luxe, pizza Verdi, Olinesa, bakeries Sunday, Alexandra group and many others.

## CORPORATE SUCCESS

For its innovative products and business solutions Orak Engineering has received the following awards and prizes:

- Honorary diploma from the CeBIT Eurasia Bilisim Istanbul 2007;
- Thanks diploma from University of Plovdiv "Paisii Hilendarski", Faculty of Mathematics and Informatics, for providing support in the activities of the faculty and realization of its alumni;
- Microsoft Gold Certified Partner - the period 2009 - 2010;
- Gold medal and diploma from the Interna-

pany of the Year 2008", organized by the Applied Research and Communications Fund, the EC Representation in Bulgaria, Enterprise Europe Network - Bulgaria, Ministry of Economy and Energy and the World Bank Mission in Bulgaria. The award was presented personally by the President of the Republic of Bulgaria Mr. Georgi Parvanov;

- Two gold medals at the International Technical Fair Plovdiv 2009 - Orak R6 on-line restaurant booking and Orak R6 Interactive business reporter.

Orak Engineering is a professional member of



tional Plovdiv Fair - 2001 and 2004 for specialized industry solutions in tourism and trade, 2007 - "Software platform for overall business management Orak R5";

- First place in the contest "Innovative Com-



the following professional organizations: BAIT (Bulgarian Association of Information Technology), BASSCOM (Bulgarian Association of Software Companies), BADFU (Bulgarian Association of Distributors of Fiscal Devices).

## BIANOR – COMPANY PROFILE

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Web site: [www.bianor.com](http://www.bianor.com)



### Short facts

Founded in 1998

Offices in New York and Sofia

70+ employees

Listed at Bulgarian Stock Exchange

### REDEFINING THE WORLD OF MOBILE SOLUTIONS



Through 11 years of software engineering experience and a large number of successful projects for customers around the globe, Bianor gained extensive expertise in the fields of Mobile & Wireless and Telecommunications.

The company helps businesses take full advantage of mobile technologies. It creates class-leading technologies and tools to unleash potential. Bianor's mobile solutions unlock new revenue streams and improve collaboration and business efficiency.

Bianor develops products addressing common business issues and custom solutions for specific business needs. The company focuses on enterprise solutions that improve business processes efficiency and optimize communications flow.

Bianor's dedication to mobile and telecommunications solutions is proved by the proprietary award-winning mobile platform MobiSDP™. The company has developed its own platform, which empowers business mobility and enables rapid development and launch of secure and stable centrally managed mobile solutions. Based on MobiSDP™, Bianor has accomplished successfully multiple mobile and telecommunications projects. Among them are: WorldMate Live - the winner of the most prestigious awards in mobile sector; Roam'n'Roll - European ICT Prize Nominee; Socialibrium - a new and promising mobile social relationship management tool. In 2009 Bianor was selected to be Bulgarian Innovative Enterprise of 2008 and was honored to be Top Product Winner of Long Island Software and Technology Network in USA. Both awards were due to company's mobile development platform MobiSDP™ and the enterprise mobility solutions of MobiECO family.

## THE MAGIC OF MOBILITY

Bianor uses cutting edge technologies and tools to apply mobile and telecommunications into business processes bringing benefits to the enterprises.

The company develops Communications-enabled business processes (CEBP) solutions to reduce human latency within business workflows. CEBP leverage Unified communications capabilities of integrating enterprise communications

ality. They promise dramatic improvements in satisfaction and loyalty, increasing the value of corporate brands.

Thanks to MobiSDP™ any customer-facing mobile application can be delivered quickly and consistently on multiple mobile platforms or mobile OS. Bianor's B2C applications allow easy integration with third party services, such as Google Maps, Flickr and YouTube in order to enable rich content delivery and multimedia expe-



systems and apply them in automating business processes flow. CEBP application results in more efficient, more automated closed-loop process; translating into significant ROI.

Bianor's CEBP solutions can be applied horizontally across different lines of business and different industries. The company develops custom CEBP solutions on top of MobiSDP™. The mobile platform simplifies the integration of enterprise communications systems with business processes and fosters workflow efficiency.

Business-to-consumer (B2C) applications developed by Bianor help any size business, anywhere in the world, unlock new revenue streams by winning new customers and increasing loy-

alties on mobile devices wherever customers are.

Bianor's solutions are a response to the increasing customers' demands for a better, faster and easier way for communication - creating, storing and sharing information. This is the reason the company works in the sphere of mobile convergence. Convergence refers to previously separate technologies such as voice, data and video that now share resources and interact with each other in synergy.

Bianor developed a technology called iMediaShare that allows UPnP/DLNA standard compliant clients to access media stored on mobile devices.

## UNIFYING COMMUNICATIONS

The experience Bianor has in developing custom mobile and telecom solutions gives the engineering team the confidence of creating own products and solutions. Such an example is Bianor's major product MobiECO Business Solutions, which is a bundle of two enterprise mobility solutions - MobiECO Sales Force and MobiECO Optima.

MobiECO Sales Force comes to help sales teams sell more by decreasing the bureaucratic overhead of manually updating CRM records.

The solution performs CRM automation. It processes all customer voice communication data and automatically stores the relevant information under the corresponding CRM records. The system helps sales teams improve efficiency through real-time member performance statistics, voice notes, call records and customer interaction rules.

MobiECO Optima provides major communications cost savings, decreasing up to 90% the costs for international mobile communications.

MobiECO Optima leverages unified communications technologies and integrates mobile and fixed corporate communications. The enterprise mobility solution performs the least cost routing for all outgoing mobile calls using the existing corporate communications infrastructure.

## ENABLING CUSTOMERS' IDEAS

In addition to proprietary products and custom solutions Bianor provides professional services.

In keeping up with the rapid changes in the mobile and telecom industries, time-to-market, cost effectiveness and high quality are the ever-more-demanding requirements to be properly addressed.

Bianor Professional Services group offers a wide variety of services to match any business and technology needs. The company's experts develop bespoke enterprise mobility solutions, getting customers' environment up and running quickly and more efficiently. To maximize the ROI, Bianor's professionals combine creative thinking, innovative technologies and best industry-specific practices to accelerate the design,

development and deployment of reliable enterprise-grade mobility solutions.

Bianor's spectrum of capabilities includes:

- Product enabling services - rapid development of a business idea into a real-life mobility solution.
- Premium services - complete project development and management based on strong expertise in mobile technologies and well-established processes.
- Quality assurance services - deliver world class verification and validation of software solutions guaranteeing market readiness.

## Word of mouth

The strongest recognition a company can get is the one coming from its customers. Bianor has hundreds of success stories with customers all around the globe.

What people say about Bianor?

"Bianor helped us develop a cutting edge travel management system."

Gilad Gruber

VP Research & Development

WorldMate

"Bianor is a reliable partner, who, in all aspects of our relationship, has proved its professionalism, quality, high technology and commercial expertise."

Marilyn Partel

Director, Product Operations Engineering

Raritan

"Bianor's team shows extremely high level of technical competence and know-how."

Pietro Rossi

Project Manager

A.T. Kearney

"I would be happy to work with Bianor again and would certainly recommend their services."

Stephanie Grosch

Head of Business Analysis

BTC Mobile

"Bianor is a reliable and predictable partner that completely fulfills all our expectations."

Markku Jarvenpaa  
Senior Vice President  
Comptel Corporation

"Bianor's engineering teams are very creative.

And thanks to their creativity and dedication, we have this product (Socialibrium) today... they (Bianor) kept their commitment and delivered an outstanding product. I am truly impressed."

Ray Bernaz  
Founder and CEO  
Socialibrium

## PANTELEY TOSHEV Ltd. – INNOVATIVE COMPANY OF 2008

**Borislav Toshev**, Head of Marketing and Sales Department

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Panteley Toshev Ltd. is a rapidly growing company specialized in development and production of beverage and food ingredients. Established in 1995 as "Panteley Toshev Commerce" Co., nowadays it is among the leading manufacturers in the region, producing and trading with wide variety of raw materials for soft drinks, sugar products and confectionary, ice cream and milk food, etc.

From its modern production and trade center located in the capital of Bulgaria, Panteley Toshev Ltd. markets about 1500 standard products, to more than 1200 customers, spreading in 17 countries in Europe and Asia. The company possesses several laboratories furnished with highly sophisticated equipment for product development and quality control, which are in the basis of the prestigious award "The 2008 most innovative company in Bulgaria".

The success of Panteley Toshev Ltd. primarily relies on exceptional quality and service. The high quality is based on modern and automated production facilities, as well as faultless incoming and outgoing manufacturing control. In the roots of our splendid service are the trained and motivated personnel, prompt production and delivery times, individually adjusted products, and technological assistance.

### YOUR INNOVATIVE SOLUTIONS

Innovation is something natural to Panteley Toshev Ltd. We spot the emerging trends in advance and translate them into innovative beverage

and food concepts. They are inspired by our constant desire to improve the life of people by making it healthy and tasty. We have developed cutting edge products that are based on herbs with proven positive effect on human health. Panteley Toshev Ltd. even went further by replacing all artificial components in a beverage emulsion, and creating a new generation product that fits the preferences of even the most health-orientated customers. This is a clear sign that by putting our best employees together with technology from the last generation we can create the impossible.

### NEW BREAKTHROUGH EMULSIONS



Natural formula

We follow the world trends and respond to them with unique product concepts. This is one of the main reasons for us to develop new breakthrough beverage emulsions that contain only natural ingredients. We excluded all synthetic weight agents, flavours, colourings, and the final result was 100% natural product. The revolutionary know-how of our product is that we managed to replace the artificial weight agents with a blend of natural extracts. The final result is a beverage emulsion with great stability, pleasant taste, good opacity and substantial body.

There is almost identical sensory and stability performance of the natural emulsions, compared to the standard version we offer (see the sensory properties). The stability is provided by our own know-how LTSS - long-term stability system.

#### WHAT IS LTSS?

Our experts in collaboration with external specialists devoted five years of research in order to develop our own production formula called LTSS (Long-Term Stability System). Through state of the art laboratory equipment, they worked on deep molecular level in order to study the water-in-oil behaviour. We used the gathered information to create a multistage production process that delivers optimal stability of the product (see the graph).

#### MAIN CHARACTERISTICS

- No Artificial Weight Agents
- No Synthetic Flavours
- No Synthetic Colouring
- Great Stability
- Excellent Sensory Properties

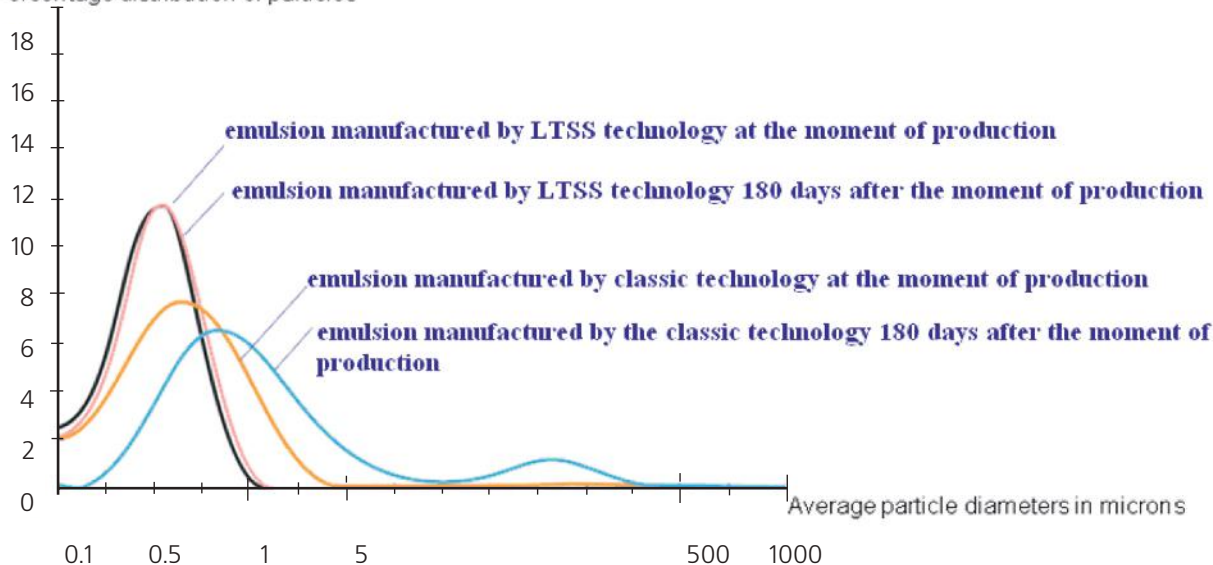
**APPLICATION AREAS:** soft drinks, fruit juice and nectars, juice containing drinks, sport drinks, drinking yoghurt, sugar products, ready-made sauces, etc.

**WE PROVIDE:** wide product range, innovative product concepts, manufacturing advice, new product development, marketing expertise, sensory evaluation, etc.

#### OUR ADVANTAGES

Distribution of oil drops in emulsions of different manufacturers at the moment of production and after 180 days.

Percentage distribution of particles





## MADE IN BULGARIA WITH EUROPEAN SUPPORT

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### ORAK R6 PLATFORM OF THE NEW GENERATION

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The company's new business software platform - Orak R6 combines modern web technologies and standards to deliver state of the art, highly responsive web applications. The internal framework was designed with the intention to allow for near instant server response and supports all major database management systems as its storage back end. The client side page is updated via AJAX calls, thus significantly enhancing user experience by eliminating full page reloads and flashing. The structure of the platform allows easy scale-out. The project has financial support from the European Commission.

#### **ORAK R6 RESTAURANT ON-LINE BOOKING - RESERVATIONS OF THE NEW GENERATION**

Orak R6 Restaurant on-line booking is the first and only reservation system of a new kind for Bulgarian restaurants and bars. It allows owners of restaurants and clients to save time, and time is money.

##### **What can it offer to the user?**

##### **Customer service**

Orak R6 Restaurant on-line booking allows shortening of the process of reservation to under a minute. Customers fill in the online reservation form, press this button to continue and then get immediate notification of whether there is a free table and the reservation was successful or not. This reduces the time it takes to find a facility to a minimum.

The system is based on the innovative business platform ORAK R6 with technological as-

sistance and with the partnership of Microsoft. It is fully integrated into Microsoft's platform solutions for business management Microsoft Dynamics. As part of this platform Orak R6 Restaurant on-line booking integrates with the following systems:

- Internet payments;
- SMS notifications;
- GPS As located at restaurants nearby in GSM / GPRS network.

Orak R6 IBR is a web application for dynamic generation of interactive business reports from distributed databases servers.

Popular reporting systems utilize only one type of database managing system. In this way if you want to combine data from two separate database servers you have to perform a complex manual operation.

If the underlying database management systems are also different (for example, Microsoft SQL Server and Oracle), even more problems might arise. These issues create great difficulty when it comes to geographically spread structure of data servers.

How ORAK R6 IBR eliminates these obstacles:

- It has a global domain login technology that allows simultaneous authorization of unlimited number of users;
- It allows simultaneous access to an unlimited number of databases;
- It allows extraction, filtering, grouping, sorting and other processing of data volumes in a web browser;

- Supports many database management systems. Currently 9 of the most common DBMS are supported.

**What are the benefits which Orak R6 IBR offers in comparison with popular business reporting systems?**

Configuration of new business report in a minute; pooling of records from different databases scattered around the globe in a second.

The unified login system makes database access authorization easier.

The reporting system can inform you via e-

mail, SMS, fax or other electronic information channels about any events based on predefined criteria.

It is fully compatible with all popular browsers and operating systems.

Since the beginning of 2009 the company's products have been exhibited in:

- Germany, Hanover CEBIT 2009
- USA, Houston WPC 2009
- Russia, Moscow PIR 2009

Official presentation of the products for Bulgaria was at the International Technical Fair, Plovdiv, 2009.

## iMediaShare – CONVERGING HOME AND MOBILE

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### BACKGROUND

#### Converging home and mobile

Today we are surrounded by a multi-level convergent media world, where all modes of communication and information are continually reforming. Mobile devices manufacturers are constantly competing in offering more and better functions for our cell phones. For a short period of time the mobile phone turned to be not just a voice communication tool but a complicated device incorporating various media and communications options. The modern cell phone now is a high resolution digital camera, mp3 player, camcorder and voice recorder, GPS navigator, just to name a few. All these features convert the phone into a mobile multifunctional data carrier.

Still, cell phone's main purpose remains communication. That is why communicating with others, the pictures we have taken with our phone's digital camera is a natural consequence. We can

use Bluetooth<sup>®</sup> or data cable to copy them to the PC or upload them in Facebook, Picasa or Flickr or just send them via MMS. But can we share the pictures with our friends on the large TV screen at home just with a single click on our handset?

The short answer is "Yes".

#### CHALLENGE

#### Cell phones are now connected to home media center.

People are always looking for the fastest and the easiest way. That is how all the innovations came to life. That is why Bianor's team faced the challenging task for developing an application that will allow cell phones to communicate with the TV sets.

We created a simple, user-friendly tool that provides convergence of mobile devices with home entertainment systems, allowing seamless media sharing. The tool allows multimedia files located on users' mobile phones to be transpar-

ently viewed on TVs at home.

#### **SOLUTION**

**Absolutely amazing. Worked on my xbox360 first try.**



Bianor's engineers built a lightweight technology based on UPnP/DLNA protocols to provide Wi-Fi communication channel to share transparently images, video and audio files between cell phones and DLNA compliant devices, such as the playing consoles PlayStation 3 and Xbox 360. These devices connect the cell phone with the TV set. In the next 2 years more than 80% of the new TVs are expected to have built-in DLNA compliant client, so that no mediating devices will be necessary.

Once having the technology know-how, Bianor's team had to apply it in the real live. The best choice was iPhone being a true, next generation multimedia device with strong users' community and well-developed apps distribution. That is why we chose iPhone's OS for the proof of the concept. That is how the name

iMediaShare was born.

iMediaShare was listed at Apple's App Store in November 2009 and only in 3 weeks it reached more than 60,000 weekly downloads. The application ranked second to Adobe's Photoshop Mobile on Photography Top Free Apps and was among top apps at New & Noteworthy Chart for more than 2 weeks.

"The first version of iMediaShare for iPhone enables only images sharing. The next major product milestone is enabling audio sharing on the iPhone platform," Kostadin Jordanov, Bianor's CEO said. "We are working towards achieving more and even better functionalities for other mobile operating systems," Jordanov added.

#### **What iPhone users say about iMediaShare**

*"Works great on my Xbox 360. All I had to do is go to the Picture Library and choose iMediaShare as a source. What a great app."*

*"Works great on ps3. So you can show your photos without plugging in a wire."*

*"Great app, works perfectly with my ps3, amazing!"*

#### **DEVELOPMENT**

iMediaShare for iPhone proved to be an app with high potential. It provoked Bianor's engineering capacity to make mobile media sharing available for larger audience. On the one hand, we had to further enable more sharing options at iPhone's app, and on the other to develop the application for other mobile OS.

"Bundling iMediaShare application with mobile devices makes them an even more useful and functional, adding more value to their users. iMediaShare is available for different mobile OS and device manufacturers looking to differentiate their product and respond to customers' demands for more functionality," Jordanov said.



## EQUAL IN EUROPEAN RESEARCH AREA

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### BULGARIAN VIPs

#### KRASIMIR STOYANOV

Chief Executive Officer (CEO) of Orak Engineering



*Obtained master's degree in Information Technology. Founder and Chief Executive Officer of Orak Engineering.*

Mr. Krasimir Stoyanov was born in 1972. He got his secondary education at Foreign Language School "Ivan Vazov" in Plovdiv and at Mathematics High School "Kiril Popov" in Plovdiv. He specialized in Guilford College (UK).

Mr. Stoyanov graduated from Plovdiv University "Paisii Hilendarski", bachelor's degree. He specialized Mathematics.

He obtained master's degree in Information Technology from Technical University of Sofia. He specialized "On-line monitoring of cash in UBB",

"Software system for transformation of object database to relational database", "System for management of Sales department of petroleum products" at the University of Aberdeen (UK).

Krasimir Stoyanov started his work experience as a programmer in the structure of Neftochim. After that he worked as a programmer in the structure of the Bulgarian National Bank.

In 1996 Mr. Stoyanov founded Orak Engineering Company with the clear vision to create quality business software solutions for global markets in the branches of trade, services, manufacturing, telecommunications, tourism and finance.

Mr. Krasimir Stoyanov is a member of the Board of BADFD (Bulgarian Association of Distributors of Fiscal Devices), a member of the committee of the mandatory BAIT (Bulgarian Association of Information Technology) and a member of the Board of BASSCOM (Bulgarian Association of Software Companies).

#### SPAS SPASOV

General Manager of Saturn Engineering Ltd.



*Awarded with master's degree in Technology of microelectronics and integrated circuits. Manager with rich experience in the field of electronics and microelectronics.*

Mr. Spas Spasov was born in 1963 in Sofia. He graduates from University of Chemistry and Metallurgy in

Sofia and has master's degree in Technology of microelectronics and integrated circuits. He has rich experience in the field of electronics and microelectronics. From 1989 to 1997 he works in Institute of Microelectronics in Sofia as a technologist. From 1997 to 2001 he works for the French company Silway Semiconductors as a process engineer and production manager. From 2001 to 2008 he works in Computing Machinery works in Sofia as a manager of Production and R&D departments. In 2006 he becomes General Manager of the company.

From April 2008 Mr. Spas Spasov is General Manager of Saturn Engineering Ltd., part of multinational business structure in the field of powered electronics. Saturn Engineering was established in 1998 as a 100% private organization. For the last 10 years the company has become a successful extension to engineering teams of many companies, helping them to increase their profits and significantly reduce the time-to-market and the development cost. The area of expertise of the company covers the industrial, medical and consumer markets. The

well-qualified and experienced staff assures to the company opportunity to provide a broad set of services, starting from research and development, prototyping to the hi-tech innovative assemblies, devices and products. The main part of the products is a wide range of induction generators, as well as dental equipment. Partners of the company are leading American companies in the field of electronic design and induction technologies. Saturn Engineering was awarded many times with prizes for innovations.

## AWARDS

### MINISTER SERGEI IGNATOV HANDED THE BIG AWARD "STUDENT OF THE YEAR 2009"



On December 3, 2009 in the Palace of Culture and Sports in Varna the next edition of the National award "Student of the Year" was organized under the patronage of the Minister of Education, Youth and Science Assoc. Prof. Dr. Sergei Ignatov.

The distinctions are handed in three spheres. The first one comprises pedagogical, humanitarian, social, economic, law and natural sciences, mathematics and informatics, technical sciences, health care and sports, arts, security and defense.

The second distinction is for the best foreign student in Bulgaria, and the third is for contribution to the development of student organizations.

Competent jury under the chairmanship of the minister Ignatov unanimously decided to adjudge the award **Student of the year** to the 22-year-old **Evelina Zlatanova** from Medical University in Varna. She is a five-year student in medicine specialty. Last year at the contest **Student of the year** she was distinguished in the categories "Health care" and "Sports"; she took part in many congresses and seminars, organized sports events and training programs and has overall excellent performance in studies.

For **scientific achievements in professional**

**spheres** the jury determined prize-winners as follows:

- Pedagogical sciences - **Penka Valcheva** from Bourgas Prof. Assen Zlatarov University
- The humanities - **Encho Tilev** from Plovdiv University "Paisii Hilendarski"
- Social, economic and law sciences - **Dimana Miteva** from Varna Free University "Chernorizets Hrabar"
- Natural sciences, mathematics and informatics - **Todor Bogdanov** from Sofia University St. Kliment Ohridski
- Technical sciences - **Mariyana Trahnova** from University of Chemical Technology and Metallurgy - Sofia
- Agrarian sciences and veterinary medicine - **Evgeniya Pancheva** from University of Forestry - Sofia
- Health care and sports - **Toma Spiriev** from Medical University - Sofia
- Arts - **Gergana Zmiycharova** from New Bulgarian University - Sofia
- Security and defense - **Georgi Angelov** from Vasil Levski National Military University - Veliko Tarnovo

**The best foreign student in Bulgaria** award was adjudged to **Emin Kumbarov** from

University of Architecture, Civil Engineering and Geodesy - Sofia.

Awards for **exceptional contribution to the**

**development of the National representation of student councils** were bestowed on the chairmen of student councils.

## SCIENTISTS DISTINGUISHED IN THE CONTEST OF THE UNION OF SCIENTISTS IN BULGARIA FOR HIGH SCIENTIFIC ACHIEVEMENTS IN 2009

### YOUNG SCIENTISTS UNDER 35

#### Diploma and prize money

- Dr. **GEORGI VLADIMIROV**, chief expert at the Ministry of Culture - for his monographs "Great Bulgaria and the Khanate of Kazan: construction, arts and architecture" and "Great Bulgaria and the Khanate of Kazan on geographical maps of the Middle Ages and the New Age. The two monographs are a considerable scientific contribution to the general history of the Middle Ages, in particular to the history of architecture and of the world.

- Research Assoc. I degree **EVGENIYA DIMOVA** from the Central Laboratory of General Ecology at the Bulgarian Academy of Sci-

ences (BAS) - for four scientific articles connected with mechanisms of cell adaptation to stress.

#### Honorary Diploma for research achievements

- Chief Assistant Prof. **MONIKA BORISOVA** from Sofia University St. Kl. Ohridski - for two monographs: "Adoptive Care in a Flash and Perspective" and "Deafness - from Definitions to Possibilities". Both monographs are worked up by modern technology, with complete generalization of Bulgarian and foreign experience; they are of extremely great practical importance.

### SCIENTISTS OVER 35 YEARS OLD

#### Diploma and prize money

- Prof. **BOYAN VALCHEV** from Sofia University St. Kl. Ohridski - for the monograph "National Revival Period Grammars of the Bulgarian Language". The monograph is an extensive research of the Bulgarian grammar thought development during the Bulgarian national revival period.

- Senior Res. Assoc. I degree **DANIEL DANCHEV** from the Institute of Mechanics at BAS - for six theoretical publications in foreign journals, connected with model systems describing the behaviour of thin films of non-polar fluids. They are at high theoretical level also as an object from the sphere of the intensively developing nanophysics.

- Senior Res. Assoc. **SVETLA DANOVA** from the Institute of Microbiology at BAS - for 16 scientific publications, including in prestigious scientific journals, thematically concerning modern molecular approaches in characterization of biodiversity and biological activity of lactic acid bacteria.

#### Honorary Diploma for research achievements

- Senior Res. Assoc. **VENELIN ENCHEV** from the Institute of Organic Chemistry at BAS - for a digest publication "Prototropic Tautomerism in Aqueous Solution: Combined Discrete/SCRF Models". The publication is a review and suggests original research results in the field of quantum chemical computations of tautomeric equilibrium in gaseous phase and in solution through a successful combination of two modern quantum chemical approaches.

- Prof. **TODORKA VLADKOVA** from University of Chemical Technology and Metallurgy - for separate chapter in the monograph "Marine and Industrial Biofouling" published by Springer.

- **IVAN YANEV**, PhD from Sofia University St. Kl. Ohridski - for the monograph "Bulgarian foreign policy during World War II in Bulgarian historical literature 1938-1944".

- Prof. **IVAN STOYANOV** from St. Cyril and St. Methodius University of Veliko Tarnovo - for

the monograph "Lyuben Karavelov. New Strokes to his life and activities".

- Senior Res. Assoc. **MILENA GEORGIEVA** from the Institute of Art Studies at BAS - for the monograph "South Slav Ptabognes in modern-

ism. Bulgarian Ort and Art of Serbia, Croatia and Slovenia 1904-1912".

- **ORLIN STEFANOV**, PhD, a scientist and journalist on free practice - for the monograph "When Art is Inspiration"

## AWARDS FROM THE JOINT CONTEST OF THE HIGHER ATTESTATION COMMISSION, UNION OF SCIENTISTS IN BULGARIA AND FEDERATION OF SCIENTIFIC TECHNICAL UNIONS FOR RESEARCH ACHIEVEMENTS OF DOCTORAL STUDENTS IN 2009

### Diploma and prize money

- Res. Assoc. **IVAN RADEV** from the Institute of Electrochemistry and Energy Systems at BAS for defended dissertation of the topic "Technique and Methods for Optimization of Membrane Electronic Structures MEA".

- **TSVETA MANDZHUKOVA**, PhD from the Institute of General and Inorganic Chemistry at BAS for defended dissertation "Obtaining and Characterization of New Composites of Magnesium, Containing 3d-metals and/or Their Compounds with Perspective Property of Hydrogen Accumulation".

- **MAGDALENA GARVANOVA**, PhD from the Marketing Agency SEERC - for defended dissertation "Change and Stability in the Value System of the Contemporary Bulgarian".

- Res. Assoc. **YANA SIMOVA**, PhD from the National Cardilogic Hospital - for defended dissertation "Possibilities for Non-invasive Vessel Depictive Methods for Estimation of the Degree of Coronary Atherosclerosis".

### Honorary Diploma for research achievements

- Assistant Prof. **VANYA VASILEVA**, PhD from Konstantin Preslavski University of Shumen - for defended dissertation "Possibilities for Development of Alternative Tourism in the Eastern Balkan Mountains and Eastern Fore-Balkan".

- Res. Assoc. II degree **ZORNITSA KATEROVA-LANDZHOVA**, PhD from the Institute of Plant Physiology at BAS - for defended dissertation "Physiological-biochemical Mutations in Pea Plants Exposed to UV-B and UV-C Radiation".

## ARTICLES

### RECENT PUBLICATIONS OF BULGARIAN SCIENTISTS

**Title:** **The role of family start ups in the emergence of a small business sector in Bulgaria**  
**Authors:** Fletcher, Denise<sup>1</sup>, denisefletcher@sheffield.ac.uk, Helienek, Emil<sup>2</sup>, Zafirova, Zveta<sup>3</sup>  
**Source:** Journal of Enterprising Culture, Vol. 17,3, (Sep. 2009), 351-375, 3 charts, 4 graphs.  
**Author Affiliations:** <sup>1</sup>University of Sheffield Management School, 9 Mappin Street, Sheffield, UK. S1 4DT, UK;  
<sup>2</sup>Nottingham Business School, Nottingham Trent University, Burton Street, Nottingham, UK;  
<sup>3</sup>Varna University of Economics, Bulgaria.  
**ISSN:** 0218-4958

**Title:** **Service Innovation in the Bulgarian Quality Wine Export Networks: Network Migration at a Macro-level**  
**Authors:** Kinder, Tony<sup>1</sup>, t.kinder@ed.ac.uk, Slavova, Milanka<sup>2</sup>, milanka.slavova@mbox.bol.bg  
**Source:** Journal of Wine Research, Vol. 20, 2, (Jul. 2009), 95-109.  
**Author Affiliations:** <sup>1</sup>Management School, University of Edinburgh, Edinburgh, UK;  
<sup>2</sup>University of National and World Economy, Bulgaria.  
**ISSN:** 0957-1264

**Title:** **DBC Technology for Extremely Thin Flat Heat Pipes**  
**Authors:** Kamenova, Lora<sup>1</sup>, Avenas, Yvan<sup>1</sup>, Yvan.Avenas@g2elab.grenoble-inp.fr, Schaeffer, Christian<sup>1</sup>, Tzanova, Slavka<sup>2</sup>, slavka@ecad.tu-sofia.bg, Kapelski, Georges<sup>3</sup>, Georges.Kapelski@grenoble-inp.fr, Schulz-Harder, Juergen<sup>4</sup>, j.schulz-harder@curamik.de  
**Source:** IEEE Transactions on Industry Applications, Vol. 45,5, (Sep./Oct. 2009), 1763-1769.  
**Author Affiliations:** <sup>1</sup>Grenoble Electrical Engineering Laboratory, Grenoble Universités, 38402 Saint-Martin-d'Hères Cedex, France;  
<sup>2</sup>Department of Microelectronics, Technical University of Sofia, 1000 Sofia, Bulgaria;  
<sup>3</sup>Laboratoire Génie Physique et Mécanique des Matériaux, Grenoble Universités, 38402 Saint-Martin-d'Hères Cedex, France;  
<sup>4</sup>Curamik Electronics GmbH, 92676 Eschenbach, Germany.  
**ISSN:** 0093-9994

**Title:** **Restructuring and present state of mineral processing in Republic of Bulgaria**  
**Authors:** Kuzev, Lubomir, Kostova, Desislava  
**Source:** Revista Minelor / Mining Revue, Vol. 15, 4/5, (Apr. 2009), 13-16.  
**Author Affiliations:** University of Mining and Geology St. Ivan Rilski, Sofia, Bulgaria  
**ISSN:** 1220-2053

- Title:** Robust stability of single input fuzzy system for control of industrial plants with time delay
- Authors:** Yordanova, Snejana, sty@tu-sofia.bg
- Source:** Journal of Intelligent & Fuzzy Systems, Vol. 20, 1/2, (2009), 29-43, 2 charts, 7 diagrams, 4 graphs.
- Author Affiliations:** Faculty of Automation, Technical University of Sofia, 8, Kliment Ohridski Blvd., 1000 Sofia, Bulgaria
- ISSN:** 1064-1246
- 
- Title:** Influence of pH and acid solutes on the phase behaviour of aqueous solutions containing poly(ethylene glycol) and poly(ethyleneimine)
- Authors:** Yankov, Dragomir S.<sup>1</sup>, Trusler, J. P. Martin<sup>2</sup>, m.trusler@imperial.ac.uk, Stateva, Roumiana P.<sup>1</sup>, Cholakov, Georgi St.<sup>3</sup>
- Source:** Biochemical Engineering Journal, Vol. 48, 1, (Dec. 2009), 104-110.
- Author Affiliations:** <sup>1</sup>Institute of Chemical Engineering, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria;  
<sup>2</sup>Department of Chemical Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ, UK;  
<sup>3</sup>University of Chemical Technology and Metallurgy, 1756 Sofia, Bulgaria.
- ISSN:** 1369-703X
- 
- Title:** Obtaining of Ashless Additives for Diesel Fuel Improving the Lubricating, Anticorrosion and Protection Properties
- Authors:** Yordanov, D. I., dobromirj@yahoo.com, Petkov, P. S.
- Source:** Petroleum Science & Technology, Vol. 27, 15, (Dec. 2009), 1783-1788, 3 charts.
- Author Affiliations:** Department of Industrial Technologies and Management, Assen Zlatarov University, Bourgas, Bulgaria
- ISSN:** 1091-6466
- 
- Title:** Ecologically safe method for improved feather wastes biodegradation
- Authors:** Vasileva-Tonkova, Evgenia<sup>1</sup>, evaston@yahoo.com, Gousterova, Adriana<sup>1</sup>, Neshev, Georgi<sup>2</sup>
- Source:** International Biodeterioration & Biodegradation, Vol. 63, 8, (Dec. 2009), 1008-1012.
- Author Affiliations:** <sup>1</sup>Bulgarian Academy of Sciences, The Stephan Angeloff Institute of Microbiology, Acad. G. Bonchev Str., Bl. 26, 1113 Sofia, Bulgaria;  
<sup>2</sup>Agricultural University, 12, Mendeleev Blvd., 4000 Plovdiv, Bulgaria.
- ISSN:** 0964-8305
- 
- Title:** In good company: The role of personal and inter-firm networks for new-venture internationalization in a transition economy
- Authors:** Tatiana S. Manolova<sup>1</sup>, Ivan M. Manev<sup>2</sup>, Bojidar S. Gyoshev<sup>3</sup>
- Source:** Journal of World Business, In Press, Corrected Proof, Available online 17 October 2009.
- Author Affiliations:** <sup>1</sup>Bentley University, 175 Forest St., Waltham, MA 02452, United States;  
<sup>2</sup>University of Maine, Maine Business School, Orono, ME 04469-5723, United States;  
<sup>3</sup>International Business School, Botevgrad, Bulgaria.
- ISSN:** 1090-9516

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**Title:** **Characterization of Bifidobacteria and Lactobacilli with Intestinal Origin with Molecular Typing Methods**

**Authors:** Zhechko Dimitrov

**Source:** Biotechnology & Biotechnological Equipment, Vol. 23,2, Special Edition, (2009), 923-926.

**Author Affiliations:** LB-Bulgaricum R&D Centre, 12-A, Malashevskia Str., 1202 Sofia, Bulgaria

**ISSN:** 1310-2818

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**Title:** **Characterization of Bioactive Peptides with Calcium-Binding Activity Released by Specially Designed Cheese Starter**

**Authors:** Zhechko Dimitrov

**Source:** Biotechnology & Biotechnological Equipment, Vol. 23,2, Special Edition, (2009), 927-930.

**Author Affiliations:** LB-Bulgaricum R&D Centre, 12-A, Malashevskia Str., 1202 Sofia, Bulgaria

**ISSN:** 1310-2818



## EVENTS

### ROUND TABLE „CREATING A NATIONAL SCIENTIFIC-INNOVATION VISION“

On November 27, 2009 r. a Round Table on the topic “Creating a national scientific-innovation vision in the context of the European strategy for science and innovation based on research” took place in Sofia on the initiative of the Minister of Education, Youth and Science Mr. Sergey Ignatov.

Before the discussion Mr. Ignatov inspected the state of research in Bulgaria in the context of priorities of the European research area. He expressed the vision of the government on the forthcoming reforms in the legislative and organizational framework of the research system.

All ministers of education and science from the period of 2000-2007 took part in the meet-

ing, together with senior officials responsible for science and education in Spain, Romania, Ireland, Czech Republic, Slovenia and Estonia, as well as representatives of the key European and American institutions dealing with research investigations.

The main goal of the Round Table is to present ideas on creation of the research strategy which will be a source and important step to the imminent intense cooperation in the research sphere. Along with this the event aims at contributing to improvement of national research systems through cooperation based on exchange of experience and good real practices.

### EUROPEAN DAY OF THE ENTREPRENEUR 2009

On November 23, 2009 the Chairman of the Commission on European affairs and control of European funds Mr. Svetlin Tanchev acclaimed the opening of the seventh edition of the **European Day of the Entrepreneur** organized by the joint initiative of the Capital city Municipality and Sofia University St. Kliment Ohridski. The event, the aim of which is to turn Sofia into a national and regional center in the South-eastern Europe for development of innovations and entrepreneurship, was held under the motto: “Innovations - a European model for overcoming the economic crisis”, which is in synchrony with the policy of the European Commission for competitiveness of European cities and regions through innovations and technology transfer.

In his address to the forum Mr. Tanchev paid special attention to active students who inspire the European idea of the week of the entrepreneur with their own view and initiative, that

shows a successful model of connections between the students and business community. Mr. Tanchev put emphasis on the great challenge before the state institutions in the field of science and education in involving more young people to research career development and investigations. In this connection he mentioned the updated in 2009 National Program for reforms of the Republic of Bulgaria (2008-2010), where some urgent measures in support of research activities and innovations are included.

The topics - accent of the present-year edition of the EDE are as under:

- The link science-business for application of the innovative policy of the EU;
- Commercialization of the research results in the public sector;
- Intellectual property - a resource and chance for economic development;
- Innovations in providing public services by

SMEs;

- Implementation of new technologies and innovations in the public and economic sectors of the municipality;
- Sharing good practices of successful entrepreneurship;
- Organizing an exhibition of separate technological products;
- Announcement of the results of the students' contest for innovative entrepreneurial idea, etc.

Among the participants of the European Day of Entrepreneur there were: representatives of the students' community, Junior Achievement - Bulgaria, Technostart Project of UNDP and Ministry of Economy and Energetics (MEE), National Network for Business Development (NNBD), Centers for technology transfer at research institutions, Bulgarian Network of Business Angels (BNBA), CEED Bulgaria, Bulgarian Academy of Sciences, the World Bank, etc.

## SIXTH NATIONAL CONTEST "INNOVATIVE ENTERPRISE OF THE YEAR" 2009

For the sixth consecutive year, Applied Research and Communications Fund and Enterprise Europe Network - Bulgaria, in partnership with the Ministry of Economy, Energy and Tourism and the World Bank office in Bulgaria are organizing the National Contest for Innovative Enterprise of the Year. This is the **first edition in which access is open also to R&D organizations** that have developed new technologies with industrial application.

The contest has established itself as the main instrument for increasing the popularity and recognition of innovative Bulgarian companies that despite all difficulties make an effort beyond ensuring mere survival to progress and tackle challenges by developing and introducing innovative approaches and technologies. The contest aims at presenting the Bulgarian model of good business practice and at drawing the attention of the public at large to achievements of Bulgarian enterprises in the area of innovation.

Innovative enterprises from all sectors of the Bulgarian economy, including ICTs, can and are encouraged to take part. An enterprise that has developed and marketed new or significantly

improved products (goods or services) and/or processes during the past three years is qualified as innovative.

The **first stage** of the competition invites nomination of candidates for participation. All companies and R&D organizations active in the field of innovative technologies are eligible for nomination.

At the next stage of the contest, the already nominated candidates are invited to complete an application form that includes a description of their innovative product, technology, process and/or service.

The applicants will be evaluated by an expert panel according to a pre-defined methodology. The ten highest-ranking companies/R&D organizations will be visited by ARC Fund experts. At the final stage, the applications will be assessed by a jury comprising representatives from ministries, employers, science and non-profit organizations, the World Bank office and other entities.

The awards will be presented during the Sixth National Innovation Forum in February 2010 and handed by the Prime Minister of Bulgaria.

## NOTES

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