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Proceedings of the 5th International Technology Transfer Conference – 5ITTC

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mag. Robert Blatnik

Marjeta Trobec

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#### The conference has been organized by:

Jožef Stefan Institute and co-organized by National Institute of Chemistry, TehnoCenter of the University of Maribor, Slovenian Technology Agency and Chamber of Commerce and Industry of Štajerska.



#### Foreword

Špela Stres, Dr. Sc., Dipl. Phys., BA, Patent Attorney, LLM (Master of Laws in Intellectual Property) Head, CTT-Center for Technology Transfer and Innovation Vice-President, ASTP-Association of Science and Technology Professionals Jožef Stefan Institute, Slovenia

#### Who are we and where do we go?

#### - The context of Technology Transfer in Slovenia -

Linking science and economic activities is nowadays true and only guarantee for a successful, stable and balanced economy. On one hand science is the source of maintaining the competitive advantage and the country's overall progress, and on the other hand it has to be bound closely to the economy, since scientific results must be a reflection of the need on the market. The key advantage of technology transfer lays in the lower development costs for the economy, through the access to research and scientific findings, which would otherwise due to financial, economic or human resources constraints often be inaccessible for companies, especially smaller ones. On the other hand, for research centers technology transfer provides a specific insight into the needs of the market and hereby brings the research closer to the public.

Slovenia is one of the 27 European Countries, which has in the last 15 years signed most of the World International Intellectual Property Organisation (WIPO) Treaties. As a newcomer to the world of IPR players, we were eager to set the system right to exploit IP rights for the benefit of inventors and to foster innovation for the benefit of our economy. However, Slovenian technology transfer offices still vary significantly in their organization and effectiveness. Two technology transfer offices can be classified as fully operational and well established – the **Centre of Technology Transfer and Innovation** at the **Jožef Stefan Institute and National Institute of Chemistry**, located in the country's capital Ljubljana, organized as internal institutes' support unit, comprising 9 professionals in the field of Technology Transfer and several out-sourced legal and marketing experts, and the TehnoCenter of the University of Maribor, which is as a company 100% owned by the University, employing 3 professionals.

The Centre of Technology Transfer and Innovation at the Jožef Stefan Institute operates as an independent internal unit since the 1th of January 2011. CTT was founded to provide assistance to researchers, implement procedures and carry out research work on the following areas: acquisition of intellectual property, marketing of intellectual property and know-how, licensing, networking and researchers with business representatives, the creation of spin-out companies and education and promotion. The contractual relationship between the Jožef Stefan Institute(JSI) and National Institute of Chemistry, ensures the functioning of the TT Group – the united office for technology transfer of both institutes.

It is in practice a shared technology transfer office of the **Jožef Stefan Institute** and the **National Institute of Chemistry**, which makes it follow some European trends, since the largest two Slovenian public research institutes established the unified office to co-operate in the field of technology transfer. The Jožef Stefan Institute is the most successful Slovenian research organization in acquiring contract co-operation with industry and in the area of establishing spin-out companies. On the other hand is the National Institute of Chemistry the leading national research entity in commercialization of patent rights.

We offer help to the researchers in two stages - before the creation / use of intellectual property (IP) in the specific projects the Centre helps individuals to connect with the use of IP options, contracting and spin-offing and certificates, patents, tests, etc.

In the second stage the Centre offers concrete advice for optimizing IP cases. As part of this activity we carry out professional legal advice, particularly in the field of intellectual property and opinions on IPR exploitation opportunities (technology assessment and market assessment). In this way the Centre is setting the foundation for finding business partners and to assess the financial performance of each technology transfer. By organizing and leading 100's of company-academia meetings and negotiations per year and subsequent new collaborations arising, we are the Technology Transfer office of Slovenia. But this is just the surface of things.

According to the structure of financing, the activities that CTT carries out currently include exclusively research and support European projects in FP7, CIP, Central Europe, South-East Europe, Alpine space, etc.. in the field management of innovation (innovation management). There is no national financing by ministries or agencies for the activity of technology transfer in Slovenia in the year 2012. CTT is not funded from the IJS system of overheads or infrastructure projects, and does not charge its services to individual researchers. These days the CTT staff carries out its research work in the context of their own research group, while it supports the researchers for free and in its leisure time.

How long do you think this can be persued?

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#### INTRODUCTION AND AIM OF THE CONFERENCE

On behalf of the Organizing Committee it is our pleasure to invite you to participate in the 5th International Technology Transfer Conference, which will be held in Ljubljana, Slovenia on the 26 and 27 September 2012. The conference is organized by the Jožef Stefan Institute in cooperation with TechnoCenter at the University of Maribor, the Slovenian Technology Agency, National Institute of Chemistry and the Chamber of Commerce and Industry of Štajerska.

AIM

The Conference is subdivided into two days.

The 1st day of the conference is dedicated to:

- presentation of knowledge transfer and trans-border collaboration in EU
- innovation in foreign markets
- intellectual property rights
- spin-off business development and preparing for the investment.

The emphasis of the spin-off business development is the workshop on pitching venture capital. Researchers and future entrepreneurs will present their business propositions in front of the commission constituted from the investors and technology commercialization experts.

The commission members will evaluate the commercial potential of the presented innovative technologies and select the prize winners.

A Special prize for INNOVATIONS FOR ECONOMY will be given.

The 2nd day of the conference is designated to the topic of joint research – industry collaboration; identifying strong points of long-term collaboration, approaches to be used to improve it. We will speak on funding possibilities for making the joint RR-industry cooperation possible and add the insight on EU programmes. Initiatives and other instruments/networks that are available to stimulate the RR-industry communication which is the basis for technology transfer.

Enterprise Europe Network helps small business to make the most of the European marketplace. Working through local business organisations, the network helps companies to:

- develop business in new markets,
- source or license new technologies,
- access EU finance and EU funding.

The Enterprise Europe Network is a key instrument in the EU's strategy to boost growth and jobs. Services are being offer by close to 600 member organisations across the EU and beyond. They include chambers of commerce and industry, technology centers, universities and development agencies. More than 3,000 experienced staff provide practical answers to specific questions. Over 50 network representatives will attend the 5. ITTC. They will also be available for entrepreneurs and researchers by giving individual advices during B2EEN meetings. They will answer questions about entering their markets, their local legislation, finding partners and resources in their countries. They will also represent companies that are looking for concrete partners in Slovenia.

#### **B2Research and B2B meetings**

Researchers applying for the 5. ITTC award will after the conference get the opportunity and networks' assistance in promoting their innovations. Innovations will be promoted via different channels (databases, thematic groups and events) in order to find needed commercial and technological partners and financial resources. Business to Research (B2Research) and Business 2 Business (B2B) meetings will be organized among researchers, foreign and Slovenian experts and technology transfer professionals. To enable a deeper interest in research work done also a poster session is being organized in a form of a networking event, where concrete issues can be solved between the interested business and researchers.

#### **INVITED LECTURES**

# Prof. Anthony Arundel MA, UNU MERIT, Maastricht: Presentation of Knowledge transfer in EU according to the "European Knowledge and Technology Transfer Practice Survey 2011", the the second in a series of surveys commissioned by the DG Research &Innovation of the European Commission.

Anthony Arundel, Franz Barjak and Stefan Lilischkis

European Knowledge Transfer Activities in 2010 and 2011

Several national and professional organisations such as the Association of Science and Technology Professionals (ASTP) and PROTON collect and publish data on the formal transfer of knowledge from European universities and public research institutes to private firms. In order to provide formal knowledge transfer indicators for all of Europe, DG Research and Innovation of the European Commission funded a collaborative project on this topic by Empirica, UNU-MERIT and FHNW. The project goal is to provide data for the leading research universities in all 27 members of the European Union and for Europe's leading public research organisations, consisting of universities and public research institutes. Data are obtained from national sources, collaboration with professional organisations and from a separate survey conducted by UNU-MERIT. A parallel survey collected data on IP policies and practices of a smaller sample of public research organisations. For the 2010 calendar year, comparable data were obtained from 430 public research organisations based in 26 of the 27 member states of the European Union and from six associated countries. The survey for the 2011 calendar year is not complete, but coverage should be comparable. Preliminary results show that performance, measured per 1,000 research staff, is similar between 2010 and 2011 for invention disclosures, patenting, start-up establishments, and license income. A multivariate analysis of the factors leading to improved performance outcomes highlights the importance of the knowledge transfer office, with most outcomes positively affected by an increase in the number of staff employed by these offices. Future research on the drivers of good performance will include variables for national and institute-level IP policies.

**Anthony Arundel** is a Professor of Innovation at the University of Tasmania in Hobart, Australia and concurrently a Professorial Fellow at MERIT. He was previously a Senior Researcher at MERIT since 1992. He specializes in the design, implementation, and analysis of innovation surveys. His research interests include questionnaire design and methodology, technology assessment, environmental issues, intellectual property rights, biotechnology, and knowledge flows from public research to firms.

#### Marta Catarino, Technology Transfer Director at TecMinho, Knowledge Transfer Office of University of Minho. ProTon - European Knowledge Transfer Association: Building synergies in trans-border collaboration in Europe and beyond.

Universities are increasingly developing and exploring partnerships in their research and knowledge transfer missions, embracing the "Open Innovation model" of university-business collaboration, where geographical borders may no longer be considered as barriers. While this represents an opportunity to strengthen links between university and industry, it also poses challenges which Public Research Organisations, individually, find hard to approach strategically. This presentation will address such challenges and opportunities in trans-border collaboration, particularly through the experience of Proton Europe, an International not-for-profit association of European Knowledge Transfer Organisations which represents the national networks of technology transfer offices ("the network of networks"). How to get value from networks to bring science to the market will be the topic proposed for discussion, exploring areas such as IP management, skills development, harmonizing policies, sharing best practices... and building synergies beyond Europe.

**Marta Catarino** is the Director of the Technology Transfer Office of University of Minho - TecMinho, where she manages a team of 10 experienced professionals in 3 business units: Industrial Property Management, Technology Commercialization and Entrepreneurship.

Since 2010, Marta is also Advisor to the Vice-Rector for Innovation and Entrepreneurship, where she supports the definition and implementation of Innovation and Entrepreneurship policies and manages the University's participation in private holdings.

With an academic background in Engineering and post-grad studies in Industrial Property, Marketing and Strategic Management, Marta has been working as a Tech Transfer professional for more than 10 years as an active member of the Innovation Relay Centre Network previously to managing the Tech Transfer Office.

TecMinho is a very dynamic Tech Transfer Office in Portugal, with an extensive track record in managing Intellectual Property, licensing and establishing successful transnational University-Industry collaborative projects. Recently, the Office has been particularly committed towards supporting the creation of knowledge intensive spin-off companies, establishing pre-seed and proof-of-concept funds and promoting creativity and innovation throughout the academia.

Marta has an extensive communication experience delivering seminars, workshops and training in more than 20 countries. She is regularly invited as an expert by the World Intellectual Property Organization and is an evaluator of proof-of-concept projects for the European Research Council and for the Ministry of Education, Youth and Sports in the Czech Republic.

Since September 2011, Marta is a Member of the Board of Directors of PROTON Europe, the European Knowledge Transfer Association.

#### Dr. Christian Czychowski, Boehmert & Boehmert, patent attorney, Munich: Contract Practice in Technology Transfer for Research and Development Projects involving Industry and Universities.

Europe is a landscape of many different research and development programs. Shaping intellectual property rights is essential for a region like Europe with not much natural resources. Cooperation between industry and the academic sector is very important since the academic sector has a pool of many skilled individuals. But how should such cooperation be done? Cooperation between the academic sector and industry can take on many different shapes. A distinction can be made between commissioned research activities and research cooperation. A research assignment with which industry more or less outsources research to institutions of higher education/non-university research institutes and bears all of the costs incurred is distinguished by the fact that research is conducted in a targeted and open-ended way, while pursuing a clearly-defined path. In a cooperation, both parties make specific contributions towards the success of research that is conducted in a targeted and open-ended way. The precise implementation of research that is conducted in a targeted and openended way is not defined and the application purpose is not known or defined in detail either. Socalled contracts work and services represent a third type of cooperation. It is distinguished by an unequivocal and known objective and the method of implementation is also known. There is often considerable need for cooperation in small and medium-sized companies and smaller universities especially regarding the legal aspects of contract research and research cooperation. For it must be borne in mind that all in all, the situation of industry and of universities / non-university research institutes is characterized by a high degree of diversity. The spectrum of universities range, for instance, from large universities that have their own contract and patent experts to universities that have just a few lecturers and students in which contracts are not fixed in organizational terms. Another aspect worth considering is that awareness that inventions can be used if an application is filed for a patent varies greatly within the various types of universities and sizes ranges. The same can be said of industry. The various industries and markets call for the companies to take action that relates to actual situation. Correspondingly, the administrative support for this field of tasks varies too. This results in a wide range of contracts for cooperation with industry which frequently results in new types of contracts during negotiations. In Germany the Federal Government therefore initiated a group of experts to simplify the complex subject matter as much as possible – for not all of the parties involved have the necessary know-how required for cooperation between the scientific community and the private sector. Inter alia the presentation will explain the results of this expert group and their sample agreements on R&D. The sample agreements are intended to give small and medium-sized universities and indeed small and medium-sized companies on particular the possibility of concluding agreements on various types of R&D cooperation between industry and scientific community that are both practical and ensure legal compliance, without incurring major legal costs.

#### Dr. jur. Christian Czychowski

Attorney at Law (Germany), Certified Information Technology Lawyer, Certified Copyright and Media Lawyer, admitted at the European Trade Mark Office, Partner, Berlin.

Studied law and musicology at the university of Bonn subsequently obtaining his doctorate in the field of copyright contract law. From 1990 to 1992, he was managing director of the Klassische Philharmonie Düsseldorf. Alongside other activities for media companies, he worked for McKinsey & Co. Inc. as a summer associate dealing with the media industry.

He joined BOEHMERT & BOEHMERT in 1997 becoming partner in 2002. His specialist areas are new media, Copyright law, information technology law, trade mark law as well as patent and licensing contract law. His clients include leading industry associations and worldwide technology companies as well as medium sized and small businesses and even public authorities.

In 2009, Dr. Czychowski played a crucial role in the development of the publication "Model agreements for research and development coooperations" which was conceived in the council for innovation of the Chancellor's Office/Federal Ministry of Economics; it later received an award from the initiative "Land of ideas".

Dr. Czychowski was visiting lecturer at the Hasso-Plattner Institute for System Technology for many years. Since 2006 he has held a teaching position in intellectual property at the legal faculty of the University of Potsdam and regularly lecturers in the German Attorney Academy and also for the European Patent Office.

Dr. Czychowski is a member of the expert committee for copyright and publishing rights of GRUR and member of the expert attorney committee on IT law of the Berlin Chamber of Lawyers. He is also a member of LES, in the German Attorney Association and the DGRI.

## Dr. Anders Haugland, Managing Director -Technology Transfer Office Bergen, Norway, president of ASTP: Tech transfer in Norway. How to foster spinning-out and licensing from research institutes and universities? Role of the ASTP in the process.

Europe is changing, and the TT/KT landscape is changing with it. Financial crisis, cultural barriers and process focused politicians and bureaucrats, both drives and limits the evolution. In my talk I will look into the changing TT/KE landscape on two levels, the regional level and the pan-european level. BTO is a regional TTO, our slogan is "Increase the value of your result" where value is meant in a broad sense. BTO is quite young, and are in the process of developing it self into the "innovation engine" of the Bergen region in Norway. Rationale, achievements, strategy and future steps are presented. Through ASTP, the pan-european organisation for KT/TT professionals I also get insight in both the differences and the similarities between the cross European operations. Some key findings will hopefully help the profession to grow stronger, in the terms of becoming more productive, gaining more impact and being seen as an important political tool for releasing the innovation potential in Europe.

#### About dr. Anders Haugland

#### Key Competence:

Board member in Start-ups, early phase strategy and funding Networking – active in the international TTO community Negotiations –lead negotiator in several license and equity deals Management of market oriented, multi-cultural and high competence teams 10 year's experience in commercial research based innovations, R&D focused

#### Experience:

2011-d.d.	Association of European Science & Technology profess	ionals	President
2011-d.d.	NTNU Discovery (PoC Fund)		Mmbr.Invest.comite
2009-2011	Forskningsfond Vestlandet (Regional R&D Fund)		BoardMember
2009-2011	ASTP ( <u>www.astp.net</u> )		VP Prof. develop
2006-d.d.	BTO AS		CEO
	Board roles in (BergenBio, TextUrgy, Unigeo, Metas)		
03.06-09.06	SINTEF Energiforskning AS, Energiprosesser		Research Director
12.03-02.06	SINTEF Energiforskning AS		Arealeader
01.03-06.06	NTNU		Postdoctor
01.99-12.02	SINTEF Energiforskning AS		Researcher
	Avdeling for klima og kuldeteknikk.		
Education:			
1995-2002	NTNU, Institutt for Klima og kuldeteknikk	PhD	
09.94-12.94	NTH, Institutt for kuldeteknikk	Siviling	eniør

Diplomoppgave utført ved Daimler Benz sitt forskningssenter Stuttgart dette var et ledd i et teknologioverføringskonsept fra NTNU/Sintef og Norsk Hydro til Europeisk bilindustri

08.90-07.94 NTH, Maskin, Institutt for kuldeteknikk

#### Boris Golob - SteP Ri, Rijeka: Business model creation.

Something strange is going on! Have you noticed? Empires and fortunes are built on "free stuff" – things and services that cost you nothing. "Low-cost" airlines are more profitable and report higher levels of customer satisfaction than regular ones.

Unique products are produced with mass production efficiency, companies turn customers into suppliers, competitors have become partners (unbeknownst to them), computer hardware manufacturers now sell songs & tunes, car manufacturers want to create a world in which people won't need to buy a car...

You might say that all these things are absurd; you might say that it "won't happen here" but that kind of attitude will not help you grow your business and prosper; actually it will not even help you to stay afloat.

Up until now we innovated and created new technologies, products (and services, too) or business processes. Now it is time to start dealing with business models and new ways of doing business.

Actually, business model innovation is not something new and it is not about information technologies. IT technologies might speed things up, but business model innovations have existed for ages; we just did not have the tools to understand it. The Singer sewing machine was the first multinational company, not because of its good product, but because of its business model. Gillette, Ford, Kodak, Google, Swatch, Wikipedia, Sun Edison, Wal-Mart, IKEA, Apple, Xerox, Skype, Amazon, Craigslist... are some global examples of what BMI can do.

What was the difference that made those companies great? At least three things - first, they all had a good product (or service), but they become great because their product was empowered through the business model. Second, for some reason they could not or did not want to simply copy from competitors, they invented new ways of doing business. And third, they took a chance - they had to take some risk and experiment - sometimes because they wanted to experiment, sometimes because it was their only chance – but it paid off well!

So what is the business model? Simply speaking – it is "your way of doing business" or rationale how you create value for your customers, how you deliver that value and how you make profit.

Lecture "Business Model Creation" will present main tools for analysis, understanding, innovation or creation of existing or new business models.

Business model innovation means that you are not afraid to be different, usually very different. And it is not just having a good idea. Swatch is not only a colorful watch, Amazon is not just an on-line bookstore, Apple is not just a nicely designed computers and Ryanair is not only a cheap flight!

Business model innovation can make you rich or allow you to change the world. Or both. Good luck!

**Boris Golob,** CEO of Science and Technology Park of University of Rijeka, is management consultant and lecturer specialized in product, service and business model innovation methodologies and innovation commercialization strategies.

#### **ROUND TABLE: How to succeed**

Five successful Slovenian companies present its success in innovation (in collaboration with Slovenian research) and on foreign markets and which entrepreneurial support was helpful.

Round table moderator: mag. Larisa Vodeb, Chamber of craft and small business of Slovenia.

Speakers:

Dr. Stanko Hočevar, Mebius, d.o.o. (spin-out of National Institute of Chemistry)

Dr. Robert Dominko, Li2 d.o.o. (spin-out of National Institute of Chemistry)

Doc. dr. Gregor Veble, R&D, Head of Research at Pipistrel, d.o.o. and University of Nova Gorica

Štefan Pavlinjek, Roto, d.o.o.

Marko Kobal & Martina Murovec, Arctur, d.o.o.

#### ABSTRACTS OF THE ROUND TABLE PARTICIPANTS

#### Dr. Stanko Hočevar

#### Spin-out in high-tech area. The case of Mebius Ltd.

<sup>a</sup> National Institute of Chemistry, Hajdrihova 19, Ljubljana, Slovenia

<sup>b</sup> Centre of Excellence for Low-Carbon Technologies, Hajdrihova 19, Ljubljana, Slovenia

<sup>c</sup> Mebius d.o.o., Na Jami 3, Ljubljana, Slovenia

Mebius d.o.o. is a young company focused on research, development, marketing and production of key components for high and low temperature PEM fuel cells. We are developing key components that represent the heart of a fuel cell : membranes, catalysts, gas-diffusion electrodes (GDE), membrane-electrode assemblies (MEA). The company is also developing its own high temperature PEM fuel cell stacks which range from a few Watts to 2 kW.

Main running project of the company are (1) "VTSklad – development of high temperature PEM fuel cell stacks" – with National Institute of Chemistry under contract for Ministry of Defense, Republic of Slovenia.

Some of the completed projects show the main line of our work: (1) "HyCore – development of key components of high temperature PEM fuel cells" – with DOMEL d.d., INEA d.o.o., Jozef Stefan Institute, Financed by European Union, Ministry of Higher Education, Science and Technology of the Republic of Slovenia and Slovenian Technology Agency. (2) Feasibility study project "Energy independence" - under contract of Center for Renewable Energy Sources and Environment Safety Pivka (COVEVO)

**Dr. Stanko Hočevar**, born on September 22, 1947, Vienna, Austria, nationality: Slovene. Current position: Senior Research Fellow at the Laboratory of Catalysis and Chemical Reaction Engineering, National Institute of Chemistry (NIC), Ljubljana (<u>http://www.ki.si</u>, E-mail: <u>stanko.hocevar@ki.si</u>).

Degrees: B.Sc., 1974, Chemistry (Physical Chemistry), Ph.D., 1984, Chemistry, Faculty of Science and Technology, University of Ljubljana.

Employment: 1975-1993 NIC Ljubljana, 1993-1995 Institute CNR-TAE, Messina, Italy, 1995- NIC Ljubljana.

International grants: KLEMENT GmbH, Graz, Austria (1988), Kinetics Technologies, Inc., Rome, Italy (1994), ENEA, Rome, Italy (1995), RENAULT, Guyancourt, France (2001-2005), EU FP5 No. ENK5-CT-2001-00572 (2001-2005), EU FP6 NMP3-CT-2006-033228 (2006-2009), etc. Slovenian grants: SRA (P2-2232-104 (1992-1994), J2-7500-104 (1996-1998), J2-7500-104 (1999-2001), 97022 (1997-1999), 99028 (1999-2000), 2001-16 (2001-2002), 2011-38 (2012-2013)), SI MoD (631-48/2007-78 (2007-2010), 4300-434/2010-1 (2010-2012)).

WoS: 44 papers, 1700 citations, 4 chapters in books, 5 patents. Supervisor of several PhD, MSc and BSc students. Peer reviwer of papers in international journals and project applications for foreign agencies (NSF/USA, FP6/EU, FP7/EU, EUROSTARS, CIVR/Italy). Expert at ICS-UNIDO Centre, Trieste, Italy.

Elected member of SATENA, member of the Slovenian Chemical Society (SCS), American Chemical Society (ACS), International Union of Pure and Applied Chemistry (IUPAC).

#### Dr. Robert Dominko, Li2 d.o.o. (spin-out of National Institute of Chemistry)

Li2 d.o.o. is a company focused on research and development of materials for Li-ion batteries and post lithium battery technologies. Our mission is commercialization of materials and components for batteries that have been discovered by researchers working on the laboratory level. Commercially viable materials are studied in terms of their implementation into prototypes. We perform studies of scale up and optimization of the production capabilities of battery components together with full characterization of materials and devices.

Due to our long term expertise in batteries we have a full understanding of their behavior, performance and degradation processes. We can help customers design and customize their individual needs for energy storage in battery packs. Based on our experiences, knowledge and connections we are offering the possibility to select and to purchase batteries with different cells chemistries from different companies, we can test their behavior to verify producer data (lifetime and rate capability) and we have knowledge to provide a full solution for the end user.

Dr. Robert Dominko, CEO of Li2 d.o.o., has more than 15 years of experiences in battery research and development. He has obtained his PhD thesis at University of Ljubljana in 2002 with a title "Tailoring of composites for Li-ion batteries". Since then he has been continuously active in research and development of various battery materials and their characterization. Before starting his postgraduate study he had been a product engineer in TKI Hrastnik. His professional orientations are the research on solid-state electrochemistry of battery composites, research and development of new active materials for lithium-ion batteries and development of new characterization techniques for lithium ion batteries, including engineering and optimization of end user products in the field of energy storage. For his work he obtained two national awards: the Pregl award in 2012 for achievements in the field of chemistry and the Jozef Stefan golden emblem prize in 2004 for his outstanding PhD thesis. On the academic level, his activities have included the supervision of several PhD students working on batteries; some of the students were part of the Erasmus Mundus master study: Materials for energy storage and conversion. He has been a project leader of two small size national and two international projects. In 2011 he successfully built a consortium for a FP7 project within the initiative for Public Private Partnership. After successful application, he became the coordinator of the project EUROLIS the goal of which is to develop a prototype lithium sulphur rechargeable battery. He is also the leader of an international group (consisting of 8 European laboratories) working on the cathode materials for Li-ion batteries in the virtual European laboratory ALISTORE-ERI. In 2011 he became a CEO of Li2 d.o.o. His primary activities within the company are commercialization of materials and technologies developed within the Laboratory for materials electrochemistry at the National Institute of Chemistry, Ljubljana.

## Doc. dr. Gregor Veble, R&D, Head of Research at Pipistrel, d.o.o. and University of Nova Gorica

#### Aircraft design - creativity through constraint

Aircraft design is a thoroughly multidisciplinary endeavour, requiring input from a broad area of engineering disciplines such as aerodynamics, structural engineering, controls and electrical systems. It is only through careful balancing of requirements and constraints from each of these fields that successful designs can be born. While specialist knowledge is a prerequisite, it is the intangibles of group dynamics that make a team gel, such as strong team focus, mutual respect between experts, critical evaluation of all ideas (including one's own), and the ability to accept solutions that compromise a certain aspect of a design while enhancing another one.

Any new design will also need to balance the use of well tried approaches versus ideas that may come from basic research and that promise large gains but that were never really properly tested. On both sides of this divide, there are aircraft design projects that were simply too similar to previous ones to be successful in the market, as well as exciting new developments that reached only the prototype phase, if that at all. A blend of both approaches is needed to make a product a success, and it is through careful risk balancing that a team can choose the proper direction.

The design process is therefore limited by a number of constraints, which can be either technical, but also competition driven, marketing and financial ones. However, the more the design space is squeezed by such constraints, the better the creative engineers seem to become at finding ingenious solutions to proposed problems. Breakthrough in design often occurs when there is simply nowhere else to evolve, at least not in an incremental way.

**Doc. dr. Gregor Veble** is Head of research at Pipistrel d.o.o. Ajdovščina, Head of Pipistrel Design Center, and assistant professor (docent) for the field of physics at the University of Nova Gorica. He obtained his diploma 1997 and his doctorate in 2001, both in the field of physics at Faculty of Mathematics and Physics, University of Ljubljana. His activities comprise aerodynamic design and research in aerodynamics and nonlinear dynamics. In 2009 he received the state Puh award for important achievements in development. He performed sizing studies and aerodynamic design for the Pipistrel Taurus G4 aircraft, the winner of the 20011 NASA Green Flight Challenge sponsored by Google competition for the world's most efficient aircraft, as well as design of aerodynamic surfaces for the Panthera aircraft.

#### Štefan Pavlinjek, Roto, d.o.o.

ROTO is the Slovenian manufacturer of plastic products with 35 years of tradition. These products are result of own knowledge of engineers and cooperation with institutes and detailed work of over 200 employees.

ROTO is a private company with residence in Murska Sobota, who also has subsidiary manufacturing companies in Croatia, Serbia, Bosnia and Macedonia. The company is certified according to ISO 9001 and ISO 1400. Roto has its own production, R&D, sales logistic and after sales service.

ROTO has received numerous international awards such as »Award for outstanding business achievements in the SCC (GZS)«, Eco partnership, Symbol of hospitality, Quality price in construction, ect...

Source: <a href="http://www.roto.si/en/company/predstavitev\_3">http://www.roto.si/en/company/predstavitev\_3</a>

#### Marko Kobal & Martina Murovec, Arctur, d.o.o.

Arctur is a leading service provider in the field of supercomputing in South Eastern Europe. HPC ondemand, system administration services, code optimization and parallelization are offered through the XaaS (Everything as a Service) model which provides our customers with substantial savings compared to purchasing and maintaining their own equipment. Our advanced IT solutions (4PM, ADS) have become indispensable tools for numerous companies and institutions.

High level of investment in research and development, exemplar cooperation with academic and scientific institutions and excellent network of international partners enables us to pursue our strategy, which continuous expansion into more complex computing environments and new global IT markets.

Source: <a href="http://www.arctur.si/arctur\_eng/about\_us/">http://www.arctur.si/arctur\_eng/about\_us/</a>
Marko Kobal. Svojo študijsko in kasneje profesionalno pot sem začel kot programer in razvijalec programskih rešitev s poglobljenim razumevanjem objektnega razvoja in agilnih metodologij. Nadaljeval sem kot analitik in vodja razvoja ter ob tem poglobljeno raziskoval sodobne agilne vidike projektnega vodenja, kar smo z razvojno ekipo v podjetju Arctur d.o.o. udejanili v sodobni spletni programski rešitvi za ravnateljevanje projektov, imenovani 4PM (www.4pm.si) – iz tega področja sem tudi diplomiral. Leta 2006 sem prevzel vlogo tehničnega direktorja. Poskrbel sem za pionirsko uvajanje virtualizacija strežniških sistemov (in kasneje računalništva v oblaku) ter skrbel za razvoj fleksibilne, programabilne ter varne IT infrastrukture, ki je omogočala rast in razvoj sistemov (strojih in programskih), ki so nastajali v podjetju Arctur d.o.o.. Od leta 2009 naprej v podjetju Arctur d.o.o. vodim raziskave in razvoj na področju zelo zmogljivega računalništva (angl. High-Performance Computing). Leta 2010 sem načrtoval in vodil implementacijo superračunalnika zmogljivosti 10 Tflops, ki je v obdobju zagona spadal med najzmogljivejše superračunalnike v širši regiji. Trenutno se posvečam doktorskem študiju, kjer raziskujem možnosti paralelnih algoritmov za procesiranje naravnih besedil z uporabo sodobnih, visoko produktivnih paralelnih programskih jezikov, predvsem X10. V prostem času svojega raziskovalnega dela pa raziskujem možnosti uvedbe polne virtualizacije tudi v HPC sisteme, ki bi ob ohranjanju visokih zmogljivosti lahko prinesla tudi odpornost na napake v infrastrukturi ter hitrejše in bolj dinamično prilagajanje HPC infrastrukture uporabniškim potrebam.

## WORKSHOP: TT & Spinoff creation

#### Presentation of real cases in front of VCs and TTOs.

The project teams - authors of the inventive/innovative technologies - present their cases in front of the evaluation commission. Each of the presenters has exactly 8 minutes for the pitch presentation and 12 minutes for responding to the questions of the commission members.

Every case has been pre-assessed by the members of the commission on the basis of predetermined assessment criteria. The criteria for the assessment of the technologies are presented in table 1.

Criteria lots	Criterions
1. Overall	Degree to which project aligns with market need
	Project's IPR situation
2. Product/application advantage	Unique benefits
	Meets customer needs better
	Value for money
3. Market attractiveness	Market size
	Market growth
	Favorable trends
4. Competitive situation	Degree of entry barriers
	Level of
	Manufacturing / processing synergies
5. Technology maturity	Technical gap
	Complexity
	Technical uncertainty
6. Risk versus return	Expected profitability (e.g. NPV)
	Return (e.g. IRR)
	Payback period
	Certainty of return / profit estimates
	Low cost & fast to do

Table 1: Assessment criteria for the evaluation of technology.\* Source: Jon Wulff Petersen, TTO A/S, Denmark

## IMPORTANT NOTICE: All information disclosed during the workshop in section 3.2 (part 1) are considered as confidential! This part of the conference is considered a not public event.

#### The members of the evaluation commission are:

Dr. Anders Haugland, Bergen Teknologioverføring Andrea Caddeo, ZernikeMeta Ventures Blaž Kos, corporate advisor at the Technology Park Ljubljana Laszlo Czirjak, iEurope Kft. Max Maupoix, Swerea IVF Rok Habinc, S.T. Hammer d.o.o. Uroš Glavan, Murka d.d.

**Anders Haugland** is managing director –at Technology Transfer Office Bergen and president of Association of European Science & Technology professionals (ASTP). He has a doctorate in applied refrigeration technology from the Norwegian Institute of Science and Technology (NTNU) and more than ten years of experience as researcher from NTNU and SINTEF.

**Caddeo Andrea** has a background in Economics, with specialization in international markets and new technologies. During his career he gained experience in financial markets, with particular reference to risk capital for companies in start up and expansion phases, working firstly as market analyst at AIFI – the Italian Private Equity and Venture Capital Association, and thereafter for ZernikeMeta Ventures S.p.A (an investment company), for which he is responsible for evaluating investment projects

**Blaž Kos** performs the function of corporate advisor at the Technology Park Ljubljana, RC IKT, the head of club Business angels of Slovenia and author of the content of professional web blog www.BlazKos.com.

He started to gain his enterprise knowledge at the age of 19 in the context of his two companies, Mojrefill (renewable supplies for printers) and Core Solutions (design, web production and online marketing) and before that in the context of different societies and clubs. Since then he is dealing with business activities, examining the laws that need to be considered in the business path and encourages individuals to embark on business path. In last years he is focusing mainly on companies with equity funding sources.

So far has organized numerous events, lectured and took part on the various business conferences at home and abroad (more than 300 events), advised more than fifty corporate groups and reviewed hundreds of business plans.

Important and successful projects that were designed and conducted in the context of Ljubljana University Incubator, where he worked for 3 years, are the Evening for innovative and entrepreneurial, SKIP conference, business breakfasts and several other projects that were important in the development of the Slovenian business environment.

Blaž Kos has also participated as head of development group for the business environment in the Slovenian Government Office for the development, as marketing manager for a project Economic challenge, the President of the Alumni Club of the Gymnasium Bežigrad. He is also an author of articles for various magazines, such as Element, MojeDelo, Podjetnik itn. Blaž Kos is a member of various business associations and commissions. He is also writing one of the most popular business blogs in Slovenia.

Laszlo Czirjak (Founder and Managing Partner) has resided in Hungary since 1992, and was born and educated in the U.S. His private equity, investment banking and operational experience spans ecommerce, Internet, automotive and transport, financial services, consumer and retail, energy and power, health care, manufacturing, technology, business services, media and telecom. Prior to founding iEurope, he was a Managing Director at Bankers Trust Company/BT Alex Brown in London, where he built the regional investment banking business in six countries in Southern Central and Eastern Europe from 1991-1998. He led over 20 major M&A and restructuring assignments involving over \$1.5 billion and 24 significant debt and equity financings totaling over \$3.2 billion. He advised on, sourced and executed various private equity transactions. He was CEO of Bankers Trust Rt. (Hungary). Earlier in his career in New York, Mr. Czirjak served as a Director at the Bridgeford Group and at IBJ Schroder Bank, US investment banking subsidiaries of the Industrial Bank of Japan. He has held positions at Goldman Sachs (in M&A and Project Finance) and in operations management at Chemical Bank. Mr. Czirjak served on the boards (or other similar governing bodies) of each of iEurope fund's portfolio companies including ATech, Vatera and others. He is a former member of the Board of Directors, and Chairman of the Board's Audit Committee, of MOL Rt., the Hungarian Oil and Gas Company that is publicly traded on several European exchanges. He also currently sits on the local CEE advisory committees of AES Hungary (AES Corporation is among the Fortune 500) and Euro-Phoenix Financial Advisors, both in non-executive roles. He is a former President of the American Chamber of Commerce in Hungary and is still active as Chairman of its Corporate Governance, Business Integrity and Entrepreneurship Committee, where he co-authored a position paper titled "Good Corporate Governance in Hungary" and a Hungarian English Glossary on relevant terminology. Mr. Czirjak is currently Chairman of the Board of United Way Resource Foundation in Hungary. He received a MBA and BS in Industrial Engineering, both with honors, from Columbia University in New York.

**Max Maupoix** is project manager technology transfer & EU cooperation at Swerea IVF. In the past he was a Coordinator west and south Sweden at Innovation Relay Centres Network, Field Implementing Officer at UN Capital Development Fund (UNCDF), Scientific Affairs Officer at UN Centre for Science and Technology (UNCSTD), Group leader at Plastic Unit at IVF- Swedish Institute of Production and Engineering Research.

**Rok Habinc** leads the venture capital fund STH Ventures, DTK. The fund invests assets in a fast growing companies with ambitious management team and great potential. Target companies of the fund are situated in Slovenia or in the region of SE Europe and are developing a product or service with global reach. With their product or service are contributing to ecological sustainability or reducing the pressure on the environment - global or local.

Mr. Habinc is a co-owner / partner in an investment group, S.T. Hammer, who has investments in various industries and funds in Slovenia, southeast Europe and the world. Since 2003 he leads the company Strenia IND, the producer of machines for mineral processing and large welded parts for the construction of building machines. He previously worked in the group Aktiva Group, where he managed projects of purchases and sales of companies in financial services, packaging, telecommunications and information technologies. He also participated in establishing the Aktiva Ventures, one of the first venture capital funds in Slovenia, and participated in this fund as an investment manager.

Mr. Habinc was or is still a member of the supervisory and management boards in a number of companies and funds in Slovenia, Bosnia and Herzegovina and Montenegro.

Rok Habinc graduated from the Faculty of Electrical Engineering and Computer Science, in the University of Ljubljana and earned a masters degree at Goizueta Business School at Emory University in Atlanta, USA. In 2004 he obtained the title CFA (Chartered Financial Analyst).

**Uroš Glavan** began his career in the company Poteza BPD d.d., continued in NLB d.d., where he as director of in investment banking and earned numerous experiences in the field of securities as well as the area of corporate finances, headed the company CEEREF Man. Co., Luxemburg, which managed the real estate fund in CEE region and is currently employed as an investment manager in the company UD d.o.o., which operates DTK Murka d.o.o., the risk capital fund. Within management company his scope of working is control and strategic management of venture capital investment. His knowledge and experience has deepened in many supervisory boards of big companies as Kapitalska družba d.d., Krona Senior d.d. Etc.

## Workshop on project preparation (impact, market need, finances) JOINT RR-INDUSTRY PROJECT PREPARATION (WS)

Stephen Taylor, Director of Technology Transfer, Consorzio per l'Area di Ricerca, AREA Science Park, TRIESTE – ITALY: Bridging the Gap between Research and Industry – The Innovation Management System of Area Science Park

Financing innovation projects isn't always enough to develop competitiveness. If you want to jumpstart an innovative road map for skills and technology transfer, with particular emphasis on smallmedium sized enterprises (SMEs) you need a tried and tested comprehensive Innovation Management System.

With 30 years of experience, AREA SCIENCE PARK, the main Italian scientific and technological park, has developed a set of distinctive skills and strategies which have also been transferred and adapted to other local contexts. This experience is used in a unique and tangible way to support business and researchers throughout the value chain to get an idea into the marketplace.

Stephen Taylor will present Area' Innovation Management system, the fruit of 15 years of continuous development and improvement. We work with many partners to enhance local research results, enable innovation projects in SMEs and support the establishment of new companies.

AREA Science Park offers a completely integrated approach to services for business development and research institutions, based on AREA's unique competencies - which constitute the core of the innovation management system.

This approach was first employed in Friuli Venezia Giulia and due to its success was then implemented in other regions. It has been recognized as a European best practice and now we are transferring and adapting it to other regional contexts.

### **Profile: Stephen Taylor**

I have over twenty years of experience, most of it as a Director or Senior Consultant, helping major firms and government agencies in Europe and North America to access the latest knowledge and expertise for analysis and planning for new business, market research, new product development, and technology commercialization. Since the beginning of 2009 I have been working with the Technology Transfer Department of Area Science Park, Trieste, Italy. My initial role was to work on strategies to optimize the activities of the department. I took over as Director of the department from September 2009. In addition to my role as Director of Technology Transfer I am also CEO of our Incubator, Innovation Factory.

I have operated in a variety of roles, all with one thing in common, the need to be an effective and persuasive communicator. I have demonstrated my ability to communicate at all levels and to achieve results, having been responsible for developing new business concepts, outlining strategies to exploit these ideas and then implementing them.

I have negotiated sales, joint ventures and partnership agreements with other organisations, both public and private, to further the strategic objectives of the organisations I have represented. I have motivated and managed teams of individuals ranging from new recruits and trainees to Chief Executives and Managing Directors of joint venture partnering companies.

I have helped companies assimilate new technology developments and translate them into business opportunities, working with key players in the following sectors: energy, aerospace and defense, information technology, telecommunications (fixed and mobile), automobiles, electronics, engineering, chemicals, and pharmaceuticals. I have been active in joint-venture negotiations, industry and competition monitoring and analysis, business and new-product-opportunity evaluation, technology and economic analysis, and forecasting.

As well as extensive face-to-face closure of key account sales, I have also successfully negotiated noncash deals with other organisations to achieve mutually beneficial partnerships. I have travelled extensively, doing business in over a dozen European countries as well as living and working in the USA prior to relocating in Italy.

### **Current role of Stephen Taylor**

Director of Technology Tansfer Department, Dirigente Servizio Trasferimento Tecnologico (STT) -Consorzio per l'Area di Ricerca (AREA), Trieste, Italy.

As Director of the department, reporting directly to the Director General and the President of AREA, I have overall responsibility for optimizing the strategic activities of the Technology Transfer Department (STT) and for meeting our objectives.

AREA, as well as supporting regional companies, is developing the capacity for strategic and operational management, including technology transfer, technology foresight, forecasting, planning, organization, command, coordination, evaluation, control, diffusion and team building activities, as well as, more generally, all support activities for the development of research and training.

AREA specializes in the transfer of the results of technological research and in various correlated activities: technological scenarios, competence databases, market analysis, patent research, business analysis, building collaboration networks between the scientific and entrepreneurial worlds, assistance with public financing, etc.

Technology transfer and innovation diffusion activities help strengthen the competitive potential of companies located in the regional area and create a connection - now stable - between the research world and the entrepreneurial system, through enhancing research results, promoting company development activities, and supporting the creation of new high-tech companies.

In addition to my Role as Director of Technology Transfer I am also CEO of our Incubator, Innovation Factory. Innovation Factory is a "first mile" incubator, which welcomes future entrepreneurs interested in creating their own business plan, and cooperates with them to transform an innovative idea into a successful business. Following an initial selection process, Innovation Factory offers space and services to support the initial, delicate phase of technological, commercial, legal and economic definition and verification of the business idea. The incubator's activities are aimed at creating and developing the new business.

## Primož Kunaver MBA: »Opportunities for Financing Technology Transfer Activities and Cooperation between Enterprises and Public Research Organisations«

Process of technology transfer is fueled by financial sources. Regretfully many perspective opportunities fail to realize their potential only because of lack of knowledge and skills related to obtaining needed financing.

Needs for financial sources are in general split in needs related to the finalization of technological development and needs related to the marketing and development of business model. On top of that additional resources are in most cases needed for financing protection of intellectual property. If financial resources are not sufficient or not available fast enough, than the whole project usually fails to succeed no matter how technological perspective it might be. The dynamics of spending of financial resources has its general rules where careful timing of availability of financial resources can be critical.

Each of the main areas of technology transfer (contractual research, collaborative research, licensing, establishing spin-off companies) has its own specifics related to the process of obtaining financial resources needed for fueling the process. However, in general we can divide the financial sources in the three main groups: shareholders investments, refundable (loan) sources and non-refundable (grant) sources. Each of these groups has several variations and specialities of financial sources that are directly linked to the innovation area and start-up enterprises – such as business angels, venture capital funds, crowd funding etc.

Especially attractive for technology transfer project financing are non-refundable funds for cofinancing of research and development projects. In 2014 will new Horizons 2020 programme replace existing 7th Framework Programme; it will be the first programme of this kind that will also fully integrate area of innovation. What will be key novelties of the Horizon 2020? What are the key factors (apart from research and development excellence) to succeed in the Programmes of the EU? Which are currently open opportunities for funding? Mentioned questions will be addressed in the course of presentation. **Primož Kunaver MBA** works as an expert for technology transfer, financing of R&D projects and business consulting. He started his professional career as designer of sailing boats at the company Seaway, later worked in marketing at the company AM-BUS and worked as project manager in the company ITEO Management Consulting. Currently he runs his own consulting company Primum d.o.o. and is permanently involved in the technology transfer activities of the CTT - Center for Technology Transfer and Innovation at the Jožef Stefan Institute.

From 2000 – 2012 he has participated in more than 130 consulting or R&D projects. In the last 12 years he has participated in preparation of more than 50 national or EU R&D or related project proposals. He has developed several technological solutions in the area of aerodynamics with three granted national patents on his name. Mr. Kunaver is author or co-author of several professional articles or publications. He has been member of the selection boards of various national and EU innovation related contests and evaluator of R&D projects.

## Round table on "How to foster R&D project applications in Slovenian academy, public sector and industry."

#### Moderator: mag. Alenka Mubi Zalaznik, TIA

Representatives of the Slovenian government, ministries and government finance (Representatives from Ministry for economic development and technology (2), Ministry of finance (Treasury/Zakladnica), TIA, Ministry of infrastructure and spatial planning (Objective 3 Unit).

The speakers will talk about fostering cooperation of research, industry and public organizations' involvement in EU programs and other initiatives. Namely, several options for cooperation or networking are available and should be more exploited and even enhanced in the future.

#### Speakers:

Dr. Aleš Mihelič, Ministry of Economic Development and Technology Mag. Marta Šabec, NCP for Health, Ministry of Education, Science, Culture and Sport Mag. Andreja Jerina, Ministry of Foreign Affairs Mag. Tomaž Vidonja, OPCOMM

Mag. Mateja Dermastia, CO POLIMAT

#### **Biography of the speakers**

**Mag. Andreja Jerina.** Svojo poslovno pot je začela na nacionalnem raziskovalnem institutu in več let delovala na področju raziskav v biokemiji. Svojo dejavnost je nato usmerila predvsem v zagotavljanje pomoči podjetjem, sprva na področju varstva okolja, od leta 1996 pa na področju delovanja EU ter možnosti, ki jih evropsko združevanje prinaša podjetjem. V tem obdobju je v okviru Gospodarske zbornice Slovenije vodila EU oddelek in vzpostavila podjetjem namenjeno informacijsko podporno mrežo, ki je zagotavljala podjetjem prilagojene sprotne informacije o poteku vključevanja v EU ter podporno okolje predvsem v zvezi s pogoji delovanja v okviru notranjega trga EU in možnosti različnih virov financiranja iz evropskega proračuna. Celotno pristopno obdobje je v okviru Vlade RS vodila nacionalno koordinacijo EU pomoči. Po zaključku pogajanj za vstop v EU je 2003 postala državna sekretarka v Službi Vlade RS strukturno politiko, kjer je bila zadolžena predvsem za področje evropske kohezijske politike. Od leta 2005 do konca leta 2008 je bila vrhovna državna revizorka Računskega sodišča Republike Slovenije, zadolžena za vzpostavitev sistema revidiranja evropskih sredstev in sredstev mednarodnih fondov in organizacij.

Od leta 2008 do začetka 2012 je bila državna sekretarka za razvoj in evropske zadeve. Trenutno opravlja naloge nacionalne koordinatorke evropskih makro regionalnih strategij v Ministrstvu za zunanje zadeve.

**Tomaž Vidonja** works as a business development and marketing director at ICT Technology Network Institute, a national ICT triple helix cluster in Ljubljana, Slovenia. He's in charge of Internet of Things Competence Center »OpComm« as a chief executive officer. He manages business and market oriented consortium which consists of hi-tech companies and public research organizations. It's a great challenge and also a motivation to develop the Living bits and things community to a globally recognized IoT brand for Smart Living networking in Central and South East European countries.

After graduation in Electrical Engineering (1995) on Faculty of Electrical Engineering & Computer Sciencies, University of Ljubljana, he joined the communication equipment manufacturer Iskratel as a hardware engineer. In 2006 he received his M.Sc. degree from Faculty of Economics, University of Ljubljana, specializing in information management and marketing. In years 2007 to 2010 he visited the executive education program in marketing and sales at Kellogg School of Management, Northwestern University, Evanston, II.,USA.

From 2000 he was in charge of system group at Iskratel and he moved to product management group in 2003. He established product marketing department in Iskratel and run it till 2010. He ran few public and private funded research & development project consortia and was in charge of product innovation committee in Iskratel. In 2009 he established and was a CEO at Inoverzum, a company for innovation management.

**Ms Mateja Dermastia** has 20 years experience in the areas of innovation, competiveness policy and strategy, and management in leading public and private institutions. She has served in various capacities including state undersecretary in the Slovenian government and senior advisor to the

Turkish government for clustering policy. Ms Dermastia has also served on various international committees and groups on competitiveness, clustering and innovation policies. She is recognized for her extensive advice to governments in developed and developing countries. She also helped build teams of experts and provide managerial guidance on issues related to industrial development and innovation. Beyond this experience Ms Dermastia's profile embodies the triple helix concept with first-hand experience in government, industry and academia. A long time associate to The Competitiveness Institute, she has worked on international assignments for the EU, the World Bank, the OECD and COMESA. Originally trained in biochemistry, Ms. Dermastia has a Masters in Economic Science and obtained executive education at the Harvard Kennedy School.

**Dr. Aleš Mihelič** je končal študij strojništva na Fakulteti za strojništvo Univerze v Ljubljani. V letih od 1988 do 1995 je delal kot raziskovalec pri optimizaciji konstrukcij in procesov preoblikovanja na isti fakulteti. Leta 1996 je končal doktorski študij in pridobil naziv doktorja znanosti s področja strojništva na Fakulteti za strojništvo Univerze v Ljubljani. Po študiju se je zaposlil kot razvojnik v podjetju za gradnjo avtobusov Avtomontaža. V podjetju je opravljal numerične analize avtobusnih konstrukcij in analiz trkov ter v podjetje vpeljal koncept optimiziranja konstrukcij. Od leta 1996 je na različnih ministrstvih, pristojnih za tehnologijo, delal kot vodja sektorja za tehnologijo in inovacije ter nekaj časa tudi kot generalni direktor za tehnologijo za tehnološko razvojno in inovacijsko politiko ter za izvajanje ukrepov in mehanizmov za implementacijo te politike. Ves čas je dejaven pri aktivnostih znanstveno-tehnološkega sodelovanja, in sicer: pri okvirnih programih EU, Eureke, Evropske vesoljske agencije, OECD in pri dvostranskih sporazumih. V preteklosti je bil član IPEG – Innovation Policy Expert Group Evropske komisije, upravnega odbora Skupnih razvojnih centrov Evropske komisije, član zrcalnih odborov EU tehnoloških platform itd. V letu 2007/2008 je vodil pobudo Eureka in bil vključen v aktivnosti slovenskega predsedovanja Svetu EU.

#### Mag. Marta Šabec

Mag. Marta Šabec je končala študij agronomije na Biotehiški fakulteti, leta 2001 pa magistrski študij mikrobiologije na Medicinski fakulteti v Ljubljani. V letih1997-2002 je kot asistentka specialistka za bakterijske bolezni rastlin delala na Kmetijskem Inštitutu Slovenije. Leta 2005 se je zaposlila na Ministrstvu za visoko šolstvo, znanost in tehnologijo, kjer je v glavnem delala na evropskih ERA-NET projektih s področja prehrane, kmetijstva, gozdarstva, biotehnologije in znanosti o življenju in na s tem povezanih nalogah ministrstva. Od jeseni 2011 je Nacionalna kontaktna oseba za področje ved o življenju.

#### Mag. Alenka Mubi Zalaznik

Her expertise are in the field of innovation and EU policy and funding programmes. She has covered these topics at Chamber of Commerce and Industry (2003 – 2006), Ljubljana University incubator (2006 – 2007), her current position is at Slovene Technology agency where she is head of unit (international programs). Originally a historian, she has a masters in EU policy analysis.

50 Round table on "How to foster R&D project applications in Slovenian academy, public sector and industry." | 5ITTC, September 26th – 27th 2012

### **POSTER SECTION AND ABSTRACTS**

The poster section of the 5th International technology transfer conference is designed to inventive and innovative projects, which with their applicable value are interesting and useful to the economy. The publication consists of a poster and an abstract with the description of the proposed technology. **The aim is to promote inventive/innovative technologies to the industry, academia and public sector for further development and industrial exploitation.** One of the aims is to promote inventiveness/innovation from the public research organizations (PROs) to be transferred into economy, primarily through the marketing of the technology, products and services in the form of "spin out" companies or licensing. If the technologies are not ready for immediate commercialization, other preferred collaboration is proposed. The abstracts of the presented technologies answer the following questions:

Where (geographically) the technology is from?

What sort of public research organization is offering it (research institute, university, other)?

What is being offered and what can it be used for?

What are the main advantages?

What sort of deal is sought?

**Description of the technologies** consist of proposed innovation and the potential application of the technology; the innovative aspects of the technology and main economic advantages regarding such elements as performance, ease of use, need of specific know-how, or expertise to adopt the technology.

**Current stage of development** defines the readiness level of the technology for further development and commercialization. The collaboration type describes the preferred way of partnership for further exploitation.

The current **IPR status** is defined in the Intellectual properties rights section.

All the technologies described in proceedings are developed at the PROs, where the authors are employed; the PRO is at least co-owner or holder of the substantive rights from the applicable ideas, know-how, or intellectual property rights which are presented in proceedings and at the poster section of the Conference.

The presented technologies are from the following areas:

Nanotechnology, New materials, Biotechnology, Management technology and production, Communication technology, Computer technology and technology skills, Environmental technology, Reactor technology.

## Bioactive coatings: helping to integrate implants with bone

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TECHNOLOGY KEYWORDS: Industrial Manufacture, Coatings, Medicine, Human Health, Care and Health Services, Clinical Research, Trials, Dentistry / Dentology, Stomatology, Diseases Environmental Medicine, Social Medicine, Sports Medicine, Medical Research Medical Technology / Biomedical Engineering, Medical Biomaterials.

#### **TECHNOLOGY DESCRIPTION**

Abstract: Slovenian research institute has developed a process for coating titanium or any titaniumbased alloy bone implants with a protective and bioactive coating that can be also produced in a form with antibacterial properties. The powder itself has high specific surface area and is therefore highly soluble in liquid media. The coating is useful especially for dental implants. The institute is looking for industrial partners interested in further development and license agreement.

Description: A group of Slovenian researchers has developed a new bioactive and antibacterial coating for dental implants. The low-temperature process for coating of titanium or titanium-based alloy with the coating is simple and can be performed in a single step. The formed crystalline oxide coating is strongly attached to the substrate, provides more favorable surface properties to the implant than the state-of-art as it is hydrophilic, promotes hydroxyapatite formation and cell attachment and it hinders release of alloying metal ions into the surrounding tissue. In addition, it may acquire antibacterial effect.

The coating can be used for any kind of Ti or Ti alloy implants, especially for dental implants to stimulate bone ingrowth and to improve implants' longer-term behavior.

Innovations and advantages of the offer: The problems and deficiencies of implants that are currently in use are:

Metals and therefore metal implants have hydrophobic surface which is not favorable for cells attached, in particular in the case of the rough or porous surface

- Metal ions are leaching from the implant into the body
- Titanium metal and Ti-alloys are not bioactive

The advantages of the offered new bioactive multifunctional coating material are:

- Coated metal implants are hydrophilic, thus providing more favorable surface for cells
- Its bioactive properties accelerate bone formation
- Leaching of harmful metal ions is reduced

Antibacterial properties lower the probability of infection

#### Current Stage of Development: Development Phase - Laboratory tested

Exploitation of RTD results: EU RTD results (FP6)

Intellectual Property Rights: Secret know-how

Type of organization: Research institute

**Collaboration Type:** License agreement, Technical cooperation (Joint further development, Testing of new applications, Adaptation to specific needs)

Type of partner sought: industry

Specific area of activity of the partner: Partners from dental and coating industry

Task to be performed of the partner sought: industrial partners interested in further development and license agreement.

#### **CONTACT DETAILS:**

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## Smart kitchen scale for people with special nutritional needs

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**TECHNOLOGY KEYWORDS:** Internet Technologies / Communication (Wireless, Wi-Fi, Bluetooth), Smart Appliances, Applications for Health

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** The technology has been developed in Slovenia, at the Jožef Stefan Institute (a public research organization). It is aimed to develop a lite, pocket-sized, wireless kitchen scale that is used for informing people with special nutritional needs. The main advantage of the technology is that it enables portability, lightness, simplicity and economic price of the scale. We have developed a prototype in a form of a smartphone and are looking for an investment support to bring the scale to the market.

**Description:** The technology enables simple and economically-priced wireless connection of a kitchen scale with a mobile phone, a tablet or a personal computer. In this way, the scale can be a lite, pocket-sized, device that is used in a connection with a mobile phone. A user can carry the scale out of home and use it as a reliable source of food composition data (FCD). The complementary mobile/web application provides complex FCD as well as tools for individual recipe calculation, barcode recognition etc. FCD are not limited to nutrients but may be also other constituents, like toxins, E-numbers etc.

Such a portable kitchen scale is aimed for people with special nutritional needs, i.e., chronic patients, people with food allergies or intolerances, as well as athletes, and pregnant and lactating women. It can be used not only by an individual but also by hospitals and elderly homes, where patients need nutritional treatment.

The proposers are senior researchers from the field of ICT. However, they lack of expertise in design and marketing.

**Innovations and advantages of the offer:** The technology for wireless connection of the Smart kitchen scale with a mobile phone, a tablet or a personal computer is inventive. We developed, designed and constructed a small communication module to fit into any kitchen scale and make it wireless, while still being economically priced. We have prepared a patent documentation.

Similar kitchen scales already exist, however, they lack of the features the Smart scale provides: i.e., they are non-portable, do not enable weighing of realistic food portions, or/and do not provide up-to-date food composition data (FCD). We are proposing a scale that provides FCD not only for a fixed set of food items, but also for any dish with known recipe. A user can select data he is interested in and adapt the system to his personal needs. Beside nutrient values, FCD may include also other constituents (e.g., toxins, E-numbers etc.). The scale can have a form of a smart phone, a plate, or

even a wristband. These features are enabled by the proposed inventive technology for simple and economically-priced wireless connection with a mobile phone, a tablet or a personal computer.

**Technical Details:** The Smart scale is implemented as a lite portable device that is used for weighing the food portion. Using a wireless connection with a mobile phone, a tablet or a personal computer, composition of the weighed portion is recorded on the phone's display. While the scale is a simple device, a mobile application is very complex and may easily adapt to new FCD. Moreover, it can provide features like recognition of the food product's barcode, recipe calculation etc. The application is based on the Open platform for clinical nutrition (OPEN; http://opkp.si), which supports nutritional care of pediatric and oncology patients we have developed and tested in the clinical practice. It is a reliable source of food composition data that supports data exchange with worldwide information centers using web services. The OPEN has been recognized by the European association EuroFIR and the European thematic network Diets that connect experts from the fields of food chemistry and medicine, respectively.

We have developed a scale prototype in a form of a smartphone and tested it a laboratory. However, the technology needs to be improved to guarantee robustness of the scale (i.e., to guarantee working under special conditions, such as falls, high temperatures, pouring, vibrations etc.).

Current Stage of Development: Development Phase – Laboratory tested

Exploitation of RTD results: Private Research

Intellectual Property Rights: Patent(s) applied but not yet granted

Type of organization: Research institute

Collaboration Type: Licence agreement, Joint venture agreement

Type of partner sought: Health-care institutions (hospitals, clinics, elderly-care institutions).

Specific area of activity of the partner: Hospitals, elderly-care institutions, sport nutrition experts for field testing the device and application and providing end user feedback.

Task to be performed of the partner sought: Hospitals, elderly-care institutions, sport nutrition experts for field testing the device and application and providing end user feedback.

#### **CONTACT DETAILS:**

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## Pressure measurements in evacuated sealed devices as a lifetime assessment tool

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**TECHNOLOGY KEYWORDS:** Jointing (soldering, welding, sticking), Vacuum / High Vacuum Technology, Thermal insulation, Energy Efficiency in Buildings, Physics of Fluids, Sensors / Multisensor Technology, Instrumentation, Other Non Destructive Testing, Thermal Material Testing

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** Vacuum laboratory (dept. of Surface Engineering and Optoelectronics) from Jožef Stefan Institute (R&D org.), Slovenia, EU is offering its expertise in low-pressure and outgassing related measurements and the related know-how. These skills and knowledge are absolutely necessary during R&D phase and quality control of any evacuated sealed device with a long life-time such as vacuum insulation panels, cathode ray tubes, vacuum glazing etc in order to obtain fast feedback on the pressure evolution.

**Description:** We are offering our expertise in the measurement of low-pressure (from ultra high vacuum up to atmospheric pressure), particularly when monitoring small and slow pressure changes in evacuated sealed devices such as vacuum insulation panels, cathode ray tubes, vacuum glazing, dewars and similar. Based on this we are further offering:

- determination of the pressure rise (outgassing rate) of a material after certain (thermal) treatment, this may also include the determination of the gasses being evolved (using quadrupole mass spectrometer)

- permeation measurements for various (even highly impermeable) materials
- vacuum processing
- identification of leaks
- determination of pressure and gas composition accumulated inside small sealed devices

- measurement of thermal conductivity vs. internal pressure for planar vacuum insulation panels (VIP).

Measurements and know-how we are offering are crucial for anyone in the R&D phase and/or later quality control of small evacuated sealed devices whose functionality inherently relies on the low level of pressure inside them. Our techniques and skills are particularly suitable for developers and producers of vacuum insulation panels. In the latter case, we are able to predict the long-term pressure rise in the VIP. Together with the measured lambda vs. internal pressure relation it leads to the rapid estimation of the VIP lifetime.

Our expertise is a result of several decades of experience in research and development of various types of evacuated sealed devices along with skills in vacuum science and technology & materials science.

**Innovations and advantages of the offer:** For evaluation of the outgassing rate of various core materials for VIP we are using an innovative type of envelope – one made of stainless steel (SS) foil. Such testing envelope is impermeable for water and does not degrade with time at any reasonable temperature when compared to conventional AI laminated polymeric envelopes. Furthermore, the native pressure rise in an empty SS envelope can be made extremely low and it can be quantified.

For determination of pressure rise only inert gauges are being used: spinning rotor gauge, capacitance manometers.

**Technical Details:** a pressure rise down to 10-12 mbar/s can be determined during few day measuring campaign.

#### Current Stage of Development: Already on the market

- We have built VIP prototypes with melamine-formaldehyde rigid foam as a core material (produced by Melamin, Kočevje, Slovenia) and determined the foam preprocessing. We determined the thermal properties of VIPs and their lifetime).

- A special transparent type of VIP is being investigated for a large industrial partner from EU whose name and details of the research cannot be disclosed according to NDA.

Exploitation of RTD results: National Programme, Private Research

Intellectual Property Rights: Secret know-how

Type of organization: Research institute

**Collaboration Type:** Technical cooperation (Joint further development, testing of new applications, Adaptation to specific needs), Manufacturing agreement (sub-contracting and co-contracting), Transfer of knowledge in new raw materials, Commercial Agreement with Technical Assistance, Technical consultancy, Quality control

Type of partner sought: industry, academy, research organization

**Specific area of activity of the partner**: vacuum insulation panels, vacuum glazing, other vacuum-related activities are possible

**Task to be performed of the partner sought:** application of our expertise, suitable partner for the coming FP7 call preferentially in Energy efficient buildings (call FP7-2013-NMP-ENV-EeB)

#### **CONTACT DETAILS:**

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## From gene to defined protein product

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**TECHNOLOGY KEYWORDS:** Pharmaceutical Products / Drugs, Virus, Virology / Antibiotics / Bacteriology, Micro- and Nanotechnology related to Biological Sciences, Bioinformatics, Gene Expression, Proteom Research, Biology / Biotechnology, Recombinant DNA (Agricultural genetic engineering applications, Industrial genetic engineering applications, Medical genetic engineering applications), Monoclonal Antibodies and Hybridomas.

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** Research group from Slovenian institute offer extensive knowledge, experiences and facilities for development of high-producing bacterial and yeast strains (E. coli, Pichia pastoris, insect cells); expression, isolation and purification of recombinant proteins; PEGylation and other protein modifications; delivery systems for proteins and development of cell based models for studying complex biological processes. Partners from industry and research organizations interested in joint further development, testing of new applications and adaption to specific needs are sought.

**Description:** Slovenian molecular biologists and nanobiotechnologists hold a great experience in research activities including:

development of high-producing bacterial and yeast strains

- E. coli,
- Pichia pastoris,
- insect cells

expression, isolation and purification of recombinant proteins (native sequence proteins and analogues:

- TNF-alfa,
- TNF-beta,
- interferons,
- hGH,
- G-CSF,
- GFP,
- EPO,
- viral surface proteins, ...

and postproduction modification of proteins.

**Innovations and advantages of the offer:** The research group has long been active in molecular biology and nanobiotechnology research and gained extensive knowledge and experiences in form of advanced skills and competences in the fields of:

- Development and optimization of chromatographic methods for the isolation and separation and technology transfer to the Pharmaceutical industry
- PEGylation of highly purified recombinant proteins, using site specific or random PEGylation approaches as well as new PEGylation approaches comprising PEGylation of immobilized protein or on-column PEGylation and PEGylation of solubilized inclusion bodies.
- Modification of proteins and peptides for purposes of nonparenteral delivery (nasal, oral, pulmonal, topical)
- Development of cell based models for in vitro evaluation of biological potency and advanced models for study of complex biological processes.
- New delivery systems for proteins: such as liposomes, nanoparticles, microspheres, microemulsions

Current Stage of Development: Available for demonstration

Exploitation of RTD results: /

Intellectual Property Rights: Secret know-how

Type of organization: Research institute

**Collaboration Type:** Joint further development, Testing of new applications, Adaptation to specific needs

Type of partner sought:/

Specific area of activity of the partner:/

Task to be performed of the partner sought:/

#### **CONTACT DETAILS:**

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## Contextify – bringing context to your emails

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TECHNOLOGY KEYWORDS: Computer Software, Databases, Database Management, Data Mining, Knowledge Management, Process Management, Information Filtering, Semantics, Statistics, Computers Software (Business and office, Natural language, Software services)

#### **TECHNOLOGY DESCRIPTION**

Abstract: Contextify is a platform that allows individuals and organizations to import emails from one or more email accounts. The user can then use advanced search features to find relevant information. The search results are not only listed but also visualized using social network, timeline and tag cloud. The service can be used on personal and enterprise level to quickly find information and display it in context. The platform is being developed by Sarasvati d.o.o. and Jožef Stefan Institute. We are looking for potential investors.

Description: Emails are being used extensively not only by companies but also by individuals for personal use. Despite the popularity of social networks, recent studies show that the number of exchanged emails is still increasing. For active email users, finding an email or a group of emails in an inbox containing thousands of emails can be a challenging task. Contextify makes this task easier and more efficient by providing advanced search functionalities and by showing the results in context.

Contextify allows the user to search for emails by specifying one or more search conditions. Conditions can include people, keywords and tags. By specifying a person's name the resulting emails will be limited to those where the person is the sender or recipient of the email. Adding keywords will select emails where the keywords appear either in the subject or body of the email. Tags are search properties extracted from email's meta information, such as folder where email is located.

After specifying the search conditions Contextify finds all emails that match the conditions. Results are displayed in several ways. The typical way is as a list that shows for each email the sender, recipients, subject and a short content. Additionally, a social network is also extracted and displayed based on the people who participate in the results. Two people are connected in the graph in case in at least one result, one person was sender and the other recipient of the email. Displaying the social graph enables users to quickly detect clusters of people and to add additional search conditions. The results are also aggregated and displayed in a timeline. The timeline allows one to see periods in time with high or low activity. The visualization is also interactive and allows the user to add additional search conditions based on time. Additional summary of the results is also provided based on the content of the results. Text mining methods are used to extract from the resulting emails the most relevant keywords which are then displayed in a form of a tag cloud. The size of the keywords in the cloud corresponds to their relevance.

Contextify can be used as an add-in in Microsoft Outlook or as a standalone application. The application brings the most value to knowledge workers who receive tens of emails per day and typically work concurrently on several projects with different groups of people. To these people, Contextify brings fast context switching. Selecting an email in Outlook, for example, can show in the sidebar all the emails related to this person (or a group of people), the exchanged attachments, related social network, etc. Contextify is highly scalable and can store and search hundreds of thousands of emails. If used as a standalone application (not from the Outlook) it can import emails from multiple email accounts. In this scenario it can be used for tasks such as early case assessment (where relevant emails and documentation has to be gathered in order to prepare for a legal case).

**Innovations and advantages of the offer:** Contextify offers a number of innovative features that allow the user to effectively find relevant information. Search is not based only on keywords but features such as people names, groups, tags and time can also be used. Instead of just listing the results, the results are also summarized and visualized in different ways. These summaries include social network visualization, timeline visualization and a tag cloud. All visualizations are interactive and allow further refinement of search conditions.

In case of the enterprise scenario or for early case assessment, the application can be configured to work in the cloud. The data importing can be automatically performed on the server side, while one or more clients can perform the search.

**Technical Details:** Contextify is implemented in Microsoft .NET using WPF (for user interface) and WCF (communication) frameworks. The core searching and indexing functionalities are implemented in C++ in order to achieve optimal performance.

Current Stage of Development: Available for demonstration

Exploitation of RTD results: Eureka

Intellectual Property Rights:/

Type of organization: Research institute

**Collaboration Type:** Technical cooperation (Joint further development, Testing of new applications, Adaptation to specific need), Joint venture agreement

Type of partner sought: Industry

Specific area of activity of the partner: Any partner with the needs that are satisfied by our product

Task to be performed of the partner sought: To be discussed.

#### **CONTACT DETAILS:**

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## Fast temperature simulation and control optimization of cooling appliances and heat pumps

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**TECHNOLOGY KEYWORDS:** Artificial Intelligence, Simulation, Household Goods & Appliances, Heat Pump, Cooling Technologies, Heating, Ventilation

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** A Slovenian research institute developed a solution for fast temperature simulation and control optimization for the development of household appliances, heat pumps and HVAC systems. The simulator replaces time consuming measurements and the optimizer automatically finds optimal control parameters. Together they quickly give an optimal design of a new product and shorten its development times. Institute is looking for industrial partners interested in adopting and licensing in the solution.

**Description:** The solution allows fast temperature simulation and optimization of the control parameters during the development process of cooling or heating appliances such as refrigerators, heat pumps, HVAC (heating, ventilation and air-condition) systems and other compressor-driven air conditioners and freezers. The solution consists of two parts: the first part is the temperature simulator and the second part is the control optimization tool (optimizer). While the simulator replaces time-consuming measurements of the slow thermal processes within appliance, the optimizer automatically finds the optimal control parameters of an appliance and provides quick and optimal control algorithm of the new appliance. Therefore the complete solution shortens the development time of the product for at least an order of magnitude.

During the appliance production, each new prototype has to be measured to determine its optimal performance with the lowest possible energy consumption. Thermal processes in the cooling/heating systems are, by their nature, very slow. Thus, to determine the energy consumption it may take several days of measurements. The fast temperature simulator is needed as a replacement of long-lasting measurements of temperature processes, which are slowing down the development process.

To optimize the performance of an appliance in a conventional way, it usually requires a lot of longterm measurements or detailed theoretical analysis of the system and the construction of complex mathematical model for simulation. This requires a lot of time and specific knowledge on expensive simulation tools. As opposed to time consuming, knowledge demanding and expensive simulation tools, the proposed solution is designed as a simple standalone program. The simulation of 48 hours of operating time takes in general about one second. There are some simulators with similar properties on the market, but they are not designed to easily and quickly adapt to new product. Our approach replaces a large part of the development measurements and thus crucially reduces the development costs. The fast temperature simulator is needed in development departments of household appliances and HVAC systems as a replacement for long-lasting measurements of temperature processes, which are slowing down the development process.

The inventor is a PhD researcher and assistant professor with expertise on optimization area, mainly in hardware implementation/acceleration of algorithms, high-level synthesis of integrated circuits and metaheuristic computations/optimizations.

**Innovations and advantages of the offer:** In conventional simulation tools a detailed theoretical analysis of the system or the construction of complex mathematical model for simulation are required. Any essential change in the appliance components and design leads to the mathematical model redefinition. Our invention requires only a limited set of simple guided measurements of an appliance to determine its behavior each time a prototype is essentially changed. It requires only minimum computer skills of the user.

The simplicity of usage is even more expressed when comparing the price of our approach to other commercial simulation tools. Furthermore, our approach offers the simulation and control optimization in one bundle. The simulator and the optimizer are fully integrated thus allowing the optimizer to work quickly.

The advantage of our invention is its low cost and fast response. The only obstacle might be its simplicity, since some companies tend to trust other well-known commercial simulation tools more. The potential synergy exists through the reference in the development process in the Slovenian company, where the invention was already successfully used.

With the use of our invention the companies would gain regarding the shorter development time of the products and decreasing their development costs.

**Technical Details:** Figure below presents the GUI (graphical user interface) of the simulation/optimization tool. After setting the simulation and/or optimization values the simulation/optimization is initiated. The simulation results and/or optimization progress are presented in the result section of the GUI, as well as in the graphical and tabular form inside the tool.

witev krivulje	tabela o programu		
simuliraj tip aparata hladilnik	HZFI2827AFV  v želena temperatura  6.0	optimiraj temperatura 4.0 8.0	rezultat poraba 1.199 kWh/dan srednja temp. HL 9.9 °C
zamrzovalnik	histereza ± 2.0 želena temperatura -20.0 histereza ± 2.0	1.0         3.0           -22.0         -17.0           1.0         3.0	srednja temp. ZA         -18.5         °C           RVČ         64         %           želena temperatura         6.0         ±         2.0
intervali	trajanje     frekvenca     stanje       1.     7     0     5       2.     9     0     7       3.     8     0     5       4.     10     0     1       5.     0     0     0	trajanje     frekvenca     stanje       2     20     0     0     5       2     20     0     0     5       2     20     0     0     5       2     20     0     0     5       2     20     0     0     5       2     20     0     0     5       2     20     0     0     5	Želena temperatura       -20.0       ±       2.0         trajanje       frekvenca       stanje         1.       7       0       5         2.       9       0       7         3.       8       0       5         4.       10       0       1
simulacija	čas simulacije 5760 čas povprečenja 2880 tangenta približka 95	shrani nastavitve	ON 35 OFF 19 shrani rezultat

Current Stage of Development: Available for demonstration

Exploitation of RTD results: National Programme

Intellectual Property Rights: Secret know-how

Type of organization: Research institute

**Collaboration Type:** Licence agreement, Technical cooperation (Joint further development, Testing of new applications, Adaptation to specific need)

#### Type of partner sought: /

**Specific area of activity of the partner**: Manufacturer of household appliances, Manufacturer of HVAC systems, Heat pump manufacturer.

**Task to be performed of the partner sought:** Providing expert knowledge in the appliances development process and joint development of customized solution, licensing in the invention.

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# Compact Position Sensitive - Transient Current Technique (PS - TCT) measurement system

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**TECHNOLOGY KEYWORDS:** Electronic Circuits, Components and Equipment, Photovoltaics, Sensors/Multisensor Instrumentation, Electronic measurement Systems

### **TECHNOLOGY DESCRIPTION**

**Abstract:** Research group from Jožef Stefan Institute, Ljubljana, Slovenia, has developed a self standing system for TCT measurements with focused (~ 6  $\mu$ m) laser beam. The system enables measurements of signals induced in DUT with fast laser pulses (150 ps rise time) with fast amplifier (BW 2 GHz). DUT can be biased with up to 2.5 kV via a custom made Bias-T. The system provides precise (1  $\mu$ m) positioning of DUT and temperature control with water cooled Peltier element.

**Description:** Studies of electrical signals induced by fast laser pulses in semiconductor detectors and other elements can reveal several properties of DUT. For example, electric field distribution, sign of the space charge, effective carrier drift length, etc.... can be measured in particle detectors. With focused laser beam and precise positioning of DUT, the response of device can be studied depending on the place of laser light impact. Focused IR laser light with long penetration depth can be directed into DUT from the side enabling measurement of signals induced by carriers created at chosen depth of DUT.

**Innovations and advantages of the offer:** The system contains innovative solutions for basic elements needed for good TCT measurements:

1. fast laser pulses (150 ps rise time):

- computer controlled (USB) laser pulse generator: bit pattern (1024 deep), repeated with selected frequency
- programmable pulse width (350-4000 ps)
- no afterglow

2. high bandwidth amplifier (0.01 - 2 GHz)

3. Bias-T enabling high voltage (2.5 kV) connection to DUT

4. focused laser beam and precise positioning of DUT allowing studies of response of the device depending on

the place of laser light impact. DUT is mounted on a ~1  $\mu m$  resolution x-y-z moving stage with range of 5 cm.

5. Temperature control of DUT is provided by water cooled Peltier element.

**Technical Details:** The setup comes preassembled with only few pieces requiring simple mechanical fixing. Outer dimensions of the aluminum enclosure are 40 cm x 40 cm x 60 cm with connectors for signal, low and high voltage bias, temperature control, cooling water in/outlets and dry air inlet. Custom made system control software (LabView) enables efficient equipment steering and automatic scans of wide parameter space. Software for offline signal analysis is also available.

Current Stage of Development: Available for demonstration

Exploitation of RTD results: National Programme

Intellectual Property Rights: Secret know-how

Type of organization: Research institute

**Collaboration Type:** Technical cooperation (Adaptation to specific needs), Commercial Agreement with Technical Assistance (Assembly, Technical consultancy)

Type of partner sought:/

Specific area of activity of the partner:/

Task to be performed of the partner sought:/

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# Development of superior varieties of wheat (*Triticum aestivum* L.) with chemical hybridizing agent base on oxalic acid

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**TECHNOLOGY KEYWORDS:** Agro Chemicals, Special Chemicals, Intermediates, Organic Chemistry, Crop Production, Soil Pollution

### **TECHNOLOGY DESCRIPTION**

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**Abstract:** The present invention refers to a chemical way of exploiting a genetic phenomenon heterosis in commercially significant hermaphrodite plant species, especially common wheat (lat. Triticum aestivum L.), in which easily soluble or water-soluble derivatives of oxanilic acid and/or agriculturally acceptable water-soluble salts thereof or water-soluble preparations that contain them are used as an active chemical hybridization substance. The invention is the result of project cooperation between SEMENARNA Ljubljana, d.d. (www.semenarna.si), Institut "Jožef Stefan" (www.ijs.si) and Agricultural institute of Slovenia (www.kis.si).

**Description:** Heterosis presents superiority of the first filial generation (F1 generation) over the parental generation, which is expressed for instance in a higher yield, lower mycotoxin content, more rational consumption of plant nutrients etc. For the exploitation of heterosis are F1 hybrids produced by a controlled cross between two genetically different homozygous parental components (line AA ( $\bigcirc$ ) × line BB ( $\bigcirc$ )).

In the past, several genetic and transgenic approaches were suggested for the induction of male sterility in hermaphrodite plant species. Common to the systems for the induction of male sterility based on cytoplasmic-genetic male sterility, the transgene for the synthesis of cytotoxic or cytostatic polypeptides and the transgene for the formation of an exogenous double-stranded RNA for the induction of RNA interference, is the preservation of male-sterile female component with its fertile analogue (threecomponent system). Unlike genetic and transgenic approaches to the cultivation of hybrid variety based on three distinct lines ( $\bigcirc$  line AA, isogenous line A'A',  $\bigcirc$  line BB) the chemical induction of male sterility needs only two parent components of the hybrid variety (two-component system). In addition to this, the advantage of chemical induction of male sterility is also the absence of complex genetic engineering and long-term input of a male-sterile cytoplasm with backcrossing.

Current approaches to a chemical exploitation of heterosis require sowing of both parent components in the form of strips. Sowing of parent components in the form of strips is very demanding in practice and what's more, the central part of the strip of the female component is often poorly pollinated due to a huge distance from the location of pollen occurrence.

An important problem in chemical exploitation of heterosis is also a selection of the active substance, since most of the chemical hybridizing agents express a strong phytotoxic effect in the early stages of
organogenesis. Consequently, the parent components cannot be sown in the form of a mixture due to flowering synchronisation, wherein the pollinator must lag behind in development.

**Innovations and advantages of the offer:** Modern chemical hybridizing agents are further developed, especially in direction of achieving better selectivity of gametocidic activity and reduced influence on the environment. The purpose of the invention was to develop new environmentally friendly agents with gametocidic activity or chemical hybridizing agents and to reduce the introduction of volatile organic compounds into the environment and plants. Oxanilic acid was found to be an interesting basis for the preparation of agents for chemical hybridization of the invention, as their synthesis is simple and economically favorable and the acid function moreover offers a possibility of a further functionalisation with the purpose of producing watersoluble active substances in terms of their getting more easily-soluble and water-soluble, and to a preparation of watersoluble preparations that confer a more simple use for the application in the field in the form of water solutions.

The invention further refers to a method for the production of hybrid seeds of F1 generation of commercially significant hermaphrodite plant species, especially common wheat (Triticum aestivum L.), with chemical hybridization with easily soluble compounds and/or the agriculturally acceptable watersoluble salts thereof, which makes it possible, unlike the ways used hitherto, a simpler design of a seed crop for the production of hybrid seeds of F1 generation, better spatial exploitation, better pollination of the female component (line AA) and a greater quantity of seeds of the desired F1 generation based on the sown quantity of both parental components (e.g. mixture of both parental components).

#### Current Stage of Development: Available for demonstration

Exploitation of RTD results: Private Research

Intellectual Property Rights: Patent(s) applied but not yet granted

#### Type of organization:

**Collaboration Type:** Licence agreement, Technical cooperation (Adaptation to specific needs), Joint venture agreement, Financial resources

#### Type of partner sought: Industry

Specific area of activity of the partner: Agrochemicals

Task to be performed of the partner sought: Registration of the new active substance and their production

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# Compact device for the treatment and recycling of sanitary waste water

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**TECHNOLOGY KEYWORDS:** Civil Engineering, Cleaning Technology, Microbiology, Waste Management, Biotreatment / Compost / Bioconversion, Mobile homes, Home furnishing and house wares

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** The National Institute of Chemistry, Ljubljana, Slovenia, has developed a compact recycling device for the treatment of sanitary waste water and its re-use for toilet flushing. Treatment is a combination of biological process for removing organic substance and disinfection process for regulating the concentration of microorganisms. The invention reduces consumption of drinking water by more than 30 % and is suitable for smaller households. The Institute is looking for partners interested in further development and license agreement.

**Description:** A group of Slovenian researchers at the National Institute of Chemistry has developed a new recycling device for the treatment of sanitary waste water and its re-use for toilet flushing. Sanitary waste water, which is generated after showering or bathing in households and public buildings, contains dissolved organic matter (soap residues and personal care products), solid particles and microorganisms. In the reservoir, which collects untreated sanitary waste water, microorganisms begin to decompose organic matter, and they multiply uncontrollably, which can lead to bad smell or even blocked pipes in the flusher or toilet bowl. The invention solves this problems with the compact system for sanitary waste water treatment, which is a combination of intensive biological process for removing dissolved organic matter and process for deactivating microorganisms.

**Innovations and advantages of the offer:** Organic matter is biologically treated with the microorganisms, which are fixed on the surface of specific plastic carrier material, this way a very high concentration of microorganisms could be obtained in the small volume of biological reactor. Namely, high concentration of microorganisms enables intensive biological processes.

Since the active microorganisms are immobilised in the reactor module, which retains and partially disintegrates also the microorganisms, which enter the tank with grey wastewater, this way the water circulation within the system only features a low concentration of dispersed active microorganisms. Therefore, for disinfection purposes a UV-light source with a lower intensity or lower energy consumption can be applied.

The problems and deficiencies of recycling devices that are currently in use are:

- current systems use untreated sanitary waste water for toilet flushing
- current systems cause bad smell or blocked pipes in the flusher or toilet bowl
- consequently expensive

• need frequent servicing

The advantages of the offered recycling device for the treatment of sanitary waste water are:

- reduces consumption of drinking water (by more than 30 %)
- suitable for smaller households
- mass production is possible
- low operating and maintenance costs

#### Technical Details: /

Current Stage of Development: Available for demonstration

Exploitation of RTD results: None

Intellectual Property Rights: Patent(s) applied but not yet granted

Type of organization: Research institute

**Collaboration Type:** Licence agreement, Technical cooperation (Joint further development, Testing of new applications, Adaptation to specific need)

#### Type of partner sought:industry

Specific area of activity of the partner: Partners from water recycling industry

**Task to be performed of the partner sought:** industrial partners interested in further development and license agreement

#### **CONTACT DETAILS:**

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# A method for simultaneous cleaning, disinfection and sterilization of delicate medical instruments

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**TECHNOLOGY KEYWORDS:** Cleaning (sandblasting, brushing), Packaging for Machines, Plastics, Polymers, Plastics and Rubber related to Chemical

Technology and Engineering, Medical Biomaterials, Food Packaging / Handling

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** Department F4, Jožef Stefan Institute, Ljubljana, Slovenia, has been working on plasma technologies for a decade. Extensive research proved that pollutants of medical instruments such as remains of body fluids and tissue debris readily interact with reactive gaseous plasma particles thus assuring perfect cleanliness. Since the technology also assures for destruction of bacteria it can be used as an ecological benign alternative to current decontamination techniques.

#### Description: Description:

The technology relates to methods for decontamination of delicate materials which do not withstand classical wet chemical cleaning and sterilization by autoclaving. In particular, our technology replaces wet chemical cleaning and subsequent sterilization with one single step - treatment of materials with highly reactive gaseous plasma. An instrument or component to be cleaned and sterilized is mounted into a reaction chamber and evacuated to rough vacuum. Pure oxygen is leaked into the chamber during continuous pumping so a working pressure of about 1 mbar is established in the chamber. Weakly ionized highly dissociated gaseous plasma is created in the chamber using an appropriate electrical discharge, preferably an electrode-less radiofrequency discharge or a microwave discharge. Gaseous molecules are partially dissociated to parent atoms and weakly ionized. The atoms are further excited to metastable states by electron impact. The neutral oxygen atoms in excited states are chemically extremely reactive and interact with organic impurities already at room temperature. Remains of the body fluids, debris and bacteria are oxidized using said atoms. The reaction products are mainly water and carbon dioxide molecules which readily desorb from the treated materials under low pressure conditions and are pumped away. Optical emission spectroscopy is applied for real-time in-situ measuring of the oxidation efficiency. When all impurities are removed the signal corresponding to radiative transitions od CO molecule drops below the detection limit indicating successful removal of all organic impurities. Potential application is for cleaning of medical instruments which do not stand heating at 130 oC during autoclaving such as catheters, sharp objects, artificial implants and alike. The technology is also suitable for application in food industry where the hygienic standards are severe. The technology may be used also for degreasing of various components in other industries where it could replace wet chemical cleaning using ecological unfriendly chemicals. The research group has extensive knowledge in construction of suitable reactors, electrical discharges for plasma creation as well as methods for plasma

characterization. The cleanliness of materials treated according to the technology can be controlled ex-situ after the treatment using our advanced methods for surface characterization including highresolution X-ray Photoelectron Spectroscopy (XPS), Auger Electron Spectroscopy (AES) and Secondary Ion Mass Spectrometry (SIMS). The major innovative step in our technology is application of metastable oxygen atoms for rapid removal of organic impurities as well as ability to monitor the cleanliness in situ using optical emission spectroscopy.

**Innovations and advantages of the offer:** Against the current techniques the innovative technology does not produce harmful or toxic materials that otherwise represent an ecological risk. The technique also allows for removal of all organic impurities irrespective to their composition and structure. An important advantage over other known techniques for cleaning of delicate materials is the possibility for real-time monitoring of the cleaning procedure. Safety issues are properly addressed, too. The processing unit is equipped with various sensors including optical spectrometer, mass spectrometer, automatic gate valve, pressure and flow meters and alike. Fully computerized system allows for automatic detection of any failure that may arise upon treatment procedure. The economic advantages include shorter processing time and high reliability of the new technology. Since 2 different classical technologies are replaced with a single step processing the handling time is reduced and any mishandling between the two classical techniques is not relevant. The energy consumption of the innovative technology is well below that of classical autoclaving. A typical classical autoclaving step requires approximately 15 MJ (approx. 4 kWh) energy for evaporation of water and heating it to 130C. The innovative technology requires less than 1 kWh, mainly for operation of the vacuum pump and plasma generator.

**Technical Details:** In the preferred embodiment the processing chamber is made from a material with a low coefficient for heterogeneous surface recombination of atoms. We use quartz or borosilicate glass. The chamber is pumped with a rotary vane pump with the ultimate pressure below 1 Pa and nominal pumping speed of 80 m3/h. Commercially available (cheap) oxygen is leaked through a flow meter in order to assure for stable operation. Gas consumption is minimal. Pressure inside the processing chamber is measured with a calibrated absolute gauge. Plasma is excited with a radiofrequency generator operating at the industrial frequency of 27.12 MHz. The system is equipped with a differentially pumped mass spectrometer and an optical spectrometer. The acquisition time of the spectrometer is set to 0.1s. The spectra are taken continuously during the treatment and the evolution of major spectral features is monitored with a PC.

#### Current Stage of Development: Development Phase – Laboratory tested

Exploitation of RTD results: National Programme

Intellectual Property Rights: Patent(s) applied but not yet granted, Secret know-how

Type of organization: Research institute

Collaboration Type:/

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Type of partner sought: Industry

#### Specific area of activity of the partner: Hospitals, food industry

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#### Task to be performed of the partner sought:/

## **CONTACT DETAILS:**

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# VESNA – An Application Customizable Wireless Sensor Network Platform

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TECHNOLOGY KEYWORDS: Electronic Circuits, Components and Equipment, Embedded Systems and Real Time Systems, Environmental and Biometrics Sensors, Actuators, Remote Control, Narrow Band Technologies, Sensory/Multisensory Technology, Instrumentation related to construction Technology, Traffic Engineering / Control Systems, Photovoltaics, Energy Management, Lighting, Illumination, Process Optimisation, Waste heat Utilisation, Sensors / Multisensor Technology, Instrumentation, Moisture Sensors, Temperature Monitoring, Environmental Medicine, Social Medicine, Sports Medicine, Sensor Technology related to Measurements, Measurement and Detection of Pollution, Natural Disasters, Remote Sensing Technology, Monitoring equipment

#### **TECHNOLOGY DESCRIPTION**

Abstract: A leading Slovenian research institution developed a new high performance wireless sensor network platform VESNA. Its modular structure enables the support of a range of sensor and communication technologies and therefore allows for high degree of customizability in diverse application areas. Both hardware and software are open source, which enables users to have full control over their solutions. It can be used in final products but is as well particularly suitable for prototype implementations.

**Description:** VESNA platform is designed for the realization of nodes in a wireless sensor network. Given the role and required functionality of a node in a network, the modular structure of a platform enables the implementation of nodes as a suitable combination of core, radio and expansion modules.

Sensor Node Core (SNC) module is based on a high performance microcontroller with ARM Cortex-M3 core and a versatile power supply that enables the combination of external, battery and solar cell supply sources. It features a range of analog and digital interfaces for the connection of additional modules, sensors and/or actuators.

Sensor Node Radio (SNR) module supplements the SNC module with a wireless sensor network interface, where various versions enable the support for a range of technologies including IEEE 802.15.4, ZigBee, 6LoWPAN, Wireless M-BUS and Bluetooth Low Energy.

Sensor Node Expansion (SNE) modules are used to extend the SNC modules with application specific functionalities, such as advanced sensor and/or actuator subsystems or gateways to external communication networks based on Ethernet, Wi-Fi or GSM/GPRS technology. Depending on the application requirements SNE can also host GPS module for localization purposes.

Several reference cases of platform use clearly show its potential for new applications particularly in environment, energy and healthcare sectors.

**Innovations and advantages of the offer:** The main distinctive feature of VESNA platform is it modular structure, which not only enables the flexibility and adaptability to application requirements, but also helps to significantly shorten the development cycle and lower the costs of hardware design.

**Technical Details:** For technical details please refer to data sheets and application notes that can be downloaded from the web page or sent upon request.

Current Stage of Development: Available for demonstration - Field tested, Already on the market

Exploitation of RTD results: EU RTD results, National Programme, Private Research

Intellectual Property Rights: Copyright(s) registered

Type of organization: Research institute

Collaboration Type: Technical cooperation (Testing of new applications, Adaptation to specific need)

Type of partner sought: industry or research organization

**Specific area of activity of the partner**: electronics, telecommunications, sensors and actuators industry,

**Task to be performed of the partner sought:** use of VESNA in own application, development of new VESNA subsystems / extensions

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# Engineered lactic acid bacterium Lactococcus lactis capable of binding TNFa for the treatment of Inflammatory Bowel Disease

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**TECHNOLOGY KEYWORDS:**Industrial genetic engineering applications, Medical genetic engineering applications, Biotechnology, Recombinant DNA, Pharmaceutical Products / Drugs

## **TECHNOLOGY DESCRIPTION**

**Abstract:** We have developed innovative recombinant lactic acid bacteria that express TNF-a-binding peptides on their surface. TNF-a (Tumor Necrosis Factor Alpha) is a cytokine which plays an important role in inflammation process. Such microorganisms can be used for treatment of inflammatory bowel diseases including Chron's disease and Ulcerative colitis. We are looking for partners interested in the license agreement.

**Description:** The team of researchers have combined anti-TNFa therapy with oral application and local immunosuppressant effect. TNFa-binding peptides have been expressed on the surface of probiotic lactic acid bacterium Lactococcus lactis. L. lactis is able to survive passage through gastro-intestinal tract and serves as a delivery system for TNFa-binding peptides on its surface. Peptides that are expressed on the surface of the bacteria are much more resistant to chemical and enzyme degradation in the gastro-intestinal tract. Microorganisms expressing these peptides are therefore capable of binding TNFa, reducing its amount and consequently reducing the inflammation in the gastro-intestinal tract. Recombinant bacteria bind and eliminate redundant cytokine from the gut (but do not influence other organs and have no systemic side effects). It has previously been proven that diminishing of TNFa concentration in the gut alone can significantly improve the clinical picture in experimental animals. Such microorganisms can be used for treatment of inflammatory bowel diseases (IBD) including Chron's disease and Ulcerative colitis.

**Innovations and advantages of the offer:** Expected to significantly lower production costs (i.e. lower purification costs due to oral application, rapid introduction into production line - with established fermentation equipment) compared to monoclonal antibodies.

Possible different types of application: OTC drug or possible GMO-free approach

## Technical Details: /

Current Stage of Development: Available for demonstration

## Exploitation of RTD results:/

## Intellectual Property Rights: Patent(s) applied for but not yet granted

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#### Type of organization: Research institute/University

**Collaboration Type:** Joint Venture Agreement;License Agreement;Financial Resources;Joint further development;Testing of new applications;Adaptation to specific needs

**Type of partner sought:** pharmaceutics or veterinary organization ready for collaborative research or patent licensing

Specific area of activity of the partner: pharmacy

Task to be performed of the partner sought: additional development, in vivo tests

## **CONTACT DETAILS:**

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## Gene for enhancing primary metabolism

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**TECHNOLOGY KEYWORDS:** Industrial genetic engineering applications, Medical genetic engineering applications, Biotechnology, Recombinant DNA, Pharmaceutical Products / Drugs

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** We have developed a gene for modified 6-phosphofructo-1-kinase, which increases productivity and yields by various commercial microorganisms. The technology is applicable with various bacterial, fungal and yeast strains used for large-scale bio-manufacturing, using both chemically defined and nutritionally complex media. Partners are sought in microbial fermentation industry or bio-fuel production for further technical cooperation or licensing.

**Description:** Glycolysis is the most direct way of glucose consumption via primary metabolism, and presents a pivotal metabolic pathway of catabolism. In normal cells it is tightly controlled to meet two major cellular needs: balanced production of ATP (Adenosine Tri-Phosphate) and controlled provision of building blocks for synthetic reactions.

In filamentous fungus Aspergillus niger a spontaneous post-translational modification of 6phosphofructo-1-kinase (PFK1), one of the key regulatory enzymes of glycolytic flux, has been described. The native enzyme is first cleaved by specific proteases, and additionally phosphorylated to give an active shorter PFK1 fragment that is resistant to feedback inhibition by citrate while the activators increase its activity to a higher level with respect to the native enzyme.

A mutated truncated (mt-pfkA) gene was prepared that enabled the synthesis of the active shorter fragment. By inserting the mt-pfkA gene into various commercial microorganisms unrestricted glycolytic flux was detected in transformants, leading to an increase in the level of tricarboxylic acid cycle intermediates. Such conditions increase the rate of overall anabolic reactions that are channelled to the increased production of a specific end product by growing the microbe in a specific production medium.

The technology is applicable to a wide variety of bacterial, fungal and yeast strains used for largescale bio-manufacturing, using both chemically defined and nutritionally complex media.

The gene technology is available for licensing on an exclusive basis for individual microorganisms and/or production processes.

**Innovations and advantages of the offer:** The enzyme encoded by mt-pfkA gene deregulates glycolytic flux, enhancing the formation of precursors for the synthesis of various bio-products.

#### Technical Details: /

#### Current Stage of Development: Available for demonstration

#### **Exploitation of RTD results:/**

Intellectual Property Rights: Patent(s) granted

Intellectual property rights comments: Patent granted: Si patent No. 22256

Type of organization: Research institute/University

**Collaboration Type:** License Agreement; Joint further development; Testing of new applications; Adaptation to specific needs

Type of partner sought: Microbial fermentation industry; bio-fuel production

**Specific area of activity of the partner**: Any industries producing primary or secondary metabolites by micro-organisms

**Task to be performed of the partner sought:** After first contact further steps in IPR transfer will be determined.

## **CONTACT DETAILS:**

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# Method and capacitive sensor for counting aerosol nanoparticles

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**TECHNOLOGY KEYWORDS:** Nanotechnologies related to Electronics and Microelectronics, Sensors / Multisensor Technology, Instrumentation, Sensor Technology related to Measurements

## **TECHNOLOGY DESCRIPTION**

**Abstract:** We have developed a novel method and capacitive sensor for counting aerosol nanoparticles in an electric way. Detectors for nanoparticles in the air can be used for monitoring aerosols in environment and in buildings. The method is demonstrated experimentally and verified by numerical simulations. The counter construction is simple, portable and cheap. Institute is looking for industrial partners interested in further development and license agreement.

**Description:** Aerosol particles, onto which a fluid was applied in an earlier process by known methods, change the capacitance of the dielectric of the capacitor when entering its field, which causes an electric signal. The method provides for detection of aerosol particles in a wide scope of their presence in the air and is not specific for any shape or chemical composition of nanoparticles.

Innovative Aspects:

- The problems and deficiencies of sensor devices that are currently in use are:
- technologically very complex
- consequently expensive
- relatively large and heavy
- consume plenty of energy for operation
- need frequent servicing

**Innovations and advantages of the offer:** The advantages of the offered method and capacitive sensor for counting aerosol nanoparticles are:

- the method is suitable for detection of aerosols in wide concentration range in the air
- the method is not specific for a shape or chemical composition of nanoparticles
- the counter allows a construction of a simple and portable nanoparticle detector
- price of a single sensor would be low
- mass production would be possible
- low operating and maintenance costs

## Technical Details: /

## Current Stage of Development: Available for demonstration

## **Exploitation of RTD results:/**

Intellectual Property Rights: Patent(s) grantedIntellectual property rights comments:WO/2010/050904

Type of organization: Research institute/University

**Collaboration Type:** License Agreement; Joint further development; Testing of new applications; Adaptation to specific needs

Type of partner sought: industry

**Specific area of activity of the partner**: Partners from environmental sensing and monitoring technologies

**Task to be performed of the partner sought:** Industrial partners interested in further development and license agreement

#### **CONTACT DETAILS:**

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## Antimicrobial coatings to maintain surface clean

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**TECHNOLOGY KEYWORDS:** Cleaning Technology, Building Materials, Anorganic Substances, Lighting, Illumination, Solid state Physics, Micro- and Nanotechnology related to Biological Sciences

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** We have developed a solution for antimicrobial surface protection which provide continuous protection through illumination by natural sun light or widely spread fluorescence lamp light. Applications based on near-UV light excitation can reach even 200 times better protection than can be achieved by the sterilization by the UV light without anitimicrobial coating. The institute is looking for partner interested in licence agreement or technical cooperation.

**Description:** Titan-oxide nanocoating have been optimized to achieve high photoinduced antimicrobial activity. Deposition process has been optimized to increase the stability of the coatings at very diverse surfaces such as polymeric, metal or glass.

Photoexcited coatings prevent bacterial contamination by cutting the binding polysaccharide layer. Illumination can be used to control the material anti-microbial activity and at the same time increases the effect of near-UV irradiation for one to two orders of magnitude.

Sterilization of infrastructure surfaces in food processing industry, hospitals, kindergartens, schools and even in heat transfer in civil engineering applications requires a continuous use of large quantities of detergents and even antibiotics to prevent the growth of various pathogenic bacteria. Among them European veterinary administration reports Listeria monocytogenesas as one of the most dangerous species due to intensive growth at lower temperatures and especially lower total number of bacteria, up-to 70% mortality and very delayed flue-like symptoms. Preventing growth of such bacteria with purely physical means is therefore highly desired to reduce use of large amount of chemical agents. The employment of antimicrobial coatings that can bind to surfaces efficiently can do exactly this - reducing the release of chemicals in the environment and preventing bacterial growth. The proposed system offers stable deposition at high antimicrobial activity.

The proposers are internationally recognized biophysicist and synthetic chemist working in the field of inorganic and organic chemistry, chemistry of materials, polymers, physics.and biophysics of biointerfaces as well as microbiology and veterinary sciences. The proposers join all the interdisciplinary expert knowledge in development and optimization of this coatings.

#### Innovations and advantages of the offer:

Technical Details: /

#### Current Stage of Development: Available for demonstration

Exploitation of RTD results: National Programme

Intellectual Property Rights: Secret know-how

Type of organization: Research institute

**Collaboration Type:** Licence agreement, Technical cooperation (joint further development, testing of new applications, adaptation to specific needs)

Type of partner sought: Industry, research organization

**Specific area of activity of the partner**: Construction industry, hospitals, laboratories, veterinary, meat packing plants, meat industry, food-processing industry, civil-engineering (heat recovery, heat transfer)

**Task to be performed of the partner sought:** Joint further development, adaptation to specific needs and applications

#### **CONTACT DETAILS:**

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## New formulation for highly effective sunscreen

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**TECHNOLOGY KEYWORDS:** Chemical Technology and Engineering (Pharmaceutics, Care, Hygiene, Beauty), Micro- and Nanotechnology related to Physical and Exact Sciences

#### **TECHNOLOGY DESCRIPTION**

**Abstract:** We have developed a new formulation for highly effective sunscreen. The new product shows almost an order of magnitude better UV-filtering ability if compared to the existing commercial products and is much more stable. The product solution is particularly appropriate for preparation of stable and effective sunscreens based on transparent oily media. We are looking for industrial partners interested in further development and license agreement.

**Description:** We have developed a sterically stabilised dispersion of a hybrid inorganic-organic material in oil as a preparation for the protection against harmful effects of UV rays. The offered invention refers to a new cosmetic material on the basis of composites of hybrid inorganic-organic coatings on TiO2 nanocrystalline particles or another metallic oxide with increased dispersibility in organic vehicles and decreased formation of free radicals.

The basic nanocrystalline particles of TiO2 and the inorganic coating from the bridged silane are prepared by the sol-gel process. Molecules of an organic steric stabiliser are then covalently bound to the coating of the bridged silane, said stabiliser being selected from one of the following groups of compounds: higher fatty acids, linear polymers, cross-linked polymers, branched polymers and dendritic polymers. The presence of the steric stabiliser prevents the TiO2 particles to agglomerate, improves dispersibility in organic vehicles, increases water resistance of the preparation and allows the use of high concentrations of oily suspensions that provide for a high factor of protection against harmful effects of UV rays.

**Innovations and advantages of the offer:** All existing sunscreen formulations require one or more stabilizers and other additives to insure physical and chemical stability. Furthermore in case of particulate-based sunscreens (i.e. nanosized) there still remains controversy regarding the safety of such products in terms of light induced radical formation. These can be very harmful as they can damage skin tissue or react with other constituents of sunscreens.

The offered sunscreen formulation resolves both issues by first coating the nanosized TiO2 with hydrophobic protective coating and afterwards grafting short-chain fatty acid stabilizer covalently to the surface of the coated particles. By doing this, supreme oil suspension stability and UV- filtering ability at extremely low concentrations was readily demonstrated along with improved safety due to the protective coating as compared to the existing commercially available products.

Technical Details: /

Current Stage of Development: Available for demonstration

**Exploitation of RTD results:/** 

Intellectual Property Rights: Patent(s) granted, Slovenian Patent Nr. 22859, PCT Application Nr. PCT/SI2009/000031

Type of organization: industry

**Collaboration Type:** License Agreement; Joint further development; Testing of new applications; Adaptation to specific needs

Type of partner sought: industry

Specific area of activity of the partner: Partners from suncare-cosmetics industry

**Task to be performed of the partner sought:** Industrial partners interested in further development and license agreement.

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# **Technology Transfer to Education Process – KidsINNscience project**

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## **TECHNOLOGY DESCRIPTION**

Abstract: Primary and secondary schools are the environment where industrial and innovative processes should find there way, too. Both, the entire technology and/or its parts (unit operations and processes) are convenient nowadays also for early ages, not only for university students. KidsINNscience project (7th FP) aims at introducing some innovative practices having elements of technologies (for example: crystallization, renewable energy transformations) to the aforementioned schools in eight European and two Latin America countries.

## **Description:**

Innovations and advantages of the offer: Innovative practices in a KidsINNscience project (2009 – 2013), www.kidsinnscience.eu, are means to promote science and technology in primary and secondary schools. Among 80 practices from Austria, Germany, Switzerland, Slovenia, The Netherlands, Italy, United Kingdom, Spain and Mexico and Brazil are also technology oriented activities which are tested in aforementioned schools by teachers in two school years (2010/2011 and 2011/2012).

Some ideas of activities are presented which allow the introduction of technologies into schools` courses. They are especially effective if based on experimentation.

"Analyzing the life cycle of industrialized products" (Brazil): the activity introduces the 1. materials involved in the products and their packaging, their process production, chemical transformations involved, properties and structure of the materials, their environmental impacts and their consumption.

2. "Robotics in your school" (Mexico): Students solve different problems, initially with simple machines, then with pneumatic machines and finally with robotization.

3. "Cooking with the Sun" (Spain): Students are asked to investigate about solar energy and construct different solar cookers with everyday materials, then checking their functioning. The activity was checked also in Slovenia.

4. "The weekly 5 minutes of science news" (Slovenia: Medveš, Stres, Likar): Innovations/news are discussed in a class. Three teachers cover the same topic/news from three different perspectives. The innovative practice allows a broad use of new technologies and discoveries in science to be introduced in a regular school courses.

5. "Science in Family – Crystallization (Mexico, Slovenian adaptation using one of basic unit operations in chemical technology: Pahor, Bačnik, Ogrin): Primary school pupils started a process of crystallization at home using sugar, discuss the technique with parents and finally bring crystals to school to discuss and compare the results. Additional goal is to make as big crystals as possible.



Figure 1: Sugar crystal



Figure 2: Searching for best technique to capture sun's heat

The project is still in a phase of evaluation but opens the question why more technology based contents are not taught at primary and secondary schools while pupils and students show motivation and interest.

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