

Number 5 (English version) Krakow/Lublin, 2010

# The university and business

Ladies and Gentlemen,

*Jagiellonian University in Krakow with more than 600-year history is one of the oldest universities in Europe. Our goal is not only to draw on the past, but primarily to look into the future. We implement this goal through cooperation with business and offering the scientific potential of the university to the economic market.*

This potential is represented by 15 faculties (from the medical and natural science to the humanities), with over 3 500 teachers and nearly 50 000 students.

In 2003 the Centre for Innovations, Technology Transfer and University Development (CITTRU) was founded - a unit dealing with

contacts between science and business. Its role is supporting academic entrepreneurship and managing of intellectual property protection, education and promotion of science. In 2007, thanks to CITTRU, the pioneering, on a national scale, **rules for the commercialization of scientific research results were introduced**. Through those activities the number of patent applications has significantly increased. During the CITTRU trainings, more than 500 people came to know the secrets of innovative business, which resulted in the creation of dozens of innovative companies. Part of them found their place in the Business Incubator - established by CITTRU.

The patent applications, mentioned earlier, are arranged in a portfolio of innovation available to any company that wants to be a partner of the University - as the licensee, investor or academic company co-founder. I encourage you to read this newsletter and contact CITTRU.

**I invite you to the Jagiellonian University in Krakow - building on the past, but still thinking about the future.**

*Prof. Karol Musioł  
Rector of the Jagiellonian University  
in Krakow*



*Prof. Karol Musioł, Rector of the Jagiellonian University, photo by Anna Wojnar*

## in this issue

### From the Jagiellonian University laboratories

Selective colonization of diseased tissue, new materials based on titanium dioxide, hybrid photocatalysts, positron emission tomography, lithium-ion batteries - are the important fields of research of the Jagiellonian University. The results may find applications in the essential areas of life.

We present a brief overview of selected inventions of the Jagiellonian University in Krakow described in 2009 patent applications, for which CITTRU is now seeking investors or licensees.

*read on page 4-5*

## in this issue

### Science, innovation and the Internet

„The Internet is not just bunch of gossip from the life of pop stars and silly comments on Twitter. The information revolution has accelerated the development of science.” - Krystian Gurba wrote in the text on supporting the scientific innovation by IT tools.

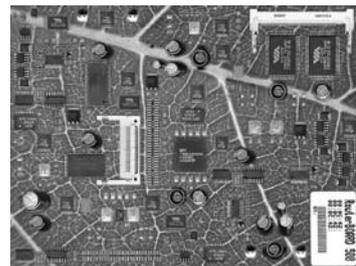
Opinions about innovation in the world of business and science are also main thread of the interview with Prof. Zbigniew Sojka, inventor in the field of industrial chemistry and environment protection.

*read on page 3 and 6*

## in this issue

### Different faces of CITTRU

CITTRU is not only a unit dealing with technology transfer. In the scope of its activities are, among other, issues concerning the cutting-edge entrepreneurship and promotion of science. On the next pages you will find a playful text from the series „Everything You Always Wanted to Know About...” as well as extensive text about CITTRU's core activities related to business and promotion (p. 7 and 8).



*Promotion of innovation and creativity. 'Digital Leaf'- image by Magdalena Włodarczyk submitted to the CITTRU photo/graphic contest in 2007*

## CITTRU dictionary

EVERYTHING YOU NEED TO KNOW ABOUT CITTRU AND WHAT WE ARE HAPPY TO TELL ABOUT

**Commercialization regulations** - a milestone in creating the foundation for science and business cooperation. The rules clearly specify: how? who? with what profit? with what support? the potential of the Jagiellonian University may be offered to business.

**Contract research** - since 2009 CITTRU has managed the formal aspects of University's commercial research contracted by companies.

**School of Entrepreneurship** - one of the CITTRU projects (in collaboration with Jagiellonian University Extension - Wszechnica UJ), which support young people with innovative business ideas. The project includes training, business consulting and non-refundable grants (about 10000 EUR) for the best business plans (see also p. 7).

**Inventions** (from Jagiellonian University) - see the following pages.

**Jagiellonian University in Krakow** - the place where CITTRU was born and where it still functions. Place of our endeavors, sometimes also stress, but above all the successes.

**Projects** - CITTRU combines regular activities (eg. coordinating the process of patenting) with projects implemented periodically (eg. internships for researchers). Projects usually run for a few months and are related to current needs or new tools to improve cooperation between science and business. CITTRU likes projects :).

**Workshops, trainings, courses** - our primary tool for creating „Academia open for business”. Currently the training aimed at researchers from Jagiellonian University is focused on methods of marketing and fundraising for research & development. Apart from them, we regularly run trainings related to various aspects of patent protection, biobusiness, etc.

**www.cittru.uj.edu.pl** - CITTRU's website is recommended by the Science in Poland webportal run by Polish Press Agency for high quality information, up-to-date news and user friendly content management.

**Important definitions** which did not appear but could also indicate the area of CITTRU functioning: science promotion, Entrepreneurship Days, academic entrepreneurship, inventions and technology fairs, CITTRU's partners, contests, business plan, structural funds and many others.

# CITTRU FAQ

## CITTRU in 6 answers + contact

### 1. CITTRU?

In Polish - Centrum Innowacji, Transferu Technologii i Rozwoju Uniwersytetu, in English - Centre for Innovations, Technology Transfer and University Development - in short it would be CITTUD. But it seems to us that the Polish acronym sounds better even in English, especially that it can be read as a mysterious Cthrough :).

### 2. How is CITTRU related to the Jagiellonian University?

It is its unit for special tasks. Our work is dedicated to all faculties and researchers, but also to each individual. Probably you have already noticed that we focus on the individual approach to each case, whether it is a patent worth millions or a student asking for supporting the organization of economic simulation game.

### 3. I have seen the slogan „Knowledge - Innovations - Business” on your website. Is it a magic spell?

Yes, it is :) . But most of all it is the motto of our activity, the desire to combine scientific knowledge with innovative business and the belief that science can offer a lot to business and vice versa.

### 4. Jagiellonian University is over 600 years old, was CITTRU already created at the time of the JU foundation?

Hmmm... yes, if the research of Copernicus (a student at the Jagiellonian University) is presented as innovation that may be commercially relevant (who knows, maybe he hoped to get profits because of increase in sales of astronomical instruments after an unexpected change of place by the Earth and the Sun). Seriously, CITTRU was founded in 2003 - so it is a young unit, but we managed to test plenty of opportunities and tools supporting university business development.



(almost) entire CITTRU team

### 5. Business, patents, companies, hi-tech - it is a relatively large range of action. How do you cope with such diverse topics?

We will surprise you, but technology transfer is one of the most important, but not the only field of our activity. CITTRU undertakes a variety of educational and also promotional activities. It supports the en-



photo by Anita Andrzejewska and Andrzej Piličowski-Ragno

trepreneurial efforts of students and young researchers. We are also involved in the promotion of science - because without a strong, understandable and effective basic science there is not any practical knowledge, which can turn into profitable business.

And it is still not everything. We also help the University to gain EU structural funds. We manage the implementation of several strategic projects of the University, which will improve both scientific and educational base.

Returning to the initial question - we take the variety of tasks as a challenge, being sure that different elements can be combined in one well-functioning system. We are doing our best.

### 6. You approach to each researcher individually (see paragraph. 2). Does this mean that such a large university does not have uniform rules on the science business?

Of course, we have the rules and we are proud of their development. Jagiellonian University - as the first university in Poland - has introduced this type of regulations for the management of intellectual property and the development of spin-off companies. As a result, the number of patent applications has grown significantly (from 0 in 2006 to 16 in 2008) and new companies with the participation of the university are emerging.

These rules are a map allowing researchers to efficiently navigate on, often rough, sea of the business. We do not want to hide ourselves behind them, we know that every case is slightly different. And we want to work with the inventor directly on these differences. Does it sound too pompously? ;) It may be explained by this - mathematical explanation: commercialization rules + individual approach = success and satisfaction.

### 7. How can I contact you? Where will I find your offer?

visit: [www.cittru.uj.edu.pl](http://www.cittru.uj.edu.pl)  
write: [cittru@uj.edu.pl](mailto:cittru@uj.edu.pl)  
call: Tel + 48 12 663 38 30

# Inventors' helpdesk

## Internet tools supporting innovations

The great Polish writer and futurist - Stanislaw Lem wrote: „...many millions of years ago, when Australopithecus was created, his biology has already condemned him to search technologies, because his upper limbs were no longer used for supporting walking, and the brain was free of a typical animal task of keeping him alive, there was no other way (except for extinction of the species) any longer...” (Mystery of the Chinese Room, Kraków 1996)

Lem - technology enthusiast, was also a fierce critic of the Internet. He lamented that it evolved in the direction of the lowest values. However, the Internet is not just bunch of gossip from the life of pop stars and silly comments on Twitter. The information revolution has accelerated the development of science but it has not neglected scientists at the same time.

### CREATION

Even, when a truly novel idea is born in mind, we should look through literature to find out whether we are not trying to reinvent the 'wheel'. The libraries of patent offices contain more than 80 million documents, and they increase by 90 new files every hour. Patent information reveals the majority of the most promising technologies that arise (it is estimated that 70% of patentable inventions are reported to protection). It is worth noting that only 1/10 of the information contained in patent documents is protected data. The rest are detailed descriptions and examples. What is important, many of the databases are available online for free.

Website that is best suited for searching the patent database is **Espacenet** ([www.espacenet.com](http://www.espacenet.com)). Among the free databases widely-used are also services of the American Patent Office and the German patent database.



Photo by Michal Koralewski

### PROTECTION

Until recently, submitting a patent application has required „secret knowledge” on how to prepare documents and deliver them to the Patent Office. For several years in international protection institutions, and recently also in Poland, applications can be made via the Internet.

In the era of globalization it is not enough to protect innovation in one country. In recent years, online tools for the effective management of the process of international protection has emerged. One of them is Inovia. The software offers the opportunity to evaluate the cost of patent protection in

individual countries. Unfortunately, you have to pay for the Inovia service.

### EVALUATION

Particularly noteworthy is a free service promoted by the European Patent Office. Program **IPScore** ([www.epo.org](http://www.epo.org)) enables the analysis of patent and fitting the patent protection strategies to the type of planned activity. What is particularly important for researchers, **IPScore** enables the assessment of a whole technology, and even projects which have not generated patents yet.

Most of the institutions supporting the technology transfer, have access to payable, frequently updated online databases. One of these services is the Knowledge Express. This portal - specialized in the field of life science - enables not only to find patent documents, but above all, gives the access to information about recent transactions, and sometimes even the content of these agreements. This and similar bases make the work much easier, prompting where to go with the offer of university innovation.

### TRANSFER

One of the primary ways of valuing intellectual property is the auctioning. A patent is worth as much as the market is willing to pay for it. Meanwhile, web tools can be used which have started to gain popularity just recently. So far it has been difficult to provide detailed information on innovation on distance, and almost impossible (except for invention fairs) to gather potential buyers in one place. The Internet has offered new opportunities, so next to the auctions of goods (ebay, Allegro), portals specializing in intellectual property auctions began to appear. A service of Ocean Tomo company can serve as example. Portal Patent/Bid-Ask gives the opportunity to both the sale of rights for developed technologies, as well as notification of a need to buy.

### HUMAN FACTOR

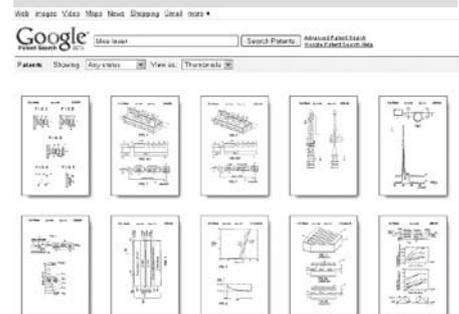
Regarding the new tools to promote innovation, does the role of technology transfer officer and patent attorney cease to have meaning? Definitely not: software is helpful, but new technologies are so unique that they require an individual marketing approach and take into account non-quantifiable factors. Also negotiations with the companies, contacts and skills that go beyond the technocracy have considerable importance. So far a human-specialist is still the most important tool for technology transfer.

Krystian Gurba, CITTRU

## worth to know

### History of Google

In 1996, two Stanford University graduate students created a web search engine based on a new concept. The results of their work were patented and in 1998 they founded Google Inc. company. Their university participated in it. In 2004, after the company made a debut on the stock market, the University sold its shares and earned more than \$ 300 million. Now, the value of Google Inc. is over 150 billion dollars.



Google's patent search engine presents a list of the results in the form of thumbnails

The answer to the question how Google values the intellectual property may be the service [www.google.com/patents](http://www.google.com/patents), which is a free search engine of patent documents. The database is limited to U.S. documents, but it includes patents even a hundred years old. If you want to find out how Edison's first light bulb looked like, you should visit this website.

### IP Score

This is a computer program based on Microsoft Access, it was developed by the Danish Patent Office in close cooperation with the business. It allows the valuation of your intellectual property. See [www.epo.org](http://www.epo.org).

### Espacenet

Espacenet ([www.easpacenet.com](http://www.easpacenet.com)) is the official database of the European Patent Office. It is recommended because of user friendly interface and a large amount of available data. It contains more than 60 million patents, inventions from Europe, U.S., Japan and other countries.

### OceanTomo

Ocean Tomo is a pioneer in the field of intellectual property management as it uses the innovative Internet tools. It launched many applications that help to create value from intellectual property. In 2006 it introduced OceanTomo auctions of intellectual property in traditional form and online. It is also developing a service for the evaluation of patents - Patent Ratings.

## innovations

### University inventions at international trade fairs

Expenditure on patent protection is meaningful only when the obtained rights can bring profits in the form of royalties. Therefore, after the introduction of regulations on intellectual property protection CITTRU has increased efforts to attract licensees, investors and research partners.

In recent months, inventions and technologies from the Jagiellonian University were presented by scientists and CITTRU staff during the fairs: Life Science Forum in Munich-Garching, BIO Convention in Atlanta, BioForum in Łódź, European Congress on Biotechnology in Barcelona, Poleko in Poznan and Pollutec in Paris.

The potential of university projects was awarded. The presentation of hybrid photocatalysts for water purification presented by Dr. Krzysztof Szczubiałka from the Department of Chemistry, during the New Material Forum in Valencia, received a special award.



Brussels Innova - medals for the University. From left to right: Prof. Paweł Moskal (physics), Dr. Gabriela Konopka-Cupiat (CITTRU), Dr. Andrzej Kotarba (chemistry)

In the autumn, Jagiellonian University took part in the Brussels Innova 2009 exhibition. The inventions of our scientists came back with medals, exceeding the last year's success of the catalyst for decomposition of nitrous oxide (see p.6). Gold medals have been awarded to: „Matrix Positron Emission Tomography” (Prof. Paweł Moskal - physics), and „Conductive carbon layers for composite electrode in lithium batteries (team led by Dr. Marcin Molenda and Prof. Roman Dziembaj, chemistry); silver medal has been awarded to „Ferrite catalyst for styrene synthesis” (team led by Prof. Zbigniew Sojka and Dr. Andrzej Kotarba, chemistry).

The jury takes into account the level of innovation, social need, capacity to implement, confirmation of the efficacy by the relevant research results and the presentation of marketing effectiveness.

# From the laboratories of the Jagiellonian University

## medicine, environmental protection, industry

*New drugs, therapies, diagnostic methods, solutions to environmental problems, as well as advanced technologies for the industry - research of the Jagiellonian University lead to results that can be applied in important areas of life.*

We present a brief overview of selected inventions of the Jagiellonian University filed as patent applications in 2009, for which CITTRU is seeking investors or licensees.

### Cancer therapy, diagnosis, disinfection

One of the most anticipated results of research is an effective cure for cancer. A novel approach to such therapies is a method of cancer treatment developed by researchers from the Jagiellonian University Medical College, which is based on a genetically modified Salmonella. The bacterial strain has the ability to selectively colonize tumor tissue by using specific antibodies. In addition, new features of the bacteria cause the destruction of tumor cells through apoptosis and necrosis. Animal studies indicate high efficiency of this new therapy.

Early detection of neoplastic lesions is essential for successful treatment. Currently, one of the most technologically advanced imaging techniques in oncology is Positron Emission Tomography (PET). The group of JU physicists led by Prof. Paweł Moskal proposed a new solution to improve PET imaging. The use of relatively cheap organic scintillators, which can be produced in any shape and size, in opposition to currently used expensive inorganic crystals, enables the construction of a diagnostic chamber of any size, allowing imaging of physiological processes at the same time throughout the patient's body.

Another invention of university researchers is getting closer to the biomedical market. The team led by Dr. Wojciech Macyk investigates materials based on titanium dioxide ( $\text{TiO}_2$ ), which are known to have photocatalyst properties.  $\text{TiO}_2$  irradiated with UV light has germicidal properties, it is also fungicide, disinfectant and deodorizer. These materials are used to

produce self-cleaning coatings and to disinfect water, sterilize surfaces and deodorize air. Modification of nanocrystalline titanium dioxide has allowed scientists to create a material which is active in visible light, thereby eliminating the need to use expensive lamps that emit harmful ultraviolet radiation.

### Clean water, clean air

The phenomenon of photocatalysis is also used by the inventions of scientists from the Department of Chemistry (team led by Prof. Maria Nowakowska) - hybrid photocatalysts based on nanoclay, which can be applied to remove water pollution.

Compared to current solutions, hybrid photocatalysts have many advantages. They are based on non-toxic natural minerals, and therefore can be used in the natural environment. They also have the ability to remove toxic compounds from water by simple physical adsorption, and at the same time - by photocatalytic degradation (they combine the advantages of photochemical and adsorption method). In addition, they undergo spontaneous separation of the aqueous suspensions as a result of sedimentation, therefore they can be easily removed from the aqueous suspension by filtration or decanting.

### CONSTRUCTION AND APPLICATION OF SALMONELLA-BASED ANTI-CANCER VACCINE

(TECHNOLOGY OFFER P-105)

The subject of the offer is a new vaccine-based cancer therapy based on genetically modified bacterial strain of Salmonella VNP20009 that is able to target tumour tissue. Tumour targeting was enhanced by antibody fragments specific to carcinoembryonic antigen. Further genetic modifications were introduced to increase apoptosis and necrosis within the tumour microenvironment, resulting in augmented cancer-specific immunity. The vaccine exhibited potent efficiency in animal studies.

Current methods of cancer treatment are based mainly on chemo- and radiotherapy combined with surgical removal of tumour and surrounding tissues. Those classical methods are being improved to focus the destructive effects of rays or drugs on tumour tissues, while sparing the rest of the organism. The major problem remains the minimal residual disease associated with incomplete removal of tumour cells by chemo- and radiotherapy.

As modern chemo- and radiotherapy protocols remain insufficient, new therapeutic strategies arise for selective destruction of tumour cells. Immunotherapy through activation of the immune system is especially promising, because it can both eliminate cancer foci and generate systemic anti-tumour immunity. Several immunotherapeutic approaches have been attempted, including the use of microorganisms, including viruses and bacteria, to construct vaccine vectors for targeted therapy. The vectors are usually equipped with costimulatory molecules to improve their anti-cancer



potential. However, despite numerous attempts the success of such treatment remains incidental, which is most likely related to the composition of the cancer tissue and its ability to induce immunotolerance.

In the studies at the Jagiellonian University, a modified bacterial strain of Salmonella was used as the vaccine vector. The strain called VNP20009 is genetically modified S. typhimurium with attenuated virulence, which is able to preferentially colonise tumour cells and inhibit their growth. The mechanism behind this phenomenon remains unclear, but it is potent enough to overcome inaccessibility of the tumour to the effective immunity. VNP20009 strain exhibits an excellent safety profile and a specific intratumoural action in rodents and dogs. Furthermore, phase I clinical trials documented the safety of the Salmonella-based therapeutic regimen.

CITTRU  
CENTRE FOR INNOVATION,  
TECHNOLOGY TRANSFER AND  
UNIVERSITY DEVELOPMENT



JAGIELLONIAN  
UNIVERSITY  
IN KRAKOW

Part of the University offer - Salmonella-based anti-cancer vaccine

Another team of chemists led by Prof. Zbigniew Sojka and Dr. Andrzej Kotarba cares for cleaner air. They work on catalytic decomposition of nitrous oxide (N<sub>2</sub>O) emitted by plants for the synthesis of nitric acid (V). N<sub>2</sub>O emissions can significantly contribute to the greenhouse effect, because they accumulate heat about 310 times more than CO<sub>2</sub>, and therefore it is necessary to eliminate them effectively. The main advantages of the catalyst developed by scientists at the Jagiellonian University are: high catalytic activity, ease of use in existing installations (no need to upgrade) and the environmentally friendly composition.

## Lithium-ion batteries, plastic materials

The production of lithium-ion batteries, used, e.g. in mobile phones, digital cameras and laptops or in cars with hybrid and electric drive, is also an eco-friendly technology. Chemists (Prof. Roman Dziembaj and Dr. Marcin Molenda) have developed a new method for direct production of conductive layers on the hard coal powder (oxides, silicates, phosphates etc.), which is designed especially for producing electrode layers in the Li-Ion batteries. The process runs completely in water and carbon precursors that are used are nontoxic, which makes the technology safer for the environment. A properly chosen composition can produce the layer of coal with desired physicochemical properties (thickness, tightness, porosity etc.) and particularly suitable electrical conductivity.

You want know more about described inventions?

Contact for business:

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or [dominik.czaplicki@uj.edu.pl](mailto:dominik.czaplicki@uj.edu.pl)

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VISIBLE LIGHT PHOTOACTIVE  
MATERIALS BASED ON MODIFIED  
NANOCRYSTALLINE TITANIUM DIOXIDE  
FOR DISINFECTION AND STERILIZATION



(TECHNOLOGY OFFER P-108)

The subject of the offer covers materials based on modified nanocrystalline titanium dioxide that can be applied for an efficient photocatalytic microorganisms inactivation or organic pollutants degradation under visible light irradiation.

Titanium dioxide based materials are commonly known as photocatalysts of environmental and biomedical relevance. Photoactive TiO<sub>2</sub> irradiated with ultraviolet light shows antiseptic, fungicidal, disinfecting and odour-neutralizing properties. It can be used for production of self-cleaning surfaces as well as disinfection, sterilization or odour-neutralizing agents.

The subject of this offer includes photocatalytic materials produced by a smart modification of nanocrystalline titanium dioxide. The new materials absorb visible light that initiates the photocatalytic processes. Under these conditions photodegradation of organic compounds and bacteria inactivation proceed very efficiently.

The main advantages of modified nanocrystalline titanium dioxide are:

- lack of the dark-toxicity of both the modified material and its components;
- visible light induced strong effect of phototoxicity towards microorganisms allowing elimination of expensive and harmful ultraviolet light sources;



Part of the University offer - Materials based on titanium dioxide

cochemical properties (thickness, tightness, porosity etc.) and particularly suitable electrical conductivity.

University discoveries can also be used in the plastics industry, where one of the most basic raw material is styrene (styrofoam is a polymer of styrene in the foamed form). Over 90% of styrene worldwide is produced by catalytic dehydrogenation of ethylbenzene. Harsh conditions of this process cause gradual deactivation of the catalyst and reduction of its usage time in industrial installations to 1-2 years. The team led by Prof. Zbigniew Sojka and Dr. Andrzej Kotarba has created ferrite catalyst with higher thermal stability, activity and resistance to surface carbon deposition. An important advantage of the invention is the fact that its practical application does not require sophisticated and expensive redesign of production lines - the catalyst can be used in existing facilities without any need for modernization.

Aleksandra Lubnicka, CITTRU

## worth to know

### POLISH SCIENTISTS - THE INVENTORS AND ENTREPRENEURS

**Jan Szczepanik** - author of hundreds of patented inventions and technical ideas in the field of photography, television and others. He patented the tectroscope in 1897, one of the first solutions in the field of monochrome television. He also created a bulletproof armor: type of fabric with thin steel sheets. This invention brought fame for Szczepanik, because it protected the Spanish King Alfonso XIII during an attempt against his life.

**Tadeusz Sendzimir** - in 1933-1934 he built a plate mill for production of 1 mm metal sheet from 1cm thick steel plate. This method was patented in the UK, France and

USA. After the Second World War he remained in exile, where he still ran his company specialized in the design of metal forming machinery. He was an author of 73 patents.

**Jan Czocharlski** - he patented a method of growing crystals, which are essential in the production of processors used today.

**Jan Łukasiewicz** - a Polish mathematician, in 1920 he developed "reverse Polish notation system" (RPN - Reverse Polish Notation) used today in branded pocket calculators.

**Henryk Magnuski** - engineer, employee of the U.S. telecommunications group Motorola, creator of one of the first walkie-talkies; he designed portable radio, which was widely used by U.S. forces.

ed. Mariusz Kielar

## worth to know

### Various faces of heparin

Heparin is a medicine which inhibits blood clotting, so it has many applications in medicine for treatments and during surgery. In many cases, the heparin treatment is needed only for a time - then it must be removed to prevent dangerous side effects such as bleeding or osteoporosis. At present, doctors neutralize heparin by administration of protamine, but it is a dangerous drug that can cause serious complications. It is worth noting that one large surgery department performs several thousand heparin treatments a year.

POLYMER MATERIAL BASED  
ON CHITOSAN  
FOR HEPARIN REMOVAL  
AND NEUTRALISATION  
IN MEDICAL APPLICATIONS

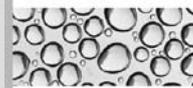


(TECHNOLOGY OFFER P-110)

The subject of the offer is an application of modified chitosan, in water solutions or in the cross-linked form of microspheres, for removal of heparin from blood and body fluids. The offered method allows for heparin neutralisation in the patient's organism, but could be also used for constructions of devices for extracorporeal heparin removal.

Heparin has many clinical applications due to potent ability for inhibition of blood clotting. Heparin is a drug of choice when such antithrombotic effect is required, e.g. during surgical procedures, and especially for prevention of blood coagulation for extracorporeal therapy (the dialysis and cardiopulmonary bypass).

is no longer needed. The most common method is administration of protamine, a small protein that is a heparin antagonist. Another way is used to inactivate heparin in dialysis, applied also to enhance the effect of protamine. Heparin can be neutralized by enzymatic degradation with recombinant heparinase.



The use of heparin carries a risk of serious side-effects, among of which bleeding, thrombocytopenia and osteoporosis are most frequent. Due to the side effects heparin should be removed from the bloodstream as soon as the anticoagulant effect

However, the current methods of heparin removal themselves can produce side-effects. For example, as many as 50% of patients suffer from unwanted reactions caused by protamine that can have severe consequences, including fatal events. Among the side-effects there are: pulmonary hypertension, arterial hypertension, anaphylactic crisis, thrombocytopenia, granulocytopenia, prolonged activation and release of cytokines. Furthermore, protamine-induced heparin neutralisation is incomplete and followed by slower reaction. Heparin, on the other hand, is a naturally occurring polymer.



Part of the university offer - material for prolonged release of heparin

Researchers of the Jagiellonian University have developed a modified polymer that has the ability to bind to heparin and inhibit its activity. The new substance consists of natural ingredients and is inexpensive and nontoxic; it can be used as a solution (for direct administration to patients) and in the form of microspheres for the manufacture of devices for extracorporeal heparin removal. The latter application is important because heparin is also used to prevent blood clotting in many medical devices, such as dialyzers.

Another material is a substance in a gel form, which allows prolonged release of heparin. In the case of diseases associated with the formation of clots, most often in acute myocardial infarction, heparin is a life-saving medicine. Unfortunately, the biological life of heparin is short. The material produced at the Jagiellonian University allows for gradual release of heparin, even for several days, and the speed of this process can be monitored. As a result long-term, stable concentration of heparin in the blood can be obtained, thereby effectively preventing the formation of blood clots.

## innovation

### Harmful nitrous oxide

Aleksandra Łubnicka, CITTRU: *What is interesting in your new technology?*

prof. Zbigniew Sojka, Department of Chemistry, Jagiellonian University: The invention you are asking about is a catalyst for removing nitrous oxide from so-called residual gases. Nitrous oxide is a greenhouse gas with 300 times greater effect than carbon dioxide. Nitric acid plants are the main source of emission of this gas, we have several plants of that kind in our country. To meet acceptable standards and avoid paying penalties in the near future, these installations must implement new technologies, which will help to reduce emission of nitrous oxide into the air.



Diploma of Brussels innovation exhibition for inventors of the catalyst

*Were the studies finished at the laboratory stage?*

Since the pilot test results were promising, with the initiative of the Fertilizers Research Institute in Puławy (partner in this project - A.L. note) there was a proposal of application for patent protection. CITTRU prepared a co-ownership agreement of the IPR related to the invention and its market applications. The promotional activities have begun and the invention was awarded a gold medal at the International Exhibition of Inventions IVIS 2008 in Warsaw, and a bronze medal at the World Exhibition of Innovation, Research and Modern Technology Brussels Innova - Eureka Contest 2008 in Brussels.

# Innovation is the role of the university

*We present a fragment of an interview with prof. Zbigniew Sojka (Department of Chemistry, Jagiellonian University); he leads a team of scientists who created the catalyst to remove nitrous oxide.*

Aleksandra Łubnicka, CITTRU: *Does the Polish industry undertake the implementation of technologies emerging in science units?*

We do not have too many good experiences. It seems, that there were very few contacts between universities and the industry. The previous era (before democratic transformation) industry was not interested in innovation. As a result of changes, in the last 20 years most factories have started to manufacture standard products. Their research centers were usually located abroad. Perhaps this initial phase of accumulation is needed, but it seems to me that Poland cannot go this way any longer. If we want competitive economy, we have to create technologically advanced products based on knowledge. The phase limited by the shortcomings in equipment, when you work on „what could be” studied, is followed by the mature phase, when you can finally analyze „what you want.” This is the first condition for the appearance of innovation.

The second condition is a matter of organization and financing. We have little experience and often no faith, that, the fundamental research can lead to effective implementation in industry. However, it must be funded up to the final success. It cannot be expected that the university will produce ready to use technology, because this is not its role. The role of universities is creating the knowledge and commercialization of intellectual property by units such as



Prof. Sojka (second from right) with his team

CITTRU. Research institutes and industry should transform the knowledge into technology and implement it. Our fruitful cooperation with the Fertilizers Research



Puławy Nitrogen Plant - the potential user of the catalyst (Photo by Sławomir Klak)

Institute in Puławy indicates that there is great potential.

*Are the scientists interested in cooperation with industry? Research shows that entrepreneurs are convinced that scientists are only interested in fundamental research...*

I think it depends on individual experiences. There are scientists who are only interested in basic research and it is good that this is so. Everybody cannot do everything, because in such a situation, there is a risk that nothing important will be achieved. An important thing is whether the basic research carried out is creative, and if it has a chance to become the basis for the development of innovative technologies for example new materials. In this context, the science-industry relationship is extremely important.

*Should the researchers take into consideration the current needs of industry while planning their research?*

The role of the university, in the first place, is to explore new areas of knowledge; because the potential results are uncertain and are too distant in time, hence it is difficult to assess their importance. **Exploitation** - the use of knowledge oriented on developing new technologies and products is the task of industry, which takes the financial risk and in case of the success of this implementation will be directly benefited.

# Tad Witkowicz: „In business I look for outstanding people”

Tad Witkowicz does not beat around the bush. He does not claim that an idea for business is a guarantee of success or that most of the interesting ideas will work commercially. He even claims (adducing the views of Ashley Brilliant) that „good ideas are everywhere - people who will work hard to implement their ideas are unique”.

This Polish immigrant, a physicist and computer industry tycoon, has a rich experience and his opinions should be taken seriously. In 1964 he went overseas; he studied physics at the University of Toronto and graduated with honors. He started his career, but soon realized that his calling was business. As the first Pole he created and launched on the NASDAQ stock exchange three high-tech companies: Artel Communications, CrossCom and Adlex. All of them were later sold for tens of millions of dollars.

He has been working for several years in America and Poland as an investor. He is ready to take a risk and finance so-called start-ups - just emerging companies with only an innovative idea and a business plan. He is the founder of Otago Capital Fund. „I prefer companies developing from scratch, without any routine. They are more interesting and more profitable” - he says.

During a meeting with Witkowicz, organized by CITTRU, nearly 300 young people gathered to listen about a difficult matter of achieving success in business. Even this two-hour seminar could be the foundation of the grand handbook for the modern company. It is worth mentioning here at least a few interesting ideas of Witkowicz. Above all, he argues that the sale of a product or service is as important, if not more important, as the innovative idea itself. The founder of the Otago Capital clearly indicates the mistakes made by young businessmen: an exaggerated faith that there is no competition on the market and you are the first or have a cheaper product is not enough to gain a fortune. He recommends common sense by saying that „competition is not as stupid as we sometimes think, but cannot walk on water either”. He also suggests avoiding a clash with rivals (especially with the giants) as long as possible and focussing on the customers, adjusting perfectly the product, service, marketing and sales.

That is only a handful of observations relating to the first stage of the company's activity. Tad Witkowicz also described, precisely and wittily, the following stages: embryonic, development, growth and dominance. He did this unassumingly, aware of his achievements, but without any superiority towards the beginning entrepreneurs.

Piotr Żabicki, CITTRU



Listening to Tad Witkowicz's explanations, photo by CITTRU



Tad Witkowicz, photo by CITTRU



Tad Witkowicz in conversation with young entrepreneurs, photo by CITTRU

## Young people and business

### Grants for 30 new companies in the Małopolska region

The best thirty business plans submitted to the competition organized by CITTRU and Jagiellonian University Extension (Wsztechnica UJ) in two edition of the Jagiellonian University School of Entrepreneurship - Innovation and business, has been awarded financial grants up to 10000 Euro.

The choice was extremely difficult. Initial assessment of the business plans helped to reveal several ideas that were presented at the public presentation. Finally, after examining: the originality of the idea, its economic value, financial projections, market entry strategies, analysis of competition and originator's potential, the jury awarded non-refundable grants of up to 10000 Euros to the best 30. The grants came from the EU Structural Funds.



A novel idea for a tourist business. Presentation, photo by CITTRU”

The group of finalists includes, among others, a company offering innovative solutions in motorcycle service, automated service for swimming pool functioning, data archiving, production of high quality software, landscape architecture studio, internet rehabilitation center, center of environmental expertise and a company creating radio dramas.

The way to success for participants of „JU School of Entrepreneurship” began in December 2008. From almost a thousand entries submitted, 108 most interesting business concepts were selected. Training cycle and meetings with advisers were another step towards own business. Finally, formulation of a professional business plan and its presentation was the final stage to receive a grant.

The last business plan competition is still to come at the end of the third edition of the project. More ideas will get a chance for realisation in the first quarter 2010.

## Contest

**SCIENCE <=> BUSINESS  
POSTER CONTEST.  
WE KNOW THE WINNERS!**

Nearly 200 works were submitted to the Science <-> Business competition, which had been organized by CITTRU to promote the importance of research for the economy. The winner of cheque for 5000 PLN was Maciej Mytnik for his work "Science + Business = Success". The official announcement of the results of competition was held, together with opening of the exhibition, in the Auditorium Maximum, JU. The awards were presented by the Rector of the Jagiellonian University prof. Karol Musiol.

In the opinion of the jury and the public, the vast majority of works was a perfect combination of art and information, aesthetics and message - something that every good poster should have.

The best work can be viewed on the

CITTRU website and in the buildings of Jagiellonian University and Lublin University of Technology.

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Poster by Maciej Mytnik - the contest winner - the words from the top mean - Success, Business, Science

## editorial board

NIMB bulletin

- Science, Innovation, Marketing, Business

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# Next science

The term „next science” does not refer to a new concept, by which researchers want to prove that aliens (sportsmen, jellyfish from the Yellow Sea, etc.) are responsible - let's say - for the planet's tectonic movements. It is simply a further stage in the development of science. Signs of this stage can be observed now. I will analyze the new phenomena, being convinced that they have an effect not only on the development of science itself, but also on future forms of cooperation between the university and business.

## From Web 2.0 to Science 2.0

„Next Science” is a result of new trends in the Internet communication and already famous phenomenon known as Web 2.0. Hence, following the pattern it is called Science 2.0. But what is it really about? The idea of Web 2.0 appeared at the beginning of this century, and for many people this is the next stage in the development of communication (not only electronic) characterized by two key attributes: access to information and forming communities around it. The success of Facebook is a good example how that idea can realize. Database of people/contacts is the information, and communities (groups) form around the renewed and new contacts.

Quite a few people also say that Web 2.0 is just a marketing name (brand), new packaging attracting more users and investors. Facebook's example can be illustration of such a view. Because this is a business venture, which aims to gather clients (no longer users) in one (virtual) location and offer them a particular product/advertisement.

How, in the face of these findings, does the „Next science” look like and how it should look like? First of all, it should guarantee extended access to information, for example so-called Open Access - creating the Internet environment of easy publishing and using of texts. More about Open Access can be read at: [www.soros.org](http://www.soros.org)

## How do storks love?

But Science 2.0. can offer something more - it can create the show, allowing the on-line access to its laboratories and transmitting the experiments. The example of some bird-watching project shows how good way of popularization of science, exchanging experiences, contacting the professionals it can be. Since 2006 a special webcam has been watching the actions of the stork family nesting in Przygodzice (Wielkopolska Region, Poland). The project „Close to storks” is a scientific experiment (it allows to follow closely the life of birds), which thanks to new technology has gone out from „quiet

and hidden laboratories”. According to the largest Polish newspaper Gazeta Wyborcza (1.08.2008): „last year, more than two million of Internet users from such exotic countries like Panama and Laos watched Polish storks. On June 2nd the website [www.bociany.ittv.pl](http://www.bociany.ittv.pl) with live coverage from the storks' nest, won the first place in the world ran-



Origami - The network linking the creative and business environments. Poster sent to Science - Business contest, author: Maria Majnusz

king for websites about birds”. Web users comment on bird's behavior, gave them names. And news that the stork parents fell in love and were expecting offspring caused a real storm of discussion.

## Life in the space and on Facebook

So what can the „next science” offer, what will help it to be more efficient (access to data, contacts between scholars) and popular (the involvement of people, new professionals)? The digitalization of the documentation could certainly be a major step in that direction. But scanning old scripts to spark greater interest in it is too little. You need a detailed description and „emotions” that will make it attractive: scientific puzzle, participation in research. Some years ago such participation was proposed by SETI @ home project, which encouraged Internet users to connect their home computers into network and analyze data from astronomical radio-telescopes. To find life in the space - this is the challenge:). Perhaps as intriguing as finding old friends on Facebook.

Piotr Żabicki, CITTRU



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