



## EXTERNAL NEWSLETTER 04/2011

External electronic Newsletter, December 2011

Dear colleagues,

There are many reasons why 2011 will be well remembered by all members and friends of CEITEC: the final approval of our project, the opening conference attended by the Prime Minister, the start of research activities and tenders, the arrival of new colleagues to our ranks and financial resources to our accounts and our first outcomes. CEITEC has made it clear it is here to produce and strongly encourage high quality research. The key instrument to make this happen i.e. independent evaluation of our performance is now clearly defined. The Coordination Board has approved the scope and criteria of the planned evaluation. These rules have been consensually elaborated internally with both Scientific Directors, all Research Programme Coordinators and consulted with members of both the International Scientific Advisory Board and the Coordination Board. CEITEC is now quickly moving from words to deeds.

I would like to thank to those who have helped us and supported us in our effort in this very hectic year and wish you all success in the next. ●●



**Tomáš Hruďa**, Executive Director

## Coordination Board Meeting



**The CEITEC Coordination Board** (principal management body of the Centre) meeting was held on 14 December in Brno. The primary goal of this board meeting was to provide a regular quarterly update to the CB members and to approve key documents – Activity Plan of the Project for 2012, **Common Evaluation of Scientific Excellence** and common rules and policies. The Coordination Board approved all negotiated documents in this meeting. ●●

## Common Evaluation of Scientific Excellence

The Common Evaluation of Scientific Excellence will be held from 10 - 12 June 2012 in Brno. More than twenty renowned scientists will participate in the assessment of CEITEC's seven Research Programmes and their Research Groups. The principal objectives of the Evaluation are to set evaluation standards, to gain a true picture of the performance and potential of all Research Groups at the starting point of Centre's operation and to receive comments and advice from

respected experts in the field. The evaluation would cover all active (in 2012) Research Groups. The assessment will take into consideration outcomes covering period of preceding 5 years, i.e. outcomes accepted after January 1st 2007 and before the end of 2011, regardless of their institutional origin, and will include peer-review as well as benchmarking with CEITEC Strategic partners. ●●

## IMEC Senior Fellow prof. Gustaaf Borghs to Lecture at CEITEC, Brno



A IMEC Senior Fellow and a member of CEITEC Coordination Board lectured to Brno scientists and the general public on 14 December 2011. In his lecture, "IMEC – The Past and the Future", Professor Gustaaf Borghs introduced the Centre's functions and its research activities. ●●

## Cooperation with the Imperial College of London Negotiated by CEITEC

A delegation of CEITEC experts negotiated cooperation with counterparts at the Imperial College of London on 8 December 2011; they met Vice-Rector for International Affairs, Simon Buckle. The parties agreed on real-life cooperation among specific research groups of both institutions. Their cooperation is already successful on a smaller scale and should develop further in the future. As an example of the results of this collaboration, students from both participating organizations'

doctoral programmes will have the opportunity to participate in exchange programmes.

The representatives of CEITEC also met with the Director of the Centre for Plasmonics and Metamaterials at the Faculty of Natural Sciences, operating within the university, Stefan Maier, who recently became a member of the CEITEC Coordination Board. ●●

## CEITEC Introduced on "Centrope 120 Seconds" in Vienna

Representatives of CEITEC established new contacts and cooperative relationships at the "Centrope 120 Seconds" international workshop held on 15 November 2011 at the Vienna University of Technology. Dozens of representatives from companies, universities, and research institutes from the Centrope region and elsewhere met there for a Day of Life Sciences. Participants had an opportunity to create new specific working relationships and informally explore areas of cooperation. ●●



## What is Else New in CEITEC?

- New General Brochures and Brochures of all Research Programmes to download (<http://www.ceitec.eu/news/to-download/>)
- New hyperlinks to CEITEC Facebook, Youtube, LinkedIn and RSS you can find on homepage ([www.ceitec.eu](http://www.ceitec.eu)).
- New profiles of all Research Groups under the respective Research Programme – section Research Programmes (<http://www.ceitec.eu/programs/>).
- Contacts for all Group leaders under the respective Research Programme – section Contacts (<http://www.ceitec.eu/contact/research-programmes/>).

## Science in CEITEC

We would like to regularly present selected publications written with the participation of CEITEC scientists which we believe cover thought-provoking topics. We hope you find these topics interesting. Full versions of all publications can be downloaded [here](#).

## Selected CEITEC Publications

### TRAC – Trends in Analytical Chemistry

Assays for determination of matrix metalloproteinases and their activity

Krizkova, S.; Zitka, O.; Masarik, M.; Adam, V.; Stiborova, M.; Eckschlager, T.; Chavis, G. J.; Kizek, R.

CEITEC Research Group: **Submicron Systems and Nanodevices**

Research Programme 1: **Advanced Nanotechnologies and Microtechnologies**

#### Summary

Matrix metalloproteinases (MMPs) are involved in many physiological and pathological processes. Numerous MMPs assays were developed for both clinical and research purposes, but far more attention was turned to understanding their biological functions. In this review, enzymatic, immunochemical and fluorimetric methods as well as in vivo imaging methods are discussed. Moreover, we aimed our attention on additional methods that are now subject to investigation, such as phage display, Multiple-Enzyme/ Multiple-Reagent Assay System (MEMRAS) and activity based profiling.

### Applied Physics Letters

In-situ observation of 110 oriented Ge nanowire growth and associated collector droplet behavior

Kolibal, M.; Vystavel, T.; Novak, L.; Mach, J.; and Sikola, T.

CEITEC Research Group: **Fabrication and Characterization of Nanostructures**

Research Programme 1: **Advanced Nanotechnologies and Microtechnologies**

#### Summary

The article reports on the growth of <110> oriented germanium nanowires in a wide range of their diameters. The explanation given in the paper shows why only the nanowires with very small diameters growing in this orientation were obtained so far. The control of the nanowire orientation is crucial for their application in sensorics and novel nanowire-based electronics.

### Journal of Nuclear Materials

Fatigue cracks in Eurofer 97 steel: Part I. and II.

Kruml, T., Polak, J., Hutar, P., Nahlik, L., Seitzl, S.

CEITEC Research Group: **Advanced Metallic Materials and Metal Based Composites**

Research Programme 2: **Advanced Materials**

#### Summary

The Eurofer 97 steel belongs to the family of high chromium ferritic–martensitic steels. It is a candidate structural material for the future nuclear fusion programme. It is supposed to be in service under intense irradiation, therefore a care is taken to use only chemical elements with fast decay properties. The fatigue crack growth rate in the Eurofer 97 steel was measured by two different methodologies and law characterizing the small fatigue crack behaviour was described in the works. Results obtained can be used for the residual fatigue life prediction based on the small crack growth kinetics.

## Polymer

Molecular weight scaling of the spherulite growth rate in isothermally melt crystallized polyethylene nanocomposites

Jancar, J., Fiore, K.

CEITEC Research Group: **Advanced Ceramic Materials**

Research Programme 2: **Advanced Materials**

### Summary

In this paper, the effect of adding small amount of high specific surface area fumed silica on the crystallization kinetics of three monodisperse polyethylenes crystallized from quiescent melt at small undercooling was investigated. Linear spherulite growth rate under temperature regime II, GII, was measured employing the hot-stage and optical microscope with polarized light equipped with color plate. Experimental data were analyzed using the modified LH secondary nucleation theory attempting to identify the specific molecular mechanism correlating with the observed variations of the activation energy of the surface transport term with varying Mn and SiO<sub>2</sub> nanoparticle content.

## Developmental Cell

Cytokinin Modulates Endocytic Trafficking of PIN1 Auxin Efflux Carrier to Control Plant Organogenesis

Marhavy, P., Bielach, A., Abas, L., Abuzeineh, A., Duclercq, J., Tanaka, H., Parezova, M., Petrasek, J., Friml, J., Kleine-Vehn, J., Benkova, E.

CEITEC Research Group: **Hormonal Crosstalk in Plant Development**

Research Programme 4: **Genomics and Proteomics of Plant Systems**

### Summary

In the article we show that cytokinin might modulate auxin efflux not only on the level of transcription, but also posttranscriptionally. At increased cytokinin levels one of the auxin efflux carriers, namely PIN1 is redirected for rapid degradation to lytic vacuoles. We identified an alternative mode of cytokinin action that uses endocytic trafficking as a means to direct plant organogenesis.

## The Plant Journal

Structure and binding specificity of the receiver domain of sensor histidine kinase CKI1 from *Arabidopsis thaliana*

Pekarova, B., Klumpler, T., Triskova, O., Horak, J., Jansen, S., Dopitova, R., Borkovcova, P., Papouskova, V., Nejedla, E., Sklenar, V., Marek, J., Zidek, L., Hejatko, J., Janda, L.

CEITEC Research Group: **Functional Genomics and Proteomics of Plants**

Research Programme 4: **Genomics and Proteomics of Plant Systems**

### Summary

We have shown that the receiver domain of sensor histidine kinase is necessary and sufficient for the specific interaction with subset of its downstream signalling partners, AHP proteins in *Arabidopsis*. Further, we determined the crystal structure of the receiver domain and identified the magnesium-mediated structural changes with impact on the binding specificity.

## The Plant Journal

Polarization of PIN3-dependent auxin transport for hypocotyls gravitropic response in *Arabidopsis thaliana*

Rakusova, H., Gallego-Bartolome, J., Vanstraelen, M., Robert, H.S., Alabadi, D., Blazquez, M.A., Benkova, E., Friml, J.

CEITEC Research Group: **Developmental and Cell Biology of Plants**

Research Programme 4: **Genomics and Proteomics of Plant Systems**

### Summary

In this paper we provide insights into the mechanism for hypocotyl gravitropic growth in *Arabidopsis thaliana*. We show that gravity perception polarizes PIN3 auxin transporter to the lower side of endodermis cells to mediate asymmetric auxin distribution for gravitropic shoot bending.

## International Journal of Neuropsychopharmacology

The effects of methamphetamine self-administration on behavioural sensitization in the olfactory bulbectomy rat model of depression.

Kucerova, J., Pistovcakova, J., Vrskova, D., Dusek, L., Sulcova, A.

CEITEC Research Group: **Experimental and Applied Neuropsychopharmacology**

Research Programme 6: **Brain and Mind Research**

### Summary

Use of olfactory bulbectomy model of depression and IV self-administration paradigm was validated as a suitable solution to simulate co-morbidity of drug addiction and depression in experimental rodents. The study has proven that animal model of depression increases methamphetamine intake in the model of drug addiction. Furthermore, increasing efficacy of methamphetamine was registered during repeated administration (sensitization to drug effects).

## Journal of Antimicrobial Chemotherapy

CTX-M-15-producing Escherichia coli clone B2-O25b-ST131 and Klebsiella spp. isolates in municipal wastewater treatment plant effluents

Dolejska, M., Frolkova, P., Florek, M., Jamborova, I., Purgertova, M., Kutilova, I., Cizek, A., Guenther, S. and Literak, I.

CEITEC Research Group: **Molecular Bacteriology**

Research Programme 7: **Molecular Veterinary Medicine**

### Summary

The global occurrence of antibiotic resistance genes in bacteria in water environments is an increasing concern. The results of the study highlight the inadequacy of the treatment process in removing multiresistant bacteria from municipal wastewater and point to a risk of transmission of clinically important multiresistant strains, such as the pandemic ST131 clone, to the environment. This is the first study demonstrating the pandemic ST131 clone in wastewater.

