PF 2015

CEITEC | Central European Institute of Technology
BRNO | CZECH REPUBLIC

NEWSLETTER Q4/2014

Dear CEITEC Friends,

As this year comes to a close, we can take stock of what we have achieved. In September 2014 we had a very robust independent, international scientific evaluation which demonstrated the improved performance of our research groups, and provided guidance to help us shine even brighter in the future. As a testament to this performance, our quality in publication output has again gone up significantly in 2014.

The recent period has been most eventful with the addition of Mary O'Connell as the new ERA Chair, the opening of the CEITEC MU buildings, our first annual international conference, which proved to be a great success, and the awarding of an international engineering prize for the development of a mobile laboratory based on LIBS technology. Some of these stories, and others, are detailed in this issue.

I am grateful to all who have put their energy into helping CEITEC grow into a respected centre for research.

Best wishes for the holidays,

Markus Dettenhofer

CONTENT

RESEARCH

Scientist with Experience in World's Most Prestigious Laboratories Joins CEITEC MU

Mary O'Connel, ERA Chair

The recognised molecular biologist Mary O'Connell, who has worked in the world's foremost research institutes such as the Albert Einstein College of Medicine in New York and the Massachusetts Institute of Technology (MIT) in Boston, has joined CEITEC MU. Bringing on board this scientific authority in a senior position was made possible by a prestigious European Grant from the ERA Chairs programme, which Masaryk University was the only institution in the Czech Republic to win.

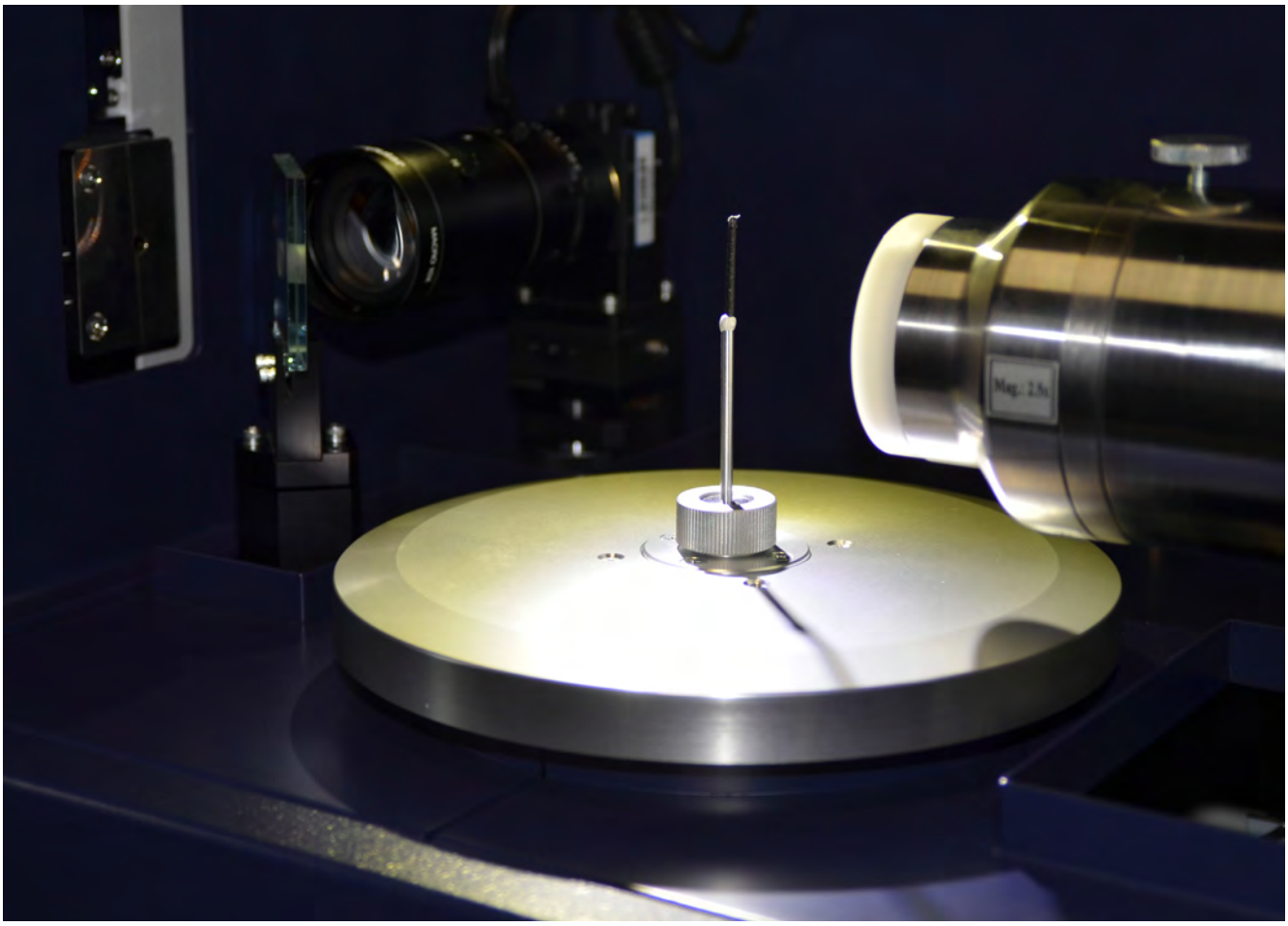
Mary O'Connell has long studied the topic of inheritable information and its modification in connection with diseases of the immune system. She has co-authored dozens of articles in prestigious international peer-reviewed journals, and has written a number of chapters in notable publications. Her task at CEITEC will be to create a working group of six to ten people and to lead it for a period of at least four and a half years.

More information can be found HERE.

CEITEC BUT's Unique Nanotomography Station Will Not Harm Even a Butterfly's Wing

First Japan, then next stop Brno. The Japanese multinational concern RIGAKU chose CEITEC BUT's laboratory for the first foreign installation of their unique X-ray computed nanotomograph. Thanks to their results so far in the area of X-ray computed nano and microtomography the Japanese experts decided to also deepen their long-term cooperation with CEITEC BUT in research and development. CEITEC BUT installed a unique nanotomography station on October 29 and at the same time CEITEC BUT's director signed an agreement with RIGAKU on future cooperation.

More information can be found HERE.



X-ray computed namotomograph

Office for the Protection of Economic Competition Vindicates University's Approach in Instrument Purchase. The University Will Make the Acquisition.

The Office for the Protection of Competition in an appeals process definitively rejected the complaint from the company Philips Česká republika s.r.o., which called into question the approach taken by Masaryk University in choosing a supplier for a scientific instrument. The university can now acquire from Siemens this unique equipment for visualising the function and structure of the brain and spinal column using nuclear magnetic resonance (NMR) for the scientists on CEITEC MU's programme Brain and Mind Research. Siemens should supply the instrument within 18 weeks.

CEITEC is Part of One of the Biggest European Projects

A budget of 94 million euros and 99 partners from 19 countries, planning research work to the tune of 770 man-years. That is EMC^2 in numbers - one of the most important EU projects of recent years. The Cybernetics in Material Science research group from CEITEC BUT was invited, thanks to their long-term successful results in the international field, to join research teams from industry and universities in EMC^2. They are now even leading one of the subprojects of EMC^2. The main endeavour of EMC^2 overall is to improve the performance and effectiveness of embedded systems across the automotive and production industries, the internet of things, and the healthcare, air and space industries.

More information can be found HERE.

Pavel Václavek, EMC^2 subproject leader

CEITEC Strengthens Cooperation with American Universities and Investors

The Deputy Prime Minister for Science, Research and Innovation, Pavel Bělobrádek, together with his deputy and Director of the Department for Science, Research and Innovation Arnošt Marks and CEITEC BUT representative Jan Ostřížek held meetings from November 17 to 20 in Washington with American partners from the areas of science, universities and investors in the Czech Republic. For some time CEITEC has been communicating with its American partners and preparing the ground for more intensive cooperation. Among the results have been an acceleration of the steps taken so far and the obtaining of further contacts important for gaining strategic partners in science and research.

AWARDS

CEITEC Seeks and Supports Talented Secondary School Students

This year's victor in the student competition České hlavičky (or loosely translated Young Czech Brains) in the category SANITAS „Life and Health of Man" was Magdalena Šubrtová from Brno's Řečkovice High School. In her work under the supervision of Ladislav Dokládal of the CEITEC's Chromatin Molecular Complexes research group, she looked at telomeres, which are the ends of chromosomes. Telomeres have a protective function, however with every cell division they shorten, until they are critically short which leads to the death of the cell.

Dokládal is now working with youngsters as part of his activities for the third year and plans to continue. *„We are interested in young talented students, and we want to interest them in the scientific topics that we are working on in CEITEC"*, explained Dokládal. *„I enjoy showing them new things and following their frequently highly inspiring ideas"*, he added.

The Scientist Karla Plevová Receives the Award of the Minister of Education

For her excellent results during her doctoral programme in the field of oncology, Karla Plevová from CEITEC MU received the Award of the Minister of Education, Youth and Sports for excellent students and graduates in study programmes. The award ceremony took place on 18 November 2014 in the hall of the National Museum of Education of J. A. Komenský.

The awardee Karla Plevová, third from the left

Karla Plevová works in the Medical Genomics research group of Prof. Šárka Pospíšilová. This talented scientist has achieved extraordinary scientific results in the field of the molecular genetics of leukaemia. She focuses on clonal evolution and immunogenetic features of leukemic cells. Her work therefore brings new insights into evaluation of the prognosis for patients with specific disease subtypes.

During her doctoral studies she was published in top scientific journals as first author or co-author, for example in Heamatologica, Nature Methods, Leukemia, Blood, Cancer Research, Stem Cells and others.

More information can be found HERE.

EVENTS

CEITEC Annual Conference 2014

The first CEITEC annual conference, which was held from October 21 to 24, was a great success - 60 lecturers from 13 countries took part, and in four days more than 500 participants attended. 168 young scientists gave presentations during the poster session alone. We believe that aside from a deluge of interesting information, meeting in person has led to or will lead to interesting joint projects.

The book of abstracts is available HERE. Our thanks go to everyone for their participation and cooperation. Should you wish to be reminded of the wonderful atmosphere and view the photos, you can do so HERE or the poster session HERE. An interview with winners of the Poster competition can be found on page 7 of this newsletter.

CEITEC Annual Conference, from the left: Markus Dettenhofer, Pavel Plevka

Conference: "Young Scientists: Balancing Career and Family"

Young experts from CEITEC and elsewhere came together to try to find the best way of combining family and science at the conference Young Scientists: Balancing Career and Family. There were four presentations as well as a panel discussion of young scientists, and the programme finished with a round table discussion involving representatives of institutions as well as young men and women scientists with their specific experiences. Among the most frequent themes were the need for provision of good facilities in the workplace and the issue of whether the employer should be actively engaged in arranging care for pre-schoolers, as well as the importance of career planning in cooperation with mentors and supervisors. This topic will be dealt with further by the team for the project Work-life Balance for Scientific Staff. Further information, presentations from the speakers and a brief report can be found on the web pages HERE.

Core Facilities Information Day for Companies

On November 27, 2014, an Information Day for Companies took place at CEITEC with the aim of setting up cooperation between CEITEC core facilities and the commercial sector. This day was held together with the Masaryk University's Technology Transfer Office and 50 participants attended from 15 different companies involved in the fields of pharmacology, food processing, biotechnology, clinical diagnostics, and others. Within the Information Day there was a short presentation from each of the ten core facilities that CEITEC offers to external users, followed by a tour of individual laboratories sited at Masaryk University's Bohunice Campus.

If you are interested in what our core facilities have to offer, take a look at our website HERE.

INTERVIEW WITH CEITEC POSTER COMPETITION WINNERS

The Poster Competition winners were ceremonially announced on Thursday, October 23, as part of the CEITEC Annual Conference: Frontiers in Material and Life Sciences.

The competition was divided into two categories: PhD students and Postdocs. In total there were almost 150 posters, so the competition was really tough. Congratulations to the winners!

Find below the interesting opinions of the first place winners in the PhD student and Postdoc categories. Complete interviews with all six winners can be found HERE.

PhD student category winners

1. Kateřina Zábrady	Chromosomal association of the SMC5-6 complex is dependent on interaction of its Nse1-Nse3-Nse4 subcomplex with DNA
2. Tomáš Šamořil	Micro- and Nanostructures Prepared by Selective Wet Etching of Silicon, Characterization of Their Properties and Their Applications
3. Ľudmila Kluková	Graphene as a promising material for preparation of an ultrasensitive lectin biosensor

Kateřina Zábrady, 1st place in PhD student category

What motivates you in your scientific work?

Finding the answer to the ultimate question of life, the universe and everything...

What do you see research in your field leading to in the future?

Once we have a detailed understanding of the biochemical and molecular biological basis of processes in cellular organisms, we will be able in future to influence and better treat in a more targeted fashion malfunctions in these processes that result in disease.

Don't the results speak for themselves? Is it necessary to present science?

Even if you have obtained excellent results, they are not going to know how to present themselves. No-one is going to fund further research, no matter how excellent, if they do not know what it is good for.

Do you have any experience abroad? What has it brought you? Do you think that in today's world international cooperation is absolutely essential?

I was on a three-month placement in the UK. It was a wonderful experience. I learned new methods and gained important results and contacts. In science I think that the exchange of techniques and knowledge are in general incredibly important. Research cooperation with other laboratories working on the same or similar areas is definitely far quicker and more effective than if we instead compete and keep results secret from each other.

Kateřina Zábrady, 1st place in PhD student category

Tomáš Šamořil, 2nd place in PhD student category

Ľudmila Kluková, 3rd place in PhD student category

Postdoc category winners

1. Anton Manakhov	Deposition of amine-rich films by cyclopropylamine plasma for increased biocompatibility of polycaprolactone nanofibers
2. Pavel Pořízka	LIBS for in-situ Qualitative and Quantitative Analysis of Mineral Ores
3. Vlastimil Křápek	Mapping of Plasmonic Model in Gold Nanoparticles by Means of Electron Energy Loss Spectroscopy

Anton Manakhov, 1st place in Postdoc category

What motivates you in your scientific work?

I have been doing research since university and interestingly I have not changed the field in which I decided to work. Really, I have been carrying out research in plasma chemistry since 2000 and still I have the passion and strong motivation to pursue my goals in this field. What drives me? The huge technical problems of modern society. These problems, such as healthcare quality, decreasing carbon emissions or the development of sustainable energy sources must be solved and it should be done pretty quickly. I am strongly motivated, as my feeling is that my research is linked, at least partially, with the solution to these problems. The journey towards a solution is far from its end, but I am sure that my outcomes and my achievements will be another brick in the wall.

Anton Manakhov. 1st place in Postdoc category

What do you see research in your field leading to in the future?

As I already mentioned, I have never changed my field and the reason is that I know that my work is very diverse, since plasma processing has many applications, from photovoltaics to wound healing. My current topic is at the frontiers of materials science and life science and it concerns physics, chemistry and biology. I am sure that future emerging technologies require work at the boundary, because if you stay just within one focused area of work, you cannot arrive at a breakthrough solution. For example, one of the most demanding research areas, cancer treatment, is progressing but not as quickly as we would wish. From my point of view the reason is related to the complexity of a solution that will require brainstorming by physicians, biologists, chemists and material scientists. I know that my work can contribute to this topic, as plasma technologies is a unique technique activating that surface and enabling immobilisation of bio-molecules and drugs on any kind of surfaces. By applying plasma techniques to biodegradable materials a novel drug carrier can be synthesized. Therefore, the major goal of my work is the development of low cost, selective and effective cancer treatments. Indeed, material scientists cannot pursue that goal alone and we need to cooperate with many researchers from different fields, and this is not easy.

Don't the results speak for themselves? Is it necessary to present science?

Of course. The same results can be presented so differently that in one case the audience will admire you and in another case show their contempt. Fortunately for me I have seen hundreds of both excellent and terrible presentations and I know where to draw inspiration from. For me a presentation is a movie, like a song, like a story. It must be truthful, eye- and ear-catching, and dynamic. I consider the presentation as a sort of art; you should be well prepared to give a good presentation. Indeed, a good presentation leads to good outcomes: new contacts, collaborations, gains in your h-index. I can hardly imagine that after a boring presentation the scientist would receive the same outcome. The most difficult part of presenting is to adapt your slides to a certain audience. Are they experts in your field or do they have no idea about your methods? Of course the latter case is the most difficult one, but this is exactly where you may get valuable contacts so as to progress, to diversify.

What has experience abroad brought you? Do you think that in today's world international cooperation is absolutely essential?

Indeed. I am a very lucky person, as I have worked in many different countries: Russia, South Korea, Luxembourg, Belgium and now here in Czech Republic. I know what the Korean style of work is, the so called seven-eleven (meaning 7AM-11PM). This is a very exhausting approach, but we were able to solve technical problems within 1-2 months, while in Europe all that research would require 1-2 years. However, in EU there more passion in research, deeper analysis, fundamental work; while in Asia, everything is applied research. I am able to mix both styles: deeper analysis if I have time and Korean style at the deadline. Finally, I think that we must cooperate with researchers abroad as much as possible. New ideas, new methods and new views: these are what every good scientist should look for.

Pavel Pořízka, 2nd place in Postdoc category

Vlastimil Křápek, 3rd place in Postdoc category

SELECTED RECENT PUBLICATIONS

ADVANCED NANOTECHNOLOGIES AND MICROTECHNOLOGIES

BOUCHAL P., BOUCHAL Z., 2014. Non-iterative holographic axial localization using complex amplitude of diffraction-free vortices. *Optics Express* 22 (24), p. 30200-30216.

ADVANCED MATERIALS

MACA K., **POUCHLÝ V.**, BODIŠOVÁ K., ŠVANCÁREK P., GALUSEK D., 2014. Densification of fine-grained alumina ceramics doped by magnesia, yttriaand zirconia evaluated by two different sintering models. *Journal of the European Ceramic Society* 34 (16), p. 4363-4372.

STRUCTURAL BIOLOGY

TRIPSIANES K., FRIBERG A., BARRANDON C., BROOKS M., VAN TILBEURGH H., SERAPHIN B., SATTLER M., 2014 . A Novel Protein-Protein Interaction in the RES (REtention and Splicing) Complex. *The Journal of Biological Chemistry* 289, p. 28640-28650.

HRITZ J., BYEON I-J., KRZYSIAK T., MARTINEZ A., SKLENÁŘ V., GRONENBORN A.M. 2014. Dissection of binding between a phosphorylated tyrosine hydroxylase peptide and 14-3-3ζ: a complex story elucidated by NMR. *Biophysical Journal* 107, p. 2185-2194.

GENOMICS AND PROTEOMICS OF PLANT SYSTEMS

MUCHOVÁ V., AMIARD S., **MOZGOVÁ I.**, **DVOŘÁČKOVÁ M.**, GALLEGO M.E., WHITE C., FAJKUS J., 2014. Homology-dependent repair is involved in 45S rDNA loss in plant CAF-1 mutants. *The Plant Journal,* published online.

ZÁBRADY M., **HRDINOVÁ V.**, MÜLLER B., CONRAD U., **HEJÁTKO J.**, **JANDA L.**, 2014. Targeted in vivo inhibition of specific protein–protein Interactions using recombinant antibodies. *Plos ONE* 9 (10).

MOLECULAR MEDICINE

TE RAA G.D., DERKS I.A., **NAVRKALOVA V.**, SKOWRONSKA A., MOERLAND P.D., VAN LAAR J., OLDREIVE C., MONSUUR H., **TRBUSEK M.**, **MALCIKOVA J.**, LODÉN M., GEISLER C.H., HÜLLEIN J., JETHWA A., ZENZ T., **POSPISILOVA S.**, STANKOVIC T., VAN OERS M.H., KATER A.P., ELDERING E., 2014. The impact of SF3B1 mutations in CLL on the DNA-damage response. *Leukemia*.

SANA J., **RADOVA L.**, LAKOMY R., KREN L., FADRUS P., SMRCKA M., BESSE A., NEKVINDOVA J., HERMANOVA M., JANCALEK R., SVOBODA M., HAJDUCH M., SLAMPA P., VYZULA R., **SLABY O.**, 2014. Risk Score based on microRNA expression signature is independent prognostic classifier of glioblastoma patients. *Carcinogenesis*. 35(12), p. 2756-62.

BRAIN AND MIND RESEARCH

BOČKOVÁ M., CHLÁDEK J., JURÁK P., HALÁMEK J., **ŠTILLOVÁ K.**, **BALÁŽ M.**, **CHRASTINA J.**, **REKTOR I.**, 2014. Complex Motor-Cognitive Factors Processed in the Anterior Nucleus of the Thalamus: An Intracerebral Recording Study. *Brain Topography*.

DOLEZALOVA I., **BRAZDIL M.**, HERMANOVA M., JANOUSOVA E., **KUBA R.**, 2014. Effect of partial drug withdrawal on the lateralization of interictal epileptiform discharges and its relationship to surgical outcome in patients with hippocampal sclerosis. *Epilepsy Research* 108(8), p. 1406–1416.

MOLECULAR VETERINARY MEDICINE

DOLEJSKA M., VILLA L., MINOIA M., GUARDABASSI L., CARATTOLI A., 2014. Complete sequences of IncHI1 plasmids carrying blaCTX-M-1 and qnrS1 in equine Escherichia coli provide new insights into plasmid evolution. *Journal of Antimicrobial Chemotherapy* 69(9), p. 2388-2393.

SAK B., PETRŽELKOVÁ K.J., KVĚTOŇOVÁ D., MYNÁŘOVÁ A., POMAJBÍKOVÁ K., **MODRÝ D.**, CRANFIELD M.R., MUDAKIKWA A., KVÁČ M., 2014. Diversity of Microsporidia, Cryptosporidium and Giardia in Mountain Gorillas (Gorilla beringei beringei) in Volcanoes National Park, Rwanda. *PLoS One* 9(11).

UPCOMING EVENTS

Winter School on Structural Cell Biology

The goal of the Winter School on Structural Cell Biology is to acquaint young scientists with links between different disciplines and to provide an opportunity to learn about recent advances in Integrative Approaches to Cell Structural Biology. The course will be led by top-level tutors from abroad.

WHEN: February 9 -13, 2015
WHERE: University Campus Bohunice

The programme and further information about registration for students can be found HERE.

Lectures: Advanced Fluorescent Microscopy Techniques: I Believe What I See

You are cordially invited to the upcoming lectures and workshop organised by Life B - Laboratory of Interaction and Function of Essential Biomolecules. The workshop will be dedicated to modern microscopic techniques used for the study of biomolecular interactions and functions.

WHEN: Monday, February 16, 2014
WHERE: Mendel Museum, Augustinian Abbey,
Mendlovo nám. 1a, Brno

You can find more information and register for the event HERE.

The event is followed by an international winter school for students focused on Advanced Fluorescent Microscopy Techniques. You can find more information about the winter school HERE.

Please send your comments and ideas to **pavla.vyhnankova@ceitec.cz**