Příloha č. 4

Vzorový anglický text

New frontiers for Europe with Quantum Technologies

Technologies able to exploit quantum phenomena like superposition and entanglement will form a key sector of technological development in the 21st century. EU research efforts in this highly exciting field promise to guarantee Europe's position at the forefront of the quantum science revolution.

The increasing ability to manipulate quantum effects in customised systems and materials is leading to devices with fundamentally superior performance and capabilities for communication, metrology, sensing, simulation and computing. Data security and safety will also be dramatically impacted by quantum technologies. Therefore, mastering quantum technologies is of strategic importance for Europe's enterprises, governments and citizens.

Europe has a well acknowledged world-class scientific and technical expertise in Quantum Technologies thanks to almost 20 years of research, and the investment of around EUR 550 million in EU funding (with more than EUR 300 million of support via the Future and Emerging Technologies -FET- scheme). There is also a growing interest from European companies in concrete applications for quantum technologies, as expressed in the 'Quantum Manifesto', published in spring 2016, with the support of academic and industrial stakeholders. However, more has to be done to successfully transform the research advances made possible through EU support into tangible market solutions.

Endorsing a strategy for quantum, the European Commission launches an ambitious, long-term and large-scale flagship initiative to unlock the full potential of quantum technologies and accelerate their development and take-up into commercial products in Europe. This is part of the European Cloud Initiative, which objective is to fully unlock the value of big data by providing world-class supercomputing capability, high-speed connectivity and leading-edge data and software services for science, the industry and the public sector. The initiative is part of the digitisation of the industry package that ambitions to maintain Europe's leading position in data-driven innovation, improve its competitiveness and cohesion and help create a Digital Single Market in Europe.

This CORDIS Results Pack highlights some of the most innovative EU-funded projects in the field of Quantum Technologies. Some of these projects notably cover the development of cutting-edge optics and matter-wave technology, new devices to improve the accuracy of underground and seismic activity measurements, and a new class of Bose Einstein Condensates (BECs)-based quantum interferometers. These projects lead the way in the Quantum Technologies revolution.

Zdroj: **http://cordis.europa.eu/article/id/400020-new-frontiers-for-europe-with-quantum-technologies_en.html**

Energy efficient process industries: Furthering Europe's ambitious environmental targets

Greater energy efficiency in Europe's process industries will not only contribute to the EU's long-term competitiveness but will also play a prominent role in Europe's quest to meet its highly ambitious environmental objectives.

Over 450 000 enterprises and around 6.8 million jobs are dependent on Europe's process industries, which range from chemicals, engineering, minerals and ore, non-ferrous metals, steel and water. Consequently, the process industries, which generate more than EUR 1.6 billion in annual turnover and represent 20 % of the EU's total industrial production, are absolutely vital to Europe's economy and long-term industrial competitiveness.

However, these vital industries have had to face the key challenge of reducing their high dependency on resources. Although energy efficiency in industry across the EU has gradually improved (by an average of 1.8 % per year up until 2009), there is still much work that could and should be done to encourage the uptake of cleaner technologies, more efficient methods and better industrial procedures to reduce the industrial processing industries' environmental impact.

Achieving a better environmental footprint for the process industries is now even more pressing due to the EU's target to cut its emissions to at least 40 % of 1990 levels as a part of its comprehensive 2030 climate and energy framework. On Friday 22 April 2016, the EU also formally signed the Paris Agreement on Climate Change (COP21) that was agreed in December last year, formally committing the Union to fully embracing the transition to a low-carbon economy and society.

This CORDIS Results Pack showcases some of the EU-funded projects that have taken up the challenge of developing the novel methods and enabling technologies that will increase energy efficiency in industrial processes. Examples include the implementation of more sustainable and less-resource dependent manufacturing methods, the design and optimisation of new and accurate computational frameworks and software, and the cultivation of better international cooperation.

Zdroj: **http://cordis.europa.eu/article/id/400040-energy-efficient-process-industries-furthering-europes-ambitious-environmental-targets_en.html**

An adaptive and integrated computational framework for intensified processes in the chemical and biochemical industries

The EU-funded OPTICO project has established an adaptive and integrated computational framework, consisting of multi-scale, multi-phase phenomena-based modelling technologies, and advanced process analytics tools and optimisation/control techniques for intensified chemical/biochemical plant design and operation.

The integrated framework at the heart of the project was successfully applied to four industrial processes. These were a pharmaceutical crystallisation process, two polymerisation (i.e. suspension and inverse suspension) processes, an organic oxidation with hydrogen peroxide process, and finally a monoclonal antibodies production and purification system.

Such a framework facilitated OPTICO's ultimate goal, that being the optimisation or/and redesign of existing equipment, as well as the design of new modular equipment for the development of dynamic, adaptable and flexible intensified processes.

A major innovation of OPTICO was towards the establishment of a fully integrated Process integration (PI) framework of modelling, simulation, optimisation and control tools, as well as online monitoring and process analytics tools that can be used over a range of computer-aided process engineering activities.

'Process integration is the key technological pathway to drastically improve the sustainability of the chemical and biopharmaceutical process by replacing the existing, inefficient plant equipment with new, intensified operations,' explained project coordinator Prof. Costas Kiparissides. PI can comprises the development of novel equipment and production methods that can bring dramatic improvements in manufacturing and processing and lead to safer, cleaner, smaller and cheaper production rates.

'OPTICO aimed to extend the present state-of-the-art in multiscale modelling of chemical and biochemical systems by integrating models at various length/time scales into a unified computational framework,' Prof. Kiparissides elaborated.

From a practical perspective, OPTICO chose four key enabling technologies as a means to facilitate and highlight the benefits of its new framework to its four selected chemical/biochemical processes.

Online sensors were implemented to the selected industrial processes for real-time monitoring of product quality, with their robustness being assessed via the implementation of complementary sensor technologies. Novel approaches were developed for in-line calibration and drift correction procedures to avoid elaborate pre- and post-process calibration procedures of the sensors.

Secondly, the project implemented a Process Analytical Technology (PAT) platform to the selected industrial processes for sensor data interpretation, inferential analysis and control of key process parameters, including particle/crystal size distribution, morphology, composition and degree of agglomeration.

The third enabling technology consisted of multi-scale, multi-phase model libraries for the simulation of the selected chemical/biopharmaceutical processes. The libraries comprised models at different length/time timescales and a generic modular structure was adopted so that a wide range of processes could be generated with little or no modification of the developed library models.

Finally, robust model predictive control (MPC) and explicit/multi-parametic non-linear process control (NPC) tools were developed for optimisation and control of the selected industrial processes. Robust dynamic optimisation and model-predictive control methods were employed for the determination of optimal control policies to improve product quality, maximise plant productivity and minimise the production of off-spec products.

The project has been a great success. 'Commercialisation of the most promising results has already been pursued by the industrial partners via the development of new intensified processes and products,' Prof. Kiparissides explains.

OPTICO involved two SMEs representing different industrial sectors (FIBRE PHOTONICS and CHROMACON) in the development of the framework. 'Collaboration with SMEs is extremely important as they are the drivers behind the development of new markets, playing therefore a key role in the development of intensified chemical and biochemical processes,' stated Prof. Kiparssides.

Overall, Prof. Kiparssides believes that PI offers concrete opportunities to chemical and biochemical enterprises and that OPTICO's successes will strengthen Europe's competitive global position regarding these vital industries and will do so in an environmentally friendly way.

Zdroj: **http://cordis.europa.eu/result/rcn/147350_en.html**