

NANOCON'23 accentuated nanomaterials for sustainable energy and the environment

Just two weeks after the Nobel Prize for Chemistry was awarded this year to three scientists for the discovery of quantum dots, the 15th NANOCON international conference took place in Brno on October 18-20, 2023. For **260 participants from 28 countries** in total **77 lectures** and an exhibition of **135 posters** were prepared. They demonstrated progress in research and in use of nanomaterials and nanotechnologies. The central theme of the program was nano applications for sustainable energy and the environment. The anniversary conference year confirmed that it is one of the largest events of its kind in the Central European and the largest in the Czech Republic. This year, NANOCON was attended by experts from 14 Czech universities, ten institutes of the Czech Academy of Sciences (CAS), and there were also representatives of companies, incl. manufacturers of scientific instruments and laboratory materials. The Czech Society for New Materials and Technologies is the co-organiser of this conference.

In the last forty years or so, when scientific pioneers in nanotechnology started synthesizing components and creating a library of nanostructures (among them **Prof. Louis E. Brus, this year's Nobel laureate**, who gave a **plenary lecture at the NANOCON 2015**), nanotechnology research has moved significantly to specific applications and to targeting socio-economic challenges, particularly sustainable future and high-quality medical care. Both plenary contributions reflected this essential knowledge shift. Prof. **Jagadeesh Rajenahally** from the Leibniz Institute for Catalysis in Rostock opened the conference with a lecture on nanocatalysis for circular chemistry. Dr. **Rabah Boukherroub**, the director of research at the French National Research Center in Lille, presented nanotechnology advances in diabetes management.

In other lectures and posters, researchers in Brno presented innovations in the preparation, characterization of the properties of nanomaterials and their use in various sectors, including medicine and the environment. For example, Dr. **Martin Ledinský** from the Institute of Physics of the CAS presented the progress in the field of thin films for photovoltaics. How to effectively reduce CO₂ to renewable fuel or other valuable chemicals using solar energy was the topic of the lecture performed by Prof. **Kamila Kočí** from the VSB – Technical University of Ostrava. Prof. **Erik Reimhult** from the Vienna University of Natural Resources and Life Sciences (BOKU) introduced new methods for characterizing and testing interactions of nanoparticles with proteins and cells. Prof. **Janina Kneipp** from the Humboldt University in Berlin indicated the possibilities of a new scientific field - nanobiophotonics. Dr. **Monika Šrámková** from the Biomedical Research Center of the SAV in Bratislava presented the results of a study exploring toxicity of inorganic nanoparticles of gold and oxide of titanium, silicon and iron on human renal cells.

The prize for **the best poster** won Matěj Hývl from the Institute of Physics of the CAS. He showed, how to characterize the electrical properties of nanostructured solar cells and electronics. And the application of two new techniques on silicon cell samples: scalpel C-AFM and C-AFM tomography was demonstrated.

A third of all conference participants were students of doctoral programs. In the competition for **the best lecture for a young scientist** under the age of 33 in total 20 participants competed. The winner was Kristýna Gazdová, a doctoral student at the Faculty of Science at Masaryk University in Brno with the lecture on magnetism induced by a vacancy in TiO₂ thin layers. Honourable mention was awarded to Markéta Šlapal Bařínková from the Faculty of Electrical Engineering of the Czech Technical University in Prague for a lecture in which she presented a new technique which incorporates real-time monitoring of E. Coli bacteria growth in the presence of photosensitive ZnO nanoparticles and continuous visible light illumination source. Pavel Čurda from the Faculty of Science of the University of South Bohemia in České Budějovice also left Brno with an honourable mention. In his talk, he focused on the origin of nanoparticle nuclei - the formation of dimers in pulsed magnetron discharges. He collaborates on this research with researchers from the Institute of Physics of the CAS, the Charles University in Prague and the University of Greifswald in Germany.