4th International Conference on

Advances in Biotechnology and Bioscience

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Scientific Tracks & Abstracts

Day 1

Day-1

SESSIONS

Bioscience | Health & Pharmaceutical Biotechnology | Biotechnology | Environmental Biotechnology | Cell Biology & Immunology | Biopharmaceutics and Biochemistry

Chair: Betty Lee, Bureau of Industry and Security, USA

SESSION INTRODUCTION

Title: Life science in space: How it is/can be done and what has been achieved so far
Jutta Krause, European Space Research and Technology Centre, Netherlands

Title: Microfluidic double emulsion and particle for a controlled release of therapeutic peptide
Marine Truchet, ESPCI, France

Title: Silkworm waste management in biogas production
Malgorzata Lochynska, Institute of Natural Fibres and Medicinal Plants, Poland

Title: Alzheimer is caused by alkaline body fluids
Manuel Mateos de Vicente, Polytechnic University, Spain

Title: Partially reduced graphene oxide as a fluorescent probe and its interaction with liver cancer cells: DUV imaging study
Vladimir Djoković, University of Belgrade, Serbia

Title: Commentary on mutations in interleukin-10 receptor in inflammatory bowel disease in Iranian IBD cohort
Razieh khoshnevisan, Isfahan University of Medical Science, Iran

Jutta Krause et al., J Biotechnol Biomater 2018, Volume 8
DOI: 10.4172/2155-952X-C6-103

Life science in space: How it is/can be done and what has been achieved so far

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[2]Norwegian University of Life Science, Norway

The European Space Agency (ESA) is an organization of 22 member states. ESA's mandate is to provide and to promote, exclusively for peaceful purpose, the cooperation among ESA member states in space research and technologies, as well as their space applications. This includes life science research on the International Space Station (ISS) in particular within the Columbus module. One of ESAs very successful equipment is to conduct life science experiments in space is KUBIK, a 37x37x37 cm^3 temperature controlled box, which was designed and developed in 2004. Since 2006, KUBIK is operating as a centre-isle unit inside of the Columbus module. It allows scientists to conduct experiments fully automated under microgravity conditions. Samples are returned to ground and the effects of exposure to the environmental conditions on the ISS can be investigated in the home laboratory. KUBIK has, over the years, hosted experiments on bacteria, fungi, human white blood cells, stem cells of various types, plant seedlings and live tadpoles. A currently pending experiment will examine how microbial biofilms interact with rock surfaces across different gravity levels (weightlessness, Mars and Earth gravity). Results have been published by the scientists in various journals. Because biological experiments are very valuable, experiment preparation is a crucial part of the work. The careful planning of the experiment accounting for the 'upload-' and 'download scenarios' and the 'no access to sample' requires thorough testing upfront. Special designed hardware needs science verification testing to ensure samples are turned to the science laboratory in useful quality.

Biography

Jutta Krause is a Payload System Engineer working at the European Space Research and Technology Centre of the European Space Agency [ESA/ESTEC] since 2002. Since 2013, she is responsible for hardware development for KUBIK life science experiments. She has completed her Engineering Degree in Chemistry with a specialization in Biochemistry and Biotechnology at Fachhochschule Niederrhein in 1998.

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Marine Truchet, J Biotechnol Biomater 2018, Volume 8
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Microfluidic double emulsion and particle for a controlled release of therapeutic peptide

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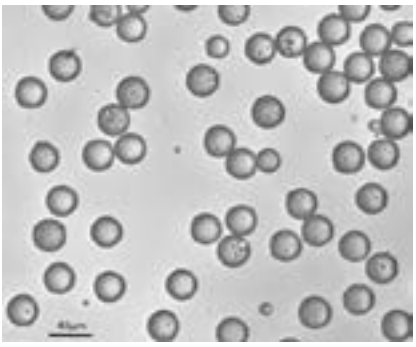
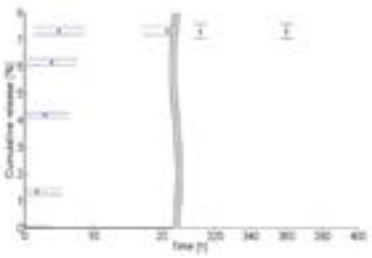
Encapsulation of peptide therapeutics has a growing significance in pharmaceutical and biotech industry to control the release over weeks or months. If the capsule is made from biodegradable polymer, it will degrade slowly and release the drug progressive. To fabricate the particle, people often use the double emulsion/solvent removal method. A double emulsion of water in oil in water (W/O/W) is formed. The active ingredient is within the inner water droplet. The middle phase composed of the solvent and the biodegradable polymer is then solidified. The emulsification process is mostly performed with mechanical stirring or ultrasonication, a process that enables the creation of large volumes of emulsions but results in very bad monodispersity and low encapsulation yield. The production of monodispersed (W/O/W) double emulsions using different microfluidics technologies has been demonstrated. However, none of them could be used to prepare microparticles with desired properties compatible with control delivery of APIs. Each technique has one or several limitations: compatibility of chips with solvents, low throughput, droplet size. In this study, we solved these problems by combining traditional technologies with microfluidics. Our three-step hybrid process allows the formation of very well controlled size, morphology and drug loading particles. We managed, for the first time, to obtain micro-particles with desired particle size, whose structure is controlled and adapted to the delivery challenge we address. We are now able to study precisely the mechanism of release and the influence of each parameter on the drug release.





Recent Publications

1. Bezemer J M *et al.* (2000) Microspheres for protein delivery prepared from amphiphilic multiblock copolymers. Journal of Controlled Release. 67(2-3):233-248.
2. S Okushima et al. (2004) Controlled production of monodisperse double emulsions by two-step droplet breakup in microfluidic devices. Langmuir 20(23):9905-8.
3. Utada A S *et al.* (2005) Monodisperse double emulsions generated from a microcapillary device. Science 308(5721):537-41.
4. J Pessi *et al.* (2014) Microfluidics-assisted engineering of polymeric microcapsules with high encapsulation efficiency for protein drug delivery. International Journal of Pharmaceutics 472(1-2):82-87.

Biography

Marine Truchet is currently a third year PhD student at ESPCI, Paris, France. She pursued her Engineering Diploma from Centrale Nates and an 8-month internship in a biotechnological start-up, Twist Bioscience. This experiment permits her to discover microfluids and to acquire strong knowledge in biotechnology. Her PhD project is in collaboration with the Gulliver Laboratory at ESPCI and the pharmaceutical company SANOFI.

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Malgorzata Lochynska, J Biotechnol Biomater 2018, Volume 8
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Silkworm waste management in biogas production

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In time of waste utilization problems, sericulture focuses not only on the cocoon production, but also on other ways that can benefit the farm's economy and help with environmental protection. It is necessary to find new sources of income for farmers not only through cocoon selling, but also by the multiple uses of by-products. Insect farming technology provides a cheap source of biomass, which may be a good material in biogas production. Studies showed that the substrates, both silkworm breeding waste and caterpillar excreta, generate a biogas yield similar to other substrates of agricultural origin, such as animal manure. Fermentation of silkworm excreta under mesophilic conditions produces 167.32 m^3/Mg TS of methane and 331.97 m^3/Mg TS of biogas, while fermentation of silkworm breeding waste yields 256.59 m^3/Mg TS of methane and 489.24 m^3/Mg TS of biogas. Presentation shows a part of an extensive research project concerning management of products and by-products obtained from sericulture. The presented study allows investors and farmers to easily estimate the amount of electricity and heat offered by the available substrate.

Biography

Malgorzata Lochynska has completed her PhD at Adam Mickiewicz University in Poznan. She is the Head of the Department of Silkworms Breeding and Mulberry Cultivation at Institute of Natural Fibers and Medicinal Plants in Poznan, Poland. She has published 70 papers in international journals and attended 93 research conferences.

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Manuel Mateos De Vicente, J Biotechnol Biomater 2018, Volume 8
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Alzheimer is caused by alkaline body fluids

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Dr. Mateos started analyzing Alzheimer because a member of his family and some friends had it. This allowed him to analyze it in many different ways. He applied his knowledge based on the many courses in several subjects he took at Iowa State University for his MSc, PhD and postgraduate studies and research for eight years. Besides analyzing family and friends he also diagnosed many other Alzheimer's patients. This analysis was also made on hundreds of healthy persons to have a comparison. Blood, urine saliva were analyzed. He also followed the development of reactions mentioning people we knew, friends, facts of life, situations, towns where they had lived. Applying his knowledge of the 48 chemical products he first used in his MSc thesis and following research he noticed the body of Alzheimer patient had a high pH. Analyzing persons with known Alzheimer he noticed a common denominator: Alkaline fluids were present on dozens of Alzheimer patients analyzed. He also has known that Alzheimer patients who drink acid drinks show an improvement. He presented a basic research on Alzheimer at the Drug Discovery and Therapy World Congress in Boston 2014 and now he has more reliable and supported information. His findings have now the support of studies on Alzheimer made in three universities in other countries. Once we know the origin of Alzheimer it is easier to develop a medication to counteract it. His self-financed research could save billions of dollars.

Biography

Manuel Mateos De Vicente had the degree of Public Works Engineer and also Highways, Canals and Harbors Engineer (In Spain ITOP and ICCP). He went to the United States and completed a 2 years MSc at the age of 30 from Iowa State University (ISU) and also a PhD at the age of 33. He continued postdoctoral studies and research at ISU to the age of 37. He passed the requirements as a Professional Engineer. He also studied in Norway, Austria and Baghdad Mustanshiriya University. He has completed non-technical studies such as anthropology, linguistics etc. He continued doing research in 1964 mainly on traffic safety as well as on rural development, rare illnesses, heart arrhythmia and other subjects. His accepted proposals in traffic safety prevented hundreds of potential accidents for which he was awarded a medal. His research on the use of wastes is saving millions of tons of CO_2 from going into the atmosphere. He has written more than 30 books and around 1.000 publications. His research on engineering has been presented in English in 39 Congresses, 19 of them at the USA National Academy of Sciences HRB and TRB, and published in Proceedings and Journals. He is the president of a company dealing with water supply. He is Life Member of seven scientific or technical societies of the USA. His work, studies or conferences took him to 25 countries.

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Partially reduced graphene oxide as a fluorescent probe and its interaction with liver cancer cells: DUV imaging study

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Partially reduced graphene oxide (prGO), an intermediate form between graphene oxide (GO) and graphene, was studied as a potential probe for fluorescent bioimaging of cancer cells. prGO material was obtained by the reduction of the initially prepared graphene oxide nano-sheets with hydrazine. The fluorescence of the GO sheets increases with time of the reduction due to change in ratio of the sp^2 and sp^3 carbon sites. It was found that the fluorescence intensity reached its maximum after reduction for six minutes and the prGO sample was extracted from the dispersion at this particular time. After that, the reduction process was left to proceed further to saturation until highly reduced graphene oxide (rGO) was obtained. Scanning transmission electron microscopy coupled with energy dispersive spectrometry (STEM-EDS) was used to study the morphology and structure of the GO, prGO and rGO samples. Their optical properties were investigated by UV-vis and photoluminescence (PL) spectroscopies. The fluorescent GO, prGO and rGO nanosheets were used in the DUV fluorescence imaging studies of the cancer liver cell line Huh7.5.1, which were performed on DISCO beamline of synchrotron SOLEIL. The internalization of prGO sheets by the cells resulted in a strong increase in the intensity of fluorescence signal, which was 2.5 times higher than the intensity of the autofluorescence of the control sample. Also, time-lapse fluorescence microscopy experiments showed that the dynamics of the fluorescent signals changes after incubation of the cells with GO, prGO and rGO sheets. The prGO nanostructure was suggested as a possible carrier for cancer drugs, since it could be easily conjugated with aromatic ring containing molecules.

Biography

Vladimir Djokovic has completed his PhD in Physics at University Belgrade, Faculty of Physics in 1999. He spent two years as a Postdoctoral Fellow at University of the Free State, South Africa. In the last couple of years, he was a Visiting Professor/Researcher at NASA University Research Center, North Carolina Central University. So far, he has published two book chapters and more than 60 papers in ISI journals. He is a Leader of Polymer Nanocomposite group at Vinča Institute from 2005 and a Professor of Polymer Physics in the Faculty of Physics at University of Belgrade.

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Razieh Khoshnevisan et al., J Biotechnol Biomater 2018, Volume 8
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Commentary on mutations in interleukin-10 receptor in inflammatory bowel disease in Iranian IBD cohort

Razieh Khoshnevisan and **Roya Sherkat**
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Introduction: Early-onset inflammatory bowel disease is a diagnosis of Crohn's disease, ulcerative colitis and inflammatory bowel disease unclassified which runs a chronic, relapsing course, and can result in substantial long-term morbidity. IBD is a multifactorial disorder with genetic susceptibility, immunological predisposition and environmental triggers. To generally determine prevalence of IL10R mutation in IBD patients in Iran-Isfahan, we performed sequencing of all exons in IL10RA and IL10RB in a cohort of IBD patients and healthy control.

Materials & Methods: Total DNA content of each patient was extracted from whole blood with and PCR amplification was done.

Results & Discussion: Overall detection rate of IL-10RA mutations was 69.3% (53/76) and IL10-RB 3.9(3/76) in total patients. Identified IL-10RA mutations were P.(I224V), P.(A153V), P.(A153A), P.(S159G), P.(R263Q), P.(R284C), P.(R351Q), P.(Q376Q), P.(T416I), P.(A493V), P.(A511A) and P.(S563S) and IL10RB mutation was P.(K47E). Of them, P.(A153V), P.(A153A), P.(R284C), P.(T416I), P.(A493V), P.(A511A) and P.(S563S) were not reported variant in IBD variants. The most common mutations were p.(A153A) and p.(R361G) which found 63.1% (48/76) patients. Like as all studies which demonstrate relation between IL10R mutation and IBD our results also confirmed that early-onset IBD could be attributed to a synergistic effect of several variant alleles of the genes encoding *IL10* receptors. These variants, alone, could only give rise to a sub-clinical manifestation of the IBD.

Biography

Razieh Khoshnevisan born on September 5th, 1985 in Qom, Iran. She is currently PhD Student in medical immunology at the Medical University of Esfahan, Iran under the supervision of Prof. Roya Sherkat and Prof. Abbas Rezaie. and pass around two years internship in lab of prof christoph klein-munich -Germany. She will be involved in the recruitment of children with primary immunodeficiencies and very early onset inflammatory bowel disease from Iran. Our collaboration will provide Iranian patients with rare diseases access to modern genetic diagnostics and therapies.

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Scientific Tracks & Abstracts

Day 2

Day- 2

SESSIONS

Bioscience | Plant & Agricultural Biotechnology | Health & Pharmaceutical Biotechnology | Nano-Biotechnology | Biotechnology & Molecular Biology | Biosafety & Bioethics

Chair: Vladimir Djoković, University of Belgrade, Serbia

SESSION INTRODUCTION

Title: Unraveling origin of spectral tuning in phytochrome photoreceptor proteins enables rational design of the near-infrared absorbing molecular tools
Egle Maximowitsch, Max Planck Institute for Medical Research, Germany

Title: Hybrid nanostructures of inorganic particles and biomolecules: Fabrication, antimicrobial activity and application in deep-UV imaging of live cells
Vladimir Djokovic, University of Belgrade, Serbia

Title: Role of curcumin-zinc oxide composite nanoparticles on streptozotocin-induced diabetic rats
Mai Mohamed Raslan, Beni Suef University, Egypt

Egle Maximowitsch et al., J Biotechnol Biomater 2018, Volume 8
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Unraveling origin of spectral tuning in phytochrome photoreceptor proteins enables rational design of the near-infrared absorbing molecular tools

Egle Maximowitsch and **Tatiana Domratcheva**
Max Planck Institute for Medical Research, Germany

Near-infrared absorbing molecular tools are in high demand for *in vivo* imaging and control of biological processes. Such tools can be engineered on the basis of phytochrome photoreceptor proteins which play a central role in red/far-red light reception in various organisms. Phytochromes can photoswitch between two thermally stable red-absorbing (Pr) and far-red-absorbing (Pfr) forms, although the molecular mechanism inducing the spectral tuning in phytochromes was unknown yet. We performed computational studies and identified molecular origin of the red spectral shift in the Pfr state. Quantum-chemical calculations demonstrated that interactions between the ring D of the tetrapyrrole chromophore and conserved aspartate lead to a change in the tetrapyrrole electronic structure, which translates to the red shift of the absorption maximum. The MD simulations demonstrated that these interactions can form only after other structural changes take place in the protein ensuring a coupling of the phytochrome spectral and conformational switching. Our study provides understanding of how hydrogen bonding controls phytochrome optical properties and enables rational design of phytochromes and other tetrapyrrole binding proteins as optogenetic tools and fluorescent proteins operating in the far-red spectral region.

Biography

Egle Maximowitsch has completed her Bachelor's Degree in Biochemistry at Vilnius University, Lithuania in 2013 and Master's Degree in Molecular Biosciences at Heidelberg University, Germany in 2015. Since 2015, she is a PhD student in Computational Photobiology at Max Planck Institute for Medical Research in Heidelberg, Germany.

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Hybrid nanostructures of inorganic particles and biomolecules: Fabrication, antimicrobial activity and application in deep-UV imaging of live cells

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Hybrid nanostructures that comprise inorganic nanoparticles (noble metals, semiconductors) and biomolecules received a considerable attention in last decades due to a number of interesting fundamental properties as well as a wide range of possible applications. Here, we present the results on two types of hybrid structures: noble metal (Ag, Au) nanoparticles functionalized with small biological molecules (tryptophan, riboflavin) and ZnO biomacromolecule (cellulose, alginate) hybrids. The obtained materials were studied in detail by microscopic (TEM, SEM) and optical (PL and UV vis) techniques. The antimicrobial activity of the ZnO-, Ag- and ZnO/Ag-biomolecule hybrids was tested against the *Staphylococcus aureus, Escherichia coli* and *Candida albicans* pathogens. Silver nanoparticles functionalized with amino acid tryptophan and gold nanoparticles bi-functionalized with tryptophan and riboflavin were tested as fluorescent probes for deep-UV (DUV) imaging of microbial and cancer cells. DUV imaging was performed on DISCO beam line of synchrotron SOEIL, France. ZnO-biomacromolecule hybrids exhibit other interesting properties such as ability to immobilize antibodies, catalytic activity and a strong CO_2 absorption, which will also be presented.

Biography

Vladimir Djoković has completed his PhD in Physics at University of Belgrade, Faculty of Physics in 1999. He spent two year as a Postdoctoral fellow at University of the Free State, South Africa. In last couple of years, he was a Visiting Professor/Researcher at NASA-University Research Center, North Carolina Central University. He has published two book chapters and more than 60 papers in ISI journals. He is a leader of polymer nanocomposite group at Vinča Institute from 2005 and a Professor of Polymer Physics at Faculty of Physics, University of Belgrade.

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Role of curcumin-zinc oxide composite nanoparticles on streptozotocin-induced diabetic rats

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Diabetes mellitus (DM) is a chief global public health concern, as it is a tremendously widespread endocrine disease that causes many complications risking patient's quality of life. The correlation of diabetes and disturbance of zinc homeostasis made zinc oxide nanoparticles an attractive therapeutic suggestion. Glucose-phosphorylating enzyme glucokinase (GK) and glucose transporter GLUT2, had been implicated in glucose metabolism control in DM. Curcumin, the major active polyphenolic constituent of turmeric rhizomes (*Curcuma longa*, family Zingiberaceae), shows pleiotropic effects on a wide spectrum of molecular targets. In DM, curcumin exerts hypoglycemic effects via different mechanisms including GK and GLUT2 gene expression. The use of nanoparticles in medicine is an attractive proposition. The current study aims to evaluate the potential activities of prepared and characterized curcumin nanoparticles (Curc-NP), zinc oxide nanoparticles (ZnO-NP), and curcumin-zinc oxide composite nanoparticles (Curc-ZnO-NP) on streptozotocin (STZ)-induced diabetic rats (10 rats/group). The potential defending character of every treatment against diabetic rats was evaluated by investigating different biochemical (glucose, insulin, urea, creatinine, HbA1-C, AST and ALT) and histopathological parameters as well as protein expression of GK and GLUT2 in the pancreas and livers of diabetic rats. Adult Wistar albino rats (180-200 g) were injected intraperitoneally with a freshly prepared STZ single dose (50 mg/kg b.w.) for the induction of type-2 DM. Diabetic rats were treated orally with a daily dose of 50 mg/kg b.w. of Curc-NP, and 10 mg/kg b.w. of ZnO-NP, Curc-ZnO-NP, and diamicron (traditional anti-diabetic agent) for 21 days. All treatments showed significant reduced blood glucose, elevated insulin levels, regulated GLUT-2 and glucokinase genes, however, Curc-ZnO-NP showed the most potent anti-diabetic activities comparable to normal rats. The histopathological findings confirm the biochemical and molecular data recommending Curc-ZnO-NP as a potential anti-diabetic agent.

Biography

Mai M. Raslan works as a lecturer at Biotechnology and Life Sciences Department, Faculty of Postgraduate Studies for Advanced Sciences, Beni-Suef University, Egypt. Mai Raslan has completed her PhD in Pharmacognosy, Faculty of Pharmaceutical Sciences, Cairo University, Egypt in 2011.

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