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EMERGING MATERIALS AND NANOTECHNOLOGY

September 06-07, 2018 | Bangkok, Thailand

DAY 1

Keynote Forum

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Paola De Padova, Biomed Res 2018, Volume 29 | DOI: 10.4066/biomedicalresearch-C4-009

Paola De Padova

Consiglio Nazionale Delle Ricerche, Italy

Biography

Paola De Padova Senior Scientist, with over 20 years of work experience at the National Research Council, Institute of Structure of Matter, Rome, Italy. Well known and appreciated worldwide for her research in the surface science physics, with special attention to two-dimensional (2D) nanostructures and 2D systems;

Pioneer in the synthesis of new allotropic form of silicon, namely Silicene, one atom thick silicon layer arranged in honeycomb structure, contributing significantly to the development of 2D elementary systems beyond graphene worldwide.

Author of more than 80 manuscripts published in International journals of high reputation and impact factor; H-index is 26 and she has been serving as an editorial board member of reputed Journals such as Journal Physics Condensed Matter and Associated Editor of 2D Materials, from IOP.

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SILICENE AND MULTILAYER SILICENE

Up to now, silicene, one atom thick honeycomb-like arranged silicon sheet, and multilayer silicene have represented an interesting challenge either for the synthesis of new Si allotrope (2012, 108, 155501, Phys. Rev. Lett.) or the birth of the emerging topic on two-dimensional (2D) elemental materials (2018, 41, 175, Rivista del Nuovo Cimento) and 2D Van der Waals heterostructures (2013, 19, 499 Nature; 2016, 353, 6298, Science). Beyond graphene, one atom thick honeycomb arranged carbon sheet, whose discovery deserved in 2010 Physics Nobel Prize (Nobelprize.org): "For the groundbreaking experiments regarding the two-dimensional material graphene", Silicon is the first element of group 14 manifested both exotic structural and electronic properties, showing Dirac cone and electron fermions quasiparticle behavior, nevertheless its no free standing peculiarity (2013, 102, 163106, App. Phys. Lett.; 2013, 25, 382202, J. Phys. Condens. Matter). Multilayer silicene, already synthesized on both single crystal Ag(111) (2014, 1, 0211003, 2D Materials; 2016, 3, 031011, 2D Materials) and on Si(111) after the interface formation of Si(111)-√3×√3 Ag (2017, 121, 27182, J. Phys. Chem. C), displayed the ambipolar character in the realization of the first multilayer silicene-based field effect transistor (2017, 11, 3376, ACS Nano).

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"With the contribution of the Italian Foreign Affairs Ministry and of International Cooperation, General Direction for the Italy Country system promotion".

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Gurumurthy Hegde
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Biography

Gurumurthy Hegde has completed his PhD from Mangalore University, India. Presently he is heading Centre for Nano-Materials and Displays, BMS College of Engineering, Bengaluru, India. He has over 125 publications with 18 patents in his name. His H-index is 18 and has been serving as an Editorial Board Member of reputed journals. He obtained more than 60 international awards from various countries like USA, Malaysia, South Korea, Japan, India etc. He is expert in porous nanoparticles from biowastes, energy, health, LCDs, liquid crystals etc. He guided several students for their PhD.

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EMERGING POROUS NANOPARTICLES FROM BIOWASTES AND ITS APPLICATIONS

Due to ever-growing human progress specially in technology has left many wastes behind. Segregating the biowastes is big headache and due this environment is heavily polluted. Working in this sector is utmost importance for keeping future generation healthy. Time has arrived to treat biowastes in to useful manner so that one can adopt waste to wealth approach. Porous nanoparticles are having unique advantage due to their porous structure. Obtaining porous structure is the state-of-the-art technology and it offers many benefits for various applications. Carbon nanospheres from biowastes are having inbuilt porous structure due to their lignocellulosic nature present in biowastes. These emerging porous nano-structures from biowastes has been used extensively in energy, water and health. Present talk summarizes the overview of such porous nanostructures and their characterization along with unique applications in supercapacitors, waste water treatment, antimicrobial studies etc. This method offers low cost devices to the market, highly stable, easy bulk production and environmentally friendly.

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Fuad Fares
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Biography

Fuad Fares has completed his MSc and DSc studies at the Faculty of Medicine, Technion-Israel Institute of Technology, and postdoctoral studies at the Department of Molecular Biology and Pharmacology, School of Medicine, Washington University, St. Louis Missouri. He developed the Department of Molecular Genetics at Carmel Medical Center and lead this department last 20 years. He is Associate Professor at the Department of Human Biology, University of Haifa and head the Laboratory of Molecular Genetics. He has published more than 90 manuscripts in reputed journals and served as a Member of the Israel Council for Higher Education last 15 years. He is the founder of PROLOR Biotech company for designing long acting recombinant proteins and CanCurX for identification of natural products for treatment of cancer.

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NOVEL STRATEGY FOR DESIGNING LONG-ACTING RECOMBINANT PROTEINS FOR CLINICAL USE

One major issue regarding the clinical use of many peptides is their short half-life due to the rapid clearance from the circulation. To overcome this problem, we succeeded to ligate the signal sequence of O-linked oligosaccharides to the coding sequence of the hormones. The cassette gene that has been used contains the sequence of the carboxyl-terminal peptide (CTP) of human chorionic gonadotropin (hCG) subunit. The CTP contains 28 amino acids with four O-linked oligosaccharide recognition sites. It was postulated that O-linked oligosaccharides add flexibility, hydrophilicity and stability to the protein. On the other hand, it was suggested that the four O-linked oligosaccharides play an important role in preventing plasma clearance and thus increasing the half-life of the protein in circulation. Using this strategy, we succeeded to ligate the CTP to the coding sequence of follitropin (FSH), thyrotropin (TSH), erythropoietin (EPO) growth hormone (GH) and thus to increase the longevity and bioactivity of these proteins *in-vivo*. Interestingly, the new analogs of FSH and GH were found not immunogenic in human and it is already passed successfully clinical trials phase III and phase II respectively. Moreover, FSH long acting (ELONVA) was approved by the European Commission (EC) for treatment of fertility since 2010. In addition, our results indicated that long acting GH is not toxic in monkeys and the results from clinical trials phase I and phase II seem to be promising. Designing long acting peptides will diminish the cost of these drugs and perhaps reduce the number of injections in the clinical protocols. On the other hand, we found that deletion of N-linked oligosaccharides from hTSH subunits resulted in significant decreased in the bioactivity. Moreover, deglycosylated variants of TSH compete with normal hTSH and human thyroid stimulating immunoglobulin (hTSI) in a dose dependent manner. Thus, this variant, behaves as potential antagonist, who may offer a novel therapeutic strategy in the treatment of Grave's disease, the most common form of hyperthyroidism. In conclusion, it was found that addition of O-linked oligosaccharides or deletion of N-linked oligosaccharides could be interesting strategy for designing new analogs of glycoprotein hormones.

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Gurumayum Jitendra Sharma
Manipur University, India

Biography

Gurumayum Jitendra Sharma has done his PhD (Radiation Biology) from Jawaharlal Nehru University, New Delhi and Postdoctoral research from Department of Biochemistry, Brunel University, London. Since 1976, he joined the Department of Life Sciences, Manipur University, and retired as Senior Professor in 2016. Currently, he continues as UGC-BSR Faculty Fellow in Life Sciences at Manipur University. He has 90 publications in national/international journals, supervised 20 PhDs, participated in over 75 conferences and delivered 34 keynote/plenary/invited lectures in conferences/congresses/workshops held in USA, UK, France, China, Japan, Netherlands, Italy, Singapore, Thailand and India. He was a Visiting Professor at National Institute of Food and Nutrition Research, Rome. He is reviewer for 12 international journals of repute, his research areas are Plant Biotechnology, food irradiation, free radicals and dietary antioxidants. He serves as Member, Scientific Panel on GMOs and foods, Food Safety and Standard Authority of India (FSSAI), Government of India.

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Note:

PROTECTION OF RADIATION-INDUCED DNA DAMAGE BY ANTIOXIDANT-RICH MEDICINAL PLANT EXTRACTS

The broad field of free radicals and antioxidants covers an emerging area known as redox biology and has been perceived as focusing around the use of antioxidant supplements to prevent a variety of human diseases. During the events of evolution, the emergence of photosynthetic system in aerobic organisms, plants, generates reactive oxygen species and has opened a paradoxical situation compelling life confront hostile environment and to be able to adapt, the redox processes have become increasingly significant. Antioxidants/free radicals permeate the entire living systems in the cellular milieu. Life is a balance between the two like a tug-of-war: antioxidants serve to decrease the levels of free radicals permitting them to perform useful biological functions without causing much damage. However, some damages are inevitable requiring repair systems to maintain cellular integrity and viability. Reactive oxygen species are all over the cellular environment in aerobic microbes, plants and animals. These species protect living systems from various types of infections and involve in critical signaling pathways. Eventually, these species also often kill cells, tissues and organs in the end. The continual damages by these species, failing repair pathways, can cause age-related tumor development, neuro-degenerative diseases and several human disorders. It would have been wonderful if life had evolved entirely in the anaerobic environment, in which case, the life-spans would have been much longer, and diseases would have rarely occurred. Interestingly, several medicinal plants possess bio-active molecules which can prevent human diseases. These molecules having diverse chemical entities possess high antioxidant profiles and encounter damaging radical species extremely efficiently at time scales of nano-, pico- and femto-seconds in cellular environment thereby preventing molecular damages done to the DNA and membranes. Antioxidant potentials and radioprotective properties of curcumin and rhizome extract of tropical ginger have been investigated. Free radical scavenging activities were measured using ferric ion reducing power assay, DPPH radical test, hydroxyl radical scavenging activity assay, nitric oxide scavenging assay and superoxide scavenging capacity. Both curcumin and tropical ginger extract exhibited good protection against radiation-induced damage in plasmid pBR322 and rat bone marrow cell DNAs as revealed by agarose gel and single cell gel electrophoreses. Some of these results shall be discussed in this paper.

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Kampon Sriwatanakul
Vitastem Co, Ltd, Thailand

Biography

Kampon Sriwatanakul is an internationally recognized pioneer of stem cell therapy, received MD degree and PhD degree from Mahidol University where he had an academic career for more than 35 years. He has also received training in Clinical Pharmacology from University of Leicester, UK and University of Rochester, USA. Apart from publishing more than 40 publications in international journals, he has spearheaded several important research and development activities related to stem cell technology in Thailand, including setting up of cord blood and tooth cell banking.

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POTENTIAL OF PROBIOTICS AS A NEW BIOTHERAPEUTIC AGENT FOR BOOSTERING THE IMMUNE SYSTEM

Probiotics or heath-beneficial bacteria have recently been introduced as the new biotherapeutic agents for boostering immune system as well as treatments of several chronic diseases. Probiotics have also been demonstrated to exert positive effects on the composition of gut microflora and overall health. This presentation provides an overview research and development of probiotics, emphasizing non-dairy foods that contain probiotic bacteria. Production of the Lactobacillus genus is found mostly in dairy products with yogurts, kefir and cultured drinks. Our research group decided to use the plant sources which are more beneficial and have much less side effects than animal products. Cordyceps militaries, Houttynia cordata and other immune-boosting herbs were carefully selected as the raw materials for probiotic production. The finished product contained mixture of probiotics including *L Plantarium, L acidophilus, B subtilis* and *Saccharomyces cerevisiae.* It was well recognized that a healthy body is dependent on a strong immune system. Probiotics help maintain intestinal microbial balance and gut mucosa development. Our pilot studies indicated the potential applications of this plant-based probiotic mixture in the treatments of chronic allergies, frequent infections and autoimmune disorders. The immune status tests also showed marked increases in NK cell, CD4, CD8 cell counts as well as restoring immune balance. We believe that probiotics communicate with the host by proteomic recognition receptors, such as nucleotide binding oligomerization domain, which modulate key signalling pathways. Our future goal of research is to explore probiotic mode of action focusing on how gut microbiome influence the host immune system.

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Ashok Kumar Srivastava
Indian Institute of Technology, India

Biography

Ashok Kumar Srivastava has received his PhD degree from the McGill University, Montreal in 1990. He has 40 years of industrial research teaching experience in Biochemical Engineering and Biotechnology. He has 110 international journal papers, 154 international/national presentations and two patents to his credit. He has supervised 16 PhD (five continuing) and 73 master's theses. His major interest is in modelling simulation, optimization and control of bioprocesses, microbial/plant cell/hairy root cultivations for important metabolite production (bio/copolymer production, podophyllotoxin, azadirachtin, ajmalicine, shikimic acid production etc) and novel bioreactor development.

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PLANT CELL CULTIVATION OF *A INDICA* IN BIOREACTOR FOR MASS PRODUCTION OF AZADIRACHTIN

Presently bio-pesticide (azadirachtin) is produced by solvent extraction of *Azadirachta indica* (Neem) seeds. However, this protocol features low variable yield and severe contamination problems. *In-vitro* plant cell cultivation in bioreactors can serve as an alternate for mass production of azadirachtin. Successful attempt was made to initiate callus from the seed kernel of high yielding variety of *Azadirachta indica*. This was followed by development of shake flask suspension culture under statistically optimized culture conditions for maximum growth and azadirachtin production. The biomass and azadirachtin yield enhancement strategies were then applied (which included addition of elicitors, precursors, growth factors and permeabilizing agents) to enhance azadirachtin production. Batch growth and azadirachtin production kinetics of the cell suspension culture was there after established in a stirred tank bioreactor. Engineering optimization was then attempted where in a mathematical model was developed using the batch kinetic data. This served as an excellent tool to understand the culture behaviour under different cultivation conditions and facilitate the design of an appropriate feeding strategy(ies) in fed-batch/continuous mode(s) of cultivation. A pre-optimized computer simulated continuous cultivation strategy with cell retention was experimentally implemented which featured high biomass and azadirachtin production from *A indica* cells in the bioreactor. The experimental verification resulted in a biomass accumulation of 61.4 g/L and azadirachtin production of 751.9 mg/L with 14% release of azadirachtin (105.0 mg/L) in the culture medium. This was significantly higher than the azadirachtin production from seeds from natural plant of neem.

Note: