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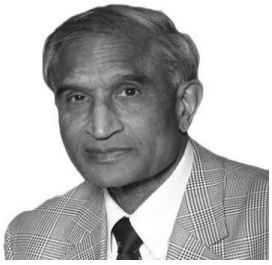
29th-30th , June 2017 at Singapore



K. K. Jain MD

FRACS, FFPM

Personalized medicine based on nanobiotechnology

Abstract

Personalized medicine simply means the prescription of specific therapeutics best suited for an individual. It is usually based on pharmacogenetic, pharmacogenomic, transcriptomic, pharmaco-proteomic and pharmacometabolomic information. Other individual variations in patients and environmental factors are also taken into consideration. Concept of personalized medicine is the best way to integrate various biotechnologies and their translation into clinical applications.Advances in nanobiotechnology will facilitate the development of personalized medicine by: (1) Nanodiagnostics will improve the sensitivity and extend the present limits of molecular diagnostics, point-of-care devices, biochips and biosensors; (2) improve discovery of biomarkers; (3) facilitate integration of diagnosis and therapy, which is an important part personalized medicine; and (4) nanomedicines are suitable for targeted delivery to lesions. Important areas of application include oncology, cardiology and neurology.Examples of personalized nanomedicines will be discussed. In case of cancer the variation in behavior of cancer of the same histological type from one patient to another is also taken into consideration in addition to variations among patients. Personalization of cancer therapies is based on a better understanding of the disease at the molecular level and nanotechnology will play an important role in this area. Anticancer nanomedicines can be targeted to the tumor and spare the normal tissues

to reduce systemic toxicity. Personalized nanomedicines will be more effective and safer than conventional medicines.In conclusion, nanobiotechnology is playing an important role in the development of personalized medicine.

Biography

Professor K.K. Jain is a physician trained in neurology/neurosurgery and biomedical research and attained specialist qualification as Fellow of the Royal College of Surgeons of Canada and Fellow of the Royal Australasian College of Surgeons. He worked for 25 years in various academic and private practice positions worldwide mostly in Canada and the United States. In 1989, he moved to Switzerland and has been involved in biotechnology since then. He founded Jain PharmaBiotech in 1996 and serves as a CEO of the company as well as a consultant to the biopharmaceuticals industry. He was elected a Fellow of the Faculty of Pharmaceutical Medicine of the Royal College of Physicians of UK in 2000. Prof. Jain is the author of 470 publications including 28 books (23 as the sole author and 5 as editor) and 50 special reports. The reports topics include genomics, proteomics, molecular diagnostics, biomarkers, cell therapy, gene therapy, RNA interference, nanobiotechnology, drug discovery, drug delivery, neurological disorders and personalized medicine. Prof. Jain has been involved in development of personalized medicine for the past 2 decades. He wrote the first monograph on personalized medicine in 1998 and is the sole author of Textbook of Personalized Medicine, published by Springer, which is now in the 2nd edition, and has been translated into Japanese. Over the past 15 years Prof. Jain has given numerous invited lectures worldwide as well as conducted workshops on personalized medicine. He considers personalized medicine the best approach to integrating new biotechnologies and translating them into clinical applications. Among these, nanobiotechnology is the most promising. The 3rd edition of his "Handbook of Nanomedicine", was by Springer in May 2017. He wrote the first journal article on "Role of nanobiotechnology in personalized medicine" and is the author of most of the publications on this topic. The most important of these is the Handbook of Nanomedicine (Springer 2008, Chinese edition 2011, 3rd edn 2017). He is an invited lecturer on nanobiotechnology as well as a member of review panels for research grants by government agencies in Canada, the European Union, the Netherlands and Singapore.

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Computational Explorations of Biosystems and Nanosystems

Abstract

The physical principles used in computational chemistry underlie all branches of chemistry; as such, computational chemistry has unlimited potential to contribute to the advancement of fundamental chemistry in every different subdiscipline as well as to finding solutions to critical challenges that humankind faces today, such as healthcare and energy/environmental issues. With this in mind, our computational exploration of chemistry applies quantum chemistry, multiscale QM/MM and QM/QM approaches, and many other advanced computational chemistry techniques to a broad range of complex molecular systems such as metalloenzymes, transition-metal catalysts, drugs/drug targets, metal-organic frameworks (MOFs), and nanomaterials. In particular, using computational approaches and often with experimental collaborators, we seek to derive information about chemical reaction mechanisms and bonding patterns of these complex molecules. We are also developing efficient computational methods and algorithms, in the hope that our new computational methods will expand

the capability of computational chemistry and thereby enable one to simulate the behavior of complex molecular systems with higher reliability and predictability in the future.

Biography

Dr. Hajime Hirao received his BEng and MEng degrees from Kyoto University and his PhD from The University of Tokyo. He underwent his postdoc training at The Hebrew University of Jerusalem, Emory University, and Kyoto University. Prior to that, he worked for three years on computer-assisted drug design at the Novartis institute in Japan. Before joining City University of Hong Kong, he worked as faculty at Nanyang Technological University in Singapore..

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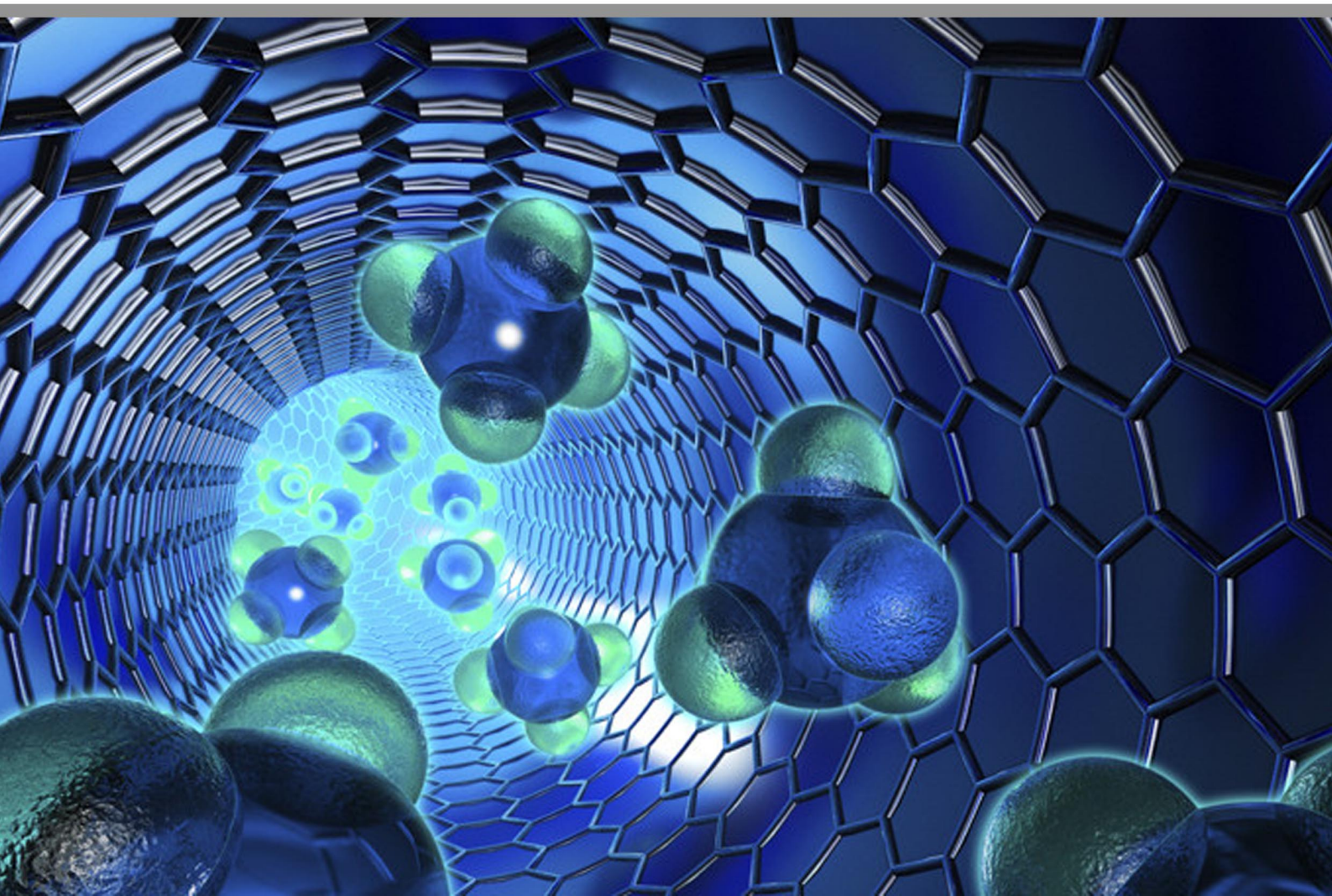

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Cerium Oxide Nanoparticles with Antioxidant Capabilities and Gadolinium Integration for Mri Contrast Enhancement

Abstract

Gadolinium (Gd) with 7 unpaired 4f-electrons has been shown to be promising element when designing CAs for MRI contrast enhancement. Today Gd based complexes are clinically used as CAs all over the world for this purpose. Despite the effective contrast properties of gadolinium, it has recently been noticed that Gd-based contrast agents (CA:s) such as gadodiamide can in rare cases cause toxicity issues associated to Nephrogenic Systemic Fibrosis, while newer developed Gd-based CAs as for example Dotarem (gadoteratemeglumine) is notably safer for clinical use. There is a need to develop new multimodal CAs to further increase the contrast enhancement and develop targeting properties. Our aim is to design powerful CAs and one strict and urgent requirement is to obtain safe CAs. In this project, we have successfully implement fractions of gadolinium in cerium oxide nanoparticles (Gd-CeNP:s). Cerium oxide is highly biocompatible and possesses very interesting scavenging abilities of reactive oxygen species (ROS). A catalytic and multi-targeting ROS-scavenger as cerium oxide has a high potential as a therapeutic agent, especially in the form of nanoparticles where the surface-to-volume-ratio is huge. Large surface area is also an important contributing factor to the high MRI contrast enhancement of the developed Gd-CeNPs. We have recently shown that the Gd-based nanoparticles when used as contrast enhancement deliver about 2-3 times higher signal per gadolinium compared to today´s commercial contrast agents, which will improve local MRI contrast and thereby reduce the injection doses and facilitate diagnosis. This novel Gd-CeNPs have successfully been synthesized using a facile wet-chemical approach and thereafter the nanoparticles have carefully been characterized using techniques such as X-ray diffraction, dynamic light scattering and high-resolution transmission electron microscopy. The Gd-CeNPs have exhibit clear antioxidant properties in cellular environments and for the first time have the antioxidant behavior spectroscopically been studied using near edge X-ray absorption of fine structures.

Keywords

Nanoparticles, Cerium Oxide, Gadolinium, Contrast agent, Biomedical Imaging, Magnetic Resonance Imaging, Reactive Oxygen Species, Antioxidant

Biography

Peter Eriksson received his Master´s degree in Engineering Biology from Linköping Institute of Technolgy in 2013. He started his PhD in Octorber 2013 in Professor KajsaUvdal´s research group Molecular Surface Physics & Nanoscience. The research focus on developing nanoprobes for biomedical imaging, utilizing the interesting properties of lanthanide elements such as cerium and gadolinium. In summer 2017, Peter will continue his research project in Assistant Professor XuanjunZhangs research group at Macau University

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Dr. Seema Nara

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Using Nanocatalytic Probes for Detecting Pesticide Contamination in Water

Abstract

Artificial enzymes have emerged as a promising alternative to overcome the limitations of natural enzymes such as their high cost, complicated purification steps, and sensitivity to harsh environmental conditions. Nanostructures have shown great potential as enzymes due to their easy synthesis, stability, and facile biofunctionalization and have been employed as catalyst in various sensing applications. Contamination of water resources with pesticides released from agricultural wash offs and industrial effluents is a major concern driving the need for continuous monitoring of these water resources for presence of pesticides. Besides the complicated and reliable chromatographic assays like HPLC/GC-MS, most of the detection methods for pesticides rely upon the use of acetylcholineesterase (AChE) as a biological element. AChE, being a natural enzyme impose certain restrictions on the stability and sensitivity of detection method. Hence, we have demonstrated the use of gold nanostructures as artificial enzymes to develop a simple colorimetric assay for malathion detection. The intrinsic peroxidase potential of gold nanorods for oxidation of colorimetric substrate 3,3',5,5'tetramethylbenzidine/hydrogen peroxide (TMB/H2O2) is demonstrated. This peroxidase

potential is selectively quenched in the presence of malathion which has been used for developing a colorimetric inhibition assay for malathion detection. The developed assay is specific, has a sensitivity of 1.78µg/ml. the assay shows reproducibility and accuracy when tested with real water samples spiked with malathion. Assay shows immense potential of catalytic nanostructures in biosensing applications.

Biography

Dr. Seema Nara is working as assistant professor in Department of Biotechnology, Motilal Nehru National Institute of Technology, Allahabad, India since April 2009. She completed her PhD in 2009 from Indian Institute of Technology Delhi, India. She is presently supervising M.Tech and Ph.D thesis in here area of interest and couple of sponsored research projects. Her research interests includes developing newer diagnostic methods for detection of bacterial pathogens or their toxins, drugs, pesticides and cancer biomarkers, nanostructure synthesis and exploring their applications in diagnostics and therapeutics.

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Fabrication of Hierarchical Nanoarchitectures Inspiredalbumin-Bound Paclitaxel Nanoparticle for The Effective Small Molecular Therapeutics

Abstract

Albumin-based nanocarrier (Abraxane®) was developed to improve the therapeutic efficacy of PTX in solid tumors. However, upon intravenous administration, albumin conjugates becomes unstable and resulted in unfavorable pharmacokinetics and suboptimal biodistribution, limiting its clinical success. Therefore, we attempted multiple strategies to improve the therapeutic efficacy of Abraxane®, in particular and PTX, in general. First, we applied the principles of a layer-by-layer (LbL) technique to improve the physicochemical properties of nab-PTX/Abraxane®. LbL-based nab-PTX was fabricated by the alternate deposition of polyarginine (pARG) and poly(ethylene glycol)-block- poly (L-aspartic acid) (PEG-b-PLD) onto an albumin conjugate. LbL assembly improved the colloidal stability of nab-PTX and effectively increased the blood circulation potential of PTX. Second, we have combined nab-PTX with vorinostat (VOR) to achieve maximum synergistic effect in solid tumors. In this attempt, transferrin (Tf)-anchored PEGylated lipid bilayers (Tf-L-APVN) was developed for the targeted co-delivery of chemotherapeutic drugs. At cellular levels, Tf-L-APVN significantly enhanced the synergistic effects of PTX and VOR on the proliferation of cancer cells. In HepG2 tumor-bearing mice, Tf-L-APVN displayed excellent antitumor efficacy and significantly inhibited the tumor growth. Overall, therapeutic efficacy of Abraxane® was remarkably improved by our unique formulation strategy.

Biography

Professor Chul Soon Yong graduated from the College of Pharmacy, Seoul National University and received PhD degree from the University of South Carolina. He was the dean of College of Pharmacy, Yeungnam University, president of The Korean Society of Pharmaceutical Sciences and Technology, president of The Asian Federation for Pharmaceutical Sciences (AFPS), and chair of Organizing Committee for AFPS Conference 2013. He is serving as vice-chairman of The Local Organizing Committee of FIP Seoul Congress 2017. He has published over 250 papers in SCI journal and edited several books. His research interests cover the development of novel drug delivery systems and have expanded to include the application of various nanoparticles in drug delivery to treat cancers.

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Construction and Expression Full Length of Indonesian Hepatitis B Core Antigen (HBcAg) B3 Subgenotype in Lactococcus Lactis for Therapeutic Vaccine

Abstract

HBcAg is viral proteins, which forms the inner core of Hepatitis B Virus (HBV) particles. HBcAg has strong immunogenicity that is described by a T-cell dependent and independent antigen, therefore HBcAg able to act as a potent B-cell activator and to use as a therapeutic vaccine in chronic HBV patients. This paper propose for the first time, the study about construction and expression of HBcAg into Lactococcus lactis by Nisin Controlled Expression (NICE) system. Nisin system has been

used in the protein expression because of ease of use and high protein yield. The HBcAg gene used in this study was HBV B3 subgenotype which is dominant in Indonesia. In this study, HBcAg gene has successfully cloned into vector pNZ8148, resulting in the creation of transformant L.lactis NZ3900 pNZ818-HBcAg (Figure 1), in which HBcAg protein was 21 kDa in size. Induction with 10 ng/mL nisin has increased the concentration of expressed protein significantly. Dot blot hybridization analysis indicated that HBcAg proteins were successfully expressed in L. lactis after nisin induction. These result indicated that HBcAg gene was successfully cloned and expressed in L.lactis under NICE system.

Biography

The author was born at Rembang, Indonesia. She is studying at Post Graduate Programme, Bogor Agricultural University with major in Master of Biotechnology. She also works at Agency of Assessment and Application for Technology, Deputy of Agroindustry and Biotechnology. Currently, she is doing join research between Bogor Agricultural University and Indonesian Institute of Science about construction and expression HBcAg gene for therapeutic vaccine.

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MineoHiramatsu

Department of Electrical and Electronic Engineering, Meijo University, Nagoya, Japan

Nanoplatform Based on Vertical Nanographenefor Electrochemical and Bio Applications

Abstract

Carbon nanowalls (CNWs) are few-layer graphenes, standing vertically on a substrate. The sheets form a self-supported network of maze-likewall structures with thicknesses ranging from a few nanometers to a few tens of nanometers, and with a high aspect ratio. CNWs draw attention as platform for electrochemical sensing and biosensing, due to the large surface area of vertical nanographene network combined with surface functionalization. Here, CNWs were used as electrode to detect several biomolecules.Dopamine, ascorbic acid, and uric acid are compounds of great biomedical interest, which all are essential biomolecules in our body fluids.CNWs were fabricated by plasma-enhanced chemical vapor deposition and were used as electrode to detect these biomolecules in phosphate-buffered saline. In addition, CNW surface was decorated with platinum (Pt) nanoparticles. The electrochemical property of Pt-decorated CNWs as the electrode of hydrogen peroxide sensor was explored. Moreover, CNWs were used as scaffold for cell culturing. The dependence of the cell-culturing rates and morphological changes of HeLa cells on CNW scaffolds with different densities and wettability were systematically investigated.Nanoplatform based on vertical nanographene offers great promise for providing a new class of nanostructured electrodes for electrochemical sensing, biosensing and energy conversion applications.

Biography

Dr. MineoHiramatsu is a Full Professor of Department of Electrical and Electronic Engineering and the Director of Research Institute, Meijo University, Japan. His main fields of research are plasma diagnostics and plasma processing for the synthesis of thin films and nanostructured materials. Author of more than 100 scientific papers and patents on plasma processes for materials science

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Wei, Peng-Sheng

National Sun Yat-Sen University/Department of Mechanical and Electro-Mechanical Engineering

Fabrication of Porous Materials Used for Scaffolds

Abstract

TThe pore shape in solid as a result of entrapment of a bubble by a solidification front is predicted in this work. Porous materials have been widely used as scaffolds in biology and tissue engineering. In this work, the relevant pore shape is determined by accounting for mass and momentum transport of species across a self-consistent shape of the cap, as proposed previously. This work finds that there exist three different mechanisms for pore formation, depending on solidification rate and directions and magnitude of solute transfer across the cap. Case 1 is subject to solute transport from the pore into surrounding liquid as a result of the cap emerged from a thin concentration boundary layer on the solidification front. An increase in initial solute concentration in liquid decreases pore radius and times for bubble entrapment. The predicted pore shape in solid agrees with experimental data. Opposite directions of solute transport across the cap submerged into a thick concentration boundary layer along the solidification front, however, cannot result in bubble entrapment, because solute increases and decreases rapidly in late stage in Cases 2a and 2b, respectively. Porous materials used as scaffolds can be attributed to mechanisms of Cases 2a and 2b.

Biography

Dr. Peng-Sheng Wei received Ph.D. in Mechanical Engineering Department at University of California, Davis, in 1984. He has been a professor in the Department of Mechanical and Electro-Mechanical Engineering of National Sun Yat-Sen University, Kaohsiung, Taiwan, since 1989. Dr. Wei has contributed to advancing the understanding of and to the applications of electron and laser beam, plasma, and resistance welding through theoretical analyses coupled with verification experiments. Investigations also include studies of their thermal and fluid flow processes, and formations of the defects such as humping, rippling, spiking and porosity. Dr. Wei has published more than 85 journal papers, delivered keynote or invited speeches in international conferences more than 100 times. He is a Fellow of AWS, and a Fellow of ASME. He also received the Outstanding Research Achievement Awards from both the National Science Council, and NSYSU, the Outstanding Scholar Research Project Winner Award from National Science Council, the Adams Memorial Membership Award from AWS, the Warren F. Savage Memorial Award from AWS, and the William Irrgang Memorial Award from AWS. He is currently the Xi-Wan Chair Professor of NSYSU, and Invited Distinguished Professor in the Beijing University of Technology, China.

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Multifunctional QD-aptamer/Graphene Oxide Platform for the construction of a Half-adder, Half-subtractor and switch

Abstract

The multiple and complex logic gates were integrated on the universal multifunctional QD-aptamer/GO nanocomplex to perform a half-adder, half-subtructor and switch. In such nanocomplex, Green InP/ZnS QD506-labeled thrombin aptamer (TA-QD506) and yellow InP@ZnS QD571-labeled ATP aptamer (AA-QD571) were adsorbed onto GO to form TA-QD506/GO/AA-

QD571nanocomplex, leading to the quenching of the fluorescence of InP/ZnS QD. In the presence of ATP or thrombin, the fluorescence of TA-QD506 or AA-QD571 was recovered. To thrombin and ATP as a signal input, the sum of the fluorescent signal intensity of QD506 and QD571 as output, we constructed "NAD" logic gate, the fluorescent dual-emission relative strong/weak ratio intensity of QD506 and QD571 as output, we constructed "XOR" logic gate. The "NAD" and "XOR" logic gate together constitute half-adder. When thrombin + PDNA1 and ATP + PDNA2 as a signal input, the fluorescence ratio of QD571/QD506 as output, we constructed "INHIBIT" logic gate, the fluorescent dual-emission relative strong/weak ratio intensity of QD506 and QD571 as output, we constructed "XOR" logic gate. The "INHIBIT" logic gate and "XOR" logic gate together constitute half-subtractor. In addition, the optical switch based on the TA-QD506/GO/AA-QD571 platformwas ON and OFF at pH=8.0 and 6.0, respectively.

Biography

Xianyun Hu is a PhDstudent in the laboratory ofProfessor Qingjiang Sun in School of Biological Science & Medical Engineering, Southeast University, China. Myresearchinterests involve analyticaland bioanalytical applicationsof quantum dots, nan-logic operation design, DNA nano-structures, and the use ofmodified nanoparticles forprobing intracellular processes.

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Biosynthesis of Nanoparticles Using Coffee Powder Extract

Abstract

The past method for synthesis of nanoparticles are expensive and hazardous to the environment than the biosynthesis of nanoparticles using plant extract. The green technology that uses plant material for nanoparticle synthesis have more natural and more secure benefits to human health and does not harm the environment around us. Coffee is one of those plants that contain a lot of natural components and based on the latest research results have many biologically active benefits for the health of the body, such as antioxidants. The antioxidant content of coffee will remove free radicals. Coffee nanoparticles will absorb and release oxygen free radicals in conditions that are less harmful then will release the nanoparticles and will absorb more free radicals. During this time, there are still many people who do not understand the advantages of the use of synthesis of nanoparticles using plant extract especially the coffee. The purpose of this paper is to discuss the benefits of synthesis of nanoparticles using plant extract using coffee powder materials.

Biography

Rosa is a doctor who became a lecturer and a duty to pursue the field of nutrition-related problems, especially coffee, obesity, gout and herbs. Education taken by Rosa is a medical undergraduate education, professional education as a general practitioner, master degree in biomedical sciences with a concentration of nutrition and health medical doctoral education. In 2011, Rosa received an award from the dean of the Faculty of Medicine, University of Diponegoro as one of the winners in the race textbook writing. Since 2014 Rosa has been a member of the ACS / American Chemical Society.

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Syntheses of Nucleotide-Based Lanthanide Nanomaterials as Scavenger for Nitrite Ion

Abstract

Three functional components: Tb3+ as luminescent ion, nucleobase 5-fluorouracil (U) as an auxiliary ligand and 4.4'-oxybis (benzoic acid) (OBBA) as an antenna molecule were prepared in U-Tb-OBBA CPNPs. U-Tb-OBBA showed the shape of aspherical nanoparticles with a size of approximately 100 nm. The selected area electron diffraction revealed that U-Tb-OBBA is amorphous. When mixed with

nitrite, the shape of U-Tb-OBBA CPNPs remain unchanged, meaning the presence of nitrite ions did not changed the morphology and size of U-Tb-OBBA. U-Tb-OBBA CPNPs have high stability and strongly fluorescent; for the U-Tb-OBBA CPNPs suspension containing NO2-, the precipitate of U-Tb-OBBA CPNPs almost completely turn into nonfluorescent particles and the supernatant had almost no NO2- by a Griess test. When the concentration of added NO2- is below 4 µM, no NO2- was found in supernatant, indicating that NO2- has been completely removed by U-Tb-OBBA CPNPs. For 1 mL of drinking water containing 400 µM NO2- spiked with nitrite, approximately 4.2 mg of U-Tb-OBBA CPNPs can remove all the NO2- ions in the solution. The removal capacity of U-Tb-OBBA CPNPs is approximately 4.44 mg (96.52 µM) of NO2- per gram of particles.

Biography

Qi You is a PhDstudent in the laboratory ofProfessoYang Chenin School of Biological Science & Medical Engineering, Southeast University, China. Myresearchinterests involvesynthesesand bioanalytical applicationsof lanthanide nanomaterials.

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Study of the Best Support for immobilizing Trichoderma reesei for Hydrolysis of Tiger Grass

Abstract

Bioethanol, one of the outstanding biofuels, is a renewable bio-based resource, thus, is interesting to research for achieving a cheaper production cost. The purpose of this work is to improve the hydrolysis step in bioethanol production by immobilizing Trichoderma reesei on various mesoporous supports, namely, SBA-15, TUD-1, and MCM-48. The amount of the adsorbed enzymes was investigated by UV-visible spectrophotometry. Among those studied supports, SBA-15 showed 100% enzymatic adsorption on support due to its largest pore diameter, which was large enough to accommodate protein molecules inside the channel. This research examined the effect of temperature, time, pH, and amount of the support for optimizing the immobilized enzyme. The immobilized T.reesei on SBA-15 support was characterized by N2 adsorption-desorption, X-ray diffraction (XRD), and scanning electron microscope (SEM). The amount of monomeric sugar after hydrolysis process was measured by high performance liquid chromatography (HPLC).

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Vishwanath D. Mote

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Structural, Morphological, Physical and Dielectric Properties of Mn doped ZnO Nano-particles Synthesized by Sol-Gel Technique

Abstract

The effect of Mn doping on the structural, morphological, physical and dielectric properties of Zn1-xMnxO nanoparticles were prepared using novel sol-gel technique and sintered at 400°C. Samples were systematically characterized using x-ray diffraction (XRD), transmission electron microscopy (TEM), fourier transform infrared (FT-IR) spectroscopy and LCR-Q meter. The peaks corresponding to broad were observed by x-ray diffraction (XRD) patterns, which indicate that the all samples were nanocrystalline with hexagonal phase. Although, according to x-ray diffraction (XRD) data, we have studied the lattice parameters and volume of unit cell of Zn1-xMnxO nanoparticles as a function of Mn content. The crystalline size, lattice strain, stress and strain energy density of Mn doped ZnO nanoparticles were determined from the first six most intensive reflection peaks of XRD using simple W-H models. The results obtained using three models yields strain, stress and strain energy density increases with increasing Mn content and crystalline size decrease. Among the developed models UEDM models was observed to be the best fit and realistic models for sol-gel route. The transmission

electron microscopy (TEM) result confirms that mean particle size of Zn1-xMnxO nanoparticles were about 32 – 43 nm. The functional groups and chemical interactions of Mn substituted ZnO samples were also determined at various peaks using FTIR data and observed the presence of function groups in the samples. Dielectric constant and dielectric loss decreases with increasing Mn concentration and frequency. Thus Zn1-xMnxO nanoparticles observed structure, physical, morphological and dielectrical studies can be used in opto-electronics, spintronics and higher frequency applications.

Biography

V. D. Mote has completed his PhD at the age of 26 years from Advanced Material Research Laboratory, Department of Physics, Dr. B. A. M. University, Aurangabad, India. He is the Assistant Professor, Department of Physics, Dayanand Science College, Latur, India. He has published more than 45 papers in reputed journals.

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S. Vijayavenkataraman

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Three-dimensional Porous Scaffolds for Tissue Engineering using 3D Printing Assisted Electrohydrodynamic Jetting Technology

Abstract

Tissue Engineering and regenerative medicine is an interdisciplinary field aimed at enhancing or replacing the damaged tissue and organs by a combinatorial approach of biomaterials, materials processing and cells. Most of the life science researchers perform the cell experiments on a two-dimensional (2D) substrate while the native in vivo tissue microenvironment is three-dimensional (3D). Cells exhibit biomimetic behavior in a 3D environment than that on a 2D substrate. 3D porous scaffolds provide such desired microenvironment. However, the limitations of the current techniques (i.e., solvent casting, gas foaming, phase separation, freeze drying, electrospinning and other 3D printing (3DP) / rapid prototyping) for fabrication of porous scaffolds hinder the wide spread use of porous scaffolds. 3D printing assisted Electrohydrodynamic jetting technology (EHD-jetting) has many advantages over the other techniques, mainly in terms of its resolution, controllability and repeatability. Biomimetic scaffolds of complex geometries can be printed layer-by-layer with high resolution using this technique and has the potential to be used in tissue engineering of skin, bone, and neural tissue engineering.

Biography

Vijayavenkataraman is a President's Graduate Fellow in the Department of Mechanical Engineering at National University of Singapore (NUS), awarded only to candidates who show exceptional promise or accomplishment in research.His research interests include 3D bioprinting, additive manufacturing, biomaterials and graphene based 2D materials.

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2nd Asia Pacific Nano Biotechnology Summit

29th-30th , June 2017 at Singapore

Dr. Anil K. Suresh (Associate Professor)

SRM University, Chennai, India

Nano-Biotechnology: An Interphase of Bio-Medicine with Nanoscience and Nanotechnology

Abstract

Nanomedicine includes novel class of engineered nanomaterial's that are garning tremendous significance to pursuit in various biological and therapeutic applications. The current talk will provide a brief overview of my research expertise with regards to the biomedical applications of engineered nanoparticles. Firstly, will talk about our recent work on the use of metallic gold nanoparticles for selective targeting of breast carcinoma. In the later part of the talk will discuss how we made use of super paramagnetic iron oxide nanoparticles for glioblastoma, brain cancer therapeutics. Finally I will describe about our ongoing work on the use of super paramagnetic iron oxide nanoparticles as nanomagnets, the next generation nanobiotics, to directly remove Leukemic cells (Blood Cancer cells) out of the blood. Using the last strategy, we don't have to worry about achieving targeted therapeutics, multi-drug resistance, side effects caused by various drugs, and screening for novel drugs and would be the simplest and safest way ever implemented to cure blood borne diseases.

Biography

Anil Suresh received his Ph.D. (2008) from Pune University. Worked as Visiting Scholar/Postdoc (2007-2009) at the Dept. of Biomedical Engineering, McGill University (Canada) and Research Associate (2009-2011) at Nanosystems group, Oak Ridge National Laboratory, USA. He then worked as a Staff Scientist (2011-2013) at the Dept. of Biomedicine, City of Hope National Medical Center (USA). He returned back to India on the prestigious Ramalingaswami Fellowship as a PI to establish his own research and is currently he is working as an Associate Professor (Principal Investigator) at the Dept. of Biotechnology, SRM University, India. His research is focused on biomedical applications of engineered nanoparticles; nanomedicine, nanoimaging, targeted drug delivery, nanotoxicology, bacterial and cancer therapeutics. He authored about 38 peer-reviewed papers; 13 book-chapters, Springer also published a portion of his research as brief-books (2) upon invitation. Dr. Suresh is editor-in-chief for innovative research in chemistry, associate editor (3), editorial board member (2) for different International SCI Journals.

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Biosynthesis of Nanoparticle: A Journey Through Different Cohorts of Nature

Abstract

Mother Nature is occupied with preparing a plethora of nanomaterials having different types and dimensions towards their utilization with a zeal to nurture its constituent congeners.This has indeed led to an attractive adaptability and subsequently the amazing diversity which broadly ranges right from magnetotactic bacteria to mollusks and human beings and from cyanobacteria to giant tree ferns and pines all are ensuing the theories of thermodynamics and principles of supramolecular chemistry which are being operated at the nanometer scale. On the other hand, biotechnology utilizes the biological principles and techniques that manage molecular, genetic and cellular procedures to develop various products and their uses in diverse fields from medicine, environment to agriculture. Furthermore, nanobiotechnology is considered as unique amalgamation of biotechnology and nanotechnology into which possibilities seem exponential. We have taken use of benign microbes, plants, expired pharmaceuticals, lower animals and higher animal processing wastes to synthesize a variety of nanomaterials for bio-medical as well as technological applications which will be discussed during presentation.

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Neeraj Mishra

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LTA-Appended Chitosan Nanoparticles for Mucosal Immunization Against Hepatitis B

Abstract

The present study was aimed at exploring the targeting potential of LTA-anchored chitosan nanoparticles (CH-NP) specifi cally to M cell following oral immunization. The lectinized CH-NP exhibited 7 – 29% coupling capacity depending upon the amount of glutaraldehyde added. Induction of the mucosal immunity was assessed by estimating secretory IgA level in the salivary, intestinal and vaginal secretions, and cytokine (IL-2 and IFN- g) levels in the spleen homogenates. The results demonstrated that LTAanchored CH-NP elicited strong humoral and cellular responses and hence could be a competent carrier-adjuvant delivery system
for oral mucosal immunization against Hepatitis B.

Keywords

chitosan nanoparticles , hepatitis B , LTA lectin , M cells ,oral immunization

Biography

Dr. Neeraj Mishra is working as Professor in Department of Pharmaceutics at ISF College of Pharmacy, Moga (Punjab) since 2012. He has completed his B. Pharm (2000), M. Pharm (2003) and Ph.D.(2011) in Pharmaceutical Sciences from Department of Pharmaceutical Sciences, Dr. H.S. Gour Central University, Sagar (M.P.). He was qualified in National Level Test GATE conducted by IIT, Kanpur in 2001. He is having around fifteen years teaching experience at post graduate and under graduate level. He is also having four years of research experience in Department of Pharmaceutical Sciences, Dr. H.S. Gour Central University, Sagar (M.P.). (2006-2010). He is also having one year of industry experience as production chemist in Symbiotec Pvt. Ltd., Indore (2000-2001). He was recipient of ICMR- SRF (New Delhi, India) (Grant: 45/02/2007-BMS/ PHA Dated 06\07\2007\H.S.Gour) during his Ph.D. tenure. He is having 43 International and 12 National Publication typically in recent concept of novel drug delivery system, particularly in vaccine delivery and drug targeting. He is also written 2 book chapter in national and International publisher (Nova Science Publishers). He is having membership of the Indian Pharmaceutical Association (Life Time membership MP/IND/LM/0086) and Association of Pharmaceutical Teachers of India (APTI) life membership No. is PU/LM-379. In Addition to this he is also acts as a reviewer of International repute journal (Journal of Microencapsulation (Informa Pharmaceutical Science). He has successfully organized one AICTE sponsored national seminar on "Emerging trends and applications of nanotechnology" on 11th June 2011 as Organizing secretary as organizing secretary in Swami Vivekanand College of Pharmacy, Indore (M.P.). He has also presented his research work in National and International conferences.

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Hassan A. Hemeg

Associate professor ,Taibah University,Kingdom of Saudi Arabia

Nanomaterials for Alternative Antibacterial Therapy

Abstract

Despite an array of cogent antibiotics, bacterial infections, notably those produced by nocosomial pathogens still remain a leadingfactor of morbidity and mortality around the globe. Theytarget the severely ill, hospitalized and immunocompromised patients with incapacitated immune system, who are prone to infections. The choice for antimicrobial therapy is largely empirical and not devoid of toxicity, hypersensitivity, teratogenicity and/or mutagenicity. The emergence of multi-drug resistant bacteria further intensifies the clinical predicament as it directly impacts public health due to the diminished potency of current antibiotics. In addition, there is anescalating concern with respect to biofilm-associated infections that are refractory to the presently available antimicrobial armory, leaving almost no therapeutic option. Hence, there is a dire need to develop alternateantibacterial agents. The past decade has witnessed a substantial upsurge in the global use of nanomedicines as innovative tools for combating the high rates of antimicrobial resistance. Antibacterial activity of several metal and metal oxide nanoparticles has been reported. The microbes are eliminated either by microbicidal effects of the nanoparticles such as release of free metal ions culminating in cell membrane damage, DNA interactions, free radical generation, or by the microbistatic effects coupled with killing potentiated by the host's immune system. The diverse annihilative effects of conventional and green nanomaterials on the bacteria are discussed in this review. Combinatorial therapy with metallic nanoparticles as adjunct to the existing antibiotics, may aid to restrain the mounting menace of bacterial resistance and nocosomial threat.

Biography

Dr. Hassan Hemeg is associate professor in Taibah university, in Saudi Arabia, he published several papers in medical microbiology. He lead several committees in health organizations related to the health care accreditation, the new area of research interest is the nano-material and the implementation in the antimicrobial therapy.

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LiqiuWang
The University of Hong Kong

Small is Big: Magic Microfluidic Droplets

Abstract

Droplets of nanoliter and subnanoliter are useful in a wide range of applications, particularly when their size is uniform and controllable. Examples include biochemistry, biomedical engineering, food industry, pharmaceuticals, and material sciences. One example of their many fundamental medical applications is the therapeutic delivery system for delivering site-specific therapy to targeted organs in the body and as the carriers for newer therapeutic options. The size, the size distribution, the generation rate and the effective manipulation of droplets at a scale of nano, pico, femto and even atto liters are critical in all these applications. We make an overview of microfluidic droplet generation of either passive or active means and report a glass capillary microfluidic system for synthesizing precisely controlled monodisperse multiple emulsions and their applications in engineering materials, nanofluids, microfibers, embolic particles and colloidosome systems. Our review of passive approaches focuses on the characteristics and mechanisms of breakup modes of droplet generation occurring in microfluidic cross-flow, co-flow, flow-focusing, and step emulsification configurations. The review of active approaches covers the state-of-the-art techniques employing either external forces from electrical, magnetic and centrifugal fields or methods of modifying intrinsic properties of flows or fluids such as velocity, viscosity, interfacial tension, channel wettability, and fluid density, with a focus on their implementations and actuation mechanisms. Also included is the contrast among different approaches of either passive or active nature.

Biography

Prof. L. Q. Wang received his PhD from University of Alberta (Canada) and is currently a full professor in the Department of Mechanical Engineering, the University of Hong Kong. He is also the Qianren Scholar (Zhejiang) and serves as the director and the chief scientist for the Laboratory for Nanofluids and Thermal Engineering, Zhejiang Institute of Research and Innovation (HKU-ZIRI), the University of Hong Kong.

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Bio-Nanocomposites Based on oil Palm and Ceiba Pentandra Fibres for Environmental Remediation and Monitoring

Abstract

There is a great need for unprecedented re-evaluation of human activities to address the issues of the destruction of eco-systems and habitat for wildlife, climate change, increasing temperature of the earth, rising ocean level, destructive weather patterns, the emerging infectious diseases and global famine and poverty. With the call for better resource and biodiversity management, improved food production and distribution, better and affordable health care, clean energy, air and water, and minimal wastage, emission and pollution, the integrated approach towards developing green technologies and more eco-friendly processes is no longer a matter of choice for scientists, engineers, investors, economists and social scientists, but a matter of one's commitment to come together and work out the solutions. The focus of this presentation is to highlight our R&D in developing an integrated biorefinery strategy based on oil palm and Ceibapentandra fibres for the production of bio-nanocomposite materials for environmental remediation and monitoring. This hopefully could lead to collaborative effort to tackle immediate and pressing problems facing the world today.