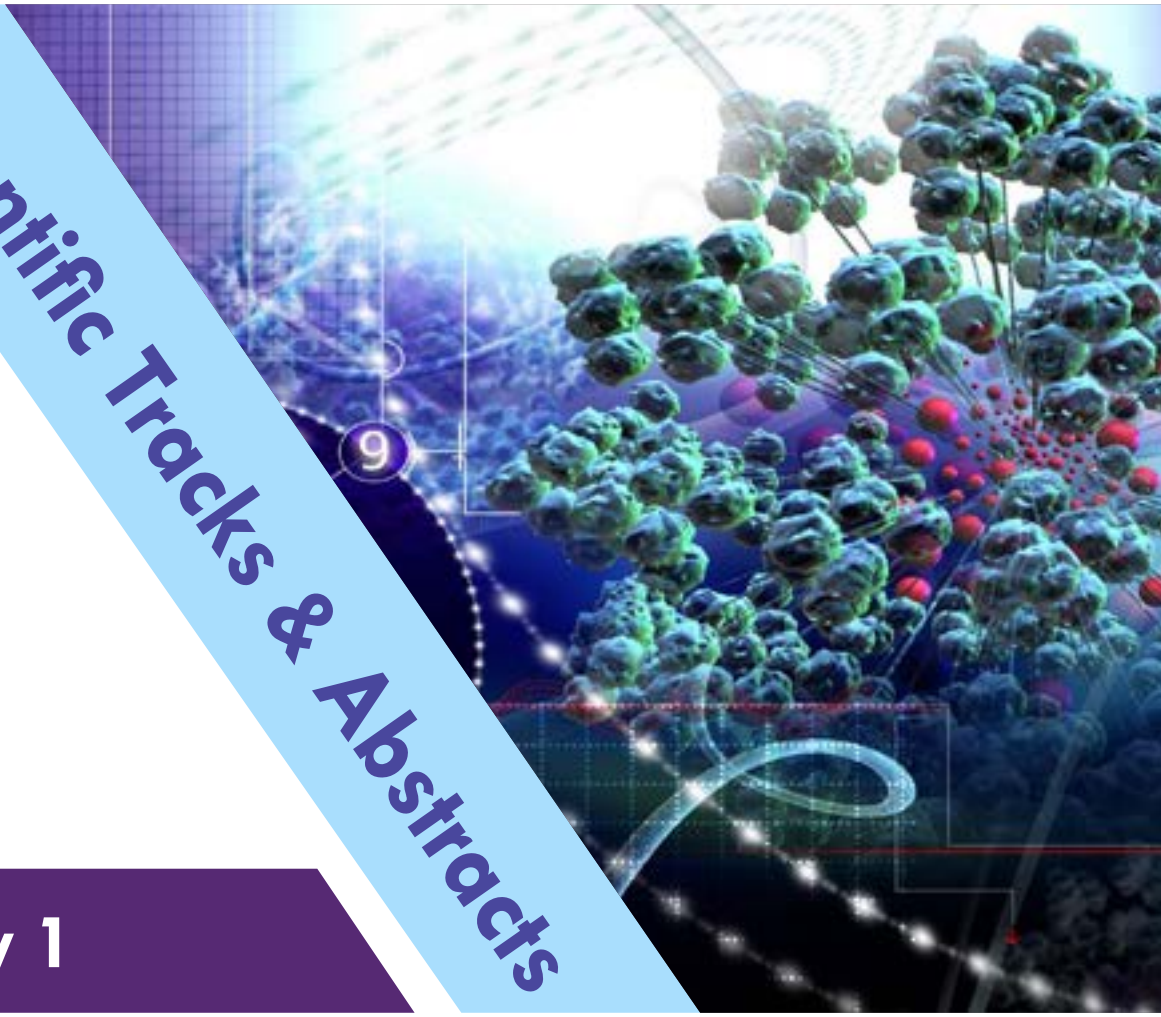
11th International Conference and Expo on

Nanoscience and Molecular Nanotechnology

October 20-22, 2016 Rome, Italy

Scientific Tracks & Abstracts



Day 1

Nanoscience 2016

Nekane Guarrotxena, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Accurate and simultaneous biological targets identification by optically active nanoprobes

Nekane Guarrotxena
Spanish National Research Council, Spain

The ability to quantify multiple proteins in parallel using a single sample allows researchers and clinicians to obtain wide and important information with minimal assay time, sample volume, and cost. Such multiplexed analysis is accompanied by several challenges, including molecular encoding and the need to retain assay sensitivity, specificity, and reproducibility with the use of complex mixtures. In this talk, we present a method based on the electromagnetic surface enhancement of optically encoded nanostructures that combines NP assembly, encoding and probe incorporation into a single process which allow a simultaneous multiplexed protein scan and detection with high sensitivity.

Biography

Nekane Guarrotxena is a PhD student from the University of Complutense, Madrid-Spain and Post-doctoral researcher at the Ecole Nationale Superieure d´Arts et Metiers (ENSAM), Paris (France) and the University of ScienceII, LEM-Montpellier (France). From 2008-2011, she was visiting Professor in the Department of Chemistry, Biochemistry and Materials at the University of California, Santa Barbara (USA) and the CaSTL at the University of California, Irvine (USA). She is currently Research Scientist at the Institute of Polymer Science and Technology (ICTP), CSIC-Madrid (Spain). Her research interest focuses on the synthesis and assembly of hybrid nanomaterials, nanoplasmonics, and their uses in nanobiotechnology applications (bioimaging, biosensing, drug delivery and therapy).

nekane@ictp.csic.es

Notes:

Francesco Cellesi, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Targeted nanodelivery to treat chronic kidney disease: Nanomaterial design, response of podocytes and the role of glomerular filtration barrier

Francesco Cellesi
Politecnico di Milano, Italy

Chronic kidney disease (CKD) is a worldwide health threat characterized by a gradual loss in renal function, which often progresses to maintenance dialysis treatment and renal transplantation. The majorities of kidney diseases that lead to CKD starts in the glomerulus, where podocytes, highly specialized polarized cells, are damaged and fail to guarantee selective permeability of the glomerular filtration barrier. CKD drugs are known to have a direct action on podocytes, however they are charged by severe side effects, particularly when a systemic prolonged administration is required. The goal of this work was to develop novel targeted therapies directed to treat glomerular diseases of the kidney. New polymeric nanocarriers as well as liposomal nanoformulations were designed and synthesized to facilitate drug permeation through the glomerular filtration barrier, in order to target podocytes, aiming at reducing dose regime and systemic side effects to CKD patients. New engineered polymeric nanocarriers were synthesized by emulsion polymerization and controlled-living polymerization techniques and produced with a fine tuning of key properties such as size, degradability, surface chemistry, drug loading and release. Alternatively, functional liposomal formulations were also investigated as targeted nanodelivery systems. The effects of these nanomaterials on two-dimensional and three-dimensional cultures of glomerular cells were evaluated *in vitro*, in order to predict the effect of nanodelivery on glomerular filtration repair. Nanomaterial biodistribution, accumulation and permeability in the kidney glomerulus were assessed in animal models under physiological and pathological conditions.

Biography

Francesco Cellesi is Associate Professor at Politecnico di Milano, and Group Leader at Fondazione CEN-European Centre for Nanomedicine, Milan, Italy. He obtained a PhD at the Institute of Biomedical Engineering, ETH Zurich (CH), in 2003, and in 2006 he became Lecturer of Pharmaceutical Biomaterials at the School of Pharmacy, University of Manchester, UK. His research interests focus on nanomedicine, including polymeric nanomaterials, drug delivery, cell microencapsulation and tissue engineering, and materials science and process engineering.

francesco.cellesi@polimi.it

Notes:

Anna Rita Bilia, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Natural products loaded in nanocarriers: An opportunity to increase stability, oral bioavailability and bioefficacy

Anna Rita Bilia
University of Florence, Italy

Natural products represent a main source of drugs due to their enormous structural and chemical diversity. They may have additive/synergistic or antagonistic effects, or possess unique mechanisms of action (i.e. taxol activity on tubulin polymerization), others can modulate multiple targets or activating multiple pathwaysdriving fundamental biological processes. A paradigmatic example is curcumin, it is a highly pleiotropic molecule with anti-inflammatory, anti-oxidant, chemopreventive, chemosensitization, and radiosensitization activities. In spite of these advantages, several questions concerning the role of natural compounds in the treatment of some diseases remain unanswered, principally due to the transferability of *in vitro* to *in vivo* and ultimately to human studies: mostly of promising molecules in cell-based assays fail in phase II and phase III. This passage from impressive *in vitro* activity to less or no significant *in vivo* efficacy is generally due to their poor water solubility, high lipophilicity resulting in poor absorption and hence poor systemic bioavailability, resulting in less or no therapeutic effects. Another problem is their instability in biological milieu, premature drug loss through rapid clearance and biotransformation. Over the last ten years, our laboratory has formulated biocompatible and biodegradablenanocarriers encapsulating various imperative natural products including artemisinin and derivatives, curcumin, andrographolide, salvianolic acid, verbascoside, flavonoids. The developed new dosage forms, namely micelles, vesicles, nanoparticles, microemulsions, solid lipid nanoparticles and structured lipid capsules performed several sound characteristics and functions, which are currently unavailable in conventional formulations of natural drugs, such as enhanced solubility and stability, effect of targeting and increasing bioavailability.

Acknowledgments: this work was supported by Ente Cassa di Risparmio di Firenze.

Biography

Anna Rita Bilia is Associate Professor at the Department of Chemistry of the University of Florence, and Director of the Post-graduate School of Hospital Pharmacy. She is President of the International Society for Medicinal Plant and Natural Product Research and President of the Italian Society of Phytochemistry. She is Italian delegate at the European Scientific Cooperative for Phytotherapy and Expert of the European Pharmacopoeia. She published more than 180 scientific papers, several books chapters and invited reviews in reputed journals. She is Editor and Editorial Board Member of several international scientific journals.

ar.bilia@unifi.it

Notes:

Bi-Hsuan Lin, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

The capabilities of X-ray excited optical luminescence by using X-ray nanoprobe beamline aimed for 40 nm spatial resolution at Taiwan photon source

Bi-Hsuan Lin
National Synchrotron Radiation Research Center, Taiwan

X-ray excited optical luminescence (XEOL) and time-resolved XEOL as well as the 40 nm spatial resolution which is focused by Montel KB mirrors are developed in the X-ray nanoprbe beamline at the new synchrotron facility, Taiwan Photon Source (TPS). Photoluminescence (PL) is one of the efficient and fundamental tools for characterising the optical properties of the wide band gap semiconductor materials. The advantages of using synchrotron radiation as the excitation source are that the tunable X-ray energy allows the preferential excitation of the elements through the X-ray absorption edges, and a suitable time structure of the synchrotron can be used to study the dynamics of luminescence of the materials. Before the nanoprobe beamline constructing completion, the XEOL experiment was measured by unfocus X-ray beam at Taiwan Light Source (TLS). In this study, by means of XEOL to study the optical properties of O and Zn polarity of c-plane ZnO bulks has been achieved successfully. The low temperature (less than 5K) and temperature-dependent XEOL with X-ray excited energy below, at and above the Zn K-edge (9.659keV) were used to obtain the further information of the optical mechanisms of the two polar faces. The first excited state (n=2) of A free exciton was observed at 3.422eV with only for O-polar. The result indicates that O-polar has higher optical quality than Zn-polar. The exciton-phonon (A1-LO) coupling strength will be changed by using different X-ray excitation energy while the temperature above 150 K. The current design of the nanoprobe beamline and the detail XEOL experimental results will be reported.

Biography

Bi-Hsuan Lin has completed his PhD from Department of Photonics and Institute of Electro-Optical Engineering, National Chiao Tung University, Hsinchu, Taiwan and Postdoctoral studies from European Synchrotron Radiation Facility (ESRF) for one year. Now, he works at National Synchrotron Radiation Research Center as the Assistant Scientist. He is participating in the construction and commission of the X-ray nanoprobe beamlime at Taiwan Photo Source (TPS), and is responsible for development of the XEOL and TR-XEOL.

bihsuan@nsrrc.org.tw

Notes:

Yanqing Wu, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

A new stitching soft X-ray interference lithography technique

Yanqing Wu
Shanghai Institute of Applied Physics - CAS, P R China

A new stitching soft X-ray interference lithography technique is developed in BL08U1B, SSRF. A special multi-beam grating mask for soft X-ray is employed in this technique, which adopted permalloy as the beam stop layer to improve the service life. An order-sorting aperture (OSA) is necessary to block the 0th order diffraction beams from the mask to realize stitching the exposure area one by one via moving the wafer with a micron precision. And a new in situ monitoring scheme using high harmonics is employed to collimate the mask and OSA. Therefore, the 0th order diffraction beams can be blocked completely and the undesired pattern around the exposed area could be eliminated. In this way, the exposed depth has been increased from less than 100 nm up to 300 nm and the exposed area is no longer decided by the mask and then could be stitched with a micron precision, up to several square centimeters.

Biography

Yanqing Wu has completed his PhD from Fudan University and Post-doctoral studies from Pohang University of Science and Technology. He is the Team Leader of Soft X-ray Team, Shanghai Synchron Radiation Facility. He has published more than 20 papers in reputed journals.

wuyanqing@sinap.ac.cn

Notes:

Shao-Chin Tseng, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Using laser-induced jets fabrication method to control the particle size and alloy ratio of nanoparticle arrays

Shao-Chin Tseng
National Synchrotron Radiation Research Center, Taiwan

In this study, we developed a new method—based on laser-induced jets of nanoparticles (NPs) and air drag forces—to select the particle size and control alloy ratio of NP arrays. First, thin metal (Au, Ag) films having a thickness of 35 nm were deposited on fused silica substrates through a sputter system. In addition, we can control the metal thin film ratio (Au/Ag, Ag/Au/Al) to manufacture variety alloy NPs. The pulsed laser light (Excimer laser) was irradiated on the rear side of the metal film-deposited fused silica substrates to generate jets of NPs. The incident wavelength of an excimer laser was varied to ensure good photo-to-thermal energy conversion efficiency. We then exploited air drag forces to select NPs with sizes ranging from 5 to 50 nm at different captured distances. Controlling the jet distances allowed us to finely tune the localized surface plasmon resonance (LSPR) wavelength. We further calculated the relationship between the air drag force and the diameter of the NPs to provide good control over the mean NP size (capture size >300 μm) by varying the capture distance. Laser-induced jets of NPs could also be used to fabricate NP arrays on a variety of substrates, including Si, glass, plastic, and paper. This method has the attractive features of rapid, large-area preparation in an ambient environment, no need for further thermal annealing treatment, ready control over mean particle size, and high selectivity in the positioning of NP arrays. Detailed analysis and results will be reported in the conference.

Biography

Shao-Chin Tseng has completed his PhD from Department of Materials Science and Engineering, National Taiwan University. He is the Assistant Scientist of National Synchrotron Radiation Research Center. He focuses on Nanotechnology, X-ray nanoprobe, Optoelectronic Materials, Semiconductor Process, Biomedical Sensing. He has published more than 25 papers in reputed journals.

tseng.sc@nsrrc.org.tw

Notes:

Wei Zong, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Poly-dopamine coated nano-size liposomes as novel drug carriers

Wei Zong
Harbin Institute of Technology, China

We report the stimuli-responsive poly-dopamine protected liposomes (liposome@PDA) drug carriers. The novel drug carriers are pH sensitive drug delivery systems. 5-fluorouracil (5-FU) which is the typical chemotherapeutic agent was loaded into the nano-size liposome@PDA capsules. The release percentages of 5-FU are 2.9%, 23.7%, 48.4%, 77.2% in the solution with pH 7.42, 6.87, 4.11 and 3.16, respectively. The *in vitro* cell cytotoxicity experiment showed that the capsules presented positive cell viability (above 90%). The capsule can easily pass the cell membranes and then up taken by the cells, thus leading to inhibition of cancer cell activity. The drug-loaded capsules performed better than free drug. Our finding demonstrates the great potential of liposome@PDA capsules as carriers in biomedical applications.

Biography

Wei Zong has completed her Master's from Harbin Institute of Technology University. She is a PhD candidate in Harbin Institute of Technology University now.

709178430@qq.com

Notes:

Yi Jun Liang et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Design and synthesis of magnetic nanoparticles by microwave strategy

Yi Jun Liang, Yu Zhang and **Ning Gu**
Southeast University, P R China

In the past few years, numerous investigations have utilized the high quality magnetic nanoparticles in bio-applications, ranging from cancer therapy to bio-sensing applications for specific diagnosis, all due to their unique magnetic properties to solve mass practical issues. To the best of our knowledge, the magnetic nanoparticles can be synthesized by chemical methods, such as sol–gel, thermal decomposition, sol-or hydrothermal reaction and co-precipitation. Recent studies have demonstrated this issue to be promising and exciting. However, these approaches mentioned above centrally, over some points, have restricted further supporting of the reliability and stability of mass fabrication, though they were known as the conventional technique that possess long been recommended as well as well-defined morphology and narrow size distribution. In microwave matrix, energy output and thermal feedback is uniformly distributed and responsive to minimize thermal gradient, hence could be leading enhanced reaction rate and should be more appropriate to achieve the aim. Here, attention is focused on demonstrating that hypothesis. We engaged, in this issue, to develop a universal synthesis strategy for the magnetic nanoparticles preparation, and the products own the outstanding performance which can be differentially modified to expand and/or improve their functions, thus considered as the highly promising biomedical nanomaterials. As stated, our powerful strategy is of relevance for a broad range of applications, which could also be extended to exploit other monodisperse NPs benefiting from its important advantageous features.

Biography

Yi Jun Liang, as a PhD candidate, joined the Lad of Nano Biological Materials and Devices in Southeast University, 2013, under the supervision of prof. Dr. Gu and Prof. Dr. Zhang. Currently, his research interests include the preparation of multifunctional magnetic nanoparticles for integration of diagnosis and treatment of cancer, and developing the microwave ultra-fast strategy for achieving magnetic nanomaterials production in commercial scale.

yj.leung2010@gmail.com

Notes:

Xunan Zhang, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Hierarchical release of liposomes with aqueous two phase system: A new strategy for long circulating liposomes

Xunan Zhang
Harbin Institution of Technology, China

We discovered the unique release behavior of aqueous two phase system (ATPS) within liposomes, which might pave new revenue for long-circulating liposomes. ATPS is composed of PEG and dextran. The unique release behavior is based on the disproportional distribution of DOX in each polymer phase. The release time was prolonged 3 h more than regular liposomes. Lipid vesicles were fabricated by electro-formation and extrusion methods. Furthermore, cytotoxicity and localization in HeLa cells of nanoscale vesicles were estimated. The inhibition rate was twice than pure drug.

Biography

Xunan Zhang is pursuing his PhD at Harbin Institute of Technology. He is a Member of Professor Xiaojun Han's group which has published more than 40 papers in the fields of artificial cell membranes, controlled drug release, biosensors and microfluidics since established, in 2012.

58178899@qq.com

Notes:

Alaaldin M Alkilany et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Facile encapsulation of gold nanoparticles into PLGA nanocarriers: Toward visualizing polymeric nanoparticles inside biological compartments

Alaaldin M Alkilany[1], **Ji E Park**[2], **Jonathan R Eller**[2] and **Catherine J Murphy**[2]
[1]University of Jordan, Jordan
[2]University of Illinois at Urbana-Champaign, USA

Polymeric nanoparticles are promising candidates as a selective drug delivery platform with tremendous number of biomedical applications. PLGA, poly(lactic-co-glycolic acid), is the most used polymer to prepare polymeric nanoparticles due to its well documented safety and biodegradability, high drug loading, ease of synthesis and being commercially available at reasonable cost. However, the fate of PLGA nanocarriers (PLGA-NCs), as well as other polymeric nanoparticles, in biological compartments is poorly understood. Available labelling approaches with fluorescent agents suffer from serious drawbacks such as photobleaching and desorption of the conjugated flourophores from nanoparticles. Herein, we report on loading PLGA-NCs with gold nanoparticles (GNPs) that serve as a probe for quantification and visualization of the hosting PLGA-NCs. In this contribution, we describe a facile method to encapsulate GNPs efficiently into PLGA-NCs. Moreover, we describe an interesting trend where the type of the capping agent on GNPs plays a crucial role in controlling the encapsulation efficiency into PLGA nanomatrix. Finally, we show preliminary results on visualizing "transparent" PLGA nanocarriers inside cancer cells using encapsulated GNPs as probes.

Biography

Alaaldin M Alkilany obtained his PhD at the University of Illinois Urbana-Champaign, USA (under the supervision of Professor Catherine Murphy). Afterward, he joined the Georgia Regents University (USA) as a Post-doctoral research fellow and then the University of Jordan as an Assistant Professor of Pharmaceutics and Pharmaceutical Technology in the Faculty of Pharmacy (Jordan). His research focuses on understanding the nano-bio interface toward desighning effective and safe nanotherapeutics. He has published more than 25 papers in reputed journals.

a.alkilany@ju.edu.jo

Notes:

Paula Obreja, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Synthesis, structural properties and applications of zinc oxide nanowires growth on different substrates

Paula Obreja
National Institute for R&D in Microtechnologies (IMT-Bucharest), Romania

Statement of the Problem: Zinc oxide (ZnO) nanowires have been widely studied due to their use in many devices, such as UV lasers, light-emitting diodes, solar cells, nanogenerators, gas sensors, photodetectors, and photocatalysts to inactivate bacteria and for the degradation of environmental pollutants. ZnO NWs have been synthesized by wet chemical methods, sputtering, physical vapor deposition, pulsed laser deposition, metal–organic chemical vapor deposition (MOCVD) and molecular beam epitaxy (MBE). But, the relationship between the properties desired in applications and the preparation conditions is not clearly revealed. The purpose of this study is to evaluate the morphology and the physical properties of ZnO nanowires growth in different preparation conditions according to application requirements. Methodology: ZnO nanowires have been synthesized by hydrothermal method on a seed layer prepared by sol-gel process on different substrate materials (silicon oxide, indium-tin oxide, gold, graphene oxide, reduced graphene oxide) and in different conditions. The size of ZnO nanowires was evaluated using scanning electron microscopy. The morphology, structure and optical properties were investigated by X- ray diffraction, photoluminescence and UV-Vis spectra. The photorespons of ZnO nanowires growth on pre-patterned electrodes was evaluated from photocurrent measurement in different illumination conditions. Findings: The morphology and properties of ZnO nanowires can be easy and effectively controlled by a variety of parameters such as concentration and pH of solution, temperature and time of hydrothermal process. The choice of substrate may be another option to improve some applications based on ZnO nanowires. Conclusion & Significance: This study point out that ZnO nanowires grown on silicon oxide and indium-tin oxide are suitable for solar cells, those grown on gold are suitable for sensors and those grown on graphene oxide and reduced graphene oxide for UV photodetectors.

Biography

Dr. Paula Obreja has expertize in materials, processes and 3D microfabrication and manufacturing of optical components and photonic devices. She's main areas of interest are in the applied research for development of new materials with improved physical properties and innovative processes for thin films preparation. In its projects she developed polymer and hybride nanocomposite materials for MOEMS and sensors microstructures, synthesis of CuInSe2 and other semiconductor, sol-gel, self- assembly, soft lithography or microstructuring techniques for micro and nano-photonics, light-emitting diodes, IR diodes and photodetectors for optical communications.

paula.obreja@imt.ro

Notes:

Marzieh Aghababaie et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

(I-CRLMNP): Immobilization of candida rugosa lipase on magnetic nanoparticles with three different surface modifications

Marzieh Aghababaie, Masoud Beheshti, Amir Razmjou and **Abdol Khalegh Bordbar**
University of Isfahan, Iran

Lipase enzymes are biocatalysts which can catalyze different reactions such as oil hydrolysis, esterification, transesterification, biodiesel production and polymer synthesis. Due to the high cost of enzymes, immobilization offers a promising way for enzyme reusability and improving operational stability. Magnetic nanoparticles are a promising supports for enzyme immobilization due to their ease of preparation and recycling. In this study, Fe3O4 nanoparticle was synthetized and coated with silica to provide a silane group for further reaction with (3-Amino Propyl) Triethoxy Silane (APTS). Afterwards, 3 different coupling agents, i.e., epichlorohydrin, glutaraldehyde, and cyanuric chloride were used for covalent attachment of lipase on magnetic nanoparticles. Various techniques such as SEM, TEM, XRD and FTIR were applied to characterize the MNPs. According to SEM and TEM results, size of magnetic nanoparticles was about 20-30 nm. The results showed that these immobilization processes were successful in terms of enzyme activity and immobilization efficiency. However, glutaraldehyde and cyanuric chloride functionalized magnetic nanobiocatalysts (MNBCs) had a higher activity than epichlorohydrin functionalized ones. This must be due to the side reactions of epichlorohydrin with amino functionalized MNPs which has opened the epoxy group in an improper condition. Further modifications in functionalization process with epichlorohydrin may provide a better support for enzyme immobilization. These MNBCs were used for biodiesel production in further experiments which showed a suitable biocatalyst for this purpose.

Biography

Marzieh Aghababie is a PhD student at University of Isfahan since September 2012. She is working on her PhD thesis entitled "Developing an Enzymatic Nanocomposite Membrane Bioreactor Using Immobilized Lipase on Magnetic Nanoparticle for the Production of Biodiesel". In her Master's, she published three papers in Journal of Food Engineering, Food and Bioproducts Processing Journal and Nutrition and Food Sciences Research. Last year, she had oral presentation about enzymatic nanocomposite membranes in the international conference on membrane science and technology. The present work is a small part of her thesis work.

maz_babaie@yahoo.com

Notes:

Nazanin Ghafari, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Fabrication and characterization of polyvinyl alcohol nanofiber

Nazanin Ghafari
Islamic Azad University, Iran

Nanotechnology is the study and application of extremely small things (about 1 to 100 nanometers) and can be used across all the other science fields, such as chemistry, biology, physics, materials sciences and engineering. Polymeric nanofibers are one of the most known nanotechnology products and have huge potential applications in many fields due their high aspect ratio and porosity. The three dimensional feature of the product, results in having high capability for mechanical and biological applications. Electrospinning is a simple and inexpensive method of producing nanofibers in which, because of their unique structure, can be used in tissue engineering. Polyvinyl alcohol (PVA) is a biocompatible and water soluble synthetic polymer that is easily electrospun. Typically, PVA is soluble in water but in fact water can decrease the solubility of some polymers, hence blending these polymers with PVA can solve this problem. In this work, PVA was prepared by acetic acid which has less affection to degradation and is of low toxicity. The main objective of this work focuses on effect of distance and voltage parameters on morphology and diameter of nanofibers. The morphology of electrospun PVA nanofibers were characterized by using scanning electron microscope (SEM) and Fourier transform infrared spectrometer (FTIR).

Biography

Nazanin Ghafari has completed her BS in Textile Engineering/Textile Chemistry Major in 2013 and her MSc in Nanofibrous Structure in 2015 from Islamic Azad University, Yadegar Imam, Shar-e-rey Branch; and has been pursuing PhD degree in Science and Research University. She has submitted papers in several conferences like: 1st Conference on Textile Engineering with latest Methods in Related Industry at Islamic Azad University Tehran Branch, Iran; 4th National Conference on Textile Engineering, Polymer at Islamic Azad University Yazd Branch, Iran, and so on.

nghafari69@yahoo.com

Notes:

Marzieh Aghababaie et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Covalent immobilization of candida rugosa lipase on a novel enzymatic nanocomposite membrane prepared by covalent attachment of magnetic nanoparticle to poly acrylonitrile membrane

Marzieh Aghababaie, Masoud Beheshti, Amir Razmjou and **Abdol-Khalegh Bordbar**
University of Isfahan, Iran

Enzymatic nanocomposite membranes which are the combination of nanocomposite membranes and immobilized enzymes have received increasing attention, recently. In this study, poly acrylonitrile ultrafiltration membrane was aminated and then magnetic nanoparticles which were modified by glutaraldehyde or cyanuric chloride were covalently attached on the surface of membrane. Afterwards, Candida Rugosa Lipase (CRL) was covalently immobilized on this nanocomposite membrane. Nanoparticles and nanocomposite membrane were characterized with various techniques such as SEM, TEM, XRD, FTIR, ATR, AFM, contact angle goniometry and surface free energy measurement. The evidence of immobilization was also done by ATR, enzyme activity and loading efficiency. It was found that the PAN nanocomposite membrane increased the relative activity and loading capacity in comparison to UF membrane. The Km and vmax values represents the increasing of substrate affinity and decreasing of catalytic activity of immobilized enzyme due to the mass transfer limitation for both nanocomposite membranes. Thermal, storage, and operational stability of immobilized enzyme increased significantly which make it a suitable candidate for to bio-catalytic processes.

Biography

Marzieh Aghababie is a PhD student at University of Isfahan. She is working on her PhD thesis entitled, "Developing an enzymatic nanocomposite membrane bioreactor using immobilized lipase on magnetic nanoparticle for the production of biodiesel". In her Master's, she published three papers in "*Journal of Food Engineering", "Food and Bioproducts Processing Journal*" and "*Nutrition and Food Sciences Research*". Last year, she gave an oral presentation about enzymatic nanocomposite membranes in the international conference on membrane science and technology and published a paper in this regard in "Food and Bioproducts Processing Journal".

maz_babaie@yahoo.com

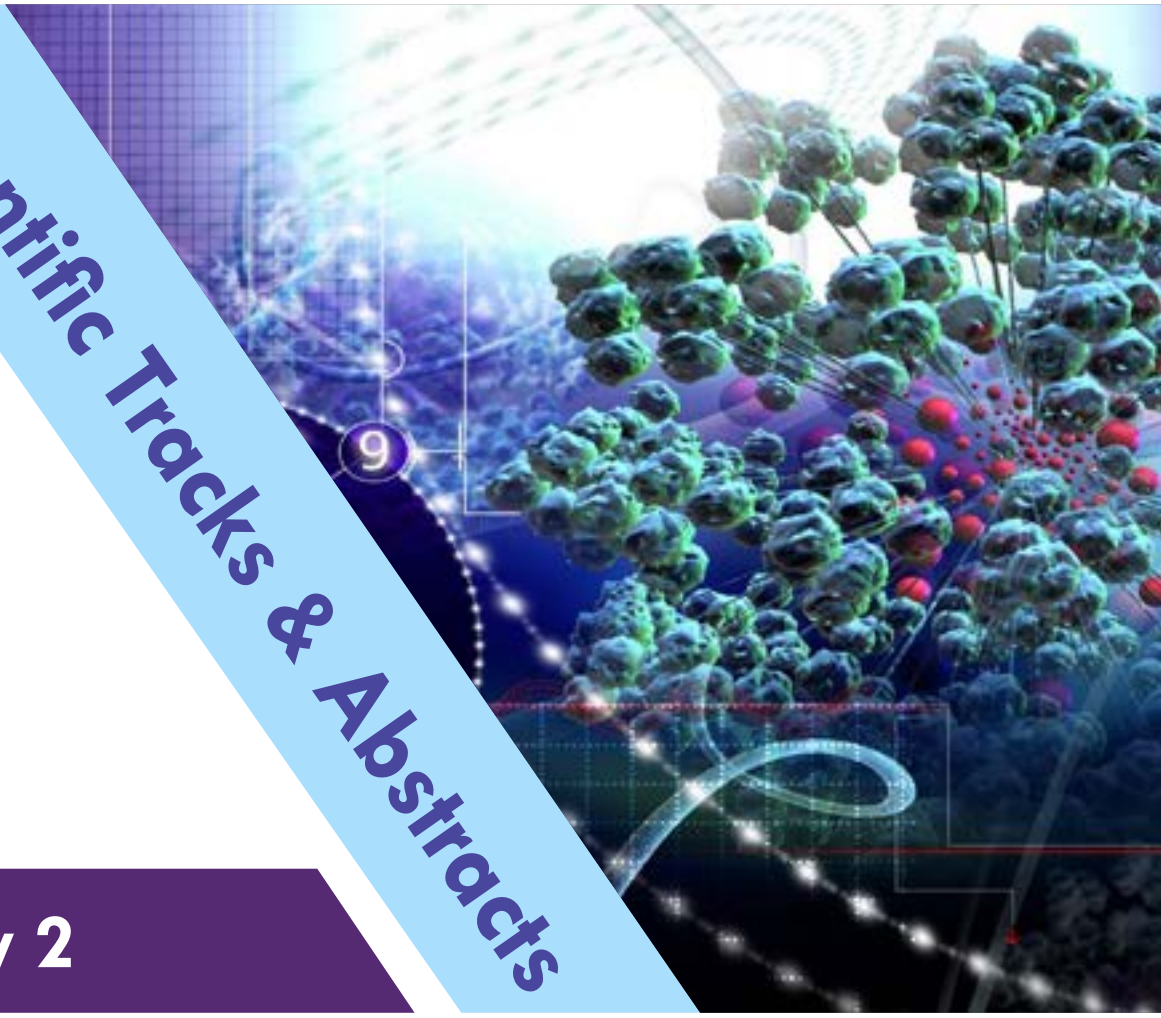
Notes:

11th International Conference and Expo on

Nanoscience and Molecular Nanotechnology

October 20-22, 2016 Rome, Italy

Scientific Tracks & Abstracts



Day 2

Nanoscience 2016

Nekane Guarrotxena, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Smart organic-inorganic hybrid nanomaterials: Design and functionality

Nekane Guarrotxena
Spanish National Research Council, Spain

The combination of the unique physical properties (light scattering, emission and absorption, and magnetic response) of inorganic nanoparticles (NPs) with the relevant chemical features derived from the morphology and the microstructure of polymer chains talk by themselves about its key-role played in the development of highly functional nanomaterials and nanocomposites. So far, functional smart polymers are becoming increasingly straightforward to design and synthesize multifunctional nanomaterials with a remarkable range of predictable responses and other properties. A smart polymer, by definition, can convert energy from one form into another by responding to a change in some stimuli (temperature, pH, mechanical strength, or electric and magnetic fields) in its environment. Therefore, smart polymers are used in biotechnology, medicine and engineering, in such applications as drug delivery systems, chemical separation, sensors and actuators. On the basis of the high interest within the scientific community, even when important research has been done along the last years on the effective polymer coating approaches of NPs, the establishment of new protocols for their functionalization is still needed. Within this presentation, we want to highlight the recent progress in their successful integration via multidentate ¨grafting to¨ conjugation which guarantees the highly desirable features, such as compact hydrodynamic size, amphiphilic, pH- and thermo-responsiveness, and enhanced optical properties for future bio- and technological applications of our functional nanohybrid materials. A detailed characterization of these properties will be exposed along.

Biography

Nekane Guarrotxena is a PhD student from the University of Complutense, Madrid-Spain and Post-doctoral researcher at the Ecole Nationale Superieure d´Arts et Metiers (ENSAM), Paris (France) and the University of ScienceII, LEM-Montpellier (France). From 2008-2011, she was visiting Professor in the Department of Chemistry, Biochemistry and Materials at the University of California, Santa Barbara (USA) and the CaSTL at the University of California, Irvine (USA). She is currently Research Scientist at the Institute of Polymer Science and Technology (ICTP), CSIC-Madrid (Spain). Her research interest focuses on the synthesis and assembly of hybrid nanomaterials, nanoplasmonics, and their uses in nanobiotechnology applications (bioimaging, biosensing, drug delivery and therapy).

nekane@ictp.csic.es

Notes:

Angelo Monguzzi, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Low power up-conversion nano-materials for solar applications and bio-theranostics

Angelo Monguzzi
Università degli Studi Milano-Bicocca, Italy

Luminescence-based techniques continue to attract considerable attention due to their broad range of applications and to their potential in the fields of optical devices and biomedicine. Many materials exhibit Stokes shift luminescence, thus they emit lower-energy photons under excitation with higher-energy photons. As opposite, photon up-conversion (UC) is a process which leads to the emission of light at energy higher than the absorbed (anti-Stokes shift). UC materials are largely studied for their potential application in solar devices (SD) technology, to recover the low energy tail of the solar emission, and as optical probes for biological imaging, due to the high contrast given by the UC anti-Stokes emission. Therefore, low power triplet-triplet annihilation assisted up-conversion (TTA-UC) in organic systems has been proposed in 2006 as a straightforward strategy to manage photon's energy. Thanks to its high efficiency with non–coherent excitation, TTA-UC is currently the strongest candidate for application in SD technology with an estimated maximum improvement of the solar cell performance up to 50% for standard photovoltaic devices and 100% for photo-catalytic water splitting cells. On the other hand, TTA-UC based nanoparticles are preferable to inorganic up-converters for the better bio-compatibly of organics and the significantly higher efficiency at low power, reducing the potential damage to the biological environment. Consequently, high-energy blue photons are easy available for drug/contrast agents and chemical reactions activation. A careful analysis of the photophysics involved in the process will be presented, enlightening the guidelines for the development of appealing nanomaterials suitable to be employed as efficient photon up-converters in real applications.

Biography

Angelo Monguzzi received the PhD degree in Materials Science in 2008 at the University of Milano-Bicocca. He started his research working on hybrid light emitters for telecom, in the framework of several national and international project and networks. The topic of his current research is the triplet-triplet annihilation assisted up-conversion of non-coherent photons in multicomponent organic systems. In 2009, he has been awarded by the Italian Society of Physics. In 2014, he has been Fellow of the Japan Society of the Promotion of Science and he has been awarded with the Edison S.p.A "Physics 2014" Scholarship for the collaboration with the ETH-Zurich in Switzerland.

angelo.monguzzi@mater.unimib.it

Notes:

Alexander Soldatov, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Synchrotron based picoscale local atomic structure characterization of advanced nanomaterials for nano-bio-med applications

Alexander Soldatov
Southern Federal University of Russia, Rostov-on-Don, Russia

The study of nanoscale atomic structure of matter is important both from fundamental point of view for the understanding the nature of physical and chemical properties of the materials and for applied research as a basis for the synthesis of novel nanomaterials with the necessary for nano-bio-medical applications properties. To gain deep insight into the nature of the relation "Structure-Function" one has to use both computer nanodesign and advanced experimental methods for picodiagnostics. The status of modern theoretical analysis of the synchrotron based experimental x-ray absorption spectra to extract local atomic structural parameters is presented. Novel in situ technique for picodiagnostics-extracting of 3D local atomic structure parameters on the basis of advanced quantitative analysis of X-ray absorption near edge structure (XANES) has been developed. The possibility to extract information on bond angles and bond-lengths (with accuracy up to 1 pm) is demonstrated and it opens new perspectives of quantitative XANES analysis as a 3D local structure probe for any type of materials without long range order in atoms positions (all nanostructured materials and metallo-proteins belong to this class of materials). Nowadays, progress in the development of the synchrotron radiation facilities for time dependent measurements opened the possibilities for the study the atomic and electronic structure dynamics as well.

Biography

Alexander Soldatov has completed his PhD from Rostov State University (Russia) in 2002 and Post-doctoral studies from La Sapienza University (Rome, Italy). He is the Director of Smart Materials Research Center at Southern Federal University of Russia. He has published more than 230 papers in reputed journals and has been serving as an Editorial Board Member of several scientific journals.

soldatov@sfedu.ru

Notes:

Aziz Habibi-Yangjeh, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Novel magnetically separable nanocomposites as visible-light-driven photocatalysts with highly enhanced activity

Aziz Habibi-Yangjeh
University of Mohaghegh, Iran

In the present century, human beings face with different challenges, such as environment pollution, energy shortage, and global warming. Heterogeneous photocatalytic processes have attracted a great deal of attention as a promising green technology with potential application to address these challenges. However, generally there are three main drawbacks for efficiently using traditional photocatalysts. Firstly, they cannot sufficiently absorb the solar irradiation, due to their wide band gaps, impeding energy absorptions from the solar energy. Secondly, separation of photocatalysts from the treated solutions by filtration or centrifugation in large scale is not economic. Thirdly, the photogenerated electron-hole pairs recombine with high rate, leading to reduced activity. However, by combination of semiconductors with matching band potentials, the formed nanocomposites can benefit from the synergistic effects of suppressing recombination of the charge carriers and enhancing absorption of the solar radiation. Moreover, magnetic visible-light-driven photocatalysts can provide an effective strategy for separation of photocatalysts from the treated solutions using magnetic field. In this presentation, we will discuss about some novel magnetic nanocomposites prepared by my research group with facile and large-scale method. The prepared nanocomposites were characterized by X-ray diffraction, energy dispersive analysis of X-rays, transmission electron microscopy, UV–vis diffuse reflectance spectroscopy, Fourier transform-infrared spectroscopy, thermogravimetric analysis, and vibrating sample magnetometry techniques. Photocatalytic activities of the nanocomposites were investigated by degradation of different dye pollutants.

Biography

Aziz Habibi-Yangjeh received his PhD in Physical Chemistry/Reaction Kinetics from Sharif University of Technology, Tehran, Iran, in 2001. He is currently Full Professor of Physical Chemistry at the University of Mohaghegh, Ardabili. His research interests include preparation of different visible-light-driven photocatalysts based on ZnO and graphitic carbon nitride (g-C3N4). He has published more than 85 international refereed journal papers. Moreover, he is reviewer in his area of research for several international journals. Also, he has published two Persian text books.

ahabibi@uma.ac.ir

Notes:

P Guida et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Nanofabrication strategies for influencing biomolecule behavior

P Guida, E Angeli, R Lo Savio, L Repetto, G Firpo and **U Valbusa**
University of Genoa, Italy

In recent years, nanofabrication techniques have shown themselves to have the most promising potential for innovative research on crucial biomolecules for life sciences, such as DNA and RNA. Two main examples are: Firstly, large-scale nanostructuring, effective for engineering innovative biosensors; and secondly, nanopores, intensively exploited for developing fast and inexpensive technologies for DNA sequencing, a major research challenge in the field of biomedicine. In addition to nanopores, nanoslits and nanochannels allow interesting functionalities for the study, processing and sorting of DNA. For example, when a long DNA chain is forced to enter a nanochannel, it stretches, thus acquiring a conformation which allows its genetic information to be optically read. Herein, we have focused on various geometry-based strategies, involving short and long channels, as well as funnels and a series of pit nanostructures, integrated into polymeric lab-on-a-chip models. We have implemented these miniaturized systems in order to study, at single molecule level, the typical conformations of DNA chains in various nano-confinement conditions whilst also observing the dynamic behavior of the long strands in crossing structures with different cross sections. In fact, by taking advantage of polydimethylsiloxane's elasticity, we have developed a strategy for modulating the translocation dynamics of single molecules crossing a nanochannel. Lastly, we have investigated on important applications for life and material sciences of the recent innovative tool which counts and recognizes nanoparticles through a new simultaneous optical and electrical sensing method.

Biography

P Guida graduated from the University of Genoa in 2003 with a thesis on Biophysics and Dysfunctioning of CLC-channels. In 2008, at the same university, she obtained her PhD in Neurochemistry and Neurobiology (Molecular and Clinical Experimental Biology and Medicine); her thesis being on NMDARs Pathological Modulations. Her working career began in 2002 at the IBF-CNR-Genoa, remaining there until 2007. Since May 2009, she has been a Post-doctoral Researcher at the university's physics department responsible for developing biomimetic platforms for cancer cells, tissue engineering and nanostructures for diagnostic applications. She is co-author of several papers published in numerous international journals.

patrizia.guida@unige.it

Notes:

M Mebonia et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Geometry induced doping in thin Si nano-grating layers

M Mebonia[1,3], A Tavkhelidze[1], L Jangidze[2], G Skhiladze[2], D Ursutiu[4], C Samoila[4], Z Taliashvili[2] and **L Nadaraia[5]**
[1]Ilia State University, Georgia
[2]Institute of Micro and Nano Electronics, Georgia
[3]Peter Grünberg Institute, Germany
[4]Transilvania University of Brasov, Romania
[5]Georgian Technical University, Georgia

Recently, new quantum features have been studied in the area of nanostructured layers. Nano-grating on the surface of the thin layer imposes additional boundary conditions on the electron wave function and induces G-doping or geometry doping. G-doping is equivalent to donor doping from the point of view of the increase in electron concentration n. However, there are no ionized impurities. This preserves charge carrier scattering to the intrinsic semiconductor level and increases carrier mobility with respect to the conventionally doped layer. We fabricated Si nano-grating layers and measured their electrical characteristics to monitor geometry induced doping (G-doping). Grating was fabricated using laser interference lithography (375 nm laser) followed by reactive ion etching of Si. Next, large square island (0.3 x 0.3 mm) was shaped in the device layer and 4 Si\Ti\Ag ohmic contacts were formed to measure electrical characteristics. The I-V characteristics were recorded using both 4 wire and 2 wire methods. Resistance-temperature (T) dependences (T=4-300 K) were recorded as well. For all 12 samples, nano-grating layers show 2-3 order of magnitude reduction in resistivity. Resistivity anisotropy was in the range 0.2-1 at 300 K. Obtained geometry induced doping level corresponds to "Effective Impurity" concentration of 3 x 1018 cm-3. The (T) dependence is in agreement with G-doping theory. It was observed (data from 12 samples) that nano-grating reduces resistivity of Si layer from 10 Ohm cm (plain layer) to 5 x 10-2-8 x 10-3 Ohm cm. This reduction is in agreement with theoretical prediction of G-doping. Value 10-2 Ohm cm corresponds to "Impurity" concentration of 3 x 1018 cm-3 (phosphorous in Si). G-doping does not require ionized impurities. This allows high carrier mobility and temperature independent carrier concentration. Nano-grating fabrication does not require sophisticated technology and can be used for solar cells and other photovoltaic devices, ultra high frequency electronics and power electronics.

Biography

M Mebonia has completed his Master's from Ilia State University and started his PhD at the same university collaborated with RWTH Aachen University. Since 2014, he has been working in Research Centre Juelich and Fraunhofer Institute of Laser Technology as a PhD Researcher. From 2013, he has been working in Scientific and Technological Centre "Nano Structured Materials for Renewable Energy" the School of Engineering in Ilia State University. He has published some papers in reputed journals.

m.mebonia@fz-juelich.de

Notes:

Fengguo Fan et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Research on nano-particle film preparation having a flexible magnetothermal response and good biocompatibility

Fengguo Fan, JianFei Sun and **Ning Gu**
Southeast University, China

Flexibility magnetic is a topic of rapidly growing interest in both the scientific and engineering research due to its numerous potential in a broad range of applications. Previous assembly approaches for 2 dimensional magnetic iron oxide at the nanoscale are used by the layer by layer technology. Here, a strategy is introduced that exploits flexibility material for self-assembly of 2D thin film, and this material can be bent at different angels from 0 to 360. In alternating magnetic field with different elastic deformation of the film, there are obvious differences magnetothermal effects. Vibrating sample magnetometer shows that the material has good anisotropy. Low frequency impedance analyzer test results further demonstrate that it has a good magnetic response. Deformation of the nanoparticle film changed its impedance due to its nanoparticles arrangement. This film has a good hydrophilicity can be used for skin adhesion. Scanning electron micrograph shows that for different nanoparticle film deformation the nanoparticles space from each other has changed. Analysts believe that such particles pitch density that can have a very important effect on the magnetic coupling between the particles, resulting in different deformation having different magnetic response effects. In conclusion, we prepared a flexible nanoparticle film having a magnetic effect and good bio-compatibility. In future it may be used for skin adhesion of administration and control magnetic stimulation.

Biography

Fengguo Fan Southeast University is a PHD student at State Key Laboratory of Bioelectronics, Southeast University, School of Biological Science and Medical Engineering, China. His research field is Nano thin film assembly and electromagnetic effect.

fanfengguo@126.com

Notes:

Gilles Le Blevennec, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Comprehensive study of ZAIS Nanocrystals photo-physics

Gilles Le Blevennec
Univ Grenoble Alpes, CEA-LETI Minatec Campus 38000 Grenoble France

AgInS2-ZnS (ZAIS) nanocrystals are semiconductor phosphors generally used for a variety of applications in the visible domain such as LED lighting, bio-imaging or photovoltaics. This communication is about photo-physics of such a nanoparticle. Those particles behave without quantum confinement, their luminescence has its origin in donor-acceptor pair (DAP) transitions. In a first step, lifetime of the emissions measured by time resolved spectroscopy will be exploited in order to describe the three radiative mechanisms acting either on surface or in the core of the particle. In a second time, we will combine lifetime and quantum yield measurements to quantify radiative and non-radiative recombination rates. This step is a very powerful method for understanding electronics processes. Indeed, those values associated with other material characterizations (optical absorption and XPS) allows to determine the relationship between structural properties and emission processes. As consequence, we will establish the direct effect of disorder on non-radiative recombinations and identify the element defects involved in the photoluminescence. All these experimental results give a complete analysis of electronics processes occurring in a sub-10nm nanoparticle.

Biography

Graduated from the French, Ecole Nationale Supérieure d'Ingénieur Electricien de Grenoble, Electrical engineering school in 1982. Work as Engineer in Alcatel and Crismatec companies before to enter in CEA (French Governmental Research Center) in 1988. Involved in materials for electromagnetism applications during 8 years, then was responsible of Optical Materials Laboratory at CEA Tours, for 4 years. In 2000, I am promoted Manager of the Material Department in CEA Grenoble. In 2008, I became Senior Expert in the Optical Department.

gilles.le-blevennec@cea.fr

Notes:

Ewa Kicko Walczak et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Flame retardants nanocomposites: Synergy effect of combining conventional antypirenes with carbon nanofillers

Ewa Kicko Walczak and **Grażyna Rymarz**
Institute for Engineering of Polymers Materials and Dyes, Poland

The thermoset resins are proven construction materials for the technical and highly demanding applications. Heat stability, high thermal, low shrinkage, mechanical properties are typical for their type of polymers. Above applications also requires a good flame retardant (FR). Undertaken activities refer to official draft recommendations in UE states. This paper presents positive effect of reduced flammability of thermoset resins thanks to the use of nanocomposites containing multi-ingredient halogen-free flame retardants which combine phosphorus/nitrogen modifiers interacting with nanofillers: Expandable graphite (EG), graphene (G), graphene oxide (GO) and anthracite (AN). The flame retardancy of modified polymers has been investigated by LOI analysis, TG and by using CC method. The fine-plates, phase morphology of nanocomposites were assessed by SEM. We confirm that nanocomposite formation is an important concept for the flame retardants industry. Laminates made of modified resins meet requirement LOI over 28-34% and reduced 30-70% head release rate (HRR) by CC method. No adverse impact on strength properties was observed. A multi-ingredient combination of FR turned out to make significant progress in achieving a desired flammability. It should be assumed that the presence of conventional flame retardants led to a synergy effect promoting faster formation of a protection layer hindering oxygen flow-through resulting from the process of thermal destruction.

Biography

Ewa Kicko Walczak graduated from Polytechnic University in Warsaw, Chemical Department. In 1979, she started working in Industrial Chemistry Research Institute. In 1985, she was recipient of Doctor Technical Science title from ICHRI; and in 2012, she received a DSc Chemistry Faculty of Cracow University. Since 2010, she started to cooperate with The Institute for Engineering of Polymers Materials and Dyes (IIMPaD) and since 2015 is General Director of IIMPaD. She completed International Centre of Physics and Chemistry in Ferrara-Roma (Italy) and International Professional Course for Managers of Chemical and Pharmaceutical Industry in Copenhagen (Denmark)-Washington (US). She is the author of more than 80 original research publications and author 90 scientific presentations in international conferences. She is also author (or co-author) of 65 patents/patent applications. She has coordinated Polish and international conferences, 23 research projects oriented towards new polymer materials. Her scientific activity concentrates on ecological aspect of technology and modification polymeric materials, particularly on fire retardant and reduced smoke toxic emission from thermoset resins systems.

e.kicko-walczak@impib.pl

Notes:

Cansel Tuncer et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Removal of dye contaminants from waste water by using highly cross-linked polymer as novel adsorbent

Cansel Tuncer, Mehtap Kilinc and **Vural Butun**
Eskisehir Osmangazi University, Turkey

Waste water treatment is a huge problem in many industrial sectors. There are various pollutants in waste water such as dyes, heavy metals, pharmaceuticals and phenols. Dyes are complex organic compounds and mainly classified into cationic, non-ionic and anionic groups. They are used in great numbers of industries as coloring agents. Various physical and chemical methods have been investigated for the removal of dye contaminants. Most commonly used methods are adsorption, biological degradation, coagulation/flocculation, ion exchange, ozonation, chemical precipitation, reverse osmosis, etc. Polymeric materials are often used and play an important role in waste water applications. Herein, new types of highly cross-linked (HCL) polymers were synthesized from a tertiary amine methacrylate based monomers (DMA, DEA, DPA and GMA) as a dye adsorbent. Systematically, the effect of pH change on dye adsorption and the adsorption capacity of related polymers were determined. Adsorption isotherms were analyzed to understand dye-polymer interactions. From related isotherm, kinetic adsorption rate of the polymer-dye system and thermodynamical parameters (ΔH, ΔS and ΔG) were calculated. Secondly, dye molecules were extracted from aqueous phase. Host-guest relationship (between copolymer and dye molecules) was used as a method for extracting. Since HCL polymers have cavities and functional groups, dye molecules were easily pulled from the aqueous phase to the organic phase. Extraction capacities of HCL polymers were calculated from UV-Vis spectrophotometer data.

Acknowledgement: ESOGU and the Scientific and Technological Research Council of Turkey (TUBITAK) are thanked for financial supports (GN: 201619C104 and 115Z726, respectively)

Biography

Cansel Tuncer completed her PhD at Eskisehir Osmangazi University in 2015. She has been working as a Research Assistant at the same university since 2009. She has published 7 papers in reputed journals. She has worked as Researcher on various projects based on biotechnology and polymer technology. She is currently working on 2 projects as a Director. She has great experience on the synthesis of polymers and their derivatizations, hydrogels, microgels, nanoparticles and metal production by using various methods including GTP, ATRP, free radical polymerization and heterogen polymerization techniques.

ctasagir@ogu.edu.tr

Notes:

Hsien Ting Chiu et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Albumin-gold nanorods based core-shell nanoplatforms for cancer theranostics

Hsien Ting Chiu, Chung Hao Chen, Meng Lin Li, Chi Shiun Chiang and Yu Feng Huang
National Tsing Hua University, Taiwan

Over the past two decades, the rapid development of albumin- and gold nanostructures-based nanoplatforms offer promising solutions to address numerous scientific difficulties in cancer research such as drug delivery, tumor targeting and cancer therapy. In this study, a hybrid system (NR@SA) was designed for theranostic nanomedicine through chemically cross-linking of serum albumin (SA) shell outside the core of gold nanorod (Au NR). A tremendous amount of anticancer drugs, doxorubicin (DOX) could also be encapsulated inside the SA shell via physical adsorption during the formation of NR@SA:DOX. Our results demonstrated that the SA shell exhibited a great impact on the photoacoustic signal generation, leading to a strong contrast enhancement in photoacoustic imaging of tumor cells. Delivered NR@SA:DOX with higher DOX loading exhibited greater killing efficacy while the photothermal effect induced by the near-infrared laser irradiation also greatly improved the therapeutic efficacy of DOX against tramp-C1 prostate carcinoma *in vitro* and *in vivo*. These findings suggest that the development of core-shell nanoplatform, NR@SA is highly promising as an integrated theranostic nanoagent for further clinical applications.

Biography

Hsien Ting Chiu has completed his Bachelor's degree from National Tsing Hua University at the Department of Biomedical Engineering and Environmental Sciences in 2012. He is now a PhD student in National Tsing Hua University in the Department of Biomedical Engineering and Environmental Sciences. His research is focused on nanomaterial design for cancer application.

haha4301292@yahoo.com.tw

Notes:

Elena Angeli, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Polymeric nanochannels for studing DNA and for counting natural and engineered nanoparticles

Elena Angeli
Univerisity of Genova, Physics Department, Genova, Italy

Single and multiple nanochannels' devices are powerful tools whose exploitation covers various field of application. Slightly modifying the characteristics of a basic structure like a nanochannel, it is possible to investigate a variety of different phenomena: conformational change in biopolymers, nanoparticles' translocation processes. For example: devices with multiple nanochannels can be used for stretching long DNA moleucles for bar coding applications [1-2], while nanochannels interrupted by series of deep regions can be used as entropic traps for studying the dynamics conformational changes in biopolymers [3]. Devices with short single channels are used for counting and sizing nanoparticles one-by-one exploting an electro-optical tracking method recently developed by our laboratory. This technique is based on the simultaneous acquisition of electrical traces and optical tracks of nanoparticles crossing the nanochannel. This multimodal analysis approach greatly increases the reliability of these sensors, compared to conventional monomodal approaches, in counting and sizing nanoparticles of different nature. The versatility of these nanodevices makes them very valuable tools for several areas of Nanotechnology.

1. C. Manneschi et al., Macromolecules 46, 4198 (2013).
2. C. Manneschi et al., Biomicrofluidics 8, 064121 (2014)
3. E. Angeli et al., Lab on chip 11, 2625 (2011)
4. E. Angeli et al., Nano Letters 15 (9), 5696 (2015)

Biography

Elena ANGELI received her PhD in Physics from the University of Modena and Reggio Emilia, then she moved to the University of Genova where she started working on Nanofluidics for Biomedical applications, at Nanomed Labs. She has been developing innovative technologies and nanofluidic devices, mainly polymeric, for manipulating DNA molecules at single molecule level. Besides her activity on nanofluidic lab-on-chips, she is also exploring the field of polymeric devices for culturing and handling cells of oncological interest.

elena.angeli@unige.it

Notes:

Elena Kuchma, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

11th International Conference and Expo on
Nanoscience and Molecular Nanotechnology
October 20-22, 2016 Rome, Italy

Synthesis and Characterization of Superparamagnetic Colloidal Nanoparticles for Theranostics in Oncology

Elena Kuchma
Southern Federal University, Russia

Nowadays one of the most important research field is the application of magnetic nanoparticles for theranostics in oncology (contrast agent for MRI (Magnetic Resonance Imaging) and active material for Magnetic Hyperthermia treatment). Development of novel advanced nanomaterials for biomedical applications is limited to a great extent by the lack of cutting-edge characterization techniques of both nanoparticles themselves and their spatial distribution in biological tissues after administration. A possibility of fine tuning of these nanoparticles characteristics in size, shape and specific magnetic characteristics should be realized. For the manufacture of colloidal magnetic nanoparticles having tuneable magnetic and biochemical properties advanced micro-wave synthesis technique was used, thus preparing a bases for future personalized nanomedicine platform. To get detailed insight into the relationships between parameters of colloidal magnetic nanoparticles (size, morphology, stoichiometry, type of surfactant covering the nanoparticles) and their magnetic and biochemical properties advanced *in-situ* x-ray spectroscopic methods were applied. Iron oxide based colloidal magnetic nanoparticles for theranostics in oncology are promising candidates for nanomedical applications as one could use them both for diagnostics (as a contrast agent in MRI) and simultaneously for therapy (as active agent for magnetic hyperthermia of tumour tissues). In the present study advanced synchrotron radiation x-ray spectroscopic methods were used for *in-situ* study of colloidal magnetic nanoparticles in solution, reproducing their "natural" conditions in biological tissues. High-energy-resolution XANES and non-resonant XES obtained at ESRF ID26 beamline were applied to study the atomic and electronic structures of the colloidal nanoparticles in both occupied and unoccupied electronic states regions. High energy resolution XAFS, obtained through selective fluorescence detection was treated by using of advanced FitIt theoretical approach to obtain the 3D local structure parameters exploiting the improved full-potential FDMNES code.

Biography

Elena Kuchma graduated from Faculty of Physics at Southern Federal University of Russia. She is a Master student at Southern Federal University and assistant for director of Smart Materials International Research Center.

elenaku4ma@yandex.ru

Notes:

Güncem Özgün Eren et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Conservation of historical documents with silver/chitosan nanocomposite

Güncem Özgün Eren
Yıldız Technical University, Turkey

'History is teacher of life' as Romans expressed. It is a very significant matter of fact which contains the past, the present and the future of the societies, also has a very important place in improving the social consciousness. One of the most important duty of the mankind is to protect such a worthy history heritage. Archives that are made by paper are one of the main parts of our past. Paper can be deteriorated due to physical, chemical and biological based factors such as acidity, metal ions, lightning, heat, humidity, UV light, pollutants or biodeteriogens. Among these factors, for one, microorganisms can damage on papers irrevocably via releasing some reactive groups. This study is focused on conservation of historical paper samples by using silver-chitosan nano composite coating to gain antibacterial and antifungal feature. It is well known that Ag nanoparticles possess antibacterial properties. Chitosan, a polysaccharide biopolymer derived from naturally occurring chitin, displays unique polycationic, chelating and film forming properties due to the presence of active amine and hydroxyl functional groups, and is a natural polymer that is both non-toxic and biodegradable. Silver-chitosan nano composite produced at specific temperature via solvothermal method. Then, produced samples are characterized via scanning electron microscopy (SEM). Coating of sample papers are carried out by using three different methods that are called dipping, spraying and electrospinning. Afterwards, micro-organism growth was tested in Süleymaniye Manuscript Library.

Biography

Güncem Özgün Eren got Bachelor's degree and Master's degree from Metallurgy and Material Engineering Department at Yıldız Technical University, İstanbul, Turkey. During his Undergraduate and Graduate studies, he has studied some projects about nanotechnology as 'developing gas sensors', 'anti-viral and anti-microbial masks' and 'conservation historical documents'. Also, he has done researches in archaeometallurgy and has published a paper about this situation in *Journal of Turkish Studies*-Harvard University. He has finished his Master's in December 2015 and right now is doing PhD in Bioengineering Department at the same university.

guncemozgun@gmail.com

Notes:

Damla Ülker, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

In vitro controlled release of 5-FU drug from a stimuli-responsive microgel/liposome biomaterials at different temperatures

Damla Ülker[1], **Inci Barut**[2], **Erol Şener**[2] and **Vural Bütün**[1]
[1]Eskisehir Osmangazi University, Turkey
[2]Anadolu University, Turkey

Poly (ethylene glycol) stabilized stimuli-response microgels have been used as a drug carrier and a release system due to its low toxicity and high biocompatibility nature. They are promising material for the advancement of specific drugs carriers like cancer drugs. They have huge pore size which can be decreased by varying cross-linker ratio. They might be modified with liposome and magnetic nanoparticles as well. Liposome/microgel stimuli-response drug release system may provide better application opportunities such as delivery of multiple components and imaging agents, diagnostic and therapies. In this study, multi-response liposome/microgel hybrid drug delivery and targeting system was synthesized. 5-fluorouracil (5-FU) drug was loaded into liposomes in aqueous media, and then a water soluble monomer based multi-responsive microgel hosting liposome-5-FU system was synthesized. Finally, 5-FU loaded hybrid system was covered with magnetic Fe_3O_4 nanoparticles in order to provide a response to magnetic field. This hybrid system was used *in vitro* studies as a drug carrier for a target and controlled drug release system in phosphate buffer solution (pH 7.4) incubated at 37°C and 42°C and physiological saline solution incubated at 37°C. All microgel, liposome and liposome/microgel systems were characterized by using dynamic light scattering, zetapotentiometer, transmission electron microscopy. Magnetic Fe3O4 nanoparticles covered liposome/microgel hybrid system was characterized by using TEM. The release of 5-FU from liposome-microgel hybrid system was analyzed using high-performance liquid chromatography with ultraviolet spectrophotometer detector at 266 nm.

Acknowledgement: ESOGU and the Scientific and Technological Research Council of Turkey (TUBITAK) are thanked for financial supports (GN: 201619C104 and 115Z726, respectively)

Biography

Damla Ülker is a PhD student at the Department of Polymer Science and Technology of Eskisehir Osmangazi University. She works in various projects based on polymer synthesis and their application studies. Her recent research is based on "Synthesis and Characterization of Novel Microgels, Nanometals, Nanocomposites, Block Copolymer Stabilizers for Related Application Studies". She has great experience on nanometal dispersion preparation, ATRP chemistry and heterogeneous polymerization techniques including both emulsion and dispersion polymerizations.

damlaulker@gmail.com

Notes:

Kooshina Koosha, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Study of some effective parameters on characterization of gelatin nanofiber prepared from gelatin-acetic acid solution

Kooshina Koosha
Islamic Azad University, Tehran, Iran

Electrospinnig is a simple, versatile and widely accepted technique to produce ultra-fine fibers ranging from nanometer to micron. Recently there has been great interest in developing this technique to produce nanofibers with novel properties and functionalities. Most of the works reported on electrospinning evolve on the synthetic biodegradable polymer for dozens of applications in medicine, energy, transportation and electronic devices. In biomedical applications, synthetic biodegradable polymers such as polyester regularly associated with poor biocompatibility and systemic or local reaction resulted from the acidic degradation products. Therefore, naturally occurring polymers such gelatin has been widely explored due to its biocompatibility , biodegradability, hydrophilic in nature and commercial availability at low cost. Gelatin is a natural biopolymer derived from collagens and has almost identical compositions and biological properties as those of collagens. Accordingly, this natural biopolymer could be useful for dozens of biomedical applications. In order to expand the range of applications and to produce uniform and very fine nanofibers, choosing a non-toxic solvent, which will not degrade the gelatin structure and investigation of electrospinning parameters, play an important role. In the present work, gelatin was prepared by acetic acid which has a less affection to degradation and is of low toxicity. The morphology of electrospun gelatin nanofibers was characterized using scanning electron microscope (SEM). FTIR measurements were performed in FTIR spectrometer to verify the composition of fibers for functional groups and determining whether acid has affected the gelatin structure or not.

Biography

Kooshina Koosha has completed her BS in Textile Engineering/Textile Chemistry Major in 2013 and her MSc in Nanofibrous Structure in 2015 from Islamic Azad University, Yadegar Imam, Shar-e-Rey Branch. She has submitted papers in conferences; some of which are: 1st Conference on Textile Engineering with latest Methods in Related Industry at Islamic Azad University Tehran Branch-Iran, 4th National Conference on Textile Engineering, Polymer at Islamic Azad University Yazd Branch-Iran and so on.

koosha.ksh@gmail.com

Notes:

Faseeh Ahmad Khan, J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Applications of nanotechnology in oil and gas industry

Faseeh Ahmad Khan, Aarushi Ohri and **Vikas Nain**
DIT University, India

Nanotechnology has found use in all sectors of the industry and oil and gas technology is not an exception to it. Nanotech applications in the oil industry are not new: Nanoparticles have been successfully used in drilling muds in the past. Only recently all the other key areas of the oil industry such as exploration, primary and assisted production, monitoring, refining and distribution are approaching nanotechnologies as the potential savoir for facing critical issues related to remote locations (such as ultra-deep water and artic environments) and nonconventional reservoirs. The most significant of these is the use of nanoparticles in Enhanced Oil Recovery (EOR). EOR is especially important now because of the recent global rise in energy demand which is expected to be met by the oil and gas industry. The ability of nanoparticles to alter certain factors in the formation and in oil properties can be taken advantage of to enhance recovery. This involves introducing these nanoparticles into formations and studying its effect on oil recovery. Nanotechnology produces nanomaterials with many useful properties, which can play a very important role in oil well drilling and production like improving mud cake quality, reducing friction, reducing differential pipe sticking problems, maintaining borehole stability and protecting the reservoir, apart from enhancing oil and gas recovery. With its broad reach across diverse fields, nanotechnology stands on the verge of launching a new technological revolution in the oil and gas energy industry. The paper gives a review of the most common areas with basic nanotechnological applications in the oil and gas sector.

Biography

Faseeh Ahmad Khan is currently pursuing a Bachelor's degree in Petroleum Engineering from DIT University. He is a part of the University Training & Placement Office as the Student Placement Representative and has also worked as the Student Training & Placement Officer. He has taken part in various other co-curricular activities also. He has published 2 papers in international and national conferences and is a member of SPE also.

faseehkhan9@gmail.com

Notes:

Mazita Mohd Diah et al., J Nanomed Nanotechnol 2016, 7:5 (Suppl)
http://dx.doi.org/10.4172/2157-7439.C1.043

Skin permeation characterization for conjugated carboxymethyl-oligochitosan carboxymethyl-5-fluorouracil nanoparticles

Mazita Mohd Diah[1,2,3], **A V Dolzhenko**[4] and **T W Wong**[1,2]
[1]Non-Destructive Biomedical and Pharmaceutical Research Centre, Malaysia
[2]Universiti Teknologi MARA, Puncak Alam, Malaysia
[3]Industrial Biotechnology Research Centre-SIRIM Berhad, Malaysia
[4]Monash University Malaysia, Malaysia

Nanoparticulate drug delivery systems refer to systems in which drugs are physically incorporated into nanoparticles or nano entities. Nanoparticles, being small with a large specific surface area, increase solubility, enhance bioavailability, improve controlled release and enable precision targeting of the entrapped compounds. In this study, carboxymethyl-oligochitosan (CM-oligochitosan) as polymeric permeation enhancer was conjugated to a polar pro-drug, carboxymethyl-5-fluorouracil (CMFU) through succinate linker, to increase the skin drug permeation. CM-oligochitosan-CMFU conjugate was then transformed into nanoparticles (NP) via spray drying technique. Skin drug permeation was profiled through treating the Sprague Dawley rat's skin (*in vitro*) with CM-oligochitosan-CMFU NP and CMFU and, had the skin characterized using ATR-Fourier transform infra-red (ATR-FTIR) spectroscopy, differential scanning calorimetry (DSC) and scanning electron microscopy (SEM) techniques. The nanoparticles were characterized by particle size: 229.10±57.05 nm, polydispersity index: 0.60±0.15, zeta potential: -55.92±24.48 mV and drug content: 2.29±0.27% w/w. The level of skin drug permeation of CM-oligochitosan-CMFU NP was higher than CMFU, which had no conjugation to CM-chitosan and nanoparticulation, following 24 hours of study. ATR-FTIR spectra of the untreated skin showed characteristic CH stretching vibrational peaks (asymmetric and symmetric CH2) associated with the lipid alkyl chains of epidermis at 2918.63±0.02 and 2850.56±0.15 cm-1. Similar peaks were not obtainable in skin samples treated with CM-oligochitosan-CMFU NP, while CH peak of lipid was noted in epidermis treated with CMFU. The interaction of CM-oligochitosan-CMFU NP with CH regime of epidermis could have disrupted and loosened the lipid packing thus facilitating skin drug permeation. Through treating the skin with CM-oligochitosan-CMFU NP, the amide I band of skin was shifted to lower wavelength from 1646.83±1.08 cm-1 to 1642.40±3.72 cm-1 unlike cases of CMFU. The band shift indicated that corneocytes perhaps dehydrated and shrunk, thereby leading to the formation of larger intercellular aqueous pores and better nanoparticles permeation. The ATR-FTIR outcome was further supported by thermal and morphological analysis. DSC analysis showed that the melting temperature and enthalpy of endotherm at 65.92±0.57^{0}C related to lamellar lipid structure were reduced when the skin was treated with CM-oligochitosan-CMFU NP. The skin lipid packing became disordered and this was not observable in study using CMFU. Using SEM, the skin treated with CM-oligochitosan-CMFU NP was characterized with pore formation, while the surfaces of skin remained intact when it was treated with CMFU.

Biography

M M Diah is now pursuing her PhD in Drug Delivery at Non-Destructive Biomedical and Pharmaceutical Research Centre, iPROMISE, Universiti Teknologi MARA, Malaysia. She got her Master's in Chemistry degree (Zeolitic Material Catalysis) in 2002 from Universiti Teknologi Malaysia. She is also a Senior Researcher at Industrial Biotechnology Research Centre, SIRIM Berhad, Malaysia. Her research interests are in bioactives' isolation from natural product for cosmeceutical and pharmaceutical application and in delivery technology. She has published papers and patents especially for bioactives that are applied in skin whitening products.

mazita@sirim.my

Notes: