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Application of RP-HPLC/UV for the detection of polycyclic aromatic hydrocarbons in atmospheric environments

A.P. Wickramasinghe

National Veterinary Research Institute, Sri Lanka

Polycyclic aromatic hydrocarbons (PAHs) are toxic environmental pollutants of growing importance for their potent carcinogenicity. Being emitted from incomplete organic combustion, urban atmospheres under rapid economic expansion are heavily polluted with PAHs and pose special threats on the dense population. Monitoring and characterizing atmospheric PAHs is therefore of considerable importance for better management of air quality and subsequent community health conservation programmes. Although the analytical methods for PAHs seem established, being inconsistent, the primary objective of our work was to simplify the conventional techniques for sample preparation in US EPA Compendium Method TO-13A and develop relatively an economical method for routine analysis of 16 priority PAHs in air samples without compromising the accuracy. It was further accomplished with HPLC/UV detector system which was validated to be adequately precise, effective, selective and sensitive with comparable/higher criteria to the conventional GC/MS or HPLC/FLD for routine atmospheric monitoring. Over the perfect linear calibration ($r=0.99$) of 16 PAHs, the detection limit ranged from sub nanogram to picogram levels with a limit of quantification for p-PAHs, $9.5\text{pg}/\text{m}^3$ - $3.43\text{ng}/\text{m}^3$. Overall recoveries and precision of the method as %RSD were highly comparable; %RSD for integration area, 1.59% and retention time, 0.68%. Particulate and gaseous PAHs in Kandy, analyzed based on this method were comparable to the world data, but at/above the upper end and well correlated with the assessed sources and health impacts. The developed HPLC/UV method would therefore widely be used in routine external exposure assessment of atmospheric PAHs in analytical toxicological studies.

Biography

A.P. Wickramasinghe, basically qualified with honored BVSc degree from Faculty of Veterinary Medicine, University of Peradeniya with distinctions, gold medal and scholarship for best performance in 1994. She transferred her carrier to the broad environmental field with post graduate qualification in Environmental Engineering in 2005, to PhD in Environmental Sciences in 2012, which covered both Environmental Engineering and Environmental Health aspects, from Faculty of Engineering with collaboration from Faculty of Medicine, University of Peradeniya. Her recent research work were published in international journals of Atmospheric Environment-2011 and Chemosphere-2012 and also presented at Planet Under Pressure-2012 conference in London.

priyanvadaw@yahoo.co.uk

Polymorphism determination of two formulations of a spread margarine and fat blend used by X Ray Diffraction (XRD) and Fourier Transformer Infrared (FTIR)

Anis Chikhoun

University of Mentouri Constantine, Republic of Algeria

In margarine and many food products, fat content is in a crystallized or semi-crystallized state at storage or use temperatures. Triglycerides, like the majority of long chains compounds, can exist in various crystal forms called polymorphism. Margarine had now grown into a recognized industry. Newer and better methods for the production of margarine were continually introduced. The major effort in margarine production should be for the product to be in the β' crystal form as it would then be smooth, creamy and homogenous. In this work, our interest is focused on the study of polymorphism of a spread margarine, produced in a pilot plant. Two formulations (MF1 and MF2) are then produced using two different oil blends. The study of polymorphism in margarine is of a great interest for food industry. In order to achieve this aim, two spectroscopic methods are used: X Ray Diffraction (XRD) and Fourier Transformer Infrared (FTIR). The polymorphic forms in the samples studied were determined by X-ray diffraction (XRD) on a Philipps X'PERT diffractor (Philipps X'PERT PANalytical, Almelo, the Netherlands) according to Liu & al. (2010). Before FTIR analysis, a preparation of the samples is required. The protocol of preparation followed is that recommended by SHIMADZU company (2008). Analysis was carried out according to Koca & al. (2010) on a FTIR spectrometer (IR Affinity-1 FTIR SHIMADZU, Kyoto, Japan). The two techniques showed the presence of the following polymorphic forms: α , β' and β with prevalence of the β' polymorphic form.

Biography

Anis Chikhoun has studied at A/Mira University, Bejaia in Algeria where he got his engineering degree in Food Sciences in 2008 at the age of 24. Then, he studied and got his master's degree at the age of 27 years from Mentouri University, Constantine, Algeria. He was a Ph.D student at A/ Mira, Bejaia in Algeria since November 2011 and he was recruited as a lecturer assistant at INATAA Mentouri University, Constantine in Algeria since December 2011. His major is Food Technologies and he makes a study about texture and polymorphism of margarine manufactured on a pilot plant and improvement of its preservation using natural plant extracts and essential oils.

anis.chikhoun@gmail.com

A total analysis of a Kentucky Coal; ^1H by VCT CRAMPS; ^{13}C by CPMAS NMR minor constituents by spectroscopy using an inductively coupled plasma

Bernard C. Gerstein
Iowa State University, USA

Residual saturated solution in aspirin is detected quantitatively and qualitatively utilizing Variable Contact Time Combined Rotation and Multiple Pulse (VCT CRAMPS) NMR of protons¹. Concentrations of residual solutions, occluded during crystallization from solution, can be detected to better than 0.01 mol %. Samples from the same newly-opened bottle exhibit quite different finger prints for the occluded mobile phase. Specifically, the NMR signal of the saturated solutions are broadened relative to the NMR of aspirin in non-saturated solution. Because reactions in solution are much more rapid than those in solids, the amounts of saturated solution determine the lifetimes of drugs on the shelf.

Biography

Bernard C. Gerstein received his Ph.D. from Iowa State University, and is Professor Emeritus at present. He has published two books (Rudimentary Thermodynamics, with Franzen, and Transient Techniques in NMR of Solids; an Introduction to the Theory and Practice, with C.R. Dybowski) and about 160 papers in the refereed Literature.

BernieGerstein@aol.com

Materials and processing for biosensors and bioelectronics

Bohdan Khomtchouk

Ecole Polytechnique Federale de Lausanne, Switzerland

The field of biosensing/bioanalytics in microfluidic channels represents a new frontier in the study of molecular surface detection. Measuring concentrations of particular drugs in the plasma of a patient's bloodstream represents just one of the promising applications of this technology. There have been many studies investigating the characteristics of nanoscale and microscale sensor systems on the ultrasensitive detection of target molecules at very low concentration and rapid flux. However, despite great experimental progress and acquired knowledge in the field, the optimization of biosensor design remains an open question. For example, it has been conventional wisdom that the design and the development of SiNW and CNT-based cylindrical sensors should be able to achieve ultrafast detection (<100 s) at femtomolar concentration. However, some experimental results point to data indicating that, under standard experimental protocol conditions, only picomolar-order detection limits can be achieved. Others demonstrate that without active-directed methods to transport molecules to the sensor surface, the detection limits top out in the picomolar range. As far as theoretical work is concerned, numerical validation of simulations have shown that there is a trade-off between settling time of ligand binding to sensor and its minimum detectable concentration for planar (1D), cylindrical (2D), and spherical (3D) biosensors. In this way, the analysis of sensor geometry influence on its performance is a key element in designing sensors well adept at detecting biomolecules. Thus, analysis on various geometries, as well as the performance issues associated with the nanoscale and the microscale, need to be further investigated. The design principles of biosensors are not well elaborated, and the path to further optimization is not well established in the field. Even in the most recent articles about biosensor miniaturization, conclusions regarding the optimal size of a sensor in terms of absolute numbers have not been determined. Most importantly, there is a lack of case studies where the optimization of the sensor size is conducted with respect to the size of the microfluidic channel. By decoupling, or treating separately, the analysis of the sensor and the analysis of the channel, the quantitative and qualitative predictions generated lose their experimental relevance both for commercial systems (e.g., surface plasmon resonance (SPR) machines such as BIAcore) and custom-built systems designed in the lab for specific applications (where the dimensions of the microfluidic channel are just as important as the dimensions of the sensor itself). Our work mathematically treats the sensor and the channel as an integrated system, thereby generating equations that explicitly incorporate the parameters of both constructs. This is important in deciding when to downsize a microscale sensor to the nanometer range and, hence, when to go through the difficulty of making this transition. Thus, we aim to fill in a niche in the determination of design considerations for biosensor construction. Our analysis treats both microscale and nanoscale sensors individually and then compares the results. By understanding how the dimensions of the biosensor are scaled with respect to the channel it is in, not only can we make more realistic predictions before beginning an experiment, but we can also determine how to best construct a custom-built biosensor for a particular desired application.

bkhomtchouk@gmail.com

The ionic liquid effect on the preparation of epoxy-silica nanocomposites

Henri S. Schrekker
Tecnocat - UFRGS, Brazil

The imidazolium based ionic liquids (ILs) have been proved to be very efficient in structure control and reinforcement of nanocomposites. The epoxy-silica nanocomposites were prepared by simultaneous epoxy network build-up and in situ formation of silica nanodomains by the sol-gel process. The presence of a small amount (0.6 wt.-%) of IL controls the hybrid formation and the interfacial interaction. Both the anionic and cationic IL components are of importance.

The application of 1-n-decyl-3-methylimidazolium tetrafluoroborate IL together with HCl as an acid catalyst promotes reactions of the sol-gel process and self-assembly ordering of the IL. It produces very fine hybrid morphology with well-dispersed silica nanodomains and a significantly increased rubbery modulus due to physical crosslinking by the ordered domains of decyl substituents. The IL 1-triethylene glycol monomethyl ether-3-methyl imidazolium methanesulfonate catalyzes the silica formation, affects the interfacial epoxy-silica interaction and leads to a remarkable enhancement of tensile properties; including tensile modulus, strength and toughness. Surface properties of the nanocomposites, such as hydrophobicity, were also well controlled.

Biography

Henri Stephan Schrekker initiated his independent research career in May 2006 as Assistant Professor of the Department of Organic Chemistry at Universidade Federal do Rio Grande do Sul. Since then he acted as group leader of the Laboratory of Technological Processes and Catalysis. His research interests are focused in the fields of catalysis, nanoscience and polymers. In the year 2007, he received the DuPont Young Faculty Award, being the first recipient that performs research in South America. Actually, he is member of the Brazilian Advanced Center for Olefin Catalysts and has published more than 20 papers in reputed journals.

henri.schrekker@ufrgs.br

Nanoscale materials (nanocomposites, nanowires, carbon nanotubes, nanoparticles): Computational modeling and applications in molecular, cell biology and nanomedicine

Katya Simenova

Bulgarian Academy of Sciences, Bulgaria

Discovering of carbon nanotubes (CNTs), by S. Iijima, [1] in 1991 was a revolution in nanoscience. (CNTs) possess extraordinary physico-mechanical properties, and could be used as reinforcement for nanocomposites (a matrix- polymer, ceramic etc. reinforced by CNTs). Recently has been discovered that these nanomaterials, could be used as constructive elements in many regenerative and tissue engineering problems. As has been proved nano and biocomposites, play an important role as successful tools in molecular and cellular biology and medicine. Moreover it has been established that nanoparticles (nanowires, nanoshells), could be considered as appropriate materials in cancer research. Nanotechnology based on nanoparticles, have been developed and in many cases they have been used for In Vitro and In Vivo Diagnostics, Therapy and Treatment of cancer. The aim of the work, presented could be formulated as follows: to give some basic studies, regarding to the mechanical behaviour of nanocomposites, and to present some new computational models regarding to molecular and cellular biology and medicine. Nanowires, as nanoscale materials also have very important applications, as field effect transistor (NWFET), for example [2]. Computational models, based on the classical mechanics theories and molecular dynamics for simulations of physico-mechanical, electronics, optical etc. properties of polymeric nanocomposites have been designed as well in the paper by authors. Numerical author's FORTRAN programs and algorithms have been developed by authors in the paper. Some basic definitions and applications of nanomedicine have been analysed too. Numerical results, obtained have been compared by the experiments in literature and they show a very good agreement. Applications of nanotubes, nanowires, nanorods, nanoparticles, nanodots, nanocomposites in engineering, technique, nanomedicine, molecular and cellular biology have been given, accounting for work

katyas@bas.bg

Brain computational modeling by tools of nanotechnology, biotechnology and nanomedicine

Katya Simenova

University of Nottingham Medical School, UK

Recently has been found, that nanomaterials, especially carbon nanotubes (CNTs), have their application in neuroscience, [1]. Regarding that relatively novel topic, a discussion on studies, describing nanoneuroscience has been presented, [2]. Also potential applications of nanotechnology in neuroscience have been analyzed in [2]. New class of generation of “nanodevices and hybrid systems could be help in the repair of damaged central nervous system (CNS) tissue and that have paved the road to nanoneuroscience as a new discipline which can aid in veiling functional properties of brain”. Moreover CNTs discovered by S. Iijima in 1991, are cylindrically shaped carbon nanostructures and they possess unique mechanical, electrical, thermal, conductivity, electronic, optical, chemical etc. characteristics. Depending on geometry CNTs are known as both types- single walled carbon nanotubes (SWCNTs) and multi walled carbon nanotubes (MWCNTs). CNTs could be considered as very good substrates/scaffolds for neuronal growth. Applications of CNTs in neuroscience research “has been orientated towards the use of both MWNTs and SWNTs”. In the articles [3,4,5], has been reported that CNTs, MWNTs and SWNTs, could be used as biocompatible materials. “The effects of CNTs substrates on the electrical neurons and neuronal networks in culture” have been given in [6]. A great attention has been directed towards generating CNTs scaffolds” that may guide new tissue regeneration after injury”. So it has been concluded that “CNTs have the potential to be the next generation of materials for use in implantable neuroprosthetic devices and in injectable local treatment to promote nerve regeneration after injury”. Many authors have been reported some cases and analysis of electrical interactions between neurons and CNTs.

katyas@bas.bg

A straightforward label-free Au-LSPR portable detection system

Kuan-Jiuh Lin

National Chung Hsing University, Taiwan

It is helpful for early diagnosis, staging, prognosis, and mediating the aggressiveness of viral infections and cancer by providing real-time information to doctor. However, the common detecting methods (i.e. ELISA or flow cytometry) have some drawbacks to reflect the real-time information. For example, the method of ELISA usually took 2~3 days to complete the whole process. Therefore, development of detecting method which has properties such as high throughput and sensitivity is essential. In this report, a rapid and highly sensitive chip has been developed for detecting low concentration molecules or specific rare cells. Unlike time-consuming ELISA and flow cytometry, the advantages of the chip include low-cost, reusability, high sensitivity and easy preparation. This chip is based on durable gold nanostructures on transparent glasses with uniform spacing which having an average nano-particle size and inter-particle gap of 8 nm and 11 nm, respectively. According to results, the optical response of localized surface plasmon resonance (LSPR) is strongly dependent on the chemical/biological molecule binding location. The optical response of LSPR increases when binding molecules are immobilized at the inter-particle spacing. The anti-Human immunoglobulin G molecule was applied as target to detect. Chemical immobilization had been used as bridge between the Human immunoglobulin G molecules and chip. The experimental result indicates that the limit of detection for anti-Human immunoglobulin G molecules is 10 ng/mL. In the next step, we will attempt to detect pathogens or specific rare cells (i.e. circulating tumor cells or cytotoxic T lymphocyte) with special functionalization due to the high sensitivity by using our Au-LSPR chips. Now mass-production of the Au-LSPR chips can be achieved according to our patented microwave-plasma methods. Moreover, a hand held equipment of UV absorption has been designed to replace the large apparatus. We hope the Palm-sized equipment for detecting specific molecules that can be applied to Point-of-care testing in the future.

Biography

Kuan-Jiuh Lin is the distinguished professor of department chemistry of National Chung Hsing University, Taichung, Taiwan. His research fields focused on the exploring interfacial electric-materials, such as nanoparticles embedded on glass substrates and photoanode solar cells. He has published more than 100 papers in reputed journals and over 30 patents.

kjlin@dragon.nchu.edu.tw

Experimental advances in comprehensive online multidimensional fast fourier transform separations applied to natural product analysis

Mark J.E. Trudgett

University of Western Sydney, Australia

The authors have previously described the theoretical basis of a new separations method that provided for the possibility of very high peak production chromatography in multidimensional systems whilst simultaneously affording comprehensive separations with greatly reduced analysis times. This method was called Comprehensive Multidimensional Fast Fourier Transform Separations (COMForTS). By applying time-dependent frequency-domain signals processing, the location of different analyte velocities is reported as a function of time, resulting in a comprehensive separation of all analyte signals providing only that no two analytes have the same retention time in all separation dimensions.

Significant advances have been made in COMForTS methodology that relax previously reported constraints and the method is now capable of producing very high peak capacities as well as extraordinarily high peak capacities per unit of analysis time. This paper presents an extended experimental proof of these concepts by utilizing a prototypical instrument consisting of an analytical HPLC column as the first dimension and an online open-tubular liquid capillary column as the second dimension for the analysis of brewed coffees with ultra-violet absorbance detection. Time dependent frequency spectra of separated analytes were calculated and the resulting separations compared to previously reported results produced by comprehensive offline (heart-cut) separations. The present results are discussed with respect to the theoretical basis and practicality of the COMForTS method in resolving wrap-around effects in multidimensional separations. Also discussed are the implications of these results for high-speed qualitative analysis and fingerprinting of complex samples of natural origin.

Biography

Mark Trudgett completed his M.Sc.(Hons) in 2005 at The University of Western Sydney, Australia. With extensive experience in consulting and pharmaceutical analytical chemistry and a master's degree in science management, he is currently a doctoral candidate at UWS under the supervision of Andrew Shalliker.

mark@trudgett.com

The ionic liquid effect on the preparation of epoxy-silica nanocomposites

Moises Armides Franco Molina

Universidad Autonoma de Nuevo Leon, Mexico

Regulatory T cells (Treg) are important regulators of the immune system, however, in many types of cancer an increase in the number of Treg has been observed. Foxp3 is a transcription factor involved in the development and function of Treg. Recently, Foxp3 expression was thought to be restricted to the T-cell lineage, however it also has been detected in different types of human cancer cell lines, although the role of Foxp3 in cancer cells is still unclear. The aim of this study was to determine the correlation between Foxp3 expression, Treg, and cytokine production during the development of a murine melanoma. We detected the Foxp3 expression in B16F10 cancer cell line by immunofluorescence, flow cytometry, and real time-PCR. The results showed that Foxp3 expression was increased during tumor development in intratumoral B16F10 cancer cells and it was positively correlated with the percentage of infiltrating regulatory T cells (CD4+CD25+FOXP3+), and TGF- β and IL-10 production was increased, the INF- γ production was decreased evaluated at 7, 14, 21, and 28 days. These results suggest that Foxp3 expression in B16F10 melanoma cells could act as an important regulator in the growth of melanoma.

Biography

Moises Armides Franco Molina completed his Doctoral degree at age of 35 from Universidad Autónoma de Nuevo León. He actually is Professor and President of Immunology Academy of the faculty of Biology Science of the Universidad Autonoma de Nuevo Leon. He has published more than 18 articles in international journals.

moyfranco@gmail.com

A tissue stem cell niche regulates calcific aortic valve disease via Wnt/LRP5

Nalini Rajamannan
Mayo College of Medicine, USA

Calcific aortic valve disease is the most common indication for valvular surgery in the United States. Cellular mechanisms are under intense investigation. This study hypothesizes that this disease develops secondary to a tissue stem cell niche. The niche is regulated by Wnt secretion from the endothelial layer to activate LRP5 receptor on the adjacent myofibroblast cell to form bone.

Methods: Human ex vivo calcified valves versus control aortic valves were tested for Lrp5/Wnt3a expression by RTPCR, Western Blot and Immunohistochemistry. eNOS null mice: control (n=20), cholesterol (n=20), cholesterol + Atorvastatin (n=20), were tested for the development of aortic stenosis by Visual Sonics Echo, Immunohistochemistry for Wnt, Lrp5, Osteocalcin, PCNA and RTPCR for Lrp5 and Cbfa1. In vitro studies were performed to isolate Wnt3a from aortic valve endothelial cells in the presence of lipids with and without Atorvastatin using Anion exchange chromatography. Oxidative stress levels were tested via eNOS expression. Treated endothelial cell conditioned media with lipids with and without Atorvastatin was added to myofibroblast cells. Gene expression for Cbfa1, Lp5 and osteocalcin from the valve myofibroblast cells with the various treatments was measured by semi-quantitative RTPCR.

Results: Secretion of Wnt3a (>300-fold, $p < 0.0001$) from aortic valve endothelium in the presence of abnormal oxidative stress as measured by nitric oxide regulation and lipids as measured by eNOS enzymatic activity and tissue nitrite levels. Osteoblastogenesis in the adjacent myofibroblast cell treated with conditioned media by LRP5 receptor signaling. Human ex vivo calcified valves express LRP5 as compared to normal valves ($p < 0.0001$). Cholesterol treated eNOS mice develop severe stenosis with an increase in Lrp5, Cbfa1, (3-fold increase ($p < 0.0001$)).

Conclusion: Targeting the Wnt3a/Lrp5 pathway in valvular calcification presents a novel approach towards treating this disease. The Wnt3a/LRP5 cross talk mechanism is demonstrated in three models. These findings demonstrate important implications for the therapeutic regeneration of a normal valve.

nrajamannan@gmail.com

Synthesis and characterisation of triethyl ammonium BIS (aminobenzoato)phenylsilicate

Neena Garg
Panjab University, India

Synthetic chemistry of hypervalent silicon compounds have been mainly confined to the O,O type ligands like Catechol, Salicylic Acid, Glycerol, Pinacol etc. where silicon is bonded to oxygen atoms. There has been very less report on the isolation of anionic silicates having O,N type ligands. In order to understand the effect of these atoms attached to silicon atom and on the structure and reactivity of zwitterionic silicates it is desirable to bring variation in the environment around silicon atom. Therefore we have attempted the synthesis of title compound with a view to incorporate a different environment around silicon atom i.e. using ligand having heteroatom (O,N type ligand) e.g. Anthranilic acid. The title compound is prepared by the reaction of Phenylsilane, Triethylammonium and Anthranilic acid in 1:1:2 molar ratio in dry acetonitrile. The compound is characterised by elemental analysis, molar conductance, IR, multinuclear (^1H , ^{13}C , ^{29}Si) NMR, FAB mass spectroscopy and X-ray crystallography.

Biography

Neena Garg, did B.Sc. (hons.), M.Sc. (hons.), in Chemistry from Panjab University, Chandigarh, in 1998, and then completed Phd in chemistry in 2004 from Panjab University, Chandigarh, on the topic "Synthesis and characterisation of some hypervalent silicon compounds". I have published two research papers in international journals, one in "Main Group Metal Chemistry" and the other in "Phosphorous, Sulfur and silicon". I have five years of research experience and six years of teaching experience. Presently I am teaching in a Govt. Engineering College "CCET, Chandigarh College of Engineering and Technology", sector 26, Chandigarh.

neenag11@yahoo.com

Sorting out the reliable profiles in capillary zone electrophoresis : The example of the carbohydrate-deficient transferrin (CDT) assay of cirrhotic patients

Philippe Gonzalo
University de Lyon, France

CDT is a serum marker used to estimate chronic alcohol abuse. This assay is both difficult and critical for cirrhotic patients, especially those awaiting liver transplantations. In this presentation, we propose to display the performances of the CDT-Capillary assay (Sebia) to discriminate abstainers from abusers among cirrhotic patients and to expose recommendations to improve its reliability in this patient group.

Methods: 110 patients with known hepatic status of cirrhosis had their CDT measured by Capillary2 and confronted to their daily alcohol intake. CDT assays by the Bio-Rad %CDT by HPLC test or the N-Latex CDT assay (Siemens) were also performed as alternative methods.

Results: Many electrophoretic profiles displayed by the Capillary2 are extensively processed by the Phoresis software in case of cirrhosis. This was not observed with control sera. In order to decide when the processed electrophoretic profiles could reliably be used, we defined a qualitative criterion. This criterion consisted to apply an indicator of the resolution between the disialo and trisialo-transferrin peaks. Thus detecting abusers with cirrhosis using the CDT-Capillary assay is possible when the indicator is in the normal range. However, only 54% of the profiles from cirrhotic patients fulfilled this criteria and no alternative CDT assay demonstrated satisfying performance for excluded samples.

Conclusions: Applying an internal criterion of quality can help deciding which electrophoretic profiles can reliably be interpreted. However, improving the global quality of the test and decreasing the number of uninterpretable results require an improvement of the CDT assay.

Biography

Gonzalo, P., Pecquet, M., Bon, C., Gonzalo, S., Radenne, S., Augustin-Normand, C., and Souquet, J.-C. (2012). Clinical performance of the carbohydrate-deficient transferrin (CDT) assay by the Sebia Capillary2 system in case of cirrhosis. Interest of the Bio-Rad %CDT by HPLC test and Siemens N-Latex CDT kit as putative confirmatory methods.

philippe.gonzalo@lyon.unicancer.fr

Engineering alkaloid biosynthesis discovery in microbes

Rajesh Viswanathan

Case Western Reserve University, USA

Our laboratory's scientific goals are directed along two complementary directions: a. creation of new chemical space. In layman's terms, this means creating new molecules; and b. discover new biocatalysts, in other words enzymes. Our approach toward accomplishing these goals is by turning to nature. Looking into biosynthesis to gain clues for molecular construction and enzyme discovery is a well-known scientific approach. Our unique contribution to this field of natural product chemical biology stems from the combined use of techniques like organic synthesis and genomic analysis in order to engineer microbial biosyntheses.

Recent research has shown that exploration and understanding of our world's biodiversity stands at a mere 1%. The science that defines us is centered on biological questions such as "How does nature construct molecules like penicillin, for example, that has benefited humanity tremendously over the past decades?" and "Can we identify new pathways hosted in prokaryotic cells that can lead to toxins, biofuels and other useful molecules for therapeutic evaluation?". Microorganisms are our choice of biological systems in which we address such questions. We develop chemical and biotechnology tools to address these significant issues. This presentation will highlight recent research from our lab at the interface of chemistry and biology, with a specific focus on natural products that are genetically encoded. We will illustrate interfacial concepts such as genome-guided total synthesis, gene-function IDing and profiling enzymes through microarrays.

rxv69@case.edu

Oral administration of Fe-bLf loaded nanocapsules for colon cancer therapy

Rupinder Kanwar
Deakin University, Australia

Oral administration of bio-macromolecules is an uphill task and the challenges presented in the gut milieu, from varying pH and enzymatic activity, are difficult to overcome. In this regard, nanotechnology promises a new hope and offers advantages such as controlled release, target specific delivery, combinatorial therapy with lower doses and abolished toxicities.

Aim: This study aims to develop polymeric-ceramic nanocapsules in order to achieve oral delivery of the anti-cancer neuropeptide protein iron saturated bovine lactoferrin (Fe-bLf).

Methodology: A formulation of novel anti-cancer nanocapsules was prepared using combination of polymers and ceramics. Alginate enclosed chitosan coated enclosing Fe-bLf or paclitaxel (taxol) adsorbed onto nanocores of calcium phosphate nanocapsules (AEC-CP-Fe-bLf NCs or AEC-CP-taxol NCs), were made by combination of ionic gelation and nanoprecipitation techniques to encapsulate the anti-cancerous therapeutics. Size distribution, morphology, internalization and release profiles of the NCs under varying pH along with in vitro and in vivo anti-cancer efficacies were evaluated. Paclitaxel was used as positive anti-cancer drug to compare the effectiveness with our natural anti-cancer protein, Fe-bLf.

Results: AEC-CP-Fe-bLf NCs obtained spherical morphology and showed enhanced anti-cancer efficacy in vitro. Further, these NCs were efficiently taken up by the colon cancer (Caco-2) and didn't effect the mucosal integrity during transcytosis. AEC-CP-Fe-bLf NCs were supplemented in AIN 93G diet with 1.2%w/w of Fe-bLf, by replacing casein and fed to mice, in both prevention and treatment xenograft colon cancer models. Nanoformulated Fe-bLf diet when given orally, as a pre-treatment, one week before Caco-2 cell injections, was found to be highly effective. None of the mice fed with the AEC-CP-Fe-bLf NCs diet, developed tumours, or show any signs of toxicity, while the mice fed control AIN-93G diet, showed normal tumour growth. When taxol or Fe-bLf were given orally as a nanoformulations post tumour development, a significant regression in the tumour size was observed and completely rejected in 35 days, while intra tumoural injection of taxol just delayed the growth of tumours. The pharmacokinetic and bioavailability studies indicate that nanoformulated Fe-bLf predominantly present on tumour cells as compared to non-nanoformulated Fe-bLf. These NCs can thus be used for future targeted protein/peptide or nucleic acid based drug delivery to treat difficult diseases including cancer. Fe-bLf loaded NCs were found to help in absorption of iron thus may have utility in enhancing the iron uptake during iron deficiency without interfering with the absorption of calcium.

Conclusion: With the promising results of our study, the future potentials of the NCs loaded Fe-bLf, in chemoprevention and in the treatment of human colon cancer, deserve further investigations for translational research and preclinical studies of other malignancies.

rupinder.kanwar@deakin.edu.au

Complete chromatographic process for fast separation of biopolymers

Xindu Geng
Northwest University, China

Scientists working in many fields require fast separations of intact proteins using liquid chromatography. From the viewpoint of chromatography, the speed of separations usually refers to the quickness of the chromatographic run process (CRP) of solute separation, i.e. the process from the sample injection to the elution of all of the components without considering the non-chromatographic process (NCP), such as column regeneration, system equilibration in 1D-LC and buffer exchange in 2D-LC. The NCP usually takes longer than those of the CRP alone. Routine analyses in hospitals, quality control in production lines, and protein separations in proteomics must operate hundreds and even thousands of samples daily. Thus, a complete chromatographic time (CCP) as a new concept for rapid protein separation, including both CRP and NCP must be considered together. This presentation comprehensive discusses recent developments in both of CRP and NCP. For the former, it involves nonporous packings, core-shell silica particles, monolithic columns and disks, perfusion chromatography, chromatographic cake, and high-temperature fast chromatography, for the latter, it contains 2 dimensional cylinder column (2D column), off-line and on-line 2D-LC, protein folding liquid chromatography in small and large scales, one minute separation of intact proteins, and so on. The fast analysis of nutrition proteins in milks in analytical scale and the renaturation with simultaneous purification of recombinant human interferon-gamma in industrial scale are taken as two typical examples to explain the advantages of the CCP.

Biography

Xindu Geng has completed his BS at the age of 19 years from Northwest University (Xi'an) and Faculty Member of Department of Chemistry, University of Minnesota in 1982~1983; Visiting Professor of Purdue University separately at Department Biochemistry in 1982~1984 and Department Chemistry in 1985~1996, and Visiting Professor of Chemistry Department of Creighton University. He is Director of Institute of Modern Separation Science of Northwest University. He has published more than 260 papers in reputed journals and serving as an editorial board member of reputed Journals, Biomedical Chromatography, Separation Science, and Journal of Chinese Chromatography, honor Chinese Distinguish Contribution Scientist.

xdgeng@nwu.edu.cn

Polymorphism determination of two formulations of a spread margarine and fat blend used by X Ray Diffraction (XRD) and Fourier Transformer Infrared (FTIR)

Anis Chikhoun

University of Mentouri Constantine, Republic of Algeria

In margarine and many food products, fat content is in a crystallized or semi-crystallized state at storage or use temperatures. Triglycerides, like the majority of long chains compounds, can exist in various crystal forms called polymorphism. Margarine had now grown into a recognized industry. Newer and better methods for the production of margarine were continually introduced. The major effort in margarine production should be for the product to be in the β' crystal form as it would then be smooth, creamy and homogenous. In this work, our interest is focused on the study of polymorphism of a spread margarine, produced in a pilot plant. Two formulations (MF1 and MF2) are then produced using two different oil blends. The study of polymorphism in margarine is of a great interest for food industry. In order to achieve this aim, two spectroscopic methods are used: X Ray Diffraction (XRD) and Fourier Transformer Infrared (FTIR). The polymorphic forms in the samples studied were determined by X-ray diffraction (XRD) on a Philipps X'PERT diffractor (Philipps X'PERT PANalytical, Almelo, the Netherlands) according to Liu & al. (2010). Before FTIR analysis, a preparation of the samples is required. The protocol of preparation followed is that recommended by SHIMADZU company (2008). Analysis was carried out according to Koca & al. (2010) on a FTIR spectrometer (IR Affinity-1 FTIR SHIMADZU, Kyoto, Japan). The two techniques showed the presence of the following polymorphic forms: α , β' and β with prevalence of the β' polymorphic form.

Biography

Anis Chikhoun has studied at A/Mira University, Bejaia in Algeria where he got his engineering degree in Food Sciences in 2008 at the age of 24. Then, he studied and got his master's degree at the age of 27 years from Mentouri University, Constantine, Algeria. He was a Ph.D student at A/ Mira, Bejaia in Algeria since November 2011 and he was recruited as a lecturer assistant at INATAA Mentouri University, Constantine in Algeria since December 2011. His major is Food Technologies and he makes a study about texture and polymorphism of margarine manufactured on a pilot plant and improvement of its preservation using natural plant extracts and essential oils.

anis.chikhoun@gmail.com