Polymer Science & Composite Materials Virtual

June 17-18, 2022

Abstract Book

SciWide
WEBINARS

KEYNOTE FORUM

DAY 1

POLYMER SCIENCE AND COMPOSITE MATERIALS

VIRTUAL

JUNE

17-18, 2022

GMT 07:00 – 12:00

V-PSCM2022

Richard J Spontak

Institute for Catalysis, Hokkaido University, Sapporo 001-0021, Japan.

Ultraselective Polymer Membranes for Carbon Capture

Climate change, attributed largely to atmospheric CO_2, continues to threaten the global environment and its inhabitants. Numerous efforts have endeavored to design membranes to remove CO_2 from both industrial processes involving flue gas and natural gas, and have recently emphasized permeability rather than selectivity primarily through the development of such materials as polymers of intrinsic microporosity (PIMs). What if, however, we focused on selectivity instead? In this work, we explore two approaches starting from different ends of the permeation spectrum that are used to fabricate organic membranes capable of CO_2 *ultra*selectivity (*i.e.*, CO_2/N_2 selectivity > 100). In one instance, the starting point is a sustainable bionanoparticle, micro/nanofibrillated cellulose (MNFC), which by itself acts as a barrier to gas permeation. Upon addition of a hydrophilic ionic liquid (IL) to coat and separate MNFC fibrils followed by subsequent use of humidified feed gas, a "gate-opening" mechanism can be activated at intermediate relative humidity levels so that CO_2 is permitted to selectively permeate through the hydrated IL. The selectivity levels measured here for such hybrid membranes exceed 300. In the second case considered, the starting point is a low-selectivity, ultrapermeable (CO_2 permeability > 1000 Barrer) membrane that is surface-functionalized to introduce CO_2-philic groups. By integrating these components and two different transport mechanisms together, CO_2 concentrates on the CO_2-philic membrane surface and then quickly permeates through the high-permeability substrate polymer, yielding ultraselective and ultrapermeable membranes that not only defy the Robeson upper bound but also remain economically viable and process compatible.

Biography

Richard J. Spontak received his B.S. and Ph.D. degrees in Chemical Engineering from Penn State and UC Berkeley, respectively. He has >300 peer-reviewed journal publications, and his research has been featured on >30 journal covers and cited over 14,000 times. He has been recognized with the ACS Chemistry of Thermoplastic Elastomers and Roy W. Tess Awards, the IOM3 Colwyn Medal, the SPSJ International Award, and the SPE International Award. A fellow of the American Physical Society and the Royal Society of Chemistry, he is a member of the Norwegian Academy of Technological Sciences and a Distinguished Professor at NC State.

Chua Kien Hui

Department of Physiology, Faculty of Medicine, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia.

Application Of Polymers In Medicine, Health And Biotechnology

Polymers made from the material of poly-esters group has many applications in the field of regenerative medicine and biotechnology. Polymer can be fabricated into various shapes for the reconstruction of new tissue like cornea, skin, cartilage, tendon, bone, heart valve, blood vessel and muscles. The fabricat-fabrication technique will make scaffold with large surface area and prepare location for cells to attach and grow into new tissue for the application in tissue engineering. Sometime, polymers with different composition of biological and synthetic materials are needed to produce a suitable scaffold for tissue to regrow. Factors like strength, bio-compatibility, bio-degradability, metabolic byproducts toxicity are important to be considered for the successful of polymer scaffold. Polymer degradation time should match with the time needed for the replacement of extracellular matrix synthesize by cells for good tissue healing. Polymer is also used to construct bio-composite for testing in biotech industry, such as chemical irritation testing using the skin and cornea bio-composite. In different sector of health, polymer can act as a slow release delivery system to achieve long duration release of incorporated drugs, antibiotic, hormone, cytokine and miRNA that implanted in the body.

Biography

Chua Kien Hui has completed his PhD from Universiti Kebangsaan Malaysia (UKM), in the field of tissue engineering and regenerative medicine. He joined UKM in 2005 and serve currently as the head of Physiology Department in Faculty of Medicine UKM. He has published more than 125 papers in international journals and patented a few products that going for commercialization. He also appointed as consultant for a cGMP facility manufacturing cell therapy products.

Xufeng Dong[1], Qi Wang[2], Chenguang Niu[3], Yu Tong[1], Min Qi[1], Ning Ma[4] and Jinping Ou[4]

[1]School of Materials Science and Engineering, Dalian University of Technology, Dalian, Liaoning Province, China.
[2] School of Civil Engineering, Chongqing University, Chongqing, China.
[3]College of Mechanical and Vehicle Engineering, Taiyuan University of Technology, Taiyuan, Shanxi Province, China.
[4]School of Civil Engineering, Dalian University of Technology, Dalian, Liaoning Province, China.

Preparation and Application of Magneto/Electro-rheological Materials

It is a crucial issue to reduce the vibration of civil structures, mechanical structures and space structures. Passive energy dissipation devices based on elastomers, metal dampers, viscous dampers only can control the vibration of structures in a narrow frequency. Smart materials with tunable stiffness or tunable damping could actively control the vibration of structures within a wider frequency. Magneto/electro-rheological materials, including magnetorheological fluids, electrorheological fluids, magnetorheological elastomers, and electrorheological elastomers, are such a kind of smart materials. These materials are prepared by dispersing electric polarized or magnetic polarized particles within carrier liquids or polymer matrix. Under an applying electric or magnetic field, their viscosity, yield stress or dynamic viscoelasticity change fast and reversibly. During the past decades, we investigated the mechanisms of magneto/electro-rheological materials. By controlling the morphology of the active particles, we developed some high performance magneto/electro-rheological materials. We also used them to fabricate smart devices that could reduce the vibration of various structures in wide frequency. Several typical works will be introduced in this presentation.

Biography

Xufeng Dong has completed his PhD from Harbin Institute of Technology, China and postdoctoral studies from Dalian University of Technology, China. He is a professor of Dalian University of Technology, one of the top technological universities of China. He has published more than 100 papers in reputed journals and has been serving as an editorial board member of repute.

Giuseppe Cesare Lama[1], Letizia Verdolotti[2]

Institute for Polymers, Composites and Biomaterials, National Research Council of Italy, Italy.

Graphene and renewable fillers used in sustainable composites: lab-scale studies for the circular economy paradigm

Bio-based polymers have gained growing interest in the last decades. Their development stands in the will of the worldwide community to overcome the nowadays environmental issue, especially reducing the carbon footprint of the modern industry. In this view, innovative production of thermosetting polymers is paving the way for the forthcoming economy. Among them, polyurethanes (PU), and more specifically the PU foams, have a quite large market segment. Their production requires the use of two main components, namely isocyanate and polyols, whose origins are traditionally oil-based. The main achievement reached in this field, from the point of view of a sustainable circular economy, is the wide use of bio-derived precursors, especially polyols. However, a drawback has to be reported: using this kind of precursors, gives a slight detrimental effect on the mechanical properties of the final product. In order to overcome this issue, fillers are used, in order to exploit their astonishing properties at the micro- and nanoscale, obtaining a best-performing nanocomposite. Depending on the aimed purpose, fillers are chosen, and, among them, those based on carbon family (graphite, nanotubes, graphene, and derivatives), those from industrial wastes (biomasses, blast furnace slag, glass, etc.), and those from natural extraction (clay, cellulose, diatomite, etc.) are the most widely used. Using those class of filler, combined or separately, bio-based nanocomposites, with strengthened mechanical properties, characterized by other useful functionalities, such as electrical conductivity, or endowed with an even more extensive environmental-friendly fingerprint, are obtained, becoming part of the paradigm of the

Biography

Giuseppe Cesare Lama has completed his PhD in Industrial Product and Process Engineering from University of Naples “Federico II”, Italy and postdoctoral studies from IPCB-CNR, Italy. He is now Senior Research Fellow at IPCB-CNR. He has published 15 paper in peer-reviewed journals, almost 15 between conference papers and proceedings, took part in many conferences and has been serving as reviewer for many reputed journals.

Sara Liparoti, and Roberto Pantani

University of Salerno, Italy.

Prediction of morphology evolution within injection molded parts: description of fibrils formation

The thermomechanical history experienced by polymer chains during processes determines the morphology in the final part, thus all the final properties within the parts. Molding parts are characterized by anisotropic morphology distribution: oriented fibrils close to the part surface and spherulites in the core. Obviously, anisotropy of final morphology follows the anisotropic distribution of both flow and temperature; the interaction between temperature and flow fields determines the distribution of residual molecular stretch, thus, the morphology distribution. A high molecular stretch favors the formation of fibrillar morphology, spherulitic morphology form under low stretch levels. Obviously, a minimum molecular stretch is expected for the fibrillar crystallization. The fiber thickness also seems correlated to the molecular stretch during crystallization.

On the basis of these concepts, a model for the crystallization of thermoplastic polymers has been proposed. The model for the description of the kinetics of fibrils and spherulites characteristic of the alfa-phase, formations has been adopted for describing the morphology distribution within injection molded parts. The main features of the morphological structures' distribution are consistently described by the proposed model. The predictions can describe the morphology dependence on the mold temperature: the higher is the mold temperature, the smaller is the fibrillar layer thickness.

Biography

Sara LIPAROTI graduated cum laude in Chemical Engineering at University of Salerno in 2009, where she also received PhD in Science and Technologies for Chemical, Pharmaceutical and Food Industry in 2013. She is Assistant Professor of Fundamentals in Chemical Engineering at University of Salerno (Department of Industrial Engineering). She is Editorial Board Member of JCR journal Processes (MDPI), and Guest Editor for Polymers. She is author of more than 50 works on peer-reviewed journals in the field of polymer processes.

Federico Carpi
Department of Industrial Engineering, University of Florence, Florence, Italy.

Enabling new biomedical and bioinspired mechatronic systems with electroactive smart elastomers

The development of a variety of new biomedical and bioinspired mechatronic systems raises challenges that share the need for innovative technologies for electromechanical actuation, especially based on soft materials, so as to enable applications not feasible or even imaginable with conventional approaches.The presentation will show how new technologies based on electromechanically active polymer (EAP) transducers are particularly promising to address this need. The idea is to use 'active smart materials' that exhibit inherent mechanical response to an electrical stimulus, so as to design radically new electrical devices characterized by light weight, mechanical compliance, compact size, simple structure, low power consumption, acoustically silent operation, and low cost. EAPs offer such properties and are referred to as 'artificial muscle materials', because of their ability to undergo large and controllable deformations upon electrical stimulation. This talk will be focused on the most versatile and performing EAP technology, known as dielectric elastomer actuators. Following a brief overview on the field and on the underpinning physical and engineering fundamentals, the talk will present some devices and applications under development by the speaker's group, including full-page refreshable and portable Braille displays for the blind people, wearable tactile display for virtual interactions with soft bodies, haptic or visual displays of biological tissue compliance or organ motility, artificial ciliary muscles for electrically tuneable optical lenses for artificial vision systems, artificial muscles for electrically stretchable membrane bioreactors.

Biography

Federico Carpi is an Associate Professor in Biomedical Engineering at the University of Florence. From 2012 to 2016 he has been an Associate Professor (Reader) in Biomedical Engineering and Biomaterials at Queen Mary University of London, School of Engineering and Materials Science, UK. Since 2016, he is with the University of Florence, where he leads the 'SMART – Soft Matter ARtificial muscles and Transducers' research group (www.smart.unifi.it). His research interests include smart material-based biomedical and bioinspired mechatronic devices, and polymer artificial muscles. His publications include some 70 articles in international journals, 3 edited books and several contributions to books and conferences.

Rohit Jain[1], Sumita Kachhwaha[2] and SL Kothari[3]
[1]Department of Biosciences, Manipal University Jaipur, Jaipur, Rajasthan, India.
[2]Department of Botany, University of Rajasthan, Jaipur, Rajasthan, India.
[3]Amity Institute of Biotechnology, Amity University Rajasthan, Jaipur, Rajasthan, India.

Structural and physicochemical characterization of gum exudates derived from drumstick tree: a non-toxic gelling and encapsulating agent

Moringa gum exudates are mucoadhesive polymers derived from the stem of Miracle tree, *M. oleifera*. Even though *Moringa* gum has a wide range of applications in food and medicine, but due to tedious harvesting methods and less knowledge of physicochemical properties, its uses have been restricted to the research laboratories only due to lack of detailed knowledge about its structural and physicochemical characteristics. Therefore, in this study comprehensive characterization of the *Moringa* gum exudates to gain detailed knowledge of its structural, chemical and physical properties was performed. Being sparingly soluble in water, extracts of gum was prepared in different solvent systems using both hot and cold extraction methods. Further, deacetylation of gum was done to identify functional groups having central role in maintaining the structural integrity of the gum. The findings revealed that acetyl groups play important role in the structural integrity of the gum and its deacetylation resulted in formation of a mesh with scattered and fibrillar particles with reduced pore size (0.2 µm) than that of the aqueous gum (0.5 µm). This hydrocolloidal gum polymer was amorphous in nature and showed maximum thermal stability in alkaline solvent system. Carbohydrate derivatives constituted its major (>80%) part while other metabolites including terpenes and fatty acids were present in traces. The preliminary findings of this study have not only laid the foundation for its applications in preparation of drug formulations with sustained release but has also confirmed its bioligand and gelling properties. Moreover, the non-toxic nature and inherent medicinal properties of the gum make it an excellent substitute for its conventional counterparts in both food and therapeutic preparations

Biography

Dr. Rohit Jain is working as Assistant Professor in Department of Biosciences, Manipal University Jaipur, India. He has more than 10 years of teaching & research experience and have published ~25 journal articles and 3 book chapters. He has ~500 citations with i-10 index of 12 and h-index of 11. He has also been working as Assistant Director (Research) at Manipal University Jaipur since 2020. Currently, he is working on metabolomics and transcriptomics of endangered desert plant *Withania coagulans* and have published its whole transcriptome sequence on NCBI SRA database. He is recipient of research grants worth ₹ 38.36 lakhs (INR) from various government and industry funding organizations. Dr. Jain is an enthusiastic researcher and is always passionate to explore the new in the field of life sciences through some quality collaborative and interdisciplinary research

Aidana Rysbek[1,2,*], Yerlan Ramankulov[3,4], Askar Kurmanbayev[1], Agnieszka Richert[5] and Sailau Abeldenov[1]

[1]National Center for Biotechnology, 13/5 Kurgalzhynskoye Road, Nur-Sultan 010000, Kazakhstan.
[2]L.N. Gumilyov Eurasian National University, Department of General Biology and Genomics, Kazhymukan 13 St., Nur-Sultan 010000, Kazakhstan.
[3]Nazarbayev University, School of Science and Humanities, Qabanbay Batyr Ave 53, Nur-Sultan 010000, Kazakhstan.
[4]Department of Genetics Faculty of Biological and Veterinary Sciences, Nicolaus Copernicus University in Toruń, Lwowska 1, 87-100 Torun, Poland.

Comparative Characterization and Identification of Poly-3-hydroxybutyrate Producing Bacteria with Subsequent Optimization of Polymer Yield

In this work, the strains *Bacillus megaterium* RAZ 3, *Azotobacter chrocococcum* Az 3, *Bacillus araybhattay* RA 5 were used as an effective producer of poly-3-hydroxybutyrate P(3HB). The purpose of the study was to isolate and obtain an effective producer of P(3HB) isolated from regional chestnut soils of northern Kazakhstan. This study demonstrates the possibility of combining the protective system of cells to physical stress as a way to optimize the synthesis of PHA by strains. Molecular identification of strains and amplification of the phbC gene, transmission electron microscope (TEM), extracted and dried PHB were subjected to Fourier infrared transmission spectroscopy (FTIR). The melting point of the isolated P(3HB) was determined. The optimal concentration of bean broth for the synthesis of P(3HB) for the modified type of *Bacillus megaterium* RAZ 3 was 20 g/L, at which the dry weight of cells was 25.7 g/L^{-1} and P(3HB) yield of 13.83 g/L^{-1}, while the percentage yield of P(3HB) was 53.75%. The FTIR spectra of the extracted polymer showed noticeable peaks at long wavelengths. Based on a proof of concept, this study demonstrates encouraging results.

Biography

Aidana Rysbek - PhD candidate in biology at L.N. Gumilyov Eurasian National University (ENU), Kazakhstan and part-time junior researcher at the Laboratory of Molecular Biotechnology at the NCB, Kazakhstan. In 2022, she completed a month-long internship at the Wroclaw University of Environmental and Life Sciences within the framework of Professor Tolpa Scholarship, Poland. In 2021, she completed a three-month internship at the Warsaw University of Life Sciences - SGGW, Poland. In 2018, she received a master's degree in biotechnology ENU. Since 2017, she has started scientific career and has more than 16 papers, including in reputed journals.

Ricardo Acosta Ortiz
Department of Macromolecular Chemistry and Nanomaterials, Centro de Investigación en Química Aplicada, Saltillo, Coahuila, México.

The Epoxy/Thiol-ene Photopoymerization: a new and efficient technique to cure Epoxy Resins

In this talk is discussed the research concerning a new method to photopolymerize epoxy resins in the presence of a thiol-ene system. This system include a compound with two or more tertiary amine groups function-nalyzed with allyl groups, a multifunctional thiol such as the pentaerythritol tetrakis (3-mercapto-propionate) and the 2,2-dimethoxy 2-phenylacetophenone as radical photoinitiator. When the thiol-ene system is added to the epoxy resins at concentrations between 20-40 mol % an irradiated with UV light, the photocuring of the epoxy resins proceeds in 7 min obtaining a crosslinked co-network of the polyether-polythioether type. The epoxy/thiol-ene system display advantages over the conventional thermal curing of the epoxy resins, for instance, a considerable energy saving in comparison with conventional thermal curing that is usually carried out at temperatures between 120-180 °C and curing times between 6-12 h. The obtained polyether-polythioether co-network display enhanced toughness in comparison with the polyethers derived from the conventional thermal curing of epoxy resins, due to the presence of the flexible polythioethers. The combination of a hard phase such as the polyethers and a soft phase like the polythioethers in the co-network derived from the epoxy/thiol-ene system, allowed us to obtain materials with shape memory materials. Also, by replacing the multifunctional thiol used in the epoxy/thiol-ene system with a thiol-disulfide oligomer, it was possible to obtain self-healing materials by means of a sulphide-thiol exchange reactions.

Biography

Dr. Ricardo Acosta Ortiz studied chemistry at the State University of Coahuila in Mexico and graduated as BSc in 1985. He then joined the chemistry research group at the Applied Chemistry Research Center (CIQA). He received a PhD degree at the Manchester Metropolitan University, UK in 1995. After one year postdoctoral fellowship supervised by Prof James Crivello in the Rensselaer Polytechnic Institute in Troy, NY in 2000 he obtained the position of senior researcher at CIQA. He has published more than 60 research articles.

Blaž Likozar,* Florian Harth, Filipa A. Vicente, Edita Jasiukaitytė-Grojzdek, Brett Pomeroy, Miha Grilc*

[1]Department of Catalysis and Chemical Reaction Engineering, National Institute of Chemistry, Hajdrihova 19, SI-1001 Ljubljana, Slovenia.

Engineering Bio-based Monomer Materials by Catalysis

Biomass, marine and especially lignocellulosic, has a high potential to be converted into the various value-added chemicals. Cellulose is a polysaccharide that can be hydrolzed into its monomers, i.e., glucose molecules. A very promising upgrading pathway targets the important polymer precursor adipic acid. Glucose is first oxidatively converted into aldaric acids, e.g. mucic acid, and subsequently fully dehydroxylated over supported Re catalysts. Combining dehydroxylation and Pt-catalyzed hydrogenation in a one-pot process, bio-based adipic acid is directly accessible. Alternatively, glucose can also be dehydrated to 5-hydroxymethylfurfural (5-HMF), a highly versatile bio-based platform chemical for bio-polymer and biofuel production. The diols 2,5-bishydroxymethalfuran (BHMF), and 2,5-bishydroxymethyltetrahydrofuran (BHMTF), and the triol, 12,6-hexanetriol (1,2,6-HT) are of particular interest. Catalytic hydrotreatment of 5-HMF has then been recognized as an effective conversion route to obtain these value-added chemicals from 5-HMF using nickel-based catalysts and high hydrogen pressures. Lignin is a natural polymer composed of aromatic monomeric units representing a renewable source for chemical production considering its aromatic, highly-functionalized structure and abundancy. Reductive depolymerisation is a promising method to convert lignin to aromatic monomers and oligomers. Thus, by mimicking the functional properties of the conventional toxic reactants (phenol, BPA) depolymerized products are successfully applied as green functional substitutes in polymers formulations. Additionally, the DES-based crustacean waste biorefinery approach into calcium carbonate, proteins, chitin and astaxanthin, which is the pigment responsible for the orange to redish coloration of crustaceans, will be presented.

Biography

Prof. Blaž Likozar is head of the department of Catalysis and Chemical Reaction Engineering, National Institute of Chemistry, programme head, project head, *etc*. Background: PhD in chemical engineering (2008); post-doc in Austria and USA. The participation in EU/projects: the PI in 15 H2020, 2 ERA-NET, & 5 ERDF projects, *etc*. Other useful information: >200 peer-reviewed research documents, > 5000 citations, and the *h*-index of 36; SusChem, EERA Bioenergy, EFCE Chemical Reaction Engineering Working Party, EFCE Energy Section & NATO ET/SET member; SRIP CE vice-chair; an editor, reviewer and author.

SciWide
WEBINARS

KEYNOTE FORUM

DAY 2

POLYMER SCIENCE AND COMPOSITE MATERIALS
VIRTUAL

JUNE

17-18, 2022

GMT 07:00 – 12:00

V-PSCM2022

Mansoor Zoveidavianpoor

[1]Petroleum Engineering Program, School of Chemical & Energy Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, Johor, Malaysia.

High-Strength Ultra-Lightweight Composite Proppant

This study is on the experimental characterization of a chemically modified and reinforced composite proppant (CMRCP) made from renewable resources. The CMRCP is mostly made of an organic substrate or any other nutshell that is reinforced with a natural fibre and has a resin or phenolic coating on the outside. Microscopic Characterization (FESEM and SEM) and XRD were used to look at the CMRCP's microstructure and its parts for characterization, and Thermo Gravimetric Analysis (TGA) was used to figure out the range of temperature degradation. Roundness and sphericity, specific gravity, bulk density, turbidity, crush resistance, and fracture conductivity were investigated in detail. Physical test results are compared to those of other proppants, and the fracture conductivity is compared to the well-known proppant made from walnut hulls (i.e., ULW-1.25). The results show that the CMRCP can handle much more pressure than its counterpart product.

Biography

Dr. Mansoor Zoveidavianpoor has completed his PhD from Universiti Teknologi Malaysia (UTM) in 2013. Currently, he is an associate professor in petroleum engineering at UTM. He has published more than 40 papers in reputed journals. He has 22 years of industry, academic, and research experience working on multidisciplinary projects in oil and gas and energy transition,

Mohd Hasmizam Razali

[1]Faculty of Science and Marine Environment, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia.

TiO_2 Bio-nanocomposite For Biomedical Application

The synthesized titanium dioxide nanostructures (TiO_2-NS) were emerged as wound healing enhancer as well as exhibited significant wound healing activity on Sprague Dawley rats. In our present study, different type of TiO_2-NS bio-nanocomposite film was characterised by fourier transform infrared (FTIR) x-ray diffraction (XRD), scanning electron microscopy (SEM), thermogravimetric analysis, atomic force microscopy (AFM). The morphology of TiO_2-NS was investigated using transmission electron microscopy (TEM). The mechanical properties study shows that the GG+ TiO_2 nanotubes bio-nanocomposite film possessed the highest tensile strength and young modulus which are (4.56±0.15) MPa and (68±1.63) MPa, respectively. GG+ TiO_2 nanotubes also displays the highest antibacterial activity with (16±0.06) mm, (16±0.06) mm, (14±0.06) mm, and (12±0.25) mm inhibition zone was recorded against *Staphylococcus aureus*, *Streptococcus*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The prepared bio-nanocomposite films have good biocompatibility against 3T3 mouse fibroblast cells and caused an accelerated healing of open excision type wounds on Sprague Dawley rat model. The synergistic effects of bio-nanocomposite film like good swelling and WVTR properties, excellent hydrophilic nature, biocompatibility, wound appearance, and wound closure rate through *in vivo* test makes it a suitable candidate for wound healing applications.

Biography

Mohd Hasmizam Razali has a PhD degree in Materials Engineering (Nanomaterials) from Universiti Sains Malaysia (USM) MSc. in Chemistry (Catalyst) and B.Sc (Hons) in Chemical Industry from Universiti Teknologi Malaysia (UTM). Currently he is a Assoc. Prof. at Faculty of Sciences and Marine Environment, Universiti Malaysia Terengganu (UMT), Malaysia. He has published more than 70 technical papers in journals and conference proceedings locally and internationally related to the functional nanomaterials research. Owing to their significant impacts to the science, economy and society, his innovative research and inventions have attracted global and national interests, enabling him to secure financial support from both private and government agencies.

Chavee Laomeephol[1,2], Sirikool Thamnium[2], Tisana Kaewruethai[3] and Jittima Amie Luckanagul[1,2*]

[1]Biomaterial Engineering for Medical and Health Research Unit, Chulalongkorn University, Bangkok, Thailand.
[2]Department of Pharmaceutics and Industrial Pharmacy, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand.
[3]Department of Biochemistry and Microbiology, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand.

Modified Hyaluronic Acid as Delivery Platform

Functionalized hyaluronic acids (f-HAs) were developed as materials forming hydrogels for macrogels and nanogels used in delivering therapeutics. The polymer modification was optimized with the drug-materials interaction confirmed. Methacrylated HA macrogels were tested for tissue regenerations, such as, chondrogenesis and osteogenesis, *in vitro* and *in vivo*. Nanogels was designed to overcome the difficulties in drug bioavailability. f-HA nanogel presented the distinct drug encapsulation at 87.84% and drug release under 37°C indicating controlled delivery potential. The nanogels were assessed biocompatible. There were many types of cargos tested in our group for various platforms based on f-HA. As an example, the nanogels loaded with curcumin, one of the most interesting hydrophobic natural molecules, further promoted cell growth showing the potential wound healing activity. The aqueous stability of the cargos (e.g., fibroblast growth factor, cannabinoids (CBD), asiatic acid, curcumin, etc.) was significantly increased when incorporated in the nanogels. Furthermore, the cellular internalization of loaded nanogel was investigated. The studies showed enhanced efficacy of bioactive molecules after loaded with nanogels. Lastly, we tested the delivery system for gene delivery in cancer immunotherapy.

Biography

Jittima Amie Luckanagul has completed her PhD from University of South Carolina, USA in Biochemistry. She is the Vice Dean of the Faculty of Pharmaceutical Sciences, Chulalongkorn University, the topnotch university in Thailand. Apart from her academic specialization, she has extensive experience working with nanomaterials for biomedical uses and system/material analyses, through a spin-off company in the U.S. and Thailand. She is a president of club Chula spin-off at Chulalongkorn University. She has published more than 30 papers in reputed journals and has been serving as an editorial board member of Scopus™ indexed jounal.

Noorfatimah Yahaya*, Muhammad Nur' Hafiz Rozaini, Nadhiratul-farihin Semail

[1]Department of Toxicology, Advanced Medical and Dental Institute, Universiti Sains Malaysia, Bertam,13200 Kepala Batas, Penang, Malaysia.

Molecularly imprinted silica gel incorporated with agarose polymer matrix as mixed matrix membrane for separation and preconcentration of sulfonamide antibiotics in water samples

Molecularly imprinted silica gel (MISG) was incorporated through dispersion in the agarose polymer matrix to form a mixed matrix membrane (MMM) and was applied for the determination of three sulfonamide antibiotic compounds (i.e., sulfamethoxazole (SMX), sulfamonomethoxine (SMM), and sulfadiazine (SDZ)) from environmental water samples. Several important microextraction conditions, such as type of desorption solvent, extraction time, amount of sorbent, sample volume, pH, and effect of desorption time, were comprehensively optimized. Preconcentration factors of ≥ 20 were achieved by the extraction of 12.5 mL of water samples using the developed method. This microextraction-HPLC method demonstrated good linearity (1–500 μg/L) with a coefficient of determination (R^2) of 0.9959–0.9999, low limits of detection (0.06–0.17 μg/L), and limits of quantification (0.20–0.56 μg/L), good analyte recoveries (80–96%), and acceptable relative standard deviations (< 10%) under the optimized conditions. The method is systematically compared to those reported in the literature.

Biography

Noorfatimah Yahaya is a senior lecturer at the Department of Toxicology, Advanced Medical and Dental Institute, Universiti Sains Malaysia. She obtained her PhD from Universiti Teknologi Malaysia, Malaysia, and postdoctoral studies from University of British Columbia, Canada. She has published 88 journals and has been serving as an editorial board member of Malaysian Journal of Analytical Sciences. Her research interests are in the area of analytical chemistry separation science, specifically involving the development of green extraction technology, chromatography and capillary electrophoresis, micro-solid phase extraction, food chemistry, and trace chemical analysis.

Prem Lata Meena

[1]Department of Polymer Science, Bhaskaracharya College of Applied Sciences, University of Delhi, Delhi, India.

Preparation, Characterization and Biodegradation of Biodegradable Polymeric film

Food plays vital role for an individual's survival. Harvesting food is a challenge but keeping it fresh is a bigger challenge. Food is a perishable substance that can degrade after some days if not kept in proper conditions. Here, packaging comes into the picture it keeps the food fresh for long time but disposing it becomes the major problem. So, many researchers are looking for the films which strength as well as can be degraded easily. Natural Polymers can be blended with synthetic polymers so as to make it less biodegradable and give it the desired mechanical strength and barrier property. One such example is the case of Cellulose which is a natural polymer but as per requirement, it can be tailored via various chemical routes. This work focusses on the development of a biodegradable polymeric film which can meet the properties of packaging material but also proves healthy to the environment by exhibiting biodegradability. A blend of Cellulose Acetate (CA), Gelatin (G) and Polyethylene Glycol (PEG) was prepared. Biodegradable polymeric film has been developed which fulfils all the required properties of food packaging material and proves healthy to the environment by exhibiting biodegradable properties simultaneously.

Biography

Dr. Prem Lata Meena is working as Assistant Professor in the Department of Polymer Science at Bhaskaracharya College of Applied Sciences, University of Delhi, New Delhi. She obtained her Ph.D. in Chemistry from Delhi University. Dr. Meena has more than 8 years of research and teaching experience in the field of chemistry and has specialisation in Polymer Science. She published several research papers and book chapters in National and International journals. She has also been Awarded in the Innovation Project in University of Delhi and also received best paper awards in International Conferences.

Exiquio Maldonado Vidaurri

Biological Science Faculty, UANL, Monterrey, Nuevo León, México.

Perspectives In Polymer Applications

Polymers are one of the greatest fields of scientific advance today. The applications in medicine, advanced material, detection and signaling make polymers especially interesting. In advanced materials the presence of polymers is giving to those materials more resistance and characteristics for space research. In signaling, they can detect and identify different textures in surfaces, giving us a better idea about the work or detection for work. In medicine we have some advances and applications in treatments, like those in cancer or infectious diseases. It is possible to direct and protect the drugs inside polymers. We can also mark them by using antibodies, which gives them a specificity to detect and to stick into particular cells or tissues. In this application is possible to protect the body from side effects caused by aggressive drugs. Slow release of medicines is a different application, improving life quality for people with necessity of taking many medicines every day. The slow release could give them the possibility of taking one dose every several days or even weeks instead of three doses every day, which is the normal today. Polymers are changing perspectives in different science fields; the continuous research on them will improve the applications in the near future.

Biography

Dr Maldonado has completed his doctorate from Autonomous University of Nuevo Leon, Mexico. He is teacher and researcher of the university. He has published 1 paper and 2 research in the polymers and biopolymers fields in reputed journals and has been serving as an evaluator for different thesis works.