V-PSCM22

2ND EDITION OF POLYMER SCIENCE AND COMPOSITE MATERIALS VIRTUAL

November 11-12, 2022

virtual CONFERENCE

Contact us:

Contact: +91 9440424355

E-mail: v-pscm22@sciwideonline.com

Website: https://sciwideonline.com/v-pscm22/

KEYNOTE PRESENTATIONS

Freeda A. Amir[1*], Habibah Ghazali[2], A. R Othman[3], Lin Ye[4] and L. K. Moey[5]

[1*]Centre of Advanced Materials and Intelligent Manufacturing, Faculty of Engineering, Built Environment & IT, SEGi University, Petaling Jaya, Selangor, Malaysia.
[2]School of Mechanical Engineering, Universiti Teknologi Malaysia, Skudai, Johor, Malaysia.
[3]Mechanical Engineering Department, Universiti Teknologi PETRONAS, Seri Iskandar, Perak, Malaysia.
[4]Jiangsu Industrial Technology Research Institute, Research Institute of Advanced Composite Forming Technology and Equipment, Wuxi, Jiangsu, China.
[5]Centre of Modelling and Simulation, Faculty of Engineering, Built Environment & IT, SEGi University, Petaling Jaya, Selangor, Malaysia.

Quality Assessment and Integrity of Circular Drilled-Holes in CFRP Laminates

Introducing circular holes in carbon-fibre-reinforced polymer (CFRP) laminates by drilling is a typical process involved in the assembly of composite aircraft parts. It is a complex process, owing to the heterogeneity of materials and the processing configuration, and to the fact that reinforcements and debris are very abrasive. As CFRP laminates are prone to drilling-induced damage in the form of delamination and edge chipping, a conventional twist drill is no longer conclusive as different configurations of drill bits have been developed for practical use. In this study, the drilling performance and integrity of circular holes in CFRP laminates to assemble a flat panel of a commercial aircraft were investigated. The analyses were focused on three different bit configurations of dagger drill, drill reamer, and twist carbide drill, employing drilling speeds at 500, 1000, and 2000 rpm with different backing supports. Quantification of output responses, including thrust force and torque were measured. Assessment of the quality and integrity of holes was accomplished by evaluating surface roughness, heat distribution, roundness, chip size, and damage factor defining delamination at the hole edge, providing some guidelines for optimization of machining parameters for introducing circular holes in practical operation.

Biography

Freeda Amir has completed her PhD in Mechanical Engineering from The University of Sydney, Australia and early education in Malaysia for her Bachelor's Degree in Aerospace Engineering. Her major research interests are in the areas of composites science and technology, smart materials and structures, nano-materials and nano-composites, structural integrity and durability. Currently also working with Jiangsu Industrial Technology Research Institute in Wuxi, Jiangsu China as an engineering consultant.

Jörg Imberger
UCL, Australia.

Human Extinction: Inevitable Or Avoidable

The scientific literature in the social science area is generally very pessimistic about the prospect for human survival. This pessimism is based on the fact that modern technology is severing the parallel, direct connections between people and between people and nature, that are based on our five senses of sight, hearing, smell, taste and touch. Technology is rapidly replacing these senses in a way, that most of us now see and experience the world through the internet, which is a simple series data stream, a change that evolution has not prepared us for. Psychologist have shown that this impersonal way of "communication" is leading to a huge increase in mental illness and drug use and is negatively disrupting our decision-making processes. All these factors contribute to a lifestyle that is becoming increasingly more unstable and is reducing humankind's ability to solve even basic day to day problems. This is happening at a time when the rate of human impact on our planetary resources is becoming too rapid and too extensive to be easily managed. Combined, these two trends are leading to the "Perfect Storm" that is brewing for mankind. By way of example, engineers design plastic containers with a single objective, to contain substances. The externality of plastics is death of the oceans. Consequently, if we want to survive, humans need to learn and implement, a new way of living! Banning access to the internet is the first thing that comes to mind. However, this type of prohibition is a form of dictatorship that, in the age of technology, easily leads to uncontrolled anger and violence within the population affected! While this is a scenario that logically should be avoided, the frightening thing is that violence already seems to be on the rise throughout society and is a major factor in sociologists predicting the demise of mankind within the next 30 to 50 years.

To find a solution, as with all problems, the first step is to acknowledge that there is a problem. Second, we must use existing technologies to confront humans with the "externalities" of their actions. Third, we must use this new awareness to get humans to accept that non sustainable behaviour is simply a result of the wrong upbringing wiring the brain in a detrimental way and to show the public that education is much cheaper than enforcement. Fourth, we need to change the political system and the media, back to one of hope and optimism, by using engineering to providing solutions, so that people wake up in the morning feeling good about their world.

Biography

Jörg received his PhD from UCB at 28 years of age and became Australia's youngest full professor at 35. His research interests are in environmental engineering as applied to rivers, lakes, estuaries and coastal seas. Recent foci also include strategies for sustaining functionality of aquatic systems in a changing world. He is a Fellow of 10 International Academies and the recipient of 30 major honours including the Onassis International Prize, the Stockholm Water Prize and Member of the Order of Australia. He has published 5 books, with two in preparation, contributed to 19 books and has published 275 journals papers. Google Scholar credits him with 21,439 citations and an h-Index of 67.

Sahrim Ahmad, Nur Adilah Abu Hassan and Ruey Shan Chen

School of Applied Physics Faculty of Science and Technology Universiti Kebangsaan Malaysia 43650 UKM, Bangi,Selangor, Malaysia.

PLA/recycled HDPE blend Biocomposite Foams reinforced with Kenaf Fibre

This research aims to study the effect of blend composition and compatibilizer and the effect of blend matrix ratio and foaming agent loading on morphology, mechanical and thermal properties of poly(lactic) acid/recycled high-density polyethylene (PLA/rHDPE) polymer blend and PLA/rHDPE/kenaf fibre composite foams, respectively. The two systems, which are binary blend of PLA and rHDPE with different weight percentage of 90/10, 70/30 and 50/50 (wt/wt) %, and ternary blend of kenaf fibre biocomposites foamed with various (1-5 phr) azodicarbonamide (ADC) loadings, were prepared by melt-mixing method. Results revealed that (90/10) and (70/30) (wt/wt) % compatibilized blends of PLA/rHDPE shown an improvement in flexural and impact properties and supported by FESEM micrographs as compared to the neat PLA and rHDPE. The ((70/30)/30) ((wt/wt)/wt) % composites exhibited a notable density reduction at 5 phr of ADC up to 8%. The mechanical properties showed an increment trend up to 7 – 23%. This results shows that the ((70/30)/30) ((wt/wt)/wt) % PLA/rHDPE/kenaf fibre foamed composites appeared as more suitable blending composition with the production of uniform porous structured bio-composite foams which having lower density and higher mechanical strength

Biography

Professor Dr Sahrim Ahmad obtained his PhD from University of Loughborough, United Kingdom in 1988. He is an expert in the field of polymer , composites, magnetic materials, nanocomposites and advanced materials. He has completed more than 53 research projects and consultancy work as a leader and co-researcher. His work on novel radar absorbing materials (RAM) subjected to transverse electromagnetic (TEM) has been successfully developed. His team managed to produce products that offered proper characteristics for handling, flexibility and lightweight, meeting requirement for various applications. He has published more than 250 papers in various journals and supervised more than 60 PhD students. Dr Sahrim was former Dean of Faculty Science of Technology and Editor In Chief of Journal Sains Malaysiana (ISI/WOS). Currently he is the Fellow Academy of Science Malaysia. Fellow Academy Profeesor Malaysia and Fellow of Malaysia Solid Science Society.

[1]Chi-Ping Li

[1]Department of Chemical Engineering, Department of Chemical Engineering, National United University, Miaoli City, Taiwan.

Deposition of Composite Polymer Films for Electrochromic Glass Using Ultrasonic Spray Deposition

In this research, ultrasonic spray deposition (USD) technology was used, with polymethyl methacrylate (PMMA) as the matrix, dimethyl carbonate (DMC) as the solvent, and silicon dioxide as the second phase to prepare nanocomposite polymer electrolyte membranes. The annealing procedure improves the uniformity and transmittance of the film. Due to the aggregation of silica nanoparticles, the addition of silica reduces the transmission of the electrolyte membrane. However, the addition of the surfactant cetyltrimethylammonium bromide (CTAB) disperses the silica nanoparticles and returns the optical transmittance of the nanocomposite polymer electrolyte membrane to about 90%. The hardness and elastic modulus of our nanocomposite polymer electrolyte membrane are better than commercial materials.

Biography

Dr. Chi-Ping Li received his PhD of Materials Science from Colorado School of Mines in 2014 and followed by postdoctoral research in National Renewable Energy Laboratory (NREL, USA) in 2015. He joined Department of Chemical Engineering in National United University in Taiwan as an assistant professor in 2018. His research interests are mainly focused on synthesis of nanostructured films, nanocomposite films and nanoparticles. Those materials are used in electrochromic windows, lithium batteries, organic photovoltaics and LED encapsulants. His goal is to overcome the challenges and produce great but low cost materials in the fields of green and renewable energy.

Noor Najmi Bonnia[1] Nor Dalila Nor Affandi[2]

[1]Materials Science and Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, Malaysia.
[2]Textile Research Group, Faculty of Applied Sciences, Universiti Teknologi MARA, Malaysia.

Elucidation of structural and antibacterial properties of regenerated carbon of waste tire Graphene Oxide incorporated Polypropylene as filter materials

This project focuses on incorporating graphene oxide (GO) on Polypropylene fabric as a filter sheet material. The graphene oxide coating repels dust and is effective against airborne particles of less than 2.5 microns in diameter. PP melt-blown cloth was employed for the basic medical masks due to its non-absorbent qualities. The objective is to study the conversion efficiency of regenerate carbon black (rCB) from waste tire to GO by using Hummer's method. Then, produced GO was spread into a layer of Polypropylene fabric by using the sonication method. The Raman analysis peak confirmed the effective synthesis of GO from a waste carbon tyre, with the value of the D band peak at ~1372cm-1 and ~1583cm-1 respectively. The intensity of GO, (ID/IG) is 0.72 representing a few layers of GO produced. FESEM images of coated PP sample show that GO adhered well to the fabric fibers and demonstrated superior air and water permeability when compared to the control PP fabric. EDX results show that Carbon (C) has a higher elemental content than oxygen (O), indicating that graphene oxide has a favored composition. This result established that graphene oxide might be employed as a filler to enhance the filterability of PP fabric. The antibacterial analysis has proven that GO recycle waste tyre have good antibacterial properties to gram-positive and negative bacteria. This superb product from green technology is environmentally friendly and has new antibacterial technology materials that will benefit people in fighting any airborne diseases.

Biography

Noor Najmi has completed his PhD from Universiti Kebangsaan Malaysia, Malaysia She is the Assoc Prof at Faculty of Applied Sciences Universiti Teknologi MARA, Malaysia. She has published more than 50 papers in reputed journals and has been serving as a Chief Editor for Scientific Research Journal from 2020 -2022. She was awarded many research grants, international and national and also active join research exhibitions, and recently was awarded GOLD MEDAL at ITEX2021, SILVER RISE 2021, IIDEX UiTM 2020, and copyright "Akta Hak Cipta 1987" under registration number CRLY00026350.

Abu Bakar Sulong[1,*], Izdihar Tharizi[2], Che Hassan Che Haron[1], Norhamidi Muhammad[1]

[1]Department of Mechanical & Manufacturing Engineering, Faculty of Engineering & Built Environment, Universiti Kebangsaan Malaysia, Bandar Baru Bangi, Selangor, Malaysia.
[2]Faculty of Engineering, Universiti Teknologi MARA, Shah Alam, Selangor, Malaysia.

Hot Pressing Process of Unidirectional Kenaf Reinforced Polylactic-Acid Composites

The use of green composites from fully biodegradable materials is gaining more attention in the automotive sector. These changes are due to environmental issues and strict end-of-life vehicle (ELV) regulations by the European Commission. However, the properties of green composites for automotive components has not yet been fully explored such as the resistance to moisture and changes in ambient temperature. In addition, the difficulty of producing optimum and consistent green composites encourages researchers to use optimization techniques in processing. Thus, the main objective of this study is to produce a green composite consisting of polylactic-acid (PLA) reinforced unidirectional kenaf fibre (PLA/UD kenaf) and to characterize the mechanical, physical and thermal properties of the composite. In addition, the effects of fiber orientation, temperature and humidity changes on the mechanical properties of PLA/UD kenaf composites were studied and the optimization of thermoforming parameters for composites was also carried out using simulations. Preparation and characterizations of the composite was done and hot-press process was used to fabricate the composite. Simulation of thermoforming was done by PAM-FORM software to analyze the formability of the composite. In conclusion, PLA/UD kenaf composite with good mechanical properties and comparable to other synthetic-based materials have been successfully produced. The contribution of this study may provide some insight that this new green composites of PLA/UD kenaf has a huge potential to becoming a substitute for sustainable automotive components.

Biography

Abu Bakar Sulong is Professor at the Dept. of Mechanical and Manufacturing Engineering, University Kebangsaan Malaysia (UKM). Currently, he served as Deputy Director at Centre for Research and Instrumentation (CRIM). His specializations are in the area of Advanced Polymer Composite and Metal/Ceramic Injection Moulding (Powder Metallurgy). He had been awarded as 2021 Top Research Scientist Malaysia (TRSM) by Academy of Sciences Malaysia (ASM). Based on Scopus data on August 2022, he has 4371 citation, 35 h-index with nearly 150 manuscripts in Q1 and Q2. He had been invited as keynotes, invited talks and speakers at various international and national conferences.

Silvia Tedesco
Istituto Superiore di Sanità, Italy.

Deep inside for a good fiber

Nowadays it is possible, with the help of biomedical engineering, to replace damages skin tissue by biodegradable scaffolds (ECM), above whom the new skin tissue can grew; these scaffolds can then sustain and drive the fibers in their formation and degrade in the time when their help is no more necessary.
One of the more common used modern techniques is electrospinning, which ejects electrostatically a polymer solution toward a collector, where the fiber should be formed.

It is known that bad solutions could give only beads or a beaded fiber, so many efforts have been made to improve solutions properties (and also mechanical factors in the instrumental apparatus) to obtain a good fiber.

A lot of works and efforts are often made walking step by step, by experimental attempts.

This work wants to go deep inside the polymer solution, in the basic microscopic characteristics and behaviors present at the molecular level (specially about the polymeric chain and chain entanglements), which can be crucial for the macroscopic aspects of the material.

The aim is to optimize the project of a good fiber behind and before trials, but also to better understand or discover some crucial property interesting and useful to other and wider scopes.

Biography

Silvia Tedesco have been graduated in solid state physics at “La Sapienza“ University of Rome. She worked in the electronical department of engineering faculty of Rome in numerical calculations, to optimize parameters for last generation transistors, with the help of genetic algorithms. After that she worked in the National Institute of Health (ISS) in Rome, in a biomedical engineering department, in the field of smart materials and nanomaterials applied to medical devices, and in the field of tissue engineering, studying properties of polymers solutions to optimize fiber scaffolds for the electrospinning technique.

Ernnie Illyani Basri[1], Adi Azriff Basri[1,2*], Sarveshwaaran Balakrishnan[1], Mohammed Thariq Haji Hameed Sultan[1,2], Kamarul Arifin Ahmad[1,2]

[1]Department of Aerospace Engineering, Faculty of Engineering, Universiti Putra Malaysia (UPM), 43400, Selangor, Serdang Darul Ehsan, Malaysia.
[2]Aerospace Malaysian Research Center (AMRC), Universiti Putra Malaysia, 43400, Serdang, Selangor, Malaysia.

Aerodynamic Loading-Structural Analysis on a Composite Laminates Wing Skin using Fluid Structure Interaction (FSI)

The advancement of today's technology has driven composite materials to globally use in aircraft design with its advantages of significant high strength with lightweight structure. With the aid of simulation, ANSYS, two main common problems in designing the aircraft composite wing, which is the aerodynamic loading on the wing and FE composite modelling; whereby both can be coupled to solve the mentioned problems. The paper deals with the use of Fluid Structure Interaction simulation and developed a standardized numerical approach by integrating the aerodynamic loading from fluid domain with Finite Element analysis from structural domain in the application of hybrid composite laminates of aircraft wing structure. In this study, the Computational Fluid Dynamics is conducted on the selected wing model of Selig 1223 in order to obtain the pressure loading from fluid domain prior to be transferred as an input for FE composite of structural domain. Two parametric conditions undergone the FSI simulation which involving the Composite Wing Skin without Honeycomb (CWS) and Composite Wing skin with Honeycomb (CWSwH). From the result, CWSwH produced less total deformation compared to CWS with 3.06% percentage difference. However, the shear stress and strain values of CWSwH performed higher value than CWS due to the effect of elasticity of honeycomb core. Hence, the numerical approach of FSI with the application composite material has proven to be feasible and significant of current research on the behavior of fluid flow and structural for the wing skin, which replicated the real condition of aircraft wing for take-off or cruise.

Biography

Dr. Adi Azriff Bin Basri is currently a Senior Lecturer in the Department of Aerospace Engineering, Universiti Putra Malaysia (UPM). He received his Doctoral of Philosophy (PhD) from UPM in the area of blood flow behaviour of cardiovascular disease (CVD) with the computational application of Fluid-Structure Interaction (FSI). During his PhD, he also collaborated with National Heart Institute (IJN), Malaysia and Kyushu Institute of Technology (Kyutech), Japan for numerical and experimental studies.

Tomasz Krystofiak[1], Barbara Lis[2]

[1]Department of Wood Science and Thermal Techniques, Division of Gluing and Finishing of Surface, Poznan University of Life Sciences, Poznan, Poland.
[2]Department of Wood Science and Thermal Techniques, Division of Gluing and Finishing of Surface, Poznan University of Life Sciences, Poznan, Poland.

Decorative epoxy resins for furniture industry

Epoxy resins are chemicals that have at least one epoxy group that is able to undergo polyreactions, which transform them into cross-linked, nonsoluble and non-melting plastics. Thinners, plasticizers, solvents, fillers and hardeners are used to improve the properties of resins. One interesting solution are decorative epoxy resins. In recent years, modern furniture has begun to enter the market and create public and domestic facilities using wood species combined with epoxy resin. This furniture is characterized by high resistance to water what is expected from tables, working kitchen elements and bathroom panels. An additional advantage of wood products, in which the mentioned polymer is used, is the ability to create original visual effects. Such furniture is characterized by modern and unique design.

This presentation presents the results of investigations of the composites in the wood species - decorative epoxy resin system. Photos of examples of furniture were showed.

The advantages of decorative epoxy adhesives and opportunities in the production of ecological furniture and interior design elements were presented.

Biography

Tomasz Krystofiak in 1994 was finished study of Faculty of Wood Technology at Agriculture Academy in Poznan. In 2002 he prepared a PhD dissertation and in 2019 habilitation. Author or co-author of more than 310 scientific publications in the scope of gluing and finishing of wood and wood-based composites. To his research activities belongs surface phenomena, wettability, adhesion and adherence, modification, gluability and paintability of lignocellulosic materials. He was a Management Committee Member of COST Actions FP1006, CA15216, CA 21159 and Working Group Member (FP1303, FP1407). Since 2021 Guest Editor in 8 Special Issues in Coatings, Energies, Forests, Materials.

M. Trigo-López,[1] A. Miguel-Ortega,[1,2] S. Vallejos,[1] J.M. García[1], M.A. Muñoz[1]

[1]Departamento de Química, Facultad de Ciencias, Universidad de Burgos, Plaza de Misael Bañuelos s/n, 09001 Burgos, Spain.
[2]Universidad Autónoma de Madrid, Calle Einstein 3, 28049 Madrid, Spain.

Aramids and composites as functional and improved high-performance materials

Aromatic polyamides or aramids are high-performance materials showing outstanding mechanical strength and thermal resistance combined with low density. Thus, they are used in advanced applications such as protective equipment or the aerospace industry. To expand their applications and improve their properties or processability, our current research is directed threefold: a) to provide aramids with new functionalities by introducing functional monomers; b) to lower their weight by reducing their density; and c) to improve their properties by introducing both new monomers and/or by reinforcing them with carbon or ceramic nano- or micromaterials.

The introduction of functional monomers on aramids allowed us to prepare crosslinkable materials with improved properties and inherently colored polymers, or to expand their applications as LUCOs and in molecular recognition as chromogenic sensors. To further enhance their properties, we were also able to prepare porous aramids with a controlled cellular structure with up to a 73% density reduction compared to commercial aramids, without impairing their performance, by a simple method of adding porosity promoters. We also demonstrated that the high-performance of these low-density aramids can be further improved by including carbon nanomaterials (carbon nanofibers, carbon nanotubes and graphene) or ceramic materials (such as hexagonal-boron nitride) in their formulation by achieving an effective load transfer through functionalization.

The current demand for lighter and advanced materials makes our ability to prepare *a la carte* high-performance materials and composites an ideal tool for their design and development.

Biography

Miriam Trigo-López completed her Ph.D. at the University of Burgos, Spain, receiving three different awards. She is currently a member of the Polymer Research Group of the University of Burgos, where she directs her own research after obtaining funds from the Spanish Government. She has published more than 25 papers in reputed journals, together with books, and encyclopedia and book chapters and has been serving as scientific editor of different journals. Regarding applied research, she has been co-author of 12 patents since 2011, and collaborates on projects with private enterprises in the polymers field.

Arturo Carreón-Escamilla[1], Michelle Flores-Gómez[2], Rubén González-Núñez[3], Álvaro Martínez-Gómez[3], Milton Vázquez-Lepe[1]

[1]Departamento de Ingeniería de Proyectos, 2Departamento de Estudios en Agua y Energía,
[3]Departamento de Ingeniería Química, Universidad de Guadalajara, Jalisco, México.

Composites of phenol-formaldehyde resin with agave fiber and chitosan, their XPS analysis for adsorption of Cr(VI) and As(III)

A porous material was compounded based on chitosan (Q), a phenol-formaldehyde resin (R) and agave fiber (F) for reinforcement. These composites are tested in batch adsorption systems in a packed bed system, to measure the adsorption capacity of ion metals Cr (VI) and As (III). Chitosan is a linear biopolymer, it has hydroxyl functional groups (-OH) and amino groups ($-NH_2$), capable of adsorbing free ions through chemical and electrostatic interaction.

Different proportions of agave fiber (5, 10 and 15%wt) with respect to Q/R ratios were tested to obtain flexion test such as ions adsorption. Composites were characterized to obtain morphological images, functional bounding groups, thermal properties and chemical bonding. The adsorption capacity was quantified by ultraviolet-visible spectroscopy (UV-vis) and the chemical bonding is analyzed with X-rays Photoelectron Spectroscopy (XPS). The adsorption tests were carried out at different initial concentrations (10, 20, 40, 60, 80, 100, 150) ppm. Efficiencies up to 50% adsorption were obtained. The results show that the compound presents a good adsorption capacity and these could be use in batch to remove heavy metals and a potential use for wastewater treatments.

Biography

Milton Vázquez-Lepe has completed his PhD from Universidad de Guadalajara Mexico and Université Laval in Canadá, and postdoctoral studies from Cinvestav, Mexico. He was President of the Mexican Polymer Society during 2019-2021. Dr. Milton collaborates with researchers in Spain, France, Brasil, US and Canada. He has published more than 25 papers in reputed journals about chemical surface modification on polymer composites and thin films. His actual frontier science project research involves hard XPS using synchrotron light source.

Kou Okuro

Department of Chemistry, The University of Hong Kong, Hong Kong.

Guanidinium-based Molecular Glues for Controlling Biomolecular Functions

Controlling functions of biomolecules such as proteins and nucleic acids is one of the essential subjects in the field of chemical biology and chemotherapeutics. Notably, proteins are attractive targets to control because they play central roles in most biological events including signal transduction and metabolism. To date, diverse molecules and biomaterials have been developed to control or modulate protein functions. These molecules and materials, in general, are designed to bind target proteins selectively. However, this approach is applicable only when binding motifs for a target protein are known.

To tackle this issue, we have developed a series of water-soluble polymers bearing multiple guanidinium ion (Gu^+) pendants as "molecular glues" for biomolecules. Molecular glues can tightly adhere to various biomolecules through multivalent salt-bridge interactions with oxyanions. It has been revealed that the adhesion of molecular glues to the surface of biomolecules results in blocking their interaction with other molecules. Hence, molecular glue can suppress the functions of proteins by physically inhibiting ligand-receptor interactions, enzyme-substrate binding, etc. Since the inhibition of proteins with molecular glues can be achieved without causing protein denaturation, the proteins recover their function when liberated from molecular glues. In this presentation, several types of "stimuli-responsive" molecular glues, which alter their adhesivity by external stimuli, and their application for controlling protein functions will be introduced.

Biography

Dr. Okuro has completed his Ph.D. from the University of Tokyo, Japan. He is an associate professor in the Department of Chemistry, the University of Hong Kong. He has published more than 25 papers in reputed journals and has been awarded Chemical Society Japan Award for Young Chemist.

Rizafizah Othaman[1], Nurul Amni Abdullah[2], Siti Khairunnisa Abdul Halim[3], Siti Nurzubaida Shahdan[4] and Azizah Baharum[5]

[1]Polymer Research Centre (PORCE), Faculty of Science and Technology, Universiti Kebangsaan Malaysia, UKM Bangi. Selangor, Malaysia.
[2]Faculty of Applied Sciences, Universiti Teknologi MARA, Tapah, Perak, Malaysia.
[3]Department of Chemical Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, UKM Bangi. Selangor, Malaysia.
[4]Department of Chemical Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, UKM Bangi. Selangor, Malaysia.
[5]Polymer Research Centre (PORCE), Faculty of Science and Technology, Universiti Kebangsaan Malaysia, UKM Bangi. Selangor, Malaysia.

Composite Membrane of Poly (L-Lactic Acid) and Modified Eggshell Powder for Oil and Water Separation:

Developing high-performance membrane materials is crucial for membrane technology to treat oily wastewater effectively. A novel poly (L-lactic acid)/modified eggshell particles (PLLA/MESP) composite membranes were prepared via solution blending of various compositions and subsequently fabricated using a casting knife and non-solvent induced precipitation technique. The functional groups, microstructure, morphology, and mechanical strength of the membranes were characterized by Fourier-transform infrared spectroscopy, X-ray diffraction, scanning electron microscopy, contact angle, and tension test, respectively. The spectroscopic results showed that the esterification reaction occurred by the carboxyl at the end of stearic acid combined with the hydroxyl group on the ESP surface to form calcium stearate. Surface morphology revealed that the modified ESP had formed micro- and nano-scale structures to attain hierarchical roughness, which inhibits the liquid water from wetting the particles' surface. The modified ESP was confirmed to possess a hydrophobic (WCAave ~ 119.1° ± 1°) and oleophilic surface (OCAave ~ 70.7° ± 1°). The results have shown that the MESP incorporation of 15% - 20% in the PLLA matrix is beneficial for enhancing the separation performance of the derived membranes for oily wastewater. Hence, the composite membrane material is greatly promising for theoretical study and practical application in oily wastewater treatment.

Biography

Rizafizah has completed her PhD from Tokyo Institute of Technology, Japan and currently an associate professor in Universiti Kebangsaan Malaysia (UKM). She is the head of Polymer Research Center (PORCE), a center of excellence in Faculty of Science and Technology, UKM. She has published more than 75 papers in reputed journals and has been serving as an editorial board member of repute.

Soshu Kirihara

Osaka University, Japan.

Systematic Nanoparticles Assembling with Photo Polymerizations for Stereolithographic Additive Manufacturing

In stereolithographic additive manufacturing (STL-AM), 2-D cross sections were created through photo polymerization by UV laser drawing on spread resin paste including nanoparticles, and 3-D models were sterically printed by layer lamination. The lithography system has been developed to obtain bulky ceramic components with functional geometries. An automatic collimeter was newly equipped with the laser scanner to adjust the beam diameter. Fine or coarse beams could realize high resolution or wide area drawings, respectively. As the row material of the 3-D printing, nanometer sized metal and ceramic particles were dispersed into acrylic liquid resins at about 60 % in volume fraction. These materials were mixed and deformed to obtain thixotropic slurry. The resin paste was spread on a glass substrate with 50 μm in layer thickness by a mechanically moved knife edge. An ultraviolet laser beam of 355 nm in wavelength was adjusted to 50 μm in variable diameter and scanned on the spread resin surface. Irradiation power was automatically changed for an adequate solidification depth for layer bonding. The composite precursors including nanoparticles were dewaxed and sintered in the air atmosphere. In recent investigations, ultraviolet laser lithographic additive manufacturing (UVL-AM) was newly developed as a direct forming process of fine metal or ceramic components. As an additive manufacturing technique, 2-D cross sections were created through dewaxing and sintering by UV laser drawing, and 3-D components were sterically printed by layer laminations with interlayer joining. Through computer-aided smart manufacturing, design, and evaluation (Smart MADE), practical material components were fabricated to modulate energy and material transfers in potential fields between human societies and natural environments as active contributions to Sustainable Development Goals (SDGs).

Biography

Soshu Kirihara is a doctor of engineering and a professor of Joining and Welding Research Institute (JWRI), Osaka University, Japan. In his main investigation “Materials Tectonics as Sustainable Geoengineering” for environmental modifications and resource circulations, multi-dimensional structures were successfully fabricated to modulate energy and materials flows effectively. Ceramic and metal components were fabricated directly by smart additive manufacturing, design and evaluation (Smart MADE) using high power ultraviolet laser lithography. Original stereolithography systems were developed, and new start-up company “SK-Fine” was established through academic-industrial collaboration.

Mirza Muhammad Faran Ashraf Baig

The Hong Kong University of Science and Technology, Hong Kong.

Recent Advances of Magnetic Gold Hybrids and Nanocomposites, and Their Potential Biological Applications

Magnetic gold nanoparticles (mGNP) have become a great interest of research for nanomaterial scientists because of their significant magnetic and plasmonic properties applicable in biomedical applications. Various synthetic approaches and surface modification techniques have been used for mGNP including the most common being the coprecipitation, thermal decomposition, and microemulsion methods in addition to the Brust Schiffrin technique, which involves the reduction of metal precursors in a two-phase system (water and toluene) in the presence of alkanethiol. The hybrid magnetic–plasmonic nanoparticles based on iron core and gold shell are being considered as potential theranostic agents. In this critical review, in addition to future works, we have summarized recent developments for synthesis and surface modification of mGNP with their applications in modern biomedical science such as drug and gene delivery, bioimaging, biosensing, and neuro-regeneration, neuro-degenerative and arthritic disorders. I shall discuss the techniques and biological applications of mGNP majorly based on my own research.

Keywords:

Nanohybrids, magnetic gold nanoparticles; nanocomposites; surface functionalization; core-shell nanocomposites; magnetic-plasmonic nanoparticles; biological applications

Biography

My research work mainly focuses on the construction and function of DNA nanomachines, which are cutting edge and challenging topics. I designed and constructed unique DNA molecular tension probes using a short circular DNA nanotechnology technique and functionalized these probes with fluorophores, gold nanoparticles, small molecular drugs, and peptide ligands. I achieved nano-specific precision in organizing plasmonic nanoparticles on the nano DNA frameworks to achieve plasmon resonance effects. My work on the DNA nanomachines provided an efficient mechanism of fluorescence resonance energy transfer that realizes the bio-imaging, and detection of biological events, and functions of the biomolecules. I have been working on multilayered hybrid magnetic nanoparticles for applications in nanomedicine from last two years.

John Texter

Coating Research Institute, School of Engineering, Eastern Michigan University, Ypsilanti, MI 48197, USA.
Strider Research Corporation, Rochester, NY 1410-2246, USA.

Polymerized Ionic Liquids as Stabilizers and Binders

Polymerized ionic liquids (PIL) are foundational in forming a new branch of soft materials science, and some of these new PIL-materials are finding innovative applications as thermodynamically stable nanoparticulate dispersions and as dispersing aids with tunable solubilities. They include radical chain-polymerized nanolatexes and block copolymers and condensation polymers (polyurethanes, polyureas, and polyesters) that provide biodegradability pathways for composite materials. Their materials performance features include providing thermodynamic stability to dispersions of all forms of nanocarbon and diverse high performance composite coatings.

These PIL are illustrated to be excellent stabilizers for SWCNT (single-wall carbon nanotubes), MWCNT (multiwall carbon nanotubes), hydrothermal carbon, and graphene in water. SEM (scanning electron microscopy) illustrates PIL-nanolatexes (NL) appear to bind randomly and irreversibly from suspension onto nanocarbon surfaces. Excellent aqueous dispersion stabilization is provided by strong NL binding to nanocarbon surfaces by π-overlap explained above and by very strong solubilization of imidazolium bromide (or chloride) by water. These strong binding and osmotic sphere effects have provided means to prepare the most concentrated aqueous dispersions of MWCNT (17% w/w) and graphene (6.4% w/w) reported to date via liquid-phase exfoliation in water.

Biography

John Texter is Professor Emeritus of Polymer and Coating Technology at Eastern Michigan University and Managing Consultant for Strider Research Corporation. He has been Editor-in-Chief of the *Journal of Dispersion Science and Technology*, Associate Editor of the *Journal of Nanoparticle Research*, and Section Editor for Applications of *Current Opinion in Colloid and Interface Science*. He has worked for Eastman Kodak Company in various areas of dispersion and emulsion technology and consults through Strider Research Corporation. He received his undergraduate engineering education and his PhD in Chemistry from Lehigh University, where he studied at the Zettlemoyer Center for Surface and Coatings Research. He is an experienced lecturer, inventor, editor, organizer, and technical project manager with over 250 publications including five books, 47 issued U.S. patents, and many research and review articles.

INVITED PRESENTATIONS

Helyati Abu Hassan Shaari [1,2], Muhammad Mahyiddin Ramli[3], Mohd Mustafa Al Bakri Abdullah[3], Mohd Nazim Mohtar1,[3, 4], Norizah Abdul Rahman[1], Azizan Ahmad[5], Nurul Huda Osman[3, 6] and Febdian Rusydi[7]

[1]Institute of Advanced Technology, Universiti Putra Malaysia, Serdang, Malaysia.
[2]Faculty of Applied Sciences, Universiti Teknologi MARA Perlis Branch, Arau Campus, 02600 Arau, Perlis, Malaysia.
[3]Centre of Excellence Geopolymer and Green Technology (CEGeoGTech), Universiti Malaysia Perlis (UniMAP), Perlis, Malaysia.
[4]Faculty of Engineering, Universiti Putra Malaysia, Serdang, Malaysia.
[5]School of Chemical Sciences and Food Technology, Faculty of Science and Technology, Universiti Kebang-saan Malaysia, 43600 Bangi, Selangor, Malaysia.
[6]Applied Electromagnetic Laboratory 1, Department of Physics, Faculty of Science, UniversitiPutra Malaysia, Selangor, Malaysia.
[7]Department of Physics, Faculty of Science and Technology, Universitas Airlangga, Jl. Mulyorejo, Surabaya 60115, Indonesia.

Various Polymerization Time towards Conductivity and Properties of poly(methyl methacrylate)/polyaniline (PMMA/PANi) Copolymer

The effects of various polymerization time on the properties and conductivity of poly(methyl methacrylate)/polyaniline (PMMA/PANi) copolymer has been investigated. Different polymerization times such 1 hour, 2 hours and 3 hours has been employed during free radical copolymerization of PMMA/PANi copolymer. The properties of newly synthesized PMMA/PANi copolymer were discussed with the help of Fourier transform infrared (FTIR), 1H nuclear magnetic resonance (NMR) spectroscopies, UV-Vis spectroscopy, and transmission electron microscopy. All copolymers showed electrical conductivity of a semiconductor material, compared with PMMA itself. It was found that the reaction role played a significant role, especially at optimum polymerization time where PANi formation and conductivity was at highest. Our present work demonstrates that the copolymer film would be a promising material to fabricate polymer conducting film in many electronics applications.

Biography

Dr. Ramli has completed his PhD from Advanced Technology Institute (ATI), University of Surrey, UK in Nanotechnology. He is an Associate Professor in Faculty of Electronic Engineering & Technology, Universiti Malaysia Perlis, Malaysia. He has published more than 50 papers in reputed journals and has been serving as an editorial board member of repute. His research interest including graphene oxide synthesis, gas sensor, biomedical sensor and copolymerization.

Alaa Adawy

Unit of Electron Microscopy and Nanotechnology, Institute for Scientific and Technological Resources, University of Oviedo, Oviedo, Asturias, Spain.

Resorbable Calcium Phosphates as Repository for Antimicrobial Ions

Metal phosphates represent an important category of materials with established technological and industrial applications that are still attracting special scientific interest, owing to their outstanding physical and chemical properties. Most of the conducted research regarding metal phosphates as biom-biomaterials focus on stable calcium phosphate compounds (CPCs). To date, CPCs are among the most widely studied, and thus, accepted compounds for biomaterial applications together with less famous phosphates compounds, such as magnesium phosphates. However, resorbable phases have gained particular attention in the recent years, owing to the revolution that has been encountered in this research field and the increased consideration of the bioreactivity (bio-functionality) of biomaterials side by side to their biocompatibility. Therefore, increased interest has been gained in brushite and its anhydrous form monetite that are among the most interesting resorbable CPCs that can be applied as cements and for in situ fabrication of three-dimensional (3D) implants. Therefore, the aim of the present work was to synthesize monetite and dope it with silver and zinc ions and assess their cytocompatibility and antimicrobial activity. The results confirmed the effective antimicrobial activity of silver ions, but also showed that the incorporation of zinc ions can provide a reasonable antimicrobial activity without losing much of the cytocompatibility as was the case with silver ions.

Biography

Dr. Alaa Adawy completed her PhD at Radboud University, the Netherlands and postdoctoral studies at the same University and Groningen University, the Netherlands. Currently, she is the scientist responsible for the transmission electron microscopy facilities at the University of Oviedo, Spain. She has published more than 40 papers and chapters in reputed journals and has been serving as peer reviewer for more than 20 reputed journals and has acted as guest editor for two special issues in prestigious journals. More information can be found on her biography on https://orcid.org/0000-0001-5517-6693

Chiara Di Tucci[1], Mara Di Feliciantonio[1], Flaminia Vena[1], Carmela Capone[1,] Michele Carlo Schiavi[1], Daniela Pietrangeli[1], Ludovico Muzii[1], Pierluigi Benedetti Panici[1]

Department of Gynecological, Obstetrical and Urological Sciences, "Sapienza" University of Rome, Rome, Italy.

Alpha lipoic acid in obstetrics and gynecology

Alpha-Lipoic acid (ALA) is a natural antioxidant synthetized by plants and animals, identified as a catalytic agent for oxidative decarboxylation of pyruvate and α-ketoglutarate. In this review, we analyzed the action of ALA in gynecology and obstetrics focusing in particular on neuropathic pain and and anti-inflammatory action. A comprehensive literature search was performed in PubMed and Cochrane Library for retrieving articles in English language on the antioxidant and anti-inflammatory effects of ALA in gynecological and obstetrical conditions. ALA reduces oxidative stress and insulin resistance in women with polycystic ovary syndrome (PCOS). The association of N-acetyl cysteine (NAC), alpha-lipoic acid (ALA), and bromelain (Br) is used for prevention and treatment of endometriosis. In association with omega-3 polyunsaturated fatty acids (n-3 PUFAs) with amitriptyline is used for treatment of vestibulodynia/painful bladder syndrome (VBD/PBS). A promising area of research is ALA supplementation in patients with threatened miscarriage to improve the subchorionic hematoma resorption. Furthermore, ALA could be used in prevention of diabetic embryopathy and premature rupture of fetal membranes induced by inflamation. In conclusion, ALA can be safely used for treatment of neuropatic pain and as a dietary support during pregnancy.

Biography

Chiara Di Tucci,MD completed her residency in Obstetrics and Gynecology at “Sapienza” University of Rome, Italy. She obtained PhD in Gynecology Oncology in 2019 at Sapienza” University of Rome. She is a practicing gynecology as medical executive in Local Health Unit of Rome. Her key areas of interest are: endometriosis, infertility and oncological gynecology. She has published more than 35 papers in reputed journals and has been serving as an editorial board member of repute.

Seongwoo Woo[1]

[1]Manufacturing Technology, Ethiopian Technical University, Ethiopia.

Reliability Design of Mechanical Systems Subjected to Repetitive Stresses

The basic reliability concepts - parametric ALT plan, failure mechanism and design, acceleration factor, and sample size equation were used in the development of a parametric accelerated life testing method to assess the reliability quantitative test specifications (RQ) of mechanical systems subjected to repetiti-repetitive stresses. Parametric ALT is a way to enhance the prediction of fatigue failure for mechanical systems subjected to repeated impact loading. It incorporates: (1) A parametric ALT plan formed on the system BX lifetime, (2) a fatigue failure and design, (3) customized ALTs with design alternatives, and (4) an assessment of whether the last design(s) of the system fulfills the objective BX lifetime. A BX life concept with a generalized life-stress model and a sample size equation are suggested. As a case study, the hinge kit system (HKS) of a door in a refrigerator was redesigned to improve its reliability. Using a force and moment balance analysis, the mechanical impact loads in closing the door of the HKS were calculated. During the first ALT, the kit housing in the HKS fractured and the oil damper leaked when the HKS failed. The faults in the design of the HKS included the weakness of the housing hinge kit and the oil sealing structure of the oil damper. In the second ALT, the hinge cover fractured due to the impact of the damper support. The material in the hinge cover in the HKS was changed from plastic to aluminum. After three rounds of parametric ALTs, the reliability of the new HKS was guaranteed to be a 10 year life with an accumulated failure rate of 1%.

Biography

Dr. Woo has a BS and MS in Mechanical Engineering, and he has obtained PhD in Mechanical Engineering from Texas A&M. He major in energy system such as HVAC and its heat transfer, optimal design and control of refrigerator, reliability design of mechanical components, and failure Analysis of thermal components in marketplace using the Non-destructive such as SEM & XRAY. Especially, he developed parametric accelerated life testing (ALT) as new reliability methodology. If there is design fault in the mechanical system that is subjected to repetitive stress, it will fail in its lifetime. Engineer should find the design faults by parametric ALT before product launches. In 1992–1997 he worked in Agency for Defense Development, Chinhae, South Korea, where he has researcher in charge of Development of Naval weapon System. In 2000-2010 he had been working as a Senior Reliability Engineer in Side-by-Side Refrigerator Division, Digital Appliance, SAMSUNG Electronics, where he focused on enhancing the life of refrigerator as using parametric the accelerating life testing. Now he is working as associate professor in Manufacturing Technology, Ethiopian Technical University.