PEERS ALLEY MEDIA

3rd Advanced Chemistry World Congress

MARCH 21-22, 2022
LONDON, UK

ADV. CHEMISTRY 2022

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PEERS ALLEY MEDIA

A CONFLUENCE OF ERUDITE AND KNOWLEDGE-SEEKER

PROGRAM-AT-A-GLANCE

ADV. CHEMISTRY 2022

DAY 1

MARCH 21, 2022

Scientific Program

08:30-09:00	**Opening Ceremony**
	Keynote Session
09:00-09:25	**Title: Multivariate optimization approach applied to natural polymers from Ceratonia siliqua L. and Moringa oleifera Lam as coagulating/flocculating agents** **Flavia Vieira da Silva-Medeiros,** *Federal University of Technology, Brazil*
09:25-09:50	**Title: Primary immune thrombocytopenia and essential thrombocythemia: Cases series** **Maria Podolak-Dawidziak,** *Wroclaw Medical University, Poland*
09:50-10:15	**Title: Present state of the Density Functional Theory studies, the spin problem, and following from quantum mechanics limits on its application** **Ilya G. Kaplan,** *National Autonomous University of Mexico, Mexico*
	Refreshment Break 10:15-10:30
	Distinguished Speaker Talks
10:30-10:50	**Title: Creating complex 3D and 5D anisotropy in phase field modeling interface energies** **Jacob L. Bair,** *Oklahoma State University, USA*
10:50-11:10	**Title: Electromotive force generated in all materials under temperature difference** **Dong-Il Song,** *Korea Meteorological Administration, South Korea*
11:10-11:30	**Title: Multi-class modeling of grain growth and delta phase dissolution kinetics of alloy 718 with in-situ HT-EBSD measurements** **Christian Gruber,** *Materials Center Leoben Forschung GmbH, Austria*
11:30-11:50	**Title: Use of metallized raw materials in electric furnace steelmaking** **Karimov Ramin Ismatbey oglu,** *Baku Steel Company LLC, Azerbaijan*

11:50-12:10	**Title: Highly efficient photoswitch in diarylethene-based single- and bi-layer molecular junctions** **Jean Christophe Lacroix,** *Université Sorbonne Paris Cité, France*
12:10-12:30	**Title: Characterization and anticancer potential of Withania somnifera fruit bioactives (a native species to Pakistan) using GC-MS, NMR and LC-MS-ESI** **QudsiaTabassam,** *University of Sargodha, Pakistan*
12:30-12:50	**Title: Electromagnetic methods for improved production of additive manufacturing materials** **Imants Kaldre,** *University of Latvia, Latvia*
12:50-13:10	**Title: Causes of celestial motion** **Dong-Il Song,** *Korea Meteorological Administration, South Korea*
Group Photo	
Lunch Break 13:10-13:40	
13:40-14:00	**Title: A novel technique for mapping material and information flow in food traceability systems** **Samantha Islam,** *University of Cambridge, UK*
14:00-14:20	**Title: Chemicals and Multiple Chemical Sensitivity (MCS)** **Andrea Cormano,** *ISDE Benevento, Italy*
14:20-14:40	**Title: Systematic review and meta-analysis on the effects of astaxanthin on human skin ageing** **Xiangyu Zhou,** *University College London, UK*
14:40-15:00	**Title: Bactericidal surfaces by biomimetics of the nanopillars on insect wings** **Richard W. van Nieuwenhoven,** *Vienna University of Technology, Austria*
15:00-15:20	**Title: Front-end investigations of the coated particles of nuclear fuel samples – Ion polishing method** **Zuzanna M. Krajewska,** *National Centre for Nuclear Research, Poland*

15:20-15:40	**Title: Novel image analysis technique for UHP hybrid nano-based fiber-reinforced concrete** **Mohammad Iqbal Khan,** *King Saud University, Saudi Arabia*
Refreshment Break 15:40-15:55	
15:55-16:15	**Title: Fabrication of pore-selectively silver-functionalized honeycomb-atterned film and its application for antibacterial activity** **Do Sung Huh,** *Inje University, South Korea*
16:15-16:35	**Title: Compact dual-band 4-MIMO Antenna elements for 5G mobile applications** **Fayad Ghawbar,** *Universiti Tun Hussein Onn Malaysia, Malaysia*
16:35-16:55	**Title: Energy and CO_2 emission assessments of alkali- activated concrete and ordinary portland cement concrete: A comparative analysis of different grades of concrete** **Ali Alsalman,** *Almaaqal University, Iraq*
16:55-17:15	**Title: The effect of cholesterol removal from milk and cream on the textural and organoleptic properties of final products** **Lukáš Kolarič,** *Institute of Food Nutrition, Slovak University of Technology, Slovakia*
17:15-17:35	**Title: Octyl-Sepharose CL-4B - lipase catalytic systems as potential biocatalysts in the kinetic resolution of (R,S)-flurbiprofen** **Natalia Kocot,** *Nicolaus Copernicus University in Torun, Poland*
Poster	**Title: Development of environmentally friendly HPLC methods for the simultaneous detection of several benzodiazepines and their applications to pharmaceuticals and human biological fluid** **Hassan M Albishri,** *King Abdulaziz University, Saudi Arabia*
Poster	**Title: Determination of endocrine disruptor Bisphenol-A leakage from different matrices of dental resin-based composite materials** **Naser Faissal Al-Tannak,** *Kuwait University, Kuwait*
E-Poster	**Title: Separation of radioactive Ni from activation products** **Fabiola Monroy-Guzmán,** *Instituto Nacional de Investigaciones Nucleares, Mexico*

E-Poster	**Title: Mesoporous tungsten oxide films for electrochromic windows** **Chi-Ping Li,** *National United University, Taiwan*
E-Poster	**Title: Pesticides: Agricultural food products, problems, chemistry** **Lydia Bondareva,** *Federal Scientific Center of Hygiene Maned After F.F. Erisman, Russia*
E-Poster	**Title: Influence of ammonia modification on ultra-pure activated carbons derived from furfuryl alcohol** **Agnieszka Kałamaga,** *West Pomeranian University of Technology, Poland*
E-Poster	**Title: Bandgap-coupled template auto-catalysis towards the growth of high-purity sp2 nanocarbons** **Jun Gao,** *Tsinghua University, China*

Panel Discussion

End of Day 1

DAY 2

MARCH 22, 2022

Scientific Program

08:30-09:00	**Opening Ceremony**

Keynote Session

09:00-09:25	**Title: Smart coatings: Degradation of priority pollutants on TiO_2 based photocatalytic materials in indoor and outdoor environments-Principles and mechanisms** **Dimitrios Kotzias,** *Institute for Health and Consumer Protection, Italy*
09:25-09:50	**Title: High sodium content P2-type cathode for high-performance sodium-ion batteries** **Ting Jin,** *Northwestern Polytechnical University, China*

Distinguished Speaker Talks

09:50-10:10	**Title: Circular polarizing filters based on chiral metasurface** **Xin He,** *Zhejiang University, China*
10:10-10:30	**Title: Hot ECAP implementation in zirconia reinforced aluminium chip matrix (Al6061) composite production** **Sami Abdo Mohammed Al-Alimi,** *Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia*
10:30-10:50	**Title: Nanoparticles as cell tracking agents in human ocular cell transplantation therapy** **David C. Mundy,** *Stanford University School of Medicine, USA*

Panel Discussion

End of Day 2

KEYNOTE PRESENTATIONS

DAY 1

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BIOGRAPHY

Flavia Vieira da Silva-Medeiros graduated, masters and doctorate in Chemical Engineering from the State University of Maringá (Brazil), the latter with an internship period at the University of Minho (Portugal). She is currently an associate professor at the Federal University of Technology - Campo Mourão Campus. She is also a dual-degree advisor at the Polytechnic Institute of Bragança and permanent professor at the Postgraduate Program in Technological Innovations and at the Professional Master in National Network in Management and Regulation of Water Resources. She has experience in Chemical Engineering and Sanitary Engineering, acting on the following topics: production of drinking water, water resources and environmental sanitation.

F.V. Silva-Medeiros

Federal University of Technology, Brazil

Multivariate optimization approach applied to natural polymers from Ceratonia siliqua L. and Moringa oleifera Lam as coagulating/flocculating agents

In this study, a multivariate 2^3 experimental design was applied to optimize the operational conditions (seed mass, salt concentration and pH) to employ Ceratonia siliqua L. (carob) and Moringa oleifera Lam (moringa) as coagulating/flocculating agents for water treatment. Currently, the coagulation stage in water treatment uses aluminium compounds, due to the characteristic reaction to natural alkalinity in raw water and for its low market value. Considering that aluminium effects on human health are not sufficiently studied to acknowledge its toxicity, and its significant environmental impacts, it is suitable for the studies to search for alternatives to be employed in the water treatment that will be distributed to human consumption. This study was carried out with raw water of high turbidity level, 83.7 NTU. The raw water collected was also characterized according to pH, colour, Total Organic Carbon (TOC), Dissolved Organic Carbon (DOC), and Dissolved Organic Matter (DOM), with values of 6.7, 178 NTU, 6.80, 2.45 and 138.58 mg/L respectively. The optimized results showed that with 2 g of seed, 0.5 mol L^{-1} of NaCl and pH 11.0 In these conditions, moringa coagulant reached 90%, 86%, 6%, 67%, and 81% for turbidity, colour, DOC, TOC, and DOM removal respectively, whereas the carob coagulant achieved 85%, 76%, 5%, 55.6%, 66.7% respectively for the same parameters' removal. Both coagulants presented lower sludge formation, 1.1 mL L^{-1} for moringa coagulant, and 1.1 mL L^{-1} for carob coagulant. The results could be considered promises and natural polymers carob and moringa can be suggested as alternatives agents in coagulation/flocculation stages for water treatment.

BIOGRAPHY

Maria Podolak-Dawidziak is a head of the Working Group on Hemostasis of the Polish Society of Haematologists and Transfusiologists (2019-); Vice President Polish Society of Internal Medicine (2008-2012); Vice-Dean Faculty of Medicine for Postgraduate Education Medical University in Wroclaw; Editor – in – Chief: Advances in Clinical and Experimental Medicine (2008-2016). His Specializations: internal medicine (1982), haematology (1995), clinical oncology (2003) Wroclaw Medical University; Faculty of Medicine; Department and Clinic of Haematology, Blood Neoplasms and Bone Marrow Transplantation.

Maria Podolak-Dawidziak

Wroclaw Medical University, Poland

Primary immune thrombocytopenia and essential thrombocythemia: Cases series

We have identified in the literature five cases of primary immune thrombocytopenic purpura (ITP) with subsequent development of essential thrombocythemia (ET). This surprising clinical condition is possible, but very rare and not easy to diagnose and manage. JAK2V617F mutation was present in three and CALR mutation in one patient. Three out of five ITP patients undergone splenectomy and had a good response. Moreover, a new case from our Department, that has not yet been published. In the 51-year-old female ITP was diagnosed in the age of 27 (1997). The normalization of platelet count has been achieved after splenectomy performed in 2004. In 2013 the diagnosis of systemic lupus erythematosus (SLE) was confirmed. At that time, her platelet count increased up to 900 G/L, and the diagnosis of ET-TN was made on the basis of bone marrow histopathological examination and WHO criteria. We have made an attempt to analyse the possible causes of the sequential appearance of ITP and ET taking into consideration the following: alteration of thrombopoietin receptor (TPO-R), the role of autoimmunity and inflammation, and cytokine modulation. A better understanding of these interactions may provide the opportunities for determination of predisposing factors and may aid in finding a new treatment modalities both for ITP and ET patients.

BIOGRAPHY

Ilya G. Kaplan was formed as a scientist in Russian Academy of Science in the famous school of acad. Lev Landau.

He is widely-known specialist in such different areas such as: analysis of foundation of quantum mechanics, e.g., fundamental Pauli Exclusion Principle; theory of photoelectron spectroscopy in -region; theory of measurement of neutrino rest mass and dependance from molecular structure of -decay source; theory of intermolecular forces; theory of superconductivity and other areas.

He is author of 10 scientific books, among them 4 monographs in English are broadly used by professors in their lectures, by academic researchers, and by graduated students in universities of many countries. His book on Intermolecular Interactions was published in Russia by "BINOM", Moscow, 2012, and in China by Chemical Industry Press, Peking, 2013.

I.G. Kaplan

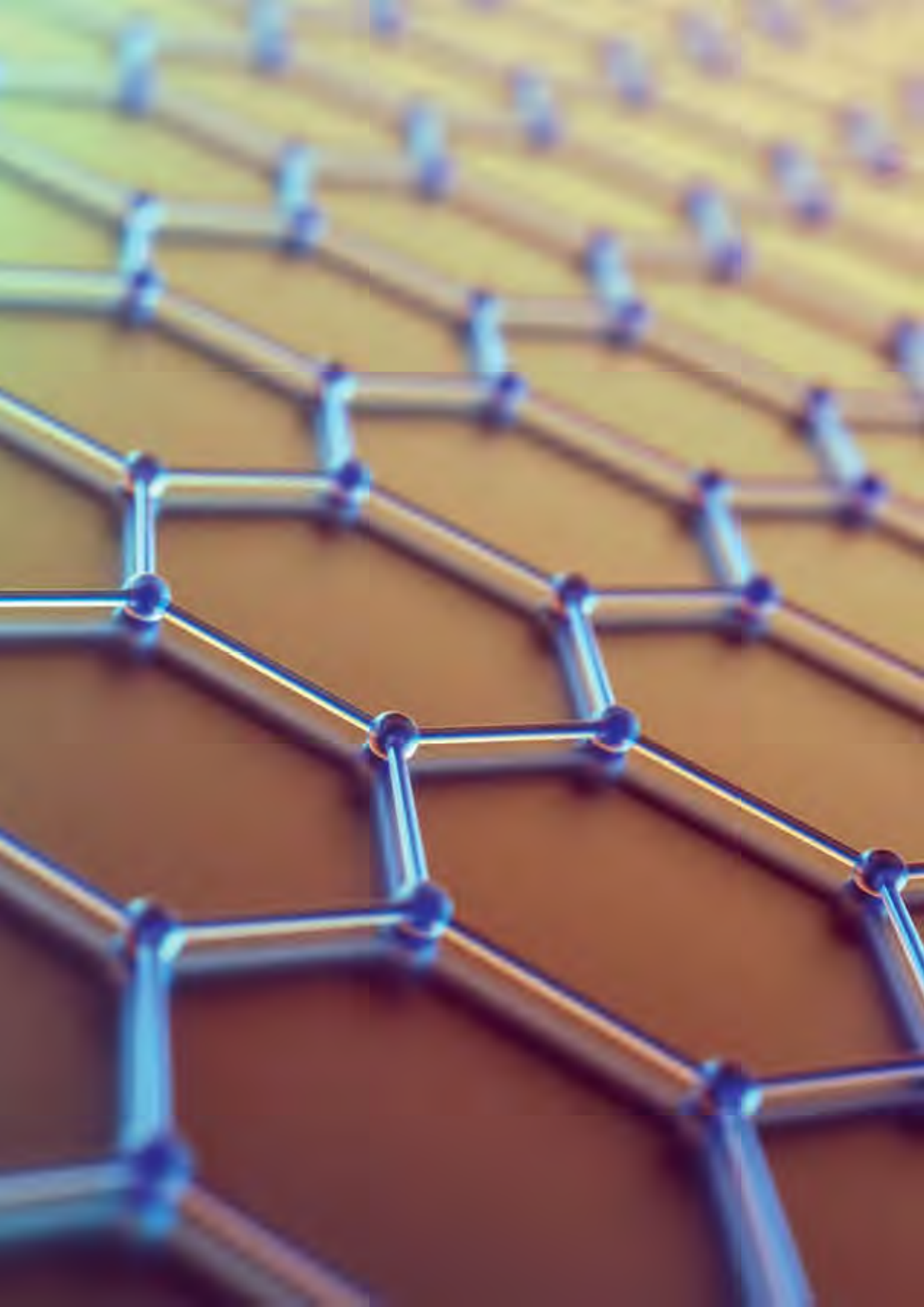
National Autonomous University of Mexico, Mexico

Present state of the density functional theory studies, the spin problem and following from quantum mechanics limits on its application

The Density Functional Theory (DFT) approach elaborated by Kohn with co-authors almost 60 years ago, at present became the most widely used method for studying molecules and solids. It can be applied to systems with million atoms, if the modern computation facilities are used. The application of the Density Functional Theory (DFT) approaches to large systems, which were not available to be studied before, induced a euphoria in the DFT community that led to using the DFT methods without an analysis of the limitations following from quantum mechanics.

In this report, I will discuss the modern state of DFT studies basing on the last publications and will consider two cases when the conventional DFT approaches, cannot be applied. As the author rigorously proved for an arbitrary N-electron state by group theoretical methods, the electron density does not depend on the total spin S of the state. From this follows that the Kohn–Sham equations have the same form for states with different S. I will present the critical survey of elaborated DFT procedure taking into account the spin and show that they modify only exchange functionals, while correlation functionals do not correspond to the spin of the state. The conception of spin in principle cannot be defined in the framework of the electron density formalism. It is the main reason of the problems arising in the study by DFT methods the magnetic properties of the transition metals. The possible way of resolving spin problems can be found in the two-particle reduced density matrix formulation of DFT. Then, I will consider the case of the degenerated states.

In the end of my report, I will present some results obtained in my studies of the Pauli Exclusion Principle (PEP), in which PEP was substantiated and also the review published recently. I will demonstrate that if PEP is not fulfilled, this leads to contradictions with the concepts of particle independence and their identity. It will be proved that the particles, described by wave functions with the permutation symmetry not allowed by PEP, may not exist. From this follows a very important conclusion: we may not expect that in future some unknown elementary particles that have not fermion or boson symmetries can be discovered.



SCIENTIFIC ABSTRACTS

DAY 1

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Creating complex 3D and 5D anisotropy in phase field modeling interface energies

J.L. Bair[1,2] and **L.C. Yeo**[1]

[1]*Oklahoma State University, USA*

[2]*Pacific Northwest National Laboratory, USA*

One of the limitations in phase field modeling historically has been a lack of ability to reproduce complex anisotropy in interface energies. Spherical Gaussians are able to produce continuous interface energies by subtracting a divot from a base value to reproduce experimentally or computationally calculated minima. The method is described for more simple 3D anisotropies, as would be seen in dendritic solidification, then is expanded to accurately reproduce 5D grain boundary energies to model polycrystalline grain growth (GG). In the 3D case, a base value is selected for a given system based on atomistic simulations or experimental data. Minima in energy are found with their corresponding directions, then a spherical Gaussian is subtracted out at each minimum direction to produce the desired total interface energy. In 5D quaternions, assigned to individual grains as orientations and as misorientations for grain boundaries, conduct the ongoing mesoscale changes. A 5D space scanning generates meaningful grain boundaries; input into the continuous function developed by Bulatov et al. to calculate grain boundary energy (GBE); which local minima are used in the phase field model. The methodology involves using 2D Gaussian switches, which match the misorientation between grains with misorientations for the GBE minima. Accounting a threshold range for the minimas, the switch activates a Spherical Gaussian to set the GBE to the desired value; creating in combination a full 5D GBE space. Multiphysics Object Oriented Simulation Environment (MOOSE), where reduced order parameters still retain individual grain identification useful for individually assigned quaternions, is used for implementation; with validation performed through bicrystal simulations of known outcomes.

Biography

Jacob L. Bair was raised on a farm near Ephrata, WA. He earned a B.S. degree in Mechanical Engineering with a second major in French from Washington State University in December of 2012, then his Ph.D. in Materials Science and Engineering from Missouri University of Science and Technology in December of 2016. His research has been on experimental and computational studies of the microstructural evolution of materials using scanning electron microscopy with Electron Backscatter Diffraction, Phase Field Modeling, and Molecular Dynamics. Topics he has researched include hydrides in Zr fuel rod claddings, grain boundary migration in face centered cubic materials, twinning in nickel, phase field modeling of UC formation in a liquid U melt, and Pu Oxalate precipitation. He joined the faculty of the Mechanical and Aerospace Engineering Department at Oklahoma State University in August of 2020 and currently serves there as an Assistant Professor.

Electromotive force generated in all materials under temperature difference

Dong-Il Song

Korea Meteorological Administration, South Korea

In this research, we investigate the thermoelectric effects of general materials.

An electromotive force was generated in all 17 types of materials, such as soil, when the temperature difference was tested.

The results of this showed that an electromotive force was generated under a temperature difference between two points in materials. As no material has infinite electric resistance, an electromotive force is expected to be generated under a temperature difference in all materials. In conclusion, the thermoelectric effect generates an electromotive force.

This electromotive force causes an electric current to flow, thereby generating a magnetic field (Framing's left-hand rule).

Such a thermoelectric effect of material explains The induction of static electricity by friction, The generation of geomagnetic fields, The electromotive force of lightning, The Earth's rotation and celestial rotation, The generation of sunspots, The reverse rotation of planets, The release of electromotive force through spark discharges in volcano eruptions, The generation of electromotive force through spark discharge in nuclear explosions and creates an ionosphere that reflects radio waves.

Biography

Dong-Il Song was born in Korea. He worked for the Korea Meteorological Administration for 33 years. At the Korea Meteorological Administration, He worked at the Meteorological Communication Center (deputy director), the information operation department head of the Gwangju Regional Office of Meteorology, Jeju High-rise Radar Weather Station (Chief), and Pohang Weather Station (Chief). And now he retired from the Korea Meteorological Administration.

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Multi-class modeling of grain growth and delta phase dissolution kinetics of alloy 718 with in-situ HT-EBSD measurements

C. Gruber[1,2], P. Raninger[1], W. Costin[1], A. Stanojevic[2], E. Kozeschnik[3] and **M. Stockinger[4]**

[1]*Materials Center Leoben Forschung GmbH, Austria*

[2]*Voestalpine BÖHLER Aerospace GmbH & Co KG, Austria*

[3]*TU Wien, Austria*

[4]*University of Leoben, Austria*

In the aerospace industry, the microstructure evolution of alloy 718 during forging and heat treatment and the resulting mechanical properties are decisive in view of the high quality requirements of aircraft components. During thermo mechanical processing, the temperature control and adiabatic heating leads to grain growth and, if δ-solvus temperature is exceeded, to the dissolution of the δ-phase, which further results in accelerated grain growth. To describe the history of the microstructure in terms of grain size during and after forging or heat treatment, an existing multi-class microstructure model was optimized with focus on grain growth kinetics and parameterized by experimental results.

In the model the distribution of various grain fractions is simultaneously monitored and the growth of fractions in favor of thermodynamically disadvantaged classes is calculated. To verify and optimize the thermodynamic and kinetic parameters in this multi-class grain growth model, two in-situ HT-EBSD experiments with different initial microstructures (with and without δ-phase) were performed at 1045°C with a holding time of 90 minutes. The experiments were supplemented with a series of annealing treatments where temperatures and holding times were varied and results documented with light microscopy. All image files from the different experiments were evaluated for grain size distribution and δ-phase area fraction by the use of proper image analysis techniques.

Furthermore, the δ-phase dissolution kinetics was evaluated with an in-situ SEM video and the influence of the δ-phase on grain growth inhibition was visualized. After complete δ-dissolution, the re-building of Ni3Nb precipitates was investigated with focus on kinetics and morphology.

The multi-class model describes the microstructure and the coarsening during processing more precisely in terms of the grain size distribution than previously used single-class models. This is crucial in order to be able to predict mechanical properties such as tensile strength, fracture toughness and creep resistance.

Biography

Christian Gruber completed his Bachelor degree - Metallurgical engineering, University of Leoben, Austria 2011 – 2017. He completed his Master degree - Metallurgical engineering, University of Leoben, Austria 2017 – 2018. He did PhD in Metallurgical engineering, University of Leoben, Austria. Currently he is an Innovation manager at Voestalpine BÖHLER aerospace GmbH & Co KG, Austria since 2021 and since 2018 he is working as a Junior Scientist at Materials Center Leoben Forschung GmbH, Austria.

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Use of metallized raw materials in electric furnace steelmaking

R. I. Karimov

Baku Steel Company LLC, Azerbaijan

The paper discusses the use of a secondary smelting technology for reinforcing steel (rebar) production at Baku Steel Company, LLC, noting the feasibility of adding metallized pellets to the furnace charge consisting of scrap metal and other manufacturing waste products. The addition of such pellets enhances the process of melting the charge in an electric arc furnace (EAF). The process utilizes direct-reduced iron (DRI) and hot-briquetted iron (HBI) pellets. The status of metallized pellet production in different countries was analyzed. The characteristics of DRI and HBI pellets were compared. The results of two EAF melting runs conducted at Baku Steel Company, LLC are presented. It is shown that the use of metallized raw materials in the EAF charge resulted in 87 to 90% yield of usable metal. The rebar stock obtained from this steel meet the standard strength requirements. Various EAF pellet-charge layouts are demonstrated, noting the importance of continuous loading of the charge materials through the furnace roof. Alternatively, the pellets can be loaded into EAF through an opening in the furnace wall. At Baku Steel Company, LLC, pellets are loaded through the furnace port. It is shown that the mixture of materials is supplied to a bunker, and then loaded into the furnace using a belt.

Biography

Karimov Ramin Ismatbey oglu, born on August 12, 1981. He is a Doctor of Technical Sciences. He is the First Deputy General Director on Production of Baku Steel Company LLC.

Highly efficient photoswitch in diarylethene-based single- and bi-layer molecular junctions

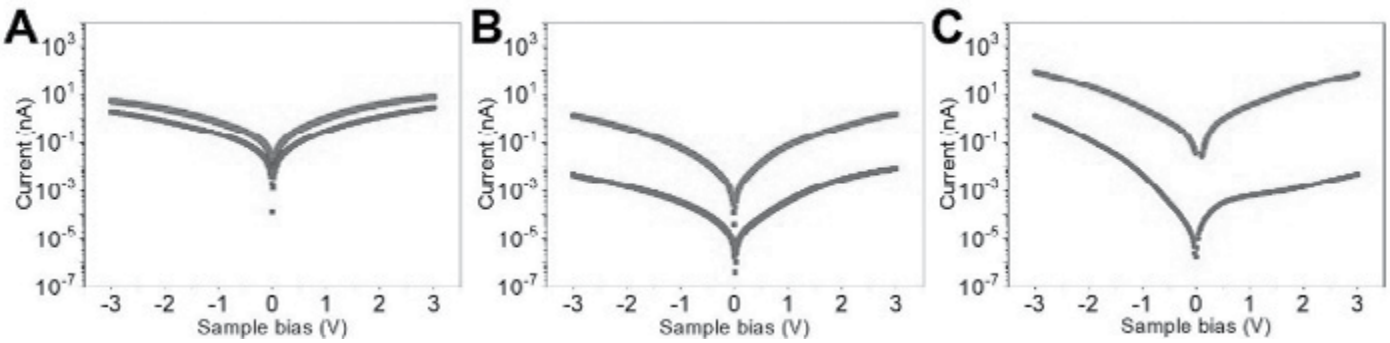
J. C. Lacroix, I. Hnid, M. Liu, S. Bellynck, X. Sun, F. Lafolet and **D. Frath**

Université Sorbonne Paris Cité, France

Photochromic molecules, that is, molecules with two different forms which can be interconverted by light irradiation, have been proposed as building blocks for photoresistive switches in molecular electronics. Diarylethenes (DAE) are among the molecules investigated due to their excellent properties such as the high reversibility, thermal stability and fatigue resistance of both forms. Most studies, investigating the transport characteristics of photochromic molecules, are devoted to monolayers or single-molecule-based Molecular Junctions (MJs) where the dominant transport mechanism is direct tunneling. Herein we present the electrical characterization of photoswitchable MJs using molecular layers of diarylethene oligomers (oligo(DAE)) for tunneling and hopping transport regimes.

First, we prepared single-layers of oligo(DAE) deposited by electrochemical reduction on gold electrodes. The layers were fully characterized using electrochemistry, XPS, and AFM. The electrical characterization of closed and open forms of oligo(DAE) were investigated by C-AFM for two different layer thicknesses fixed below and above the direct tunneling limit. It was observed that both layers switch between high and low conductance modes ("ON" and "OFF" states corresponding to "closed" and "open" forms of the oligo(DAE), respectively) when irradiated by UV and visible light, respectively. ON/OFF ratios of 2-3 and 200-400 were obtained for 3 nm- and 9 nm-thick DAE MJs, respectively2.

Next, we prepared, using a bi-layer system, 9 nm-thick MJs, i.e. in the hopping transport regime. The first layer (5 nm) is based on bisthienylbenzene oligomers, (BTB). The second layer (4 nm) is based on the oligo(DAE). The impact of this first layer on the switchable properties of the system and on the electronic behavior and on the photoresponse of the 9 nm-thick MJs will be presented, with focus on its influence on the ON/OFF ratios.



Biography

Jean-Christophe Lacroix present fields of interest are nanoelectrochemistry, conjugated oligomers and polymers, chemical and electrochemical modification of surfaces through diazonium reduction and thiol adsorption. He developed active plasmonic devices, molecular junctions based on oligothiophene chemistry, redox gated molecular and metallic nanowires.

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Characterization and anticancer potential of *Withania somnifera* fruit bioactives (a native species to Pakistan) using GC-MS, NMR and LC-MS-ESI

Qudsia Tabassam[1], Tahir Mehmood[1,2], Farooq Anwar[1] and **Abdul Rauf Raza[1]**

[1]*University of Sargodha, Pakistan*

[2]*University of Veterinary and Animal Sciences-UVAS, Pakistan*

Introduction: Withania somnifera is a plant with remarkable pharmacological properties. The plant has an impressive profile of medicinal uses in the folk medicine system of several civilizations.

Aim: This comprehensive study is aimed to characterize phytochemicals in fruit of W. somnifera and tested for in vitro anticancer potential to find out active candidate in disease prevention and treatment

Method: The bioactive components from W. somnifera fruit were extracted with polar and non-polar solvents. Anticancer potential of the isolated bioactive was assessed against different cancer cell lines through MTT assay and Incucytes imaging analysis. The extracts were characterized for secondary metabolites using GC-MS, LCMS-ESI and 1H-NMR techniques.

Results: Both freeze-dried and rotary evaporator condensed extracts exhibited anticancer potential against MDA-MB-231, MCF7- SKOV3 and SKBR3 cell lines. The tested extracts have cell growth inhibition potential against mammalian cancer cell line. Hexacosanedioic acid purified from n-hexane extract through HPLC was investigated for its cytotoxicity against breast cancer cell line SKBR3 by using Incucytes imaging analysis.

Conclusion: We found that a variety of bioactive compounds existed in this plant. One identified compound that was not investigated for cytotoxicity in previous studies was purified and its application showed cytotoxicity on breast cancer cell lines. A number of bioactive identified from Withania somnifera fruit may have an effective potential for development into chemotherapy drugs.

Biography

Qudsia Tabassam research background is in Natural Products Chemistry. Her research interests focus on the isolation and structure elucidation of novel metabolites and nanocarrier with diverse chemical structures and potential as anticancer, antimicrobial including antiviral, or antifungal agents. The overall goal of her research is to identify biologically active molecules that can act as templates for the development of new therapeutic agents having eco-friendly (green nature) for the treatment of diseases especially cancer.

She have published 18 research articles in my field with 30 impact factor and published two thesis and 1 book chapter. Currently, working as visiting lecturer in two public sector Universities in Pakistan.

Electromagnetic methods for improved production of additive manufacturing materials

Imants Kaldre

University of Latvia, Latvia

Additive manufacturing is one of the rapidly growing industries today. There are various types of metal additive manufacturing allowing to create complicated custom parts quickly and effective. Limiting factors of this technology are slow printing process and high cost of the initial material. Raw material for metal 3D printing is special powder or wire. Metal powder for additive manufacturing needs to have spherical shape, amorphous structure and narrow size distribution. Metal powder is produced by gas atomization process where metal is melted, and droplets are dispersed by inert gas jet. This process still has some shortages and that is why additive manufacturing quality metal powder is still expensive, thus limiting faster adaption of the technology. Wire is produced by controlled oriented solidification.

In this work we investigate the application of electromagnetic processing to improve material production process for metal additive manufacturing. Stationary magnetic field and injected electric current is one of the methods how to induce force in the liquid metal and affect its solidification. Pulsed magnetic fields can be a good tool for grain refinement and how to control equiaxed to columnar transition. This may solve several issues and affect the production process leading to better outcome and possibility to control various aspects of the metal solidification process. Institute of Physics University of Latvia has great experience and experimental basis to carry out this research. Various experimental research results well be presented.

Biography

Imants Kaldre research interests in applied magnetohydrodynamics, solidification of metallic alloys, metal matrix nano-coposite production, electromagnetic processing of materials and applied physics related to process metallurgy. He finished Ph.D from Grenoble University in France in 2014. Dissertation: Thermoelectric current and magnetic field interaction influence on the structure of binary metallic alloys. Recently he is working in projects related to electromagnetic production of particle strengthened Metal Matrix Composites. He is also working on the innovative production of Titanium from Ti-tetrachloride by electroslag process. He is deputy director of the Institute of Physics University of Latvia since 2017 and member of the scientific board of Institute of Physics University of Latvia since 2015. Member of the Latvian young scientist's society.

Causes of celestial motion

Dong-Il Song

Korea Meteorological Administration, South Korea

The purpose of this research is to study the causes of celestial motion.

For the method, Earth, Venus, and the Sun were investigated.

As a result. In celestial bodies such as the Earth, current flows due to the temperature difference, this current generates a magnetic field, and this magnetic field generates rotational force to rotate the celestial body.

The celestial body causes power generation and rotation of the celestial body as if an electric motor and a generator were combined.

In the diurnal change of geomagnetism, the maximum horizontal component appears between 14:00 and 15:00.

This coincides with the daily maximum temperature between 14:00 and 15:00.

Therefore, geomagnetism is related to the temperature difference.

That is, the temperature difference generates a current, and this current is evidence of the generation of a magnetic field.

Because the magnetic field in the Northern Hemisphere is stronger than the magnetic field in the Southern Hemisphere, the Earth rotates from west to east

The jet stream of the Earth's Northern Hemisphere flows eastward and that of the Southern Hemisphere flows westward. This is proof that the magnetic field forces rotate the jets and Earth.

In other words, the Earth's Northern Hemisphere generates forces in the east direction, whereas the Southern Hemisphere generates forces in the west direction

If the magnetic field in the Southern Hemisphere of a celestial body is strong, it will retrograde like Venus.

The conclusion is that the current of the celestial body generates a magnetic field to make the celestial body rotate.

The kinetic energy of the celestial body is due to the temperature difference.

The temperature difference causes an electric current to flow through the celestial body and creates a magnetic field. Rotating celestial bodies generate gravitational waves.

Biography

Dong-Il Song was born in Korea. He worked for the Korea Meteorological Administration for 33 years. At the Korea Meteorological Administration, He worked at the Meteorological Communication Center (deputy director), the information operation department head of the Gwangju Regional Office of Meteorology, Jeju High-rise Radar Weather Station (Chief), and Pohang Weather Station (Chief). And now he retired from the Korea Meteorological Administration.

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A novel technique for mapping material and information flow in food traceability systems

Samantha Islam and **Jonathan M Cullen**

University of Cambridge, UK

Traceability of food products, ingredients and associated operations are important requirements for improving food safety and consumer confidence. Food traceability systems are complex, encompassing processes, material flow, information flow, techniques, infrastructure, people, and control strategies. Food traceability systems often suffer from inefficiency in either material or information flow within an enterprise or between supply chain partners. Modelling of system architecture is a visualization approach that allows multiple parties to collaborate in a system design process, identify its inefficiencies and propose improvements. However, there is little academic research on the ability to use a standard visualization tool that supports collaborative design and considers both material and information flow for a given food traceability system.

Therefore, the aim of this research is to propose a new visualization approach that allows supply chain operators to collaborate effectively in the design process of food traceability systems capable of maintaining streamlined information flow, minimizing information loss, and improving supply chain performance. Screening of literature demonstrates that

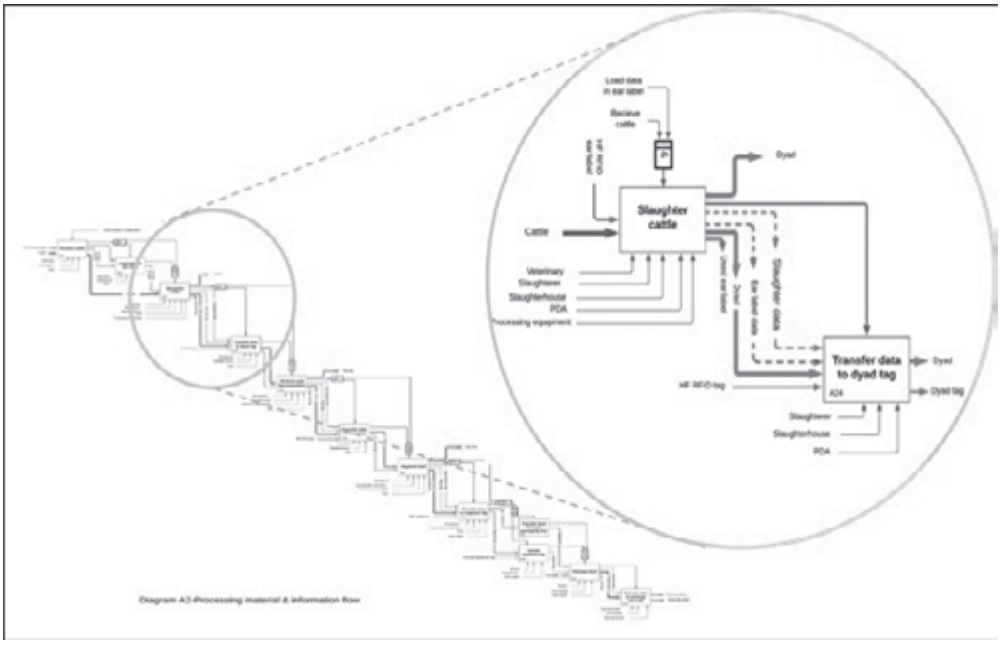


Figure 1. MIFMT modelling of material and information flow in a beef processing plant

model-based system engineering (MBSE) offers a sound way for visualization of complex multi-dimensional systems. However, in the food traceability literature, an MBSE-based standardized traceability system modelling approach is absent. This study makes a strong contribution to existing literature by proposing a novel, material and information flow modelling technique (MIFMT), to visualize food traceability system architecture. MIFMT can support common understanding and iterative implementation of effective food traceability systems that contextualize food supply chains at multiple levels and provides opportunity to identify points at where inefficiencies can occur so that actions can be taken to mitigate them.

Biography

Samantha Islam is pursuing her PhD at Department of Engineering at University of Cambridge since October 2018. She is a Cambridge Commonwealth Trust scholar and is affiliated with St John's College, Cambridge. She undertook a research-Masters on Green Manufacturing from Monash University, Australia with Monash Merit Scholarship and a four-year bachelor on Industrial and Production Engineering from Bangladesh University of Engineering and Technology. After finishing her bachelor's degree, Samantha also worked as a Quality assurance officer at Save the Children. This experience co-mingled by her Engineering knowledge led her to further prolongate towards research in Sustainable Manufacturing. Her current PhD work at Cambridge lies in the topic: "Reengineering food traceability systems ". Before coming to Cambridge, she pursued another one-year research position at University of New South Wales based in Australian Defense Force Academy. Apart from her research, Samantha blogs on mental health issues and paints landscapes during her free time.

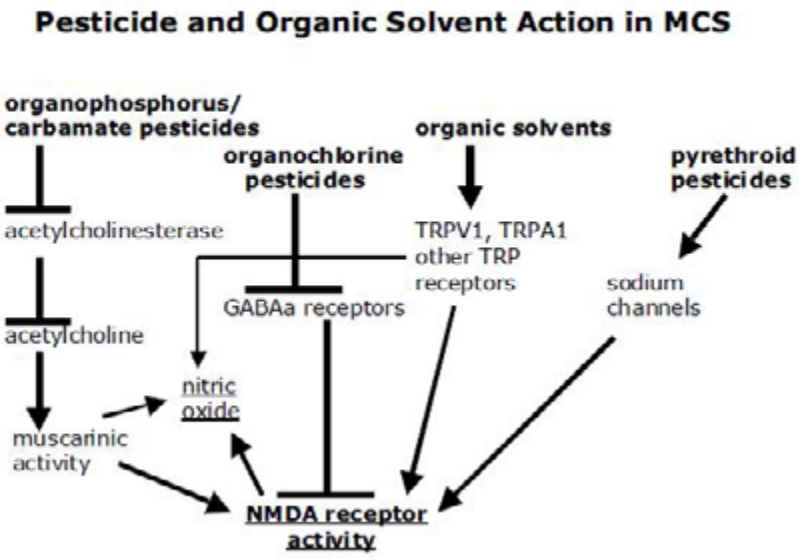
Chemicals and multiple chemical sensitivity (MCS)

Andrea Cormano

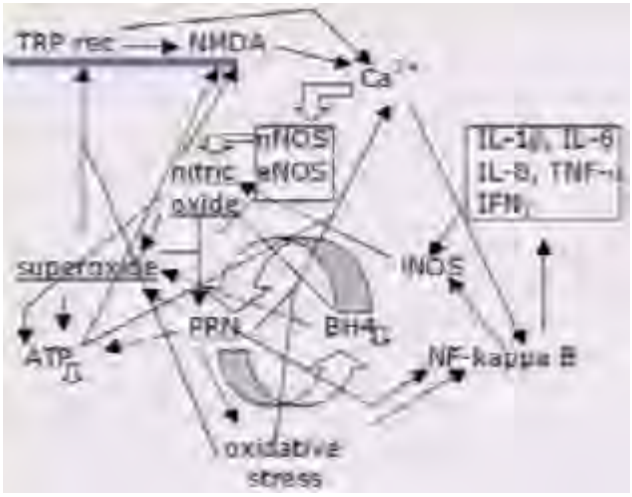
ISDE Benevento, Italy

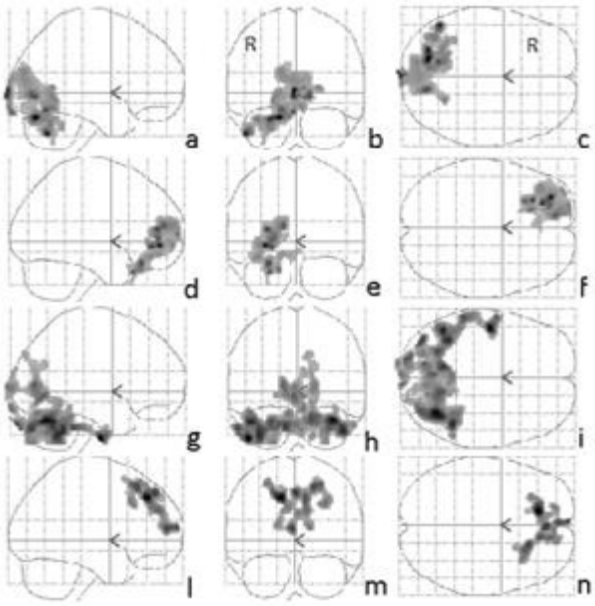
The Multiple Chemical Sensitivity (MCS) is a chronic disease with recurrent symptoms affecting multiple organs and systems, reproducible in response to exposure to low levels of chemical substances, which are not related to each other from a molecular point of view, a much lower concentration that those generally tolerated by the general population. The Symptoms improve or disappear when the triggers are removed (Consensus Report Of Chicago, USA 2001). MCS has an incidence between 2,5% and 12,6% in the population (Caress SM 2003-2004, Mooser 1987, Hausteiner 2005). Exposure the xenobiotic substances causes hyperactivation of NMDA receptor (Pall 2002, 2003, 2007, 2008, 2013), which trigger a vicious circle of NO/ ONOO aggravated by increase of oxidative stress and pro inflammatory cytokines and reduced production of ATP. MCS patients often have olfactory disorders: 18F-FDG PET/TC Study, carried out first with a neutral stimulation, then with a pure stimulation, show anomalies of cerebral perfusion in patients

Figura 1
Modo di azione dei pesticidi e dei solventi organici nella MCS



with MCS, compared to the normal population (Chiaravalloti 2015). A recent regression analysis showed that patients with MCS have a higher incidence of mutation of the enzymes of Phase I (Cytochrome P450 2D6, 2C9, 2C19) and Phase II (GST, PON, SOD, NOS, UGT), involved in xenobiotic detoxification (Micarelli, Cormano 2019). Exposure to xenobiotic compounds and impaired functioning of Phase I and II enzymes can therefore cause bioaccumulation within living organism. The study of adducts on leukocyte DNA, carried out on 187 MCS patients of the Reference Center for Prevention, Diagnosis and Treatment of MCS of Policlinico Umberto I in Rome, showed the presence of 91 adduced genes, 72 xenobiotic substances such as heavy metals, pesticides, herbicides, insecticides, VOCs, derivatives of Petrol and exhaust gas.





Biography

Andrea Cormano did masters in Acupuncture and Traditional Chinese Medicine, Clinical Practica in Acupuncture and Chinese Medicine at Nanjing in China, Specialization in Biointegrated and Rehabilitative Medicine, MD at the Center of Reference for the Prevention, Diagnosis and Therapy of MCS in Policlinico Umberto I of Rome, Phytotherapy.

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Systematic review and meta-analysis on the effects of astaxanthin on human skin ageing

Xiangyu Zhou[1,2]

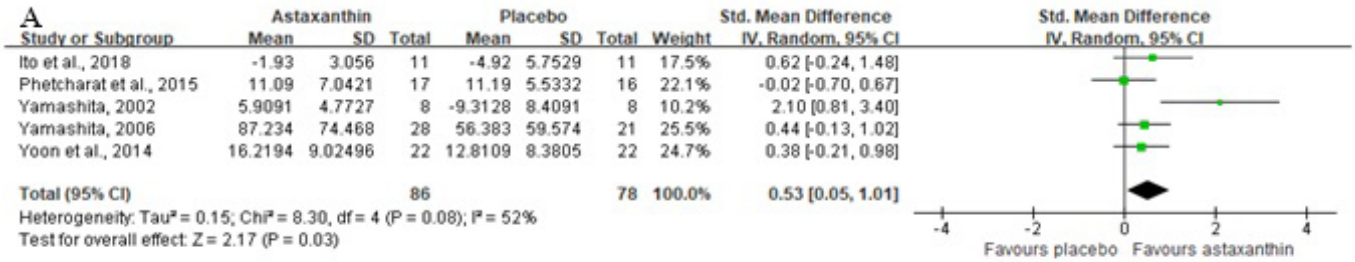
[1]*University College London, UK*

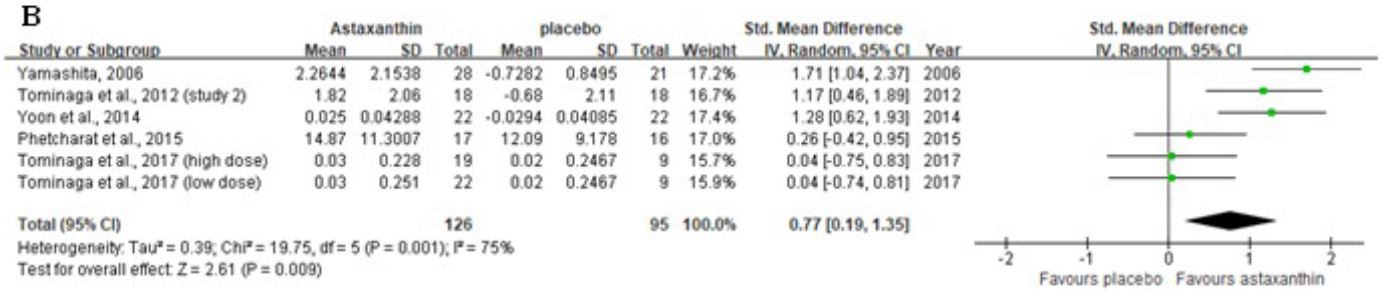
[2]*University of Leeds, UK*

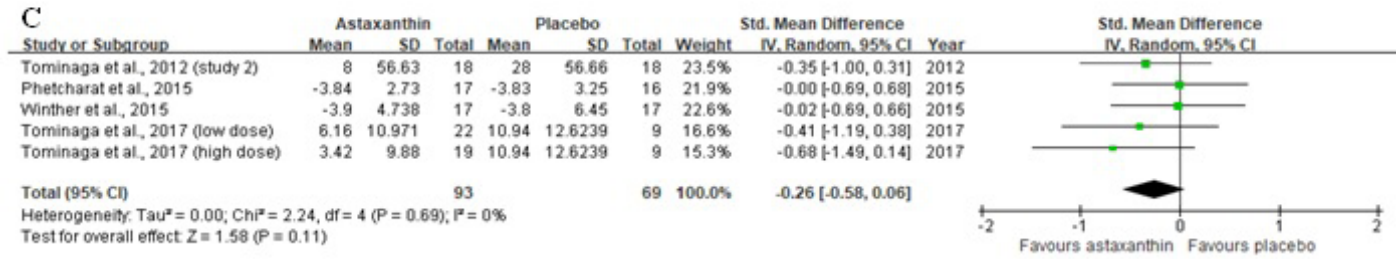
Skin ageing is becoming a global challenge due to longer human longevity and intensive ultra-violet rays contributed to the ozone layer destruction, attracting greater scientific interests in developing nutricoesmetic products, especially from natural functional ingredients with lower side-effects. Astaxanthin, a carotenoid with high antioxidant and anti-inflammatory effects, prevented animal skin photoaging and age-related skin diseases. It could be extracted from the microalgae *Haematococcus pluvialis* and byproduct of processed crustaceans which are generally discarded as marine waste, losing potentially valuable ingredients, and causing serious environmental problems by accumulating high amounts of organic materials. This paper evaluated whether astaxanthin has cosmeceutical potential to prevent or reverse human skin ageing.

A comprehensive search of PubMed, Scopus and Web of Science found a total of eleven studies. Nine randomised, controlled human studies assessed oral ASX effects and two open-label, prospective studies evaluated topical, oral-topical ASX effects on skin ageing. GetData Graph Digitizer was used to extract mean values and standard deviations of baseline and endpoint, and Cochrane Collaboration's tool assessed RoB for all included studies. Review Manager 5.4 was used to conduct meta-analysis of RCTs; the results were reported as effect size ± 95% confidence interval.

Continuous oral astaxanthin applications might restore moisture content, improve elasticity significantly, but did not significantly reduce wrinkle depth compared to the placebo group. Oral supplementations might be more sustained and pronounced than topical applications. A synergistic skin protective effect was found in the combinational usages in open-label-prospective studies. But the reliability of evidence was limited by small sample sizes, imperfect study design, and potential conflicts of interests, requiring more large-scale and robust studies to reconfirm the mechanisms. This paper clarifies the human skincare effects of astaxanthin and confirms its promising cosmetical potential, facilitating marine waste recycling, environmental protection, and sustainable development.







Biography

Xiangyu Zhou is a zero-waste living advocate who participated in the TAMFI project, focusing on exploring the functional ingredients of food byproducts while engaging in nutritional interventions for human health, such as skin aesthetics, neuroprotection, and metabolic disease prevention. She led a team to study the health effects of food ingredients substitution and innovated a bento with East Asian appeal for the health benefits of people with diabetes and obesity, and participated in the Ecotrophelia UK-Food Innovation student awards.

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Bactericidal Surfaces by Biomimetics of the Nanopillars on Insect Wings

Richard W. van Nieuwenhoven, Alexander M. Bürger and **Ille C. Gebeshuber**

Vienna University of Technology, Austria

The wings of certain insects (for example, cicadas Fig. 1 and dragonflies Fig. 2) reveal exceptional properties such as super-hydrophobicity and self-cleaning abilities. In these aspects, they are comparable to the famous lotus leaf.

Furthermore, the wings can also kill bacteria [1][2]. Hexagonally arranged arrays of nanopillars (average height between 200nm and 500nm with a center distance of around 130nm) are responsible for mechanically destroying bacteria (notably without chemical bactericides) [3]

We investigated the wing surface structures of cicada and dragonfly species with Atomic Force Microscopy Fig. 3 and Scanning Electron Microscopy Fig. 4. The study's main focus lies in analyzing antibacterial structure properties by introducing low-cost bioimprinting techniques to transfer these structures to artificial surfaces. Especially, the combination of Polyvinyl Siloxane (PVS) and 3D printing UV resin give is promising.

However recent studies have raised valid questions about the bactericidal effectiveness of the nanostructured surfaces, especially in context to the verification protocols used [4]. Therefore, the bactericidal properties of the material surfaces are verified using specially developed reproducible protocols.

Keywords: Biomimetics; Nanopillars; Bactericide; Bioimprinting; Nanolithography.

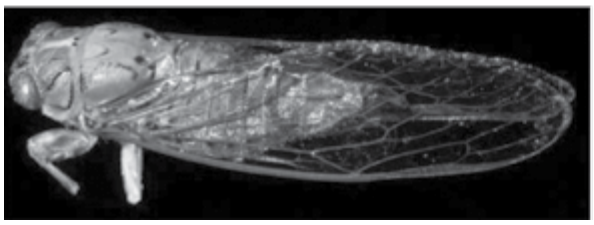

Figure 1: Cicada Kikihia scutellaris endemic to New Zealand

Figure 2: Dragonfly Sympetrum striolatum endemic to Austria

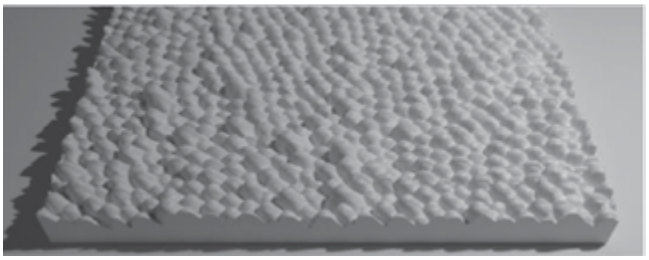

Figure 3: 3D representation of the upper K. scutellaris wing Surface AFM scan

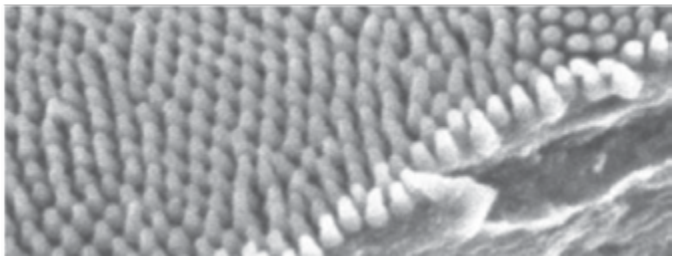

Figure 4: SEM scan of the upper K. scutellaris wing surface

Biography

Richard W. van Nieuwenhoven Master student in Biomedical Engineering at the Institute of Applied Physics, TU Wien, Vienna, Austria. His master thesis, supervised by Ille C. Gebeshuber, is about the nano templating of bactericidal properties to artificial surfaces, as well as sharpening his skills in AFM, confocal fluorescent microscopy, and laboratory techniques.

He is currently planning his Ph.D. in the area of his main interest, engineered living materials. The basic concept deals with the use plant gall development as a mechanism to control the growth and form of structures produced by plants.

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Front-end investigations of the coated particles of nuclear fuel samples – Ion polishing method

Zuzanna M. Krajewska[1], Tomasz Buchwald[2], Tomasz Tokarski[3] and **Wacław Gudowski[1]**

[1]National Centre for Nuclear Research, Poland

[2]Poznan University of Technology, Poland

[3]AGH University of Science and Technology, Poland

The investigations of the coated-particles of nuclear fuel samples are carried out in three stages: front-end, irradiation in the reactor core, and post-irradiation examination. The front-end stage is the initial analysis of the failures rates of produced samples before they are placed in the reactor core. The purpose of the verification is to prepare the particles for an experiment that will determine the degree of damage to the coated particles at each stage. Before starting experiments with the samples, they must be properly prepared. Polishing the samples in order to uncover the inner layers is an important, initial experimental step. The authors of this paper used a novel way to prepare samples for testing - by applying an ion polisher. Mechanical polishing used frequently for sample preparations generates additional mechanical damages in the studied fuel particle, thus directly affecting the experimental results. The polishing methods were compared for three different coated particles using diagnostic methods such as Raman spectroscopy, scanning electron microscopy, and confocal laser scanning microscopy. Based on the obtained results, it was concluded that the ion polishing method is better because the level of interference with the structures of the individual layers of the tested samples is much lower than with the mechanical method. The same technique is used for the fuel particles undergone ion implantation simulating radiation damage that can occur in the reactor core.

Biography

Zuzanna Krajewska is associated with the Laboratory for Nuclear Energy and Environmental Analyses at National Center for Nuclear Research in Poland. Her interests include combining knowledge in fields of physics, nuclear medicine, and nuclear engineering and materials. Currently, she specializes in experimental research on the TRISO particle fuel - a nuclear fuel used in the High-Temperature Reactors. In her research, she uses a wide range of research tools, including ion implantation, Raman spectroscopy, Scanning Electron Microscopy.

Novel image analysis technique for UHP hybrid nano-based fiber-reinforced concrete

M. Iqbal Khan, Galal Fares and **Yassir M. Abbas**

King Saud University, Saudi Arabia

The formulation of ultra-high performance (UHP) concrete is characterized by the presence of fine inert and reactive filling materials to cement with proper superplasticizer and low water-to-cement ratio. In this study, the use of crystalline nanocellulose (CNC) and carbon nanotube (CNT) to reinforce the flexural resistance of the cementitious matrix at the nano level is investigated. CNC and CNT were utilized in the presence of hybridized polyvinyl alcohol (PVA) microfibers with either macrosteel or microsteel fibers of different physicomechanical properties. Additionally, fine aggregates of a maximum particle size of 4 mm and two types of desert sands were incorporated and evaluated in the presence of fly ash (FA) and silica fume (SF). The use of FA has led to an improvement in workability with elevated compactness integrated with SF nanoparticles. The optimal combination of aggregates with maximum packing density was selected in the mix composition. The effect of CNC and CNT on the temperature evolution profiles and superplasticizer dosage on the setting time was individually evaluated. The results have confirmed that there had been a limited zone of accepted workability with CNC, after which a substantial workability loss was noticed. Macrosteel fibers have limited content, after which a remarkable reduction in compressive strength becomes evident in contrast to the microsteel fibers that can be incorporated in much higher contents. The image analysis technique was used to support the interpretation of data. It is concluded that the utilization of fine aggregates of maximum particle size of 4 mm has limited the properties of UHPC mixes.

Biography

Mohammad Iqbal Khan is a Professor in Structural Engineering, and Managing Director of Center of Excellence for Concrete Research and Testing at King Saud University, Saudi Arabia. He is an Adjunct Professor at the Department of Civil Engineering, Missouri University of Science and Technology, Rolla, USA. He is actively engaged in research and his primary research interests are in developing blast and impact-resistant materials; fiber reinforced concrete structures; cement-based and polymer-based fiber-reinforced composites; nano- and micro-mechanics of composite materials; sustainability and environmental impact; application of artificial intelligence.

Fabrication of pore-selectively silver-functionalized honeycomb-patterned film and its application for antibacterial activity

D. S. Huh, S. Falak and **B. K. Shin**

Inje University, South Korea

Pore-selective silver (Ag)-functionalized honeycomb-patterned (HCP) polystyrene (PS) films were fabricated via a modified breath figure method using an interfacial chemical reaction and its application for an antibacterial film using the role of micro-trapping pit was systematically studied. PS polymer solution containing ferrocene which acts as a reducing agent was cast under humid conditions containing silver nitrate ($AgNO_3$) to induce an interfacial chemical reaction between ferrocene and $AgNO_3$ at the water droplet/polymer solution interface. The antibacterial activity of the film against Escherichia coli and Staphylococcus aureus was assessed by the micro-dilution method and crystal violet assay. The study of BF for a functional HCP film by accompanying an interfacial chemical reaction for the pore-selective Ag functionalization shows that specific metal or inorganic materials could be pore-selectively functionalized by a similar method under various conditions, thus potentially giving the HCP films various applications.

Biography

Do Sung Huh is working as a Professor of Department of Chemistry, Inje University, South Korea. He completed PhD in Korea Advanced Science and Technology (1989).

Compact dual-band 4-MIMO Antenna elements for 5G mobile applications

Fayad Ghawbar, Jumadi A. S, H. A Majid, Aimi S.A Ghafar, Faiz A. Saparudin and **B.A.F Esmail**

Universiti Tun Hussein Onn Malaysia, Malaysia

The Multiple Input Multiple Output (MIMO) system in the 5G wireless communication system is essential to enhance channel capacity and provide a high data rate resulting in a need for dual-polarization in vertical and horizontal. Furthermore, size reduction is critical in a MIMO system to deploy more antenna elements requiring a compact, low-profile design. A compact dual-band 4-MIMO antenna system has been presented in this paper with pattern and polarization diversity. The proposed single antenna structure has been designed using two antenna layers with a C shape in the front layer and a partial slot with a U-shaped cut in the ground to enhance isolation. The 4-MIMO antenna elements were printed orthogonally on an FR4 substrate with a size dimension of 36 × 36 × 1.6 mm^3 with zero edge-to-edge separation distance. The proposed compact 4-MIMO antenna elements resonate at 3.4-3.6 GHz and 4.8-5 GHz. The s-parameters measurement and simulation results agree with a slight frequency shift of the measurement results at the upper band due to fabrication imperfection. The proposed design shows isolation above -15 dB and -22 dB. The MIMO diversity performance has been evaluated in terms of efficiency, envelope correlation coefficient (ECC), diversity gain (DG), total active reflection coefficient (TARC), and channel capacity loss (CCL). The total and radiation efficiency were above 50 % across all parameters at both frequency bands. The ECC values were lower than 0.10, and the DG results were about 9.95 dB in all antenna elements. TARC results exhibited values lower than -25 dB at the dual-bands. Moreover, the channel capacity losses in the MIMO system were depicted using CCL, resulting in values lower than 0.4 Bits/s/Hz. As a result, the proposed design is adequate for 5G applications.

Biography

Fayad Mohammed Ghawbar is an Engineering Technology Ph.D. candidate at Universiti Tun Hussein Onn Malaysia, Batu Pahat, Malaysia. He has received the Master of electrical engineering in 2015 from Universiti Tun Hussein Onn Malaysia. Previously, he has obtained his first degree from Universiti Malaysia Pahang, Malaysia, with honors, in electrical & electronics engineering in 2013. His current Ph.D. research is under RF Microwave MIMO technology for 5G applications, especially smartphones. Besides, he is doing recent research about metamaterials to be deployed in high order MIMO antennas for 5G smartphones to reduce the mutual coupling effect..

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Energy and CO_2 emission assessments of alkali- activated concrete and ordinary portland cement concrete: A comparative analysis of different grades of concrete

A. Alsalman[1,2], L. Assi[3], R. Kareem[4], K. Carter[3] and **P. Ziehl[3]**

[1]*Almaaqal University, Iraq*

[2]*Tatum Smith Welcher Engineers, USA*

[3]*University of South Carolina, USA*

[4]*Shatrah Technical Institute, Iraq*

Studies have indicated that alkali-activated concrete (AAC) is comparable to ordinary Portland cement concrete (OPCC) in terms of mechanical properties (eg. compressive strength, tensile strength, flexural strength, and modulus of elasticity) and can deliver environmental advantages compared to OPCC. This research assesses the energy and CO_2 emissions associated with OPCC and AAC. Three grades of concrete were selected; 40, 60, and 100 MPa to cover a wide range of concrete that can be used for several purposes. The 40 MPa is considered standard strength concrete, and it is common for most structural uses where exceptional compressive is not required. On the other hand, the 60 MPa is high strength concrete with compressive strength > 55 MPa. Finally, the 100 MPa is ultra-high- strength concrete with compressive strength ≥ 100 MPa.

Analysis shows that the selection of constituent materials can considerably influence the energy and emission of AAC and OPCC. Ordinary Portland cement (OPC) is the primary contributor to the energy and emission of OPCC, accounting for 80% of energy and 91% of emissions of OPCC. The activating solution of AAC, meanwhile, is the main contributor to the energy and CO_2 emission of AAC. Normal strength AAC (40 MPa) shows 46% less energy and 73% less CO_2 emission than OPCC. However, high-strength AAC (60 MPa), using metakaolin as a base material, experiences higher energy (8%) than OPCC yet the emission is 40% less than OPCC. A substitution of fly ash for metakaolin results in superior efficiency of AAC compared to OPCC. Two mixtures of ultra-high-strength AAC (100 MPa) result in contradictory findings. One mixture with sodium hydroxide and silica fume activating solution shows 5% and 30% less energy and emission, whereas the other mixture with a sodium hydroxide and sodium silicate activating mixture is less efficient than OPCC.

Biography

Ali Alsalman is a faculty member at the Civil Engineering department at Almaaqal University and a structural engineer at Tatum Smith Welcher Engineers, Inc. He earned his Ph.D. in civil engineering with a structural engineering focus from the University of Arkansas in Fayetteville AR, United States of America. His area of interest is civil engineering materials and structures. Besides, Ultra-High Performance Concrete (UHPC), geopolymer concrete, and CO_2 emission are his major concerns.

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The effect of cholesterol removal from milk and cream on the textural and organoleptic properties of final products

L. Kolarič and **P. Šimko**

Institute of Food Nutrition, Slovak University of Technology, Slovakia

As cardiovascular diseases (CVD) are the leading cause of mortality in the world, the production of low-cholesterol content products could decrease effectively high cholesterol intake what would be one of the crucial steps in CVD prevention. The elimination of cholesterol content in milk products is successfully achieved by the application of β-cyclodextrin (β-CD). Only 1.5% and 5.0% (w/w) of β-CD can reduce the cholesterol content in milk and cream by almost 99% and 96%, respectively. This study aims the effect of the processing conditions and the elimination of cholesterol on the textural and organoleptic properties of final cholesterol-free milk and cream. The textural analysis was monitored by a TA.XT plus Texture Analyzer (Godalming, Surrey, Great Britain) with the determination of firmness and consistency values. It was found that the final cholesterol-free milk and cream had similar firmness and consistency values to standard samples. The elimination of cholesterol content from milk and cream thus not influenced the texture of final products. The color coordinates (L*, a*, and b*) and whiteness index were monitored by a UV-VIS spectrophotometer Cary 300 (Agilent Technologies, USA). It was studying the effect of β-CD concentration on the changes of these values in final products. The β-CD concentration slightly influenced the L* values (whiteness coordinate) and thus the final whiteness index of samples. The color differences (ΔE) were not, however, significantly influenced thus it was not noticed any changes in the visual appearance of treated milk and cream. From the results, it can be concluded, that the elimination of cholesterol from milk and cream by β-CD does not influence the textural and organoleptic properties of final products, which makes this method excellent for the production of milk products with health benefits.

The authors would like to thank for financial contribution from the STU Grant scheme for Support of Young Researchers and grant APPV-18-0061. This article was also funded by Operational program Integrated Infrastructure within the project: Demand-driven research for sustainable and innovative food, co-financed by the European Regional Development Fund (Grant no. Drive4SIFood 313011V336).

Biography

Lukáš Kolarič is a PhD student at the Faculty of Chemical and Food Technology, the Slovak University of Technology in Bratislava in department of Food Technology. His master thesis was describing the extraction of starch from sweet potatoes, its analysis of chemical composition and resistant starch content, and its application in pasta production. Recently, he is focusing on the analysis of cholesterol content in milk and dairy products, and the study of elimination of cholesterol from these products. His expertise is connecting to High-Performance Chromatography, spectroscopy, food sample preparation, food constituent's extraction and analysis, or the analysis of mechanical, rheological, and sensory properties of food products.

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Octyl-Sepharose CL-4B - lipase catalytic systems as potential biocatalysts in the kinetic resolution of (R,S)-flurbiprofen

Natalia Kocot, Tomasz Siódmiak, Rafał Mastalerz, Jacek Dulęba and **Michał Marszałł**

Nicolaus Copernicus University in Torun, Poland

Biocatalysis is a tool of "green chemistry" trend, which is widely known in the chemical and pharmaceutical industries. In the area of kinetic resolution of racemic mixtures of drugs, lipases are willingly used as biocatalysts, because they are easily commercially available and are able to catalyze the reaction also in an apolar environment. Moreover, they do not require cofactors and do not show high substrate specificity, therefore they have a wide application spectrum. For the industrial purposes, lipases are often immobilized on the supports, aiming to increase their activity, stability or to enable its recovery after the reaction is completed.

The aim of presented study was to optimize the catalytic systems to obtain pure enantiomers of (R,S)-flurbiprofen by esterification with methanol in organic solvents with different logP values. We immobilized two lipases on Octyl-Sepharose CL-4B carrier: lipase from Candida rugosa (CRL) and lipase B from Candida antarctica (CALB), which differ in structure and enantioselectivity toward the enantiomers. It was the first time, Octyl-Sepharose CL-4B- lipase biocatalysts have catalyzed the kinetic resolution of (R,S)-flurbiprofen by esterification in organic solvents with a good yield and enantioselectivity. The best results were obtained (enantioselectivity expressed by eep=90,48%), when the reaction was performed by CALB lipase in dichloromethane, characterized by low logP value. In contrast to CALB, CRL catalyzed the reaction to a very small extent. Studies have shown that immobilization of CALB lipase on the Octyl-Sepharose CL-4B support increased its activity by about 12 times in dichloromethane and about 45 times in dichloroethane. Moreover, it was observed that the choice of the reactor with regard to the material from which it is made is important.

Biography

Natalia Kocot is a student of the 6th year of pharmacy at Ludwik Rydygier's Collegium Medicum in Bydgoszcz. During her education she did two interesting internships: in Pharmaceutical Institute in Warsaw, Łukasiewicz research network and in Celon Pharma research and development center.

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Development of environmentally friendly HPLC methods for the simultaneous detection of several benzodiazepines and their applications to pharmaceuticals and human biological fluid

Hassan M Albishri[1], Naflaa Aldawsari[1] and **Deia Abd El-Hady[2]**

[1]King Abdulaziz University, Saudi Arabia

[2]University of Jeddah, Saudi Arabia

Using environmentally friendly solvents in high performance liquid chromatography is considered one of the most important areas of green chemistry. Therefore, two liquid chromatographic methods were developed and applied to the simultaneous determination of five benzodiazepines (bromazepam, clonazepam, diazepam, lorazepam and oxazepam) in human plasma and tablet with a simple and fast sample pretreatment. Natriumlauryl -sulfat (SDS) and (2-hydroxyproyl)-ß-cyclodextrin was used as the ecofriendly mobile phase in the first method. However, 1-Butyl -3- methylimidazolium chloride with the combination of few volumes of acetonitrile was used in the second mobile phase. The chromatographic separation of target analytes was performed on Hypersil Gold aQ (150x 4.6x 5µm) and Zorbax SB-C18 (150x 4.6x 5µm) columns with 1 mL min^{-1} flow rate and 250C column temperature. Diode array detection was performed with monitoring at 230 nm. Both methods established a rapid, sensitive and selective separation. However, SDS + (2-hydroxyproyl)-ß-cyclodextrin gave a better recovery and RSD values between 90 % -103 % and 0.0003- 0.0093, respectively. The methods detection limits were between 0.455-0.918 and 0.550- 0.724 ng mL^{-1}, respectively. These developed methods were successfully applied to the determination of the studied benzodiazepines in human plasma and tablet samples.

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Determination of endocrine disruptor Bisphenol-A leakage from different matrices of dental resin-based composite materials

Naser F. Al-Tannak[1], Fawaz Alzoubi[1], Fatma M. Kareem[2] and **Ladislav Novotny[1]**

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Background: Bisphenol A (BPA) derivatives monomers as resins are common components in dental restorative materials and materials used for orthodontic treatment. However, they are a source for BP-A leakage, which can affect adult and child health as an endocrine disruptor.

Objective: This study aimed to investigate the level of BPA leakage from four selected weights (0.1, 0.2, 0.3, 0.4 mg) of five different resin combinations used in dental restorative materials.

Method: The resin combinations were cured with light for 20 seconds, kept in 1 mL of acetonitrile, and sonicated for 30 minutes. Separation was achieved by using BEH C18 (1.7 µm, 2.1 x 100 mm) analytical column (Waters® Acquity UPLC) and a mobile phase composed of water and acetonitrile (68:32 v/v). Moreover, Waters® Xevo G2-SQToF coupled with Waters® Acquity UPLC system with binary Solvent Manager (I-Class) via electrospray ionization (ESI) interface was used to confirm peaks identities.

Results: BPA was detected in all resin combinations and in all selected sample weights. However, BPA was below the limit of quantification (LOQ) in all selected weights of the Filtek Z350 XT Universal Restorative System. The results show that BPA is still released from selected dental resin combinations available in the market despite the general concern about its potential adverse effects.

Conclusion: Nevertheless, the amounts of BPA were within the acceptable levels indicated by the U.S. Environmental Protection Agency and the U.S. Department of Health and Human Services National Toxicology Program and represent a very small contribution to the total BPA exposure. The use of alternative materials such as high-viscosity glass ionomers, inorganic biomaterials, and ceramic would be ideal and healthier for adults and children.

Biography

Naser Al-Tannak is a graduate of the Universities of Kuwait (B.Pharm Hons) and Strathclyde (MSc, PhD in Pharmaceutical Analysis) and an assistant professor in the department of pharmaceutical chemistry at Kuwait University. He is currently a post-doctoral researcher and teaching fellow at Strathclyde University. Previously, he was a post-doctoral researcher at University of Strathclyde, Glasgow-United Kingdom. His research focuses on separation techniques, pharmaceutical dosage form analysis, natural product analysis and drug stability studies. Recent publications include: A new sesquiterpene from South African wild ginger (Siphonochilus aethiopicus (Schweinf) B.L. Burtt) and Determination of Endocrine Disruptor Bisphenol-A leakage from Different Matrices of Dental Resin-Based Composite Materials, Current Pharmaceutical Analysis.

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Separation of radioactive Ni from activation products

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Ni-63 is generated by oxide activation produced in components that are in contact with the primary coolant of light-water reactors. Ni-63 has a half-life of 101.2 years and is a pure beta emitter with a maximum energy of 67 keV, so that its isotopic characterization, necessary for decommissioning and radioactive waste management activities, involves separation processes to isolate and analyze it. Therefore, the goal of the present work was to develop a separation method for Ni-63 from activation products such as Fe-55 (2.7 y), Fe-59 (44.49 d), Zr-93 (1.61x106 y), Co-58 (70.86 d), Co-60 (5.27 y), Nb-94 (20,300 y). Two separation methods were applied, first ion exchange chromatography, using DOWEX 1X8 anionic resin packed in chromatographic columns and HCl solutions as eluent. Separation tests were performed as a function of HCl concentrations, based on the adsorption properties of these elements on anionic resins, reported in the literature. Finally, Ni was purified by precipitation with dimethylglyoxime which is deposited on an inert support. The precipitate is washed with ammonium citrate solutions and Ni is recovered by dissolving the nickel dimethylglyoxime chelate [$Ni(DMG)_2$] with HNO_3. Several inert supports (Amberlite®XAD4, PTFE and Silica Gel) and ammonium citrate concentrations were tested in order to define the best Ni recovery conditions. The short half-life radioactive tracers and gamma emitters Ni-65 (2.52 h), Co-58, Fe-59, Zr-95 (64.03 d), Nb-95 (34.99 d), and Hf-181(42.39 d) were used to facilitate the monitoring of the separation process, which were produced by irradiation of Ni, Zr and Fe nitrates in the Triga Mark III reactor at ININ. Ni, Zr and Hf are eluted from the anionic resin with 8 M HCl as shown in Figure 1 and finally Ni is separated from Zr and Hf by precipitation with dimethylglyoxime.

Biography

Fabiola Monroy-Guzmán: Chemical Engineer and Master in Nuclear Sciences from Faculty of Chemistry at the National Autonomous University of Mexico. PhD. from University of Paris XI, France; 20 years of experience in radiochemical separation processes. Founder and leader of the ININ's Radioactive Waste Laboratory. Leader of projects funded by CONACYT (National Council for Science and Technology, Mexico), IAEA (International Atomic Energy Agency) and UNESCO (United Nations Educational, Scientific and Cultural Organization), focused on the production of radioisotopes for medical purposes, archaeometry and management of radioactive waste. ININ full-time researcher.

Mesoporous tungsten oxide films for electrochromic windows

Chi-Ping Li

National United University, Taiwan

Template-assisted sol gel chemistry provides a versatile approach to introduce order and porosity into nanostructured materials. However conventional evaporation induced self-assembly techniques are not easily scaled to produce films with sufficient thickness over large areas at the throughput required by electrochromic windows. Here we demonstrate that the principles of sol gel chemistry may be deployed using ultrasonic spray deposition (USD) for scalable synthesis of nanocrystalline WO_3 films with unrivaled electrochromic performance. Systematic manipulation of sol chemistry enabled the production of mesoporous films with high specific surface area (>100m^2/g), mean pore sizes of ~5 nm, and narrow pore size distributions. Film thickness is found to be proportional to the sol concentration and number of spray passes, and various combinations are shown to produce films capable of modulating >98% of incident solar radiation in the visible spectrum (450–900 nm). Elimination of haze enables full transmission in the bleached state, while the broadband coloration is attributed to the exceptionally high charge density (>120 mC/cm^2). The materials have good switching speeds which improve with specific surface area, and the long term durability is promising.

Biography

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 field of green and renewable energy.

Pesticides: Agricultural food products, problems, chemistry

L. Bondareva and **N. Fedorova**

Federal Scientific Center of Hygiene Maned After F.F. Erisman, Russia

On the global scale the damage of agricultural crops is caused by approximately 50 000 species of plant pathogens, 9 000 species of insects and mites and 8 000 species of pest plants. This damage of crops is estimated as the crop loss due to plant pathogens - 13%, due to pest insects - 14% and due to pest plants - 13%. Furthermore, pesticides are indispensable for growing plants, especially for growing economically important crops. The present our research we considers potential approaches to the solution of an important problem, i.e. the impact of pesticides of various classes and applications on living organisms, mainly, on food crops Special attention is paid to the validation of the multi-residual method for determining 40 items of pesticides in agricultural food products, with the following practical application of the method to determine pesticides in real food products, as well as in components of model experiments. The distribution of pesticides between the components of the system soil-plant was studied at an example of rimsulfuron, a pesticide belonging to the class of sulfonylureas. Moreover, grain crops were shown to be less susceptible to the impact of such pesticides as acetamiprid, flumetsulam and florasulam while the shoot development in bean plants was hindered, with the subsequent death of the plants.

Biography

Lydia Bondareva is PhD of Analytical Chemistry, Full Professor of Ecology. She is a Leader in Analytical laboratory research. Her education completed in Lomonosov's Moscow State University, Analytical chemistry. He research interests are analytical chemistry, radioecology, chemistry of pesticides, aquatic plants.

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Influence of ammonia modification on ultra-pure activated carbons derived from furfuryl alcohol

A. Kałamaga and **R. J. Wróbel**

West Pomeranian University of Technology, Poland

The series of ultra-pure carbonaceous materials were produced from furfuryl alcohol by carbonization process under nitrogen and ammonia atmosphere at 600°C followed by physical activation under carbon dioxide at 1000°C with different times. Sorption capacities were measured by thermogravimetry analysis (TGA) at 30°C. The highest carbon dioxide and ethene uptakes for unmodified samples reached 2.5 mmol/g and 4.2 mmol/g, respectively. N-doped materials were characteristic of significantly lower sorption capacities. X-ray photoelectron spectroscopy (XPS) confirmed purity of materials. In chemical compounds occur solely carbon, oxygen, hydrogen and nitrogen (in modified samples). Lack of impurities e.g. calcium, iron or silica allows to eliminate their influence on sorption processes. In addiction it is possible to determine crucial pore sizes for different adsorbates. By volumetric analysis were obtained pore volume and pore size distribution (PSD). Specific surface areas were calculated from BET equation. The highest SSA for unmodified materials reached 1821 m^2/g.

Using of furfuryl alcohol as a precursor to carbonaceous materials is followed by ecological aspects. It is commonly produced from agricultural waste e.g. corncobs. It is also used to green solvents production.

Ultra-pure carbonaceous materials may find application in expensive areas of science where price of material is irrelevant e.g. purification of atmosphere in spaceships, supercapacitors and lithium-ion batteries.

Biography

Agnieszka Kałamaga graduated chemical technology with a specialization in inorganic chemical technology at West Pomeranian University of Technology in Szczecin in 2021. Currently she is a PhD student at ZUT Doctoral School. She is working on carbonaceous materials for sorption application, especially for carbon dioxide, ethene and butane adsorption.

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Bandgap-coupled template auto-catalysis towards the growth of high-purity sp_2 nanocarbons

Jun Gao[1], Zhenxing Zhu[1], Boyuan Shen[2], Yunxiang Bai[3], Silei Sun[1] and **Fei Wei[1]**

[1]Tsinghua University, China

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Extraordinary properties and great application potentials of carbon nanotube (CNT) and graphene fundamentally rely on their large-scale perfect sp_2 structure. Particularly for high-end applications, ultralow defect density and ultrahigh selectivity are prerequisites, for which metal-catalyzed chemical vapor deposition (CVD) is the most promising approach.

Due to their structure and properties, CNTs and graphene can themselves provide growth template and non-local dual conductance, serving as template auto-catalysts with tunable bandgap during the CVD. However, current growth kinetics models all focus on the external factors and edges.

Here, the growth kinetics of sp_2 nanocarbons would be elaborated from the perspective of template auto-catalysis and holistic electronic structure. After reviewing current growth kinetics, various representative works involving CVD growth of different sp_2 nanocarbons are analyzed, to reveal their bandgap-coupled kinetics and resulting selective synthesis. Then our recent progress is reviewed, which has demonstrated the interlocking between the atomic assembly rate and bandgap of CNTs, with an explicit volcano dependence whose peak would be determined by environment. Besides, the topological protection for perfect sp_2 structure and the defect-induced perturbation for the interlocking are discussed. Finally, the prospects for the kinetic selective growth of perfect nanocarbons are proposed. Perfect sp_2 structure is protected by the large formation energy of topological defects, resulting in the relative lack of defective CNT (d-CNT) under proper conditions. Bandgap is significant for the kinetic growth of CNTs. The atomic assembly rate, depicted with turnover frequency (TOF), is prominently lower for metallic CNT (m-CNT) than that for semiconducting CNT(s-CNT), and the latter manifests a volcano dependence on the bandgap that is inversely proportional to diameter, while the peak position of the volcano is shiftable and determined by environment.

Biography

Jun Gao is a Ph.D. candidate in the Department of Chemical Engineering at Tsinghua University. He received his bachelor's degree from Tsinghua University in 2018. His research interests focus on controlled preparation, properties of ultralong CNTs and catalysis.

SCIENTIFIC ABSTRACTS

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Smart coatings: Degradation of priority pollutants on TiO_2 based photocatalytic materials in indoor and outdoor environments-Principles and mechanisms

Dimitrios Kotzias

Institute for Health and Consumer Protection, Italy

The heterogeneous photo-catalysis using semiconductors e.g.TiO_2 is a promising technology for the degradation of environmental pollutants. Preliminary evidence indicates that materials and paints enriched with TiO_2 degrade, upon activation with UV-light, NOx gases and volatile organic compounds (VOCs) e.g. benzene, toluene at concentrations typical for the urban environment. The photocatalytic TiO_2-materials and paints developed are primarily for use outdoors, on facades in high traffic roads.

Due to its band gap of 3.2 eV, TiO_2 is effective only in the UV-region (ca. 5%) of the solar spectrum and with wavelengths <380 nm. Hence, efforts made to increase the area of activity of TiO_2 using visible light, which will expand its application to improve the quality of indoor environments.

The photocatalytic activity of TiO_2 depends on the lifetime of charge carriers - positive holes and electrons - produced on its surface. Recombination of positive holes and electrons occurs in an extremely short time with most charge carriers recombining at the surface of the semiconductor before undergoing redox reactions. In this case no reaction takes place.

One way to reduce or inhibit recombination is to blend/dope TiO_2 with transition metals, which create traps for electrons and /or positive holes and block the charge carriers by reducing the recombination rate. Doping (change/ modification of the crystalline structure of TiO_2) causes a bathochromic (red) shift, which results in a reduction in the energy gap leading to increased absorption in the visible light region. Many transition metals such as V, Cr, Fe, Mn, Ni, Co, Cu, Zn have been explored to reduce the energy gap and facilitate the transfer of electrons to the conduction band and thus extend the spectral range of modified TiO_2 to the area of visible light. In our experiments, 0.1% (w/w) and 1% (w/w) Mn-TiO_2 admixtures were prepared and the ability of the modified photo-catalysts to degrade NO by both solar and indoor illumination was evaluated.

Principles and mechanisms of the photocatalytic reaction at the air/catalyst interface and the possible formation of undesired by-products through the photocatalytic reaction of TiO_2 with organic paint matrices are discussed.

Biography

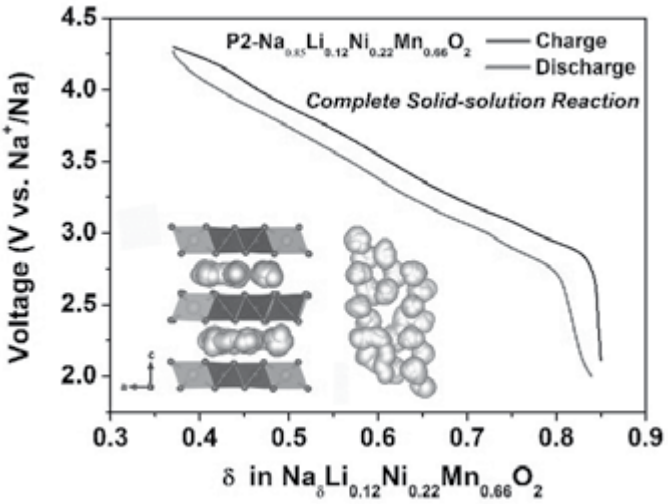
Dimitrios Kotzias (Ph.D in chemistry, University of Bonn/Germany) was Acting Director of the Institute for Health and Consumer Protection (IHCP) and Head (retired) of the Chemical Assessment and Testing Unit at the European Commission's Joint Research Centre (JRC), Ispra/Italy. His research activities focused on trace analysis of organic compounds in complex matrices, photochemical and photocatalytic reactions, photochemical oxidants, indoor air quality and exposure assessment to chemicals and chemical mixtures. Founding member and for many years President of the Mediterranean Scientific Association of Environmental Protection (MESAEP).

High sodium content P2-type cathode for high-performance sodium-ion batteries

Ting Jin

Northwestern Polytechnical University, China

P2-type layered oxides suffer from an ordered Na^+/vacancy arrangement and P2→O_2/OP_4 phase transitions, leading them to exhibit multiple voltage plateaus upon Na^+ extraction/insertion. The deficient sodium in the P2-type cathode easily induces the bad structural stability at deep desodiation states and limited reversible capacity during Na^+ de/insertion. These drawbacks cause poor rate capability and fast capacity decay in most P2-type layered oxides. To address these challenges, a novel high sodium content (0.85) P2-type cathode-$Na_{0.85}Li_{0.12}Ni_{0.22}Mn_{0.66}O_2$ was developed. In situ XRD shows both P2→O_2/OP_4 phase transitions and Na^+/vacancy ordering can be successfully converted into a complete solid solution dominated region after Li substitution. The complete solid-solution reaction over a wide voltage range ensures both fast Na^+ mobility (10-11 to 10-10 cm^2 s^{-1}) and small volume variation (1.7%). The high sodium content P2-$Na_{0.85}Li_{0.12}Ni_{0.22}Mn_{0.66}O_2$ exhibits a higher reversible capacity of 123.4 mA h g^{-1}, superior rate capability of 79.3 mA h g^{-1} at 20 C, and 85.4% capacity retention after 500 cycles at 5 C. This work highlights the importance of the solid-solution reaction mechanism in a high sodium content P2-type cathode, which ensures higher reversible capacity, superior cycling stability and remarkable rate capability.



Biography

Ting Jin is a professor at the State Key Laboratory of Solidification Processing and the School of Materials Science and Engineering at Northwestern Polytechnic University, China. She received her PhD in 2020 from Nankai University (China) and her B.S. in materials chemistry from Northwest University (China) in 2015. Her research interests focus on the design and fabrication of advanced electrode materials for energy storage and conversion, such as rechargeable lithium-ion and sodium-ion batteries.

Circular polarizing filters based on chiral metasurface

X. He, J. Li, X. Liu and **X. Hao**

Zhejiang University, China

Chirality is a structural feature in which two objects are mirror images of each other, similar to the left and right hands. For example, we can find the chirality in DNA, cholesteric liquid crystals, screws, and circular metal spirals. Meanwhile, the left circular polarization and right circular polarization light tracks are mirror images, like the above chiral structures.

Metal gratings based on the Plasmonics are sensitive to linear polarization light. The 3D helices can be considered as the integral of metal gratings twisted with a constant angle along the propagating direction. By adjusting the twist angle and effective length of the polarization charge oscillation, the anisotropy of a single arc can be successfully transformed into a broadband double anisotropic optical response. Moreover, the chiral metasurface exhibits nearly uniform circular dichroism and asymmetric transmission to circularly polarized light. Therefore, we can use chiral metasurfaces to make circular polarizers.

The application of circular polarization imaging is particularly extensive, covering various fields such as biomedical imaging, material science, space remote sensing, and military target recognition, including such as flying airplanes, living cells and tumor lesion detection, which can greatly improve our lives and promote the development of science and technology. For example, when we conduct medical research, the main disadvantage of polarization gating of light backscattered from tissue is that surface reflections affect the image. The combination of images obtained by using linearly polarized and circularly polarized light can produce polarization-gated images without surface reflection, no need additional optical devices and materials.

In view of these various types of omni-directional applications, we do need chiral metasurface based circular polarizers.

Biography

Xin He is currently working at Zhejiang University as a Postdoctoral researcher. He obtained a PhD and a Master's degree at the University of Melbourne. His PhD research interests include plasmonics, spectral imaging and other metasurface based optical devices (e.g., polarizers, phase shifter, metalens). He obtained advanced skills on COMSOL Multiphysics, FDTD and Micro/Nano fabrications. He also created a prototype of a multispectral image sensor with six bands, the minimum full width half maximum (FWHM) is 17nm in the near IR wavelength.

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Hot ECAP implementation in zirconia reinforced aluminium chip matrix (Al6061) composite production

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[2]Imperial College London, UK

The demand of aluminium in transportation sector is growing rapidly due to the high strength to weight ratio requirement for fuel saving and performance purpose. There is a need to develop a sustainable recycling process without melting phase for the secondary aluminium production that can further save the energy, reduce the greenhouse gas emission level and global warming. Therefore, a meltless equal channel angular pressing (ECAP) method was introduced to process the aluminium wastes in the form of chips to achieve the forementioned agenda. In this study, the composites made of aluminium AA6061 chips reinforced with 5%, 10%, and 15% volume fraction of ZrO_2 powder were produced under the different processing temperatures of 450˚C, 500˚C, 550˚C. The experimental results were analysed using the design and analysis of experiments (DOE) principle and assisted by the Minitab 18 software. It was reported that the maximum yield strength and hardness increased to 119.26 MPa and 65.25 VH compared to 100.26 MPa and 50 VH (as-received AA6061) respectively.

Biography

Sami Abdo Mohammed Al-Alimi received the B.Eng. degree in the faculty of mechanical and manufacturing Engineering, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia 2014, and Master in 2016 form the same university. Passed Ph.D viva on 9/62021. He worked on metal forming of light metals by plastic deformation techniques. He is a researcher in solid-state recycling of light metals, and plastic deformation forming techniques, he worked as a research assistant with an internal grant university. His research interest is in enhancing mechanical and physical of light metals properties, such as aluminium in the composite or pure form as long as developing and combined forming techniques which are superior ways to reproduce metals as same or close to the pure properties.

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Nanoparticles as cell tracking agents in human ocular cell transplantation therapy

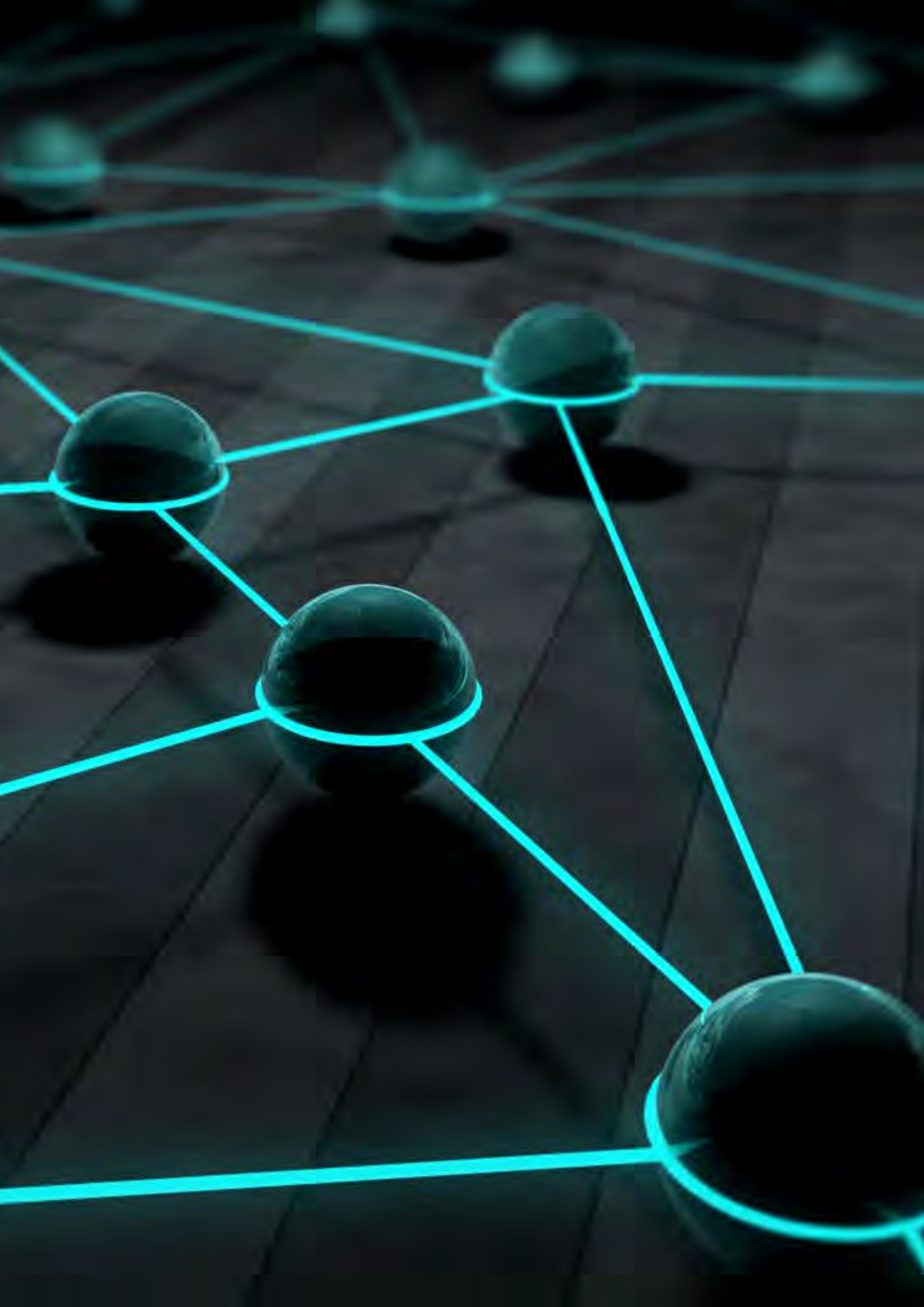
David C. Mundy and **Jeffrey L. Goldberg**

Stanford University School of Medicine, USA

Cell transplantation is a promising strategy for treating degenerative eye disorders for which no curative therapies exist, including age-related macular degeneration (AMD), diabetic retinopathy, and glaucoma. While past and ongoing clinical trials of ocular cell transplantation have demonstrated encouraging findings, our insight into their successes and failures is limited, in large part due to the difficulty of following the fate of the transplanted cells in the human eye. Here we explore the potential use of nanoparticles (NPs) as cell tracking agents in ocular cell therapy, highlighting their advantages over other labeling methods such as fluorescent reporters and DNA barcoding. Two classes of NP—gold nanoparticles (GNPs) and superparamagnetic iron oxide nanoparticles (SPIONs)—may be particularly well-suited for longitudinal cell tracking in the eye, owing to their safety profile and compatibility with clinical imaging modalities. To establish these NPs as viable cell trackers in human ocular cell therapy, further research should be aimed at elucidating their eye-specific imaging characteristics, safety, and clearance. Our ability to accurately assess the critical processes in ocular cell transplantation—delivery, distribution, immune acceptance, retention, and integration—will help accelerate the progress of regenerative medicine in the eye.

Biography

David Mundy studies Medicine at Stanford University School of Medicine. His research is focused on harnessing regenerative approaches to restore vision in the eye. He received his undergraduate degree from Stanford University, where he was a Bio-X fellow and earned the Dean's Award for Academic Excellence. At Stanford Medicine, he was awarded the Medical Scholars Grant and has authored several papers on natural killer cell biology and tumor immunology. Currently, his main research interests include: (1) developing hydrogels for stromal replacement and stem cell delivery to facilitate tissue regeneration; and (2) developing theranostic nanoparticles for ocular regenerative therapy.



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