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Abstract Book

5th Edition of Applied Science, Engineering and Technology Webinar

December 13-14, 2021 | GMT 07:00 – 12:00

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DAY 1

KEYNOTE FORUM

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APPLIES SCIENCE, ENGINEERING AND TECHNOLOGY WEBINAR

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V-ASET2021

Rémi Léandre

Université de Franche-Comté, France.
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Malliavin Calculus of Bismut type for non-markovian semi-groups: an introduction

We give a survey of our recent papers relating the Malliavin Calculus of Bismut type and non-markovian semi-groups. Formulas are valid only for the semi-group and not for the whole path space.

Biography

Rémi Léandre has written about 200 papers about the applications of the Malliavin Calculus, white noise analysis and stochastic differential geometry to analysis, geometry and mathematical physics. He received Rollo Davidson Prize in 1989 and Bronze Medal of CNRS in 1988 for various works on hypoelliptic diffusions. He has organized several conferences in France and published two books with X. Dai, W. Zhang and X. Ma in honour of J.M. Bismut in Astérisque (French Mathematical Society).

Kenji Shiraishi

Institute of Materials and Systems for Sustainability, Nagoya University, Nagoya, Aichi, Japan.
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First Principles Studies on the Atomistic Processes of GaN Metal Organic Vapor Phase Epitaxy (MOVPE)

GaN has attract a great attention because it is the key material of future power devices as well as present optoelectronics devices. To achieve recent requirement of future power devices, epitaxial growth of high quality GaN is necessary, and atomistic understanding of GaN MOVPE growth is inevitable.
In this presentation, we clarify the gas phase reactions of GaN MOVPE by using the first principles calculations. Our calculations indicate that TMG (trimethylgallium, Ga(CH3)3) decomposes into GaH3 by removing methyl groups. This decomposition reaction includes two gas phase reactions of TMG + NH3 DMGNH2 + CH4 and DMGNH2 + H2 DMGH + NH3. This two step decomposition of TMG is the key atomistic mechanism of gas phase reactions of GaN MOVPE.

Biography

Dr. Kenji Shiraishi has completed his PhD from the University of Tokyo, Japan in 1988 and worked for NTT basic research laboratories, Japan from 1988 to 2000. From 2001-2013, he worked for University of Tsukuba. From 2013, he moved to Nagoya University. He is now a professor of Nagoya university. He has published more than 200 papers in reputed journals.

Tetsuya Hiraishi

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Applicability Test of New Type Removable Tsunami Breakwater and Simple Barrier

Since the 2011 East Japan Great Earthquake Tsunami, the risk of large tsunami hazard has been increasing in the coastal area in Japan. Especially the occurrence probability of huge earthquake and tsunami is expected very high in the south-west part of Japanese main island. As the harbor area is the center of industry and residence, the hazard may become destructive when the tsunami attacks. In order to prevent the damage level, the tsunami breakwater and tidal wall is constructed. However, the harbor entrance is opened to keep the navigation truck for vessels. A new concept removable breakwater has been developed to close the opening when the tsunami attacks. The Fin-type Removable Tsunami Breakwater is applicable to the emergency time usage at the harbor opening. In the presentation, the application of the breakwater to river gate protection case is demonstrated employing a model experimental result. A removable tidal barrier to prevent the land inundation is introduced and numerically validated at the later part of the presentation.

Biography

Tetsuya Hiraishi has completed his Dr.Eng. from Kyoto University, Japan in 1992. He became a member of the Japanese Ministry of Transport in 1982 after graduation. During 1989-1990, he studied in National Research Council Canada. He moved to Kyoto University as a professor of the Disater Prevention Research Institute in 2011. He published more than 100 original papers

Ji Wang

Piezoelectric Device Laboratory, School of Mechanical Engineering and Mechanics, Ningbo University, 818 Fenghua Road, Ningbo, 315211 Zhejiang, China. Email: wangji@nbu.edu.cn

An Analysis of Thermal Effects on Vibrations of a Quartz Crystal Microbalance

A quartz crystal microbalance (QCM) is a high precision gravimetric sensor for biological and chemical samples in research laboratories, hospitals, and industry. The accuracy of QCM depends on the design of the quartz crystal resonator with the specially tailored electrode and affinity layer for the sensing function and the stability in operations. As a result, careful and accurate analysis of the QCM structure with considerations of quartz crystal blank, electrodes, temperature, and sample characteristics are important in the evaluation of materials and configurations. Concerning these issues, there are some experimental studies on the material and structural parameters and frequency variations, and corresponding analyses are also made with simplified plate equations to ensure an analytical procedure to improve the design process. It is found that the approximate equation of plate vibrations is capable for accurate results in certain ranges of parameters, and the results are consistent with the finite element analysis. The refinement of the equation and techniques for the complication factors like electrodes, samples, and temperature will provide a more reliable procedure for the design and optimization of QCM with better precision. There will be detailed discussions on the analytical equations and comparisons of results from measurements with the consideration of temperature.

Biography

Professor Ji Wang is the founding director of the Piezoelectric Device Laboratory, Ningbo University. Professor Ji Wang also held visiting positions at Chiba University, University of Nebraska-Lincoln, and Argonne National Laboratory. He received his PhD and Master degrees from Princeton University in 1996 and 1993 and bachelor from Gansu University of Technology in 1983. Professor Wang has been working on acoustic waves and high frequency vibrations of elastic and piezoelectric solids for resonator design and analysis with several US and Chinese patents, over 200 journal papers, and frequent invited, keynote, and plenary presentations in major conferences around world.

Ahmad Razlan Yusoff
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Design of Machining Tools: Current Development and Future Prospect in Mold and Die, Automotive and Medical Applications

Machining process deals with material removal from bulk metal using either turning, drilling, milling or grinding process in the mold and die, automotive and medical industries. Metal cutting processes demand higher productivity and profits facing problems of tools wear, breakage and failure consequently increase the cost of metal fabrication and production. In first case study: end milling tool geometries utilized for reducing chatter vibration in milling process for automotive application. Analytical and optimization analyses with semi discrete method and Differential Evolution produces the optimized helix and pitch geometries. This passive chatter mitigation offers a double cutting process productivity compared to regular cutting tools. In drilling application, deep twist drilling introduced to increase machining productivity. A primary issue in this process is the premature tool breakage due to tool wear, chip clogging and failures. The optimization of tool drills geometries of point angle, helix angle and chisel edge can reduce the tool failures. This second case study of deep drilling in making cooling channels of hot forming die found that the optimum tool geometries can reduce tool failures. In third case study: drilling bit geometries have been identified for reducing the thermal damage in bone drilling process. Numerical and optimization analyses with finite element

Biography

Prof Yusoff has completed his PhD from University of Sheffield, UK, appointed as visiting professor at universities in Japan, Turkey and Indonesia and research fellows in multi-national and international companies. He serves as the deputy dean of Institute of Post Graduate Studies, Universiti Malaysia Pahang, Malaysia and received a Professional Engineer from BEM, Malaysia and Chartered Engineer from I-MechE, UK. He has graduated 5 PhD and 10 master students, actively supervised 6 PhD students which is published more than 75 papers in reputed journals, served as national research grant evaluators and thesis examiners for more than 30 students.

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Per A. Löthman [1,2]
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[2]University Kaiserslautern, Germany.

Sculpting the Nanoscale: targeting novel applications and venues

Instead of turning to a different class of materials such as nanoribbons or nanocomposites, nanoscopic sculpting of graphene and other 2D materials would further alter the already numerous and exceptional properties and extend the fields of applications. It would open up an energy band gap in a graphene sheet for the application as field effect transistors (FETs). Sculpted nanopores can turn semimetallic graphene into a semiconductor. Nanoscopic sculpting such as nanolithography, manipulation by AFM or an electron beam of a transmission electron microscope is considered a promising venue to target properties of nanomaterials. In this way for example nanopores can be introduced into graphene.

The aim of this contribution is to illustrate how the properties and applications of nanoscopic materials such as graphene can be altered, improved and extended by nanoscopic sculpting.

Biography

Dr. Per A. Löthman is a multidisciplinary researcher, he obtained his Ph.D. degree from Twente University , The Netherlands in the field of Macroscopic Magnetic Self-assembly and conducted research in Canada, France and Germany on carbon nanotubes, Graphen and related nanomaterials. His research is interdisciplinary and involve BioNanotechnology including DNA, S-layers, Viruses (archaea, bacteriophages), Biomolecular Architecture. Botany and functional surfaces. Dr. Löthman has published over 60 scientifical articles, several book chapters and serves as a reviewer for several journals such as Nature, Journal of Bioanalytical and Analytical Chemistry, Journal of Colloid and Interface Science, Thin Solid Films, Sensors and Actuators, Microsystems Technologies, Biophysical Reviews and Letters, He is Senior Research Scientist at Foviatech GmbH in Hamburg, Germany, a young innovative high-tech company in the field of advanced materials and artificial intelligence, and a senior lecturer in Nanomedicine, Nanopharmacy and Nanomaterials (Kaiserslautern University) and Mechatronics Systems and Design (Hamburg University), Germany and HTW Berlin.

Akira Nishimura

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Numerical Analysis on Coupling Phenomena in Single Cell of PEFC under High Temperature Operation Condition than Usual

According to the New Energy and Industrial Technology Development Organization (NEDO)'s road amp in Japan, a polymer electrolyte fuel cell (PEFC) is required to be operated at around 90 ℃ and 100 ℃ for stationary application and mobility application, respectively, from 2020 to 2025. However, the PEFC having a polymer electrolyte membrane (PEM) such as Nafion is normally operated at the temperature ranging from 60 ℃ to 80 ℃. However, we have to consider the following problems if we operate the PEFC at higher temperature than usual: (i) degradation of the membrane material, (ii) catalyst corrosion, and (iii) gas flows, pressure, temperature, and non-uniform distribution of voltage and current in the PEFC. These problems must be resolved in order to commercialize PEFC operating in a relatively high-temperature range. Consequently, it is necessary to analyze heat and mass transfer mechanism in the PEFC to enhance the power generation performance and stability in the high-temperature range. This study aims to analyze the coupling phenomena such as heat and mass transfer as well as electrochemical reaction in single cell of PEFC. Using the commercial CFD software COMSOL Muitiphysics, the concentration distribution of H_2, O_2 and H_2O as well as current density distribution are calculated. The initial operation temperature is changed by 80 ℃, 90 ℃ and 100 ℃ and the relative humidity of supply gas is changed by 80 %RH and 40 %RH for anode and cathode, respectively. The effect of thickness of PEM on coupling phenomena is also investigated.

Biography

Dr. Akira Nishimura is an associate professor in Division of Mechanical Engineering at Mie University, Japan. He received the B.S. Eng., the M.S. Eng. and Dr. Eng. degrees in Chemical Engineering from Nagoya University, Japan in 1995, 1997 and 2000, respectively. He worked at Center for Integrated Research in Science and Engineering, Nagoya University as research associate from 2000 to 2002. He moved to Mie University in 2002 as an assistant professor and promoted to associate professor from 2014. He has published 80 reviewed journal papers. His current research is clarification on heat and mass transfer mechanism of PEFC..

Poster Presentation

Shiuh-Chuan Her [1] and Wei-Da Huang [2]

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Tensile Strength of Multi-Walled Carbon Nanotubes Buckypaper

Carbon nanotube with excellent thermal, mechanical and electric properties, has received wide attention. In this study, pristine and functionalized multi-walled carbon nanotubes (MWCNTs) were employed to prepare Buckypapers. MWCNTs were dispersed in de-ioned water with a sonication probe. The surfactant Trixon X-100 was used to provide a better dispersion of MWCNTs. Using a Vacuum pump, the suspension was filtered through a PVDF membrane, resulting in the deposition of MWCNTs on the PVDF filter to form the Buckypaper. Three different types of multi-walled carbon nanotube, namely pristine MWCNT, functionalized carboxyl group MWCNT-COOH and hydroxy group MWCNT-OH were used. Tensile tests were conducted to determine the mechanical properties of the Buckypaper including the Young's modulus, yielding strength, tensile strength, break strain and fracture modulus. Experimental results show that the tensile strengths of pristine MWCNT, MWCNT-OH and MWCNT-COOH Buckypapers were 2.14 MPa, 2.55 MPa and 3.03 MPa, respectively. While the Young's modulus of pristine MWCNT, MWCNT-OH and MWCNT-COOH Buckypapers were 208 MPa, 246 MPa and 333 MPa, respectively. This demonstrates that the tensile strength and Young's modulus of Buckypaper can be improved by grafting MWCNTs with functionalized groups such as carboxyl COOH or hydroxy OH.

Biography

Shiuh-Chuan Her has received his PhD from University of California Los Angeles, USA. He is professor of Department of Mechanical Engineering, Yuan Ze University, Taiwan. He has published more than 50 papers in reputed journals.

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Hoshang Kolivand
Department of Computer Science, Liverpool John Moores University, Liverpool, UK

Current and Future of Directions of Augmented and Virtual Reality

There is no doubt that Augmented and Virtual Reality(AR/VR) has changed the world recently and has the potential to become a fascinating widespread requirement in daily life. In about two decades, AR/VR has turned into one of the most attractive topics involved in a variety of topics attempting to obtain satis-satisfactory results. In this speech, I am going to present what I have done so far with AR and VR and new technologies. Current advances and future directions of AR/VR and wearable devices will be discussed with an eye on revenue of this technology How to engage our current research with new technology to enhance our current research will be the next part of my speech.

Biography

Hoshang Kolivand is Visiting professor at Barath University, India and a Senior Lecturer in Computer Graphics at the Department of Computer Science, Liverpool John Moores University, UK. He received his MSc degree in Applied Mathematics and Computer Science from Amirkabir University of Technology, Tehran, Iran, and his PhD from Universiti Teknologi Malaysia (UTM) in 2013. His background is in 3D maths & Computer Graphics in particular Augmented and Virtual Reality. Over 150 international publications in the area of 3D visualisation, immersive technology & human Computer Interaction. A global leader in this field invited to address the current & future advances of immersive technology in several high-ranked international events.

Edgar Harzfeld

Stralsund University of Applied Sciences

New solutions for storing and using surplus electricity in Methanol

The decline of fossil fuels requires the expansion of renewable energy production. The use of wind and pv energy is associated with strong fluctuations that are insufficiently adapted to the demand. The use of storage systems can help to reduce the mismatch. While short-term storage systems such as batteries rely on charging and discharging cycles, long-term storage systems such as methanol storage can be charged and discharged over any time range. Current studies show a wide variety of possible applications for long-term storage systems based on methanol. Methanol can contribute to the decentralised supply of electricity, heat and fuel as well as to grid stabilisation. In an emergency case, it can even supply entire consumer clusters autonomously for several days.

Biography

Edgar Harzfeld, Professor at Stralsund University. Studies and research in Leipzig and Zurich. Since 1996 at the Faculty of Electrical Engineering and Computer Science of Stralsund University responsible for electrical power supply and renewable energy systems. Since 2004 - 2021 numerous research projects on the subject of electrical energy storage technologies.

Jiangtao Cheng

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Electrowetting and Its Applications in Adaptive Electronics Cooling, Optofluidic Solar Concentrators and Agile Beam Steering for Automatic Driving

First, we introduce electrowetting-based digital microfluidics for hot spot cooling of electronics systems. In response to the rapid advances in microelectronics, novel cooling technologies are needed to meet increasing cooling requirements. As a paradigm-shifting technique, electrowetting- As a paradigm- on -dielectric (EWOD) uses electric potential to control the movement of a liquid droplet on a dielectric surface. We have developed an EWOD-based microfluidic technique for active and adaptive thermal management of on-chip hot spots. A two-dimensional array of control electrodes was patterned on the chip surface for EWOD operations. By applying AC voltages with appropriate sequence and timing to the coplanar electrode units, we are able to transport microdroplets of tens of □L along a programmable path. Without the need of external pumps and valves, the droplets are precisely delivered to cooling targets. With the driving voltage as low as 40 V_{AC}, we demonstrate high heat flux (7.6 W/cm^2) cooling on a hot spot. The EWOD-induced internal circulation within the droplets leads to a time-averaged Nusselt number of ~45.

Next, we introduce a novel optofluidic solar concentration system based on electrowetting tracking. With two immiscible fluids in a transparent cell, we can actively control the orientation of fluid–fluid interface via electrowetting. The naturally-formed meniscus between the two liquids can function as a dynamic optical prism for solar tracking and sunlight steering. An integrated optofluidic solar concentrator can be constructed from the liquid prism tracker in combination with a fixed and static optical condenser (Fresnel lens). Therefore, the liquid prisms can adaptively focus sunlight on a concentrating photovoltaic (CPV) cell sitting on the focus of the Fresnel lens as the sun moves. Because of the unique design, electrowetting tracking allows the concentrator to adaptively track both the daily and seasonal changes of the sun's orbit (dual-axis tracking) without bulky, expensive and inefficient mechanical moving parts. This approach can potentially reduce capital costs for CPV and increases operational efficiency by eliminating the power consumption of mechanical tracking. Importantly, the elimination of bulky tracking hardware and quiet operation will allow extensive residential deployment of concentrated

solar power. In comparison with traditional silicon-based photovoltaic (PV) solar cells, the electrowetting-based self-tracking technology will generate ~70% more green energy with a 50% cost reduction. Last, we introduce reconfigurable beam steering components, which are indispensable to support optical and photonic network systems operating with high adaptability and with various functions.

Currently, almost all such components are made of solid parts whose structures are rigid, and hence their functions are difficult to be reconfigured. Also, optical concentration beam steering is still a very challenging problem compared to radio frequency/microwave steering. Here we show a watermill-like beam steering system that can adaptively guide concentrating optical beam to targeted receivers. The system comprises a liquid droplet actuation mechanism based on electrowetting-on-dielectric, a superlattice-structured rotation hub, and an enhanced optical reflecting membrane. The specular reflector can be adaptively tuned within the lateral orientation of 360°, and the steering speed can reach ~353.5° s^{-1}. This work demonstrates the feasibility of driving a macro-size solid structure with liquid microdroplets, opening a new avenue for developing reconfigurable components such as optical switches in next-generation sensor networks and LIDAR system for automatic driving.

Biography

Dr. Jiangtao Cheng received his Ph.D. degree in Physics from *Purdue University* in 2002. He also has a M.S. degree in Computer Science from *Purdue University* and a B.S. degree in Applied Physics from *Peking University*. Prior to joining the Department of Mechanical Engineering at *Virginia Tech* in 2015 as Associate Professor, Dr. Cheng was a research associate at *the Pennsylvania State University* and a research scientist at *Teledyne Scientific Company* (formerly *Rockwell Science Center*). He has served as the principal investigator of several research projects funded by DOE, NASA, DARPA and NSF totaling more than 3M. He has authored/co-authored more than 70 papers in journals and proceedings of conferences. Dr. Cheng has been on the editorial boards of five international journals. He has won numerous awards during his career including five times of Best Paper/Best Poster Awards in various international conferences and 2013 Outstanding Overseas Young Scholar Award from China NSF. In 2010, Dr. Cheng's project "Optofluidic Solar Concentrators" was announced by the U.S. Department of Energy as one of the "six transformational energy research and development projects that could revolutionize how the country uses, stores, and produces energy". In 2021, Dr. Cheng was elected a fellow of ASME. He has extensive experience in renewable energy, optofluidics, thermal-fluid sciences, micro/nano-fluidics, multiphase fluid flow, nano-fabrications and CFD numerical simulation.

Dave White
Climate Change Truth Inc. cctruth.org, USA.

Discovery: Reduction in photosynthesis correlation to carbon dioxide increase

Carbon dioxide emissions correlate to 363 ppm and are not the cause of the Atmospheric CO2 rise since 1957. The correct cause is deforestation of the Amazon Rain-Forest (0.99 by Pearson's regression). Since 1950, the Amazon Rain forest has been deforested. An average of 12 million hectare per year. This defor-deforestation causes a minimum of 30% of the biomass burned. The burning of the biomass is adding billion of tons of carbon dioxide to the atmosphere. The carbon dioxide has overwhelmed the rain forest and caused massive decay. The rain forest has now become and oxygen sink and carbon dioxide producer. Now emitting 10 billion tons of CO2 annually. Also losing its ability to produce oxygen. To solve these issues the deforestation and burning needs to stop. Then after 10 years, the burning can continue 10% a year for 10 years. This will heal the amazon and bring down atmospheric carbon dioxide quickly by increasing photosynthesis consumption to 100 billion tons annually. Stop non- sustainable deforestation like the Indian and Amazon rain forests. Please native trees and shrubs all over the world. The residence time of atmospheric CO2 is 150 years. This is why there exists no signature to any recession or other lowering of CO2 emissions.

http://cctruth.org/residence_time.pdf
Keywords: carbon dioxide increase, carbondioxide scavenging, Climate Change, rain-forest

Significance Statement: Atmospheric CO2 has two possible issues. CO2 emissions are one. We have worked on that and have been flat at 36 billion tons annually since 2014. However the atmospheric CO2 concentration and residence time are still increasing. The atmospheric tank model is just like a kitchen sink. When the water rises and stays in longer, we know we have a plugged drain. That drain is photosynthesis.

Conclusion We can never bring down Atmospheric carbon dioxide by working on emissions alone. We need to put even more effort into increased photosynthesis. This will reduce atmospheric carbon dioxide to 330 ppm by year 2031 to 2040.

Biography

Dave Is a Chemical Engineer with Masters studies in Statistics, currently working on Climate Change. He has 30 years' experience since graduation in 1984. Promoting responsibility to environment and health of all species. Dave White graduated in Chemical Engineering in 1984. During the time at Oregon State University Dave worked on a cross flow counter current scrubber for coal fired power plants. Additionally took masters level classes on statistics. Then he moved to Hillsboro with his wife and worked in Semiconductors. In 2007 Dave along with Dr. Tom Wallow produced a paper on ArF double patterning for semiconductors. This multi-pattering scheme is widely used in today's semiconductor manufacturing plants. In 2011 Dave started a consulting business for Semiconductors. In 2017 Dave Started Climate Change Truth Research Inc. Dave is seeking the truth about climate change. His research interests are evaporation from the ocean, rain forest destruction effects and diffusion of CO2 through the atmosphere. Acta Scientific agriculture Journal editor

Huamin Li

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Two-Dimensional Materials for Future Energy-Efficient Nanoelectronics

With the rise of graphene in 2004, two-dimensional (2D) materials have received great attention in multiple disciplines and been considered one of the most promising materials for future energy-efficient nanoelectronics. In this talk, I will briefly review the novel and fascinating properties of 2D materials, ranging from semimetal graphene to semiconducting MoS_2 and insulating *h*-BN, and their state-of-the-art applications in low-power beyond-CMOS nanoelectronics.

Biography

Huamin Li has completed his PhD from Sungkyunkwan University, Korea, and postdoctoral research from University of Notre Dame, USA. His expertise is in the exploration of nanoscale two-dimensional materials and their application for next-generation nanoelectronics. He is an Associate Editor for IEEE Access and an Editorial Board Member for Nano Express.

Tran Thi Thanh

Research Scientist and Grant Writer, Aptagen LLC, USA.

Aptamer as “chemical antibody soup” and organ on a chip: promising material for personalized treatment

The aptamer, known as a chemical antibody, has proven to be of high diagnostic and therapeutic value with the FDA’s first aptamer drug in 2004 and many aptamers under clinical validation. However, the clinical translation of aptamer for therapeutics has been delayed because of the limitation of using the target model during selection and a lack of information on several crucial factors, including their inherent physicochemical characterization and safety, and the function. The organ-on-a-chip integrates microfluidic technology with 3D cell culture that possesses in vivo-like tissue-based models that have been engineered for validation to transform the commercial drug discovery. Thus, the organ-on-a-chip may offer a promising solution for the addressed problems, enhancing the clinical translation procedure for aptamer-based therapeutics. Motivated by the advantageous function of the aptamer-based organ-on-a-chip system, I update the current technology to generate aptamers using SELEX (Systematic Evolution of Ligands by EXponential Enrichment) and confirm the application of aptamers to various long-term treatments. Also, with this concept, I will sugguest about using aptamer as “chemical antibody soup” for personalized treatment.

Biography

Tran Thanh Thoa graduated her PhD from Tokyo Metropolitan University, Japan in 2017. Since then, she had worked as a Research Professor at Korea University, and, subsequently, served as a research scientist at the Institute of Fluid Mechanics (LSTME) Busan.

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R. Khemmar[1], A. Mauri[2], B. Decoux[3], M. Haddad[4], R. Boutteau[5]

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Environment Perception-based Deep Learning. Application to Road and Railway Smart Mobility

For smart mobility, autonomous vehicles (AV), and Advanced Driver Assistance Systems (ADAS), perception of the environment is an important element in scene analysis and understanding. A better perception of the environment allows for enhanced decision-making, which, in turn, allows very high accuracy actions. To this end, we introduce a new single-stage monocular real-time 3D object detection Convolutional Neural Network (CNN) based on YOLOv5 dedicated to smart mobility applications for both Road and Rail real-time environments. To perform the 3D parameters regression, we replaced YOLOv5's anchor boxes with our hybrid anchor boxes. Our method is available in different model sizes such as YOLOv5: Small, Medium, and Large. We also added a new model optimized for real-time embedded constraints (lightweight, speed, and accuracy) that takes advantage of the improvement brought by Split Attention (SA) convolutions called Small Split Attention Model (Small-SA). To validate our CNN model, we also introduce a new virtual dataset for both Road and Rail environments by leveraging the video game Grand Theft Auto V (GTAV). We provide extensive results of our different models on both KITTI and our own GTAV datasets. Through our results, we show that our method is the fastest available 3D object detection with accuracy results close to state-of-the-art methods on the KITTI road dataset. We further demonstrate that the pre-training process on our GTAV virtual dataset GTA improves the accuracy of our methods on real datasets such as KITTI thus allowing our method to obtain an even greater accuracy than state-of-the-art approaches with 16.16% 3D Average Precision on hard car detection.

Biography

R. KHEMMAR is currently associate professor with the ESIGELEC, Normandy University of Rouen, France. He received his European Master of Science in Computer Vision from University of Poitiers (France) and his PhD in Computer Vision from the University of Strasbourg (France). For two years, he was with the University of Strasbourg as an associate teacher researcher, before moving to the industry, where he worked as engineer and project manager in JOUVE, ALTEN, and THALES companies. After, he joined IRSEEM/ ESIGELEC High Engineer School (Normandy University) as an associate professor in embedded systems and computer vision, and the "Instrumentation, Computer Sciences and Systems" research team in the IRSEEM laboratory. His research interests include mobile robotics, environment perception, and computer vision dedicated to autonomous vehicles and smart mobility.

Leandro S. R. Rocha[1], Miguel A. Ponce[2], Carlos Macchi[3], Alberto Somoza[3], Elson Longo[1]

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[2]Institute of Materials Science and Technology Investigation (INTEMA), National University of Mar del Plata, Mar del Plata, Buenos Aires, Argentina.
[3]Institute of Materials Physics, National University of Central Buenos Aires, Buenos Aires, Argentina.

Spectroscopic evidences of defective species in hybrid ceria quantum-dots

This study reports the defect structure characterization of hybrid cerium oxide (CeO2)@(MCC) microcrystalline cellulose quantum dots prepared by the Microwave Assisted Hydrothermal (MAH) route. Positron spectroscopic studies revealed the presence of two distinct oxygen defects, in addition to an increment in the concentration of Ce3+-oxygen vacancy associates as a function of temperature. Besides, it showed that both temperature and pH influence the concentration of ceria defects along the cellulose surface. The application of the semiconductor for biocidal activity is directly related to the defect density. In this way, we have successfully synthesized hybrid nanoceria structures with an indication of the distribution of localized energetic levels originated from defective species, essential in the scavenging of reactive oxygen species (ROS) and the consequent multifunctional therapeutic/biocide properties to be further evaluated against the SARS-CoV-2.

Biography

Leandro Silva Rosa Rocha has completed his PhD from The School of Engineering, São Paulo State University and is currently finishing postdoctoral studies at the Center for Research and Development of Functional Materials, Federal University of São Carlos (UFSCar). He has published more than 20 papers in reputed journals besides 3 intellectual properties deposition.

Piotr Maśloch

Institute of Management, Management and Command Faculty, War Studies University, Warsaw, Poland.
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Avatar: from fantasy to an innovative customer service tool

The paper entitled "*Avatar: from fantasy to an innovative customer service tool*" presents the possibilities of the interactive avatar tool in terms of shaping marketing relationships with potential customers. The paper presents the results of research on the use of traditional channels of marketing messages along with comments on them. The second part of the article contains conclusions from the research carried out by the Academy of War Studies as part of an EU-funded project on the possibility of using Avatar in practice. What's more, during the pandemic, Avatar provided a comprehensive service to customers without the need to contact employees directly, which is its added value. The results of the research, combined with analysis of device activity, gives the idea that Avatar can be an innovative tool used in marketing communications. This is confirmed by current global trends in the development of both modern marketing and other areas of social life, development based on virtualization, digitization, augmented reality and industry 4.0.

Biography

Piotr Maśloch is a Professor at Was Studies University in Warsaw, Management and Command Faculty. Prof. Piotr Maśloch is an officer of the Polish Army and Dean's Representative for EU projects. He is an author and manager of international projects (founded by UE) in the field of new technologies and modern education. He is an active teacher and researcher in management, sustainable energy, sustainability and SI. He is a reviewer of scientific publications of the best Polish Universities and international publishing houses, is an author and co-author of more than 100 publications as paper contribution on international journals, book chapters and conference proceeding. His research interest includes management, new technology and global aspects of management.