

6th Edition of Applied Science, Engineering and Technology Virtual

April 22-23, 2022

**Book of Abstracts** 





### and TECHNOLOGY VIRTUAL

APRIL

22-23, 2022

GMT 07:00 - 13:00

PLENARY FORUM



April 22-23, 2022

### **Edgar Harzfeld**

Stralsund University of Applied Sciences, Germany.

#### 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 decentralized supply of electricity, heat and fuel as well as to grid stabilization. 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 - 2022 numerous research projects on the subject of electrical energy storage technologies.





# APPLIED SCIENCE, ENGINEERING

and TECHNOLOGY VIRTUAL

APRIL

22-23, 2022

GMT 07:00 - 13:00

KEYNOTE FORUM

April 22-23, 2022

### Akira Nishimura

<sup>1</sup>Division of Mechanical Engineering, Graduate School of Engineering, Mie University, Tsu, Mie, Japan. E-mail id: nisimura@mach.mie-u.ac.jp

#### Impact of Through-plane Separator Shape on Heat and Mass Transfer Phenomena in Single Cell of PEFC Operated at Higher Temperature than Usual

This study aims to investigate the impact of separator thickness on heat and mass transfer characteristics and power generation performance of polymer electrolyte fuel cell (PEFC) with thin polymer electrolyte membrane (PEM) and this gas diffusion layer (GDL) operated at high temperature such as 363 K and 373 K. This study has measured in-plane temperature distributions on the anode and cathode separator back, which are the opposite side to GDL respectively, using a thermograph at various initial temperature or cell ( $T_{ini}$ ), relative humidity (RH), and flow rate of supply gases. This study has also measured the voltage corresponding to load current to evaluate the performance of the PEFC. As a result, it is confirmed that the impact of RH on the power generation performance is more significant with the decrease in the separator thickness. It is revealed that the power generation performance at high current density decreases with the increase in  $T_{ini}$  for the thinner separator thickness. Regarding in-plane temperature distribution, it is clarified that the temperature drops at some positions for the separator thickness of 2.00 mm when the in-plane temperature image is divided into the area from A to T followed the gas channel flow. On the other hand, the temperature gradually increases from the inlet to the outlet for the separator thickness of 1.50 mm and 1.00 mm. This study suggests that the thinner separators such as thickness of 1.50 mm and 1.00 mm are not suitable for high temperature operation.

#### **Biography**

Dr. Akira Nishimura is 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 81 peer-reviewed journal papers. His current research is clarification on heat and mass transfer mechanism of PEFC.

April 22-23, 2022

### Nor Ashidi Mat Isa<sup>1</sup>, Khairunnisa Hasikin<sup>2</sup>, Tan Weng Chun<sup>3</sup>

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<sup>2</sup>Department of Biomedical Engineering, Faculty of Engineering, Universiti Malaya, 50603 Pantai, Kuala Lumpur, Malaysia. Email: <u>khairunnisa@um.edu.my</u>
<sup>3</sup>Faculty of Engineering and Technology, Tunku Abdul Rahman University College, Kampus Utama, Lembah Jalan Genting Kelang, 53300 Kuala Lumpur, Malaysia. Email: wctan@tarc.edu.my

#### Automated Feature-Based Sperm Motility Analyzer System

A pproximately half of the cases of infertility are related to male sperm, either due to poor sperm quality or abnormal shape. The researchers found that sperm motility has contributed significantly to causing infertility compared to other factors such as total sperm counts or abnormal sperm morphology. The difficulty in distinguishing between debris and spermatozoa (i.e. objects of interest) especially for clotted or agglutination spermatozoa and trajectory reconstruction properties can lead to underestimation of spermatozoa concentration, while the proportion of moving sperm will be overestimated. This study focuses on the integration between image processing and artificial neural network approaches in analyzing sperm motility. Two sets of data, namely Sprague Dawley mice and human sperm video were used to test the developed sperm motility analyzer system.

#### **Biography**

Professor Ir Dr Nor Ashidi Mat Isa received the B. Eng. Degree in Electrical and Electronic Engineering with First Class Honors from Universiti Sains Malaysia (USM) in 1999 and the PhD degree in Electronic Engineering (majoring in Image Processing and Artificial Neural Network). He is currently a Professor at the School of Electrical and Electronic Engineering, USM. His research interests include intelligent systems, image processing, neural networks and medical imaging. He has published more than 180, 217 and 294 articles indexed in WoS-ISI (H-index 30), SCOPUS (H-index 36) and Google Scholar (H-Index 42) respectively. Due to his outstanding achievement in research, he gained recognition, both national and internationally. He was recognized as top 2% researcher in category - Citation Impact in Single Calendar Years 2019 and 2020 by Stanford University USA in 2019 and 2020 and Top Research Scientist Malaysia (TRSM) by Akademi Sains Malaysia (ASM) in 2020.

April 22-23, 2022

### Manyu Xiao and Jun Ma

<sup>1</sup>Xi'an Key Laboratory of Scientific Computation and Applied Statistics, School of Mathematics and Statistics, Northwestern Polytechnical University, Xi'an, 710072, China. E-mail id: manyuxiao@nwpu.edu.cn

#### **On-the-fly Double Reduced Model for Large-Scale Stress Constrained Topology**

echanical stress is a critical factor that affects performance, service life, fatigue resistance and safety of structural components, and is inarguably an important design criterion. Traditional topology optimization formulations typically do not consider stress constraints, which could result in the phenomenon of high stress concentrations, leading to a final "optimized" design that all too often fails to meet real engineering requirements. In order to handle these problems, researchers have put forward a variety of effective methods to deal with them. The main hindrances are the solution of large-scale linear systems during the FEA analysis (equilibrium equation) in each iteration, as well as the sensitivity analysis of stress constraint functions due to the non self-adjoint nature.

In this work, we present a paradigm for large-scale stress-constrained topology optimization problems, where we build a multi-grid approach using an on-the-fly Reduced Order Model (ROM) and the p-norm aggregation function, in which the discrete reduced-order basis functions (modes) are adaptively constructed for both the primal and dual problems. In addition to reducing the computational savings due to the ROM, we also address the computational cost of the ROM learning and updating phases. Finally, the tests on 2D and 3D benchmark problems demonstrate improved performance with acceptable objective and constraint violation errors. This work is supported by the Natural Science Foundation of Shaanxi Province, China (Grant No.2021JM-043) and the research project of NPU (Grant No. 2021AG04).

#### **Biography**

Manyu Xiao has completed her PhD and post-doctoral study in Advanced Mechanics from the Université de Technologie de Compiègne (UTC) in France. Since 2012, she works as an associated professor at Northwestern Polytechnical University in Xi'an, P.R. China. She is a member of the joint French-Chinese research group "Virtual Prototyping and Design". Her interest research includes model reduction, POD, multi-fidelity co-kriging, Machine Learning, Large scale topology optimization. Until now, she has herself authored/co-authored over 50 peer reviewed journal articles, book chapters.



### Abu Zahrim Yaser

Chemical Engineering Programme, Faculty of Engineering, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia. E-mail id: zahrim@ums.edu.my

April 22-23, 2022

#### Coagulation-flocculation for wastewater decolorizations

The presence of residual colored particles in surface water is esthetically undesirable and causes annoyance to the aquatic biosphere due to reduction of sunlight penetration and depletion of the dissolved oxygen. Due to their toxic and recalcitrance properties, colored particles can also contribute to the failure of biological processes in wastewater treatment plants. Further, the regulations imposed for the discharged colored effluents have become more stringent and thus motivated the industries to improve their wastewater decolorization technology. Generally, there are two de-colorization methods: by destruction of colored particles (e.g., chemical oxidation and bio-oxidation) and the other is by separation of colored particles from water (e.g., coagulation-flocculation, sand filtration and membrane separation). In a wastewater treatment process, coagulation/flocculation is widely used as a pre-treatment in the removal of natural organic matter, since it has low capital cost, is efficient and is simple to operate. In this presentation, the coagulation-flocculation study on various colored wastewaters and the future directions will be discussed.

#### **Biography**

Dr. Abu Zahrim Yaser is Associate Professor in Waste Processing Technology at the Faculty of Engineering, Universiti Malaysia Sabah. He obtained his Ph.D. from Swansea University. Dr. Zahrim has published 7 books and over 100 other refereed technical papers. Dr. Zahrim is Visiting Scientist at the University of Hull and Member of Institutions of Chemical Engineers (United Kingdom), Board of Engineers (Malaysia) and MyBIOGAS.



### M. H. Jamaluddin<sup>1</sup> and S. N. H. Saadon<sup>2</sup>

<sup>1, 2</sup> Wireless Communication Centre, School of Electrical Engineering, Universiti Teknologi Malaysia. E-mail ids: haizal@fke.utm.my<sup>1</sup>, sitinorhafizahsaadon@gmail.com<sup>2</sup>

#### Graphene Antenna Array Using Defected Ground Structure for Isolation and Gain Improvement

In the development of antenna for 5G, high gain is one of the characteristics that must be taken into account besides large bandwidth. A high gain can be obtained by increase the number of antenna element. However, when the number of antenna element increases, the main beam of the radiation pattern splits up even though the gain value rises. It is due to the enhance of mutual coupling when two element is located at side by side. Therefore, a defected ground structure is introduced in a two-element graphene antenna array to reduce the current distribution. With that, the mutual coupling is reduced and the radiation pattern can be associated as well as gain. The antenna is designed at frequency of 15 GHz with co-planar waveguide excitation. The defected ground structure is located at the ground of antenna in between two elements. From the result, the gain obtained is 6.189 dBi which is near double value compared to the case of without defected ground structure.

#### **Biography**

MOHD HAIZAL JAMALUDDIN received the bachelor's and master's degrees in electrical engineering from Universiti Teknologi Malaysia (UTM), Malaysia, in 2003 and 2006, respectively, and the Ph.D. degree in signal processing and telecommunications from the Université de Rennes 1, France, in 2009, with a focus on microwave communication systems and antennas design, such as dielectric resonator, reflect array, and dielectric dome antennas. He is currently an Associate Professor with the Wireless Communication Centre, School of Electrical Engineering, Universiti Teknologi Malaysia. He has published more than 150 papers in reputed indexed journals and conference proceedings. His research interests include dielectric resonator antennas, printed microstrip antennas, MIMO antennas, and DRA reflect array antenna.

April 22-23, 2022

### Juergen Reichardt

University of Applied Sciences, MSA Muenster School of Architecture, Muenster/ RMA Architects and Engineers Essen, Germany.

#### Novel Concept and Technologies of Sustainable Building Design

What are the current digital and/or physical innovations driving sustainable architecture? What could be suggestions for a more holistic approach?" The single efforts of esteemed experts could be digitally linked together for a synergetic approach. It is believed that this combined effort could be more productive than the sum of their individual issues. Sustainable design parameters may be visualized as the genetic code of a building's specific performance requirements—similar to the DNA of all living entities. This "Building DNA" could provide comprehensive "Performance" parameters, which further could be programmed to be SMART—sensible, meaningful, adaptive, realistic and time–cost effective.

"Virtual Twins" BIM approach focuses on state-of-the-art 3D-BIM modeling for architecture, structure and utilities integrated with dynamic climatic simulations and CFD analysis, sustainable parameters and cradle-tograve lifecycle systems. It is needless to mention that programming has become an all-important task, as specific parameters of geography, climate, topography, culture, process, technology and logistics are key forces driving innovative and integrated architecture from a very early stage. While we are shaping out "Passive" sustainable design solutions for site, volume, structure, envelope, and interiors, we are minimizing the need for "Active" utilities, if and where necessary.

In a nutshell, we strongly believe that our ecological responsibility lies in designing sailboats and not motorboats in architecture. A German government funded program culminated in a webportal and app climatehub.online. Holistic design strategies and academic research will open a wider audience, a collaborative and deeper understanding of the topics on hand and a one-of-akind e-learning platform–program.

#### **Biography**

Prof. Reichardt has completed his studies in Architecture and Art from reputed Technical Universities and Academies in Karlsruhe and Brunswick, Germany. He has taught architecture and building construction as Professor in Muenster University for 25 years. He is board member of RMA Architects and Engineers in Essen, Germany, for more than 20 years, with multiple awards for energy efficiency, steel and wood construction architecture. Currently Prof. Reichardt is Guest Editor and Peer Review head for MDPI Applied Sciences for Sustainability Building and Environmental Issues. He has published a series of books with holistic planning background and more than 30 papers in reputed journals.

April 22-23, 2022

### Soshu Kirihara

Joining and Welding Research Institute, Osaka University, Osaka, Japan. E-mail id: kirihara@jwri.osaaka-u.ac.jp

#### Additive Manufacturing of Ceramic Component with Fine Microstructures

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

#### **Biography**

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



April 22-23, 2022

### Javad Fardaei

Department of Chemical Engineering, Hanyang University, Seoul, Korea, Republic of Korea. E-mail id: yjang53@hanyang.ac.kr

#### **Intrinsic Intelligence In The Atom**

fter decades of my independent study on the foundation of our science on the universe, physics and chemistry, I created nonpartisan questions regarding our knowledge of such, instead of accepting the whole as it stands. As a result, I found many errors in which one side of the equation does not match with the other side. Here in this historical gathering, I am sharing with you just one of the unscientific incidents regarding the modeling of the atom, molecules and nanotechnology.

The Universe, with several hundred billion galaxies, where each galaxy holds billions of solar systems like ours and then places them in an orderly manner, must be an intrinsically intelligent universe. Thus, this highly significant evidence leads us to conclude that the Universe has a complete smart element or a complete unit of the universe that follows its rule, where this unit must be atoms or chemical elements. An atom accounts for the smallest complete unit of the Universe; for the same reason, an atom is recognized by its entire body, not by imaginary components such as electron/positron, proton/neutron, matter/antimatter...etc.

Modeling of the atom by adding electrons was created by Ernest Rutherford 1911 and Neil Bohr 1913, both of which did not have enough knowledge of atoms.

Nanoscience is associated with the synthesis of the building blocks in biology, chemistry, engineering, medicine, medical application...etc. It comes down to the atomic properties for its communication, unlike the physics' perception of mechanics.

Keywords: Applied science, applied physics, nanotechnology and smart materials

#### **Biography**

Mr. Javad Fardaei has two degrees in chemical engineering and computer science. For the last two decades, as an autodidact, he is working as an independent researcher on all theories regarding the Universe, GTR, SR, Gravity, Atom, QM, Electromagnetic wave, Speed of the light, and the quality of space in the Universe. He is a Pioneer of introducing Intrinsic Universal Intelligence, Quantum Intelligent Gravity, and Space as a Substance in the intrinsic atom. He wrote a few books and many articles in many medias and has been a plenary speaker at a several International Physics Conferences. Currently he lives in California-USA.





### and TECHNOLOGY VIRTUAL

APRIL

22-23, 2022

GMT 07:00 - 13:00

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### Siew Xian Chin<sup>1</sup> and Chin Hua Chia<sup>2</sup>

<sup>1</sup>ASASIpintar Program, Pusat GENIUS@Pintar, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia. <sup>2</sup> Materials Science Program, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.

#### Synthesis and purification of copper nanowires for advanced applications

e report the microwave and hydrothermal syntheses of copper nanowires (CuNWs) by using alkylamine-mediated approach. CuNWs with aspect ratio more than 500 were successfully synthesized. A simple and fast purification process was proposed to collect the CuNWs by centrifugation method using water-hydrophobic organic solvent system. The obtained CuNWs were used for two different applications, i.e., (1) transparent conductive coating, (2) reduction of reduction of 4-nitro phenol (4-NP) into 4-amino- phenol, and (3) catalysis of MB clock reaction. The transparent CuNWs coating showed a low sheet resistance of 35  $\Omega$ /sq with high transparency of 81% (at  $\lambda$  <sub>550</sub> nm). The CuNWs showed an excellent catalytic performance where 99% reduction of 4-NP to 4- AP occurred in just 60 s by using only 0.1 pg of CuNWs after treatment with glacial acetic acid (GAA). The CuNWs showed an outstanding catalytic activity for at least ten consecutive reusability tests with a consistent result in 4-NP reduction. In clock reaction of MB, approximately 99% of reduction of MB into LMB was achieved in ~5 s by using 2 µg CuNWs.

#### **Biography**

Dr Chin is currently a Senior Lecturer in the GENIUS@pintar, Universiti Kebangsaan Malaysia (UKM). She has received her Ph.D. in Materials Science, UKM, Malaysia in 2015. Her research interests include the development of new materials for wastewater treatment, such as membrane, bead, aerogel, etc. She has utilized agricultural by-products, including cellulose and chitosan, to produce adsorbent materials with high adsorption capacity by introducing various chemical modifications. She has awarded as Visiting Doctoral Researcher di Chinese Academy of Science, China in 2014. Her current H-index is 11 (Google scholar) with total of 450 citations.

April 22-23, 2022

#### Paola Costanzo, Loredana Maiuolo, Fabrizio Olivito, Vincenzo Algieri, Antonio Jiritano, Matteo Antonio Tallarida, Antonio De Nino

<sup>1</sup>Department of Chemistry and Chemical Technologies, University of Calabria, Rende, CS, Italy.

#### **Novel Cellulose Materials For Advanced Applications**

ellulose, the most abundant biopolymer on Earth, represents a great challenge both from a chemical and environmental point of view. Research on cellulose ideally fits within many research programs both at the national and international level, since it complies with the Sustainable Development Goals defined by the United Nations in 2015. Cellulose became one of the main topics of research worldwide in brief time, due to its wide natural availability, biodegradability, and chemical–physical properties. In the recent years, many examples of new cellulose materials were developed not only as synthetic catalysts, but also for water remediation, and bio-composites development. Results taken from our investigations of cellulose derivatives will be presented, outlining their versatility in these frameworks. In particular, magnetite-decorated sulfate cellulose nanoparticles will be described as a powerful tool for water purification with an adsorption percentages of amines up to 90% [1]. Then, cellulose-citrate will be described as a convenient and reusable bio-adsorbent for dye-polluted water with methylene blue [2]. Finally, a novel series of bio-based cellulose-polyurethane composite foams interesting mechanical properties will be showed [3].

[1] A. De Nino, M. A. Tallarida, V. Algieri, F. Olivito, P. Costanzo, G. De Filpo, L. Maiuolo, *Appl. Sci.* **2020**, 10, 8155.

[2] F. Olivito, V. Algieri, A. Jiritano, M. A. Tallarida, A. Tursi, P. Costanzo, L. Maiuolo, A. De Nino, *RSC Adv.*, **2021**, 11, 34309.

[3] L. Maiuolo, F. Olivito, V. Algieri, P. Costanzo, A. Jiritano, M. A. Tallarida, A.Tursi, C. Sposato, A. Feo, A. De Nino, *Polymers* **2021**, 13, 2802.

#### **Biography**

Dr. Paola Costanzo is an assistant professor in Organic Chemistry (University of Calabria). She is the co-author of 41 papers on peer review international journals. In 2020, she received the Junior Research Award for Organic Chemistry in its Methodological Aspects for her studies focused on the realization of eco-sustainable methodologies by using unconventional reactors for the development of alternative and effective ways for synthetic processes in the chemical and pharmaceutical industries. Her actual research interests focus on chemical modifications of biomaterials, coming from agri-food wastes, to obtain new advanced tools for water remediation and technological applications.



### Salvatore Antonio Biancardo

Department of Civil, Architectural and Environmental Engineering; University of Naples Federico II, Italy; E-mail id: salvatoreantionio.biancardo@unina.it

#### HBIM approach for historic pavement digitalization and management

The growing necessity to design and digitally represent historical pavements has led specialists to use different Building Information Modelling (BIM) tools to control the road design and construction phases. In this research paper, a Heritage BIM (HBIM) approach was developed to recreate an archaeological road to accomplish the structural analysis of stone pavements. In detail, starting from the Digital Elevation Model (DEM) generated with Autodesk Infraworks, the road design process was performed. The corridor was modelled with Autodesk Civil 3D using a parametric road section created with the Subassembly composer tool. Subsequently, a visual programming application (Dynamo) based on Python language was adopted to extract corridor information and apply changes based on conditions established through code scripts. In detail, a workflow was developed to implements a disruption analysis of road stone pavements. As preliminary results, a tool is proposed to support the authorities and experts during the managing process.

#### **Biography**

Salvatore Antonio Biancardo is Assistant Professor at the Department of Civil, Construction and Environmental Engineering of the University of Naples Federico II. In 2018, he earned the National Scientific Qualification as Associate Professor. He served as Scientific Committee Member and Chairman for several International Conference as the Transportation Research Board Annual Meeting in Washington D.C. He is Editorial Board Member/Reviewer and S.I. Lead/Guest Editor for several indexed journals. His main fields of research are BIM for infrastructures; construction and management of infrastructures; road pavement materials. He is author/co-author of more than 60refereed journal/conference publications.



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22-23, 2022

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EDITION OF

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### Yang Yue and Xiaoyan Wang

<sup>1</sup>School of Information and Communications Engineering, Xi'an Jiaotong University, Xi'an, Shaanxi, China. E-mail id: yueyang@xjtu.edu.cn

#### **3D ToF Camera Based Face Mask Recognition Using Facial Contour**

Whether a person is wearing a face mask, and the mask type can be further classified. Firstly, we use ToF depth camera to collect the three-dimensional (3D) face images. Then extract the facial contour. The designed spatial and frequency features are used for classification, and the average detection accuracy is 82.11%. With the extracted facial contour from the ToF camera, we also use artificial neural network for recognition, and achieving 97.32% accuracy. Through the facial contour, computational cost is significantly reduced.

#### **Biography**

Yang Yue is a Professor with the School of Information and Communications Engineering, Xi'an Jiaotong University, China. Dr. Yue's current research interests include intelligent photonics, optical communications and networking, optical interconnect, detection, imaging and display technology. He has published over 200 journal papers and conference proceedings with >9,000 citations, four edited books, >50 issued or pending patents. Dr. Yue is an Associate Editor for IEEE Access, and an Editor Board Member for three other scientific journals. He also served as Guest Editor for ten journal special issues, Chair or Committee Member for >80 international conferences, Reviewer for >60 prestigious journals.

April 22-23, 2022

### **Dave White**

Chemical Engineer Climate Change Truth Inc. research@cctruth.org corresponding author

## The Essential Role of Photosynthesis in Defining Net Zero Carbon Dioxide Emissions for Equilibrium Calculations

In this research manuscript, the authors seek to answer four essential questions relative to the current climate change conversation now underway globally: (Q1) What is the numerically defined goal for annual Net Zero Carbon Dioxide Emissions in gigatonnes essential for global atmospheric homeostasis? (Q2) Why is atmospheric CO<sub>2</sub> rising even though recent data support that CO<sub>2</sub> emissions have the rate of rise lowered by 50% since 2014 globally? (Q3) Are CO<sub>2</sub> cap and trade policies the best immediate intervention, or does globally increasing photosynthesis offer a more rapid and better long-term solution to climate change? (Q4) What strategies can be employed to have the greatest positive impact over the upcoming crucial twelve-year period?

Nothing absorbs carbon dioxide out of our atmosphere like photosynthesis, and therein lies the most underdiscussed solution to the greatest problem of our time. A single hectare of healthy Amazon Rainforest can sequester up to 100 tons of  $CO_2yr^{-1}$  due to photosynthesis. And the fast-growing Empress Tree (*Paulownia* tomentosa) not only grows ten to twenty feet tall in its first year, but a single hectare of these trees can sequester up to 103 tons of  $CO_2yr^{-1}$  due to photosynthesis (Emily Chasan 2019).

Prior to the Industrial Revolution and long before global deforestation devastated Earth's delicate atmospheric ecosystem, forests around the world are estimated to have consumed up to 400 billion tons of  $CO_2yr^{-1}$ . As of 2019, that has been reduced dramatically as global forests consume less than 10 billion tons of  $CO_2yr^{-1}$  with photosynthesis (Max Roser 2015).

#### **Significance Statement**

The vast majority of climate experts agree that there has been a five-times increase in CO<sub>2</sub> emissions due to human related factors since 1870. While fossil fuel carbon have been confirmed to be approximately seven gigatons annually and does weigh in the climate change discussion, during this same period the photosynthetic consumption of carbon dioxide has been reduced by more than 97% due to incessant global deforestation. Historical forestry records indicate that prior to the 1900's, annual worldwide carbon dioxide consumption was estimated to have been around 400 gigatons due to photosynthesis. However, as of 2019, calculated estimates now have annual carbon dioxide consumption due to photosynthesis below ten gigatons. We only have 2.6 gtyr-1 in the Northern hemisphere. All the rainforests in the southern hemisphere have switched to an Oxygen sink and carbon dioxide producer from organic decay. NetZeroCO2e=8.6 gt/yr

Keywords: Photosynthesis, carbon dioxide increase, carbon dioxide scavenging, climate change, Amazon Rainforest

#### **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 Semiconduc-tors. In 2017 Dave Started Climate Change Truth Research Inc.



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### Zuhair Jamain<sup>1</sup> and Melati Khairuddean<sup>2</sup>

<sup>1</sup>Faculty of Science and Natural Resources, Universiti Malaysia Sabah (UMS), 88400 Kota Kinabalu, Sabah, Malaysia. <sup>2</sup>School of Chemical Sciences, Universiti Sains Malaysia (USM), 11800 Penang, Malaysia.

## Synthesis and Liquid Crystalline Behaviour of New Cyclotriphosphazene Derivatives with Amide and Azo Linkage

zotization reaction of *p*-nitroaniline with phenol formed 4-(4-nitrophenylazo)phenol, **1** which was alkykated with heptyl, nonyl, decyl, dodecyl and tetradecylbromide to give a series of nitro compounds, **2a-e**. Reduction of **2a-e** and **1** formed the subsequent amine compounds **3a-f**, 4-(4 alkyloxyphenylazo) phenylamine. Another similar reaction of protected aniline with a series of substituted aniline formed a series of compounds **3g-j**. Reaction of cyclotriphosphazene with methyl 4-hydroxybenzoate formed hexasubstituted cyclotriphosphazene benzoate, **4** which was then reduced to give the subsequent benzoic acid, **5**. Further reaction of compound **5** with intermediate **3a-j** produced a new series of hexasubstituted cyclotriphosphazene derivatives, **6a-j**. All the synthesized compounds were characterized using Fourier Transform Infrared spectroscopy (FT-IR), <sup>1</sup>H and <sup>13</sup>C Nuclear Magnetic Resonance spectroscopy (NMR) and CHN elemental analysis. The texture of these compounds were determined using Polarized Optical Microscope (POM) and their mesophase transition were further confirmed using Differential Scanning Calorimetry (DSC). All hexasubstituted cyclotriphosphazene compounds with terminal alkoxy chain (C<sub>7</sub>, C<sub>9</sub>, C<sub>10</sub>, C<sub>12</sub> and C<sub>14</sub>) are mesogenic with smectic C, smectic A and nematic phases. However, other compounds were found to be non-mesogenic without any liquid crystal properties.

#### **Biography**

Dr. Zuhair Jamain has completed his PhD from Universiti Sains Malaysia, Penang, Malaysia, and is currently a senior lecturer in Universiti Malaysia Sabah, Malaysia. He has published more than 20 papers in reputed journals and has been serving as a reviewer for several journals. Dr. Zuhair's research interests focus on synthesizing and modifying organic compounds for various applications such as liquid crystal, fire retardant, and dielectric materials. Moreover, he has been involved in various research projects as a principal investigator and collaborator.

April 22-23, 2022

#### Mohd Sani Sarjadi<sup>1\*</sup>and Wong Xin Lin<sup>1</sup>

<sup>1</sup>Faculty of Science and Natural Resources, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia. E-mail id: Email: msani@ums.edu.my

#### Multicomponent High-Entropy Cantor alloys for Recycling and Reuse

D onor-Acceptor (D-A) framework, which copolymerizes electron-donors and electron- acceptors alternatively in conjugated backbones, has proved to be the most effective strategy for obtaining low bandgap polymers that desirable for optoelectronic applications. Direct arylation polymerization (DArP) is a established synthetic strategy that provides a clean and low cost pathway towards conjugated polymers. It allows direct coupling of aryl halides and aromatic compounds without preactivation of Carbon-Hydrogen (C-H) bonds. In this work, an alternating D-A type copolymer based on N-9-hexadecyl-2,7-dibromocarbazole and 4,7-di(2 thienyl)benzothiadiazole was synthesized by DArP. This structure is modified from the classical low bandgap copolymer poly[N-9'-heptadecanyl-2,7-carbazole-alt-5,5-(4',7'-di-2-thienyl- 2',1',3' benzothiadiazole)] (PCDTBT) which exhibited excellent devices performance. It showed good solubility in organic solvents and has been satisfactorily characterized by FTIR and NMR. UV-Vis absorption spectra show the presence of inter-chain interaction and aggregation in the solid state. The copolymer's optical bandgap was determined to be between 1.77 – 1.81 eV, which is slightly lower than that of the PCDTBT (1.88 eV).

#### **Biography**

Mohd Sani Sarjadi has completed his PhD from University of Sheffield, UK in 2015. He is currently the Deputy Dean (Research and Innovation), Faculty of Science and Natural Resources, Universiti Malaysia Sabah (UMS) and Associate Professor in Industrial Chemistry in FSSA, UMS. He had published numerous articles in local and international refereed journals and conference proceedings. He is Associate Member of the Royal Society of Chemistry, United Kingdom (Chartered Chemist, AMRSC), Associate Member of the Malaysian Institute of Chemistry (AMIC) and Professional Technologist (Material Science Technology (MT)), Malaysia Board of Technologists (MBOT).

April 22-23, 2022

### **Tomasz Krystofiak**

<sup>1</sup>Department of Wood Science and Thermal Techniques, Laboratory of Gluing and Finishing of Surface, Poznan University of Life Sciences, Poznan, Poland. E-mail id: tomasz.krystofiak@up.poznan.pl

#### Varnishing of Modified Wood and Wood Based Composites

The 21<sup>st</sup> century has seen an interest in thermo-mechanical modification of wood. It can be carried out on solid wood and in the form of veneers. It consists of the interaction of controlled thermal energy transferred by contact and appropriate mechanical compression at different times during the process. The modification of wood and veneers, when carried out under appropriate parameters, can result in beneficial changes in, for example, their gluability and paintability. Modified veneers can be used to manufacture plywood and to veneer furniture panels.

Research has been carried out to determine the susceptibility of thermo-mechanically modified veneers and wood species after thermal mofification to varnishing. Veneers made of wood species such as birch (*Betula verrucosa* Ehrh.), beech (*Fagus sylvatica* L.), black alder (*Alnus glutinosa* Gaertn.) and Scots pine (*Pinus sylvestris* L.) and wood species from ash (*Fraxinus excelsior*) were used in the studies. Commercial eco-friendly varnishing systems were used.

Aesthetic and decorative features, adhesion and resistance to selected factors were tested. Selected results were presented at conferences and published in the scientific journals.

On the basis of the results, it was concluded that veneer modification with the STTM method and wood after thermal modification should be regarded as a developmental direction with the great application possibilities.

#### **Biography**

Tomasz Krystofiak has completed his PhD from Poznan University of Life Sciences, Poland. He is the member of SWST /Society of Wood Science and Technology/ organization. He has published more than 140 papers in reputed journals or/and conference proceedings. He is an editorial board member or Guest Editor in Coatings, Forests and Materials Journals. Tomasz Krystofiak participated in COST Actions FP1006 (as Management Committee Substitute Member), FP1303 and FP1407 (Working Groups Member) and in CA15216 (Management Committee Member).

April 22-23, 2022

### Angelamaria Cardone, Dajana Conte and Beatrice Paternoster

Department of Mathematics, University of Salerno, Fisciano, Italy.

#### Implementation issues of collocation methods for fractional differential equations

The introduction of non-integer derivatives into the models of many processes of science and engineering led to reliable qualitative and quantitative descriptions and overcame the unphysical predictions of classical models, which may happen in certain cases. In this talk, we discuss the numerical solution of fractional differential equations by spline collocation methods. These methods present several advantages: they are continuous methods i.e., they approximate the solution at each point of the time interval; they have high order of convergence, if a suitable mesh of points is set; they have good stability properties, which is a fundamental property to obtain a reliable numerical solution. We focus on the implementation issues, which needs to be addressed to apply one and two-step spline collocation methods, to develop an efficient and accurate mathematical software. They regard the evaluation of fractional integrals of certain polynomial functions, a matrix formulation of the considered method and, in the case of two-step spline collocation methods, the introduction of a suitable starting procedure. We give some details on the proper settings of the parameters of methods, too. Finally, we show some numerical experiments to confirm the theoretical expectation on the order of convergence and to compare one and two step collocation methods.

#### **Biography**

Angelamaria Cardone has completed her PhD at the age of 27 years from "Federico II" University of Naples, Italy. She is Associate Professor in the Mathematics department of University of Salerno, Italy. She has over 35 publications that have been cited over 200 times, and her publication h-index is 15 (source: Scopus). She has been serving as an editorial board member of Applied Numerical Mathematics and of other reputed journals.

April 22-23, 2022

### Farah Jemili

Computer Science - Researcher in Artificial Intelligence & Big Data Analytics at Modeling of Automated Reasoning Systems (MARS) Research Lab in the Higher Institute of Computer Science and Telecom (ISITCom), University of Sousse, Tunisia.

#### **Artificial Intelligence for Cyber Security Applications**

The recent White House report on artificial intelligence (AI) highlights the importance of AI and the need for a clear roadmap and strategic investment in this area. As AI emerges from science fiction to become the frontier of world-changing technologies, there is an urgent need to systematically develop and implement AI to see its real impact in diverse fields of study.

This paper offers a contribution to the deployment of AI for cybersecurity applications. Intrusion detection has been the subject of numerous studies in industry and academia, but cybersecurity analysts still want a greater accuracy and comprehensive threat analysis to secure their systems in cyberspace. Improvements to intrusion detection could be achieved by adopting a more comprehensive approach in monitoring security events from many heterogeneous sources. Merging security events from heterogeneous sources and learning from data can offer a more holistic view and a better knowledge of the cyber threat situation. A problem with this approach is that at present even a single event source (for example, network traffic) can encounter big data challenges when it is considered alone. Attempts to use more heterogeneous data sources poses far greater challenges. Artificial Intelligence and Big Data Technologies can help solve these heterogeneous data Problems.

The proposed approach includes the pre-processing of data and learning. The experimental results show effectiveness of the approach in terms of accuracy and detection rate and prove that Artificial Intelligence I can help achieve better results in Cyber Security context.

Key words: Artificial Intelligence, Cyber Security

#### **Biography**

Farah JEMILI had the Engineer degree in Computer Science in 2002 and the Ph.D degree in 2010. She is currently Assistant Professor at Higher Institute of Computer Science and Telecom of Hammam Sousse (<u>ISITCOM</u>), <u>University of Sousse</u>, Tunisia. She is a senior Researcher at <u>MARS Laboratory (ISITCOM</u> –Tunisia). Her research interests include Artificial Intelligence, Cyber Security, Big Data Analysis, Cloud Computing and Distributed Systems. She served as reviewer for many international conferences and journals. She has many publications; 6 book chapters, 6 journal publications and more than 20 conference papers.

April 22-23, 2022

#### Dajana Conte<sup>1</sup>, Raffaele D'Ambrosio<sup>2</sup>, Leila Moradi<sup>1</sup>, Giovanni Pagano<sup>1</sup>, Beatrice Paternoster<sup>1</sup>

<sup>1</sup>Department of Mathematics, University of Salerno, Fisciano, Italy. <sup>2</sup>Department of Information Engineering and Computer Science and Mathematics, University of L'Aquila, Italy.

#### Equation dependent numerical methods for deterministic and stochastic problems

This talk concerns the numerical solution of evolutionary problems related to natural phenomena and physical processes exhibiting specific characteristics such as stiffness, oscillations, presence of memory together with stochastic terms. We will describe the construction of numerical methods which are strongly oriented to the problem and which are able to preserve the intrinsic qualitative characteristic of the problem itself. As regards stiff systems of ordinary differential equations arising from the discretization in space of diffusion terms in partial differential equations, we will describe the derivation of highly stable explicit numerical methods based on the use of Time-Accurate and Highly-Stable (TASE) operators. For problems with oscillating solution we will show how the usage of non-polynomial bases permits to adapt numerical methods to the known behavior of the solution. Highly stable numerical methods for problems with memory subject to stochastic rumor will also be described.

#### **Biography**

Dajana Conte is Associate Professor in Numerical Analysis at University of Salerno, Italy. Her research activity concerns the development and analysis of efficient and stable numerical methods for the solution of deterministic and stochastic evolutionary problems, also with memory, modeled by differential and integral equations. She is author of more than 70 papers in the field of Numerical Analysis and she is member of the editorial board of reputed international scientific journals.



# EDITION OF APPLIED SCIENCE, ENGINEERING

### and TECHNOLOGY VIRTUAL

APRIL

22-23, 2022

GMT 07:00 - 13:00

INVITED FORUM

April 22-23, 2022

#### N. A. Umor<sup>1,2</sup>, S. Abdullah<sup>1\*</sup>, Azhar M.<sup>3</sup>, S. B. Ismail<sup>4</sup>, S. I Ismail<sup>1</sup> and A. Misran<sup>1</sup>

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Terengganu, Malaysia; shahrul.ismail@umt.edu.my (S.I) \*Correspondence: sumaiyah@upm.edu.my

### Strategies For High Yield Cultivation Of *Volvariella Volvacea* (Bull.) Singer Using Oil Palm Empty Fruit Bunch (Efb) Fiber

In this research, various strategies were applied to improve yield in the *Volvariella volvacea* cultivation using EFB fibre. EFB pellet was introduced as an alternative substrate for cultivation. Additional of rice bran and organic fertilizer in the compost were also tested. Next, the effect of the application of boosters namely foliar, sodium acetate and chitosan at different concentration , 0.01, 0.03 and 0.05 % (w/v) to the yield, enzyme activities and post-harvest quality were investigated. The cultivation were carried out indoor using 2 kg compost. It was found that the pellet substrate without composting gave the highest yield of 20.37% B.E. Then, the effect of adding rice bran and fertilizer in the compost formulation with pellets was also analysed. Additional of rice bran and fertilizer produced best yield of 24.83% B.E. with suitable C:N ratio for fungal growth. Chitosan at 0.03% concentration produced the highest % B.E. (29.86) followed by acetate 0.05% (27.45) and foliar 0.03% (23.63). It was found that higher cellulolytic enzyme and reducing sugar released during pinning stage compared to post fruiting stage. Proximate analysis of the fruiting bodies of the harvested mushrooms showed that there was no significant difference in the protein content compared to mature stage. Booster application during cultivation improve yield of the mushroom and maintain the post-harvest quality.

Keywords: V. volvacea cultivation., booster, biological efficiency, enzyme activities, proximate analysis

#### **Biography**

Noor Azrimi Umor is a final semester PhD in Microbiology student from UPM, Malaysia and waiting for the viva examination in 2022. He is senior lecturer in the Faculty of Applied Science, UiTM Negeri Malaysia. He has published more than 25 papers in reputed journals and has been serving as lecturer of Microbiology for the past 11 years. His field of interest is in the environmental microbiology, mushroom cultivation and biomass technology.

April 22-23, 2022

### Chengbin Yu<sup>1\*</sup>, Young Seok Song<sup>2\*</sup>

<sup>1\*</sup>Department of Materials Science and Engineering, Seoul National University, Seoul 08826, Republic of Korea. E-mail id: ycb0107@snu.ac.kr
<sup>2\*</sup>Department of Fiber Convergence Materials Engineering, Dankook University, Yongin-si, Gyeonggi-do, Republic of Korea. E-mail id: ysong@dankook.ac.kr

### Modified graphene aerogel supported form-stable phase change materials (PCMs) for smart control of pyroelectric energy harvesting

Though phase change materials (PCMs) can absorb or release plenty of thermal energy during the phase transition process, the leakage problem is a typical problem to stop the further utilization. Thus, fabricating form-stable PCM composites can overcome the leakage problem and achieve high thermal energy storage (TES). The graphene aerogel is a popular supporting material that can hold many pure PCM into the internal space. Therefore, the graphene aerogel supported PCM composites can keep the initial solid shape during the melting process. However, the leakage problem causes the reduction of porosity of graphene aerogel that this supporting material has some weight loss of pure PCM during the infiltration process. To ensure the weight fraction of the working material, the modified graphene aerogel is utilized as an advanced supporting material to fabricate form-stable PCM composites. In this work, cross-linked graphene/cysteamine aerogel is prepared by the cysteamine vapor method to produce a modified graphene aerogel with high mechanical property and flexibility. The PCM composites are connected to the pyro-electrode for collecting output electrical energy during the light-on/-off process. The smart control of pyroelectric energy harvesting is confirmed by using form-stable PCM composites and pyro-electrode is composed of window glass and indium tin oxide (ITO) to measure the output electrical energy harvesting. From the various intensity of solar light, the PCM composite constructed pyro-electrode can generate solar-to-electrical energy harvesting effectively.

#### **Biography**

Chengbin Yu, Researcher. Degree of Bachelor: 2009.09 ~ 2013.06 Beijing University of Chemical Technology (BUCT). Polymer Science and Engineering. Degree of Ph.D.: 2013.09 ~ 2019.02 Seoul National University (SNU). Material Science and Engineering. Have published 17 papers (13 first author, 4 co-author) and 7 papers (3 first author, 4 co-author) are under revision process. The published journals are Energy Conversion and Management, Macromolecular Research, Fibers and Polymers, Polymers for advanced technologies, Journal of Sound and Vibration, Materials & Design, Journal of Polymer Research, ACS Applied Energy Materials, Nanomaterials, Chemical Engineering Journals, and Applied energy.



# EDITION OF APPLIED SCIENCE, ENGINEERING

### and TECHNOLOGY VIRTUAL

APRIL

22-23, 2022

GMT 07:00 - 13:00

E-POSTER FORUM

April 22-23, 2022

#### Stefania Peddio<sup>1</sup>, Alessandra Padiglia<sup>2</sup>, Faustina B. Cannea<sup>2</sup>, Antonio Rescigno<sup>1</sup>, Paolo Zucca<sup>1</sup>

<sup>1</sup>Department of Biomedical Sciences (DiSB), University Campus, 09042 Monserrato, Cagliari, Italy; s.peddio@unica.it (SP); rescigno@unica.it (AR); pzucca@unica.it (PZ) <sup>2</sup>Department of Life and Environmental Sciences (DiSVA), University Campus, 09042 Monserrato, Cagliari, Italy; padiglia@unica.it (AP); faustinab.cannea@unica.it (FBC)

#### Italian *Phaseolus vulgaris* cultivars as sources of α -amylase inhibitors

Phaseolus vulgaris is the legume species most eaten worldwide but an increasing attention has been paid about its  $\alpha$ -amylase inhibitor ( $\alpha$ -AI) content. This protein inhibits the activity of mammalian  $\alpha$ -amylase having the potential of reducing carbohydrate absorption, above all, in overweight and diabetic subjects, with nutraceutical commercial applications.

Several Italian *P. vulgaris* cultivar were screened, involving spectrophotometric assays. In particular, 3 cultivars (from northern Italy and Sardinia) were identified as the most promising sources of  $\alpha$ -AI.

Solvent precipitation and ion exchange chromatography have been then used to increase the purity of inhibitor, preserving its activity. From a commercial perspective, in fact, the presence of antinutritional factors, such as hemagglutinin, must be avoided in nutraceutical preparations. The developed purification protocol was able to increase by 15-times the purification fold.

Besides, we aimed to extend molecular knowledge about  $\alpha$ -AI gene in these cultivars. In fact, no nucleotide sequence of the gene is recorded. The degenerate hybrid oligonucleotide primer (CODEHOP) strategy was used to identify the nucleotide sequence of the gene. After intercepting a fragment of the gene of interest made of 235 nucleotides, we have translated the nucleotide sequences into aminoacidic sequences. This preliminary analysis allowed to identify some genetic variability, being possibly linked to the functional  $\alpha$ -AI differences.

These results are encouraging for further investigations, increasing the knowledge about this class of proteins and developing preparations with potential commercial interest.

#### **Biography**

Stefania Peddio graduated in Biology MSc in 2016. She is completing her Biochemistry PhD at Cagliari University, Biomedical Sciences Department (estimated graduation date December 2022). Her research interests mainly involve plant proteins with pharmaceutical activity. She has published more than 6 papers in reputed journals.

April 22-23, 2022

### **Ching-Lung Fan**

Department of Civil Engineering, the Republic of China Military Academy, Kaohsiung, Taiwan, E-mail id: p93228001@ntu.edu.tw

#### **Convolutional Neural Network Models to Detect Multiple Types of Civil Damage**

amage to the surface construction of reinforced concrete (RC) will have an impacts on the security of the facility's structure. Deep learning can effectively identify various types of damage, which is useful for taking protective measures to avoid further deterioration of the structure. Based on deep learning, the multi-convolutional neural network (MCNN) has potential for detecting multiple RC damage images. The MCNN6 of this study was evaluated by indicators (accuracy, loss, and efficiency), and it was confirmed that the optimized architecture. The results show that the detection performance for "crack and rebar exposure" (Type B) by MCNN6 is the best, with an accuracy of 96.81% and a loss value of 0.07. The accuracy of the other five types of damage combinations is also higher than 80.0%. Finally, this experiment can make the following conclusions: Types A, B, and C have better accuracy, which means that MCNN6 has better recognition ability for cracks, and cracks are unique compared with other damage; in contrast, types E and F have poor accuracy. This finding shows that MCNN6 does not easily recognize spalling; in other words, spalling is easily confused with efflorescence and rebar exposure. In summary, the MCNN6 model can be used in the detection of various types of civil damage to achieve automated assessment for RC facility surface conditions.

#### **Biography**

Ching-Lung Fan is an assistant professor in the Department of Civil Engineering at the Republic of China Military Academy. He received the Ph.D. degree in engineering technology from National Kaohsiung University of Science and Technology in Taiwan, 2019. His research interests include performance evaluation of construction, construction risk management, machine learning, and deep learning. He has authored/coauthored more than 30 articles, and published in well-known journals, such as Journal of Construction Engineering and Management. He was the recipient the 25th Symposium on Construction Engineering and Management/International Conference on Big Data, Sensing, and Machine Learning Outstanding Paper Award, in 2021.