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Abstract Book

4th Edition of Applied Science, Engineering and Technology Webinar

August 20-21, 2021 | GMT 07:00 – 12:00

SciWide
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DAY 1

KEYNOTE FORUM

4th EDITION OF
APPLIES SCIENCE, ENGINEERING AND TECHNOLOGY WEBINAR

August
20-21, 2021

GMT 07:00 – 12:00

V-Appliedscience2021

Bunsho Ohtani and Mai Takashima

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Identification of Inorganic Solids for True Design and Precise Characterization of Functional Materials

Different from a strict rule in the field of organic chemistry, in which identification of materials is essential for presentation and publication, inorganic solid materials such as metal oxides used widely as functional materials are not required to be identified. As a result, scientific discussions on those solid materials have often been muddled and confused and we have encountered the problem that different properties, performance and activities are observe even if products of same code number or samples prepared in the same recipe are used. One of the reasons why identification of solid materials is practically impossible is that we have no analytical techniques providing macroscopic information on the surface of solid materials and amorphous structure possibly included in them. Recently, we have developed reversed doublebeam photoacoustic spectroscopy (RDB-PAS) which enables measure energy-resolved density of electron traps (ERDT). Those electron traps (ETs) seem to be predominantly located on the surface of almost all the metal oxide particles and therefore they reflect macroscopic surface structure in ERDT patterns even if the bulk structure is entirely amorphous. Using ERDT pattern with the data of CB-bottom position (CBB), i.e., ERDT/CBB patterns, it has been shown that metal oxide powders can be identified without using the other conventional analytical data, and similarity/differentness of a pair of metal-oxide samples can be quantitatively evaluated as a parameter, zeta, degree of coincidence of ERDT/CBB patterns. In this talk, a novel approach of functional-material design based on the ERDT/CBB patterns is introduced.

Biography

The research by Professor Ohtani started in 1981 when he was a Ph. D student in Kyoto University. Since then, he has been studying photocatalysis and related topics for more than 40 years and published more than 300 original papers (h-index: 70). After gaining his Ph. D. degree from Kyoto University in 1985, he became an assistant professor in the university. In 1996, he was promoted to an associate professor in Graduate School of Science, Hokkaido University and was then awarded a full professor position in Institute for Catalysis, Hokkaido University in 1998. He was awarded several awards from societies

Sahrim Ahmad

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Macroscopic Lattice Boltzmann Model and its Applications

T main objectives of our research work are to produce hybrid thermoplastic rubber nanocomposites for absorbing materials (RAM). Our recent work is to prepare thermoplastic blend with polyaniline (PANI) nanocomposites filled with the hybrid fillers of graphene nanoplatelet (GNP) and magnetite (Fe_3O_4), n-ickle zink ferrite nanoparticles using melt blending method. Thermoplastic rubber were prepared by mixing 40wt% of linear low density polyethylene (LLDPE) with 50 wt% of natural rubber (NR) and liquid natural rubber (LNR) as compatibilizer (10 wt%). In the first stage, the effects of processing parameters which are processing temperature, rotation speed, processing time and the content of PANI (1-5 wt%) on mechanical, thermal, electrical conductivity, physical and microwave absorbing properties were investigated. The mechanical properties of sample increased with addition of PANI into the blend and the highest tensile strength were obtained at 3 wt% of PANI with improvement of 42 % as compared with thermoplastic matrix. In the second stage our work is to study the effect of GNP (1 – 5 wt%) in TPNR/PANI/GNP nanocomposites on mechanical, thermal, electrical conductivity and physical properties. TPNR/PANI samples filled with GNP showed an increase of 54 % in tensile strength.TGA results showed good improvement in thermal stability especially with addition of small composition of GNP. In the third stage is to study the effect of magnetite nanoparticles (Fe_3O_4) addition on magnetic and microwave absorbing properties in TPNR/PANI blend . The addition of Fe_3O_4, nanoparticles in the nanocomposites has improved the thermal stability, magnetic and microwave absorbing properties significantly. Newly developed nanocomposites is capable to absorb microwave about 80-90% at the frequency from 2-18 GHz.

Biography

Professor Dr Sahrim Ahmad obtained his PhD from University of Loughborough, United Kingdom in 1988. He is an expert in the field of magnetic, nanocomposites and advanced materials. He has completed more than 50 research projects and consultancy work as a leader and co-researcher. His work on novel radar absorbing materials (RAM) subjected to transverse electromagnetic (TEM) has been successfully developed. His team managed to produce products that offered proper characteristics for handling, flexibility and lightweight, meeting requirement for various applications. He has published more than 250 papers in various journals and supervised more than 50 PhD students. Dr Sahrim was former Dean of Faculty Science of Technology and Editor In Chief of Journal Sains Malaysiana (ISI/WOS). Currently he is the Fellow Academy of Science Malaysia. Fellow Academy Profeesor Malaysia and Fellow of Malaysia Solid Science Society.

M.H. Mamat[1*], A.S. Ismail[1], N. Parimon[1], M.Z. Musa[1], M.F. Malek[1], N. Vasimalai[2], I.B. Shameem Banu[2], and M. Rusop[1]

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[2]School of Physical and Chemical Sciences, B.S. Abdur Rahman Crescent Institute of Science & Technology, Vandalur, Chennai 600 048, India.

Performance of Resistive-Type Humidity Sensor Using Chemical Solution Grown Metal Oxide Nanostructures

I the past decade, humidity sensors have been widely studied and considered in the various applications including agriculture, food industries, climate monitoring, chemical storage, healthcare, and semiconductor industries. The studies have been focused to prepare humidity sensor with good humidity sensing performance and low cost, which required for large-scale volume and to fulfil the rigorous performance obligations of the emerging areas. In this research, resistive-type humidity sensors were fabricated using zinc oxide (ZnO), titanium dioxide (TiO_2) and nickel oxide (NiO) nanostructures. These nanostructures were produced and grown on substrates using solution immersion method. This method is cost-effective fabrication process, which could produce nanostructure films in large scale. The results obtained in this research show that metal oxide nanostructures in form of ZnO nanorod arrays, flower-like TiO_2 nanorod arrays and NiO nanoball/nansoheet structures are good candidates for humidity sensing applications. These nanostructures produce high humidity sensing sensitivity and could provide potential humidity sensing applications in the emerging areas.

Biography

Associate Professor Ir. Ts. Dr. Mohamad Hafiz Mamat graduated from Department of Electrical& Electronic Engineering and Information Engineering, Nagoya University, Japan in 2005 and received both MSc degree and PhD degree in Electrical Engineering from Universiti Teknologi MARA (UiTM) Shah Alam, Malaysia. Currently, he is the Head of NANO-ElecTronic Centre (NET) of UiTM. His research area is in the field of nanoelectronics, which focuses on nanomaterial syntheses and fabrication of electronic devices such as sensors and solar cells. He was awarded both Professional Engineer (Ir.) and Professional Technologist (Ts.) in 2018. He has published over 370 papers in the journals and conference proceedings.

Yusran Sulaiman[1,2], Shalini Kulandaivalu[1] and Nur Hawa Nabilah Azman[2]

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Layer by Layer Composites for Supercapacitors

A good supercapacitor should possess a remarkable specific power, long shelf life, fast charge-discharge capacity and good specific power. The properties of supercapacitors can be improved by designing the electrode materials. In that regard, a layer-by-layer approach is a viable option in the fabrication of electrode materials for supercapacitors. Presently, there is a great interest in conducting polymers, carbonaceous materials, layered double hydroxides and their nanocomposites as electrode materials for supercapacitor. Therefore, this study offers details on designing the electrode materials utilizing the layer-by-layer approach and a thorough investigation of the electrochemical performance of the electrode materials for supercapacitors. The works carried out in this study have shown that the LBL approach is an inspiring and promising way to produce high-performance electrode materials for supercapacitors. The presence of composite in each layer via this approach has resulted in a synergistic effect that contributed to the high performance of supercapacitors.

Biography

Yusran Sulaiman is currently an Associate Professor at the Department of Chemistry, Universiti Putra Malaysia (UPM). He is also an Associate Researcher at Functional Device Lab in the Institute of Advanced Technology, UPM. He received his PhD in Chemistry from Durham University, United Kingdom. His expertise is in Electroanalytical Chemistry and Materials Chemistry. His research focuses on nanostructured advanced materials for energy storage, energy conversion and sensing. He is a very competent and innovative researcher. He has more than 100 refereed papers in renowned international journals and has filled 6 patents. Honoring his expertise, he has been invited as Invited Speakers and Keynote Speakers in the International and National conferences and seminars. He has also served as reviewers for many reputed International Journals.

Akira Nishimura
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CO_2 Reduction Performance of Cu/TiO_2 Photocatalyst with NH_3 and H_2O

This study has investigated the impact of molar ratio of CO_2 to reductants NH_3 and H_2O as well as that of Cu loading on CO_2 reduction performance over Cu/TiO_2 photocatalyst. There is no study to optimize the reductants' combination and Cu loading weight in order to enhance CO_2 reduction performance of TiO_2. This study prepared Cu/TiO_2 film by loading Cu particles during the pulse arc plasma gun process after coating TiO_2 film by the sol-gel and dip-coating process. As to loading weight of Cu, it was regulated by change in pulse number from 100 to 500. This study characterized the prepared Cu/TiO_2 film by SEM and EPMA. Additionally, the performance of CO_2 reduction has been investigated under the illumination condition of Xe lamp with or without ultraviolet light. As a result, it is revealed that the molar ratio of $CO_2/NH_3/H_2O$ is optimized according to the pulse number. Since the amount of proton which is the same as that of electron is needed to produce CO decided following the theoretical CO_2 reduction reacting with H_2O or NH_3, larger proton is needed with the increase in the pulse number. It is revealed that Cu of 4.57 wt% for the pulse number of 200 is the optimum condition, whereas the molar quantity of CO per unit weight of Cu/TiO_2 with and without UV light illumination is 34.1 □mol/g and 12.0 □mol/g, respectively.

Biography

Dr. Akira Nishimura is an associate professor in Division of Mechanical Engineering at Mie University, Japan. He received Dr. Eng. degrees in Chemical Engineering from Nagoya University, Japan in 2000. 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. His current researches are CO_2 reduction by photocatalyst, H_2 production from biogas, smart city utilizing renewable energy actively, clarification on heat and mass transfer mechanism of polymer electrolyte fuel cell.

Maatouk Khoukhi

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The Effect of Temperature and Moisture Change on the Heat Transfer through Building Envelope

This paper investigates the impact of the change of thermal conductivity of the insulation layer embedded in a typical residential building on the cooling effect. The simulation has been performed using the polystyrene (EPS), in extremely hot conditions of Al Ain (UAE) at different level of densities denoted as low density LD (12 kg/m3), high density HD (20 kg/m3), ultra-high density UHD (30 kg/m3) and super-high density SHD (35 kg/m3), and three moisture content levels (10%, 20%, and 30%) compared to dry insulation material for LD. The thermal wall resistance was evaluated by applying a conjugate heat transfer model based on enthalpy-based formulation. The thermal performance of the building incorporating polystyrene with variable thermal conductivity (λ -value) was compared to a constant thermal conductivity by quantifying the additional cooling demand and capacity due to the λ-relationship with time using the e-quest as a building energy analysis tool. The results show that, when the λ-value is modelled as a function of operating temperature, its effect on the temperature profile during daytime is significant compared with that obtained when a constant λ-value for the polystyrene (EPS) insulation is adopted, however, this trend is reversed at night time. A similar trend in the evolution of temperatures across the wall section was observed when EPS material was tested with different densities and moisture contents. The monthly energy consumption for cooling required by the building is found to be higher in case of variable thermal conductivity for LD sample.

Biography

I earned my doctorate in Mechanical Engineering from Tohoku University-Japan in collaboration with New South Wales University-Australia. My research interests cover mainly three interrelated areas of renewable energy, bio-insulation materials, and building energy systems. Most of my publications come out from research development work performed for well-known international companies, organizations, and universities. I have a long record of academic and industrial experience and I have been actively involved in several research projects supported by several grants from Samsung, NEDO, and universities' internal and external grants. The total budget of my projects exceeds 2 Million USD. I have published more than 100 journal and conference papers and I am a reviewer for several journals in my field of specialization.

Rajneesh Kumar

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Recent Trends in Plasma Antenna Technology

Plasma antenna is a radio frequency antenna based on plasma element instead of metal conductors. The attraction of the plasma antenna in the field of research remains still because of their potential applications. A plasma column excited by a surface wave can act as a plasma antenna. Experiments are carried out to study the current and conductivity distributions, field, power patterns, directivity and efficiency of such a plasma antenna. In addition, an equivalent metallic copper antenna is built up and its antenna parameters are compared with that of the plasma antenna. Our study indicate that the power content in the harmonics of the plasma antenna is more prominent as compared to the copper antenna (which only generates a fundamental frequency). However, the power patterns for both antennae are quite similar. To provide a more qualitative understanding regarding the generation of harmonics in the field of the plasma antenna, a bi-spectral analysis is performed to study the nonlinear interactions in the current fluctuations. Moreover, single plasma antenna is transformed into array plasma antenna by changing the operating parameters. Further, array plasma antenna parameters are also compared with monopole plasma antenna parameters. The study of present paper invoke that the plasma antenna can be applied for steering and controlling the strength of Wi-Fi signals as per requirement. Further, wireless communication and jamming capability of plasma antenna are tested.

Biography

Dr. Rajneesh Kumar has completed Ph.D from Institute for Plasma Research, Gandhinagar, India. He was post-doctoral fellow in LAPALCE, University of Toulouse France where he worked on plasmas as metamaetrials, plasma photonic crystal for microwave invisibility. He was project scientist in Indian Institute of Technology, Kanpur, UP. He was post-doctoral research associate in Masdar Institute of Science and Technology, Abu Dhabi, UAE. He was assistant professor in Dr. Harisingh Gour Central University, Sagar. He is associate professor in Banaras Hindu University since 2017.He has published four books, one chapter and more than 25 papers in reputed journals.

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DAY 2

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APPLIES SCIENCE, ENGINEERING AND TECHNOLOGY WEBINAR

August

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Nurul Akidah Baharuddin

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Advanced Cathode Materials for Solid Oxide Fuel Cells

The Paris Agreement (2015) set an important objective in curbing climate change, specifically by limiting the global increase in average temperature (first by less than 2 °C and then by 1.5 °C). Under the conditions of the agreement, carbon neutrality through reduction of GHG emissions must be achieved, in which where fuel cell technology finds its place. Solid oxide fuel cells (SOFCs) are energy conversion technologies known for their excellent efficiency and high energy density. However, the application of SOFCs is restrained by their high operating temperatures (800 °C–1000 °C), which result in the issue of overall energy system degradation. Nevertheless, reducing the operating temperatures of SOFCs leads to a reduction in power density because of insufficient protonic–ionic conduction. Ionic conduction at the cathode component is related to polarisation and area-specific resistance that varies following the selected material. To date, several types of cathode materials are investigated namely, the pure electronic conductor, mixed protonic–electronic conductor, mixed ionic–electronic conductor (MIEC), and triple protonic–electronic–ionic conductor (THOEC). Amongst these conductors, MIEC and THOEC currently lead in research development and application in conventional and proton-conducting intermediate–low temperature SOFCs, yet further studies need to be carried out to ensure the continuous improvement of these materials as SOFC cathode. In this presentation, an explanation of the different types of cathodes will be discussed, as well as the highlight on the MIEC- and THOEC- based cathode, which includes recent progress and challenges encountered for both materials in the SOFC environment.

Biography

Nurul Akidah Baharuddin completed her PhD in Fuel Cell Engineering (2014) from Universiti Kebangsaan Malaysia (UKM). She is a senior lecturer cum research fellow at the Fuel Cell Institute, UKM. She currently serves as a Chairman of Hydrogen Sub-working Group under Malaysian Technical Standards Forum Bhd and was appointed as Malaysian delegates for the 2021 United Nation-ITU Telecommunication Standardization Meeting (Geneva). She has published more than 40 peer-reviewed international scientific papers with impressive citations. Her research interests include materials processes for fuel cell application and deployment of fuel cells for stationary applications specifically solid oxide fuel cell (SOFC).

Noriyuki Uchida

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Design of Phospholipid Self-assembly in View of Transdermal Drug Delivery System

Bicelles are aqueous lipid–surfactant assemblies in which lipid bilayer fragments are edge-stabilized by certain surfactants. Because bicelles adopt morphologies that are intermediate between those of lipid vesicles and lipid–surfactant mixed micelles, they form a new class of phospholipid-based materials. So far, bicelles have been applied to biomembrane models, NMR alignment media, and drug delivery carriers. However, applications of conventional bicelles have been limited owing to insufficient stability toward temperature, concentration, pH, etc.

We have developed a series of sodium cholate (SC)-based surfactants allowing for the preparations of kinetically and thermally stable bicelles in view of applications to membrane models or drug delivery carriers. First of all, we synthesized SC modified with three triethylene glycol chains endcapped with polymerizable units (SC-R) and prepared bicelles by mixing SC-R with DMPC lipid. After crosslinking of SC-R, the bicelle became kinetically and thermally stable. We next utilized SC endcapped with butoxy groups (SC-OC4) instead of SC-R. As a result, we could prepared thermally stable SC-OC4/DMPC bicelles without the complicated polymerization process. Recently, we successfully prepared a bicelle with kinetic stability, dilution tolerance and size tunability by mixing SC endcapped with hexyl chains (SC-C5) and DPPC lipid with a bilayer melting point higher than room temperature. Because the features of the SC-C5/DPPC bicelle are desirable for drug delivery carriers, we utilized SC-C5/DPPC bicelle for a drug delivery application.

Biography

Noriyuki Uchida is currently working on development of phospholipid-based functional materials at Tokyo University of Agriculture and Technology. He received his PhD from the University of Tokyo under Prof. Aida. After that he worked at RIKEN, In 2020, he joined Tokyo University of Agriculture and Technology as an assistant professor. His research interest is design of functional materials based on self-assembly of biomolecules such as phospholipids and proteins, and their application to biomaterials. He has received several awards including the Prize of the Japan Association for Chemical Innovation.

Hamed Radpour

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Four-Dimensional Geometry-Based Stochastic Channel Modeling for Polarized MIMO Systems with Moving Scatterers

In this presentation, a four-dimensional (4D) geometry-based stochastic model (GBSM) for polarized MIMO systems with moving scatterers will be discussed. The mixture of Von Mises Fisher (VMF) distribution is considered for scatterers resulting in a more general and practical model. A closed form formula for calculating space time correlation function (STCF) is achieved, which enables the study of the behavior of channel correlation and channel capacity in the time domain with the presence of moving scatterers. To obtain numerical results for channel capacity, Monte Carlo simulation method is used for channel realization purpose. The effect of moving scatterers on MIMO systems performance is evaluated using 2×2 MIMO configurations considering various dual polarizations, i.e. V/V, V/H, and slanted $\pm 45^{\circ}$ polarizations for different signal-to-noise (SNR) regimes. The applied process and achieved formula are general and can be applied to MIMO systems with any arbitrary number of antennas and polarizations.

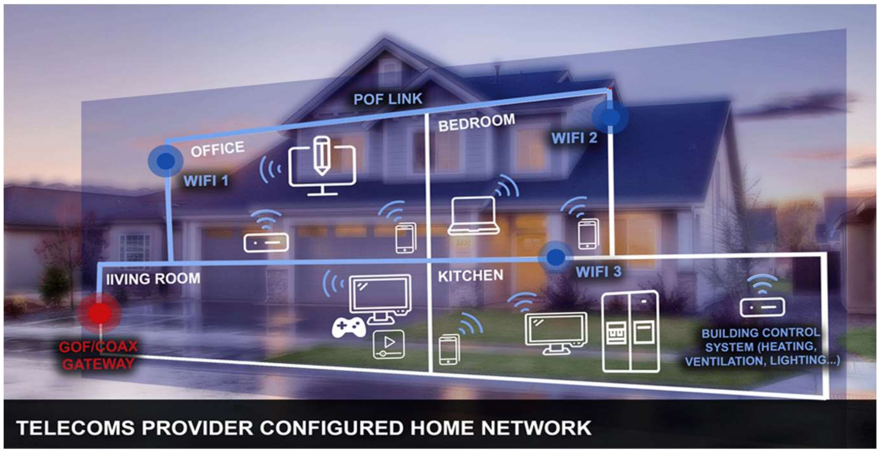
Biography

Hamed Radpour received the B.Sc. in Electrical Engineering and Computer Science at University of Tabriz, Tabriz, Iran and is currently a research assistant at Korea Advanced Institute of Science and Technology (KAIST) where he is pursuing the M.Sc in Electrical Engineering. He was awarded the KAIST scholarship and joined the Microwave and Antenna Laboratory (MALAB) in 2020. He published several papers in relativistic scattering and Inter-Satellite link (ISL) communications in various journals. His current research interests are Deep Learning in Wireless Communications, Massive MIMO systems, Reconfigurable Intelligent Surfaces (RIS), 5G mmWave technology, channel modelingand vehicular/UAV communications

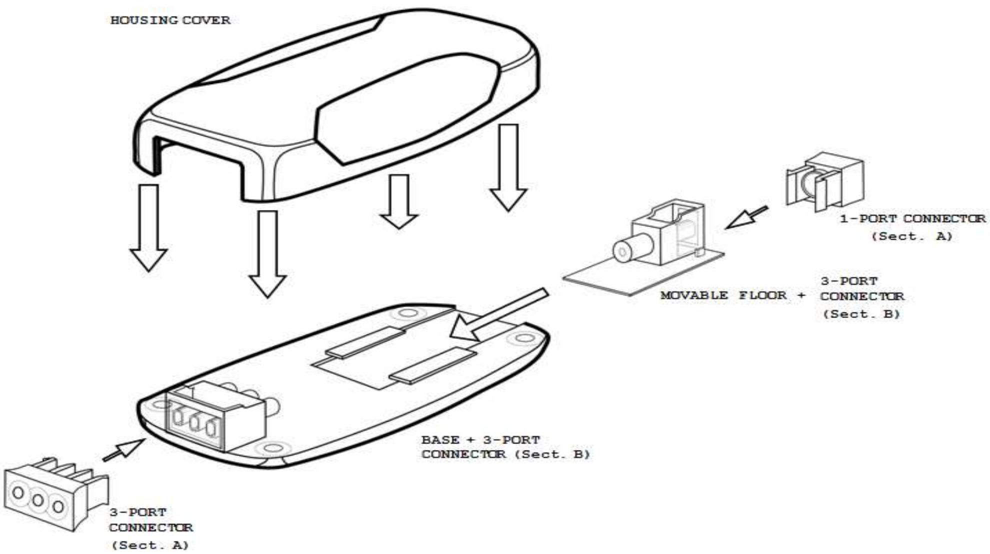
Mohammad Syuhaimi Ab-Rahman
Universiti Kebangsaan Malaysia, Malaysia.

Green Communication & Devices Towards A Future Of Wdm-Pof Network With User And Environmental Friendly

Polymer Optical Fibers (POFs) replace traditional communication media such as copper and glass step by step within short distance communication systems, mostly because of their cost-effectiveness and easy handling. POFs are used in various fields of optical communication, e.g. the automotive sector or in-house communication. The current "state of the art" are single mode communication systems. These systems use only one wavelength for communication, which limits the bandwidth. For future scenarios, this traditional technology is the bottleneck of bandwidth (e.g. for HDTV with IP-TV). One solution to surpass this limitation is to use more than one wavelength over one single fiber, a technique known as WDM (wavelength division multiplexing). This multiplexing technology requires two more technical key elements: a multiplexer, which combines the multi-wavelengths signals into one fiber and a demultiplexer at the end of the network to separate the colored signals. This presentation discusses the overall POF technology for small world communication from device fabrication, device types, configurations and applications. Our solution supports the basis of a wavelength division multiplex (WDM) system in the visible spectrum. Discussion will focus on the technologies that have been developed in our laboratory concerning user friendly approach, ease of maintenance, safety and high-performance solution.





Biography

Mohammad Syuhaimi Ab-Rahman began his career at Universiti Kebangsaan Malaysia (UKM), in mid-2007 as a lecturer and appointed as a senior lecturer in early 2008. In January 2010, he was appointed as Associate Professor in the Department of Electrical Engineering, Electronics and Systems. His specialization is in the field of electronic engineering specifically in optical communication system. He has been involved in many impact researches, academic writing, teaching, supervision, leadership positions, registered prototype and innovation, policy development and community services. He was promoted to full Professor at the age of 33 years old; which is very young and rare in Malaysia.

Soshu Kiriahra

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Stereolithographic Additive Manufacturing of Ceramic Component for Energies and Materials Flow Modulations

In stereolithographic additive manufacturing (STL-AM), 2-D cross sections were created through photo polymerization by UV laser drawing on spread resin paste including nanoparticles, and 3-D models were sterically printed by layer lamination. The lithography system has been developed to obtain bulky ceramic components with functional geometries. An automatic collimeter was newly equipped with the laser scanner to adjust 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 in to acrylic liquid resins at about 60 % in volume fraction. These materials were mixed and deformed to obtained thixotropic slurry. The resin paste was spread on a glass substrate at 50 μm in layer thickness by a mechanically moved knife edge. An ultraviolet laser beam of 355 nm in wavelength was adjusted at 50 μm in variable diameter and scanned on the spread resin surface. Irradiation power was changed automatically for enough 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. Though the computer aided smart manufacturing, design and evaluation (Smart MADE), practical materials components were fabricated to modulate energy and material transfers in potential fields between human societies and natural environments as active contributions to Sustainable Development to 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" for environmental improvements of "Geotechnology", 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.

Anupama B. Kaul

Department of Materials Science and Engineering; PACCAR Technology Institute; Department of Electrical Engineering, University of North Texas, Denton, TX 76203, USA.

Quantum Interactions in Halide-assisted Growth of WSe2 for High-performance Optoelectronic Devices

Despite the varying compositions of van der Waals (vdW) two-dimensional (2D) layered materials, their unifying feature stems from the weak vdW interaction that serves as the glue between adjacent layers, while the in-plane bonding is through the strong covalent interaction. this study, halide-assisted- (HA-) low-pressure- (LP-) chemical vapor deposition (CVD) synthesis of monolayer (1L) WSe2 with average size ranging from 10-25 µm was achieved, where the use of sodium chloride helps to reduce the growth temperature of WSe2 to as low as ~ 750oC, unlike conventional CVD where synthesis temperatures are typically much higher. The temperature-dependent photoluminescence spectra for 1L WSe2 reveals localized excitons and trions vanish for temperatures greater than about 100 K and ~ 273 K, respectively, while the exciton population starts decreasing only above 348 K due to the increased electron-phonon interaction at these higher temperatures. The phonon lifetime τ was found to be higher for WSe2 synthesized on sapphire (τ ~ 0.98 ps), compared to WSe2 grown on SiO2/Si (τ ~ 0.76 ps). Finally, a monolayer WSe2-based photodetector was fabricated with Aluminum contacts from which photoresponsivity $\mathscr{R}$ of ~ 502 AW-1 and ~ 736 AW-1 was obtained for photodetectors fabricated on Al/WSe2/SiO2/Si and Al/WSe2/sapphire substrates, respectively. Our successful prototype photodetector demonstration validates the tremendous potential of WSe2 to open avenues for stateof-the-art electronic, opto-electronic and quantum-optoelectronic devices using scalable synthesis routes.

Biography

Dr. Anupama B. Kaul is the PACCAR Professor of Engineering at UNT and serves as Director of the Nanoscale Materials and Devices Laboratory and the PACCAR Technology Institute. Dr. Kaul has served as a Program Director at NSF in the ECCS Division, where she was on rotation as an IPA from JPL, Caltech. Prof. Kaul serves on the External Advisory Board of Penn State University's Twodimensional (2D) Crystal Consortium (2DCC) – MIP. She was also Chair and PI of the *NSF US EU Workshop on 2D Layered Materials and Devices* held in 2015 with the European Union (EU) Graphene Flagship Program.

SciWide
WEBINARS

DAY 2

SPEAKER FORUM

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August

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V-Appliedscience2021

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Synthesis of novel therapeutics towards COVID-19 management: nanoceria as the tool

The COVID-19 pandemic has devastated the world, with the SARS-CoV-2 replicating much more easily when compared to other flu viruses, with several distinct complications from cytokine storm to systemic inflammation and pulmonary fibrosis. In this context, nanoceria emerged as a remarkable anti-inflammatory, antioxidant, and anti-fibrotic material, making it an attractive tool to fight the virus and its associated systemic complications. In this way, we synthesized hybrid nanostructures composed of cerium oxide and microcrystalline cellulose by the microwave-assisted hydrothermal (MAH) route and investigated its structural, morphological, and spectroscopic behaviors to evaluate the presence of structural defects that might lead to the capability to inactivate the SARS-CoV-2. The samples depicted to be crystalline in nature with mean crystallite sizes around 10nm, with an interplanar spacing of 0.3nm, characterizing the formation of quantum dots with primary (111) fringes, unevenly distributed along the cellulose template with a certain agglomeration degree. The quantum dots presented the characteristic Raman Ce – O vibration close to 450 cm-1 as well as a second-order mode around 1050 cm-1, indicative of localized energetic levels distribution originated from defective species, such as oxygen vacancies and Ce(III) atoms, essential in the scavenging of reactive oxygen species (ROS). Therefore, based on preclinical evidence, we have successfully synthesized hybrid nanoceria structures with potential multifunctional therapeutic properties to be further

Biography

Leandro Rocha has completed his Ph.D. from the School of Engineering, Sao Paulo State University (UNESP), Brazil, and is currently performing postdoctoral research (FAPESP grant n°2018/20590-0) at the Center for Research and Development of Functional Materials, Federal University of São Carlos (UFSCar), Brazil, coordinated by Prof. Dr. Elson Longo. He has published more than 20 papers, besides 3 patents, with an H-index of 8.