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Part I　Conference Schedule

Time: December 4-6, 2021
Location: International Asia-Pacific Convention Center Sanya
三亚亚太国际会议中心

Date	Time	Lobby		
Dec. 4	**14:00-17:00**	**Registration (Lobby)**		
Date	**Time**	**Location: TBD**	**Location: TBD**	**Location: TBD**
Dec. 5	**08:30-12:00**	**Biomedical & Life Sciences** **Keynote Speech Session I:** Prof. Limin Chen, Prof. Rui Gong, Prof. Min Yue, Dr. Nicoletta Guaragnella, Dr. Ibrar Khan **Chair:** **Group photo & Coffee Break: 10:00-10:15**	**Physics Sciences** **Keynote Speech Session I:** Prof. Nanguang CHEN, Prof. Fumio KOYAMA, Prof. Shengjun Zhou, Prof. Zhen Yuan, Prof. Shien-Kuei Liaw, Dr. Qiao Wen **Chair:** **Group photo & Coffee Break: 10:00-10:15**	**Energy Engineering** **Keynote Speech Session I:** Dr. Mohsen Sheikholeslami, Prof. John W. Sheffield, Dr. Yan Su, Prof. Ts. Dr. Mohd Ikmar Nizam b. Hj. Mohamad Isa (M.I.N. Isa), Dr. Shahzada Qamar Hussain **Chair:** **Group photo & Coffee Break: 10:00-10:15**
	12:00-13:30	**Lunch　Pacific Cafe（太平洋咖啡厅）**		
Date	**Time**	**Location: TBD**	**Location: TBD**	**Location: TBD**
Dec. 5	**14:00-18:00**	**Biomedical & Life Sciences** **Keynote Speech Session II** Dr. Amaal Gh. Yaser, Dr. Murtada D. Naser, Dr. Jidi Xu, Prof. Hude Mao, Prof. Yixing Zheng **Chair:** **Group photo & Coffee Break: 16:15-16:30**	**Physics Sciences** **Keynote Speech Session II:** Dr. Klaus Gärtner, Prof. Olivier Bonnaud, Dr. Bablu K. Ghosh, Dr. Jinshun Bi, Dr. Abu Bakar Md. Ismail, Dr. Partha S Mallick **Chair:** **Group photo & Coffee Break: 16:15-16:30**	**Energy Engineering** **Keynote Speech Session II** Prof. Indrajit Mukhopadhyay, Dr. Prashanth S A. Dr. Ralph E. White, Prof. Shahram Montaser Kouhsari, Dr.K.C.Mohite **Chair:** **Group photo & Coffee Break: 16:15-16:30**
	18:00-19:30	**Dinner　Pacific Cafe（太平洋咖啡厅）**		
Date	**Time**	**Location: TBD**	**Location: TBD**	**Location: TBD**
Dec. 6	**08:30-12:00**	**Biomedical & Life Sciences** **Technical Session:** **Chair:** **Group photo & Coffee Break: 10:00-10:15**	**Physics Sciences** **Technical Session:** Prof. Quentin A Parker, Prof. Ji Wang, Prof. Sergio Galindo Torres, Prof. In Gwun Jang, Dr. Pratibhamoy Das **Chair:** **Group photo & Coffee Break: 10:00-10:15**	**Energy Engineering** **Technical Session:** **Chair:** **Group photo & Coffee Break: 10:00-10:15**
	12:00-13:30	**Lunch　Pacific Cafe（太平洋咖啡厅）**		

Part II Keynote Speech

Biomedical & Life Sciences: Keynote Speech Session I

Keynote Speech 1: What we have learned from COVID-19 pandemic?

Speaker: Prof. Limin Chen, Institute of Blood Transfusion, Chinese Academy of Medical Sciences and Peking Union Medical College, Chengdu, 610052 China
Time: 08:30-09:15, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
COVID-19 caused by SARS-CoV-2 infection becomes a pandemic, which disrupts the normal life worldwide. Tremendous progress has been made in pathogen identification, pathogenesis, diagnostics, vaccine research and treatment for SARS-CoV-2. Viral RNA detected in the blood of some patients infected with SARS-CoV-2 brings alarm to the potential threat to the transfusion safety. Recent progress and lessons we have learned from the COVID-19 pandemic will be discussed in this presentation.

Keynote Speech 2: Development of single domain antibodies against respiratory syncytial virus

Speaker: Prof. Rui Gong, Wuhan Institute of Virology, Chinese Academy of Sciences, China
Time: 09:15-10:00, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Respiratory syncytial virus (RSV) poses great health threats to humans. However, there are no licensed vaccines or therapeutic drugs to date. Only one humanized monoclonal antibody, palivizumab, is available on the market, but it is used prophylactically and is limited to infants with high risk. With advances in antibody engineering, it has been found that a single-domain antibody (sdAb) can be therapeutically administered by inhalation, which would be more efficient for respiratory diseases. Here, we identified two human sdAbs, m17 and m35, by phage display technology. They specifically bind to RSV fusion glycoprotein (F protein) in the prefusion state with subnanomolar affinity and potently neutralize both RSV subtypes A and B with 50% inhibitory concentration (IC50) values ranging from pM to nM.

Interestingly, these sdAbs recognize a novel epitope, termed VI, that is unique to the prefusion state. This epitope is located at the C terminus of the F1 subunit, close to the viral membrane, and might be sterically restricted. We further find that m17 and m35 neutralize RSV by preventing the prefusion F conformational arrangement, thus inhibiting membrane fusion. These two sdAbs have the potential to be further developed as therapeutic candidates and may also provide novel insight for developing other antiviral reagents against RSV.

Keynote Speech 3: TBD (Video)

Speaker: Prof. Min Yue, Zhejiang University, China
Time: 10:00-10:45, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract

Keynote Speech 4: Yeast cell between tradition and innovation for fundamental and applied biology (Video)

Speaker: Prof. Nicoletta Guaragnella, Biotechnologies and Biopharmaceutics of University "A.Moro" Bari, Italy
Time: 10:55-11:40, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia -Pacific Convention Center Sanya

Abstract

Yeast is an invaluable eukaryotic model to study fundamental cellular processes and to be used for biotechnological purposes. Its well known biochemistry, physiology and easy genetics offers research opportunities in health and agri-food sectors. Our group is specialized in the use of the budding yeast Saccharomyces cerevisiae to gain insight into the molecular

mechanisms of cell stress response and its possible biotechnological applications. Specific stress responses depend on multiple factors related to the timing of stress exposure, the stressor's concentration, the cell growth phase and the sorrounding environment. Our main research activities focus on the kinetics of stress response within and between pathways with particular emphasis on the role of mitochondrial signalling and identification of genes/pathways as markers of cell stress resistance. Particularly, we study the role of the RTG pathway, conserved from fungi to plants and activated by mitochondrial dysfunction, and its interplay with nutrient sensing and oxidative and/or osmotic stress response pathways in cell death and adaptation. Stress resistance is an important yeast feature in industrial processes. At this regard we study acetic acid stress in budding yeast in the context of cellular transport, metabolism and stress-signalling pathways. In the production of biofuels and renewable chemicals from lignocellulosic biomass, the improvement of acetic acid tolerance is a key factor. This knowledge contributes to the development and competitiveness of yeast cell factories for sustainable applications. Finally, we are approaching to the design and development of yeast-based biosensors for precision agriculture providing new solutions for food safety, bringing sustainability in resources, influencing working practices and life style of farmers and suggesting new applicable agribusiness models.

Keynote Speech 5: TBD

Speaker: Dr. Ibrar Khan, Abbottabad University of Science, Pakistan
Time: 11:40-12:25, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia -Pacific Convention Center Sanya

Abstract
TBD

Biomedical & Life Sciences: Keynote Speech Session II

Keynote Speech 6: TBD

Speaker: Dr. Amaal Gh. Yaser, University of Basrah, Iraq
Time: 14:00-14:45, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
TBD

Keynote Speech 7: TBD

Speaker: Dr. Murtada D. Naser, University of Basrah, Iraq
Time: 14:45-15:30, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
TBD

Keynote Speech 8: Epigenetic variations in apple (Malus domestica) under drought stress

Speaker: Dr. Jidi Xu, College of Horticulture, Northwest A&F University, China
Time: 15:30-16:15, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Epigenetics confers the heritable variations with no DNA sequence changes, including DNA methylation and histone modification. Cytosine methylation is an essential feature of epigenetic regulation and is involved in various biological processes. Although cytosine methylation has been analysed at the genomic scale for several plant species, there is a general lack of understanding of the dynamics of global and genic DNA methylation in plants growing in environments challenged with biotic and abiotic stresses. In this study, we mapped cytosine methylation at single-base resolution in the genome of commercial apple (Malus domestica), and analysed changes in methylation patterns associated with water deficit in representative drought-sensitive and drought-tolerant cultivars. We found that the apple genome exhibits ~54%, ~38% and ~8.5% methylation at CG, CHG and CHH sequence contexts, respectively. We additionally documented changes in gene expression associated methylation levels under water deficit. Global methylation and transcription analysis revealed that promoter-unmethylated genes showed higher expression levels than promoter-methylated genes. Gene body methylation appears to be positively correlated with gene expression. Water deficit stress was associated with changes in methylation at a multitude of genes, including those encoding transcription factors (TFs) and transposable elements (TEs). Based on the methylome data, we found that MdOCP3（OVEREXPRESSOR OF CATIONIC PEROXIDASE 3）transcription factor presented a demethylation trend under drought stress and its expression level was up-regulated. Then, over-expression of MdOCP3 in tobacco and apple showed its negative regulatory role in response to drought. These data will be helpful for understanding potential linkages between DNA methylation and gene expression in plants growing in natural environments and challenged with abiotic and biotic stresses.

Keynote Speech 9: The wheat ABA receptor gene TaPYL1-1B contributes to drought tolerance and grain yield by increasing water-use efficiency

Speaker: Prof. Hude Mao, College of Plant Protection, Northwest A & F University, China
Time: 16:25-17:10, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
The role of abscisic acid (ABA) receptors, PYR1/PYL/RCAR (PYLs), is well established in ABA signaling and plant drought response, but limited research has explored the regulation of wheat PYLs in this process, especially the effects of their allelic variations on drought tolerance or grain yield. Here, we found that overexpression of a TaABFs-regulated PYL gene, TaPYL1-1B, exhibited higher ABA sensitivity, photosynthetic capacity, and water-use efficiency (WUE), all contributed to higher drought tolerance than that of wild-type plants. This heightened water-saving mechanism further increased grain yield and protected productivity during water deficit. Candidate gene association analysis revealed that a favorable allele TaPYL1-1BIn-442, carrying an MYB recognition site insertion in the promoter, is targeted by TaMYB70 and confers enhanced expression of TaPYL1-1B in drought-tolerant genotypes. More importantly, an increase in frequency of the TaPYL1-1BIn-442 allele over decades among modern Chinese cultivars and its association with high thousand-kernel weight together demonstrated that it was artificially selected during wheat improvement efforts. Taken together, our findings illuminate the role of TaPYL1-1B plays in coordinating drought tolerance and grain yield. In particular, the allelic variant TaPYL1-1BIn-442 substantially contributes to enhanced drought tolerance while maintaining high yield, and thus represents a valuable genetic target for engineering drought-tolerant wheat germplasm.

Keynote Speech 10: Evaluation of yield and quality of Moringa oleifera plantation in southwest China

Speaker: Prof. Yixing Zheng, Research Institute of Resource Insects, Chinese Academy of Forestry, China
Time: 17:10-17:55, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Moringa oleifera as a forage plant has been introduced to many countries in the world. The study assessed the effect of different cultivation densities (plant spacing0.2 m×0.2 m,0.4

m×0.4 mand0.8 m×0.8 m, i.e. 250,000 plants ha-1, 62,500 plants ha-1, and 15,600 plants ha-1, respectively) and mowing heights (15, 30 and60 cm) on the biomass production and nutritional quality of Moringa oleifera plantation in order to improve the economic benefits of local cultivation in southwest China. The regrowth of moringa plantation was harvested during two annual cycles. Twelve harvests were completed after the first regrowth harvest, with harvests 1－6 carrying out during the rainy season (from May to October) and harvests 7－12 during the dry season (from November to April). The results showed the highest fresh matter and dry matter (DM) yields were found in the cultivation density of 250,000 plants ha-1 with the mowing height of30 cmduring the two annual cycles. The 250,000 plants ha-1 cultivation density not only yielded the highest fresh and dry matter (about 8.43-76.41 Mg ha-1 and 1.66-12.85 Mg ha-1, respectively), but also the highest fine and coarse fractions of moriga throughout the two consecutive evaluation years in both the rainy and dry seasons. The30 cmmowing height produced the highest fresh and dry matter (25.18-41.53 Mg ha-1 and 5.28-8.27 Mg ha-1, respectively) during the wet season, while the15 cmmowing height produced the highest biomass during the dry season, 4.38-13.16 Mg ha-1 fresh matter and 0.82-2.26 Mg ha-1 dry matter. These data imply that the lower mowing height should be used in areas with low rainfall to obtain higher moringa productivity. Additionally, the crude protein content was within the range of 235.3-257.6 gkg-1 DM in the wet season, which was higher than in the dry season (224.1-232.8 gkg-1 DM), and was remarkablely affected by cultivation density especially in the rainy season. In contrast to the rainy season, there was much higher the crude fibre (about192.7 gkg-1 DM), neutral detergent fi bre (approximately293.1 gkg-1 DM), acid detergent fi bre (about208.4 gkg-1 DM), DM (up to173.7 gkg-1) and ash (over94.5 gkg-1 DM) contents during the dry season. This study also indicated that cultivation density fairly influenced the DM yield and ash contents in the wet season, and the crude fibre content in the wet and dry season. There were no significant differences between the different cultivation densities in crude lipid content (up to 22.9-26.1 gkg-1 DM）, while the cultivation density distinctly affected in vitro DM digestibility (approximately 766.3-853.6 gkg-1 DM) especially in the rainy season. The crude protein, in vitro DM digestibility, crude lipid, neutral detergent fibre and ash contents in both rainy and dry seasons were clearly affected by mowing height, whereas the crude fibre content in dry season and the acid detergent fibre content in wet season were obviously impacted by mowing height. These results imply that moringa with a balanced fibre component and high protein content is a excellent forage crop especially for ruminants.

Keywords: Moringa oleifera; biomass production; nutritional quality; cultivation density; mowing height

Keynote Speakers to be confirmed:

Prof. B. P. Mishra
Prof. D. D. Patra
Dr. Surendra Singh Bisht
Dr. Claude BAKOUME
Dr. Monica Santamaria

Physics Sciences: Keynote Speech Session I

Keynote Speech 1: TBD (Video)

Speaker: Prof. Fumio Koyama, Tokyo Institute of Technology, Japan
Time: 08:30-09:10, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
TBD

Keynote Speech 2: TBD (Video)

Speaker: Prof. Nanguang Chen, National University of Singapore, Singapore
Time: 09:10-09:50, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
TBD

Keynote Speech 3: Boosting quantum efficiency of GaN-based visible and ultraviolet light-emitting diodes

Speaker: Prof. Shengjun Zhou, Wuhan University, China
Time: 09:50-10:30, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
GaN-based light-emitting diodes (LEDs) have attracted considerable interest for their applications in high-definition displays, automotive front lighting, visible light communication and solid state lighting because of their high luminous efficiency, low energy consumption, long operation lifetime, and broad spectral range spanning from ultraviolet to red wavelengths. The light extraction efficiency of GaN-based blue/green/ultraviolet LEDs is relatively low due to total internal reflection of the generated light at the nitride-air interface resulting from their very different refractive indices. In addition, the further improvement in internal quantum efficiency of GaN-based blue/green/ultraviolet LEDs is limited by high threading dislocation density in the as-grown nitride semiconductors. This talk will outline the emerging challenges in light extraction micro-nano structure designs and the MOCVD growth process for high-efficiency blue/green/ultraviolet LEDs. Moreover, the recent development in flip-chip LED, vertical LEDs, and Mini/Micro-LEDs will be discussed.

Keynote Speech 4: Temperature-feedback Nanoplatform for NIR-II Penta-modal Imaging-guided Synergistic Photothermal Therapy and CAR-NK immunotherapy of Lung Cancer (Video)

Speaker: Prof. Zhen Yuan, Faculty of Health Sciences, University of Macau, China
Time: 10:40-11:20, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
In this study, to visually acquire all-round structural and functional information of lung tumor while performing synergistic photothermal therapy (PTT) and targeting immunotherapy, a theranostic nanoplatform that introduced upconversion nanoparticles (UCNPs) and IR-1048 dye into the lipid-aptamer nanostructrure (UCILA) was constructed. Interestingly, the IR-1048 dye grafted into the lipid bilayer can serve as the theranostic

agent for photoacoustic imaging, optical coherence tomography angiography, photothermal imaging and PTT in the second near infrared (NIR) window. In addition, loaded in the inner part of UCILA, UCNPs possess the superior luminescence property and high X-ray attenuation coefficient, which can act as contrast agents for CT and thermo-sensitive up-conversion luminescence (UCL) imaging, enabling real-time tracking of metabolic activity of tumor and temperature-feedback PTT. Further, under the complementary guidance of penta-modal imaging and an accurate control of in-situ temperature change during PTT, UCILA exhibited its excellent capability for ablating the lung tumor with minimal side effects. Meanwhile, synergistic CAR-NK immunotherapy was carried out specifically to eradicate any possible residual tumor cells after PTT. Therefore, the UCILA nanoplatform was demonstrated as a multifunctional theranostic agent for both penta-modal imaging and temperature-feedback PTT while conducting targeting immunotherapy of lung tumor.

Keynote Speech 5: Environmental parameters evaluation of underwater optical wireless communication system (Video)

Speaker: Prof. Shien-Kuei Liaw, Taiwan Tech, Chinese Taipei
Time: 11:20-12:00, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract

An underwater optical wireless communication (UOWC) system using green light laser source is proposed and investigated. The green light laser was modulated in various speed using NRZ-OOK format with different PRBS for system performance comparison. The bit error rate (BER) values were measured from 1.5- to 6 m, respectively, for system evaluation. The bit error rate BER performance was measured and discussed in a data rate of 1.25Gbps date rate. Then, the UOWC transmission system was carried out under several parameters such as temperature, turbulence, artificial seawater and impurity. We added salt to simulate sea water for practical application. A submerged motor with an output of 1200 L/h is used as water flow turbulence source, the influence to BER and transmission quality is negligible. For thermal change issue, the experimental results show that at room temperature of 24 ℃, it has the better BER as compared to low temperature of around 15 ℃ or high temperature of 40 ℃. We also found that water flow disturbance has negligible impact to the BER and eye diagram quality. Later, artificial seawater is applied to simulate the real seawater condition. Under such situation, the UOWC transmission system can only transmit 3 m rather instead of 6 m because that the impure particles and water disturbance issues. Both two factors may degrade the BER quality of seawater.

Keynote Speech 6: Ultra-narrow linewidth fiber laser based on quantum dots

Speaker: Dr. Qiao Wen, Shenzhen University, China
Time: 12:00-12:40, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Narrow linewidth fiber laser has been widely used in fiber sensing, coherent optical communication, laser high-precision measurement, gravitational wave detection and other fields, and has huge new application prospects. The narrow linewidth laser based on quantum dots as a saturable absorber has the advantages of low cost, simple fabrication and narrow output linewidth. In this paper, we focus on the saturable absorption properties of quantum dots, and apply them to near-infrared fiber lasers to achieve a stable output of narrow linewidth spectrum. A narrow linewidth fiber laser based on quantum dots was built. Its laser linewidth is 624.5 Hz, the highest signal-to-noise ratio (SNR) is 77.63 dB and the lowest power fluctuation is 0.4%. The experimental works prove that quantum dots are an excellent saturable absorber and have a promising application in ultranarrow photonics.

Physics Sciences: Keynote Speech Session II

Keynote Speech 7: Mathematical semiconductor transport models, energy functionals and preserving qualitative analytic properties in the discrete case for all spatial step sizes using Delaunay meshes. (Video)

Speaker: Dr. Klaus Gärtner, M4SIM, Germany
Time: 14:00-14:40, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
The classical drift-diffusion model is still the backbone for many of today's real world applications. It is used to illustrate that its basic mathematical properties, like weak formulation and the use of test functions can be preserved for finite volume methods and boundary conforming Delaunay meshes for all spatial step sizes (h) and properly choosing implicit time discretizations. Because stability is guaranteed as long as the analytical problem is stable, these basic relations can guide 'mesh construction', because one is

interested in good ('best-') approximations of some rather general functionals and additionally, special ones, like reaction rates, one or two contact currents,... with a limited number of mesh points. This is expected to hold for better approximations of the Boltzmann equation, too, as long as explicit momentum (energy as a first step) approximations are considered, that fulfill the H-theorem analytically, e.g., a 'group drift-diffusion theory' with mass-action-law like scattering reactions. The interest grows with shrinking scales and higher voltages and essentially as soon as the high energetic tail of the distribution function defines the effects of interest and a local force approximation is insufficient to result in good, energy dependent special reaction rates. Examples are reactions forbidden at equilibrium or avalanche processes, that are defining the device functionality and not the looming limit of operation.
For amplification and logic functionality one can expect that the algorithmic complexity is well below a direct, sparse Keldysh formalism (NEGF) approach ($A^{-1} R A^{-H}$) as long as the state space (energy) is extended moderately.
Examples discussed are 3d detectors for astro- and high-energy physics developed at https://www.hll.mpg.de/ and computed with Oskar3, my 'algorithmic experimental device simulator'.

Keynote Speech 8: Skills in physics and semiconductor devices: a global challenge for digital society (Video)

Speaker: Prof. Olivier Bonnaud, University Rennes 1 and Supelec-Rennes, France
Time: 14:40-15:20, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
The number of connected objects and therefore IoT devices that invade our daily lives is growing exponentially. These objects are based on electronics in the form of elementary components, circuits and hybrid and complex integrated systems. Electronics must therefore respond to an exponential growth in the number of circuits, components per circuit, data transmitted, stored and processed in data centers. As a corollary, the energy consumed by operators, servers and users follows the same law of growth. In the coming years, the main challenges will be to slow down these exponential growths by improving the design and architecture of components, circuits and systems for processing and transmitting information. These challenges require the acquisition of skills based on knowledge and know-how, and an increase in the pool of future competent and innovative players. This approach is part of the strategy led by the national academic training network which, by pooling the skills of trainers and technological platforms at the French level, aims to meet the needs of companies within the framework of a Recovery Plan for the Electronic Sector. After a presentation of the context and the consequences on the technical challenges, and after several approaches proposed, the actions carried out by the national network of microelectronics are detailed and illustrated with several examples of realizations and results.

Keynote Speech 9: TCO and carrier selective materials open circuit voltage and efficiency significance in solar photovoltaic cells (Video)

Speaker: Prof. Bablu K. Ghosh, EEE Program, UMS, Malaysia
Time: 15:20-16:00, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract

Abstract

Si and CdTe hetero-junction (HJ) solar cells are most promising in commercial stage photovoltaic (PV) technologies. Their contacts and interface defects related opto-electrical losses are still vital to limit its further technological benefit. Besides pioneer Si and CdTe PV cell, the rapid development of organic and organic-inorganic Perovskite solar cells are also huge energy potential. Enhancement of conduction and lessening recombination the carrier selectivity (CS) by field effect is most significant for majority carrier selection to improve open circuit voltage. The dark carrier injection due to thermal effects and traps are mostly classified as recombination losses [1-2] and it is related to the barrier effect. Temperature and photonic interaction with PV materials the barrier relating to temperature the current density function, J/Jo and associated built in potential $V \propto \frac{K_B T}{q} In \left(\frac{J}{Jo}\right)$ are determining factors of energy losses ΔE= ΔqV.

$$V_{oc} = V_{oc}^{SQ} - V_{oc}^{SC} - V_{oc}^{rd} - V_{oc}^{nrd} \quad (1)$$

The effective charge modulation at the surface is directly proportional to the dielectric constant of the nanostructure back surface passivation layer of high-k dielectrics effects are vital [3-4].

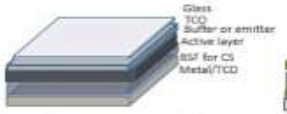
$$Q_{eff} \propto \frac{\epsilon A}{d} \quad (2)$$

Q_{eff} is effective charge density, ϵ is dielectric permittivity, d is thickness, A is area. CS is essential to combat Fermi level pinning (FLP) effects. Careful selection of the material work function with respect to the doping level the contact resistivity is varied with the Schottky barrier height.

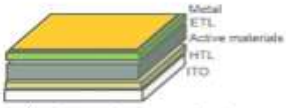
$$\rho_c \propto exp\left(\frac{\varphi_B}{\sqrt{N_d}}\right) \quad (3)$$

The contact resistivity, ρ_c, barrier height, φ_B and doped N_d are interrelated. The TCO, emitter and back contact materials proper band edge, permittivity and thermal as well as electrical conductivity has lot of influence on carrier selectivity, contact resistance, Voc and efficiency. The TCO and back barrier passivation thickness and doping effect on both Voc and efficiency variation more specifically can be understand and it is supportive to further progress in diverse materials design and electrical performance of diverse solar cell.

Image



Si or CdTe HJ cells with CS, TCO and emitter layer



Novel organic sc normal and perovskite inverted mode

Oxide Materials (meso/thin film)	Band gap, Eg (eV)	Electrical Permittivity (ε)	Electrical conductivity, σ(s/cm)x10⁻⁴	Thermal conductivity, k(W/mK)
ZnO	3.37	8.5	1.12	6.2
TiO_2	3.02	10	6.60	11.7
SnO_2	3.57	9.8	2.20	11.5
ZrO_2	4.15	10	0.76	2.5

Recent Publications

1. Ghosh, B.K., Zainal, S.S., Mohamad, K.A. and Saad, I., 2016. InGaN photocell significant efficiency enhancement on Si–an influence of interlayer physical properties. *International Journal of Energy Research*, *40*(9), pp.1271-1279.
2. Ghosh, B.K., Weoi, C.N., Islam, A. and Ghosh, S.K., 2018. Recent progress in Si hetero-junction solar cell: A comprehensive review. *Renewable and Sustainable Energy Reviews*, *82*, pp.1990-2004.
3. Ghosh, B.K. and Biswas, T.K., 2019. Emerging solar cells energy trade-off: Interface engineering materials impact on stability and efficiency progress. *International Journal of Energy Research*, *43*(5), pp.1670-1688.
4. Ghosh, B.K., Saad, I., Teo, K.T.K. and Ghosh, S.K., 2020. mcSi and CdTe solar photovoltaic challenges: Pathways to progress. *Optik*, *206*, p.164278.
5. Ghosh, B.K., Rani, A.I., Mohamad, K.A. and Saad, I., 2020. Low Leakage Current by Solution Processed PTAA-ZnO Transparent Hybrid Hetero-Junction Device. *Electronic Materials Letters*, *16*(5), pp.457-465.

Keynote Speech 10: Reliability Issues and Radiation Effects on Emerging Non-volatile Memories

Speaker: Prof. Jinshun Bi, Institute of Microelectronics, Chinese Academy of Sciences (IMECAS), China
Time: 16:10-16:50, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
This talk will focus on the reliability issues of non-volatile memories under harsh environment, especially the Flash memory and resistive random access memory (RRAM). By electrostatic force microscopy (EFM) and in situ electron holography techniques, the charge trapping and loss properties of HfO2-based trapping structures were demonstrated. Additional, the cycling operation induced degradation mechanism was clarified by charge pumping analysis and a new junction-assisted programming scheme was proposed to improve it. Meanwhile, RRAM is an emerging NVM technology, its resistance switching is based on the formation/dissolution of nanoscale conductive filaments in oxide-electrolyte insulator for non-volatile memory. To improve the reliability of RRAM, we presented some effective ways to control the formation and dissolution process of conductive filaments by optimizing programming schemes and designing device structure. Furthermore, the radiation effects of Flash and RRAM, such as total ionizing dose, displacement damage and single event effects, have been evaluated in details. In terms of storage element, RRAM shows great advantage over Flash on anti-radiation performance. If transistors or peripheral circuits are taken into consideration, the situation becomes much complex. We will make a deep discussion in this talk.

Keynote Speech 11: Photoelectrochemically solar energy harvesting using earth-abundant metal oxides (Video)

Speaker: Prof. Abu Bakar Md. Ismail, Dept. of Electrical & Electronic Engineering University of Rajshahi, Rajshahi 6205, Bangladesh
Time: 16:50-17:30, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Considering the cost of raw materials, elements with high abundance in the earth's crust are always preferred for inexpensive and scalable solar energy conversion and storage

into chemical fuels like Hydrogen (H2). This presentation provides our experience on H2 production by solar water splitting using the earth abundant metal oxides-based photoelectrochemical cells (PEC) fabricated with low-cost spin coating technique. Naturally abundant Hematite (α-Fe2O3) and Cupric Oxide (CuO) have been chosen as photoanode/photocathode in PEC because of their favorable band gap, chemical stability and low cost. Solar water splitting at a bias of ~0.8 V, which was much lower than the required 1.23 V, was achieved when naturally n-type Fe2O3 was used in a heterojunction with p-type porous silicon as photoanode. Band gap engineering of naturally n-type Fe2O3 by codoping it with Zn and Cu in a facile way transformed it to p-type, and when applied as photocathode it produced H2 by solar water splitting. Although low-bias and photocathodic reduction of water was achieved by Fe2O3, the efficiency was low (low photocurrent density). In the quest of finding photoelectrode with high photocurrent density another earth abundant material CuO was investigated. A high photocurrent density of more than 19 mA/cm2 was obtained when CuO was synthesized through a novel chemical route. Our experimental results show that earth abundant metal oxides-based devices fabricated with a simple and low cost spin-coating technique might be a solution to the sustainable harvesting of solar energy.

Keynote Speech 12: Performance of CNTs as interconnects in VLSI circuits

(Video)

Speaker: Prof. Partha S Mallick, School of Electrical Engineering, Vellore Institute of Technology, India
Time: 17:30-18:10, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Performance of highly scaled down interconnects in integrated circuits is a major cause of concern among microelectronics engineers and scientists. As the cross sectional size of interconnects is reduced to a few tens of nano-meters, many reliability problems arise in copper based interconnects, which is used currently in ICs. However, the last decade has seen extensive research by academia and industry alike, in developing carbon nanotube (CNT) based interconnects that have many advantages over existing copper interconnects. Many research groups including our own, have studied the possibilities of using CNTs as interconnects. After the first prototype of MWCNT based interconnects is fabricated and tested at 1GHz in 2008, it became very clear that the time when integrated circuits work on CNT based interconnects is closer than anticipated.

Here, the major performance factors that determine the applicability of CNTs as interconnects are presented. Factors like delay, coupling capacitance, crosstalk and peak noise in interconnects are discussed in detail. We have earlier proposed different methods to reduce delay, crosstalk and peak noise in coupled CNT interconnects. Three main possible methods are discussed here: (i) use of

semiconducting CNTs at CNT interconnect periphery, (ii) use of air-gaps in-between CNT interconnects and (iii) use of triangular cross section CNT bundles as interconnects. Results from these three methods show similar trends in reducing delay, coupling capacitance, crosstalk and noise. Interestingly, each method has its own advantages from fabrication point of view. So, a mix of all three methods wherever suitable, will be the best choice in improving the overall performance in integrated circuits.

Physics Sciences: Keynote Speech Session III

Keynote Speech 13: The emergence of Space Science at the University of Hong Kong (Video)

Speaker: Prof. Quentin A Parker, University of Hong Kong, Hong Kong (China)
Time: 08:30-09:10, Monday Morning, December 6, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
I will describe the emergence of Space Science a the University of Hong Kong with the establishment of the Laboratory for Space Research (www.lsr.hku.hk). Our vision, collaborations and current projects will be presented.

Keynote Speech 14: An Analysis of Propagation and Properties of Axisymmetric Waves in Elastic Solids

Speaker: Prof. Ji Wang, Ningbo University, China
Time: 09:10-09:50, Monday Morning, December 6, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
The wave propagation in elastic solids is widely treated as plane waves by Cartesian coordinates for known modes such as Rayleigh and Love waves with broad engineering applications. Such distinct wave phenomena also exist in other coordinate

systems but the essential property such as the velocity should be the same as known ones while many other special features related to coordinate systems are not presented in details in earlier literature. In a series of recent research, it confirmed that typical wave modes can be found in cylindrical coordinate system with axisymmetric feature and wave velocities are independent from coordinate systems of elastic solids. In general, the deformation solution is given in Bessel functions with a decaying feature along the radius that is different from the constant amplitude in Cartesian coordinates. Such feature is consistent with the energy decaying along the wavefront away from the origin. Consequently, there is a unique feature of enhancement or reduction of signal strength and amplitudes related to the direction of wave propagation. Clearly, this feature can be exploited further through the consideration of wave modes and direction of propagation in relation with the source in measurement and detection by sensors utilizing the axisymmetric waves. Furthermore, it also showed through the properties of Bessel functions that wave modes are consistent with Cartesian coordinates from the asymptotic expansions, confirming the plane wave characteristics we are familiar with. However, in the vicinity of origin, wave properties can be better represented with cylindrical coordinates and solutions. These results, similar with major wave modes in cylindrical coordinates including Rayleigh, Love, Sezawa, and others, are analyzed in details for better understanding of their special properties to aid future applications involving elastic solids with axisymmetric configurations and required interests near the origin of typical wave propagation problems in engineering applications. These analyses are essential in future study of axisymmetric waves in finite elastic solids with practical engineering applications.

Keynote Speech 15: A multi-physics simulation library

Speaker: Dr. Sergio Galindo Torres, Westlake University, China
Time: 09:50-10:30, Monday Morning, December 6, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract

Mechsys is a C++-based simulation library that has been developed for more than 10 years, starting during the tenure of Prof Sergio Torres at the University of Queensland in Australia. Its continuing development has been sponsored by research institutions such as the University of Queensland, the Australian Research Council and Westlake University; and by the industry from companies such as Newcrest Mining Ltd and Huadong Engineering Corporation Ltd. Although it was initially a Discrete Element Method (DEM) library for the simulation of granular materials with polyhedral shapes, it quickly became a multi-physics simulation engine when other methods such as Lattice Boltzmann Method (LBM to solve Navier Stokes and advection-diffusion equations), Smooth Particle Hydrodynamics (SPH for the solution of the constitutive equations of continuum mechanics under very large deformation) and Material Point Method (MPM for elastic bodies that are also largely deformed) were added. Mechsys also offers a

set of validated coupled modules such as DEM-LBM, DEM-SPH and LBM-MPM. In this talk, an outline of the projects that Mechsys has been used for, in both academy and the industry, will be shown. Shortcomings and strengths of each one of these methods will be highlighted, to support future modelers in their proper use. Also, future avenues of further development will be illustrated to encourage collaborative links amongst the audience.

Keynote Speech 16: Topology optimization-based bone remodeling and its application to bone microstructure reconstruction from clinical CT scan data (Video)

Speaker: Prof. In Gwun Jang, Korea Advanced Institute of Science and Technology, Republic of Korea
Time: 10:40-11:20, Monday Morning, December 6, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
For osteoporosis diagnosis, bone microstructure is considered as the most reliable measure of bone strength. However, there exist significant difficulties in representing in vivo bone microstructure due to the limited spatial resolutions of current clinical imaging devices such as CT and MRI. This study presents a novel method that can reconstruct bone microstructures from CT scan data, using the finite element analysis and topology optimization. For the purpose, topology optimization with a 2-D micro-finite element (FE) model is first conducted to determine a full trabecular architecture in the proximal femur under three loading cases in daily activities. The optimization results show that trabecular architecture can be considered as an optimized structure, which proves the self-optimizing capabilities of bone. As a next step, topology optimization for compliance minimization is performed to reconstruct trabecular microarchitecture in the proximal femur. A constraint for the BMD deviation is involved to maintain the patient-specific spatial bone distribution obtained from the quantitative CT (QCT) scan data. By doing so, the proposed method can enhance the QCT images of a 625μm resolution up to those of a 62.5μm resolution, which can precisely represent bone microstructure. To validate the proposed method, micro CT scan data of a 78.125μm resolution are downscaled to have a 625μm resolution. Then, they are upscaled to have an original resolution by using the proposed method. The reconstructed bone microstructure was compared with the reference in terms of image similarity, bone morphometric indices, and bone strength. This reveals a unique feature of anisotropic bone strength which the clinical CT scan data cannot provide. These results indicate that the proposed method can contribute to improving the accuracy of bone strength assessment and, therefore, can be a valuable tool for early osteoporosis diagnosis in the clinical field.

Keynote Speech 17: An Entropy based Graded mesh Refinement Approach for Boundary Layer Originated Convection Diffusion Flow Models (Video)

Speaker: Prof. Pratibhamoy Das, Indian Institute of Technology, India
Time: 11:20-12:00, Monday Morning, December 6, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract

In this talk, I will take a time delayed convection diffusion model which appear during the water flow modeling. Efficient numerical approximation for these type of models are bit tough to propose as the water flows/solutions are having boundary layers. We provide an entropy based graded mesh refinement algorithm which generates the mesh points in the boundary layer region in order to maintain the original behavior of the boundary layer adaptive solution. Numerical experiments are carried out on higher order schemes to maintain the physical behavior of the solution of the model.

Speakers to be confirmed:

Dr. Pralay Kumar Karmakar
Dr. Rishi Kumar Tiwari

Energy Engineering: Keynote Speech Session I

Keynote Speech 1: Solar collectors and nanotechnology (Video)

Speaker: Prof. Mohsen Sheikholeslami, Babol Noshirvani University of Technology's Department of Mechanical Engineering, Iran
Time: 08:30-09:15, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
The best productive means for decreasing the consumption of the conventional fossil energy is by making use of the solar thermal energy that also has a probability of wide growth. Among other kinds of solar thermal energy usage, the most advanced renewable energy method that is used worldwide is SWHS. It is a known fact that the proficiency of collector is the most significant element that affects the thermal performance in the SWHS. The principal part of SHS is the solar collectors that are responsible for absorbing solar radiation and changing that to running fluid. Among the wide variety of collectors that are in the market, the most ancient and common collectors are FPSC. These types of collectors with low performance were utilized for many years without having their designs altered or going through changes to enhance their performance. Advancement in the performance of thermal collector can result in diminution of fabrication price and size. One of the innovative passive methods which is used by several researchers is Nanotechnology. Different nanomaterials can be used for solar applications and among them, Aluminum oxide has attracted the attention of researchers. Utilizing twisted tapes can generate swirls and disturb boundary layers, thus this technique is the most extensively-employed one to improve convection.

Keynote Speech 2: Green Hydrogen Opportunities for Solar Photovoltaic Technology (Video)

Speaker: Prof. John W. Sheffield, 131 Knoy Hall of Technology, Purdue University, USA
Time: 09:15-10:00, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
There are new trends and technologies which are changing the way energy is being produced, delivered and consumed. Hydrogen, as an energy carrier, produced by water electrolysis using renewable energy is called Green Hydrogen. Efforts to scale up Green Hydrogen

use for the energy transition are increasing in many countries, with an emphasis on larger-scale, power system-friendly electrolysis. Studies have shown that commercializing the integration of concentrator photovoltaic and water electrolysis technologies could push the levelized cost of hydrogen below 2 USD/kg. Thus, Green Hydrogen may be the best economically viable option to support seasonal, dispatchable, scalable energy storage for the electric grid.

Keynote Speech 3: Energy Efficiency Enhancement with Phase Change Materials in Solar Systems (Video)

Speaker: Prof. Yan Su, University of Macau, China
Time: 10:00-10:45, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Using phase change materials (PCM) in solar energy systems has been investigated by both experimental measurement and numerical simulations. Based on our previous experimental studies, the on-site measurement show that compared with the concentrating photovoltaic-thermal (CPV-T) system with pure water cooling, the average increases of the electrical, thermal, and overall efficiencies for the CPV-T system with PCM cooling are more than 10%, 5%, and 15%, respectively. To further understanding the physical mechanism, numerical simulations of the dynamic processes of both charging and discharging processes, i.e. melting and solidification processes of the PCM, are necessary. Limited by the slow speed and unknowing dynamical solid-liquid interface curves of conventional computational fluid dynamics (CFD) method, a new method based on mesoscopic scale simulations is necessary. The mesoscopic scales simulations with a new non-dimensional Lattice non-dimensional lattice Boltzamann method (NDLBM) developed from the conventional LBMs by directly applying the mesoscopic dimensionless governing parameters, which clarified the relationships between the macroscopic and mesoscopic scales. The dimensionless collision relaxation times expressed by the dimensionless governing parameters simplified the applications of the NDLBM. Key bridges between the mesoscopic and macroscopic transport are given. This new method makes it possible for dynamical simulations of the transient interfaces between the solid and liquid phases. The energy charge speeds for the storage tank with and without the PCM have been compared. The transient temperature and flow fields including melting of the PCM are also presented. This new method makes the simulation not only in a faster speed but also with higher accuracy. The enhancement of the energy storage capability due to the PCM is calculated based on the simulation results. Also the effects of the arrangement such as pitches and positions of the PCM are discussed.

Keynote Speech 4: GREEN BATTERY: THE RESOLUTION FOR GREENER RENEWABLE ENERGY (Video)

Speaker: Prof. Mohd Ikmar Nizam Bin Hj. Mohamad Isa, Universiti Sains Islam Malaysia, Malaysia
Time: 10:55-11:40, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia -Pacific Convention Center Sanya

Abstract
Modern-day dependence on the massive growth of electricity used, especially the portable form of energy storage systems that is batteries. Batteries become an important part of the electric grids with such types of energy, allowing mitigating of power and current variation, and diminish the disadvantages of intermittent nature of renewable energy sources. It is therefore essential to incorporate material abundance, eco-efficient production processes and life-cycle analysis into the design of new electrochemical storage systems. Thus, a new chapter in the research had open on producing a green-electrolyte for batteries, resulting in a cleaner, greener planet. Cellulose and its derivatives are viewed as a green solution for the commercial non-organic polymers currently used in batteries' electrolytes. In order to develop new green batteries, a basic understanding of available battery technologies is important, and this paper focuses on reviewing most important rechargeable battery types and assesses advantages and disadvantages. A notion of the current state of energy storage from a sustainability perspective and the significant advantage of green battery are also discussed in this paper.

Keywords: Bio-polymer electrolyte; green battery; renewable energy

Keynote Speech 5: Recent development in future high efficiency silicon solar cells (Video)

Speaker: Prof. SHAHZADA QAMAR HUSSAIN, COMSATS University Islamabad, Pakistan
Time: 11:40-12:25, Sunday Morning, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia -Pacific Convention Center Sanya

Abstract
TBD

Energy Engineering: Keynote Speech Session II

Keynote Speech 6: The electrodeposition of semiconductor materials from ionic liquid bath (Video)

Speaker: Prof. Dr. Indrajit Mukhopadhyay, Pandit Deendayal Energy University, India
Time: 14:00-14:45, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
Thin film semiconductors have attracted lot of attention in the recent past for application in various devices. In the arena of solar energy conversion and photo-detection, thin film semiconductors have many advantages. Although many commercial processing relies on vapor-solid condensation process for the development of thin-film semiconductors, many solution based processes like spray pyrolysis, chemical bath deposition and electro-deposition have also made tremendous progress. Electrodeposition is a simple, versatile, easily custom designable, commercially viable and scalable technique that can tune the stoichiometry as well as the purity of the deposited films. Many researchers have already showed the possibility of electrodepositing high quality semiconductor film from both aqueous and non-aqueous electrochemical baths. The main disadvantage of using water medium is the availability of limited electrochemical window as well as the risk of contamination of surface of the electrodeposited films. In the case of non-aqueous solvent, elevated temperature is required for facilitating an acceptable growth rate. Also both the protic and aprotic media, sometimes are not eco-friendly and hazardous.
Hence, we tried to use room temperature ionic liquids, which are known as green solvents, for the electrodeposition of semiconductor thin films on various working substrates. IL offers large potential window as well as very low vapor pressure, making them environmentally benign. In the first part of the presentation, we will discuss the electrodeposition of Si from pure and water contaminated BMImTf2N on HOPG and poly crystalline Au substrate. A systematic approach will be followed to unravel the mechanism of nucleation and growth of elemental Si on the respective substrates. The second part of the talk will be focused on the possibility of electrodeposition of CdTe, a compound semiconductor on FTO glass at an elevated temperature. The second part will mainly cover the nucleation and growth process from current-time transients and the correlation between the nature of the IL and the morphology of the electrodeposited films.

Keynote Speech 7: Fe2V4O13 nanoparticles based electrochemical sensor for the simultaneous determination of Guanine and Adenine at nanomolar concentration (Video)

Speaker: Prof. Prashanth S. A. SVM Arts, Science & Commerce College, India
Time: 14:45-15:30, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
A simple strategy has been proposed for the simultaneous quantification of guanine (GU) and adenine (AD) using Fe2V4O13 nanoparticles (Fe2V4O13 NPs) modified carbon paste electrode (Fe2V4O13 NPs/CPE) in phosphate buffer solution (PBS). The Fe2V4O13 NPs were prepared by a simple solution combustion method where sucrose was used as a fuel. The electrochemical behavior of GU and AD at the electrochemical interface has been studied by using cyclic voltammetry (CV) and differential pulse stripping voltammetry (DPSV). The results illustrate that the Fe2V4O13 NPs shows enhanced electrocatalytic activity and voltammetric response towards GU and AD. The proposed sensor showed linearity between the concentration 0.5 and 60 μM with limit of detection (LOD) 32 and 37 nM for GU and AD respectively. The sensitivity towards GU and AD were respectively found to be 1.393 and 1.851 μA/μM. Further, the proposed electrochemical sensor has been successfully employed to determine GU and AD contents in milk powder and calf thymus DNA samples.
Keywords: Fe2V4O13 nanoparticles, Purine bases, Carbon paste electrode, Electrochemical sensor.

Keynote Speech 8: TBD (Video)

Speaker: Dr. Ralph E. White, University of South Carolina
Time: 15:30-16:15, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
TBD

Keynote Speech 9: TBD (Video)

Speaker: Prof. Shahram Montaser Kouhsari
Time: 16:45-17:30, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
TBD

Keynote Speech 10: TBD (Video)

Speaker: Dr.K.C.Mohite, "S.P. Pune University, Pune, Maharashtra, INDIA"
Time: 17:30-18:15, Sunday Afternoon, December 5, 2021
Location: TBD, 3rd Floor, Conference Building, International Asia-Pacific Convention Center Sanya

Abstract
TBD

Part III Technical Sessions

Biomedical & Life Sciences: Technical Session

Session Chair:

Location: TBD, 3rd Floor, Conference Building 08:30-12:00, December 6, 2021

ID	Paper Title	Author	Affiliation
Keynote Speech	TBD	Prof B. P. Mishra	Mizoram University, Aizawl
Keynote Speech	TBD	Prof. D. D. Patra	JIS University Kolkata, India
10:45-10:55	COFFEE BREAK		
Keynote Speech	TBD	Dr Surendra Singh Bisht	Chemistry and Bio Prospecting Division, IWST, Bengaluru
Keynote Speech	TBD	Dr. Claude BAKOUME	
Poster	Clinical significance and molecular mechanism of lumican expression in gastric cancer*	Xiaowei Chen	Southeast University

Physics Sciences: Technical Session I

Session Chair:

Location: TBD, 3rd Floor, Conference Building 08:30-12:00, December 5, 2021

ID	Paper Title	Author	Affiliation
Keynote Speech	TBD	Prof. Fumio Koyama	Tokyo Institute of Technology, Japan
Keynote Speech	TBD	Prof. Nanguang Chen	National University of Singapore, Singapore
Keynote Speech	Boosting quantum efficiency of GaN-based visible and ultraviolet light-emitting diodes	Prof. Shengjun Zhou	Wuhan University, China
10:30-10:40	**COFFEE BREAK**		
Keynote Speech	Temperature-feedback Nanoplatform for NIR-II Penta-modal Imaging-guided Synergistic Photothermal Therapy and CAR-NK immunotherapy of Lung Cancer	Prof. Zhen Yuan	Faculty of Health Sciences, University of Macau, China
Keynote Speech	Environmental parameters evaluation of underwater optical wireless communication system	Prof. Shien-Kuei Liaw	Taiwan Tech, Chinese Taipei
Keynote Speech	Ultra-narrow linewidth fiber laser based on quantum dots	Dr. Qiao Wen	Shenzhen University, China
Oral	Metrology of Optical Communication Systems using Error Vector Magnitude	Irshaad Fatadin	National Physical Laboratory
Oral	Short Pulse Width and High Peak Power 457nm Deep Blue Laser with V-type Cavity	Zhao Zhibin	Changchun University of Science and Technology
Oral	Research about the Effect of Fabry-Pérot Etalon with Different Q-factors on the Acoustic Performance of Fiber-optic Acoustic Sensor	Jiamin Chen	North University of China
Oral	filamentation and supercontinuum modulation by shaped femtosecond laser pulses in fused silica	Junwei Chang	Shandong Normal University

Oral	Suspended 2D Hybrid Grating Coupled Microspheres Template-Assisted Assembled on the Tip of Multicore Optical Fiber	Feiyang Hou	Capital Normal University	
Oral	Smart Microcavity on the Tip of Multicore Optical Fiber for Gas Sensing	Zheng Yuqian	Capital Normal University	
Oral	Observation of Molecules Uptake and Glass Transition of Polystyrene Microspheres Template-Assisted Assembled on the Tip of Multicore Optical fiber	Yuxin Zhan	Capital Normal University	

Physics Sciences: Session II

Session Chair:

Location: TBD, 3rd Floor, Conference Building 14:00-18:00, December 5, 2021

ID	Paper Title	Author	Affiliation
Keynote Speech	Mathematical semiconductor transport models, energy functionals and preserving qualitative analytic properties in the discrete case for all spatial step sizes using Delaunay meshes	Dr. Klaus Gärtner	M4SIM, Germany
Keynote Speech	Skills in physics and semiconductor devices: a global challenge for digital society	Prof. Olivier Bonnaud	University Rennes 1 and Supelec-Rennes, France
Keynote Speech	TCO and carrier selective materials open circuit voltage and efficiency significance in solar photovoltaic cells	Prof. Bablu K. Ghosh	EEE Program, UMS, Malaysia
16:00-16:10	**COFFEE BREAK**		
Keynote Speech	Reliability Issues and Radiation Effects on Emerging Non-volatile Memories	Prof. Jinshun Bi	Institute of Microelectronics, Chinese Academy of Sciences (IMECAS), China
Keynote Speech	Photoelectrochemically solar energy harvesting using earth-abundant metal oxides	Prof. Abu Bakar Md. Ismail	Dept. of Electrical & Electronic Engineering University of Rajshahi, Rajshahi, Bangladesh

Keynote Speech	Performance of CNTs as interconnects in VLSI circuits	Prof. Partha S Mallick	School of Electrical Engineering, Vellore Institute of Technology, India
Oral	Investigation of catalyst-assisted growth of nonpolar GaN nanowires via a modified HVPE process	Cai Zhang	Shenyang National Laboratory for Materials Science (SYNL), Institute of Metal Research (IMR), Chinese Academy of Sciences (CAS)
Oral	Topological Hall effect in single thick SrRuO3 layers	Changan Wang	Institute of Semiconductors, Guangdong Academy of Sciences, Guangzhou
Oral	Neutron irradiation effects in GaN-based white light emitting diodes	Xiang Fu	Key Laboratory of Optoelectronic Technology and Systems, Ministry of Education, Chongqing University
Oral	Optoelectronics of perovskite photodetectors: characterization and device physics	Qianqian Lin	Wuhan University

Physics Sciences: Session III

Session Chair:

Location: TBD, 3rd Floor, Conference Building 08:30-12:00, December 6, 2021

ID	Paper Title	Author	Affiliation
Keynote Speech	The emergence of Space Science at the University of Hong Kong	Prof. Quentin A Parker	University of Hong Kong, Hong Kong (China)
Keynote Speech	An Analysis of Propagation and Properties of Axisymmetric Waves in Elastic Solids	Prof. Ji Wang	Ningbo University, China
Keynote Speech	A multi-physics simulation library	Dr. Sergio Galindo Torres	Westlake University, China

10:30-10:40	**COFFEE BREAK**		
Keynote Speech	Topology optimization-based bone remodeling and its application to bone microstructure reconstruction from clinical CT scan data	Prof. In Gwun Jang	Korea Advanced Institute of Science and Technology, Republic of Korea
Keynote Speech	An Entropy based Graded mesh Refinement Approach for Boundary Layer Originated Convection Diffusion Flow Models	Prof. Pratibhamoy Das	Indian Institute of Technology, India
Oral	Mesoscale modeling of hooked-end steel fiber reinforced concrete under uniaxial compression using cohesive elements	Junjie Feng	Chang'an University
Oral	Theoretical study and numerical investigation of the inversion tube over circular dies	Wanqi Zhang	Chang'an University
Oral	Numerical simulation on the 3D MHD flow features of eutectic lead-lithium alloy in a Z-bend duct with arc-shaped corner	YANG LUO	School of Environment and Architecture, University of Shanghai for Science and Technology, Shanghai
Oral	Numerical simulation and experimental study on urban-scale thermal and wind environment	Yan Zhang	Zhejiang University
Oral	Short time dynamics of droplet spreading on a solid surface	He Ming	University of Science and Technology of China, Hefei, Anhui

Energy Engineering: Technical Session

Session Chair:

Location: TBD, 3rd Floor, Conference Building 08:30-12:00, December 5, 2021

ID	Paper Title	Author	Affiliation
Oral	Numerical study of gas-liquid two-phase flow in PEMFC cathode flow channel based on diffusion layer surface structure	WANG Kai	School of Automotive Engineering, Harbin Institute of Technology
Oral	Preparation of Anticorrosive Fire Extinguishing Agent with MOF for Lithium-ion Batteries Safety	Guo Yaqing	Huazhong University of Science and Technology
Oral	Preparation of Anticorrosive Fire Extinguishing Agent with MOF for lithium-ion batteries safety	Guo Yaqing	Huazhong University of Science and Technology
Oral	Modification of Ternary High Nickel Cathode by P-O Covalent Bonding	Guo Yaqing	Huazhong University of Science and Technology
Oral	Research on Influencing Factors of Foaming in Desulfurization Amine	Siqi Han	East China University of Science and Technology
Oral	China's energy efficiency improvement considering the impact of industrial transfer by applying a modified meta dynamic non-radial directional distance function	Xiangyu Teng	School of Economic Management, Changzhou Vocational Institute of Mechatronic Technology
Oral	The impact of China’s financial expenditure on energy and carbon emission efficiency: applying a meta dynamic non-radial directional distance function	Zhenhua Xie	School of Economic Management, Changzhou Vocational Institute of Mechatronic Technology
10:30-10:40	**COFFEE BREAK**		
Poster	2D porous carbon nanosheets with high packing density for high volumetric energy density supercapacitors	Panpan Chang	School of Biological and Chemical Engineering, Guangxi University of Science and Technology
Poster	Potassium Induced Phase Stability Enables Stable and Efficient Wide-Bandgap Perovskite Solar Cells	Lipeng Wang	Institute of Metal Research, Chinese Academy of Sciences

Part IV Technical Sessions Abstracts

Part V Instructions for Presentations

Oral Presentation

Devices Provided by the Conference Organizing Committee:

- Laptops (with MS-office & Adobe Reader)
- Projectors & Screen
- Laser pointer

Materials Provided by the Presenters:

- PowerPoint or PDF files

Duration of each Presentation:

- Regular Oral Session: 10-15 Minutes of Oral Presentation
- Keynote Speech: 40-45 Minutes of Keynote Speech

Poster Presentation

Materials Provided by the Conference Organizing Committee:

- X Racks & Base Fabric Canvases (60cm×160cm, see the figure below)
- Adhesive Tapes or Clamps

Materials Provided by the Presenters:

- Home-made Posters

Requirements for the Posters:

- Material: not limited, can be posted on the Canvases
- Size: smaller than 60cm×160cm
- Content: for demonstration of the presenter's paper

Part VI Hotel Information

About Hotel

International Asia-Pacific Convention Center Sanya is a five star standard luxury hotel, which locates beside the seashore, and is the ideal place for vacation and conference. The hotel has 254 luxury and comfortable rooms, and 16 conference rooms in different sizes. The conference rooms can accommodate people from 20-1000 and totally square 5400m2. Housing, dining, recreation facilities… everything needed is ready, Even National initiative seawater swimming poor, sea recreational centre and so on, which make you a pleasant vacation. High-speed net connectors are equipped in the houses and service of renting laptops is provided, all these give you a convenient office atmosphere while you are on vacation.

Address: No.17, Haipo tourism and economic zone, Sanya Bay, Sanya city, China

三亚市三亚湾海坡旅游经济开发区17横路

URL: www.iapccsanya.com

Tel: (86 898) 88332666

Fax: (86 898) 88332266

For authors who do not understand Chinese, please show the following info to the driver if you take a taxi:

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