NCKU AISSM–UM JOINT ONLINE SYMPOSIUM ON NEXT-GENERATION SEMICONDUCTOR TECHNOLOGIES

Date: 21 August 2026 (Friday)

Time: 3.00 pm to 4.30 pm

Objective: To foster research collaboration, academic exchange, and future joint initiatives between Universiti Malaya and AISSM NCKU while providing a platform for researchers, faculty members, and students to exchange the latest developments in semiconductor research and technology.

Program tentative

Time	Details
2.45 pm	● Open meeting room for guests and panellists ● Display housekeeping notes
3.00 pm	● Welcoming remarks and introduction by Moderator ● Group Photo (1 min) 5 mins
3.05 pm	Presentation by **Prof. Dr. Rozalina Zakaria** (Professor, Photonic Research Centre, UM) Title: **Plasmon-Enhanced 2D Semiconductor Heterostructures for Broadband Photodetection** Short biography: Prof. Dr. Rozalina Zakaria is a Professor at the Photonics Research Centre, Universiti Malaya, specializing in laser ablation, nanophotonic and plasmonic devices, and optical fibre sensors. Her research focuses on advancing photonics and optoelectronic technologies, particularly in nanophotonics, plasmonics, and optical sensing. She has published more than 200 ISI/Scopus-indexed journal articles and books, with an H-index of 33, and has secured more than 15 national and international research grants totaling approximately RM3 million. Her work has also led to extensive international research collaborations, and she has been invited as a plenary and keynote speaker at various local and international conferences and webinars Summary: This sharing session presents recent advances in plasmon-enhanced two-dimensional (2D) semiconductor materials and heterostructures for broadband photodetection. The presentation highlights the integration of plasmonic nanostructures, particularly gold and silver, with 2D materials such as graphene, MoS_2, WS_2, and WSe_2 to enhance light–matter interaction and optoelectronic performance. Key strategies for improving light absorption, carrier generation,

	responsivity, and spectral range through plasmonic coupling and heterostructure engineering will be discussed. Selected research findings on plasmon-enhanced photodetectors will demonstrate their potential for next-generation semiconductor optoelectronics, including broadband, low-power, and highly sensitive photodetection applications. 10 mins ppt
3.15 pm	Presentation by **Prof. Chia-Yun Chen** (Deputy Director, Program on Semiconductor Packaging and Testing, AISSM & Professor, Department of Material Science and Engineering, College of Engineering, NCKU) Title: **Layered material-based optoelectronics via heterostructure design** Short biography: Prof. Chia-Yun Chen is a Professor in the Department of Materials Science and Engineering at National Cheng Kung University (NCKU) and Deputy Director of the Program on Semiconductor Packaging and Testing at the Academy of Innovative Semiconductor and Sustainable Manufacturing (AISSM). His research focuses on semiconductor materials and applications, optoelectronic devices, semiconductor surface physics and chemistry, metamaterials, solar cells, semiconductor processing, and low-dimensional materials for microelectronics. His recent work particularly explores low-dimensional and heterostructured materials for photodetection, optoelectronics, nonvolatile memory, and photonic applications. Summary: Layered material-based heterostructures stand for the artificially designed structures composed of two or more different solid-state materials. When the dimensionality of materials scales down to nanoscale, the interfacial couplings associated with wide range of microscopic interactions from Van der Waals stacked force, dipolar field toward charge transfer, further act the dominant role on their materials chemistry, materials physics and even being decisive for the correlated device performances. In this presentation, we demonstrate the management of light-power resolved characteristics and exceptional photodetection performances via various types of heterostructure designs, aiming to realize the integrated system in a single Si chip with the merited large functionalities and low power consumption 10 mins ppt

3.25 pm	Presentation by **Prof. Yu-Lung Lo** (Associate Dean, AISSM & Distinguished Professor, Department of Mechanical Engineering, College of Engineering, NCKU) Title: **Advanced Laser Machining for Semiconductor Technologies** Short biography: Yu-Lung Lo received his B.S. degree from National Cheng Kung University (NCKU), Taiwan, and his M.S. and Ph.D. degrees in Mechanical Engineering from the University of Maryland, College Park, USA. Since 1996, he has served in the Department of Mechanical Engineering at NCKU, where he is currently a University Chair Professor and Vice Dean of Academy of Innovative Semiconductor and Sustainable Manufacturing. He previously served as Director of the Instrument Development Center and Chair of the Department of Mechanical Engineering at NCKU, and was a visiting scientist at the University of Michigan, Ann Arbor. Prof. Lo has received several honors, including the ASE and Micron Technology Chair Professorships, MOST Research Excellence Awards, SEM and CSME Fellowships, and the Dr. Ta-You Wu Award. His research focuses on biophotonics, additive manufacturing, laser machining, and 3D SiP technologies. He has published over 190 journal papers, filed several patents, and has been listed among Stanford University's Top 2% Scientists and ScholarGPS Highly Ranked Scholars in Sensors. Summary: In the laser machining on metal/ceramics-SiC, it is common to perform trial-and-error experiments over a wide range of parameter settings to determine the processing conditions which enhance the quality of the weld. However, trial-and-error experiments are expensive and time-consuming. Accordingly, the present study proposes a more systematic approach for determining the optimal laser power and scanning speed in the lap/butt-joint welding of SS316 stainless steel by means of high-fidelity numerical simulations and an artificial neural network (ANN) model. The validity of the simulation model is confirmed by comparing the numerical results for the melt pool dimensions with the experimental results. Using high-speed CMOS camera, the melt pool's width and depth, spatter, and spatter angle can be easily characterized. Finally, the screened processing maps are superimposed to determine the laser processing conditions which simultaneously minimize the porosity, size of the heat affected zone (HAZ), and residual stress within the weld. It is noted that the CFD modelling on the melt pool of metal/ceramics-SiC includes more comprehensive issues such as multiple reflections of laser beam within keyhole, fluid dynamic, surface traction, Marangoni force, and etc. In addition, the optimal processing parameters for the fabrication of aluminum and copper dissimilar lap joints using a pulsed laser welding (PLW) method with

	a wobble strategy are investigated. This application is extremely important for battery welding in EV industries. The validity of the proposed optimization approach is demonstrated by evaluating the shear strength, intermetallic compound (IMC) formation, and electrical contact resistance of experimental samples produced using the optimal welding parameters. 10 mins ppt
3.35 pm	Presentation by **Dr. Goh Yingxin** (Senior Lecturer, Department of Mechanical Engineering, Faculty of Engineering, UM) Title: **Advanced Semiconductor Packaging: Understanding Process-Induced Warpage** Short biography: Dr. Goh Yingxin is a Senior Lecturer in the Department of Mechanical Engineering at Universiti Malaya, with research expertise in advanced electronic packaging materials, lead-free solder alloys, sustainable engineering materials, nanomechanical characterization and reliability assessment, and microstructure engineering and failure analysis. Her research focuses particularly on the materials, reliability, and failure mechanisms of electronic packaging, including the development of sustainable and lead-free materials for advanced semiconductor applications. She is also actively involved in the IEEE Electronics Packaging Society and currently serves as Vice Chair of the IEEE-EPS Malaysia Chapter. Summary: Advanced semiconductor packaging has become a critical enabler for next-generation electronic devices, where package reliability is increasingly influenced by thermo-mechanical behaviour during manufacturing. This presentation explores the fundamental mechanisms of process-induced warpage in advanced semiconductor packages, highlighting how thermal loading, material interactions, and assembly processes contribute to package deformation. Using an industrial case study, the session will discuss key factors affecting warpage and demonstrate how finite element modelling can complement experimental investigations to better understand package behaviour. The presentation concludes with future perspectives on predictive process optimization and digital engineering approaches for improving manufacturing yield, reliability, and development efficiency in advanced semiconductor packaging. 10 mins ppt
3.45 pm	Presentation by **Associate Professor Dr Sharifah Fatmadiana Wan Muhamad Hatta** (Director, Centre of Printable Electronics, UM)

	Title: **Neuromorphic Transistors: From Materials to Systems, State of the Art and Emerging Directions** Short biography: Dr. Sharifah Fatmadiana is a Director of Centre of Printable Electronics, UM and an Associate Professor at the Department of Electrical Engineering, Faculty of Engineering, Universiti Malaya. Her research interests include wearable electronics, semiconductor reliability and testing, advanced semiconductor modelling, and IC design. She has authored more than 20 journal and conference publications and has collaborated with industry partners including Intel, MIMOS, Infineon Technologies, Motorola Solutions, and IMEC. She has also secured several research grants and is actively involved in IEEE and IEEE Electron Devices Society activities. Summary: Neuromorphic transistors are emerging as building blocks for brain-inspired computing, mimicking synaptic behaviour directly at the device level. This talk surveys the current transistor landscape for neuromorphic applications, including memristive transistors, ferroelectric FETs, and ion-gated organic transistors, drawing on recent review literature to map key device architectures and switching mechanisms. The focus then narrows to organic electrochemical transistors (OECTs) and electrolytegated transistors (EGTs), examining how electrolyte composition governs ion migration, channel doping dynamics, and synaptic plasticity. Chitosan-based electrolyte systems developed in our lab are presented as a case study, demonstrating tunable retention and switching behaviour for stable artificial synapses. 10 mins ppt
3.55 pm	Presentation by **Prof. Lih-Yih Chiou** (Professor, Program on Integrated Circuit Design, AISSM & Professor, Department of Electrical Engineering, College of Electrical Engineering and Computer Science (EECS). NCKU) Short biography: Prof. Lih-Yih Chiou is a Professor of Electrical Engineering at National Cheng Kung University (NCKU) and Director of the Program for IC Design at the Academy of Innovative Semiconductor and Sustainable Manufacturing (AISSM). His research focuses on energy-efficient VLSI design, memory circuit design, processing-in-memory, hardware security, reconfigurable computing, and VLSI computer-aided design. His work covers low-power and high-performance integrated circuit design, memory technologies, system-level optimization, and emerging computing architectures. He has published

	extensively in VLSI, integrated circuits, and low-power computing, with research contributions spanning SRAM, ReRAM, thermal-aware 3D IC design, power-efficient processors, and hardware architectures. Title: **Engineering AI Edge Devices for Life** Summary: As AI edge devices rapidly expand across sectors, medical electronics demand intelligent, ultralow-power systems to enable continuous monitoring, complete data privacy, and extended standby times. The primary bottleneck remains the energy-draining "memory wall." This talk presents a full-stack co-design framework—integrating model compression, custom compilers, data path optimization, and Compute-in-Memory (CIM) macros to eliminate data transfer overhead. 10 mins ppt
4.05 pm	Future Collaboration and Strategic Planning Topics: • Potential collaborative research projects • Joint publications • Student exchange and mobility programmes • Joint grant applications • Postgraduate co-supervision 20 mins
4.25 pm	Closing remarks • Summary of key discussion points • Next steps for collaboration • Appreciation to speakers and participants 10 mins
4.30 pm	Webinar ends