



PHOTONICS@SG 2025 Integrated Optics for Cutting-edge Applications 27 February 2025

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PROGRAMME

Session 1: Convergence of Photonic Technologies: Advancing the Frontiers of Communication, Detection, and Computational Systems

Topics:

Silicon Photonics Light Engines for Highly Integrated Optical Interconnects

Computational Flat-optics to Innovate the Imaging Technologies

On-chip integration of 2D materials with Si photonics for tunable nonlinear processing

Electrical, Stress, Thermal and Optical Performance (E-STOP) Analysis of Multi interposer Co-Packaged Optical Processor

Session 2 : Photonic Platform Integration: Novel Architectures for LiDAR, OCT, and Memory Technologies Topics:

Silicon Photonics-Based FMCW LiDAR and Its Commercialization

Chip-Scale Photonics: Enabling the Future of Precision Sensing and Imaging Across Industries

Applications of Chalcogenide Phase-Change Materials in Nanophotonic Devices

Glass-based Optical Components and Fabrication Technologies for Integrated Photonics Applications

Nanophotonic Approaches for Enhanced Biomedical Imaging and Diagnostics

Session 3 : Emerging Paradigms in Integrated Optics: Co-Packaging, MEMS, and Non-Linear Platforms Topics:

Silicon Photonics for Optical Compute Interconnect

Next-generation Multi-material System via Photonics Heterogenous Integration (PHI)

MEMS Tunable Photonic Devices and Their Applications

Nonlinear CMOS Photonics on a Chip

Scalable, High-Performance, Co-Packaged Optical Engines powering AI/ML and Next-Gen Data Centers

CONFERENCE CHAIR

Asst Professor Sia, Brian Jia Xu

School of Electrical and Electronic Engineering

Nanyang Technological University Singapore

SPEAKER BIOGRAPHY

PLENARY SPEAKERS



Dr Nagarajan, Radha SVP and CTO of Cloud **Optics Group** Marvell

Dr Rong, Haisheng Senior Principal Scientist Intel Labs

Silicon Photonics Light Engines for Highly Integrated Optical Interconnects

Dr. Nagarajan is currently the Senior Vice President and Chief Technology Officer of Marvell's Cloud Optics Group. At Marvell, he manages the development of the company's optical platform products and technology. Concurrently, he is a Visiting Professor at the Department of Electrical and Computer Engineering at the National University of Singapore. He received his B.Eng. from NUS, M.Eng. from the University of Tokyo, and Ph.D. from the University of California, Santa Barbara, all in Electrical Engineering. Dr. Nagarajan's other recognitions include the IEEE/LEOS Aron Kressel Award, the IPRM Award and the Optica David Richardson Medal for breakthrough work in the development and manufacturing of photonic integrated circuits. He was named to Electro Optics' The Photonics100 in 2024 which honors the industry's most innovative people. He has been awarded more than 250 US patents and is a Fellow of Optica, IEEE, and IET.

Silicon Photonics for Optical Compute Interconnect

Dr. Haisheng Rong is a Senior Principal Scientist with Intel Labs, where he leads pioneering research and development in silicon photonics technology for next-generation high-speed and energy-efficient Optical Compute Interconnect (OCI) applications. His career spans various domains within optical and laser technologies, including optical information processing, laser spectroscopy, laser interferometer gravitationalwave observatory (LIGO), and fiber optical communications. His outstanding contributions to silicon photonics have earned him numerous accolades, including the Scientific American 50 Award, Intel Achievement Award, Intel Labs Gordy Award, Paul F. Forman Team Engineering Excellence Award, and the Photonics 100 Award. He holds over 50 U.S. patents and has authored more than 120 scientific publications. He received his B.S. and M.S. degrees from Nankai University in China and his Ph.D. from Heidelberg University in Germany. Dr. Rong is a Fellow of IEEE, Optica, and SPIE.

INVITED SPEAKERS

On-chip Integration of 2D Materials with Si Photonics for Tunable Nonlinear Processing

Dr. Sanghoon Chae is a Nanyang Assistant Professor at the School of Electrical and Electronic Engineering (EEE) and the School of Materials Science and Engineering (MSE) at Nanyang Technological University (NTU).

Nanyang Asst Prof Chae, Sanghoon School of Electrical and Electronic Engineering, School of Material Science and Engineering Nanyang Technological

University Singapore

He received his B.S (2010) and Ph.D (2014) in Sungkyunkwan University (SKKU), Korea. Then he worked in Columbia University from 2016 to 2021 as a Postdoctoral Research Scientist. Dr. Chae's research primarily focuses on understanding novel optoelectronic phenomena in atomically thin 2D materials systems, exploring their application as a new class of optoelectronic devices, and integrating their optical functions into Si photonics for information processing.

Nanyang Asst Prof Hu, Guangwei School of Electrical and Electronic Engineering Nanyang Technological **University Singapore**

Dr Jia, Lianxi Director LightIC Technologies

Computational Flat-optics to Innovate the Imaging Technologies

Dr. Guangwei Hu is the Nanyang Assistant Professor in School of Electronic and Electric Engineering, Nanyang Technological University in Singapore. He received BSc from Harbin Institute of Technology in 2016, PhD from National University of Singapore in 2020 (during which he was a visiting scholar in UT Austin and CUNY ASRC), and the postdoctoral training in NUS and Stanford University. His research interest is nanophotonics and flat-optics for broad applications including bio-imaging, computations, photonic chips, energy and others. He has published more than 100 papers, including Nature (4), Science, Nature Photonics (2), e-Light, Nature Nanotechnology/Electronics/Communications, Science Advances, PRL and many others. His work has been featured as the Top 10 Breakthrough in Physics of 2020 by Physics World, Optics and Photonics News (Year of Optics in 2021), China's Top 10 Breakthrough in Optics in 2021, and many others. He received Early Career Awards in Nanophotonics (2023), MIT Technology Reviews, Innovators Under 35 of 2022 (China), Forbes 30 Under 30 of 2023 (Asia), the 20th Anniversary Challenge Award from Optica Foundation, Rising Star of Light in 2020 by Light: Science & Applications, NUS President's Graduate Fellowships and various other awards. He is an associate editor of npj nanophotonics.

Silicon Photonics-Based FMCW LiDAR and Its Commercialization

Dr. Jia Lianxi has extensive experience in silicon photonics processing and device development, having worked at Institute of Microelectronics of Singapore, where he specialized in silicon photonics processes and devices. He is now joining LightIC, where he will lead the development for FMCW technology.

Next-generation multi-material system via photonics heterogenous integration (PHI)

Dr. Luo has 14-year experiences on the silicon photonics integration technology and product development starting from IME, A*STAR as Research Scientist and then in AMF as Co-Founder and Research Manager / Research Director. He returned IME, A*STAR as Principal Scientist in 2023, and also appointed as VP, Advanced Photonics Platform Technology (APPT) in National Semiconductor Translation and Innovation Centre (NSTIC). He is leading the development of next-generation advanced photonics technologies, such as photonic heterogenous integration. Dr. Luo is the Fellow of Optica Society, Fellow of A*STAR, Senior Member of IEEE, and Member of SPIE and Project Management Institute. He is now serving as the Associate Editors for Optica Photonics Research. He has also been serving as the Technical Committee Chair / Co-Chair / Member for various international conferences. Dr. Luo has authored/co-authored more than 200 peer-reviewed journal and conferences papers, 5 book chapters, and holds more than 30 patents and patent applications.

Dr Luo, Xianshu VP, Advanced Photonics Platform Technology, & **Principal Scientist** NSTIC & IME, A*STAR, Singapore

Dr Martin-Monier, Louis Scientist and Technologist **Massachusetts Institue of Technology**

Nanophotonic Approaches for Enhanced Biomedical Imaging and Diagnostics

Louis Martin-Monier is a scientist and technologist specializing in cutting-edge biomedical imaging technologies. As a postdoctoral researcher at MIT, his work focuses on developing wide field-of-view and large depth-of-field color imaging for miniature endoscopy, which promises to greatly enhance diagnostic accuracy and improve patient outcomes. His research also includes advancing X-ray imaging technologies through the fabrication of nanophotonic scintillators, which can reduce radiation exposure by up to an order of magnitude without compromising image quality. Additionally, Louis contributes to the development of OCT-on-a-chip systems, which integrate on-chip sources and spectrometers to enable portable, high-resolution optical coherence tomography for medical diagnostics. His research is supported by a Swiss National Science Foundation Fellowship and has been published in top academic journals.

SPEAKER BIOGRAPHY

Mr Pamidighantam, Ramana CTO, Co-Founder & Director LightSpeed Photonics

Electrical, Stress, Thermal and Optical Performance (E-STOP) Analysis of Multi interposer Co-Packaged Optical Processor

Ramana Pamidighantam (SM IEEE) has close to 40 years of experience in Government R&D, Academics, and Industry after his Masters Degree in Applied & Modern Optics in 1984. He is the Chief Technology Officer and Director at Lightspeed Photonics Pte Ltd., Singapore. Prior to that he was Dean (R&D) and Professor, ECE in India where he was a consultant to a number of companies in India and Singapore. He is the Founder Vice Chair and served as Chapter Chair for IEEE Photonics Society, Hyderabad, India Chapter. He started his career with Defence Research Organization, India, in 1986, where he had significant contribution developing strapdown and gimbal mounted onboard opto-electronic guidance systems. He moved to Singapore in 1998 and worked at Philips, Agilent Technologies and A*STAR IME in opto-electronic semiconductors. Ramana has more than 25 patents and 60 international publications.

Dr Mojahed, Diana Founder & CEO Lightfinder

Chip-Scale Photonics: Enabling the Future of Precision Sensing and Imaging Across Industries

Dr. Diana Mojahed is the Founder and CEO of Lightfinder, an MIT spinout focused on advancing chip-based spectroscopy and imaging technologies. Previously a Postdoctoral Fellow in the lab of Professor Juejun (JJ) Hu at MIT's Department of Materials Science and Engineering, Dr. Mojahed blends cutting-edge research with entrepreneurial vision to push the boundaries of optical technology.

An expert in optical coherence tomography (OCT), Dr. Mojahed earned her Ph.D. in Biomedical Engineering from Columbia University, where she developed novel imaging solutions for rapid diagnostic applications. Her work has been supported by the U.S. National Science Foundation (NSF), National Institutes of Health (NIH), MIT Kavanaugh Fellowship, and the Columbia BiomedX Technology Accelerator Program, and she has received awards such as Best Presentation at the Women in Science at Columbia Symposium and the SPIE Optics and Photonics Education Scholarship.

Scalable, High-Performance, Co-Packaged Optical Engines powering AI/ML and Next-Gen Data Centers

Dr. Sajay BG is a Senior Scientist at the Institute of Microelectronics, A*STAR, Singapore. He has over 18 years of experience in the semiconductor industry and research. He holds a Ph.D. in Electrical and Electronic Engineering (Microelectronics) from Nanyang Technological University, Singapore, and a Master's degree in Mechatronics from the National University of Singapore. Prior to joining IME, Dr. Sajay worked with several renowned companies, including STATS ChipPAC Ltd, Hewlett-Packard Ltd, and Siltronic Singapore Pte Ltd. In these roles, he was involved in advanced technologies such as wafer-level packaging and Micro-Electro-Mechanical Systems (MEMS). At IME, Dr. Sajay's research is focused on electronic-photonic heterogeneous integration and semiconductor system-in-package technology. He works on developing next-generation optical transceiver technologies that support the growth in data traffic, particularly in the fields of hyper-scale data centres and Al-ML clusters.

Dr Sajay, B G Senior Scientist Institute of Microelectronics A*STAR

Assoc Prof Tan, Dawn Engineering Product Development Singapore University of Technology and Design

Nonlinear CMOS Photonics on a Chip

Dawn Tan is an Associate Professor at the Singapore University of Technology and Design and Principal Investigator of the Photonics Devices and Systems Group. She holds a joint appointment as Principal Scientist at the A*STAR Institute of Microelectronics. Her group's research encompasses integrated optics, nonlinear optics and silicon photonics. She was previously a visiting professor at the Massachusetts Institute of Technology and part of the design team at Luxtera. She is an Optica Fellow, L'Oréal for Women in Science National Fellow and a National Research Foundation (NRF) Investigator, Class of 2023.

Dr Ueno, Akira Principle Researcher AGC

Glass-based Optical Components and Fabrication Technologies for Integrated Photonics Applications

Akira Ueno is principal researcher at AGC Inc. He earned a BS, an MS at Tohoku University and a Ph.D at Hiroshima University, all in engineering. He also worked as a visiting scientist in Photonic Materials Research Group at Massachusetts Institute of Technology 2022-2024. His current research focuses on glass-based integrated photonics and metasurfaces with machine learning.

Applications of Chalcogenide Phase-Change Materials in Nanophotonic Devices

Dr. Qian Wang received her Ph.D. from Nanyang Technological University and subsequently held an A*STAR International Fellowship at the Optoelectronics Research Centre, University of Southampton. She currently leads a group at IMRE focused on advancing nanoimaging and defect inspection technologies. Her research interests include metamaterials, non-volatile phase-change materials, near-field manipulation of plasmonics and phonon polaritons, and all-optical neuromorphic computing.

Dr Wang, Qian Principal Scientist I Institute of Materials Research and Engineering A*STAR

Assoc Prof Zhou, Guangya School of Mechanical Engineering National University of Singapore

MEMS Tunable Photonic Devices and their Applications

Prof. Zhou received the B.Eng. and Ph.D. degrees in optical engineering from Zhejiang University, China. He is currently an associate professor in the department of mechanical engineering at NUS. His research covers micro-optics, optical MEMS, micro and nano fabrication, microsensors and microactuators, nano photonics, and novel optical imaging and spectroscopy. He is the main inventor of several patents including the MEMS-driven vibratory grating scanner, MEMS-based miniature zoom lens system with autofocus function, and high throughput single-pixel spectrometers. The technologies developed in his lab has successfully led to two startup companies. He is an associated editor of the International Journal of Optomechatronics and is on editorial board of Scientific Reports and MDPI Actuators. He is also an international steering committee member and technical programme committee member of several international conferences in the field of optical MEMS as well as micro and nano technology.