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Presidential honour for NTU trio

A team comprising TPI Co-Director Prof Nikolay Zheludev, and Assoc Profs Chong Yi Dong and Zhang Baile of NTU's School of Physical & Mathematical Sciences have been bestowed the prestigious President's Science Award (Team) at this year's President's Science and Technology Awards (PSTA).

President Halimah Yacob presented the trio with their award at a ceremony at the Istana on 18 December. The PSTA are the highest honours bestowed on exceptional research scientists and engineers in Singapore for their excellent achievements in science and technology.

The NTU team were lauded for their "global leadership in, and fundamental contributions to, topological nanophotonics research, which underpins the development of a new generation of light-based technologies".

From left: Assoc Prof Zhang Baile, Prof Nikolay Zheludev and Assoc Prof Chong Yidong

The pioneers in topological nanophotonics have designed artificial structured materials in which light waves can flow around corners and obstacles without scattering, unlike ordinary light waves. They have also found ways to use topologically structured light in advanced optical metrology and imaging, to resolve objects that are too small for conventional optical microscopes.

They said: "We expect that our research innovations will lead to higher-density optical chips, more robust and compact lasers, universal super-resolution optical imaging for applications across various technologies, such as those used in the life sciences and biomedical industries, as well as ultra-fast 6G telecommunications."

The team's research is conducted at the Centre for Disruptive Photonic Technologies (CDPT) founded and directed by Prof Zheludev.

Message from the Chairman/Co-director:

As a challenging 2020 comes to a close, it brings me great pleasure to share that a team led by Prof Nikolay Zheludev, Director of NTU's Centre for Disruptive Photonic Technologies, has received the President's Science Award (Team) for their breakthroughs in topological nanophotonics. Please join me in congratulating Prof Zheludev and his brilliant team, and you can read more about their achievement in this issue of Illuminate.

I would also like to commend the photonics community for your resilience, commitment and adaptability this year.

COVID-19 has truly changed the way we work and live. The LUX quarterly networking event in September was our second one to be held online and attracted over 90 attendees. I was pleased to be able to welcome to our growing family five new industry members (AEM, Component Technology, Nagase, Opto Precision, and Royal Bussan) and seven new faculty members from NTU and SUTD. We also congratulated Asst Prof Steve Cuong Dang and GDS Instruments for their Industry Alignment Fund – Industry Collaboration Projects (IAF-ICP) grant award.

From 20-22 October, LUX again took part in the Industrial Transformation Asia Pacific (ITAP) 2020, the leading trade event for Industry 4.0. Together with 6 member companies (Component Technology, DenseLight Semiconductors, GLOBALFOUNDRIES, Palomar Technologies, Phaos Technology, and Precision Laser Solutions), we formed a pavilion at the virtual exhibition. With both the organizer, SingEx's and LUX Photonics Consortium's joint effort, members have enjoyed a further reduced rate to access this virtual exhibition.

We also pivoted to holding the Photonics@SG 2020 conference online, with my fellow TPI Co-Directors Prof Zheludev and Prof Sir David Payne, delivering the opening addresses. Themed "From Photon to Production", the conference was chaired by Assoc Prof Wei Lei and attracted over 250 attendees from nearly 100 organisations to attend insightful talks by 10 distinguished academics and industry speakers. Photonics@SG 2020 also hosted a virtual exhibition featuring four technology exhibitors (A*STAR, NUS, NTU, SUTD) and nine industry exhibitors. The conference brings together public policy maker, venture capitalist, prestigious researchers, and industry veterans who are founder of their current companies in the same session to pitch and share ideas on prospects of innovation in photonics could leads to novel applications and impact creation.

Finally, I would like to take this opportunity to wish everyone good health and a fruitful 2021 ahead!

Prof Tjin Swee Chuan
Chairman, LUX Photonics Consortium
Co-Director, The Photonics Institute

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | The Photonics Institute | LUX PHOTONICS CONSORTIUM SINGAPORE

Photonics@SG 2020 shines with 10 talks, 22 technologies on offer

Themed "From Photon to Production", the Photonics@SG 2020 conference on 20 November was one of the year's highlights for the local photonics community.

Prof Wei Lei, Conference Chair and Director of the Centre of Fibre Technology (COFT) at Nanyang Technological University (NTU), says that the theme sought to highlight Singapore's photonics eco-system, emphasize the strong link between academia and industry, and promote the latest photonics technologies and innovation.

He hopes that the conference has provided a networking platform to translate cutting-edge research in photonics into diverse applications underpinned by the value chain created, as well as promote how academics can help and work with the photonics industry.

Conference Chair Prof Wei moderates at Photonics@SG 2020, the sixth edition of the conference

Jointly organized by Singapore's LUX Photonics Consortium and The Photonics Institute (TPI) at NTU, the conference has steadily grown its attendance in its six years. About 250 attendees from nearly 100 companies/organisations joined the virtual event, which was proudly sponsored by DSO National Laboratories, Edmund Optics, Huawei, KLA Corporation, Moveon Technologies, and SICK.

TPI Co-Directors Prof Sir David Payne, Director of the Optoelectronics Research Centre (ORC) at the University of Southampton, and Prof Nikolay Zheludev, Director of the Centre for Disruptive Photonic Technologies, delivered their opening addresses via recorded video.

Prof Zheludev shared his views on what science is important for developing light-enabled technologies, which include optical telecom, lighting & displays, lasers manufacturing, sensors, security and defence, as well as photonics in bio-medicine. He believes that future innovations will be driven by exciting research in plasmonics, metamaterials, quantum photonics, topological photonics and artificial intelligence.

Prof Sir Payne discussed his thoughts on translation research in Singapore. He mentioned that the ORC-TPI dual-centre concept for the transfer of knowledge and industrial collaborations is integral to strengthening TPI's capability in photonics research, providing the critical mass needed to be a global powerhouse.

He also provided some advice for both academics and industry on how they can work effectively with one another: Prof Payne reminded professors that industry is focussed on their next-quarter numbers, and not a 20 year horizon; at the same time, industry must be mindful that academics transfer innovation, not ready-made products.

The conference hosted talks by 10 speakers (below pic), including three prestigious invited speakers: Dr Frank Levinson, General Partner of Phoenix Venture Partners and Managing Director of Small World Group; Mr Lim Tuang Liang, Executive Director (Research, Innovation and Enterprise Coordination Office), National Research Foundation (NRF), Singapore; and Prof Din-Ping Tsai of The Hong Kong Polytechnic University.

Also invited were a trio of industry veterans and company founders: Dr Phua Poh Boon, LightHaus Photonics; Dr Lam Yee Loy, DenseLight Semiconductors; and Mr Chee Teck Lee, Moveon Technologies. Meanwhile, Assoc Prof Wei Lei from NTU, Prof Hong Minghui from NUS, Assoc Prof Joel Yang from SUTD and Dr Derrick Yong from A*STAR presented on some promising research outcomes.

The Building Photonics Wave
Dr Frank Levinson
General Partner, Phoenix Venture Partners
Managing Director, Small World Group

Singapore's RIE Journey – From Research to Impact
Mr Lim Tuang Liang
Executive Director (Research, Innovation and Enterprise Coordination Office), National Research Foundation

Production and Application of Meta-lens for Light-field Sensing, Imaging, and Quantum Optics
Prof Din-Ping Tsai
The Hong Kong Polytechnic University

Advanced Functional Fibers and Smart Textiles
Assoc Prof Wei Lei
Nanyang Technological University, Singapore

Transiting Ideas to Products
Dr Phua Poh Boon
Chief Technology Officer, LightHaus Photonics

Enabling QC in Cell Therapy Manufacturing using Optical Tools as PATs
Dr Derrick Yong
Scientist, Applied Optics (Precision Measurements Group), A*STAR SIMTech

DPhi™ for New Generation of Optical Engines for Data-centers and Optical Fiber Networks
Dr Lam Yee Loy
Chief Technology Officer, DenseLight Semiconductors

Development of Optical Microsphere Nanoscope: from Photons to Production
Prof Hong Minghui
National University of Singapore

Transformation in the Optical Industry - A business perspective
Mr Chee Teck Lee
Chief Executive Officer, Moveon Technologies

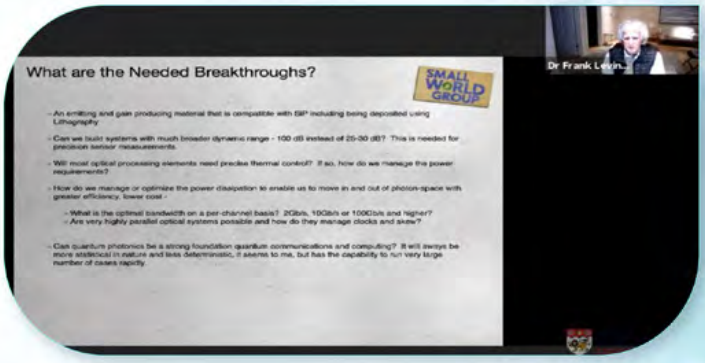
3D Printed Nano Optical Design Elements
Assoc Prof Joel Yang
Singapore University of Technology and Design

The ten talks saw strong attendances averaging 200 active viewers

At his plenary talk titled "The Building Photonics Wave", Dr Levinson discussed the evolution of optical communications and the many new applications built on the deep investment in this area, such as quantum photonics for true random number generation, sensing applications that can be used in homes for rapid diagnosis, photonic integrated-circuits for Light Detection and Ranging (LiDAR), and photonics computing. From his standpoint as a venture capitalist, he also shared what are the opportunities in photonics today.

Mr Lim's session was on the topic of "Singapore's RIE Journey – From Research to Impact" He said: "Through years of research investments, we've built up significant capabilities in terms of the knowledge and know-how in the field of photonics."

Mr Lim added that the work done by LUX has facilitated the bringing together of industry players and research collaborators to share knowledge: of the state of development of technology, and of the business and industry opportunities that are being created or the market needs that are still unmet.



According to Dr Levinson, these are some of the needed breakthroughs in the photonics space


Mr Lim discussed the role of national ecosystem platforms in realisation of innovation impact for Singapore's interest

Prof Din-Ping Tsai spoke on the topic of "Production and Application of Meta-lens for Light-field Sensing, Imaging, and Quantum Optics". He discussed the applications of meta-surfaces, general design principle of meta-lens, achromatic meta-lens for transmission, light field imaging and sensing, and high-dimensional quantum entangled light source optical chip, as well as the prospects for meta-lens.

The second part of the Photonics@SG 2020 conference was a virtual exhibition featuring four technology exhibitors (A*STAR, NUS, NTU, SUTD) and nine industry exhibitors.

Prof Tsai discussed the prospects for meta-lens

The industry exhibitors are:

CYBERNET — Cybernet Systems Taiwan, which provides digital solutions in areas like Computer Aided Engineering and Optical Solutions Software

Edmund optics worldwide — Edmund Optics, a leading global supplier of optics, imaging, and photonics technology

EXFO — EXFO, which develops test, monitoring and analytics solutions for the global communications industry

iLASER — iLASER, a solutions provider focusing on photonics technologies and digital fabrication solutions

KLA — KLA Corporation, a leading provider of process control and yield management solutions

PHAOS TECHNOLOGY — Phaos Technology, which focuses on technical development of advanced optical instrumentation technologies

SICK Sensor Intelligence. — SICK Sensor Intelligence, a leading sensor manufacturer in areas ranging from factory automation to logistics automation and process automation

TESSOLVE A Hero Electronix Venture — Tessolve, a leading end-to-end solution provider, from chip design, Test and PCB engineering through Embedded systems development

T-SMART — T-Smart, which seeks to provide novel and superior manufacturing technology to the traditional infrared temperature sensing architecture

The following exciting photonics technology offers/ research outcomes were showcased by researchers from NTU, NUS, SUTD and A*STAR:

NTU (THE PHOTONICS INSTITUTE)

CDPT01 - Room-temperature Solid-state Quantum Emitters at the Telecom range – A/Prof Gao Weibo
CDPT02 - Deeply Subwavelength Optical Imaging and Metrology – Prof Nikolay Zheludev
CDPT03 - On-Chip THz Topological Photonics for 6G Communications – A/Prof Ranjan Singh
COEB01 – Vision Correction for Digital Displays – A/Prof Steve Cuong Dang
COEB02 - Minimized Gas Sensing System Using QCLS Spectroscopy with Advanced Deep ELM– Prof Wang Qijie
COFT01 - Advanced Functional Fibers and Smart Textiles – A/Prof Wei Lei
COFT02 - Ultrafast Fibre Lasers and Specialty Fibres for Bio-imaging and Precision Engineering Applications – A/Prof Yoo Seongwoo
COLE01 - Non-contact, High-resolution Ophthalmic Imaging – A/Prof Murukeshan Vadakke Matham
COLE02 - Fully Automated Precision Micro-Welding with Pulsed Lasers – A/Prof Zhou Wei
LUMINOUS01 - Low-cost, Efficient and Mercury-Free Deep-Ultraviolet Chips for Disinfection Applications – Prof Hilmi Volkan Demir
LUMINOUS02 - Luminescent Quantum Emitters for LEDs and Lasers - Prof Hilmi Volkan Demir
Si Photonics Research Activities in Collaboration with CompoundTek – A/Prof Wang Hong
Seeing the Unseen with Micro-OCT – A/Prof Liu Linbo

NUS

NUS01 - A Single AI Sensor for the Simultaneous Detection of Multiple Gases & Vapours – A/Prof Ang Kah Wee
NUS02 - Laser Microstructuring of High-hardness Transparent Materials – Prof Hong Minghui
NUS03 - An Infrared Spectrometer with High Throughput – A/Prof Zhou Guangya

SUTD

SUTD01 - Chalcogenide Photonics – A/Prof Robert Simpson
SUTD02 - Artificial Intelligence for the Inverse Design of Structural Color Prints – A/Prof Joel Yang
SUTD03 - 3D & 4D Printed Nano-Optics – A/Prof Joel Yang

A*STAR

ASTAR01 - Quantum IR Microscopy via Visible Light Detection – Dr Leonid Krivitsky
ASTAR02 - High speed LEDs for LiFi communications – Dr Teo Ee Jin
ASTAR03 - Advanced Optical Instrumentation @SIMTech – Dr Derrick Yong

LUX Chairman and TPI Co-Director Prof Tjin Swee Chuan wrapped up the conference with his closing address, where he thanked the Photonics@SG 2020 Organizing Committee as well as NTU's Events Office and Centre for IT Services, for their contributions in ensuring yet another fruitful conference.

Prof Tjin delivers the closing address of Photonics@SG 2020

Says Conference Chair Prof Wei Lei: "The conference has successfully engaged venture capitalists, industry veterans and entrepreneurs with rich experience in the photonics industry."

"Moreover, it is a connecting point where the leading scientists in photonics can push the boundaries of science and showcase their full spectrum of photonics technologies, which will in turn generate innovations leading to a broad range of applications for every aspect of our daily lives."

Indeed, Photonics@SG 2020 proved to be a powerful meeting of minds as academics, members of industry, and policymakers such as the NRF's Mr Lim discussed the latest developments in the photonics space and gave serious consideration to how they can value-add to the photonics supply chain through new innovations and products.

LUX Welcomes New Members At Virtual Networking Event

LUX's third quarter networking event – its second to be held online – saw over 90 participants, showing a readiness by members to adapt to the new normal.

Held on 9 September, 34 companies were present alongside NTU, NUS, SUTD, A*STAR, Enterprise Singapore (ESG) and the National Research Foundation Singapore (NRF).

LUX Chairman, Prof Tjin Swee Chuan introduced five new industry members (AEM, Component Technology, Nagase, Opto Precision, and Royal Bussan) and seven new faculty members from NTU and SUTD. With these latest update, the Consortium has 63 companies and 66 faculty as active members.

More than 90 attended LUX's second networking session to be held online

New Industry members

New Faculty Members

Title	Name	Institute	School	Research Area (Keywords)
Assoc Prof	Qian Kemao	NTU	SCSE	Optical metrology, Data analysis, Computer vision
Assoc Prof	Zhang Baile	NTU	SPMS	Waves in complex media, Photonics crystals, Metamaterials, Plasmonics
Assoc Prof	Ranjan Singh	NTU	SPMS	Photonics, Terahertz electronics
Assoc Prof	Ling Xing Yi	NTU	SPMS	surface-enhanced Raman scattering (SERS)
Assoc Prof	Wong Liang Jie	NTU	EEE	Electron-photon interactions, X-ray photonics, nanophotonics
Assoc Prof	Matteo Seita	NTU	MAE	Metal additive manufacturing, High-throughput microstructure analysis, Failure of structural alloys
Assoc Prof	Dawn Tan	SUTD	EPD	Nonlinear optics, Silicon Photonics, Nanophotonics, Optical signal processing, Photonic integrated circuits

He also congratulated Asst Prof Steve Cuong Dang and GDS Instruments for their Industry Alignment Fund – Industry Collaboration Projects (IAF-ICP) grant award, and reiterated that the LUX Seed Grant 6th Call was open for proposals until 31 October 2020.

In addition, Prof Tjin shared that LUX's Steering Committee had approved a one-time goodwill waiver for members' 2020 annual fee to help mitigate the impact of COVID-19 on businesses. This gesture was well received and members were appreciative of the support rendered.

Member companies presenting at the event.

At the networking, member companies are invited to share how they can help to bring in new technology offering, solutions and value to the LUX community. CEO of T-SMART, Mr Bryan Patmon, has shared that T-SMART has plan to launch a novel thermal sensor which accurately measures and monitors the temperature of objects remotely and intelligently converts thermal energy into actionable insights; and general manager of Sunny Instrument Singapore, Dr Zhu Chuangui introducing capabilities such as 3D/AI measurement and inspection technology which could support product development or projects in optical measurement software & systems. Apart from this, Mr Chester Wan, Senior Assistant Sales Manager, Nagase Singapore list a few key material platform offerings which are relevant for the photonics community such as Inkron optics coating, EMS adhesives and Nagase Chemtex photoresist; while Mr Keigo Tang, Vice President of Opto Precision, shared that the company could support optics & electronics assembly and Micro-NanoFabrication. Mr Berne Chung, MD of Component Technology, had shared the company's experience in collaborating with public research institute and benefit a lot from it, he would like to seek more support from LUX community to create value-adds solutions for his customers. Last but not least, Mr Jeffrey Wong, Director, Business Development, AEM Singapore shared about the company's system integration solutions such as customised optics, software integration and advanced automation.

The event's highlight was the Tech Talks by faculty members. To view the videos, simply scan the QR code.

Tech Talk Highlights

Laser Polishing – Technology and Applications
Assoc Prof Zhou Wei, NTU
This talk explored the various laser choices: Continuous-wave Laser and Pulsed Lasers with mili-second, nano-second, pico-second and femto-seconds Pulse Duration. Prof Zhou has further shared with data that laser polishing is effective and efficient for improving the surface of parts produced by additive manufacturing approaches. Surface which has gone through laser polishing would see improvement not just in smoothness, but also in its wear- and corrosion-resistance.

All-fibre ultrafast laser for multiphoton microscopy applications
Asst Prof Yoo Seongwoo, NTU
Asst Prof Yoo proposed a parabolic W-type Tm-doped fibre that enables an all-fibre high energy femtosecond laser for a deep-tissue bio-imaging application. The unique all-fibre system is demonstrated via 3 unique properties offered by the parabolic W-type Tm-doped fibre. The all-fibre laser system can widen up access to the deep-tissue bio-imaging microscopy for more academics and small companies, and unleash full potential of the deep-tissue imaging technique in healthcare and bio-medicine.

Turning office appliances into high-tech materials characterization techniques
Asst Prof Matteo Seita, NTU
Asst Prof Seita shared how his research group develops advanced materials characterisation techniques based on inexpensive and easy-to-find appliances (such as document scanners, mobile phones, and digital cameras). The information which these techniques provide on the structure of solids at the microscopic scale (such as defects, the size and orientation of the constituent crystallites, etc.) is of paramount importance to understand how materials behave and to better predict their performance.

Imaging with a single pixel
Assoc Prof Zhou Guangya, NUS
Single-pixel technology provides imagers with the ability to work at any wavelengths (deep-UV, and short-wave/Mid-wave/long-wave IR) cost-effectively. Imaging outside the visible spectrum is critically important to applications in surveillance & security, forensic imaging, food & beverage and chemical/gas detection. Low-cost and portable imagers such as Hyperspectral Imaging can be achieved by combining single-pixel technology with MEMS (micro-electromechanical system).

Hyperspectral infrared microscopy with off-the-shelf components built for visible light
Dr Leonid Krivitsky, A*STAR IMRE
Dr Krivitsky discussed the challenges of conventional infrared imaging: IR array detectors are expensive, slow point-by-point imaging, and stringent requirement of cryogenically cooled chamber. He introduced a new approach to IR hyperspectral microscopy, where the IR spectral map is obtained with off-the-shelf components built for visible light. Applications include hyperspectral microscopy, quality control of silicon chips, and IR imaging of stem cells targeting lipid layers.

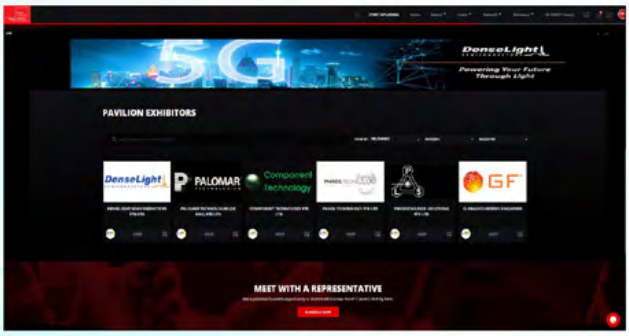
LUX First Foray into Virtual Exhibition - Industrial Transformation Asia-Pacific (ITAP) 2020

The COVID-19 pandemic has changed the way we work and venture into new normal. LUX started off with first virtual networking session on Zoom in June and subsequently in September. As physical event and exhibition is not possible during this period, LUX joins in the foray into virtual exhibition.

Coincidently, this year's edition of ITAP exhibition – a Hanover Messe event in Asia Pacific has gone digital. The event held on 20 to 22 October, over 3 days had attracted more than 5000 unique visitors from 50 countries. Guest of Honour DPM Heng Swee Keat, Deputy Prime Minister, Coordinating Minister for Economic Policies, Minister for Finance, Singapore graced the event with other distinguished dignitaries from other countries. There were 87 exhibitors from 14 countries and 3 e-Pavilions, where LUX Photonics Consortium Pavilion is one of them.

LUX had worked closely with event organiser SingEx and negotiated a good package for our members to exhibit at the event. LUX Photonics Consortium Pavilion comprise of 6 member companies – **Component Technology, DenseLight Semiconductors, Globalfoundries, Palomar Technologies, Phaos Technology** and **Precision Laser Solutions**. The LUX Pavilion branding has enabled participating members to gain wider exposure and publicity.

The new event format cater to regional industries' needs in a COVID-safe environment, enabling stakeholders to share, learn, network and collaborate with one another via a custom-built interactive platform called ITAP CONNECTED. The digital platform is powered by an AI recommendation engine to tailor to each person's learning journey and user experience.



The unique feature of the platform enabled our member companies to engage in business matching and setup meetings with visitors even before the event started. The exhibition showcase also features interactive on-demand video call and scheduled video meeting and webinars for product introduction and launches. DenseLight Semiconductors, Palomar Technologies and Phaos Technology had capitalised on these features to conduct their webinar sharing sessions.

Component Technology	Component Technology is a leading supplier of back-end semiconductor inspection machine, products include Post Die/Wire Inspection Machine, Bond Tester and X-Ray Image Analyser. www.cthelp.com
DenseLight SEMICONDUCTORS	DenseLight provides one-stop design and manufacturing solutions, from photonics design and simulation, expitaxial growth, wafer fabrication, chip production, in-line optical coating, sub-mounting, photonic measurements, product tests and screening. www.denselight.com
GF	GLOBALFOUNDRIES (GF) is the world's leading specialty foundry. GF delivers differentiated feature-rich solutions that enable its customers to develop innovative products for high-growth market segments. www.globalfoundries.com
PALOMAR TECHNOLOGIES	Palomar Technologies makes the connected world possible by delivering a Total Process Solution™ for advanced photonic and microelectronic device assembly processes utilized in today's smart, connected devices. www.palomartechnologies.com
PHAOS TECHNOLOGY	Phaos Technology is an advanced optics technology startup based in Singapore, adopting technology spin-off Optical Microsphere Nanoscope (OMN) from National University of Singapore. www.phaos.com.sg
PLS	Precision Laser Solutions develops high precision laser micro-processing automation equipment, automatic quality control and vision inspection equipment for high-end industrial applications. www.precisionlasersolutions.com

The event was well received by participating members, leveraging on the digital platform to continue to reach out and expand their client base and build up important business contacts. Said Richard Hueners, Managing Director of Palomar Technologies S.E. Asia: "our marketing team in the US is really impressed with this event and the backend setup. In fact, they said it is the best virtual event this year in terms of how it organized and how the tech works. Well done!"

Industry News

LUX members AMF and DenseLight to light the way together with MOU

From left: DenseLight's Dr Lam Yee Loy, Dr Andy Piper, Mr Rajan Rajgopal, AMF's Dr Patrick Lo and Ms Kavitha Buddharaju, and DenseLight's Mr Soma Sankaran

Advanced Micro Foundry (AMF) and DenseLight Semiconductor have entered into a Memorandum of Understanding (MOU) to jointly develop Silicon Photonics Solutions with integrated lasers.

The companies will combine their respective expertise in Si Photonics manufacturing and Laser development to develop an integrated "low loss – low cost" SiP optical engine with integrated laser light source, which will contribute to lower assembly costs and shorten development cycle times of Transceivers (400G/800G) and Fibre Sensing products.

AMF President, Dr Patrick Lo mentioned that "for the first time, two Singapore companies are working together to locally develop unique solutions that will promote the widespread adoption of Si Photonics by the Data Communication industry and by other emerging applications".

Said Mr Rajan Rajgopal, President & CEO of DenseLight: "This MOU creates a unique partnership between two synergistic Singapore-based companies to deliver turnkey Si Photonics based solutions to both Datacom & Fibre Sensing customers. Our proprietary DPHI™ technology enables the integration of InP-based photonics devices to Si Photonics platforms for efficient light coupling into waveguides".

Spotlight on SilTerra at Automotive LIDAR 2020 SILTERRA

LUX member company SilTerra presented on "CMOS+MEMS Fabrication Solutions for Automotive LIDAR Applications" at the Automotive LIDAR 2020 conference, which looked at a wide range of areas driving the future of automotive LIDAR.

In his presentation, Senior Vice President of Technology Development, Mr Arjun Kumar Kantimahanti shared the company's capabilities in fabricating MEMS-on-CMOS solutions.

He also discussed SilTerra's two technology platforms for LIDAR and sensing applications: Optical MEMS and Ultrasonic MEMS. These are used in the evaluation of 2D and 3D micro-mirror solutions for autonomous vehicles and for short- and long-range detection in commercial applications.

Super Resolution Microscope from super LUX partnership PHAOS TECHNOLOGY OptoSigma SIGMAKOKI Group

A new Super Resolution Microscope – with the ability to resolve features down to 137nm in ambient environments without the need to condition the samples – is in the works.

LUX members Phaos Technology and OptoSigma Corporation, part of the Sigma Koki Group, have joined hands to produce the OptoNano 200. The system incorporates OMN (Optical Microsphere Nanoscopy) technology and will save tremendous time and resources in comparison to other known available methods today.

"We are very proud to have found in the Sigma Koki group under the OptoSigma brand name, an experienced and reliable partner for the manufacturing and distribution of our extraordinary new technology and OptoNano systems... Together we aim to change the way nano resolution is achieved and open opportunities to new applications and markets due to the low cost of ownership, ease of operation, and fast image acquisition," said Andrew Yeo, CEO of Phaos Technology.

Dan Denison, Director of Sales & Marketing of OptoSigma, said: "We believe this new microscope system will enable commercial industry to be much more productive by utilizing the OptoNano due to the ease of use and time-saving processes to reach sub 200nm resolution. There are a variety of applications in the photonics industry from commercial to academic and research, including but not limited to printed circuit boards, semiconductor, bio-imaging, material characterization, and environmental."

A tree planting ceremony was held as part of the launch of Sustainability @ Tampines Park

Smart Illumination Lighting up Tampines the smart & sustainable way SMART ILLUMINATION

New LUX member Smart Illumination was involved in the launch of Sustainability @ Tampines Park, Singapore's first community-based circular ecosystem for sustainable food production, providing its eSave Smart Lighting solution.

For the pilot project under the Tampines Town Council, the company connected all the indoor and outdoor lightings, sensors and IoT devices onto a single online platform. Together with built-in intelligent algorithms, the system provides enhanced security to residents, improved efficiency and productivity to facility management, as well as significant energy savings.

New Industry Members Introduction

EXFO develops smarter test, monitoring and analytics solutions for fixed and mobile network operators, webscale companies and equipment manufacturers in the global communications industry. EXFO's unique blend of equipment, software and services aim to accelerate digital transformations related to fiber, 4G/LTE and 5G deployments. The company has 35+ years of leading expertise. More than 1,900 EXFO employees in over 25 countries contribute to driving innovation side by side with customers in the lab, field, data center and beyond.

EXFO is the worldwide leader in optical test solutions for telecom as well as for the research, design and manufacturing of photonics integrated circuits (PICs). Its end-to-end testing solution for PIC-based transceivers and optical components is composed of modular testers with best-in-class performance for ensuring compliance rapidly and reliably.

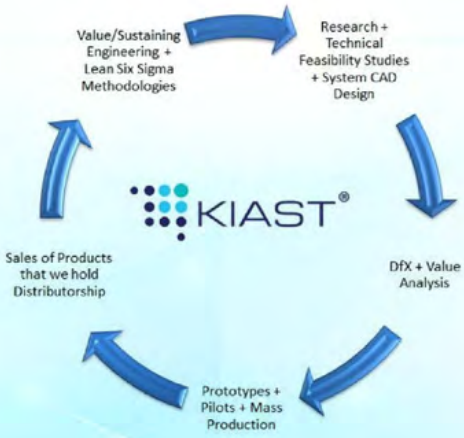
KIAST is an optical systems engineering firm with several brand distributorships. Our business is divided into two sections: 1. Engineering services and, 2. Sales of products that we hold distributorships.

For engineering services, we assist Clients throughout the entire optical system product lifecycle; from research, technical feasibility studies, system CAD design with industry standard software, through to optical components evaluation, prototype build, pilots and mass production with our network of component suppliers and system assembly partner.

On the other hand, we hold distributorships of world renowned brands in Optics industry such as Teledyne Princeton Instruments, Minus K Technology, CASTECH, Changchun Ruilaite optical gratings, Totech dry cabinets, and PB Swiss hand tools.

Over the years since our incorporation in 2017, we have accumulated a diverse portfolio in optical systems engineering ranging from spectroscopy, microscopy to interferometry covering absorbance, fluorescence to multiphoton ultrafast optics for applications in bio-medical technology and analytical sciences. We also assist Clients to troubleshoot field issues and improve their optical systems assembly process through DfX, Lean Six Sigma and various quality methodologies.

We believe, with our various engineering domain experts, we are up to the challenges of our Clients' requests to offer a solution to their optical needs with effective cost, within reasonable timeline and at sufficient quality.



SG LASER PTE LTD / MAKE LASER EQUIPMENT CO.LTD are renowned companies that collaborate with a common goal, to expand our brand and product in the global laser market industries.
Our company consist of some of the most experience laser industries technical personnel's, who specializes in producing high end laser cutting machine.
We spend a lot of effort on research and development, as our company uphold the philosophy of "Quality For Customer Satisfaction and Innovation Improvement" to further help us improve our products and to have a competitive advantage on our competitors.
We also do trading, customizing as well as providing after sale services to our end-users.
We are heavily involved in participating exhibitions under the metal working and manufacturing industries around Asia.
We will continue to strive along side with our existing and new customers closely, as we believed that customer success is our pride and it gives us the motivation to constantly improve base on their feedback and requirements, which also help us improve our company as a whole and maintaining a stronger business relationship with our end-users.

2 IN 1 Fibre Laser Pipe Cutting Machine

SMART ILLUMINATION

Smart Illumination is started by a team of experienced lighting and technology specialists with more than 40 years knowledge in the industry. With a burning desire to establish lighting as the key and base infrastructure for IoT solutions, we have set up our regional headquarters in Singapore, providing our services across Asia Pacific and beyond.

We have built up an ecosystem under the umbrella of Smart Illumination group of companies including eSave (Smart City Solutions), Wisilica (Location Aware enabled Smart Lighting), Plus Light Tech (Architectural Lighting) and Lumenhub (Façade Lighting) to provide best-in-class smart lighting solutions based on the latest advanced technologies.

Together with members of the consortium, we look forward to fostering close partnerships and seek greater advancements in the development of photonics, contributing to the society through lighting technologies.

SWISS RANKS
CYCLE OF INNOVATION

Swiss Ranks is an engineering company that designs, manufactures, and supplies highly advanced equipment for industries pursuing technological enhancement. Sincerely dedicated in realizing client's ideas and bridging new opportunities, Swiss Ranks' have been providing solutions for equipment manufacturers, OEMs and other semiconductor companies as yours to ensure cost effectiveness for ownership and development of new tools alongside improving throughput with our full-scale engineering and turnkey solutions. Currently, we are actively addressing the challenges faced across multiple industries by merging our technical expertise with the likes of Artificial Intelligence and IoT to progress towards Industry 5.0. We believe in the continuous improvement of every aspect in the manufacturing field, and constantly challenge ourselves to stay updated on the technological world.
One of Swiss Ranks' bestselling semiconductor equipment in the market is the Orion™ factory interface. To enable wafer transfers to be quicker and more accurate from one process to another, Orion™ revamped factory interface is designed with the ability to interchange different modules based on every customer's layout preference. Moreover, coupled with our linear track robot option, the Orion becomes an apparatus that can efficiently transfer wafers to multitude of different processes with the use of a single Robot.

PhotonicsSG 2020 Sponsor

Moveon

At Moveon Technologies, we pioneer & develop scalable & reliable fabrication processes for micro & nano-scale optics catered to a broad diversity of applications in consumer electronics, automotive, medical, communications & emerging industries.

Prototype & Volume production processes include optical micro-molding, nanoimprint, optical replication, thin-film coating, single point diamond turning , 2-Photon Polymerization & wafer level processes.

Learn more about us at www.moveon.bz

Upcoming Events

PHOTONICS+ Virtual Exhibition and Conference, in partnership with EPIC, is a new, efficient networking event for the photonics industry due to take place for the first time on 17 & 18 February 2021. The innovative live, digital event brings stakeholders in the photonics industry together with relevant user areas.

Event Name: **Photonics+ Virtual Exhibition and Conference**

Event Date: **17 & 18 February, 2021**

Event Time: **CET time 1.00pm to 6.00pm OR Singapore time 8.00pm to 1.00am**

LUX Photonics Consortium is proud to be one of the 200+ exhibitors in this event. There will be 30+ Keynote presentations and 200+ Exhibitor presentations. Please join us at this event, registration is FREE for visitors. Click here to register. https://www.photonicsplus.com/epic/luxphotonics04

Event Name: **2021 1st Quarter Networking Session**

Event Date: **3rd March 2021, Wednesday**

Event Time: **1.15pm to 5.00pm**

Event Venue: **NTU Singapore (To be Confirmed)**

Mark your calendar and join us at our first hybrid networking session. LUX will be hosting a limited attendees physical cum virtual networking session. Stay tune for more information!

LUX PHOTONICS CONSORTIUM SINGAPORE

Enterprise Singapore

LUX Photonics Consortium and Enterprise Singapore will be hosting a joint focus work group discussion on IC DESIGN.

Interested members are welcome to approach us for more information.

Event Date: 24 March 2021
Event Venue: ESG Office (Bugis Junction Officer Tower)