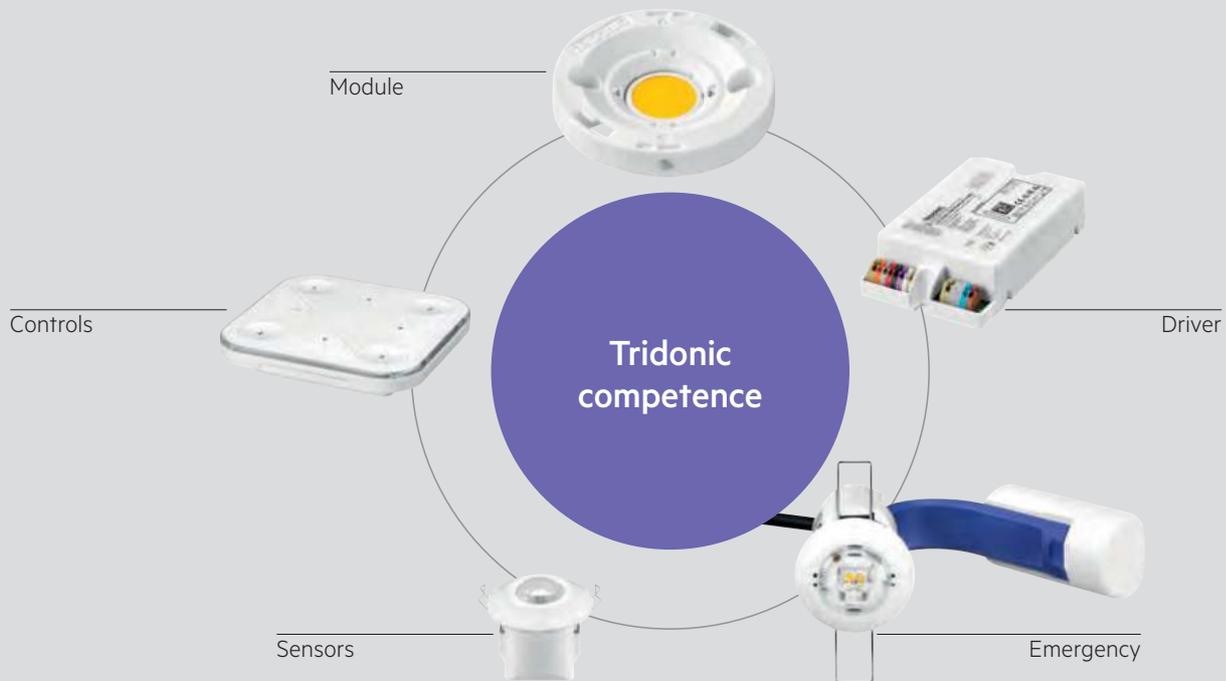


LED solutions

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PUBLISHER'S LETTER

Whispering a prayer over the COVID-19 scare - Let's stand united!

Industries today are challenged with more than just the will to flourish and representatives often express their effort to perform within an ever-evolving industry. But today, we are fighting an entity much more than the competition; with the onset of the novel COVID-19 virus, humanity is battling a pandemic that's bigger than itself. How does this connect to the lighting and the LED industry? Well, we're all torch-bearers in a world that's trying to be better with technology. The industrial sector inclusive of the lighting and the LED industry stands shaken as events are cancelled.

When we speak of evolution, we cannot negate daily living environments. While we are quarantining ourselves as a precautionary measure, we cannot ignore the implication of lighting on psychological moods and cognition. Yes, factors related to LED fixtures and lighting do have a psychological angle, and though the industry is pacing towards change, the lighting sector has moved beyond just illumination.

This issue brings to you the best we have on the latest in terms of digital lighting that is powered by intelligent control systems. We also draw considerable focus on energy consumption that contributes largely to operation costs in residential as well as commercial projects. We are expecting the LED Expo to take place during May 7th to 9th where we will have global players represent the entire value chain across the LED industry. As the Media Partner of the event, we will bring to our readers the LED-special issue which will be distributed at the event. We humbly urge you to participate.

Stay connected, stay safe!

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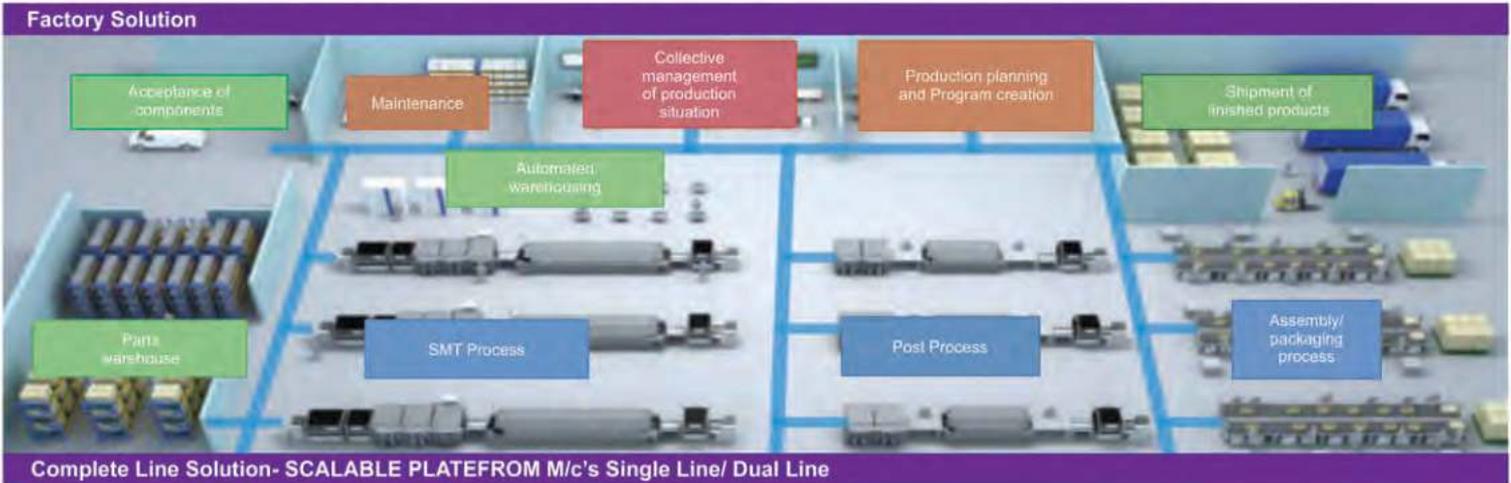
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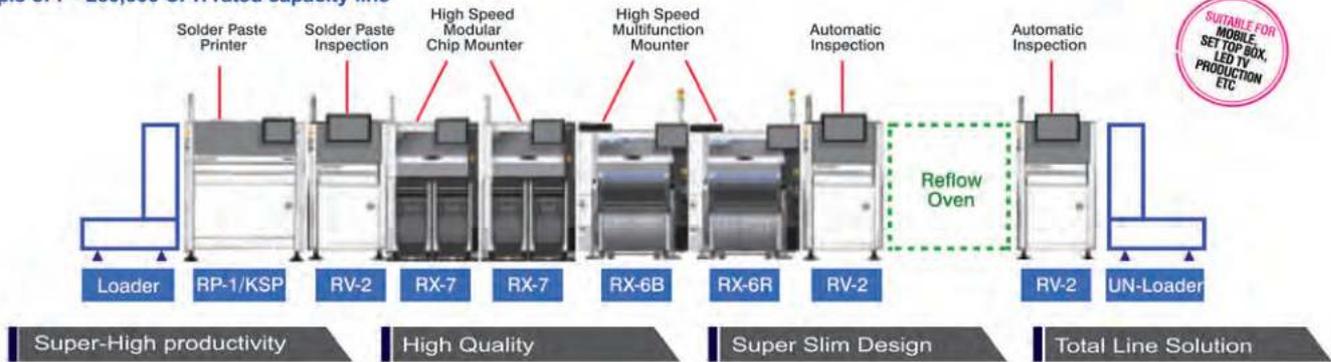
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IALD launches new guidelines for manufacturers for WELL Rating Systems

The International Association of Lighting Designers (IALD), the global association of lighting designers, in collaboration with the International WELL Building Institute (IWBI), launches guidelines for lighting manufacturers to help lighting designers more easily determine if their designs meet the WELL Building Standard criteria. The WELL v2 pilot is the latest version of the WELL Building Standard, a rating system that focuses exclusively on the way that buildings and everything in them—including lighting—can improve our comfort and enhance our health and wellness.

“With the increasing number of projects seeking WELL certification, providing designers with the information they need in a consistent format is an important step in helping ensure that lighting products are easily and correctly specified. The IALD + The Lighting Industry Resource Council (LIRC) believe that this document accomplishes that goal,” stated Grant Harlow of Cooledge, chair of the LIRC sub-committee who led the effort in developing the guidelines.

The IALD formed the LIRC over 20 years ago to pioneer collaboration among lighting designers, manufacturers and suppliers. “IALD offers the lighting profession a means for lighting designers and lighting manufacturers to come together and collaborate through the LIRC. These guidelines are an example of how collaboration across the profession—via IALD, LIRC, and IWBI—can create solutions to current lighting challenges,” stated Ken Douglas, FIALD, IALD liaison to IWBI. Today, the LIRC is comprised of over 80 global lighting and component manufacturers.

“Well-designed lighting systems can help improve productivity, support a restful night’s sleep and enhance the overall experience of being in a space,” said IWBI President Rachel Gutter. ■

Secunderabad gets its first exclusive Finolex House

Electrical and communication cables manufacturer Finolex Cables Limited inaugurated ‘Finolex House’ – its first exclusive brand retail store in Secunderabad, the twin city of Hyderabad. This launch marks Finolex’s foray into the exclusive retail market of Secunderabad after their foray in Jharkhand, Chhattisgarh, Uttar Pradesh, Karnataka, Tamil Nadu, Gujarat and Madhya Pradesh.



Speaking on the occasion, Deepak Chhabria, Executive Chairman, Finolex Cables said, “We are extremely delighted to launch our first Finolex House in Secunderabad. Finolex cables continues to be the preferred choice for customers, as the brand gets a step closer to consumers who are seeking not only beautiful but safe homes. The newly launched Finolex House will cater to the specific requirements of the discerning consumer by offering them quality options under one roof.”

Commenting on the launch, Amit Mathur, Sr. Vice President, Sales & Marketing, Finolex Cables said, “The showroom will serve consumers, who are building or refurbishing homes as the store is designed to offer end-to-end electrical solutions from a range of high-quality wires and cables to electrical fittings.”

The product range includes electrical wires, industrial flexibles, 3-core flat cables and winding wires, auto and battery cables, low voltage and high voltage power cables, coaxial cables, speaker cables, telephone cables, CCTV cables, solar cables, optic fibre cables, fans and water heaters, switches and accessories, switchgear products and LED lighting products. ■

Jaquar Lighting hosts its 2nd edition of ‘PLAY LIGHT’ dialogue series

LED lights and lighting solutions major, Jaquar Lighting, held its second dialogue panel titled Play Light at its Orientation Centre in Nagpur.



This edition of Play Light was a live symposium model on eccentric designs with discussions on the role of aesthetic appeal of lighting in modern interiors. Three detailed panel discussions formed the crux of the day’s proceedings touching upon lighting psychology, lighting trends and outdoor lighting. The expert panel comprised of both locally and nationally renowned designers, consultants and architects from prestigious design studios such as VK Associates, Naval Zamwar and associates, Aarti Shahane Architects, MBM Architects, Jayant and Anuradha Tikkas amongst others.

Speaking on the PLAY LIGHT series, Ranbir Mehra, Director, Jaquar Lighting said, “Jaquar Lighting as a business caters to consumers across segments – from value offerings to premium and luxury clientele. Being awarded international design awards for our smart street lights, we are encouraged to continue our consistent efforts in coming up with innovative lighting solutions that work harder than a normal light – serving more functions than one. Case in point, our smart street light performs various functions – it acts as a Wi-Fi router, a grid charger and an HD security camera among others. Similarly, in the home space, our lights are designed to not just appear visually appealing, but also employs the theory of phototherapy which is soothing and conducive to relaxation, depending on the purpose.” ■

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Legrand acquires Focal Point to strengthen architectural lighting portfolio



Legrand, North and Central America (LNCA) announced the acquisition of Focal Point, a Chicago-based privately held manufacturer of architectural lighting products with a 25-year record of accomplishment of exceptional products; short lead times; proven manufacturing capabilities and strong relationships with specifiers and contractors.

This acquisition is Legrand's fifth addition to its Lighting Sector and marks the company's elevation to a full solutions provider in the architectural lighting space. Legrand provides a high degree of autonomy to its lighting companies and supports Focal Point's business leadership team in the pursuit of innovation and growth. Legrand's scale and infrastructure will allow Focal Point to deliver innovative lighting solutions to their customers, faster and with capabilities that are more robust.

"Today's acquisition of Focal Point aligns with Legrand's strategy of investing in companies with shared vision and values, customer centric culture and focus on complementary market segments," said LNCA President and CEO, John Selldorff. "Focal Point's strong brand, proven relationships and impressive product portfolio— aligns well with our architectural lighting businesses and I'm confident this acquisition will expand not just Legrand's portfolio but our capacity to serve new market segments and customers." ■

Lighting the WEGA Global Games opening ceremony in Doha

Painting with Light (PWL)'s creative director Luc Peumans was asked to design an eye-catching lighting scheme for the opening ceremony (OC) of the first Qatar eSports WEGA Global Games. The OC event was staged in the Khalifa Stadium in Doha and enthusiastically attended and appreciated by 14,000 eSports fans.



Show artistic director Steven Martin from The Cintamani Stone: ArchitectofEMOTION (TCS-AOE) asked Luc onboard for their pitch, and they were awarded the project by Doha-based event company The Planners LLC.

Working together for several years now, the experienced team at The Planners combined with TCS and Trimex has become a major player in the Qatar market for these types of shows and events.

Luc was excited to be part of an all-Belgium technical design and imagineering team including OC technical director Ludo Vanstreels from Trimex with whom PWL has also worked on several previous projects. A super quick turnaround was needed to get from conception to delivery in just 4 weeks!

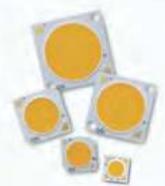
Challenges for Luc's lighting design included the positioning of the stage in one section down the long end of the stadium, which meant that the whole lighting rig – and all other technical elements – had to be ground supported.

An already incredibly tight timescale for creating and producing a complex event was also shortened when the date was brought forward by one day!

Integral to the winning pitch were elaborate projections mapped onto the stage floor and holographic images beamed on a special 30-metre-wide by 12-metre-high scrim – currently a trending aesthetic in the world of eSport tournament OCs. These had to be carefully 'lit around', combined with several flying and ground-based cast members and performers. ■

Bridgelux 8th Gen COBs deliver superior efficacy

Bridgelux announced its eighth generation of LED chip-on board (COB) products delivering up to 185 lm/W across its V Series, Vero Series and Vero SE Series product families at nominal drive current. This performance is benchmarked at the popular 3000K 80 CRI colour point, with efficacies above 200 lm/W possible at other colour points across the industry's broadest range of COB products.



In addition to the announcement of new Gen 8 products, Bridgelux continues to expand its portfolio of human centric lighting solutions. New products under development include the new Vesta Thrive™ COB, the industry's first tuneable white natural spectrum light source; expansions in the Vesta Flex dual channel driver and controls family to now include Casambi and Silvar control modules; and the new Vesta SE, the first dim-to-warm and tuneable white COBs with integrated holders to simplify and standardise mechanical, optical, and electrical connections.

"The lighting market continues to evolve, with some suppliers reducing their focus on lighting," said Tim Lester, CEO of Bridgelux. "Our expanded portfolio further enhances our ability to support our customers in navigating the market transition toward human centric lighting, the right light, in the right place, at the right time." ■

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Upwertek Released 600W Compact Constant Current LED Driver



Upwertek unveiled a new product 600W compact constant current LED driver. The new driver is highly efficient, the size is only 237x125x43mm, which is as small as competitors' 480W driver in the sport lights, bay lights, grow lights, and pole lights market, the manufacturer claims.

This new 600W design covers the output current from 2A up to 11A and supports very wide programming output range as great help to reduce SKUs while users could program the output current plus other features by NFC programmer or smart cellphone. Also, it enjoys 100,000 Hour Life @ Tc=75-deg C and 10kV surge protection to ensure the reliability. Besides, the flicker-free performance and low output current ripple < 5 per cent provide users steady light output and comfortable environment.

Main features:

- Supply Voltage: 180-528Vac
- Great Surge Immunity 10kV
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- 7 Year Warranty @ Tc<=75°C
- NFC programmable
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- 0-10V/PWM/Time/DALI /DMX (Optional) Dimmable
- Isolated Dimming
- Dim Off with 0.5W Standby Power
- 12V 300mA Auxiliary Power to Power Controllers and Fans (Optional)
- Safety according to EN 61347-1, 61347-2-3 61347-2-13, 62384 ■

eldoLED 'industry's first' DiiA certified DALI-2 DT8 Tc Drivers

eldoLED announced that it has received the first Digital Illumination Interface Alliance (DiiA) certification for DALI Device Type 8 (DT8) colour type Tc drivers.

Drivers using the DT8 protocol, also known as DALI 209, can use a single DALI short address to control two or more outputs. This can yield cost savings for LED system installations when using tuneable white driver technology (DT8). This technology allows the end user to change the colour temperature and intensity of fixtures within an LED lighting system, a significant technology advancement for using DALI to specify and control colour.

"DT8 certification is the culmination of eldoLED's latest effort to elevate color science and is a significant step forward in our quest to bring digital solutions to market, simplify solution development, and drive the quality of light in LED systems," said Gilles Abrahamse, Acuity Brands Lighting Vice President of Digital Luminaire Components. "Reducing the number of addresses simplifies design and commissioning as evidenced during eldoLED's Groningen installation."

Use of the DT8 driver technology is certified in the DUALdrive 562 driver model from eldoLED. Other DUALdrive products and certain LINEARdrive products are currently in the DT8 certification process. eldoLED drivers are interoperable with many LED systems. ■



Harvard launches new range of high spec LED drivers

New from Harvard Power Systems, one of the leaders in lighting control gear, is a new range of high specification LED drivers.

The CoolLED PRO CLi Series LED drivers come in 15W, 25W and 40W versions providing smooth flicker-free dimming down to 0.1 per cent, particularly desirable for aesthetic and display applications. This new range is specification rich. They allow smooth dim to off, ideal for interiors and architectural applications; they are 100 to 1400 mA programmable, able to drive as low as 2.5V DC for just one single LED; they have a touch/push to dim function; and also have a corridor/switch dim function as standard.

These high-performance LED drivers are designed for embodiment by luminaire manufacturers and also for remote, independent installation for which cable clamp/covers are supplied to click-fit the standard driver body.

One important feature of the new CLi Series LED drivers is that they are ultra-compact. The 15W drivers fit through a 40mm hole in the ceiling and the 25W and 40W drivers fit through a 56mm hole in the ceiling making them an ideal fast-fit solution for use with LED downlights. These new LED drivers are also future proof, having a connection port for wireless devices to connect such as Bluetooth Mesh and ZigBee.

As well as DALI dimmable versions, the CLi Series LED drivers includes 0-10V dimmable types with a fully isolated analogue dimming circuit to comply with the new standards and regulations from March 2020.

This new range of drivers come with a five-year warranty, are SELV compliant, have wireless control options, and are compatible for emergency applications. Extended life testing has demonstrated high reliability and they have low audible noise below 20dBA. ■



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Nadarajah Narendran Elected to Fellow of SPIE



Nadarajah Narendran

Rensselaer's Lighting Research Center professor and director of research Nadarajah Narendran has been elected to the grade of Fellow of SPIE, the international society for optics and photonics. SPIE Fellows are members of distinction who have made significant scientific and technical contributions in the multidisciplinary fields of optics, photonics, and imaging. They are honoured for their technical achievement and for their service to the general optics community and to SPIE in particular.

Dr. Narendran was selected for his achievements in LED and solid-state lighting performance improvement, short- and long-term testing, package design, and applications. In addition to his research achievements, he was honoured for his many years of service to SPIE, including his help in establishing the society's first solid-state lighting

conference back in 2001.

This August, Dr. Narendran will be honoured at the SPIE Optics + Photonics conference in San Diego, California, along with other Fellows.

Dr. Narendran is well known throughout the lighting industry for his pioneering research in the field of solid-state lighting, including LED performance improvement through novel packaging, development of accelerated life-testing methods, and the use of LEDs in high-value lighting applications. Dr. Narendran has authored more than 130 articles in archival journals and proceedings and holds more than 50 worldwide patents. He is a Fellow of the Illuminating Engineering Society of North America and a member of the committee on the assessment of solid-state lighting for the National Research Council of the National Academies. ■

Terrence Brady begins role as President, CEO and Trustee of UL



Terrence Brady

Underwriters Laboratories Inc. announced that Terrence R. Brady began his new position as president, chief executive officer and trustee of the 125-year-old safety science research and standards development organisation. He assumes the new posts after the retirement of long-serving CEO Keith Williams. Brady's appointment as CEO by the board of trustees had been announced this past September.

Brady said, "Safety science research and standards development will remain our core priorities as we continue to help our stakeholders overcome emerging and complex safety challenges. As I announced at our annual meeting in May, we have embarked on a path to become the world's preeminent safety science research institution by

growing both the depth and breadth of our research capabilities. Our mission to help make the world a safer place has never been more important."

In 2018, Brady was appointed president of Underwriters Laboratories with responsibility for leading its operations, strategy and growth. He joined UL in 2012 as senior vice president and general counsel and became senior vice president, chief commercial and legal officer in 2015 with responsibility for overseeing the legal, compliance, government affairs, marketing and strategy functions of UL.

Prior to joining UL, Brady was an associate and partner for 27 years in the global law firm Winston & Strawn LLP, concentrating his practice in mergers and acquisitions, securities offerings and corporate governance. ■

Atlas Copco India appoints new MD



Frans Van Niekerk

Atlas Copco India has appointed Frans Van Niekerk as the new Managing Director and Vice president India Holding. He will be responsible for the company's operations in India and Bangladesh.

Frans van Niekerk, a South African citizen, has more than 20 years of experience within the Atlas Copco Group, most recently as Vice President of Southern Africa Holding. Before that he has held a variety of Business Control functions for the Mining and Rock Excavation Technique business area in

South Africa, as well as in Southeast Asia, Chile and Sweden.

"With his long and international experience he is very suitable to contribute to our presence and development in the important Indian market," said Hans Ola Meyer, Senior Vice President Controlling and Finance and CFO.

Frans' education includes studies in accounting and economics from Lyceum correspondence college in South Africa. He succeeds Giovanni Valent who is retiring after 25 years in the Atlas Group. ■

ON Semiconductor Ranks #15 on Barron's 100 Most Sustainable Companies in US

For the third consecutive year, ON Semiconductor is ranked on Barron's 100 Most Sustainable Companies in America; moving up from No. 59 in 2019 to No. 15 this year.

"We are delighted to be recognised and named as one of the most sustainable companies for a third year by Barron's," said Jean Chong, vice president, ethics and corporate social responsibility at ON Semiconductor. "This recognition and movement on the list is a further testament to the incredible work we are doing as an organisation and the commitment we have to making the world a greener and safer environment. This commitment starts from product development to how we conduct business as an organisation. It is rooted in every aspect of how we operate."

The company said: "ON Semiconductor is committed to



energy efficiency by keeping sustainability at the forefront of its operations. From innovative technologies to its manufacturing processes, the company's approach to environmental sustainability is guided by its environmental occupational health and safety policy. The company is passionate about making the world a greener place and has several long-standing programs in place. At the corporate office, roughly nine tonnes of pollution are prevented annually through a vanpool program. Further, through a compressor and vacuum system at the manufacturing site in

Cebu, Philippines, the company has conserved 35,000 kWh of energy, equating to approximately \$77,000 in savings. Since 2016, the company's normalised water consumption has decreased by 17.3 per cent at its wafer fabrication operations and 10.5 per cent at its assembly and test operations." ■

Shuji Nakamura bags University of Louisville's renewable energy prize for LED lighting

A pioneer in sustainable energy technology, University of California-Santa Barbara materials professor Shuji Nakamura, has won the 2019 Leigh Ann Conn Prize for Renewable Energy from the University of Louisville (UofL). The prize recognises outstanding renewable energy ideas and achievements with proven global impact.

Nakamura is recognised for scientific innovations and commercialisation of efficient solid-state light-emitting diodes (LEDs), which have revolutionised electronics and lighting at more than 10 times the efficiency of incandescent lighting, more than twice the efficiency of fluorescents and a durability of 30 to 40 years. His innovations have enabled efficient use of energy, reduced the burden on the environment and helped create sustainable lighting worldwide.

Solid-state lighting and electronics are estimated to save \$98 billion in cumulative energy consumption by 2030 in the United States, or the energy equivalent of 30 1-GW power plants. Worldwide, the effects are five times greater.

In March 2020, Nakamura will give a free public talk in Louisville about his winning work and achievements, trials



and tribulations. He will receive the Conn Prize medal and \$50,000 award at a formal ceremony.

"Dr. Nakamura is a world-class scientist dedicated to the viability of LED technologies. His work and perseverance are inspiration to us all. The University of Louisville celebrates his research and its positive influence. In a world where energy use must be environmentally responsible, he is an outstanding winner of the Leigh Ann Conn Prize," said UofL President Neeli Bendapudi, who will confer the award.

The prize, administered by UofL's Conn Center for Renewable Energy Research at the J.B. Speed School of Engineering, is named for the late daughter of Hank and Rebecca Conn, who are center supporters and the prize benefactors.

"The impact of Dr. Nakamura's work is massive and exactly what Leigh Ann thought mattered most -- What good is innovation if it never changes the world?" Hank Conn said. "LED lighting touches people in all economic strata, saving energy and money with global reach. It is exciting to recognise this outstanding scientist, his innovations and their translation into clearly impactful technology." ■

THE FUTURE LOOKS BRIGHT FOR AUTOMOTIVE LIGHTING

In near future, a vehicle's lights will not only enhance the aesthetics or improve safety, but will also enable the vehicle 'interacts' with driver.

Lighting remains a significant component in vehicles. Apart from adding aesthetic looks to interior and exterior parts of a vehicle, lighting plays an important role in vehicle safety. Today, increasing concerns about road safety and government regulations for lighting are the major growth drivers for lighting equipment.

According to Allied Market Research, the global automotive lighting market, valued at \$18 billion in 2018, is expected to reach \$28.77 billion by 2026, registering a CAGR of 6.7 per cent from 2019 to 2026. "The rear lighting segment was the highest contributor to the market, with \$5.61 billion in 2018, and is estimated to reach \$8.87 billion by 2026, at a CAGR of 6.5 per cent during the forecast period," Allied Market Research report adds. Another report published by Mordor Intelligence estimates that the global automotive lighting market will register a CAGR of about 7.46 per cent, during 2019 – 2024.

Here, we discuss on some of the advanced technologies in automobile lighting components that are transforming the automotive segment.

Light is the new chrome for cars

Headlights are a major factor in providing a safe environment for night driving. However, of late, technological progress in car lighting has led to light becoming an essential design element in modern cars. The lighting manufacturer developed new ultra-slim LED Oslon Boost HM for headlights that delivers outstanding brightness values with compact dimensions.

In addition to numerous features such as adaptive front lighting, often called bend lighting or matrix lighting, the miniaturisation of this component plays a particularly important role. "With the Oslon Boost



Osram Oslon Boost HM

HM, Osram developers have succeeded in achieving an outstanding brightness of 415 lm at 1.5 A with a very small chip area of just 0.5 sq mm," Osram claims.

The package of the LED is also particularly compact at 1.9 mm x 1.5 mm x 0.73 mm, providing a finger-width front headlamp solution, without compromising light output. The luminance of 255 cd/sq. mm. at 1.5 A is an absolute best-in-class performance value for this type of LED.

Digitalisation of LED headlamps

In order to ensure the specified light distribution on the road

surface, different optical systems are developed and manufactured for vehicle headlamps depending on the area they are used. Taking into account right-hand and left-hand traffic, up to 12 technically different types of headlamps may therefore be required for a global vehicle model.

With the new world headlamp that HELLA is launching on the market in summer 2020 for a premium manufacturer, this variety of variants is expected to become 'superfluous'. The light in this headlamp is adjusted via an identical SSL 100 light module just by controlling it via software. The digital



HELLA SSL100

Mockup which is adopted LG Innotek's Nexlide-HD



control can activate each pixel individually and display the entire light distribution according to the respective regional regulations. For example, the identical headlamp provides ideal illumination of a roundabout in right-hand or left-hand traffic and prevents oncoming traffic from being dazzled.

HELLA is working on the digitalisation of light and will in future digitally cover the entire range of LED headlamps from 100 light pixels to high-resolution SSL HD technologies with tens of thousands of light pixels. "With our innovative headlamp modules, we have a technical basis for implementing all lighting functions by using software and flexibly adapting them to regional requirements. This also includes additional functions such as glare-free high beam or projected orientation lines on the road," says Dr. Michael Kleinkes, responsible for lighting technology development at HELLA.

Light enables car 'talks' to driver

In October last year, the German automaker Volkswagen highlighted a new feature for its new flagship electric car, the VW ID.3. It is equipped with a lighting system that can 'talk' to the driver.

Volkswagen describes the system: "Not only does this car's voice control obey your every word, the ID.3 also communicates visually with its occupants – thanks to the completely new intelligent ID. Light concept. A LED strip that runs across the cockpit assists the driver by changing colour according to the current function."

Once they are settled into the driver seat, ID. Light signals to the driver that the vehicle's drive system is active and that the car has been unlocked or locked. It accentuates information issued by the driver assist and navigation systems and signals braking

prompts and incoming phone calls. In conjunction with the navigation system, ID. Light reduces the stress of driving in traffic.

DRLs and tail lights

Daytime running lights or DRLs are a relatively new feature on most cars and are designed to increase visibility of a vehicle during daylight hours. DRLs are fitted on the front of a vehicle that remain on whenever the engine is running. Though countries like Sweden, Norway, Iceland, Denmark and Canada were among the first to adopt DRLs on all vehicles, the technology is not so popular in rest of the world. As various research studies have shown that DRLs can play a major role in reducing road accidents, the technology is fast catching up.

LG Innotek has recently developed Nexlide-HD (High Definition), a flexible three-dimensional lighting for cars that emits bright and uniform light from five directions for the first time in the industry.

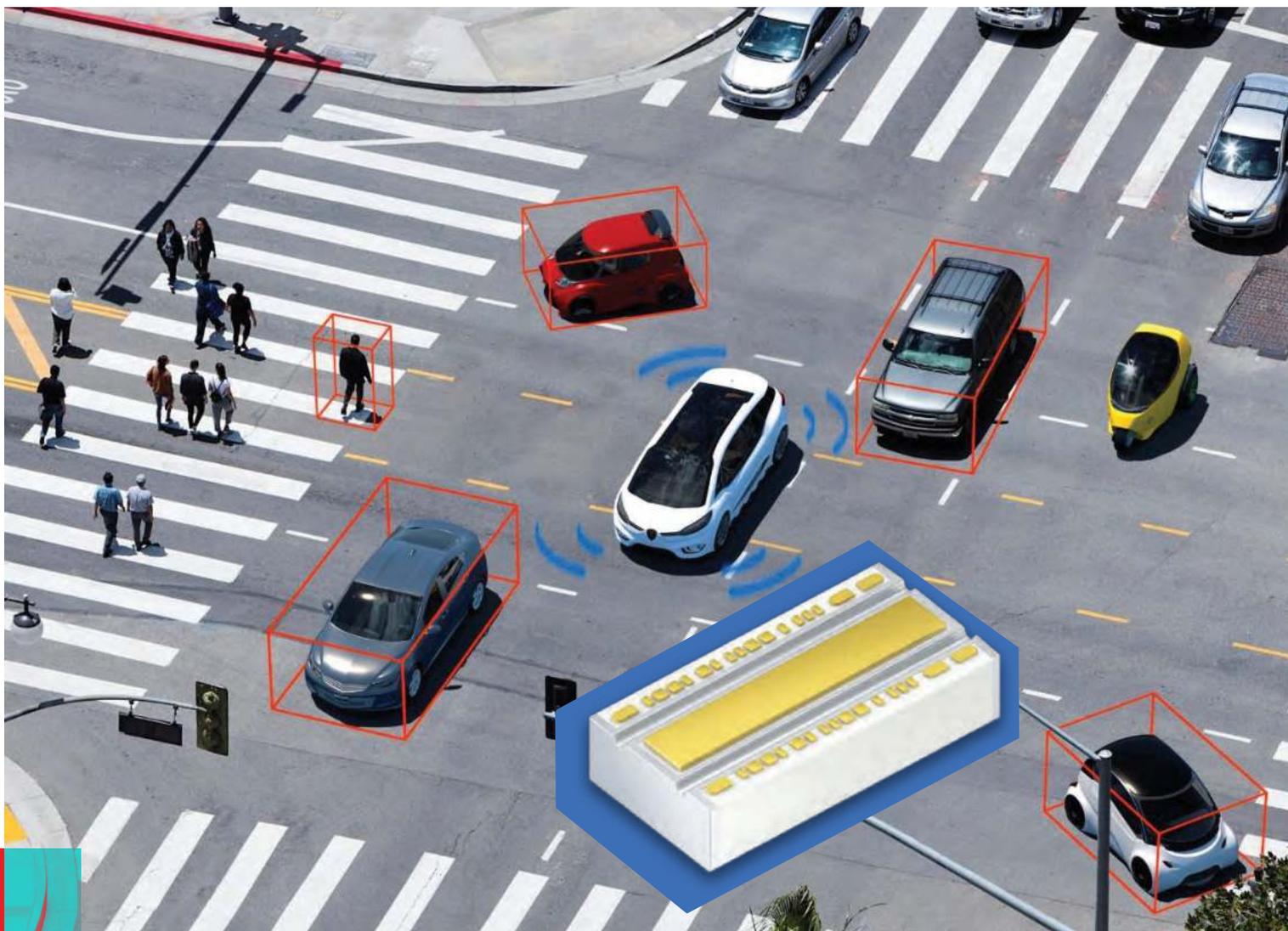
It is an automotive lighting module made by attaching a number of LED packages to a thin substrate. It is a hexahedron that gently curves like a rubber and mounted on the exterior lamps, such as DRLs and tail lights.

Nexlide-HD emits uniform light from five directions except the substrate contact surface, the manufacturer claims. The company applied the LED packages, which spreads light around 180 degrees, and a proprietary optical design technology to the product.

Nexlide-HD enables the creation of unique lightings with various designs such as straight lines, curved lines, waves, and three-dimensional figures. The module can also be cut into thin pieces and combined into blocks to create floral patterns and more. The flexibility of the module is doubled so

Volkswagen's new electric car VW ID.3 is equipped with a lighting system that can 'talk' to the driver.





With short-range LiDAR applications, the immediate vehicle environment can be scanned reliably. Picture: Osram

that one can form it into different shapes by using silicon.

This product can be used to the tail lights as well as DRL on the front of the vehicle. DRL require brightness of 400 candela (unit of light source brightness) above so that they can be recognised even in the daytime. LG Innotek has raised the module's brightness by applying a 5-sided stereoscopic lighting technology.

In addition, according to LG Innotek, Nexslide-HD can be used to produce slim lighting and reduce the thickness of automobile lamps by up to 70 per cent. This is possible because the module is no need for extra components such as an inner lens to make the light uniform.

LiDAR in autonomous driving

Though still in its infancy, autonomous driving is all set to transform our transportation system. Accordingly, car manufacturers and mobility service providers are working on their visions for driverless vehicles.

The need for autonomous vehicles to more comprehensively and reliably detect their surroundings makes the number and arrangement of sensors, such as LiDAR (Light Detection And Ranging), more critical. With SPL DP90-3, Osram Opto

Semiconductors added a 65-Watt laser to its LiDAR photonics portfolio and brings autonomous driving one step closer.

There is now a broad consensus that only a sensor fusion of LiDAR, radar and camera systems can provide the necessary security for fully autonomous driving. Each of these technologies has advantages and disadvantages depending on the respective scenario, but overall, the better they are coordinated - the safer the vehicle moves through traffic. For example, LiDAR systems are strong in generating high-resolution 3D information in real time. Long-range LiDAR is used to detect objects up to approximately 250 meters away. The immediate surroundings of the car must also be reliably captured by short- or mid-range LiDAR, which covers a distance up to approximately 90 meters from the vehicle. Short- or mid-range LiDAR covers classic traffic situations such as passing cars on highways or driving in urban traffic.

With SPL DP90-3, Osram presents a new single-channel pulsed laser that features improved beam quality and particularly compact dimensions. Its space-saving footprint of just 0.3 mm x 0.6 mm, will enable system manufacturers to create extremely compact designs. ■



There is an increased demand of connected lighting solutions in modern offices, smart cities, street lighting, industries, commercial spaces and hospitality.

Prag Bhatnagar,
Senior Vice President,
Havells India Ltd.



CONNECTED LIGHTING HAS HUGE POTENTIAL IN INDIA: **HAVELLS**

Today, lighting is not just about illumination, it is also about contributing to healthier living and working conditions. However, there is a lack of awareness on this aspect. To address this, Havells has introduced 'Lightline', a lighting consultation service, to provide expert advice about lighting to consumers, informs the company's Senior Vice President Prag Bhatnagar. He also talks about the impact of coronavirus outbreak on lighting business. Experts:

Q **Havells India's lighting & fixture business reported around 28% dip in its profit before tax (PBT) during Q3 of current fiscal. Would you like to comment on this performance?**

A The lighting industry faced some challenges like price erosion and delay in projects. The impact



was lesser in consumer lighting in continuation to our efforts in expanding distribution in smaller towns and rural markets while the B2B business has bigger impact on top line growth. In terms of volume growth, we could gain share in few categories while we could manage to retain our share in others. I think in the long-term prices will be stable and our continuous focus on innovation and technology will help us to get desired results.

Q Which segment is more affected – B2C or B2B?

A This year was difficult for the lighting industry. We managed to achieve decent growth in B2C due to our efforts in expanding distribution and focus on rural markets. Havells brand stores and a very strong dealer channel also helped in attaining significant growth in volume sales. B2B was affected due to lack of demand, price erosion and delayed projects. Overall, B2B business was affected more than B2C.

Q What will be your comeback strategy?

A As per our understanding of the industry data, we have not lost market share. We believe that the lighting business will be an important business for Havells in the long term. We will continue to invest in innovation, new technologies and brand. In the future, our focus will be more on using new technologies, connected lighting to provide solutions in B2B space and to create a sense of well-being for consumers at their home. In the current market scenario, local manufacturing and our R&D facility in Noida and Bangalore will also be an advantage.

Q How do you see the concept of connected lighting is catching up in India?

A I think connected lighting has a huge potential in India. In

my view, we need to focus more on what value it can help deliver for consumers, especially in the B2C space. We need to demystify this for users and create a language that the consumer can understand. In the recent past, the market was flooded with low quality products without any focus on data security which led to reduced confidence of consumers. With more organised players coming in with better solutions and use cases I think this will catch up fast.

In B2B space, it is already a large part of the business. There is an increased demand of connected lighting solutions in modern offices, smart cities, street lighting, industries, commercial spaces and hospitality.

Q Have you ventured in to connected lighting segment?

A We have launched connected lighting solutions a few years back with a focus on B2B customers. This has been very successful and contributed significantly to the B2B business of Havells.

Our offerings range from sensor-based lighting products to POE enabled and LitM. We are amongst the first movers in this segment and have been successfully completed many residential, smart city and indoor commercial projects.

We also have a R&D facility in Bangalore dedicated to deliver never before connected solutions for consumers in India.

Q Tell us more about Havells Lightline...

A Like I mentioned earlier, at Havells we are focused on consumers. The dramatic change from conventional lighting to LED lighting has created lots of options for consumers. Lighting can change your life in many ways. Today, lighting is not just about illumination, it is about reducing stress levels, improving quality of your sleep, how it can be easy on eyes especially for kids and elderly people at home, a better viewing experience, aesthetics and many more parameters that can improve with better light. We realise that the consumers are either not aware of these benefits or they don't know how to achieve them in their homes.

Hence, we thought about providing expert advice about lighting to consumers. This is a first of its kind in the lighting industry. A consumer can call on a toll-free number and can get expert advice for lighting of his/her homes from our lighting engineers. We also provide entire lighting design for their homes free of cost through this service.

Q Finally, is there any impact of coronavirus outbreak on your lighting business?

A Coronavirus has impacted everyone in the world. We don't know how long it will take to curb this. There could be some impact on lighting business as well. Our focus presently is more on the safety of our employees, customers and all stakeholders. We should come out of this challenging situation as early as possible. ■



Automotive lighting is a building block of autonomous driving: Yole

The automotive lighting market is booming. Yole Développement (Yole) announces a US\$29 billion market in 2018. According to the market research and strategy consulting company, the automotive lighting sector should reach US\$38.8 billion in 2024, at a 4.9 per cent CAGR between 2018 and 2024.

"This growth is driven by natural LED cost erosion, coupled with standardisation and optimisation of LED modules, resulting in more vehicles equipped with this technology," analyses Martin Vallo, PhD. Technology & Market Analyst, Solid-State Lighting at Yole. "Today, automotive lighting is becoming one potential critical node for autonomous driving. Indeed, lighting systems could represent a key location for integrating sensors such as local cameras, radar and LiDAR."

One example is the latest innovation developed by SCALA via the partnership between Valeo and Ibeo: Valeo SCALA Laser Scanner. This mechanical 3D scanner laser is able to identify objects and measure distances in any environment. This innovative product is today designed for vehicles with ADAS and autonomous cars.

"Highly and fully automated driving is about to become reality in the very near future," asserts Sylvain Hallereau, Senior Cost Analyst, System Plus Consulting. "Driven by lower production

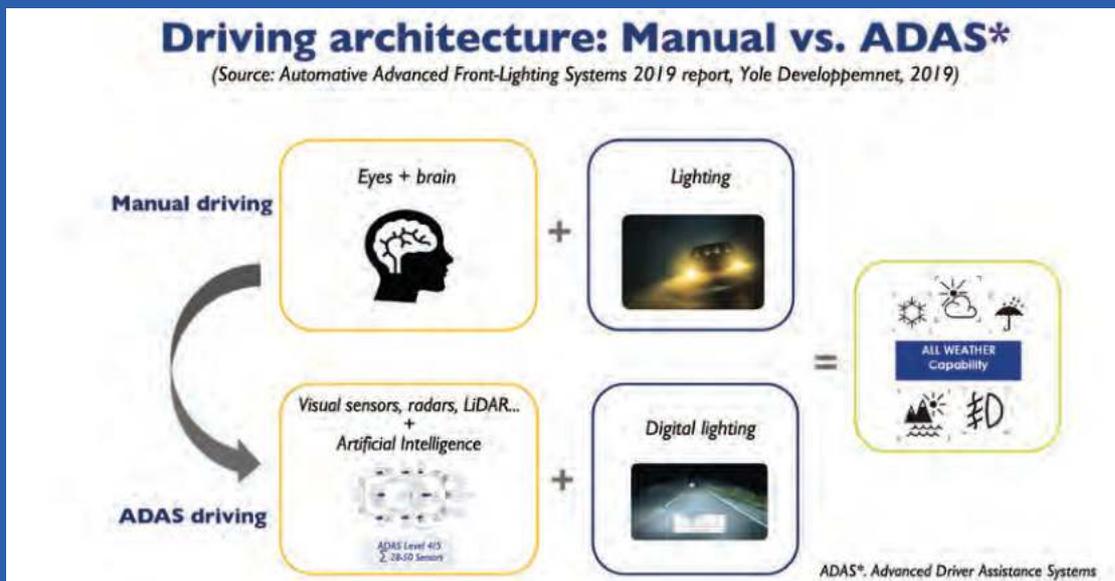
costs and the emergence of new technologies, LiDAR is becoming a key component for automotive applications and we expect this market to explode."

The reverse costing company, System Plus Consulting performed a detailed analysis of this solution and propose today a dedicated report. Based on a complete teardown analysis of the system, the study provides bill-of-material, manufacturing cost and more of this LiDAR sensor. The report includes a detailed physical analysis of the laser diode and the avalanche photodiode as well as a complete cost and selling price analysis. Without doubts, technology and application evolution brings today more complex systems, more components and subassemblies, while maintaining quality, agree both partners, Yole and System Plus Consulting. One upon a time Advanced Front-Lighting Systems.

In this dynamic context, Yole's analysts propose today a new technology and market report dedicated to the automotive lighting industry and innovations. The Advanced Front-Lighting Systems report is offering a comprehensive overview of the overall ecosystem, highlighting the latest technical innovations and the market evolution. In this report, Yole presents technology roadmaps for light sources (LEDs and lasers), and building blocks of AFLS architecture including

Key Findings

- Headlamp digitalisation is driving automotive lighting's growth and technological evolution.
- Digital lighting will continue to transform automotive lighting.
- Automotive lighting industry: positioning towards ADAS.
- Despite to the automotive industry's overall slowdown, the lighting market looks bright over the next decade.



lighting, sensing, computing, and software control. In addition, AFLS lighting technologies and penetration into different car segments are also detailed.

What is the status of automotive lighting industry? What are AFLS and the technologies behind? How will the automotive sector adopt innovations? What are the related roadmaps? Yole's experts give a snapshot of solid-state lighting innovations and their adoption.

The digitalisation of cars is a megatrend in the automotive industry, moving towards electric and autonomous vehicles. The developments related to this trend facilitate new approaches in safety, comfort, and information services. Exterior lighting is gaining significance because automated driving advancements have illustrated the importance of communication between all road users.

"Today, digital lighting is a key area of investigation for the automotive lighting supply chain, since it enables smarter lighting functionalities, safer ADB designs with cameras, and AI in the loop," explains Martin Vallo from Yole.

Two approaches are being investigated for image generation: additive and subtractive. Images from DMD, LCDs, and LCoS are formed with illuminating optics to ensure precise illumination of the corresponding SLM. The micro-structured adaptive front-lighting system (or μ AFS) forms the light distribution by projecting the light-emitting surface of each LED pixel onto the road. Pixel LED itself is a novel technology, consisting of more than 1,000 pixel points per chip, with tiny pitch.

Additionally, AFLS architecture integrates other inevitable building blocks. These include cameras and sensors enabling detection and identification of objects, ECUs for fast computing of information, and software for effective image processing and automation of functions. Based on image processing functions and intelligent settings in the projection module, critical areas of oncoming traffic that might face glare are removed from the high-beam's distribution, with the rest of the high-beam field remaining intact for the driver's convenience. With these new digital headlight technologies, light distribution must be reinvented. High resolution, combined with flexible software

and wide-ranging sensor integration, creates options that were once inconceivable.

"Despite the auto industry's overall slowdown, the lighting market looks bright over the next decade," comments Pierrick Boulay, Technology & Market Analyst at Yole. The period following the 2008/2009 global economic crisis was the auto industry's longest-ever growth phase. But after eight productive years, in 2018 we observed a modest decrease in vehicle sales. The drivers of this recent downturn are global trade uncertainty due to U.S. tariffs, and increasing trade restrictions that threaten to destabilise economies worldwide. OEMs and suppliers now must face industry disruption of a traditional model.

"New mobility and digital transformation are the key trends that will directly impact the automotive lighting industry," adds Pierrick Boulay.

LEDs are rapidly gaining popularity as their cost decreases and efficiency, luminance, and package size improves. Full LED headlamps are now being commercialised in emerging markets, and nearly all car makers and Tier-1 parts suppliers have developed full LED-based headlamp systems. Such technology is a must-have in the C and also the D (large vehicle) automotive segments, with implementation continuing in the lower B (small car segment). For example, the Renault Clio and Opel Corsa are equipped with full-LED lighting, either as standard on the base model, or as optional LED matrix headlights in the Corsa's case. Today's moderate market growth is mostly related to the strategies of light source suppliers – "LEDification" – implementing lower-cost solutions for emerging markets and to the automotive market slowdown.

Advanced LED matrix headlights, with more than 50 LEDs per vehicle, have been implemented in premium car segments. These attractive headlamps provide different lighting scenarios and are frequently selected by new-car buyers. As a result, styling and technological advances have also contributed to the market's growth.

Yole's automotive lighting report presents all AFLS applications and their associated market revenue for the period between 2019 and 2024. It details the integration status of different lighting technologies and systems, recent trends, and market size by application. ■



C&S ELECTRIC strengthening its footprint in lighting biz

We see C&S as a longstanding company within the market. Reliability and service are our promises to the market.

Dr. Rajeev Jindal, Vice President & Head-Lighting SBU, C&S Electric Ltd.

Q What's your comment on the current status of the lighting industry in India?

A Talking about the lighting business in India, the current market and the overall volume growth is temporarily slow. India is a however a highly 'under-lit' country so growth potential for lighting is huge. The changeover from traditional incandescent lights initially to the more energy-efficient compact fluorescent (CFL) led to a large growth in lighting and now the changeover to light-emitting diode (LED) lighting has again led to a major spurt in growth for the last 4 to 5 years. And that growth is still on because the changeover is continuing as people are taking the benefits in terms of savings in electricity bills.

Q When it comes to lighting business, how significant is your presence?

A C&S is a late entrant to the lighting market. Though we have been in the lighting business for the last 13-14 years, but it was just another vertical under the project business where we were offering lighting as a product under that business. We have made lighting a separate business only from June 2019 and today we see substantial growth in lighting business.

Q What are the advantages and disadvantages of being a late entrant?

A One of the advantages is that the people trust the brand 'C&S' for quality and we promise to continue the quality mindset in the lighting segment too. Since we are a late entrant, we are reaching a stage where we see a price

stabilisation. Natural erosion of prices in each market is a common phenomenon as volume grows, but still it's not as steep as it used to be.

At the same time, something that is against us, is that we have not been a retail facing brand thus selling a product through retailers was never our major focus earlier. We are trying to address this, and first step to that is to provide good service to our distributors. We have started working on this area and today distributors have started liking our services. The next challenge for us is to make ourselves more visible in the market and become a retail preferred brand, we are working hard towards it.

Further, since the penetration of LED technology, customers do not insist any particular brand and so specific brand loyalty is going away from the market. This is an opportunity for us to encash. However, we also see a lot of unknown players entering the market, which is a challenge. But I think in the long run, people will appreciate our brand value and we will remain a key player in the market. Of late, there are a lot of cases where companies have come and have gone away. We see C&S as a longstanding company within the market. Reliability and service are our promises to the market.

C&S Electric is India's leading switchgear equipment manufacturer and also has been serving the nation for more than five decades. The brand is a preferred choice among the customers and is known for reliable and quality products in lighting business. We are also committed to provide best products for indoor and outdoor lighting solutions. ■

“Light tower market value to hit \$4 bn by 2026”

Light tower market is expected to secure more than 7.6% CAGR from 2020 to 2026, says Global Market Insights, Inc.



Global light tower market revenue is set to cross US\$ 4 billion by 2026, as reported in the latest study by Global Market Insights, Inc. Rising investment in construction sector along with the increasing requirement to operate these sites regardless of weather and time will stimulate the product adoption. Moreover, efficiency, reliability and easy installation are some of the prime factors positively impacting the business landscape.

According to the study, low up-front cost, easy installation and minimal maintenance are some of the prime factors positively impacting the demand for diesel systems. Moreover, rising frequency of critical accidents specifically during night construction has encouraged the demand for reliable light towers. Accessibility to a wide range of tough and resistant mobile light towers with high quality specifications will complement the industry landscape. Different lamp technologies offer distinct benefits and considerations for contractors as per the suitability for their respective jobsites.

Some major findings of the light tower market report include:

- The industry demand for light tower is surging across infrastructure, mining, O&G, construction industries as a source of lighting.
- Increasing investments across construction activities is anticipated to drive the business growth.
- Major players operating across the light tower industry are Generac, Atlas Copco, Wacker Neuson and Doosan.
- Solar based and hybrid lighting towers are witnessing a significant increase in demand owing to strict government mandates pertaining to jobsite safety.

Electric units will grow owing to introduction of stringent government mandates to promote environment sustainability and address critical need to reduce emissions. In addition, refurbishment and modernisation of existing industrial buildings and structures on account of strict mandates is set to stimulate the product demand. Rising need for lighting in remote locations that involve construction activities, operations related to the O&G or mining industries, and emergency or rescue procedures is set to strengthen the industry landscape. Furthermore, Global Market Insights said, the introduction of minimum efficiency norms and global agreements to combat emissions will continue to positively impact the product adoption. ■

Coronavirus Fallout

MAJOR EVENTS CANCELLED OR POSTPONED

As the novel coronavirus continues to spread, major industrial exhibitions across the globe are being cancelled or postponed.

The coronavirus outbreak has become a 'pandemic'. So far, the disease has affected 158 countries and territories around the world. More than 6,526 people have died globally from COVID-19 while more than 170,442 infections have been confirmed. In India, the total number of confirmed COVID 2019 cases is 110 including foreign nationals as on 15th March.

As global coronavirus case numbers continue to rise, governments around the world stepped up restrictions on daily life, and the movement of people in a bid to curb its spread. Accordingly, a number of conferences, trade shows and events around the world have been cancelled or postponed as attendees and organisers voice concerns about the highly infectious-disease. Here we discuss on the status of some of the important events that are particularly related to lighting industry:

LIGHT + BUILDING POSTPONED



In view of the increasing spread of the coronavirus across the globe, Messe Frankfurt has decided to postpone Light + Building. The world's leading trade fair for lighting and building-services technology will now be held at the Frankfurt exhibition centre from 27 September to 2 October.

The organisers said: "Light + Building is the sector's most important meeting place for architects, the industry, the installation and retail/wholesale trades, and planners. As an innovation forum and interdisciplinary market place, it not only facilitates business and making contacts but also helps ensure a sustainable future. The industry has left no doubt that it absolutely needs this platform for doing business. Accordingly, Messe Frankfurt wants to ensure that the opportunities created by Light + Building remain available to all market participants in the current season. Therefore, Light + Building 2020 is being postponed."



Prolight + Sound 2020 cancelled

The Prolight + Sound exhibition is an important international meeting place for technologies and services relating to entertainment, shows and events, audio-visual systems integration and content creation. The event, which had been postponed from 31 Mar - 3 Apr to run on 26 - 29 May, has now been cancelled altogether due to the coronavirus outbreak.

A statement on the official website says: "At the present time, it cannot be assumed that the current situation will have changed by the time the postponed event was to have been held. Therefore, Messe Frankfurt has decided to cancel the event."

Prolight + Sound 2021 will be held from 13 to 16 April 2021.

HANNOVER MESSE 2020 postponed

For the first time in its 70-year history, the Hannover Messe is being postponed due to the ongoing spread of the coronavirus outbreak. Hannover Messe 2020, the world's most important industrial trade fair, originally scheduled for April 20-24, has been postponed to 13 to 17 July.

"Since the health of exhibitors, visitors, employees, and the public is the top priority for Deutsche Messe, the decision was made in consultation with HANNOVER MESSE's exhibitor advisory councils to switch to the July date," an official statement said.

"With the July date, we offer our exhibitors the earliest possible time slot to present their innovations to a global audience and to initiate business," says Dr. Jochen Köckler, Chairman of the Board of Management of Deutsche Messe AG. "In view of the global economic challenges triggered by the Coronavirus in the first half of the year, the new date offers great opportunities. Thus, the world's most important industrial trade fair can provide important impetus for the global economy at an early stage."



Luminale cancelled

Luminale, established by Messe Frankfurt as an accompanying event to Light + Building, the biennial is now one of the largest cultural events in the City of Frankfurt and the Rhine-Main region with around 250,000 visitors and 150 projects. The 2020 edition of Luminale was supposed to be held from 12 to 15 March.

On 12th March, Messe Frankfurt announced cancellation of this event at short notice. The organisers said: "Due to the current requirements of the health authorities to prohibit major events with more than 1,000 participants, Messe Frankfurt, as organiser of Luminale, decided to cancel the Light Festival at short notice. The volatile situation and the dynamic spread of SARS-CoV-2, combined with the recommendation of the Robert Koch Institute to also take a critical view of events with well below 1,000 participants, led to this new assessment."



Conclusion

According to Oxford Economics, globally, business conferences and events generate more than a trillion dollars in direct spending annually. So, the cancellation or even postponement of major trade events can be one the biggest threats to the global events industry. ■

OFFICE LIGHTING

Office lighting is no longer restricted to conventional patterns and have transitioned into state-of-the-art smart lighting.

As workplaces have begun placing greater emphasis on creating healthier and happier spaces for their employees, a number of trends have emerged. From improving the seating arrangements and providing relevant amenities to bettering the way the office is designed, employers are ready to take more steps to promote a healthier environment.

As both employers and employees are placing greater focus on the concept of wellness, they wish to encounter measures that do away with the traditional, rigid office designs of old, and usher in new ideas. These ideas are aimed at improving the quality of life one would have in the workplace as people generally spend close to one-third of their day here. Some of the ways offices are changing include incorporation of biophilic elements and provision of ergonomic seating arrangements, to encourage better ideas and more productive decision making.







Office Lighting Design

One of the elements that often goes underappreciated, is office lighting design. This plays a large role in building or destroying the psyche of employees, as can be seen from multiple research studies carried out over the years. This includes the Hawthorne experiment, conducted in the period of 1920-1930s America, to test how lighting affects the productivity of employees. Though the years have changed, and people have evolved, their dependence on light still remains strong. Lighting design is known to create a definite kind of form in space by illumination. It adds geometry to an area and is classified as ambient lighting, accent lighting or valence lighting.

Why is lighting important

Light has a great effect on humans. It helps them set their body clocks. Additionally, since people receive approximately 85 per cent of their information through their sense of sight, office lighting is even more important. The quality of lighting also plays a direct role in affecting the employee's productivity. As the scope of visibility increases, the employee's productivity levels can increase by 10-15 per cent. For instance, in the case of flat illumination the overall uniformity of the desktop should be at least 60 per cent.





This can help reduce errors in work by 30-40 per cent, along with decreasing the eye-strain, headaches, nausea and neck pain that accompany weak visibility. Further, to reduce straining, the unified glare rating shall be less than 22 per cent and for critical areas it should be maintained at a level lesser than 19 per cent.

As the concept of 'Wellness in the Workplace' is also geared towards improving employee mental health, one needs to understand the impact lighting has in this situation. Along with headaches, and other aforementioned issues, bad lighting can also lead to heightened stress, fatigue and anxiety in employees. This is further exacerbated in the absence of natural light, as studies have revealed that the lack of natural sunlight has an adverse effect on the body and the mind, and can result in conditions such as seasonal affective disorder (SAD). Human centric lighting brings about a dynamic change in indoor environment and drives productivity as well as motivates employees.

The path to improvement

Most welfare associations across the world state that every office should contain suitable and sufficient

light. While this statement may be vague, it does hold true. Office designers need to focus on structuring the lighting design to support the tasks carried out in their workplace. If it is a manufacturing heavy workplace, industrial lighting must be increased for more ease in assembling and handling of small fixtures. For other offices, the designer must set the lighting according to the purpose of the space. The main work floor is where employees spend the most time. Thus, it is important not just to affix bright, white lighting, but also, include avenues for inclusion of natural light. Smaller, movable lamps can also be provided to those in need of extra light.

Additionally, for other areas of the office, the designer should incorporate different types of lighting. For play or recreation areas as well as cafeterias, ambient lighting can be used, as a sort of balm for the eyes. This also acts as a differentiator within the zones, changing the perception of the employees as they move away from their work area and head towards relaxation.

It is safe to conclude and say that office lighting is no longer restricted to conventional patterns and have transitioned into state-of-the-art smart lighting. It's no longer confined to a mere desk space, rather it makes way for a space which can accommodate both formal and informal meetings and at the same time is rejuvenating. This can be achieved by meticulously adopting a lighting scheme, that factors important parameters like colour temperature for an area, the requirement of minimum colour rendition index or possibilities available to create human centric lighting. ■





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Sammeer Pakvasa,
MD, Eleganz Interiors

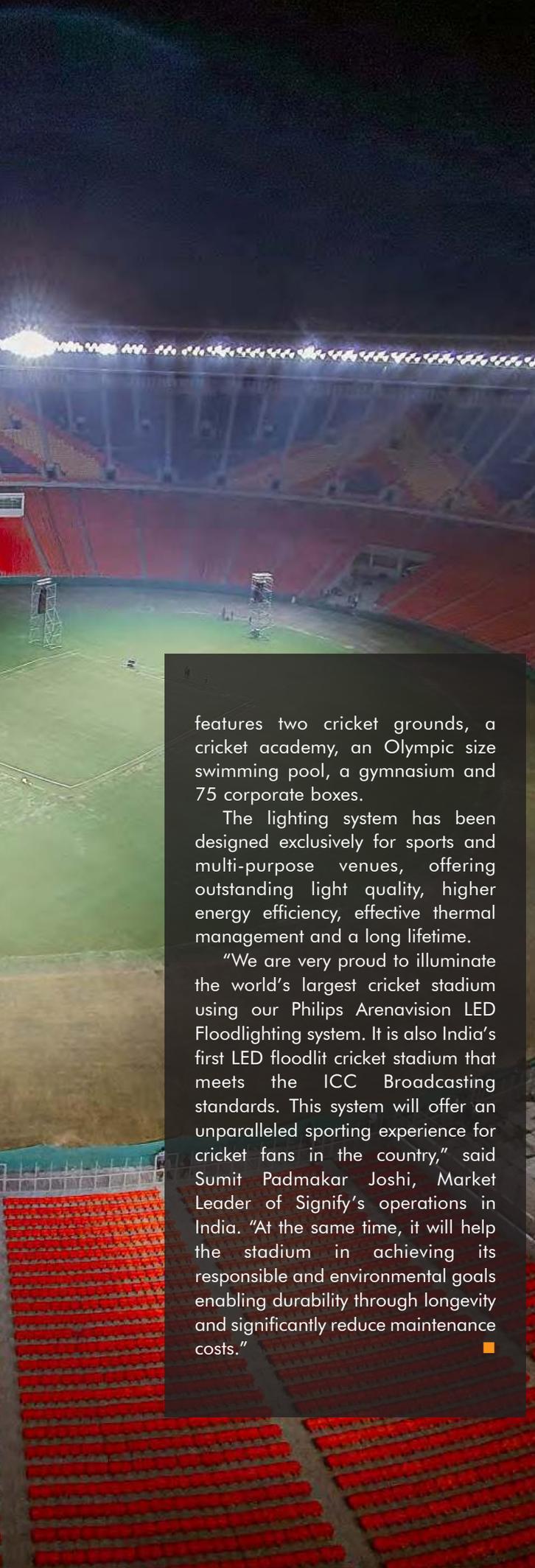
A PITCH PERFECT VIEW AT MOTERA

Signify illuminates the world's
largest cricket stadium in
Ahmedabad, Gujarat

Lighting company Signify is providing cricket fans in India with a perfect view on the nation's favourite sport as it illuminates the Sardar Patel Stadium, commonly known as Motera stadium, located in Ahmedabad.

Further, the world's largest cricket stadium was the venue for the public gathering addressed by the US President Donald Trump and Indian Prime Minister Narendra Modi during the former's recent visit to India.

Signify has equipped the Motera Stadium, which can host 110,000 spectators and is one of India's premier cricket stadiums, with 580 luminaries of Philips ArenaVision LED Floodlighting system for day-and-night games. This installation complies with the ICC (International Cricket Council) Broadcasting standards for sports illumination. The stadium, owned by Gujarat Cricket Association, is a regular venue for Test cricket and One Day Internationals (ODI) matches. It



features two cricket grounds, a cricket academy, an Olympic size swimming pool, a gymnasium and 75 corporate boxes.

The lighting system has been designed exclusively for sports and multi-purpose venues, offering outstanding light quality, higher energy efficiency, effective thermal management and a long lifetime.

"We are very proud to illuminate the world's largest cricket stadium using our Philips Arenavision LED Floodlighting system. It is also India's first LED floodlit cricket stadium that meets the ICC Broadcasting standards. This system will offer an unparalleled sporting experience for cricket fans in the country," said Sumit Padmakar Joshi, Market Leader of Signify's operations in India. "At the same time, it will help the stadium in achieving its responsible and environmental goals enabling durability through longevity and significantly reduce maintenance costs." ■

Researcher Annabelle Singer models an experimental visor and earphones that play 40 Hertz light and sound. The current study was performed on mice. The pictured device is in human testing as a possible Alzheimer's treatment. Results from those tests are to be published in later studies separate from the current study in mice. Credit: Georgia Tech / Allison Carter

FLICKERING LIGHT MOBILIZES BRAIN CHEMISTRY THAT MAY FIGHT ALZHEIMER'S

For over a century, Alzheimer's disease has confounded all attempts to treat it. But in recent years, perplexing experiments using flickering light have shown promise.

Researchers have tapped into how the flicker may work. They discovered in the lab that the exposure to light pulsing at 40 hertz – 40 beats per second – causes brains to release a surge of signalling chemicals that may help fight the disease.

Though conducted on healthy mice, this new study is directly connected to human trials, in which Alzheimer's patients are exposed to 40 Hz light and sound. Insights gained in mice at the Georgia Institute of Technology are informing the human trials in collaboration with Emory University.

"I'll be running samples from mice in the lab, and around the same time, a colleague will be doing a strikingly similar analysis on patient fluid

samples,” said Kristie Garza, the study’s first author. Garza is a graduate research assistant in the lab of Annabelle Singer at Georgia Tech and also a member of Emory’s neuroscience program.

One of the surging signalling molecules in the new study on mice is strongly associated with the activation of brain immune cells called microglia, which purge an Alzheimer’s hallmark – amyloid beta plaque, junk protein that accumulates between brain cells.

Immune signalling

In 2016, researchers discovered that light flickering at 40 Hz mobilised microglia in mice afflicted with Alzheimer’s to clean up that junk. The new study looked for brain chemistry that connects the flicker with microglial and other immune activation in mice and exposed a surge of 20 cytokines – small proteins secreted externally by cells and which signal to other cells. Accompanying the cytokine release, internal cell chemistry – the activation of proteins by phosphate groups – left behind a strong calling card.

“The phosphoproteins showed up first. It looked as though they were leading, and our hypothesis is that they triggered the release of the cytokines,” said Singer, who co-led the new study and is an assistant professor in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory.

“Beyond cytokines that may be signalling to microglia, a number of factors that we identified have the potential to support neural health,” said Levi Wood, who co-led the study with Singer and is an assistant professor in Georgia Tech’s George W. Woodruff School of Mechanical Engineering.

Singer was co-first author on the original 2016 study at the Massachusetts Institute of Technology, in which the therapeutic effects of 40 Hz were first discovered in mice.

Sci-fi surrealness

Alzheimer’s strikes, with few exceptions, late in life. It destroys up to 30 per cent of a brain’s mass, carving out ravines and depositing piles of amyloid plaque, which builds up outside of neurons. Inside neurons, phosphorylated tau protein forms similar junk known as neurofibrillary tangles suspected of destroying mental functions and neurons.

After many decades of failed Alzheimer’s drug trials costing billions, flickering light as a potentially successful Alzheimer’s therapy seems surreal even to the researchers.

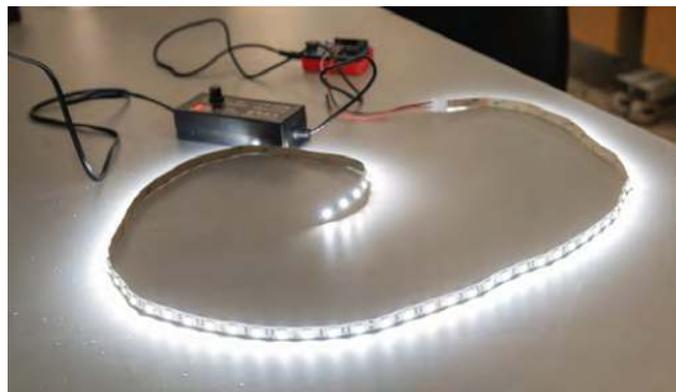
“Sometimes it does feel like science fiction,” Singer said.

The 40 Hz frequency stems from the observation that brains of Alzheimer’s patients suffer early on from a lack of what is called gamma, moments of gentle, constant brain waves acting like a dance beat for neuron activity. Its most common frequency is right around 40 Hz, and exposing mice to light flickering at that frequency restored gamma and also appears to have prevented heavy Alzheimer’s brain damage.

Adding to the surrealness, gamma has also been associated with esoteric mind expansion practices, in which practitioners perform light and sound meditation. Then, in 2016, research connected gamma to working memory, a function key to train of thought.

Cytokine bonanza

In the current study, the surging cytokines hinted at a



A flickering light strip used to expose mice to 40 Hertz light stimuli in Annabelle Singer’s lab. The exposure triggered very strong releases of signalling chemicals in the brain. Credit: Georgia Tech / Allison Carter

connection with microglial activity, and in particular, the cytokine Macrophage Colony-Stimulating Factor (M-CSF).

“M-CSF was the thing that yelled, ‘Microglia activation!’” Singer said.

The researchers will look for a causal connection to microglia activation in an upcoming study, but the overall surge of cytokines was a good sign in general, they said.

“The vast majority of cytokines went up, some anti-inflammatory and some inflammatory, and it was a transient response,” Wood said. “Often, a transient inflammatory response can promote pathogen clearance; it can promote repair.”

“Generally, you think of an inflammatory response as being bad if it’s chronic, and this was rapid and then dropped off, so we think that was probably beneficial,” Singer added.

Chemical timing

The 40 Hz stimulation did not need long to trigger the cytokine surge.

“We found an increase in cytokines after an hour of stimulation,” Garza said. “We saw phosphoprotein signals after about 15 minutes of flickering.”

Perhaps about 15 minutes was enough to start processes inside of cells and about 45 more minutes were needed for the cells to secrete cytokines. It is too early to know.

20 Hz bombshell

As controls, the researchers applied three additional light stimuli, and to their astonishment, all three had some effect on cytokines. But stimulating with 20 Hz stole the show.

“At 20 Hz, cytokine levels were way down. That could be useful, too. There may be circumstances where you want to suppress cytokines,” Singer said. “We’re thinking different kinds of stimulation could potentially become a platform of tools in a variety of contexts like Parkinson’s or schizophrenia. Many neurological disorders are associated with immune response.”

The research team warns against people improvising light therapies on their own, since more data is needed to thoroughly establish effects on humans, and getting frequencies wrong could possibly even do damage. ■

Source: Georgia Institute of Technology. Written by Ben Brumfield.

SPEIRS + MAJOR LIGHT ABERDEEN ART GALLERY

The design delivers the perception of positive naturally lit spaces consistently throughout the year...

Aberdeen Art Gallery has recently reopened after a four-year refurbishment lead by Hoskins Architects. Lighting design studio Speirs + Major were invited to redesign the lighting throughout, in a scope that included existing and new galleries, event spaces and cafes, the Remembrance Hall, and the external night-time image, as well as a refurbishment of the Cowdray Hall. The design delivers the perception of positive naturally lit spaces consistently throughout the year, a high priority for the gallery given the restricted number of daylight hours during winter months.

In the historic Remembrance Hall, a new custom pendant has been suspended beneath the skylight. A simple circular design with glowing sides, it spans an impressive 5.5 metres in diameter, casting light up into the dome, down to the gallery floor and sideways to fill the space with light. It also incorporates audio-visual projectors for gallery and event use. The pendant raises and lowers on a hidden winch system to allow for various uses of the Hall and to provide the flexibility to create different lit

A 5.5 metre diameter custom-designed pendant fills the Remembrance Hall with light. © Gillian Hayes





The Remembrance Hall pendant may be raised and lowered to create different atmospheres for different uses of the space. © Gillian Hayes

atmospheres. At the perimeter, the detail of the stepped columns is highlighted, emphasising the unique geometry of this space.

The new design by Hoskins moved the existing staircases out of the entrance hall to improve visitor access and flow. Centralising vertical circulation within the atrium known as the "Sculpture Court" also allowed for higher levels of natural light from the renovated skylight above. Looking up, the beams that cross the void have been lit on one side, highlighting them as an architectural feature, while also providing enough reflected light for circulation.

A historic sculptural frieze wraps around beneath the original ceiling, its detail and texture enhanced by soft uplighting, while a bronze linear detail to either side of the new staircase creates a strong visual marker that guides the visitor journey. Uplighting to the vaulted arches completes the visual composition of the atrium, contributing a solid edge to the historic space.

Throughout all the galleries and event spaces, Speirs + Major have carefully integrated the artificial lighting to enhance the architecture, while also prioritising visitor enjoyment of the art.

A new second floor and roof extension provides temporary exhibition space as well as education and community event facilities and a café. The inclusion of this floor blocked natural light from existing roof lights in the first-floor galleries. To preserve the character of these spaces, custom colour temperature adjustable lay lights behind the glazed panels help to recreate the feeling of natural light. The curvature of the ceiling is revealed by a slender detail, concealed on top of the historic coving. A minimalist light track runs around the edge of the roof light, providing the flexibility to add and move spotlighting as the curation of the gallery dictates. The new second-floor galleries echo the Sculpture Court skylights.

As a prominent Grade I listed building, a sensitive approach to the external lighting was required. Simple and refined, light emphasises the historical details on the façade and marks the original gallery entrance portico. Pin light details pick up on the rhythm of the cladding on the new roof extension, while warm custom-designed pendants for the new café are visible through the windows. Constructed in copper-coated aluminium and expanded metal, these pendants recall the design language of the new rooftop extension, helping to tie the composition together as a whole. The adjacent much-loved War Memorial and entrance to Cowdroy Hall was also part of the lighting scheme, with highlights to the colonnade, stone plaques and sculptural lion reinforcing the presence of the Memorial by night.



New structural beams that are visible from the ground floor Sculpture Court are highlighted as a feature.
© Gillian Hayes

A minimal track detail provides flexible lighting to enhance visitor enjoyment of the artwork. © Gillian Hayes



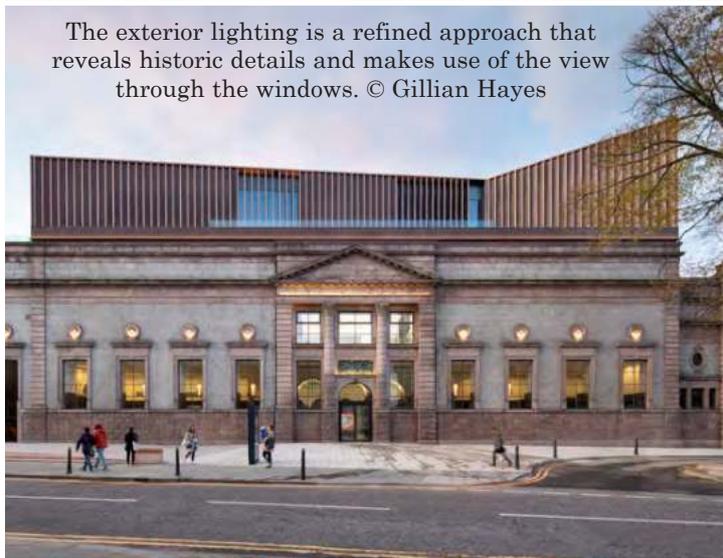
Luminaire Manufacturers:

Custom Café Lantern
Custom Hall Pendant
Other luminaires

- : Stoane Lighting
- : Spectral Lighting
- : Orluna, LED Technologies, ACDC Lighting, KKDC, Willy Meyer + Sohn, WE-EF Lighting, iGuzzini Illuminazione, Zumtobel, Lumenpulse, Aktiva, Erco, Lucifer, Santa & Cole

Custom colour temperature tuneable lay lights help to mitigate the loss of natural daylight and preserve the character of the galleries. © Speirs + Major.

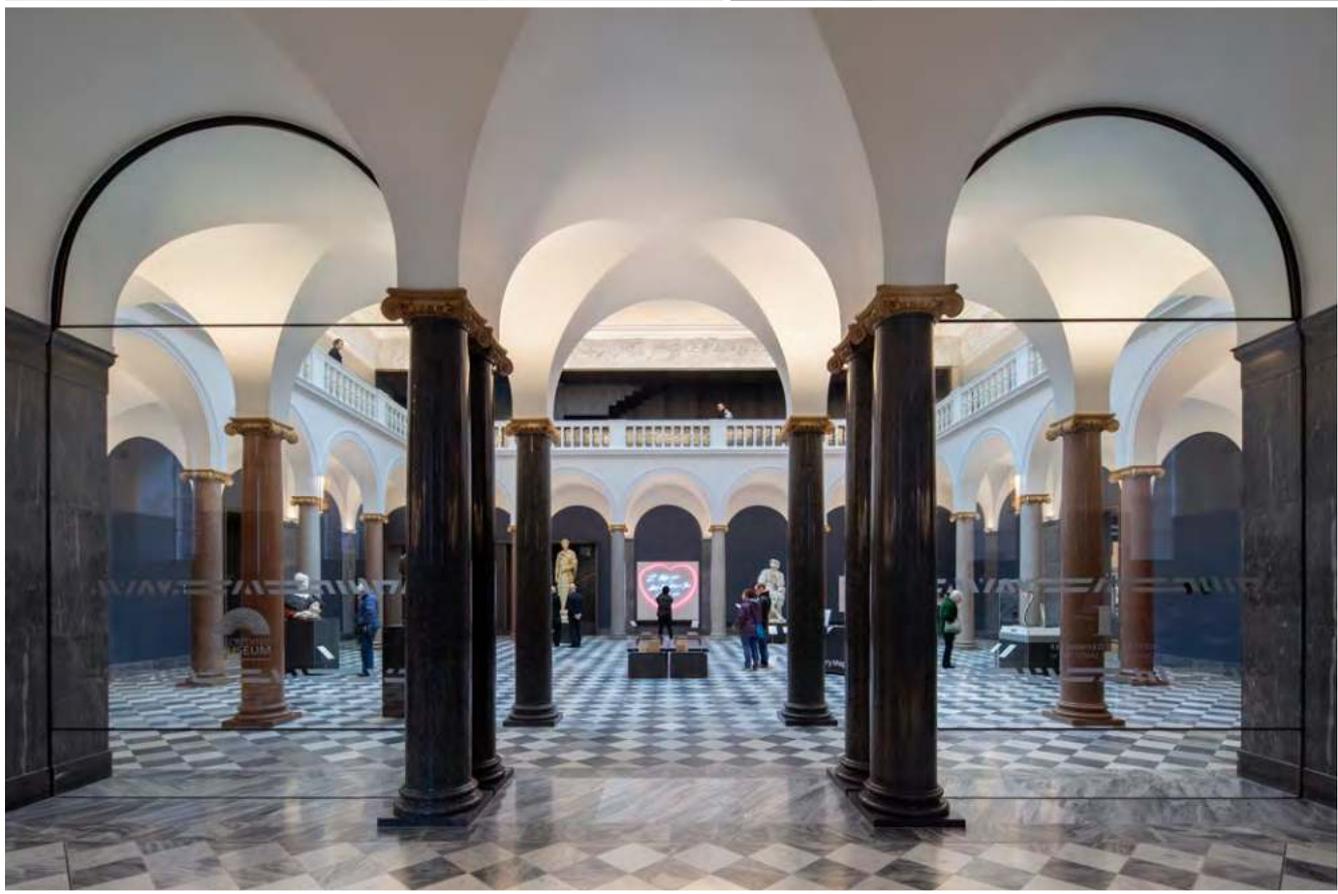
The exterior lighting is a refined approach that reveals historic details and makes use of the view through the windows. © Gillian Hayes



Project Credits

Client : Aberdeen City Council
Completion : October 2019
Area : 6000sqm

Architect : Hoskins Architects
Lighting Designer : Speirs + Major
Engineer : Buro Happold
Main Contractor : McLaughlin & Harvey Ltd
Electrical Contractor : Dowds Group



At the perimeter of the Sculpture Court, concealed uplighting reveals the form of the vaulted arches. © Gillian Hayes



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Let there be 'circadian' light

New study describes science behind best lights to affect sleep, mood and learning.

Researchers at the University of Washington School decoded what makes good indoor lighting – lighting that is capable of stimulating the cone photoreceptor inputs to specific neurons in the eye that regulate circadian rhythms.

The researchers said that the wavelengths at sunrise and sunset have the biggest impact to brain centers that regulate our circadian clock and our mood and alertness.

Their study identifies a cell in the retina, which plays an important role in signalling our brain centers that regulate circadian rhythms, boost alertness, help memory and cognitive function, and elevate mood.

These effects have been attributed to a pigment in the eye called melanopsin, which is sensitive to blue light, but researchers say cone photoreceptors are a thousand times more sensitive to light than melanopsin. The cone photoreceptor inputs to the circadian circuitry respond to short wavelength blue light, but they also respond strongly to long wavelength oranges and yellows and contrasting light – the colours at sunrise and sunset. What makes good lighting, researchers discovered, is lighting capable of stimulating the cone photoreceptor inputs to specific neurons in the eye that regulate circadian rhythms.

Lead author Sara Patterson, a graduate student in neuroscience at the UW School of Medicine, said how we set our internal clocks to the external light-dark cycle has been studied a lot. But how the changes in the colour of light affect our brain has not.

"Colour vision used for something other than colour perception was the most exciting part for me," she said.

In the study, Patterson and colleagues identified a cell known as an inhibitory interneuron or amacrine cell in the retina, which signals to photosensitive ganglion cells that affect our circadian brain centers. The researchers said these amacrine cells provide "the missing component of an evolutionary ancient colour vision circuit capable of setting the circadian clock by encoding the spectral content of light."



Patterson said so little is known about rare retinal circuitry that it was possible to find a new blue cone cell. She said there is a lot more to be discovered about how blue cone cells are projecting to other areas of the brain.

While sunrise lights, blue lights and seasonal affective disorder (SAD) lights



have all tried to capture benefits of natural light, they haven't been that effective because they are missing key science data, said corresponding author Jay Neitz, professor of ophthalmology at the UW School of Medicine, a scientist at the UW Medicine Eye Institute, and a well-known colour vision researcher. He said the science behind SAD lights, for example, is to make lights hundreds of times brighter than normal lights to stimulate melatonin.

"This research all started because of our interest in the health benefits of having natural light that occurs at the right time of day that helps regulate our circadian clock and our mood and alertness," Neitz said.

The University of Washington has licensed technology based on this discovery to TUO, a lighting technology company that will be selling white LED lightbulbs that will incorporate undetectable sunrise and sunset wavelengths for commercial use. ■



**HYBRID UV
LIGHTING SYSTEM**
to reduce
healthcare-associated
infections

People who visit hospitals are expecting care and treatment, not additional complications, yet approximately 1 in 25 patients contract healthcare-associated infections (HAIs) in U.S. hospitals, according to the Centers for Disease Control and Prevention (CDC). Standard cleaning procedures usually involve manual application of detergents and disinfectants. Unfortunately, the efficacy of these manual cleaning procedures can vary considerably. In fact, less than 50 per cent of patient room surfaces are properly cleaned.

Given the rather poor effectiveness of manual cleaning, the Lighting Research Center (LRC) at Rensselaer Polytechnic Institute is investigating alternate, so-called, no-touch methods, including short-wavelength light, ranging from ultraviolet (UV) to blue light (200nm to 410nm). Short wavelengths can kill pathogens through a variety of pathways, depending upon the wavelength, the duration, and the amount. The expectation is that decontamination of room surfaces will improve when the human element is removed.

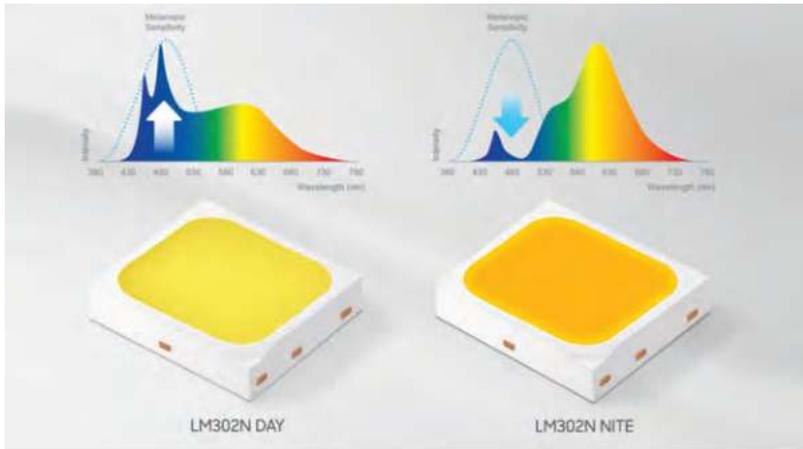
LRC researchers tested a new hybrid lighting system, developed by GE Current, a Daintree company, which was designed to provide both visible white light and disinfecting UV-A. The system was retrofitted into a modern hospital

newborn intensive care unit (NICU) at the Memorial Beacon Children's Hospital in South Bend, Indiana. The UV-A dosing was set to levels calculated to be safe for human occupation. Eight-hour exposures on counter surfaces were effective for suppressing pathogens identified by the CDC as highly problematic for healthcare facilities. LRC researchers also conducted a survey aimed at assessing the opinions of professional staff working in the NICU about the hybrid lighting system. Staff members accepted the hybrid lighting system, and the comments about the system were generally positive. An analysis of photodegrading effects suggested that UV-A resistant equipment and furnishing may need to be installed with this technology. The findings were recently published in *Lighting Research & Technology*.

"This lighting technology offers great promise in hospital applications," said Jennifer Brons, Director of Design Demonstrations at the LRC. "We are currently planning future demonstrations in another hospital unit with greater bioburden."

"Reducing healthcare-associated infections is critically important," said LRC professor Dr. Mark Rea. "Unfortunately, the prevalence of these infections is only expected to rise. The present findings should form the foundation for the next generation of this technology." ■

Samsung unveils its first family of 'human-centric' LED components to enhance indoor lifestyles



Samsung Electronics unveiled its first "human-centric" LED packages, collectively known as LM302N. Engineered with carefully created light spectra, the LM302N family helps human bodies adjust melatonin levels indoors, making people feel more energetic or relaxed depending on their daily life patterns.

"The benefits of using Samsung's LM302N reach beyond the basic lighting function of visual recognition, by improving the non-visual

biological effects of lighting on people," said Un Soo Kim, senior vice president of LED Business Team at Samsung Electronics. "Our LED solutions are ushering in a whole new human-oriented approach of using artificial lighting to enhance productivity and relaxation, benefitting modern-day indoor lifestyles."

Melatonin, a hormone which regulates the sleep-wake cycle, responds to the cyan wavelength range of light. Brighter cyan-concentrated lighting suppresses the body's production of melatonin, increasing concentration and enabling a greater overall sense of alertness. Similarly, a lower cyan light intensity minimises disturbances to the natural onset of the body's melatonin production, helping to promote sleep quality. LM302N DAY can suppress the body's melatonin level more than 18 per cent below that of conventional LED lighting, the company claims.

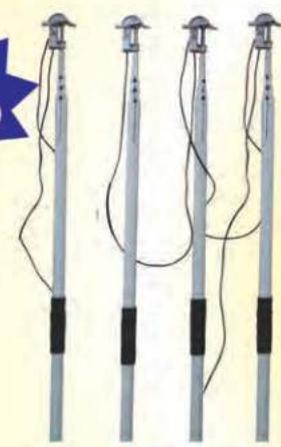
Samsung's LM302N utilises precisely designed light spectra with optimised amounts of cyan to accommodate lighting needs to the extent desired at any given point in time. ■



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“We improve the quality of life and energy efficiency at every workplace,” says Hendrik Nedeljkovic, Managing Director of ESYLUX Asia. ESYLUX is a German company with its own research, development and production near Hamburg. The focus is on intelligent automation and lighting solutions for offices, educational institutions and healthcare facilities, the pros of which will also benefit the Indian market in the future.

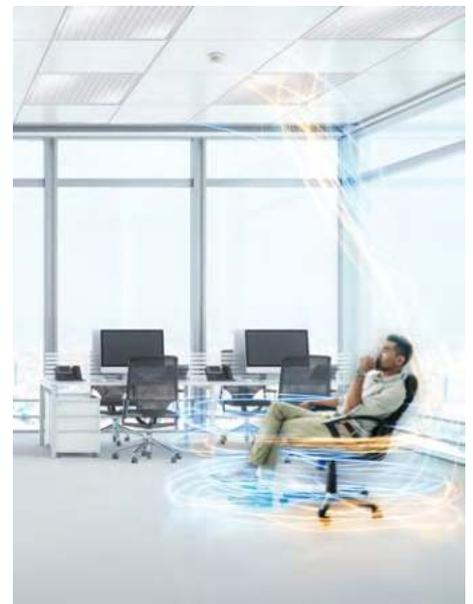
The focus in the automation sector is on presence and motion detectors. “They control the lighting and other systems such as ventilation as required,” explains Nedeljkovic. This reduces energy consumption and at the same time makes optimum use of the high life expectancy of LED luminaires. Since the end-user does not need to worry about anything, he also benefits from a high level of automation comfort. The spectrum ranges from conventional 230 V switch operation via 1-10 V to solutions for DALI-2 and KNX for integration into building management systems - for example from leading manufacturers such as Beckhoff or Siemens.

Lighting systems with integrated sensor technology

The second business area of ESYLUX is lighting using energy-efficient LED technology. Lighting systems with ESYLUX Light Control ELC are a prime example of an intelligent synergy of automation and lighting: They can be installed on a plug-and-play basis and produce Human Centric Lighting for greater vitality, well-being and health of end users at the workplace. Energy-efficient control is provided by SymbiLogic technology for energy-efficient Human Centric Lighting – in combination with ESYLUX sensor technology.

To promote the use of automation and lighting solutions in Indian buildings, the German company has entered into a partnership with iTvis Innovation from Mumbai. Nedeljkovic believes that this is exactly the right time. He said: “Innovative technologies are adapted very quickly in India. In addition, both industry and the government are supporting green buildings, sustainability and energy efficiency.”

The local partner is to manage the operational business such as customer service and daily sales support nationwide. Meanwhile, ESYLUX is committed to market and business development: through meetings and discussions with investors, planners and integrators, regular technical seminars and participation in the annual LED Expo in New Delhi. ■



Lighting systems with ESYLUX Light Control ELC can be installed via plug-and-play and produce energy-efficient human-centric lighting.

[Event Calendar]

Venue: Bombay Exhibition Center, Mumbai
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 Website: www.ledexpo-mumbai.com

**LED Expo
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 2020**

Venue: Bombay Exhibition Center, Mumbai
 Date: 28 - 30 May 2020
 Website: www.palmexpo.in

**PALM
 Expo 2020**

Venue: Guangzhou, China
 Date: 9 - 12 June 2020
 Website: www.guangzhou-international-lighting-exhibition.hk.messefrankfurt.com/guangzhou/en.html

**Guangzhou
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A drop of water lights up 100 small LED bulbs

A research team has recently developed a new form of droplet-based electricity generator (DEG) that can light up 100 small LED lights.

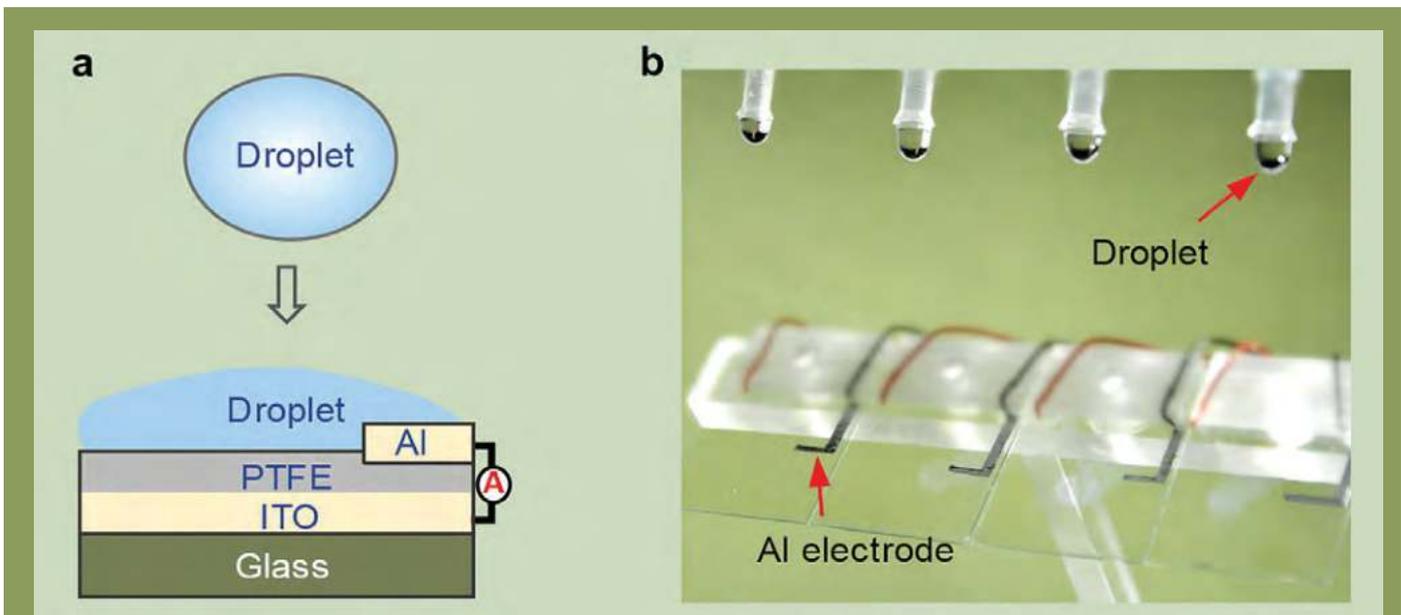


Fig a is the schematic diagram of DEG: an ITO glass slide is coated with a thin film of PTFE and an aluminium electrode is put on top of it. Drops of water act as the gate of the transistor and complete the circuit when they hit the surface of the glass.

Fig b is the optical image showing four parallel DEG devices fabricated on the glass substrate.

Researchers from City University of Hong Kong (CityU) have recently developed a new type of generator that uses rain to create electricity. It features a field-effect transistor (FET)-like structure that allows for high energy-conversion efficiency, and its instantaneous power density is increased by thousands of times compared to its counterparts without FET-like structure.

A conventional droplet energy generator based on the triboelectric effect can generate electricity induced by contact electrification and electrostatic induction when a droplet hits a surface. However, the amount of charge generated on the surface is limited by the interfacial effect, and as a result, the energy conversion efficiency is quite low.

In order to improve the conversion efficiency, the research team has spent two years developing the DEG. Its instantaneous power density can reach up to 50.1 W/m², thousands of times higher than similar devices without the use of the FET-like design. The energy conversion efficiency is also markedly higher.

"Our research shows that a drop of 100 microlitres (1 microlitre = one-millionth litre) of water released from a

height of 15 cm can generate a voltage of over 140V, and the power generated can light up 100 small LED lights," said Professor Wang, an author of the research paper.

Professor Wang said he hoped that the outcome of this research would help to harvest water energy to respond to the global problem of renewable energy shortage. He believed that in the long run, the new design could be applied and installed on different surfaces, where liquid is in contact with a solid, to fully utilise the low-frequency kinetic energy in water. This can range from the hull surface of a ferry to the surface of umbrellas or even inside water bottles.

He also pointed out that there are two crucial factors for the invention. First, the team found that the continuous droplets impinging on PTFE, an electret material with a quasi-permanent electric charge, provides a new route for the accumulation and storage of high-density surface charges. They found that when water droplets continuously hit the surface of PTFE, the surface charge generated will accumulate and gradually reach saturation. This new discovery has helped to overcome the bottleneck of the low-charge density encountered in previous work. ■



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