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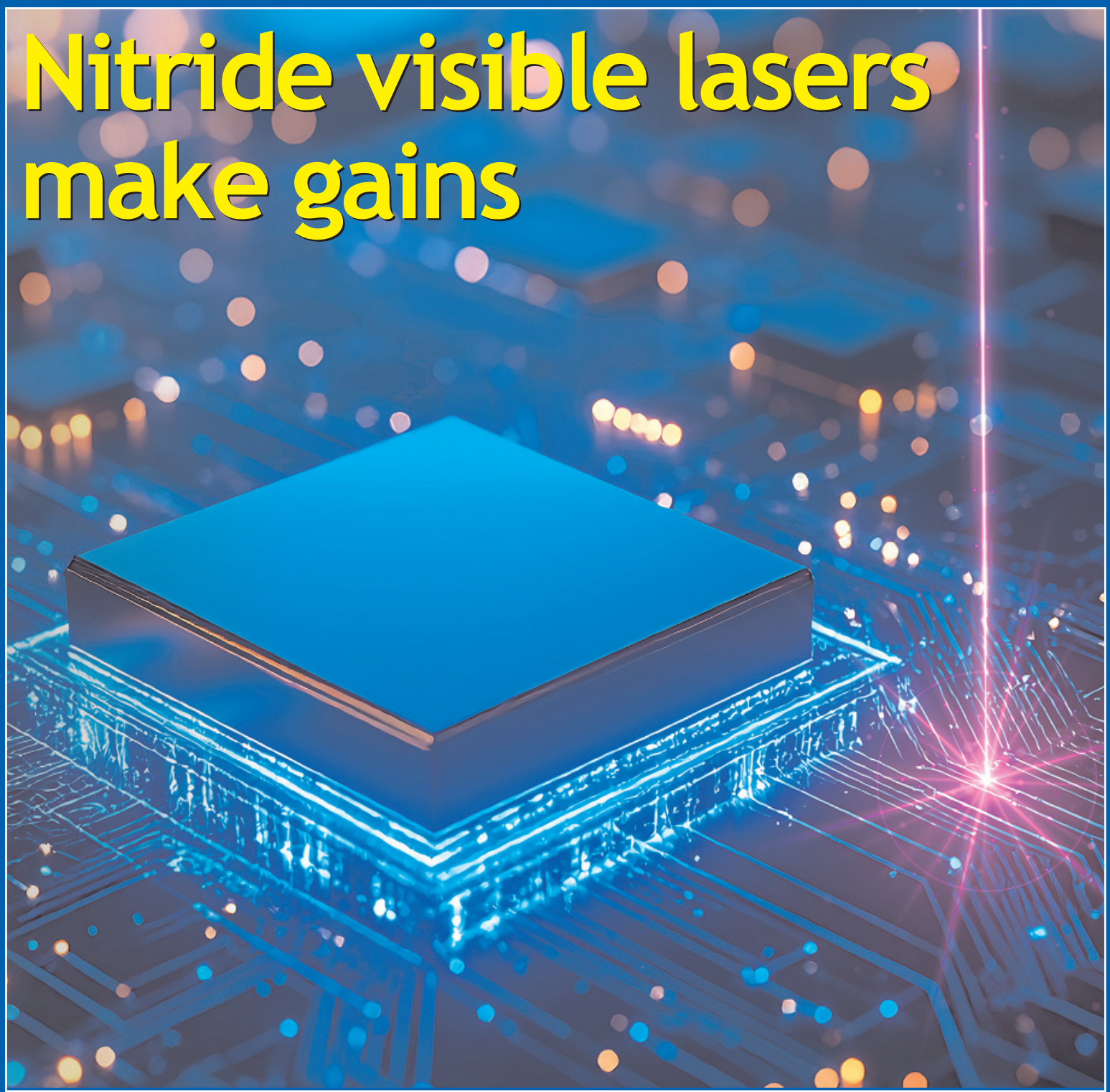

Nitride visible lasers make gains

US gallium recovery developments • Photon Bridge & PHIX partner
AXT raises $632.5m • AOI breaks ground on $300m expansion

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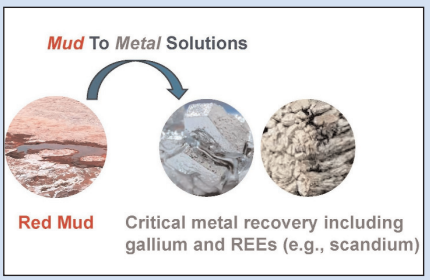
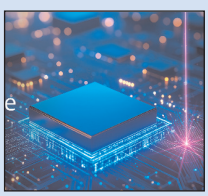


p29 US Critical Materials and Columbia University are to develop production of gallium, scandium, titanium and rare-earth elements from red mud, a major byproduct of aluminium refining.

p52 AOI has broken ground for its new manufacturing warehouse expansion.



Cover image: Nuvoton is mass producing the KLC434FL01WW high-power 402nm violet laser diode, which boosts optical output power by 1.5x to 4.5W in a 9.0mm-diameter TO-9 CAN package, which can help to improve production throughput in optical equipment such as maskless lithography systems. **p42**

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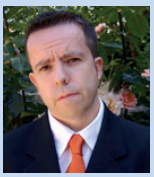

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***Semiconductor Today* covers the R&D and manufacturing of compound semiconductor and advanced silicon materials and devices** (e.g. GaAs, InP and SiGe wafers, chips and modules for microelectronic and optoelectronic devices such as RFICs, lasers and LEDs in wireless and optical communications, etc).

Regular issues contain:

- news (funding, personnel, facilities,
- technology, applications & markets);
- feature articles (technology, markets,
- regional profiles);
- conference reports;
- event calendar and event previews;
- suppliers' directory.

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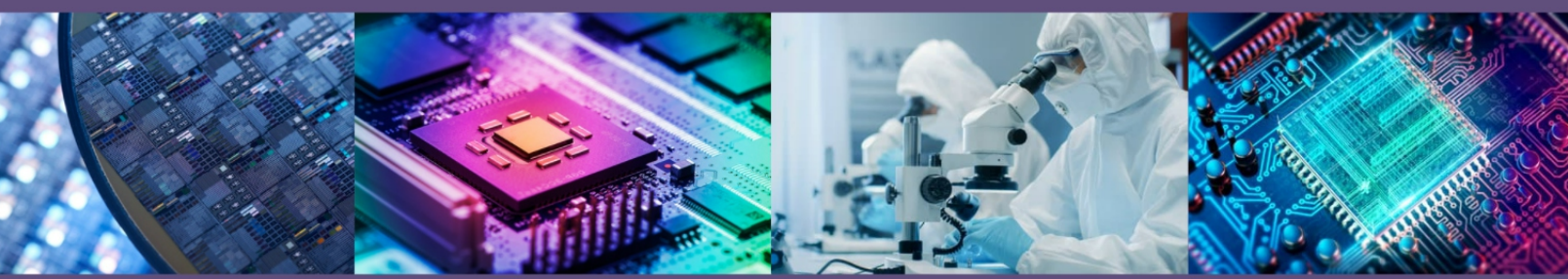

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AI optical transceiver market to reach US$26bn in 2026

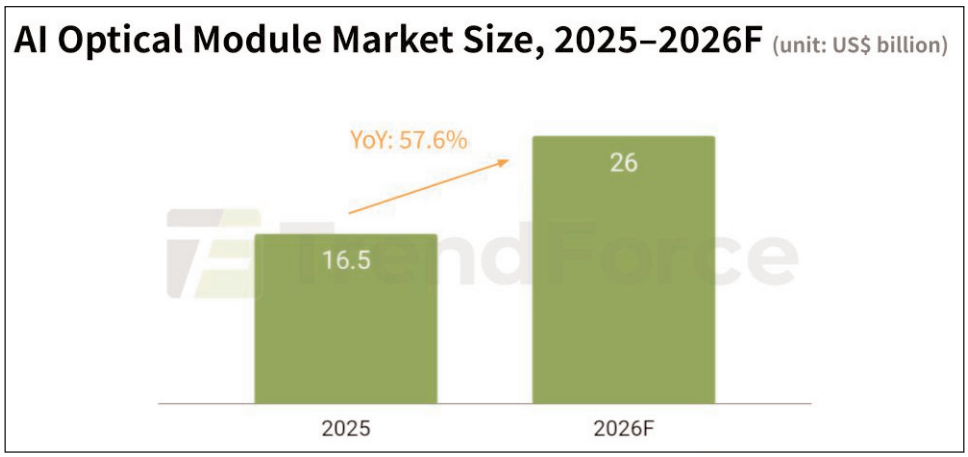
Component shortages to be main capacity expansion bottleneck

Market analyst firm TrendForce forecasts that the global AI-focused optical transceiver market will rise at more than 57% year-on-year from US$16.5bn in 2025 to $26bn in 2026, as it has entered a phase of rapid growth. This surge is driven not only by specification upgrades but also reflects a broader structural reshaping of the optical communications supply chain amid accelerating AI data-center deployment.

Demand is rising sharply for 800G-and-above optical transceivers used in AI server cluster interconnects as AI data centers continue to scale. Traffic at hyperscale data centers in North America has sustained over 30% annual growth, prompting cloud giants such as Google, Microsoft and Meta to expand GPU and AI server deployments. This has further boosted procurement of high-speed optical interconnects. Meanwhile, supply-side pressures are becoming increasingly evident.

TrendForce notes several key bottlenecks constraining capacity expansion. First, the supply of critical optoelectronic chips, such as electro-absorption modulated lasers (EMLs) and continuous-wave laser diodes (CW-LDSs), remains tight due to capacity allocation constraints.

Additionally, high-precision manufacturing processes, including optical alignment, limit scalable production. Power consumption and thermal management challenges also continue to affect system design and deployment timelines.



Upstream suppliers, led by NVIDIA and major system vendors, are mitigating supply risks by shifting procurement strategies and adopting strategic long-term agreements (LTAs) to secure key components and reduce reliance on spot-market purchasing. Meanwhile, technology roadmaps are accelerating toward low-power linear pluggable optics (LPO) and silicon photonics integration, aiming to replace traditional high-power DSP-based architectures and alleviate power and thermal constraints.

TrendForce further observes that growth in the AI optical transceiver market is shifting from single-product upgrades to three parallel drivers: market expansion, generational technology transitions, and application diversification. As the 1.6T generation gradually enters mass production, demand for edge computing and data-center interconnect (DCI) will also drive expansion of the 800G and 1.6T ZR/ZR+ coherent optical module markets.

In response to tightening component supply, leading international players like Coherent, Lumentum, and Applied Optoelectronics, along with Taiwanese firms such as Elite Advanced Laser Corp (ELASER) and LuxNet Corp, have initiated capacity expansions and technology deployments.

The upgrade cycle offers significant structural growth opportunities for Taiwan's optical communications supply chain. Taiwanese firms have established solid capabilities in foundry services, EML laser chips, passive optical components, and module packaging and testing, with ongoing advancements in silicon photonics and LPO technologies. The years 2026 to 2027 are crucial for establishing a foothold in the 1.6T supply chain, where success in design-in at tier-one customers will likely be a key factor in determining future market share, concludes TrendForce.

www.trendforce.com

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UK Semiconductor Centre launches London HQ to support rapid sector growth

New Institute of Physics base strengthens UKSC's role as gateway to UK semiconductor ecosystem

The UK Semiconductor Centre (UKSC) has launched a new HQ at the Institute of Physics (IOP) in King's Cross, London, marking a significant step in its mission to ensure that the UK capitalizes on rapid expansion in the global semiconductor industry.

Located in the heart of London's 'Knowledge Quarter', alongside Google's new £1bn Platform 37 offices, DeepMind, Meta, ARIA, and University College London, the new base places the UKSC at the center of a technology and research community, many of which have semiconductors as the foundation of their products and services.

The HQ is expected to enhance the UKSC's capacity to promote the UK's semiconductor ecosystem, connect and convene businesses, researchers, investors and international collaborators, and secure domestic and foreign direct investment for UK semiconductor companies.

The new HQ will regularly host events, workshops and industry roundtables, and act as a hub for international delegations, providing a showcase of the best technologies currently being produced in the UK.

The move forms a key part of the UKSC's strategy to help the sector capture new opportunities in a global market that is expected to double over the next decade, fuelled by demand for AI data centres and advanced computing.

Taking over a whole floor at the IOP's 37 Caledonian Road building will also strengthen links between the semiconductor and physics communities, allowing for the cross-fertilisation of ideas and initiatives and cementing the intrinsic link between physics fundamentals and semiconductor materials.

This development follows recent research from the UKSC's nationwide roadshow, which engaged more than 450 stakeholders across ten UK locations and highlighted that a lack of access to finance and infrastructure is restricting firms in their ability to scale.

IOP's CEO Tom Grinyer (left) and UKSC's chief operating officer Raj Gawera (right) outside the Institute of Physic's headquarters in Kings Cross.

"We're bringing the UK semiconductor community right into the heart of the Knowledge Quarter with our new King's Cross headquarters. It will provide us with the perfect platform to collaborate with leading research institutions, technology businesses and investors on a daily basis to help drive the sector forward and help UK companies scale," says the UKSC's chief operating officer Raj Gawera. "We chose the Institute of Physics because its mission aligns closely with ours and, together, we can push the sector forward and make a global impact," he adds.

"It is such a vital time for the semiconductor sector and the perfect time to have a thriving physics success story in the building," says the Institute of Physics' CEO Tom Grinyer. "Being able to play a part in their growth and development at such a crucial time is a wonderful opportunity," he adds. "Partnership is a fundamental principle of the IOP strategy and, in that spirit, we look forward to watching their story develop and collaborating where possible to promote technology, manufacturing and of course physics and the role they can all play in driving growth in the UK economy."

The UKSC was established to connect, convene and promote the UK's semiconductor industry on the global stage, ensuring that innovation translates into scaled commercial success and economic growth. It aligns support around critical technologies where the UK has genuine competitive advantage, including photonics, compound semiconductors, quantum technologies and next-generation computing architectures.

www.uksemicentre.org.uk
www.iop.org/strategy

Directors of investment & strategic marketing for UKSC

The UK Semiconductor Centre (UKSC) has hired Martin O'Sullivan as director of investment and Steve Taylor as director of strategic marketing, as part of its strategy to help capture new opportunities in a global market that is expected to double over the next decade, driven by demand for AI data centers and advanced computing.

O'Sullivan will help to accelerate the scale-up and growth of semiconductor firms operating in the UK. He will lead on investor relations, making it easier for founders to access public and private funds, as well as growing a network of investors who are confident in semiconductor business models and opportunities.

O'Sullivan has spent several years in technology equity research and capital markets, where he built experience analysing complex technology businesses and explaining their strategic and commercial significance to a wide range of investors and other stakeholders.

He has a PhD in semiconductor physics and began his career in semiconductor R&D, including roles at Toshiba and Philips Research Laboratories.

Taylor will lead on all marketing and communications activities, building a narrative of UK capability that combines its heritage, strengths and distinctive offer for international audiences.

He will also ensure that industry, investors and government grasp the UK's strengths lie, as well as promoting what the UK has to offer on the global stage.

Taylor has over 30 years' experience working across semiconductors, advanced hardware and global technology ecosystems, in senior roles at Arm, Linaro, Paragraf and the Autoware Foundation, supporting organizations to scale internationally and align industry, government and academic stakeholders. At Arm, he led global PR during its rise to being Intel's primary competitor.

"Financial scale-up continues to be a barrier for businesses operating the UK, and there is a clear role for the UKSC to improve ecosystem legibility for investors and strengthen the interface between companies and investment capital," says O'Sullivan. "I am thoroughly looking forward to help solve this challenge and ensure UK businesses have the best possible chance of scaling, growing and reaching their full potential," he adds.

"The UK has exceptional strengths across semiconductor design, photonics, advanced materials and emerging technologies," says Taylor. "The opportunity now is to bring these together into a clear and compelling narrative that resonates globally. There is a strong foundation to build on, but it can often appear fragmented from the outside. The role of the UKSC is to help connect that picture, making it easier for industry, investors and partners to understand where the UK's strengths lie and how they can engage."

UKSC appoints director of international partnerships

UKSC has hired Brian Robertson as director of international partnerships to lead on strengthening the UK's global position in semiconductors and deepening connections between the UK ecosystem and international partners.

He will work on building mutually beneficial relationships with international government agencies and businesses, focusing on attracting more foreign direct investment.

He will be tasked with identifying priority international opportunities, building long-term relationships, and helping the UK to navigate the global semiconductor landscape, including evolving supply chains, critical materials and geopolitical dynamics.

Robertson has over 25 years of international experience across telecoms, technology and semiconductor ecosystems, including at Arm, Broadcom, Texas Instruments and NXP. He has led global teams in AI, quantum, mobile and compute, and joins UKSC from the GSMA, where he was head of industry strategy. He has worked with operators, hyperscalers and silicon vendors to build strategic partnerships, shape industry initiatives and drive growth through complex, multi-party collaboration.

"The UK has a strong and increasingly respected semiconductor ecosystem, with a clear opportunity to scale, attract inward investment and strengthen its position in a highly competitive global landscape. International partnerships will play a critical role in unlocking that potential," says Robertson. "I look forward to working with colleagues and partners across industry, government and academia to build strategic relationships that drive collaboration, support innovation, and enable sustainable long-term growth."

The UKSC was established to connect, convene and promote the UK's semiconductor industry on the global stage, ensuring that innovation translates into scaled commercial success and economic growth. It aligns support around key technologies where the UK has genuine competitive advantage, including photonics, compound semiconductors, quantum technologies and next-generation computing architectures.

"We're delighted to welcome Brian to the UKSC at a pivotal moment for the global semiconductor industry, which is rapidly evolving and creating enormous opportunities for the UK," says UKSC's chief operating officer Raj Gawera. "Brian's wealth of experience across the global semiconductor ecosystem will ensure that the UK is primed to capitalize on these opportunities, driving long-term partnerships, investment and growth."

www.uksemicentre.org.uk

Quinas completes Innovate UK project advancing ULTRARAM for AI and neuromorphic computing

Project supports work toward ULTRARAM crossbar arrays and future chiplet-level integration

Quinas Technology Ltd of London, UK (which was spun off from Lancaster University in early 2023) has completed a project funded by Innovate UK (which provides funding and support for business innovation as part of UK Research and Innovation) that explored the application of its proprietary ULTRARAM technology to neuromorphic computing.

Delivered under the UK Research and Innovation (UKRI) 'Developing Semiconductor Hardware for Critical Technologies' scheme, the program represents a milestone in the development of ULTRARAM as a new class of memory for secure, energy-efficient and sustainable AI systems.

Based on compound semiconductors and quantum resonant tunnelling, ULTRARAM uniquely combines the speed and endurance of DRAM with the non-volatility of flash and ultra-low-energy operation in a single device. The completed project has advanced device optimization and the architectural foundations required for compute-in-memory (CIM) and neuromorphic applications.

Inspired by the structure of the human brain, neuromorphic applications relies on performing computation directly within memory to reduce data movement and energy consumption. ULTRARAM offers a pathway to enable this paradigm, addressing fundamental limitations of conventional memory technologies.

The project builds on Quinas' collaboration with Lancaster University and compound semiconductor epiwafer maker IQE plc of Cardiff, Wales, UK, and supports ongoing work toward ULTRARAM crossbar arrays and future chiplet-level integration.

"This project demonstrates the potential of ULTRARAM to address one of the most fundamental challenges in computing — the growing gap between memory and processing," says Quinas' co-founder & chief technology officer Dr Peter Hodgson. "By combining speed, non-volatility and ultra-low-energy operation, ULTRARAM opens up new possibilities for neuromorphic and in-memory computing systems," he adds.

"This grant is a huge endorsement of our ambition to reimagine memory from the device level up," says co-founder & CEO James Ashforth-Pook. "ULTRARAM is more than just a new memory — it's the foundation for a new era of secure, energy-efficient and sustainable AI. By unifying speed, non-volatility and ultra-low power, we're challenging legacy assumptions across logic, storage and inference," he adds. "This milestone marks a critical step in our roadmap to bring next-generation memory to market and opens the door to new collaborations with investors, customers and system integrators shaping the future of intelligent, sustainable compute."

The outcomes of this program underpin recent advances in ULTRARAM system-level modelling and neuromorphic architectures, supporting its continued development toward real-world AI hardware applications.

Quinas continues to expand its international research and commercial ecosystem, working with partners across device physics, modelling, and system integration to accelerate the deployment of ULTRARAM in next-generation computing systems.

The company has received global recognition for its innovation in semiconductor memory, including honours from the World Intellectual Property Organization (WIPO) in Geneva, the ICTGC Innovation Awards in Taiwan, and the Future of Memory and Storage Conference in Silicon Valley.

www.quinas.tech

Quinas links device physics to AI system performance using ULTRARAM

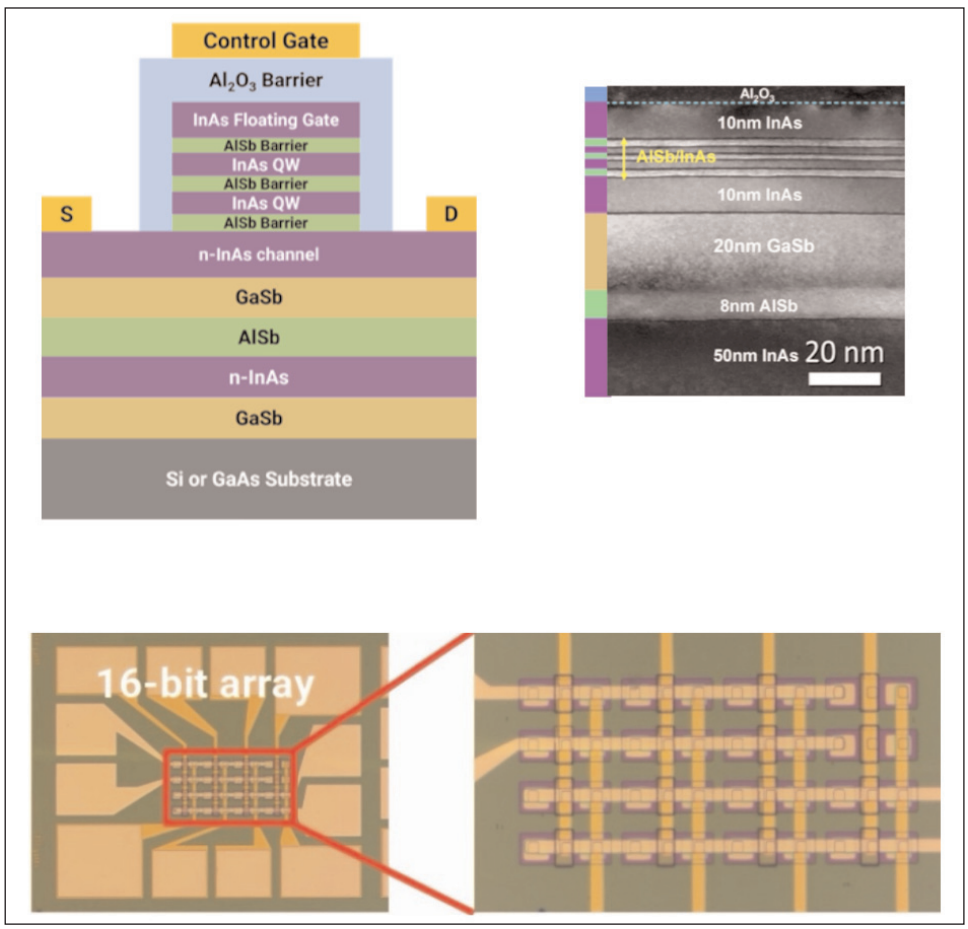
Work presented at International Symposium on Quality Electronic Design

ULTRARAM compound semiconductor memory technology developer QuInAs Technology Ltd of London, UK (which was spun off from Lancaster University in early 2023) has reported work that links device-level physics — including resonant tunnelling and floating-gate dynamics — directly to AI system performance through compact modelling and hardware-aware benchmarking, addressing a key limitation in how emerging memory technologies are typically evaluated. Published in Journal of Applied Physics, the paper 'Artificial synapse based on ULTRARAM memory device for neuromorphic applications' demonstrates how ULTRARAM can be modelled and evaluated as a synaptic memory element for next-generation AI hardware.

The company also presented this work at the International Symposium on Quality Electronic Design (ISQED 2026) in San Francisco, CA, USA (8–10 April). The presentation focused on system integration and design considerations, bringing ULTRARAM into the electronic design automation (EDA) and system design community.

Based on III–V compound semiconductor heterostructures, ULTRARAM leverages quantum resonant tunnelling to enable energy-efficient, ultra-low-energy switching and long data retention. It combines the non-volatility of a data storage memory, such as flash, with the speed and endurance of a working memory, such as DRAM, while providing significantly improved energy efficiency. Target applications include artificial intelligence, quantum computing, space and defence.

Developed in collaboration with IIT Roorkee and Lancaster University, the reported work introduces a physics-based compact modelling framework that links device-level behaviour — including resonant tunnelling and floating-gate charge dynamics — to circuit- and system-level performance. This enables, for the first time, hardware-aware evaluation of ULTRARAM in neuromorphic and in-memory computing architectures, using crossbar array simulations and DNN+NeuroSim benchmarking on tasks such as CIFAR-10 classification.



ULTRARAM 4x4 array for in-memory computing.

"Much of today's AI hardware research evaluates memory technologies under idealized assumptions," says QuInAs' CEO James Ashforth-Pook. "This work takes a different approach — connecting real device physics directly to system-level performance. That's essential if we are to build practical, energy-efficient AI systems."

The research shows that ULTRARAM can achieve competitive accuracy while offering advantages in energy efficiency and area compared to conventional SRAM-based approaches, highlighting its potential as a platform for future AI hardware.

"By integrating physics-based modelling with system-level benchmarking, we can better understand how emerging memory technologies behave in real AI workloads, rather than relying on idealized models," says the the paper's lead author Abhishek Kumar.

www.isqed.org
https://doi.org/10.1063/5.0314826
www.quinas.tech

Bosch sampling third-generation SiC chips to global automakers

Smaller size and 20% higher performance increase drive electronics efficiency

Germany-based Bosch Group has started to introduce third-generation silicon carbide (SiC) chips and is supplying samples to global automakers.

Bosch says it uses unique manufacturing expertise to make its chips both smaller and more powerful. The company adapted its etching process, which has existed since 1994 (widely known as the 'Bosch process'). Originally developed for sensors, this process enables the manufacture of high-precision vertical structures in silicon carbide. This design greatly increases the chips' power density – a decisive factor for the third generation's superior performance.

"Our next-generation chips deliver 20% higher performance and are also significantly smaller than the previous generation," says Markus Heyn, member of the Bosch board of management & chairman of the Bosch Mobility business sector. "This miniaturization is the key to greater cost efficiency, as we can produce many more chips per wafer. That means we're playing a key role in making high-performance electronics more widely available." Bosch has already delivered more than 60 million SiC chips worldwide since the first generation went into production in 2021.

Billions invested in global manufacturing network

In recent years, Bosch has pushed ahead with its development work for SiC chips and at the same time increased its manufacturing and cleanroom capacity. The firm has invested about €3bn in semiconductors as part of Europe's IPCEI (Important Projects of Common European Interest) funding programs for microelectronics and communication technology. Its wafer fab in Reutlingen, Germany, develops and manufactures the third-generation SiC chips on 200mm wafers.

At the beginning of 2025, Bosch acquired a second fab for SiC chip manufacturing in Roseville, California, and is currently equipping it for production. The firm is investing an additional €1.9bn in the US plant, which will manufacture and deliver its first SiC chips this year — initially as samples for customer trials.

"In the future, Bosch will supply its innovative SiC chips from these two fabs in Germany and the US," Heyn says. This will make for more robust and resilient supply chains in the rapidly growing electrification of the automotive industry," he adds. In the medium term, Bosch intends to expand its manufacturing capacity for SiC power semiconductors to a unit volume running into the mid-nine figure range.

www.bosch.com

Wolfspeed appoints regional president for Asia Pacific

Yasuhisa Harita to lead commercial strategy across Japan, Korea and ASEAN

Wolfspeed Inc of Durham, NC, USA — which makes silicon carbide (SiC) materials and power semiconductor devices — has appointed Yasuhisa Harita as regional president for Asia Pacific, effective 1 June. He will be based in Tokyo and lead Wolfspeed's commercial strategy across Japan, Korea and the ASEAN (Association of Southeast Asian Nations) region, with responsibility for driving revenue growth, enhancing strategic customer relationships, and executing the company's regional commercial and operational objectives.

Harita has more than 30 years of experience expanding Japan-based businesses for global semiconductor and technology companies, including Infineon and Micron. Most recently, he served as regional VP at ams-OSRAM, where he accelerated revenue growth, strengthened customer partnerships and positioned the organization for sustained performance in competitive markets. He earned his bachelor's degree in engineering from the University of Tokyo.

As regional president, he will assume full commercial responsibility, developing and implementing go-to-market strategies aligned with Wolfspeed's global objectives and customer expectations.

Wolfspeed says that Harita's appointment reflects its ongoing commitment to providing reliable, high-performance solutions for customers across automotive, industrial and energy sectors.

"His regional expertise, strong customer focus and proven track record of commercial execution will be instrumental as we continue to expand our presence and capabilities across the Asia Pacific region," comments CEO Robert Feurle.

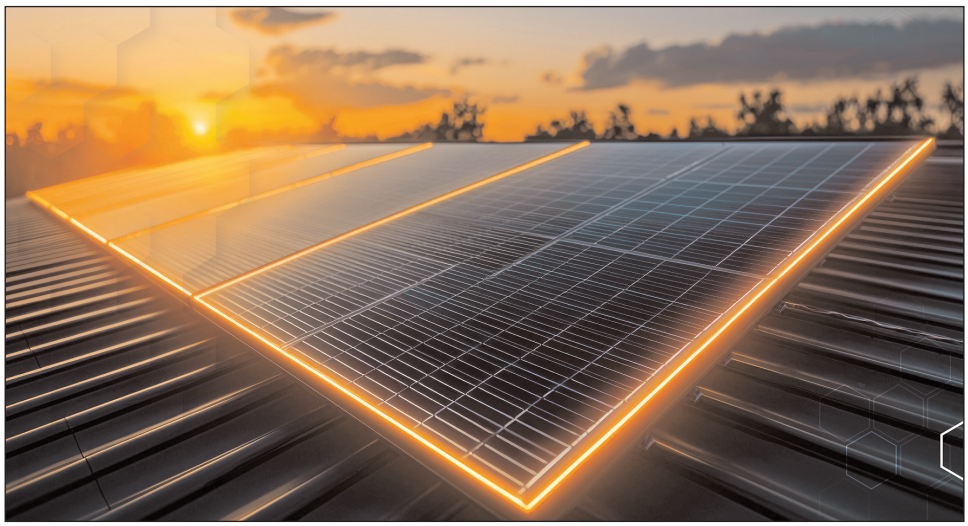
Wolfspeed says it continues to strengthen its global commercial leadership team's capabilities to support long-term growth, effective execution, and value creation for customers and shareholders worldwide.

www.wolfspeed.com

Onsemi's hybrid power integrated modules used in Sineng Electric's solar and energy storage solutions

F5BP PIMs integrate FS7 IGBT and EliteSiC diode technologies

Intelligent power and sensing technology firm onsemi of Scottsdale, AZ, USA says that its hybrid power integrated modules (PIMs) will be featured in Sineng Electric's next-generation 430kW liquid-cooled string energy storage systems (ESS) and 320kW utility-scale solar inverter. The design win builds upon the long-standing collaboration between onsemi and Sineng to deliver high-performance, future-ready solutions in the growing renewable energy and AI infrastructure markets.



Power module technology

At the core of Sineng's new platforms, onsemi's latest-generation Field Stop (FS7) insulated-gate bipolar transistor (IGBT) and silicon carbide (SiC) hybrid PIMs in the F5BP package are engineered to boost the power output of utility-scale solar string inverters and energy storage systems (ESS). Compared to previous generations, the modules offer 32% increased power density with 0.1% higher efficiency within the same footprint to increase the total system power of a solar inverter from 320kW to 350kW.

New standards for efficiency and reliability

Onsemi's hybrid F5BP PIMs integrate the company's FS7 IGBT and EliteSiC diode technologies, reducing power dissipation by up to 8% and switching losses by 10% compared to previous generations. Their advanced direct bonded copper (DBC) substrate design minimizes stray inductance and lowers thermal resistance to the heat sink by 9.3%. Together, the reduction in switching losses and thermal resistance enables up to 32% higher system power at the same weight and density compared to prior-generation designs.

The modules also feature an optimized electrical layout and an innovative baseplate design that enhance thermal management. This combination is claimed to enables superior system performance and enhanced long-term reliability.

Compared to previous-generation modules, onsemi's latest FS7-based hybrid PIM combines lower switching losses and reduced thermal resistance, enabling the following system-level improvements in Sineng's new 430kW string ESS:

- a 0.75% increase in round-trip efficiency (RTE), building on module-level efficiency gains demonstrated in benchmark testing;
- a 5% reduction in auxiliary power consumption, lowering total operating costs;
- higher power density, reducing the number of required modules and cutting component costs;
- cooler operation under high loads and improved reliability.

Compared to previous-generation modules, onsemi's latest FS7-based hybrid power integrated module combines lower switching losses and reduced thermal resistance

Stable, reliable renewable grid

"Utility-scale operators are laser-focused on squeezing more kilowatts from the same footprint while cutting lifecycle costs," says Sineng Electric's general manager of R&D Jianfeng Sun. "By integrating onsemi's F5BP package hybrid modules into our 430kW ESS and 320kW inverter platforms, we're addressing two industry imperatives at once: higher power density that uplifts system ratings, and conversion efficiency gains that compound at gigawatt scale. Those incremental improvements translate into real savings for product development and a more stable, dispatchable renewable grid," he adds.

"Developers need solutions that fit existing layouts, simplify thermal design, and reduce energy losses," says Sravan Vanaparthy, VP & general manager of onsemi 's IGBT Power Division. "By pairing FS7 IGBTs with EliteSiC diodes in our F5BP modules, we deliver higher conversion efficiency and power density without increasing the footprint, enabling significantly higher power ratings at the same system size. This combination allows utility-scale solar and storage sites to increase output from existing installations, while improving reliability and lowering lifetime operating costs."

www.onsemi.com

ROHM develops 5th generation SiC MOSFETs

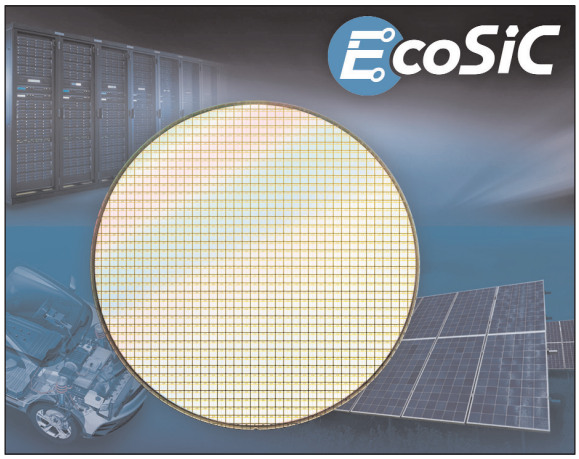
ON-resistance reduced by 30% at high temperature versus 4th Gen

Power semiconductor maker ROHM Semiconductor of Kyoto, Japan has developed the latest device of its EcoSiC series: the 5th Generation silicon carbide (SiC) MOSFETs optimized for high-efficiency power applications. The technology is suitable for automotive electric powertrain systems — such as traction inverters for electric vehicles (xEVs) — as well as power supplies for AI servers and industrial equipment such as data centers.

In recent years, the rapid proliferation of generative AI and big data processing has accelerated the deployment of high-performance servers in the industrial equipment sector. The resulting surge in power density is placing a greater strain on power infrastructure, raising concerns about localized supply shortages. While smart grids that combine renewable energy sources (i.e. solar power) with existing power supply networks are emerging as a possible solution, minimizing losses during energy conversion and storage remains a key challenge.

In the automotive sector, next-generation electric vehicles require extended cruising range and faster charging, creating demand for lower-loss inverters and higher-performance onboard chargers (OBCs). Against this backdrop, the adoption of SiC devices capable of both low loss and high efficiency is increasing in high-power applications ranging from a few kilowatts to hundreds of kilowatts.

ROHM says that, in 2010, it was the first company to begin mass production of SiC MOSFETs, contributing to reducing energy losses by implementing SiC devices over a wide range of high-power applications, including offering an early lineup of products compliant with automotive reliability standards such as AEC-Q101. Furthermore, the 4th generation SiC MOSFETs, for which sample provision began in June 2020, have been adopted



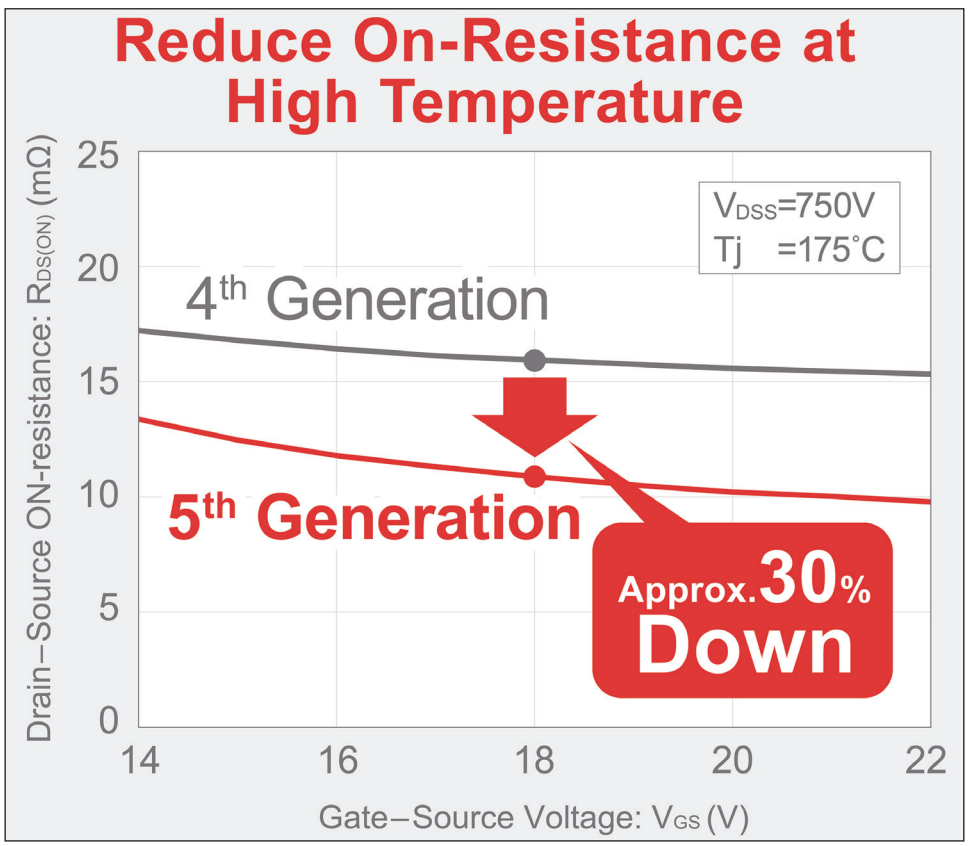
globally in automotive and industrial applications. They are available across a broad product portfolio, including both discrete devices and modules, supporting the rapid market adoption of SiC technology.

The new 5th Generation SiC MOSFETs achieve what is claimed to be industry-leading low loss, driving the broader adoption of SiC technology. Through structural enhancements and manufacturing process optimization, ON-resistance is reduced by about 30% during high-temperature operation (T_j=175°C) compared to conventional 4th Generation products (under the same breakdown voltage and chip-size conditions). This improvement contributes to making units smaller while increasing output power in high-temperature applications such as traction inverters for xEVs.

ROHM began supporting the bare dies business with 5th Generation SiC MOSFETs in 2025 and completed development in March. Furthermore, starting from July, ROHM will provide samples of discrete devices and modules incorporating 5th Generation SiC MOSFETs.

Going forward, ROHM plans to expand its 5th Generation SiC MOSFET lineup with additional breakdown voltage and package options. The firm says it will also continue to enhance its design tools and strengthen application support.

www.rohm.com/products/sic-power-devices



MoU signed to discuss integrating Toshiba Electronic Devices & Storage's semiconductor business, ROHM's semiconductor business, and Mitsubishi Electric's power device business

Toshiba–ROHM power device discussions joined by Mitsubishi Electric

Toshiba Corp of Kawasaki, Japan has signed a memorandum of understanding (MoU) to start discussions regarding a business integration of the semiconductor business of its subsidiary Toshiba Electronic Devices & Storage Corp (TDSC), the semiconductor business of ROHM Co Ltd, and the power device business of Mitsubishi Electric Corp. The MoU was signed with Japan Industrial Partners Inc (JIP), TBJ Holdings Corp (TBJH), ROHM, and Mitsubishi Electric.

Amid increasingly intense international competition in the semiconductor industry, TDSC and ROHM have been examining collaboration in the power devices business.

As part of these efforts, in December 2023 the two companies jointly submitted a plan to Japan's Ministry of Economy, Trade and Industry covering collaboration and investment in the volume production of power devices. The plan was recognized as a measure under the Japanese Government's program to ensure a secure and stable supply of semiconductors, and the companies are advancing discussions on collaborative manufacturing initiatives.

Toshiba, JIP, TBJH, ROHM and Mitsubishi Electric have now agreed to commence discussions based on their shared understanding that the proposed integration, with the participation of Mitsubishi Electric, would realize a business scale and technological foundation capable of competing in the global market, contributing to the development of a wide range of customer bases and industrial sectors as part of Japan's semiconductor industry, and maximizing the corporate value of the integrated entity.

The agreement marks the commencement of deliberations. At this stage, no decisions have been made regarding transaction terms or the specific details of the business integration, and such details will be discussed and determined going forward.

www.toshiba.semicon-storage.com

Infineon's radiation-hard devices used aboard NASA's Artemis II Orion capsule

JANS-qualified device is first internally manufactured radiation-hard gallium nitride transistor on market

Infineon Technologies AG of Munich, Germany says that radiation-hardened (rad-hard) devices from its IR HiRel (high-reliability) division supported the electronic backbone — from critical power supply and control systems to data communications — were at the heart of the Orion capsule of NASA's Artemis II mission, which recently returned from its 10-days around the Moon (reaching the furthest distance from Earth ever achieved by crewed spaceflight).

"Space programs require technologies and partners they can rely on for decades. Infineon is a critical technology partner," says Mike Mills, senior VP & general manager of IR HiRel at Infineon. "The space industry is evolving rapidly: more missions, more data, more electrification — while facing increasing pressure on size, weight and power consumption. In this equation, semiconductors are becoming a central focus in space," he adds. "The fact that our components performed flawlessly from the first to the last minute of the Artemis II mission is no coincidence. It is the result of decades of engineering expertise, state-of-the-art qualification processes and a deep understanding of what semiconductors must deliver in space."

As far back as the 1970s, Infineon's predecessor companies supplied the first rad-hard components for NASA and ESA space programs. Since then, Infineon IR HiRel has supported hundreds of space missions including navigation satellites, the International Space Station (ISS), and now the Artemis program. Its rad-hard components have traveled further than any other human-made object, over 20 billion kilometers from Earth. Infineon says that it continues to invest in, develop and manufacture rad-hard semiconductors supporting the space design community on a global scale.

The demands placed on semiconductors in space are immense. Beyond Earth's protective magnetic field, high-energy particles strike electronic components unimpeded and can permanently damage or destroy them, causing mission failure. Infineon says that its rad-hard technology addresses these mechanisms not through passive shielding but through a semiconductor architecture that is radiation-resistant by design. All products are qualified to the most stringent international space standards, including MIL-PRF-38535 Class V, MIL-PRF-19500, ESA's ESCC standards and NASA EEE-INST-002, ensuring their reliable performance.

Infineon says that its innovation is developed at the system level: semiconductor technology, rad-hard assurance, and packaging perform together. An optimized overall system influences not only electrical performance but also thermal behavior and long-term reliability — while simultaneously reducing weight and volume. As every gram counts in space, Infineon's rad-hard parts provide a system-level advantage.

Wide-bandgap technology: GaN takes the next step

Infineon is also advancing the use of new semiconductor materials in space applications. Gallium nitride (GaN) enables lower switching losses, higher power density and higher switching frequencies — reducing power losses and magnetic component requirements, which translates directly into further weight savings. Based on internal manufacturing capabilities and the process and quality stability that comes with it, Infineon's rad-hard 100V GaN transistor — qualified to JANS (Joint Army Navy Space) per MIL-PRF-19500 — brings GaN from concept to proven technology for demanding space missions. Infineon says that its JANS-qualified device is the first and only internally manufactured rad-hard GaN transistor on the market.

The firm offers a broad radiation-hard portfolio spanning silicon power MOSFETs and GaN transistors, gate drivers and solid-state relays, in addition to rad-hard memories and radio frequency (RF) devices. Backed by in-house radiation testing capabilities and guaranteed long-term product availability, Infineon positions itself not merely as a component supplier but as a strategic technology partner for the entire space industry.

www.infineon.com/gan

Infineon and DG Matrix partner to drive solid-state transformer technology for AI data centers and industrial power applications

DG Matrix to source Infineon SiC technology for Interport multi-port SST platform

Infineon Technologies AG of Munich, Germany and solid-state transformer (SST) solutions firm DG Matrix are partnering to enhance the efficiency of power conversion required to connect AI data centers and industrial power applications to the public grid. As part of the collaboration, DG Matrix will source latest-generation silicon carbide (SiC) technology from Infineon for use in its Interport multi-port solid-state transformer platform. This should strengthen DG Matrix's semiconductor supply chain and enhance the efficiency, power density and reliability of its SST systems, which are deployed worldwide.

"AI data centers and next-generation electrification systems demand higher efficiency, higher power density and uncompromising reliability. Solid-state technology, enabled by Infineon's leading silicon carbide power semiconductors, can deliver this next level of performance and value," says Andreas Weisl, executive VP & chief sales officer of Industrial and Infrastructure at Infineon. "Therefore, we are pleased to support DG Matrix with our latest-generation silicon carbide technology to help enable scalable, high-performance power infrastructure. DG Matrix's multi-port solid-state transformer architecture represents an innovative approach to power conversion," he adds.

"Our multi-port architecture was designed to take full advantage of the performance envelope that silicon carbide enables," notes DG Matrix's CEO & co-founder Haroon Inam. "Infineon's latest-generation SiC devices strengthen our supply chain and enhance

the efficiency, power density and reliability of our Interport platforms. This collaboration supports our mission to deploy faster, more efficient power infrastructure for AI data centers and electrification worldwide."

Driven by electrification and digitalization creating energy-intensive applications such as AI data centers, global electricity demand is rising. To address this, modern power grids must be scaled while maintaining stability, relying on high-performance semiconductor technology. Next-generation semiconductor-based power infrastructure solutions such as DG Matrix's SST platforms enable smarter, more efficient and more reliable grids. Infineon's latest SiC power semiconductors serve as a key enabler of these platforms, delivering the efficiency and power density required by AI data centers, EV charging infrastructure, renewable energy systems and micro-grids.

Looking ahead, both companies expect continued alignment on next-generation SiC device roadmaps as DG Matrix scales toward higher-voltage platforms and higher-volume production. The firms say that the integration of Infineon's SiC technology across DG Matrix's expanding Interport product family supports their mission to accelerate the global deployment of scalable, resilient and efficient power infrastructure for AI data centers and industrial power applications.

www.infineon.com/coolsic

Navitas adds Gregory M. Fischer as independent director

Ex-Broadcom executive brings experience in governance and business leadership

Gallium nitride (GaN) power IC and silicon carbide (SiC) technology firm Navitas Semiconductor Corp of Torrance, CA, USA has appointed semiconductor veteran Gregory M. Fischer to its board, serving on the Compensation and Executive Steering committees. He will stand for reelection in 2027 as a Class III director.

"Greg is joining at a pivotal time for Navitas, and adding his talent and experience to our current board is an important step in ensuring that Chris and our full management team have the support and access to key insights required for success in this highly competitive, fast-moving market," says chairman Richard Hendrix.

"My extensive background in

Navitas' new board member Gregory M Fischer.

governance and industry leadership will further strengthen Navitas' foundation as we scale leading-edge GaN and high-voltage SiC technologies to high-power markets," believes Fischer.

Fischer has served more than 40 years in the technology industry at leading, publicly traded semiconductor companies, currently serving as an independent director of Semtech Corp and previously as senior VP & general manager at Broadcom Inc. Prior to joining Broadcom, Fischer served in leadership roles at Conexant Systems Inc, Rockwell International Corp, and Rockwell Collins Avionics Co.

Since December 2021, he has been an independent advisor to professional services firm Gerson Lehrman Group and AlphaSights Ltd, an information services company specializing in connecting clients with experts. Fischer also serves on the advisory board of Syntiant Corp., an edge-AI neural processor and modeling company.

Fischer earned a B.S. in Electrical Engineering from the Milwaukee School of Engineering and an M.B.A. from the University of Iowa.

www.navitassemi.com

TU Delft's Karen Dowling receives NWO Open Competition ENW-XS grant

Investigating thermoelectric properties of GaN for space exploration at extreme temperatures

Dr Karen Dowling of the Microelectronics Department in the Faculty of Electrical Engineering, Mathematics and Computer Science at TU Delft (Delft Univrsity of Technology) has been awarded an NWO Open Competition ENW-XS grant for her research on materials that can be used in space exploration at extreme temperatures. Specifically, she will investigate the thermoelectric properties of gallium nitride by modelling, fabricating and testing it at temperatures ranging from 500K to 4K.

Dowling studies materials for use in space exploration under extreme temperature conditions. The average temperature in space is extremely low, only slightly above absolute zero (0 Kelvin). During space exploration at the edge of the solar system, heat is used to

Dr Karwn Dowling of the Microelectronics Department in the Faculty of Electrical Engineering, Mathematics and Computer Science at TU Delft .

power instruments. However, thermoelectric materials are rare and inefficient in extreme cold (<50K), leading to energy loss and limiting missions. This is part of her bigger aim to merge (ultra)-wide-bandgap semiconductors with integrated circuits, where the name of her MUSIC Lab comes from.

Dowling will therefore focus on gallium nitride (GaN), which is well suited to space applications that performs better at low temperatures. So far, the thermoelectric properties of GaN below 50K have not been measured, and the coupling between positive and negative charge layers has not yet been explored. The project aims to improve the power factor of GaN by a factor of 1000 by modelling, fabricating and testing 2D layers at temperatures ranging from 500K to 4K.

www.nwo.nl/calls/open-competitie-enw-xs-pakket-26-2
www.microelectronics.tudelft.nl/People/bio.php?id=857

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HRL's T3L 40nm GaN-on-SiC technology achieves Manufacturing Readiness Level 6

Process is compatible with three-dimensional heterogeneous integration architectures

HRL Laboratories LLC of Malibu, CA, USA (a corporate R&D lab co-owned by The Boeing Company and General Motors) says that its T3L 40nm gallium nitride (GaN) on silicon carbide (SiC) technology achieved Manufacturing Readiness Level (MRL) 6 through the US Office of the Under Secretary of War. The firm considers the milestone to represent a significant step in the maturation of its RF GaN manufacturing technology for defense and high-performance commercial applications.

MRL 6 validation confirms the manufacturability of HRL's 40nm T3L GaN-on-SiC technology on production-relevant fabrication flows, with repeatable process control and supply chain stability in alignment with US Department of War manufacturing standards to support purchasing this technology for a variety of US government programs.

Scaling production

HRL is on-track to transition high-volume manufacturing of this technology to MACOM Technology Solutions Inc of Lowell, MA, USA (which designs and makes RF, microwave, analog and mixed-signal and optical semiconductor technologies) as announced in November 2025, while retaining low-volume engineering foundry access and support for multi-project wafer (MPW) for qualified customers.

By coupling open-access MPW capability with a scalable production partner, HRL says that it enables rapid prototyping of baseline and advanced variants of T3L GaN while simultaneously supporting high-volume manufacturing. This is all accomplished within a unified ecosystem with a low barrier to entry.

"Reaching MRL 6 and defining high-volume transition to MACOM represent decisive steps toward sustainable domestic RF GaN production," says Dr Erdem Arkun, group manager at HRL.

Next steps

HRL has also established that the process is compatible with advanced heterogeneous integration and 3DHI (three-dimensional heterogeneous integration) architectures. This enables higher-level integration with digital control electronics, beam-forming networks and next-generation radar and communications modules, reducing system size, weight and power (SWaP) for critical defense and commercial systems.

"The GaN T3L process excels in enabling 3DHI, which drives next-generation array systems by meeting the growing demands for higher performance, compact designs and energy efficiency in advanced electronic systems," says Dr Andrea Arias-Purdue, principal investigator at HRL.

HRL is open to leveraging this manufacturing baseline and partnering with interested entities to integrate this technology into higher-level assemblies to realize differentiating solutions and advancing technological capabilities for critical defense and commercial applications. Interested parties can e-mail ganmpw@hrl.com.

HRL foundry history

Since 2019, HRL's open foundry has offered GaN processes to fabricate commercial and defense customer designs. The firm also offers design and high-frequency testing as a service and has a catalog of high-frequency monolithic microwave integrated circuits (MMICs). HRL is actively fielding requests for higher-level integration and prototyping projects.

www.hrl.com/products-services/foundry

Power Integrations extends flyback topology to 440W, offering simpler alternatives to resonant power designs

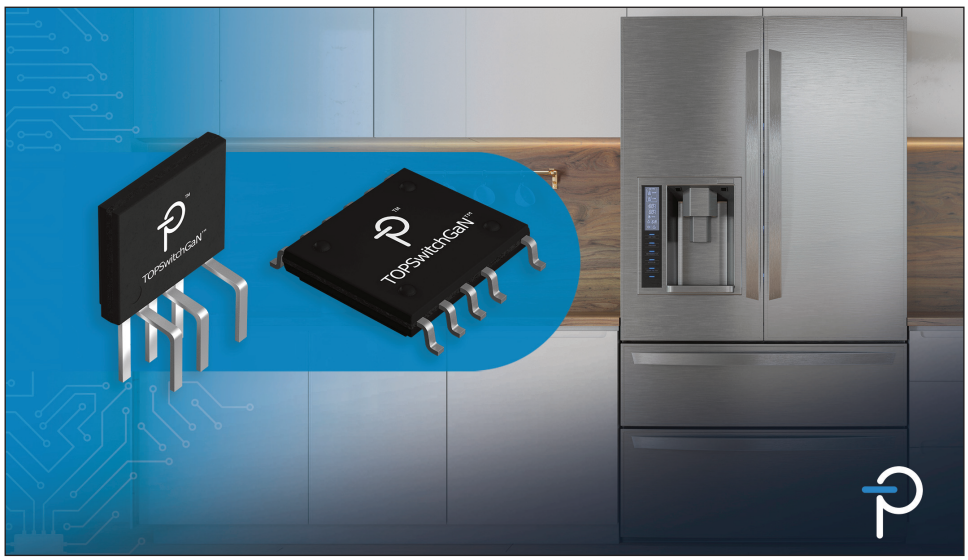
New TOPSwitchGaN ICs more than double power output, reducing system cost, complexity and design time

Power Integrations Inc of San Jose, CA, USA (which provides high-voltage integrated circuits for energy-efficient power conversion) has introduced a flyback topology that extends the power range of flyback converters to 440W — well beyond the limits that traditionally required more complex resonant and LLC topologies. The new TOPSwitchGaN flyback IC family unites the company's PowiGaN technology with its TOPSwitch IC architecture, reducing complexity, eliminating heat-sinks in many cases, shortening design time, improving manufacturability, and lowering total system cost.

"This is more than a product evolution — it's a fundamental shift in how engineers can approach power supply design," claims Silvestro Fimiani, director of product marketing. "For decades, designers have had to move to resonant topologies like LLC as power levels increased. With TOPSwitchGaN, we're pushing flyback into a power range previously not possible, allowing engineers to achieve high efficiency and performance with a far simpler architecture."

TOPSwitchGaN ICs provide 92% efficiency across the load range — from 10% to 100% load — and easily beat European Energy-related Products (ErP) regulations at less than 50mW power consumption for standby and off modes. The device does this without the need for synchronous rectification.

PowiGaN switches deliver much lower $R_{DS(ON)}$ than silicon. This results in reduced conduction losses, which dramatically increase the power capability of flyback converters. The new devices incorporate 800V PowiGaN switches, which provide what is claimed to be excellent surge withstand capabilities and low switching losses, meaning



that they can operate at switching frequencies of up to 150kHz to minimize transformer size.

No-load consumption is well below 50mW at 230VAC including line sense, and up to 210mW of output power is available for 300mW input at 230VAC to run housekeeping functions when units are in standby mode.

"As the first device to combine offline switchers into small packages — and with billions of units sold since 1994 — the TOPSwitch name stands for innovation in power conversion," says Fimiani. "Engineers rely on TOPSwitch for its efficiency and ease of use, and now those benefits are available for an even wider range of designs. TOPSwitchGaN expands the power range of the flyback architecture to 440W — previously unheard of using a flyback architecture — expanding the use of flybacks into applications previously requiring more complex topologies."

The new ICs are available in two styles. For ultra-slim designs, low-profile eSOP-12 surface-mount packaging enables 135W (85–265VAC) to be delivered without a heat-sink for applications such as appliances. The vertical orientation of the eSIP-7 package minimizes PCB footprint and has a thermal impedance equivalent to a TO-220-packaged part. By mounting a metal heat-sink using a simple clip, the extended power range is achieved for applications including power tools, e-bikes, and garage openers. Because TOPSwitchGaN ICs are pin-to-pin compatible with TinySwitch-5 off-line switcher ICs, designers can use the same methodology for applications spanning 10W up to 440W.

Availability & resources

Pricing for TOPSwitchGaN starts at $1.00 for 10,000-unit quantities (TOP7074K-TL). The following reference design materials are available:

- DER-1079 – this kit uses TOP7074K to deliver a 60W, wide-range isolated flyback PSU for appliances;
- DER-1019 – this kit details a 356W highline (89V/4A) isolated flyback industrial PSU, based on TOP7078E;
- RDK-1018 – this e-bike charger kit is a 168W wide-range isolated flyback design using TOP7075E.

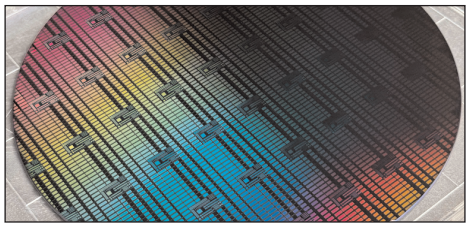
www.apec-conf.org
www.power.com

IVWorks raises $4.5m to expand reGaN technology into RF and AI power semiconductor markets

IVWorks Co Ltd of Daejeon, South Korea — which was founded in 2011 and manufactures 100–200mm gallium nitride (GaN) epitaxial wafers for RF & power electronics applications — is accelerating its expansion into the GaN semiconductor market through its proprietary reGaN technology while continuing to expand its core epiwafer business across multiple advanced device platforms. Leveraging its epitaxy expertise, the firm is positioning itself as a solution provider for next-generation RF and power semiconductor applications, including aluminium nitride (AlN) high-electron-mobility transistors (HEMTs) on silicon carbide (SiC), GaN HEMT on silicon, and vertical GaN epiwafers.

To support this growth, IVWorks recently closed a funding round of about $4.5m, bringing its cumulative investment to $33m.

The newly secured capital will be strategically deployed to strengthen



mass-production infrastructure and stabilize the global supply chain, enabling a rapid response to growing global demand for GaN materials and epitaxy.

IVWorks says that its 'reGaN' technology represents a high-value business platform built on its core selective-area regrowth capability for GaN device integration.

Recently, reGaN demonstrated commercial readiness and technical reliability by completing major foundry qualification and supplying qualified products to leading global semiconductor foundries.

The firm says that this solution directly addresses key industry challenges, particularly contact resistance reduction in GaN devices, significantly improving device performance and efficiency.

The technology is currently expanding into E-band and W-band RF applications for satellite communications and wireless backhaul, while also entering AI power delivery markets through point-of-load (PoL) converters for advanced computing platforms including high-bandwidth memory (HBM) and graphic processing unit (GPU) systems.

In parallel with this investment, IVWorks has initiated preparations for a KOSDAQ listing, with Korea Investment & Securities Co Ltd serving as the lead underwriter.

"This investment reflects our shareholders' confidence in IVWorks' technical roadmap," says IVWorks' CEO Young-Kyun Noh. "We remain committed to solving critical technical challenges for our global partners through reGaN while building a sustainable growth foundation through our planned IPO."

www.ivwkr.com

IVWorks' GaN single-crystal wafer manufacturing technology receives Green Technology Certification

IVWorks has obtained green technology certification for its gallium nitride single crystal wafer manufacturing technology, a key material for power semiconductors.

Green Technology Certification is a system that certifies and supports promising green technologies based on the Carbon Neutrality Basic Act, and eight ministries, including the Ministry of Trade, Industry & Energy and the Ministry of SMEs and Start-ups, participate in the evaluation.

The newly certified technology is a gallium nitride single-crystal wafer manufacturing technology, a key material for gallium nitride power semiconductor applications. It utilizes hydride vapor deposition and in situ separation methods instead of conventional ingot manufacturing methods, enabling increased wafer yield and larger wafer diameters.

Based on this, GaN-on-GaN epiwafers for vertical power semiconductors meet the requirements of 1kV high-voltage power semiconductors, such as electric vehicle inverters, AI data center power supplies, and renewable energy power conversion devices. The company explained that gallium nitride can increase power conversion efficiency and reduce energy loss due to its superior electronic properties compared to silicon.

IVWorks stated that this technology can improve electric vehicle battery performance by approximately 20% and, by enhancing the efficiency of solar inverters, reduce carbon dioxide emissions by thousands of tons annually. Furthermore, it can improve the efficiency of high-power LEDs by 1.5 times, contributing to reduced power consumption in the opto-electronics sector.

Previously, IVWorks announced plans to mass-produce 8-inch gallium nitride nanowire epiwafers for green hydrogen production based on artificial photosynthesis.

IVWorks plans to advance its high-efficiency gallium nitride material technology and contribute to reducing energy consumption in response to the increasing demand for power semiconductors due to the spread of electric vehicles and mobile communications.

www.venturesquare.net/en/1039382

SweGaN wins commercial orders worth SEK25m from global customers

Ulf Nolemo appointed as chief commercial officer

SweGaN AB of Linköping, Sweden — a manufacturer of custom gallium nitride on silicon carbide (GaN-on-SiC) epitaxial wafers, based on proprietary growth technology — says that it has secured multiple new commercial framework agreements from customers across Europe, Asia, and the USA. The orders received during the first four months of 2026 represent a total contract value of about SEK25m and will contribute to revenue over the next coming 6–18 months.

The new orders span a broad range of applications, including power devices for data centers and RF devices for defense, aerospace and telecommunications.

The strong growth and commercial traction across a diverse global customer and application base "indicates the recognition the market is showing to the value our material performance and tailored solutions can bring to their products," says CEO Jr-Tai Chen. "These design-in and design-win orders will propel our abilities to invest in capacity expansion and continued product innovation for the future," he adds.

In conjunction, SweGaN has also appointed Ulf Nolemo as chief commercial officer (CCO), effective 1 May, responsible for leading global commercial strategy, including sales & marketing activities, business development, and strategic customer partnerships.

Nolemo has 30 years of experience in the semiconductor industry, with a track record of scaling commercial operations and driving innovation across international markets. He has previously held leading positions at Ericsson, Wolfspeed, Macom, NXP, and Infineon.

"The appointment of a chief commercial officer marks an important step as we enter our next phase of growth," says Chen. "The industry experience and commercial leadership brought by our newly appointed CCO will be critical as global demand for our GaN epitaxial solutions continues to expand."

www.swegan.se

CVD Equipment demonstrates single-crystal SiC boule growth in collaboration with Stony Brook

Stony Brook's onsemi Research Center for Wide Bandgap Materials shows 4H crystal structure, without polytypes, and low defect density

CVD Equipment Corp (CVDE) of Central Islip, NY, USA (a designer and maker of chemical vapor deposition, thermal processing, physical vapor transport, gas and chemical delivery control systems, and equipment and process solutions for developing and manufacturing materials and coatings) has announced the successful growth of single-crystal silicon carbide (SiC) boules grown on CVDE physical vapor transport (PVT) systems and characterized by Stony Brook University (SBU) in support of its new 'onsemi Research Center for Wide Bandgap Materials'.

The SiC boule was analyzed at SBU and determined to be 4H crystal structure, without any polytypes, and low defect density. CVDE reckons that this achievement strengthens its position as an equipment supplier for next-generation semiconductor manufacturing and emerging markets that rely on high-performance materials.

"Using the PVT systems developed by CVDE to successfully grow silicon carbide single-crystal boules under the auspices of the onsemi center is a natural evolution of the long-term collaboration between CVDE and SBU," notes Michael Dudley, professor and director of the onsemi Research Center for Wide Bandgap Materials at Stony Brook. "The synergy of the expertise at CVDE in PVT systems and the prolific research background in silicon carbide and other wide-bandgap materials at SBU will propel the next generation of crystal growth technologies for silicon carbide and other wide-bandgap semiconductor materials."

"We are pleased with our collaboration with Stony Brook University which enables the opportunity to demonstrate the performance of our physical vapor transport equipment and our commitment to enabling the next generation of silicon carbide technology," says CVD Equipment's president & CEO Manny Lakios.

www.stonybrook.edu
www.cvdequipment.com

Warwick- and Southampton-led UK project to develop electro-deposition of transition-metal dichalcogenides

EPSRC-funded £10.4m EXPRESS program to grow TMDCs directly within 3D electronic structures

The EXPRESS program, a five-year, £10.4m UK Engineering and Physical Sciences Research Council (EPSRC)-funded project led by the University of Warwick and the University of Southampton, is to support the development of next-generation transistor and optoelectronic devices.

EXPRESS will explore new electrochemical approaches combined with novel precursor chemistry to grow transition-metal dichalcogenides (TMDCs) - layered semiconductors with potential applications in ultra-low-power electronics, neuromorphic computing, photonic circuits, and quantum technologies.

"TMDCs have enormous potential for future transistor and optoelectronic devices, but producing them reliably, at scale, and with high levels of crystallinity, remains a major challenge," notes Warwick lead, professor Julie Macpherson of the Department of Chemistry.

"This program brings together expertise across chemistry, physics and electronics to explore new ways of controlling how these materials form, which will help unlock their use in next-generation devices."

The team will investigate a novel approach based on electro-deposition methodology, guided by specially designed molecules that help to control how the materials assemble and grow. This approach will allow TMDCs to be grown directly within three-dimensional electronic structures, avoiding complex transfer steps and enabling more reliable testing of their properties.

"Layered 2D semiconductors offer great potential for creating the faster, more energy-efficient devices that the world needs," comments Southampton lead, professor Gill Reid. "We are exploring a new electro-deposition-based method to precisely control the growth of these layered materials, making semiconductor chips easier to produce," she adds. "It's a simple idea that we hope will turn a massive challenge into a major opportunity for future tech. The breadth of expertise across the EXPRESS team is what makes this program possible."

Alongside advancing semiconductor technologies, the program will support and train early-career researchers, helping to build UK capability in advanced materials and electronics.

www.warwick.ac.uk/fac/sci/chemistry/research/electrochemistry
www.southampton.ac.uk/people/5wxz2d/professor-gill-reid

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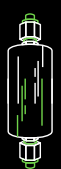
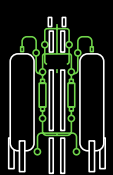
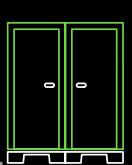


Point-of-Use Purifiers



Frame-Mounted Purifiers



Bulk Purifiers

Nova™ Series In-Line Gas Purifier

BROUGHT TO YOU BY

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Explore our Gas Purification Solutions

Silvaco expands partnership with APEC

Silvaco Group Inc of Santa Clara, CA, USA — which provides AI-enabled technology computer-aided design (TCAD), electronic design automation (EDA) software and semiconductor intellectual property (SIP) for process and device development — has announced an expanded strategic partnership with Taiwan-based silicon and silicon carbide power device developer and and manufacturer Advanced Power Electronics Corp.

APEC has significantly upgraded and expanded its technology and design flows with more of Silvaco's technology solutions. It has made a long-term commitment to deploying Victory Device 2D simulation tools along with Gateway and SmartSpice. This expanded deployment should enable APEC to accelerate its development of silicon carbide power devices while optimizing device performance and time-to-market.

"We are thrilled to deepen our partnership with Silvaco as we accelerate development of silicon carbide products," says APEC's president Dr CS Chang. "Silvaco's solutions are an integral part of our design flow, enabling us to explore complex device physics and optimize our SiC technologies," he adds. "The combination of Victory Device, Gateway and SmartSpice provides us with a comprehensive solution that bridges the gap between process development and circuit design, allowing us to deliver superior silicon carbide power solutions."

The partnership reflects APEC's strategic commitment to leveraging advanced simulation tools in the rapidly evolving power electronics market. With applications spanning automotive, industrial, renewable energy and consumer electronics, APEC's silicon and silicon carbide devices are said to require sophisticated modeling capabilities that Silvaco's TCAD and EDA solutions can provide.

"APEC's commitment to our solutions demonstrates the critical role that advanced TCAD and EDA solutions play in accelerating power device innovation," says Silvaco's chief revenue officer Ian Chen. "Their long-term commitment reinforces the clear value created by our solutions," he adds.

Silvaco's Victory TCAD platform enables comprehensive process and device simulation for power semiconductors. Gateway provides seamless integration between TCAD and circuit simulation. SmartSpice delivers fast, accurate SPICE simulation for power device characterization and circuit design. Together, these solutions are said to enable APEC to perform design technology co-optimization (DTCO) and accelerate the development of power devices with improved performance, reliability and efficiency.

www.a-power.com.tw
www.silvaco.com

Atomera extends Synopsys collaboration to GaN workflows

Semiconductor materials and technology licensing company Atomera Inc of Los Gatos, CA, USA has expanded its collaboration with Synopsys Inc of Mountain View, CA, USA — which provides electronic design automation (EDA) software, semiconductor IP and services for chip and electronic system design — to advance gallium nitride (GaN) device modeling for radio frequency (RF) and power semiconductor applications. The work builds on their long-standing relationship around Synopsys' Sentaurus TCAD and Atomera's MSTcad toolset and extends the collaboration into GaN workflows to support bringing higher-quality GaN solutions to market.

"Synopsys has a strong history of working with innovative semiconductor technology companies to help customers evaluate and integrate new capabilities," says Rahul Deokar, executive director of product management for Manufacturing Solutions at Synopsys. "Our broadened collaboration with Atomera is focused on advancing GaN TCAD simulations to gain deeper insights into how advanced materials can be leveraged to design more efficient devices and address the semiconductor industry's future RF and power challenges."

Atomera will use Synopsys' Sentaurus TCAD tools to develop a GaN calibration methodology for TCAD workflows, create marketing materials and calibrated TCAD decks for GaN devices, and provide product feedback to Synopsys.

Synopsys and Atomera have worked together for years to enable modeling of Atomera's Mears Silicon Technology (MST) technology within Synopsys' Sentaurus TCAD environment. This collaboration enables support for Atomera's MSTcad capabilities and allows customers and partners to evaluate the physical and electrical effects of MST using Synopsys' process and device simulation tools.

MST is a quantum-engineered thin-film technology that is said to increase performance and power efficiency in semiconductor transistors. It can be implemented using equipment already deployed in semiconductor manufacturing facilities and is complementary to other nano-scaling technologies in the semiconductor industry roadmap.

"This collaboration represents a natural next step in our long-standing collaboration with Synopsys," says Atomera's president & CEO Scott Bibaud. "We have already shown the value of combining MST with Synopsys' Sentaurus tools through MSTcad, and we are excited to extend that relationship into GaN to continue broadening Atomera's reach into high-value RF and power semiconductor markets."

www.synopsys.com/

QuantumDiamonds expands to Asia, starting with new operation in Taiwan

Peter Lemmens appointed as managing director Asia

QuantumDiamonds GmbH of Munich, Germany, which is developing and manufacturing semiconductor testing systems based on diamond quantum sensing technology, has appointed Peter Lemmens as managing director Asia, signalling its commitment to establishing a lasting, on-the-ground presence in the region.

The appointment coincides with QuantumDiamonds' expansion into Asia by establishing a new operation in Taiwan, which will serve as the firm's regional hub as it scales commercial and technical activities across the semiconductor ecosystem in the months ahead.

Founded in 2022, in November 2025 QuantumDiamonds announced a €152m investment in a next-generation quantum-based chip inspection facility. The next move focuses on building an operational base for QuantumDiamonds in Asia, beginning with Taiwan.

Lemmens has more than 25 years of executive leadership in the semiconductor and electronics industry, including over 15 years based in Taiwan.

He is said to have a proven record of building and scaling organizations that serve the world's most advanced chipmakers. Most recently, he was general manager Taiwan at IMS Nanofabrication, which provides multi-beam electron mask writing systems for leading-edge technology nodes, where he built the Taiwan operation from the ground up into a team of more than 100 staff, with full P&L responsibility and direct collaboration with TSMC.

Before IMS, he spent a decade as generalvmanager Taiwan for nanoelectronics research center imec of Leuven, Belgium. There, he founded imec's first technology center outside Europe and grew it into a 75-person, multi-country organization spanning R&D, business development, and account management. Lemmens began his career with a 12-year stint at global electronics firm Phillips.

His network spans the highest levels of the semiconductor ecosystems in Taiwan, Japan and Korea, including TSMC, Samsung, ASE, UMC and leading global IDMs, positioning him to drive adoption of QuantumDiamonds' technology at scale, the firm reckons.

"The semiconductor industry is navigating an inflection point," says QuantumDiamonds' CEO Kevin Berghoff. "As device architectures grow more complex through 3D stacking, advanced packaging, and backside power delivery, the demand for non-destructive, high-resolution metrology solutions has never been greater," he adds. "Peter has spent his career at the center of this ecosystem. His operational depth, industry credibility and track record of building profitable businesses from the ground up make him exactly the right leader to accelerate our growth across Asia."

QuantumDiamonds has commercialized the world's first integrated quantum sensing system for semiconductor failure analysis. Based on patented Quantum Diamonds Microscopy (QDM) technology, the platform delivers non-destructive, high-resolution 3D imaging of electrical current pathways in complex chip architectures, including 2.5D and 3D packages, backside power networks, and wide-bandgap materials such as gallium nitride (GaN) and silicon carbide (SiC).

Where conventional optical methods require destructive layer-by-layer analysis, QDM can localize faults in minutes, dramatically compressing failure analysis cycles and improving manufacturing yield.

"Open faults are the number-one yield killer in advanced semiconductor manufacturing, and the industry has lacked an effective, non-destructive solution — until now," says Lemmens. "QuantumDiamonds has built something genuinely transformative. The ability to visualize electrical activity in three dimensions, without destroying the sample, is a step change in what failure analysis engineers can do. I look forward to working closely with customers and partners across Asia to bring this capability into their production environments."

QuantumDiamonds says that nine of the world's top ten semiconductor manufacturers are already engaged with it, with active customer interest across Taiwan, Japan and Korea. In March it announced its first deployments across commercial environments in the USA and Taiwan.

www.qd-st.com

Metallium announces off-take agreement with Indium Corp for critical & precious metals including gallium and germanium

Flash Metals USA subsidiary to supply Indium Corp for initial 10 year period, plus automatic five-year renewals

Metallium Ltd of Subiaco, Western Australia, says that its US subsidiary Flash Metals USA Inc of Houston, TX, USA has executed a long-term offtake agreement with materials refiner and manufacturer Indium Corp of Clinton, NY, USA, covering the supply of gallium (Ga), germanium (Ge) and other critical metals recovered using Metallium's Flash Joule Heating technology.

Flash Metals USA will supply, and Indium Corp will purchase, specified recovered metals generated from Metallium's US recycling operations including gallium, germanium, copper, tin, gold and indium. The off-take agreement has an initial term of 10 years, with automatic five-year renewal periods unless non-renewed in accordance with agreed notice provisions.

"This agreement with Indium Corporation is an important step in commercializing our US recycling platform," says Metallium's managing director & CEO Michael Walshe. "Critical metals, and specifically their midstream processing and refining, remain highly concentrated in a limited number of jurisdictions, not all of which are aligned with Western supply chain priorities, underscoring the need for domestic capability," he adds. Establishing a long-term offtake with Indium "strengthens our pathway to monetize recovered critical metals as we scale up our operations," Walshe continues. "Importantly, metals such as gallium and germanium are foundational to advanced semiconductors, defense systems and AI infrastructure."

Metallium is pioneering a low-carbon, high-efficiency approach to recovering critical and precious metals from mineral concentrates and high-grade waste streams. Developed at Rice University, patented Flash Joule Heating (FJH) technology enables the extraction of high-value materials (including gallium, germanium, antimony, rare-earth elements, and gold) from feedstocks such as refinery scrap, e-waste and monazite. Aligned with US strategic supply chain objectives, Metallium recently secured its first commercial site in Texas via its subsidiary Flash Metals USA Inc.

www.indium.com
www.metalliuminc.com

Metallium completes Phase I SBIR contract within six months

Technical milestones achieved or exceeded, demonstrating recovery of gallium from waste streams using FJH technology

Flash Metals Texas has completed Phase I of its Small Business Innovation Research (SBIR) contract with the US Department of War (DoW) through the Defense Logistics Agency (DLA).

The SBIR program 'Domestic Recovery of Gallium from Waste through Flash Electrothermal Chlorination' applied Metallium's proprietary FJH metal recovery technology to recover gallium from gallium-rich waste streams including semiconductor scrap and electronic waste materials. These feedstocks commonly contain germanium and other valuable strategic metals, expanding the potential impact of the FJH technology across multiple critical material supply chains.

"We achieved or exceeded all technical milestones under the contract and delivered the required workstreams within six months, significantly faster than the typical 12-month SBIR Phase I program duration," says Metallium's managing director & CEO Michael Walshe.

"We have validated the capability of our Flash Joule Heating technology to address a key national security challenge for the US," says Steve Ragiel, president of Metallium's US operations. Gallium is a critical material used in advanced semiconductors, radar systems, satellite electronics and next-generation defense technologies, he adds. "Demonstrating a pathway to recover gallium domestically from waste streams aligns directly with US strategic objectives to build resilient supply chains for defense-critical minerals." Completing the program in half the typical timeframe also "highlights the maturity of our technology platform and the strength of our team".

Additional information on the program's execution and strategic importance can be found at: https://cdn-api.markitdigital.com/apiman-gateway/ASX/asx-research/1.0/file/2924-03075768-6A1319360&v=undefined.

US Critical Materials and Columbia University to advance domestic recovery of defense-critical metals from red mud

Program includes mineralogical characterization, ambient-temperature oxidative leaching, selective separations, co-recovery of titanium dioxide and iron oxide, and techno-economic and life-cycle modelling

Private rare-earths exploration and process development company US Critical Materials Corp (USCM) of Salt Lake City, Utah, USA and Columbia University have signed a two-year sponsored research agreement seeking to advance scientific pathways that enable the development of future US production of gallium, scandium, titanium and rare-earth elements from red mud, a major byproduct of aluminium refining.

The USA is fully import-dependent for gallium and scandium, which are essential to secure communications, advanced semiconductors, directed-energy systems, hypersonics, and next-generation aerospace platforms. The program 'Mud To Metal' will be led by Greeshma Gadikota, Lenfest Earth Institute Professor of Climate Change at the Columbia Climate School, Professor of Earth and Environmental Engineering at the Columbia Engineering School and director of the Lenfest Center for Sustainable Energy at Columbia.

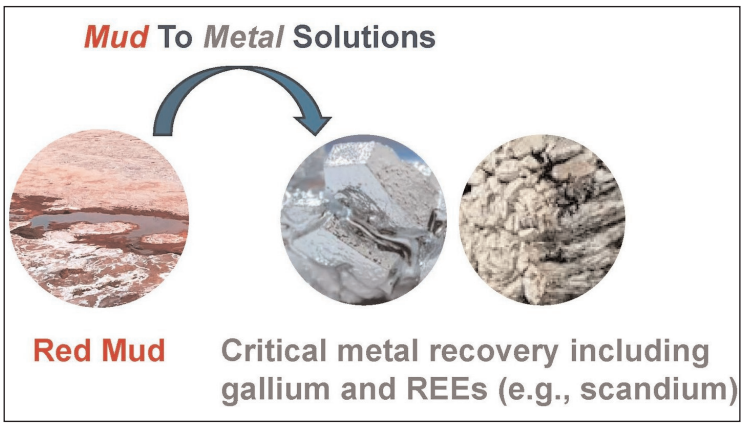


Exhibit A of the agreement notes that red mud contains elevated concentrations of these metals and that the project aims to develop intensified recovery technologies and advance them toward potential field-scale deployment.

USCM and Columbia will investigate red mud from various locations for characterization and process-development activities, including from locations operated by Alcoa.

"Gallium and scandium are strategic choke points for the US defense and aerospace industrial base," says USCM executive chairman Harvey Kaye. "This agreement with Columbia positions us to build the scientific foundation for a future domestic supply," he adds.

"Our team is focused on rigorous, environmentally responsible pathways for recovering critical metals from complex materials," says Gadikota, principal investigator. "Red mud presents a significant opportunity to strengthen US resource security through innovation."

The program includes mineralogical characterization, ambient-temperature oxidative leaching, selective separations, co-recovery of titanium dioxide and iron oxide, and techno-economic and life-cycle modeling.

www.uscriticalmaterials.com

5N Plus appoints Alban Fournier as CFO

CFO Richard Perron to be president & CEO, and CEO Gervais Jacques to be executive chair

Specialty semiconductor and performance materials producer 5N Plus Inc (5N+) of Montréal, Québec, Canada has appointed Alban Fournier as chief financial officer (CFO), effective 27 April.

This follows the firm's previously announced leadership succession plan under which existing president & CFO Richard Perron will become president & CEO, and existing CEO Gervais Jacques will become executive chair of the board, effective 31 May.

"His extensive financial expertise and leadership experience will be invaluable as 5N+ enters its next phase of growth," reckons Perron. "I look forward to working together to advance our proven strategy, deepen our standing as a trusted global partner of advanced materials in critical markets, and deliver long-term value for our shareholders."

Fournier has nearly 30 years of experience across three continents in corporate and operational roles, with expertise in finance, internal audit, corporate strategy and technology. He was most recently chief financial & technology officer at the Montreal Port Authority, where he also oversaw procurement. Previously, he was CFO at Chantier Davie Canada Inc. In over two decades at Rio Tinto, he was group head of internal audit and CFO of Rio Tinto Bauxite & Alumina.

A graduate of Sciences Po Paris (Paris Institute of Political Studies), Fournier holds a master's degree in finance and economics.

www.5nplus.com

US DOE selects five projects to restart domestic primary gallium recovery

TRACE-Ga program to drive innovative and cost-effective technologies for gallium recovery from US metal processing feedstocks

The US Department of Energy's (DOE) Office of Critical Minerals and Energy Innovation (CMEI) has announced about $5.4m for five projects to help establish a secure, domestic supply chain for gallium (Ga) as a critical material for the defense and semiconductor sectors.

"These five projects support President Trump's commitment to strengthen America's critical minerals supply chains," says Assistant Secretary of Energy (EERE) Audrey Robertson. "Using novel and innovative approaches to gallium extraction, these projects demonstrate the focus on restarting domestic primary gallium recovery for the first time in almost 40 years. Technological breakthroughs foster the commercialization of cutting-edge technologies, expand the nation's critical minerals production capacity, and reduce our reliance on foreign sources."

Funded through the Technology for Recovery and Advanced Critical-material Extraction – Gallium (TRACE-Ga) initiative, the project will complement other federal investments in the gallium supply chain, by rapidly prototyping novel technologies for gallium recovery from US metal processing feedstocks. Currently, the USA is 100% net import reliant on gallium and has not domestically produced the critical mineral since 1987.

Projects are divided into two distinct phases where performers recover gallium at defined cost, purity and quantity.

Project summaries

- PHNX Materials Inc (San Leandro, CA) will integrate a novel processing pathway to extract gallium from wastes not compatible with traditional flow sheets, producing supplementary cementitious materials, alumina, and ammonium sulfate in addition to gallium.
- Atlantic Alumina Company LLC (Gramercy, LA) will use a novel process (counter-current ion exchange and electrochemistry) with commercially demonstrated and innovative resins to recover gallium at higher temperatures and under continuous operation.
- Found Energy Co (Charleston, MA) will use the company's Direct Bayer Extraction (DBE) technology, a continuous electrochemical process that recovers gallium directly from dilute Bayer liquor without ion-exchange preconcentration of chemical modification of the underlying alumina production circuit.
- Kunin Technologies Inc (Chattanooga, TN) will develop a pathway for producing 12 tons per annum of gallium, utilizing innovative processing methods to recover gallium from metal streams with the highest gallium concentration.
- Indium Corp (Clinton, NY) will develop a capability to recover gallium from recycling scrap from a combination of commercial and innovative processes.

The TRACE-Ga initiative is managed by ENERGYWERX in partnership with DOE, a collaboration made possible through a Partnership Intermediary Agreement set up by the DOE's Office of Technology Commercialization. This agreement enables ENERGYWERX to broaden DOE's engagement with innovative organizations and non-traditional partners, facilitating the rapid development, scaling, and deployment of energy solutions.

Selection for award negotiations is not a commitment by DOE to issue an award or provide funding. Before funding is issued, DOE and the applicant will undergo a negotiation process, and DOE may cancel negotiations and rescind the selection for any reason during that time. DOE award amounts are subject to change pending negotiations.

www.energywerx.org
www.energy.gov/cmei/office-critical-minerals-and-energy-innovation

AXT closes public offering, raising $632.5m

Proceeds to fund InP capacity expansion at Tongmei subsidiary

AXT Inc of Fremont, CA, USA — which makes gallium arsenide (GaAs), indium phosphide (InP) and germanium (Ge) substrates and raw materials at plants in China — has closed an underwritten public offering of 8,560,311 shares of common stock at $64.25 per share. The firm received gross proceeds of about $550m.

In addition, the underwriters fully exercised their overallotment option to purchase up to 1,284,046 additional shares, raising a further $82.5m.

Total gross proceeds are hence $632.5m, before deducting underwriting discounts and commissions and other offering expenses.

AXT intends to use the net proceeds from the offering primarily to financially support its subsidiary Beijing Tongmei Xtal Technology Co Ltd in its efforts to increase its capacity to produce indium phosphide substrates for export worldwide, for R&D of new or improved products, and for working capital and for general corporate purposes.

www.axt.com

US DOE issues $69m Critical Minerals and Materials Accelerator funding opportunity

Projects sought for technologies that advance domestic separation, processing and refining

The US Department of Energy's (DOE) Office of Critical Minerals and Energy Innovation (CMEI) and the Hydrocarbons and Geothermal Energy Office (HGEO) have announced a 'Critical Minerals and Materials Accelerator' Notice of Funding Opportunity (NOFO) of up to $69m for technologies that advance the domestic separation, processing, and refining of critical materials. Projects selected will address the greatest technical obstacles to a more secure, domestic critical materials supply chain.

The NOFO will focus investments on American, industry-led partnerships to prototype and pilot innovative critical materials processing technologies that are currently only proven at the bench scale to address challenges in high-impact areas. The program establishes a pipeline that will support technology maturation to ultimately unlock private capital investments. It will also leverage other DOE lab-based investments, such as the Critical Materials Innovation (CMI) Hub and the Minerals to Materials Supply Chain Research Facility (METALLIC).

The NOFO should help to ensure a more secure, predictable and affordable supply of critical minerals and materials that are "foundational to American energy dominance, national security, and industrial competitiveness".

DOE is seeking projects that bridge the gap between bench-scale innovations and commercially viable technologies. Selected project teams will form industry-led partnerships and conduct R&D with support from the US national laboratories.

The NOFO, which is part of DOE's Critical Minerals and Materials Accelerator Program and jointly funded by CMEI's Advanced Materials and Manufacturing Technologies Office (AMMTO) and HGEO's Office of Geothermal, has three primary topic areas:

- Topic Area 1 (application deadline 26 May): Production and material efficiency for critical materials, including rare-earth elements (REEs). Sub-topics include:
  - 1A: recovery and production from post-industrial manufacturing scrap;
  - 1B: recovery and production from post-consumer scrap (with an emphasis on electronic waste and drivetrains);
  - 1C: recovery and production from blended feedstocks including mine tailings, post-industrial scrap, and post-consumer scrap.
- Topic Area 2 (application deadline 22 June): Processes to refine and alloy gallium, gallium nitride, germanium, and silicon carbide.
- Topic Area 3 (application deadline 20 July): Cost-competitive direct lithium extraction, separation, and processing. Sub-topics include:
  - 3A: cost-competitive direct lithium extraction;
  - 3B: advancing pre- and post-treatment and disposal technologies for direct lithium extraction;
  - 3C: exploration and characterization of critical materials and REEs from volcanic-hosted geothermal systems.

DOE expects to announce selections between July and the end of August, with funding awards issued between September and year-end. The estimated performance period is December 2026 to December 2029.

The Critical Minerals and Materials Accelerator is one of several programs developed through DOE's Critical Materials Collaborative. This NOFO is part of $1bn in critical materials funding announced by DOE in August 2025, and follows the Manufacturing Deployment Office's announcement of up to $500m for the development of demonstration and commercial facilities to increase the domestic supply of critical minerals and materials for advanced batteries.

Teaming Partner List

To facilitate the formation of project teams for this NOFO, the DOE is compiling a Teaming Partner List to allow organizations that may wish to participate in a project to explore potential partnerships with other applicants. It will be available on eXCHANGE and will be regularly updated.

www.energy.gov/cmei/ammto/critical-minerals-and-materials-

Supra extends pre-seed funding round with Rio Tinto as strategic investor

Supra Elemental Recovery Inc has announced a strategic investment from global mining and materials company Rio Tinto and Founders Factory through their mining technology accelerator. Structured as a combination of cash and in-kind services, the investment will enable Supra to build and commercialize its modular critical mineral recovery technology with insight and support from Rio Tinto.

Spun out from the University of Texas at Austin in February, Supra is focused on selectively recovering and refining high-purity critical minerals from waste streams. The firm is initially targeting elements such as gallium (Ga) and scandium (Sc).

Supra was selected as one of six startups globally from over 500 applicants. The cohort is focused on advancing exploration and processing technologies to meet growing demand for materials such as copper, lithium, and critical minerals. Supra joins Foresight Spatial Labs (Ottawa, Canada), Chemshift (Calgary, Canada), Material Difference (Cambridge, UK), Voluna (Boston, USA), and Watergenics (Berlin, Germany).

"Startups have an important role to play in solving some of mining's toughest challenges. Through our partnership with Founders Factory, we are connecting exceptional founders with Rio Tinto's operational and technical expertise to help turn promising ideas into technologies that could improve exploration, processing, and critical mineral recovery," Emily Hilton, general manager of innovation at Rio Tinto. "This cohort reflects the quality of innovation emerging globally, and we're excited about the potential to accelerate these solutions toward real-world deployment," she adds.

"We look forward to working closely with Rio Tinto and leveraging the firm's global expertise to accelerate our path to commercial deployment," says Supra's co-founder & chief operating officer Jordan Sessler. "We look forward to recovering high-purity elements from complex streams, including ore, tailings, and byproducts."

Rio Tinto and Founders Factory join Supra's existing pre-seed investors, including Crucible Capital, Climate Capital, Portmanteau Ventures, and UT Seed Fund. The funding will support continued technology development and preparation for commercial pilots.

www.getsupra.com
www.riotinto.com

Volta Metals receives $215,000 grant from Ontario Junior Exploration Program

Volta Metals Ltd of Toronto, Canada (which owns, has optioned and is exploring a critical minerals portfolio of rare-earths, gallium, lithium, cesium and tantalum projects in Ontario) has received approval for funding of up to $215,000 under the Ontario Junior Exploration Program (OJEP). The funding will support eligible exploration expenditures incurred in 2025 and the first two months of 2026 at its 4750-hectare Springer Rare Earth Element (REE) and Gallium Project, located about 70km east of Sudbury, Ontario, with direct access via the Trans-Canada Highway and Highway 64.

The $215,000 received is the maximum OJEP grant per project, which covers up to 50% of eligible mineral exploration expenditures incurred in Ontario during the 2025 and early 2026 field season. This funding has enabled Volta to expand its exploration program at the Springer REE Deposit and advance both drilling and geophysical programs targeting rare-earth and gallium mineralization.

"Ontario is leading the charge to secure the minerals that will power our economy and strengthen our sovereignty," states Stephen Lecce, Minister of Energy and Mines. "Through OJEP, we're backing companies like Volta Metals Ltd to advance promising projects here at home — unlocking resources, creating jobs, and building a more self-reliant and secure Canadian economy," he adds.

"This grant from the Government of Ontario represents a strong endorsement of the Springer REE Project and the significant progress our team has made over the past year," says Volta's president & CEO Kerem Usenmez. "The OJEP funding helps reduce exploration risk and allows us to advance more aggressive field programs without the need for additional shareholder dilution at this stage. Springer is one of the largest rare-earth deposits in North America, and this support from the Province reinforces the strategic importance of developing domestic critical mineral supply chains."

The Springer Rare Earth Element deposit is located on the traditional territory of the Nipissing First Nations in Sturgeon Falls, Ontario. The project benefits from well-developed infrastructure, including paved road access, on-site power lines fed from the Crystal Falls hydroelectric dam, a natural gas pipeline, and Canadian National Railway service, all within 8km of the deposit. Volta's portfolio also includes the Aki Project, and the firm continues to explore additional critical mineral targets in Ontario, one of the world's most prolific hard-rock critical mineral districts.

www.voltametals.ca

AlixLabs closes €15m Series A fundraising round with strategic investment from Stephen Industries

In first-quarter 2026, Sweden-based semiconductor equipment maker AlixLabs AB (which was spun off from Lund University in 2019, specializing in atomic layer epitaxy) closed its Series A funding round following a strategic investment from Stephen Industries, a Finnish investment company with a track record in scaling advanced technology ventures.

The investment marks a strategic milestone for AlixLabs as it continues to develop its proprietary atomic layer epitaxy (ALE) solutions with especially its flagship APS (Atomic Pitch Splitting) technology aimed at enabling more precise, efficient and cost-effective semiconductor fabrication.

A key dimension of the partnership is the involvement of Kustaa Poutiainen of Stephen Industries, whose experience in building and scaling deep-tech companies brings strategic value, it is rec koned. Poutiainen previously played a central role in the growth of Picosun, a Nordic atomic layer deposition (ALD) company that became a global leader in its field. Given the close technological relationship between ALD and ALE, this track record is particularly relevant to AlixLabs' mission, the firm reckons.

"Stephen Industries brings deep industrial expertise and a proven ability to scale companies in adjacent technology domains," says AlixLabs' CEO Jonas Sundqvist. "Kustaa's experience with Picosun is especially valuable as we move from development toward broader commercialization of our APS platform."

Atomic layer etching is widely seen as a critical enabler for future semiconductor nodes, complementing ALD processes by allowing atomic-scale precision in material removal, says AlixLabs. As device architectures become increasingly complex, ALE is expected to play a central role in manufacturing.

"AlixLabs operates in a highly promising space within semiconductor process technology," comments Stephen Industries' chairman & president Kustaa Poutiainen. "Having seen first-hand how ALD evolved from a niche innovation to a critical industry standard, I see strong parallels with ALE. AlixLabs has the potential to follow a similar trajectory."

The new funding will be used to accelerate product development, expand technical capabilities, and strengthen partnerships with semiconductor manufacturers.

www.alixlabs.com

AlixLabs and VDL ETG Projects announce MoU for industrialization of APS patterning

To advance the production of its APS (Atomic Pitch Splitting) equipment, Sweden-based semiconductor equipment maker AlixLabs AB (which was spun off from Lund University in 2019, specializing in atomic layer epitaxy) has signed a memorandum of understanding (MoU) with VDL ETG Projects (part of VDL Groep of Eindhoven, The Netherlands).

VDL ETG Projects supports firms in the transition from the feasibility to the design, engineering and realization of their equipment, scaling up the equipment manufacturing from first-of-a-kind units to batch manufacturing, and further to turnkey realization of complex production lines.

The agreement marks a step toward industrializing AlixLabs' APS technology, enabling scalable manufacturing solutions for advanced semiconductor patterning.

APS is designed to address critical challenges in next-generation semiconductor fabrication by enabling precise pitch splitting through atomic layer etching. This approach offers a cost-efficient and energy-conscious alternative to increasingly complex multi-patterning and EUV-based lithography.

Under the MoU, VDL ETG Projects will play a key role in developing and manufacturing the industrial APS tools, leveraging its expertise in system integration and high-tech equipment manufacturing. The collaboration aims to transition APS from advanced R&D into robust, production-ready systems for semiconductor fabs.

"This MoU represents an important milestone for AlixLabs as we move from technology validation toward industrial deployment," says AlixLabs' CEO Jonas Sundqvist. "Partnering with VDL ETG Projects strengthens our ability to scale APS and bring a new patterning paradigm to the semiconductor industry. Their industrialization capabilities are a strong complement to our process innovation," he adds.

"Implementation of AlixLabs' research in the manufacturing processes for advanced semiconductor devices will contribute to overall cost reductions and increased production speeds," says Sorin Stan, senior director for Emerging Technologies at VDL ETG. "Industrialization of the first-of-a-kind APS equipment currently under development for AlixLabs will play an essential role in fulfilling the next-node strategies at many of their customers."

The partnership reflects a shared aim to accelerate the adoption of innovative patterning technologies and support the semiconductor industry's need for sustainable scaling.

www.vdlgroep.com/en

Aixtron's preliminary Q1 order intake up 30% year-on-year, driven by Opto comprising 65% share

Full-year 2026 revenue guidance raised from €520m±€30m to €560m±€30m

Deposition equipment maker Aixtron SE of Herzogenrath, near Aachen, Germany has reported preliminary revenue of about €59m in first-quarter 2026, down 48% on €112.5m in Q1/2025, but within the guided range of €65m±€10m.

Gross profit and operating result were negatively affected by a mid-single-digit €million one-off amount related to a personnel measure. As a result, preliminary gross margin is down from Q1/2025's 30% to about 18%.

The preliminary operating result (EBIT) was about –€22m (EBIT margin of about –38%), compared with Q1/2025's €3.3m (EBIT margin of 3%).

Besides the one-off expenses, the main reason for the low gross margin and EBIT margin is the negative operating leverage due to low volume.

Nevertheless, due to continued positive cash flow development, preliminary cash and cash equivalents (including other current financial assets) rose during Q1/2026 from €224.6m to about €273m.

Preliminary order intake grew by about 30% year-on-year in Q1/2026 to about €171m, up from €132.2m in Q1/2025. More than 65% of equipment order intake came from stronger-than-expected demand in the Optoelectronics segment.

"The significantly stronger-than-expected demand from the Optoelectronics sector in the first quarter is a very encouraging development," comments CEO Dr Felix Grawert. "We expect this trend to continue and have therefore raised our guidance for the year. With our G10-AsP system, we have the tool of record for the next generation of photonic components, which are the basis for chip-to-chip, rack-to-rack and datacenter-to-datacenter communications in the AI era," he adds.

Based on the current market developments and an exchange rate of US$1.20/€, Aixtron has increased its full-year 2026 revenue guidance to €560m±€30m (previously €520m±€30m). Guidance for EBIT margin is now 17–20% (previously 16–19%). Gross margin is now expected to be about 42% (previously 41–42%).

www.aixtron.com

ACM Research unifies product portfolio as ACM Planetary Family

New portfolio structure reinforces customer-centric approach across core process technologies

ACM Research Inc of Fremont, CA, USA — which develops and manufactures processing equipment for semiconductor device and wafer- and panel-level packaging (WLP) applications — has announced a new branding and organization of its product portfolio into a unified, process-based structure, referred to as the ACM Planetary Family.

ACM's products are now organized into eight distinct families aligned with core process steps across the semiconductor manufacturing flow, collectively referred to as the Eight Planets series. The ACM Planetary Family product lineup hence comprises:

- Earth Series – cleaning tools;
- Jupiter Series – wafer-level advanced packaging tools;
- Venus Series – electroplating tools;
- Mars Series – furnace tools;
- Mercury Series – track tools;
- Saturn Series – plasma-enhanced chemical vapor deposition (PECVD) tools;
- Uranus Series – panel-level advanced packaging tools;
- Neptune Series – stress-free polishing tools.

This structure clarifies ACM's expanding product portfolio, supporting alignment with evolving customer requirements across front-end processing, advanced packaging and related applications.

"The ACM Planetary Family reflects the expansion of our product portfolio from a single cleaning product line at our founding in 1998, to a comprehensive multi-product portfolio of complementary product families today," says president & CEO Dr David Wang. "By aligning our offerings with key process steps, we are establishing a more structured foundation for our technologies that supports our long-term strategy focused on technology differentiation, product platformization and customer globalization," he adds.

"The new portfolio structure reinforces our commitment to customers and our product roadmaps," Wang says. "It supports how we organize our product portfolio around evolving customer requirements, maintaining a customer-centered approach."

www.acmr.com

Riber's net income grows 27% in 2025 to €5.2m, despite revenue falling by 2%

Order book rises by 24%, including further ROSIE system for silicon-based integrated photonics

For full-year 2025, molecular beam epitaxy (MBE) system maker Riber S.A. of Bezons, France has reported revenue of €40.3m, down 2.1% on 2024's €41.2m.

Revenue for Services & Accessories was €9.4m, down 7.8% on 2024's €10.2m, due notably to budgetary restrictions in the USA.

However, in an environment driven by strong demand for advanced semiconductor materials for artificial intelligence and data transmission applications, Riber saw solid activity in its production systems.

Revenue for MBE Systems hence remained stable at €30.9m, compared with €31m in 2024. This came from the delivery of 12 machines.

This included delivery of the first ROSIE (Riber Oxide on Silicon Epitaxy) system, which is claimed to be breakthrough technology in silicon-based integrated photonics. Designed to meet the growing requirements of optical transmission and reception applications, ROSIE is reckoned to open up new commercial opportunities in a fast-expanding market. The first two units were ordered in 2025, confirming growing industrial interest in MBE solutions compatible with 300mm production lines.

In this context, Riber achieved its revenue targets and recorded a significant improvement in its earnings compared with 2024.

Net income grows by 27%

Driven by a favorable product and pricing mix, gross margin rose from 36.1% in 2024 to 38.6% in 2025.

Reflecting both sustained business activity and effective cost control, net income rose by 27.1%, from €4.1m (10% of revenue) in 2024 to €5.2m (13% of revenue) in 2025. This includes a €0.5m tax income related to the recognition of tax loss carryforwards.

The cash position at end-2025 was €7.5m, compared with €8.6m at end-2024.

At the firm's general meeting on 17 June, the board of directors will propose a cash distribution (through a partial reimbursement of the issue premium) of €0.10 per share (up from €0.08 per share in 2024), to be released for payment on 24 June.

Order book grows by 24%

During 2025, the order book grew by 24%, from €21.7m to €26.9m. This comprises six MBE systems (€20.3m), including four production machines and one ROSIE platform, as well as services & accessories orders (€6.6m).

This does not include the order announced in January for a production system, to be delivered to Japan this year.

Outlook

"2025 marks an important milestone for Riber, with a significant improvement in our profitability and the first commercial successes of our ROSIE platform," says chairwoman & CEO Annie Geoffroy.

Against a backdrop of accelerating global investment in artificial intelligence, data infrastructure and quantum technologies, Riber reckons that it is positioned at the heart of next-generation semiconductor architectures. Demand for quantum dot lasers used in data centers continues to support the MBE production systems market.

Against a backdrop of accelerating global investment in AI, data infrastructure and quantum technologies, Riber reckons that it is positioned at the heart of next-generation semiconductor architectures. Demand for quantum dot lasers used in data centers continues to support the MBE production systems market

The rise of silicon-based integrated photonics is opening a new cycle of innovation and investment. In this context, the ROSIE platform represents an inflection point for the firm, with initial orders recorded in 2025 and a gradual ramp-up expected in the coming years.

In 2026, Riber will reach a milestone with the manufacturing of ROSIE 2, a dual-chamber cluster version. At the same time, the first BTO/STO (barium titanate oxide/strontium titanate oxide) thin-film samples on silicon wafers, developed as part of the partnership with NQCP (Novo Nordisk Foundation Quantum Computing Programme), will soon be made available to the scientific and industrial community, helping to accelerate the platform's adoption.

"We are now entering a new phase of development, driven by the industrialization of our technologies and their alignment with the growing needs related to artificial intelligence and data infrastructure," says Geoffroy. "Early market feedback and the upcoming availability of the first samples are expected to confirm the relevance of our technological roadmap."

In this favorable environment, given the visibility provided by its order book, Riber says that it enters 2026 with a positive growth outlook, subject to obtaining the export licenses required for the identified opportunities in its systems and services businesses to materialize.

www.riber.com

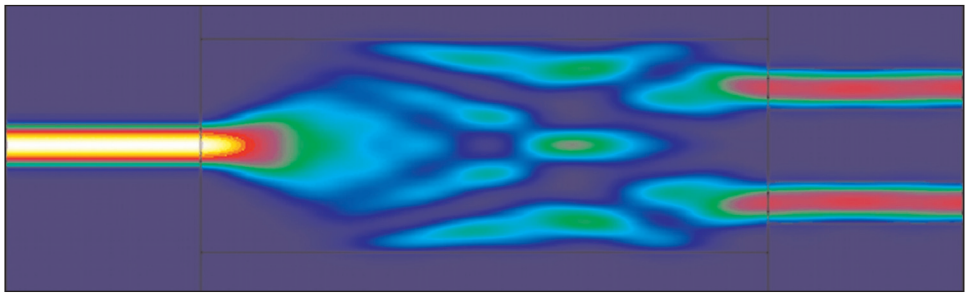
Photon Design's laser design course now part of Cardiff's physics curriculum

Course uses CAD software to produce manufacturable laser designs

Photonic simulation CAD software developer Photon Design Ltd of Oxford, UK has partnered with Cardiff University to deliver a two-day laser design course as part of its physics curriculum.

Students begin the course with laser theory and end by producing practical laser designs and models. They gain hands-on experience of Photon Design's CAD software, using its FIMMPROP simulation tool to create laser component designs, circuit simulations, and layouts. Students then progress to Photon Design's PICWave to produce a complete design workflow with three-dimensional, time-evolving, laser modelling. The course provides hands-on experience of how advanced simulation tools can simplify and accelerate the laser design process, producing functional laser designs within just two days.

"The unique partnership with Cardiff University gives students valuable, real-world industrial laser design experience, modelling physics in action," says Photon Design scientific advisor, Alex Edwards, who delivers the course. "Within two days, students produce manufacturable laser designs, clearly demonstrating the simplicity, speed and efficiency of the simulation tools and connecting academic theory to practical industry skills," he adds.



3D MMI simulation produced after one day using FIMMPROP EME.

"The course includes simulating photonic components like MMIs, rings and tapered waveguides with FIMMPROP. Introducing this EigenMode Expansion (EME)-based simulation tool is often pivotal for students, as they experience its impressive speed compared to the more familiar FDTD method. With EME, we conduct equally thorough simulations in seconds, not the hours required by FDTD, making it possible to iterate laser designs efficiently and an essential part of the process," Edwards continues.

"PICWave offers students many advanced physics effects, essential for modelling cutting-edge lasers. This covers optical mode propagation, thermal effects, carrier diffusion, and how their combined coupling will impact laser gain, ensuring the laser design meets individual application requirements," he adds.

"Our partnership with Cardiff University provides valuable feedback that helps to enhance our laser simulation products, informing and improving our next-generation of laser simulation tools."

www.photond.com

Aehr gains initial order from new silicon photonics transceiver customer

High-power FOX-XP wafer-level burn-in system for hyperscale data-center optical interconnect market

Semiconductor production test and reliability qualification equipment supplier Aehr Test Systems of Fremont, CA, USA has received an initial order from a major new customer that is "a global leader in networking products and solutions" and a "major supplier to the data-center optical transceiver market". The customer is developing advanced silicon photonics-based transceivers for data-center networking and optical I/O applications to address the rapidly accelerating demand for high-speed fiber-optic communication links in hyperscale AI and cloud data centers.

The order includes multiple systems for both engineering qualification and high-volume production, including a FOX-XP wafer-level burn-in (WLBI) system configured to test nine wafers in parallel, a fully integrated WaferPak Auto Aligner, multiple FOX-NP WLBI systems, and multiple full sets of FOX WaferPak full-wafer Contactors for production, engineering and new product introduction. The systems are scheduled to ship in Aehr's fiscal fourth quarter, ending 29 May. The customer has also provided Aehr with a forecast for additional systems, with follow-on orders possible as early as later this calendar year as it ramps capacity to support next-generation hyperscale data-center deployments.

"Data-center architectures are rapidly evolving as AI infrastructure scales, driving a major transition from traditional copper interconnects to fiber-optic communication links to meet the increasing demands for bandwidth, latency, signal integrity, thermal performance, and power efficiency," notes president & CEO Gayn Erickson. "Silicon photonics-based optical transceivers are a critical enabling technology for this transformation, and we believe this order is particularly significant because it comes from a major new customer that is a leading supplier of networking products and solutions for the data-center market," he adds.

"The customer is purchasing systems for both engineering qualification and high-volume production up front, reflecting the urgency of the ramp now underway to support the massive buildout of hyperscale AI and cloud data centers. We believe this customer engagement further validates WLBI as an increasingly important part of the silicon photonics manufacturing flow and highlights the potential for silicon photonics to become a meaningful long-term growth driver for Aehr's WLBI business," Erickson says.

"This win positions Aehr to participate in what could be a significant multi-year expansion of silicon photonics production, driven by the growth of fiber-optic interconnects in hyperscale AI data centers."

This order is particularly significant because it comes from a major new customer that is a leading supplier of networking products and solutions for the data-center market. The customer is purchasing systems for both engineering qualification and high-volume production up front, reflecting the urgency of the ramp now underway

As data-center architectures scale to support AI, cloud computing, and high-performance networking, fiber-optic interconnects offer significant advantages over copper wiring, including higher data rates, lower power consumption, longer reach, improved thermal performance, and reduced electromagnetic interference. These advantages are driving rapid adoption of silicon photonics transceivers across hyperscale and enterprise data-centers worldwide and increasing demand for cost-effective, production-proven burn-in solutions that can ensure device quality and long-term reliability at volume.

Aehr claims to be the market leader in WLBI for silicon photonics transceivers, with a large installed base at leading global semiconductor and photonics companies.

The FOX-XP platform enables high-parallelism, high-temperature and high-power WLBI, allowing customers to identify early-life failures before packaging while significantly reducing cost of test.

"With our high-power FOX-XP configuration, which we began shipping last year, we offer the highest power-per-wafer WLBI capability in the industry — up to 3500W per wafer," Erickson says. "This proven system is already installed and in production at a world-leading silicon photonics integrated circuit supplier supporting data-center and optical I/O applications. In this case, we were able to demonstrate production-ready systems on our manufacturing floor that met the customer's performance and throughput requirements. That capability, combined with our leadership in WLBI for silicon photonics and our ability to support customers from qualification through high-volume production, was a key factor in the customer's decision to select Aehr," he adds.

www.aehr.com

Marktech launches high-power 280nm UVC LEDs

Wall-plug efficiencies of up to 7%, with longevity exceeding 15,000 hours at L70

Marktech Optoelectronics Inc of Latham, NY, USA has made available for order several new 280nm UVC LEDs in single-chip, two-chip and four-chip configurations, designed to accelerate the development and prototyping of UVGI water purifiers, air disinfection systems, and surface sanitizers.

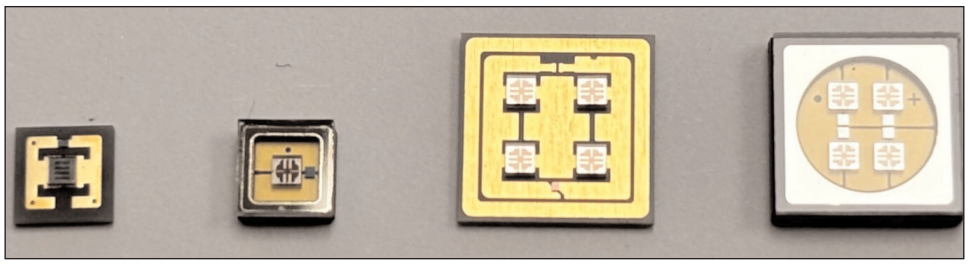
Advantages of the new 280nm UVC LEDs are cited as:

- High efficiency: Featuring 280nm-emitting chips, the UVC LEDs are claimed to provide outstanding power efficiency, with wall-plug efficiencies of up to 7%.
- Durability and eco-friendliness: The UVC LEDs are designed for longevity, exceeding 15,000 hours at L70.
- Multiple-chip options: Two, four and custom multiple UVC LED chip options enable high optical output in a compact format for demanding disinfection, medical device sterilization, and sanitization applications.
- Versatile applications: 280nm UVC LEDs are suitable for a diverse range of uses such as medical equipment, gas monitors, water quality sensors, DNA purity analyzers, UVGI air systems, water purifiers, surface sanitizers, and consumer appliances.

Marktech notes that 280nm UVC LEDs are key components in a wide array of applications, including water quality sensors, DNA purity or protein analyzers, UV-visible spectrometers, UV illuminators, upper-air disinfection systems, UV tower surface sanitizing robots, and UVC water purifiers, across both industrial and consumer product sectors.

Key applications of 280nm-wavelength UVC light are cited as:

- Biochemistry & proteomics: Used in spectrophotometers (such as Nanodrop) to measure protein concentration, often to calculate the ratio to assess protein contamination in nucleic acid samples.
- Sterilization & disinfection: As part of the UV-C spectrum, this wavelength acts as a strong germicidal agent by damaging the DNA/RNA and protein of microorganisms.
- Label-free biomedical imaging: The 280nm wavelength can be used in microscopy to detect the intrinsic fluorescence (autofluorescence) of tyrosine and tryptophan in proteins, allowing imaging of tissues without staining.
- Chromatography inspection: Used in liquid chromatography detectors to monitor protein elution in real-time.
- Material inspection & curing: UV LED systems can utilize this wavelength for specialized curing of inks, adhesives and coatings, as well as in industrial inspections.



Single-chip 280nm UVC LEDs: far left, COS/No Lens; second from left, flat lens SMD. Four-chip 280nm UVC LEDs: second from right, COS/No Lens; far right, flat lens SMD.

UVC light destroys bacteria and microbes by damaging their DNA, making them unable to reproduce. The effectiveness of a UVGI system depends on two factors: the germicidal efficiency of the wavelength used, and the optical output power delivered to the target surface. While 260–265nm wavelengths sit closest to DNA's peak absorption point, the dose of UV energy delivered — measured in mW/cm^2 over time — is equally critical to how quickly pathogens are inactivated.

Due to more favorable semiconductor physics in aluminium gallium nitride AlGaN LED structures, 280nm LEDs can deliver significantly higher optical output than their 265nm counterparts, often 2–5 times greater

Due to more favorable semiconductor physics in aluminium gallium nitride AlGaN LED structures, 280nm LEDs can deliver significantly higher optical output than their 265nm counterparts, often 2–5 times greater. This higher irradiance means that target inactivation doses are reached faster, more than compensating for the modest reduction in per-photon germicidal efficiency. Additionally, 280nm light damages both microbial DNA and proteins, providing a broader inactivation mechanism that enhances overall system performance.

"The introduction of 280nm UVC LEDs from Marktech is a significant milestone for both sensing and germicidal UV applications," claims chief marketing officer Gary Kardys. "By providing these high-power UVC LEDs, we are delivering superior high power with long life and a reasonable $/watt cost, which empowers designers to bring more efficient solutions to market quicker than ever."

www.marktechopto.com
https://marktechopto.com/

Silanna UV adds TO-39 flat-window package to SF1 and SN3 series of UV-C LEDs

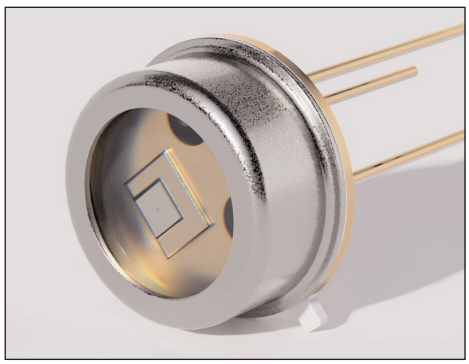
Flat-window configuration targeted at next-gen analytical, environmental, and medical devices

Silanna UV of Brisbane, Australia — which provides far-UVC light sources for water quality sensors, gas sensors, disinfection, and HPLC (high-performance liquid chromatography) applications — has released an additional package type: a TO-39 flat-window package for its high-performance SF1 series (Far-UVC 235nm) and SN3 series (Deep-UVC 255nm) LEDs. This latest development expands the firm's comprehensive metal can UVC LED portfolio, delivering greater optical flexibility, compact integration, and proven reliability for advanced sensing applications.

The new flat-window configuration is designed to meet the evolving requirements of next-generation analytical, environmental, and medical devices. By enabling the integration of custom secondary optics, the package allows precise beam shaping, optimizing performance across water, air and gas sensing applications.

Enhanced design flexibility and integration

The TO-39 flat-window package introduces several key advantages. Its optical flexibility allows engineers to integrate external lenses or light guides, enabling precise control of beam angles to suit specific sensing or flow-chamber requirements. The low-profile flat lid improves space efficiency, supporting compact system designs suitable for portable water purification systems and handheld medical sterilization devices.



TO-39 flat-window package for Silanna UV's SN3 series LEDs.

Built on Silanna UV's patented nitride semiconductor technology, the package also delivers proven reliability, maintaining high thermal stability and long operational lifetimes, as demonstrated by the SF1 and SN3 series in real-world customer testing.

SN3 series: high-performance deep UVC for analytical precision

The SN3 series delivers powerful deep UVC output at a peak wavelength of 255nm, making it highly effective for detecting chemical oxygen demand (COD) and total organic carbon (TOC) in water, as well as ozone in gas sensing applications. Featuring a wide 120º viewing angle and high optical output power, the SN3-5T9FWL1 is suited to demanding use cases including chemical and biological analysis, water quality monitoring, gas sensing, and liquid chromatography. The device also integrates ESD protection within an industry-standard metal-can footprint, ensuring durability and reliable performance in harsh and challenging environments.

SF1 series: far-UVC innovation for expanded sensing capabilities

Operating at a peak wavelength of 235nm, the SF1 series enables new sensing capabilities that require shorter wavelengths. The SF1-3T9FWL1 supports accurate detection of nitrate (NO_3) and nitrite (NO_2) in water, as well as carbon dioxide (CO_2) in gas analysis applications. Its hermetically sealed TO-can package provides enhanced environmental protection, while the mercury-free design offers a more robust and sustainable alternative to traditional UV lamps.

Suitable for chemical and biological analysis, water monitoring, gas sensing, and HPLC applications, the SF1 series combines versatility with proven reliability. Like the SN3 series, SF1 devices also incorporate integrated ESD protection within a compact, industry-standard package.

https://silannauv.com/products

SemiLEDs' quarterly revenue more than halves

Expenses and losses cut further

For its fiscal second-quarter 2026 (to end-February), LED chip and component maker SemiLEDs Corp of Hsinchu, Taiwan has reported revenue of $1.064m, more than halving from $2.57m last quarter and down from $10.87m a year ago, due to the absence of any buy–sell purchase orders of equipment (which were $9.4m a year ago).

Gross margin was 1%, level with last quarter.

Operating expenses have been cut further, from $1.03m last quarter to $0.85m.

Operating loss has hence been cut, from $1.01m to $0.845m.

Net loss has been cut further, from $742,000 ($0.09 per diluted share) to $603,000 ($0.07 per diluted share).

During the quarter, cash and cash equivalents rose from $2.9m to $4m.

SemiLEDs says that it anticipates buy–sell purchase orders in fiscal second half 2026 (to end-May).

www.semileds.com

Polar Light awarded €1.1m EU grant for 18-month 2ndGenMicroLED project

Project with Finetech to deliver first dual-color micro-LED micro-display prototype on bottom-up pyramidal LED architecture

Polar Light Technologies AB — which stems from research by founder professor Per-Olof Holtz and his team at Linköping University (with support from Sweden's innovation agency Vinnova) — has been awarded a European Union (EU) Eurostars grant.With a total budget of €1.1m, the 18-month project '2ndGenMicroLED' aims to deliver the first dual-color micro-LED micro-display prototype built on a bottom-up pyramidal LED architecture. Finetech GmbH & Co KG of Berlin, Germany (a supplier of sub-micron and high-accuracy die bonding solutions) joins the consortium, contributing its expertise in high-accuracy die attach and advanced packaging.

The project responds to a rapidly growing need for smaller, brighter and more energy-efficient micro-displays for next-generation head-up displays (HUD) and spatial computing platforms.

Key highlights include:

- Polar Light grows pyramidal GaN/InGaN micro-LEDs bottom-up directly on gallium nitride (GaN) epiwafers;
- this approach enables ultra-compact pixels and high brightness, providing a clear path toward monolithic RGB displays in a single material system;
- this project will supplement the firm's plans to bring its first commercial products to market in 2026.

"Securing this EU grant is a strong endorsement of Polar Light Technologies and our next-generation micro-LED platform," says CEO Oskar Fajerson. "The Eurostars funding validates both the scientific excellence of our bottom-up pyramidal technology and its commercial potential. With this support, we will accelerate development toward a dual-color demonstrator — a critical milestone on our path to monolithic RGB microdisplay."

"Next-generation micro-displays demand extreme bonding accuracy," says Finetech's CEO Carlotta Baumann. "Finetech brings its ultra-precise bonding expertise to integrate dual-color micro-LEDs and ensure a seamless transition from prototype development to scalable production."

www.finetech.de
www.polar-light-technologies.com

CEA-Leti, CEA-List and PSMC collaborate to integrate RISC-V and micro-LED silicon photonics into 3D stacking and interposer

To deliver solutions for next-generation artificial intelligence (AI) systems, a strategic collaboration has been announced that will leverage the RISC-V design expertise of smart digital system specialist CEA-List and the silicon photonics expertise of micro/nanotechnology R&D center CEA-Leti of Grenoble, France to introduce high-bandwidth communication and high-efficiency computing technologies into the established 3D stacking and interposer platforms of Taiwanese foundry Powerchip Semiconductor Manufacturing Corp (PSMC).

The semiconductor industry faces mounting challenges, including the physical limits of traditional copper interconnects, increasingly stringent power budgets, and the urgent need for flexible, scalable computing architectures. By integrating short-reach, high-bandwidth optical links for energy-efficient data movement and customizable RISC-V processor architectures, the collaboration directly addresses these constraints and aims to establish a new paradigm in high-performance data transport and computing architecture.

"RISC-V is transforming processor design by combining openness, flexibility and cost efficiency. Its customizable architecture allows industrial players to develop solutions tailored to their needs," says Olivier Thomas, deputy head of the Digital IC Design Division at CEA-List. "Our joint effort will give customers a customizable compute platform that meets the performance and power targets," he adds.

"In the collaboration, micro-LED is a critical enabling technology that will boost optical communication throughput using low-power GaN LED solutions," says CEA-Leti's CEO Sébastien Dauvé.

"This collaboration enriches PSMC's 3D stacking and interposer technology envelope with high-efficiency RISC-V computing IP and high-bandwidth silicon photonics chiplet communication," says PSMC's chief technology officer Dr Shou-Zen Chang. "By leveraging the expertise of CEA-Leti and CEA-List alongside PSMC's technologies, we will provide foundry services to customers for next-generation AI applications."

www.powerchip.com
https://list.cea.fr/en/
www.leti.fr

InPHRED expands into data-center optical interconnect market with InP VCSEL and micro-RC-LED solutions

Nanoporous semiconductor platform targets ultra-short-reach optical I/O and intra-data-center optical interconnects for AI infrastructure

InPHRED Inc of Boston, MA, USA (a developer of next-generation photonics solutions for consumer sensing and digital health that was founded in 2023 at Yale University) has announced its formal expansion into the data-center optical interconnect market, extending its nanoporous platform into high-speed connectivity solutions for next-generation AI infrastructure.

As demand for AI infrastructure surges and hyperscalers push for higher bandwidth density, lower power consumption, and more scalable architectures, InPHRED notes that optical I/O is increasingly defined by two key design questions: how close the optical engine is to the ASIC, and how far the optical link must carry data.

Across the industry, architectures such as mid-board optics (MBO), near-packaged optics (NPO) and co-packaged optics (CPO) are designed to reduce the electrical distance between ASICs and optical engines, improving signal integrity and lowering power consumption. Separately, optical links are commonly deployed across a range of reach classes, from copper and active electrical links at the shortest distances, to multi-mode fiber for short-reach links, to single-mode fiber for longer intra-data-center connections.

InPHRED's optical I/O roadmap

InPHRED says that its optical interconnect strategy is focused on two complementary 'wide and slow' approaches spanning ultra-short-reach optical I/O and longer-reach intra-data-center links. Its gallium nitride (GaN) micro-resonant cavity light-emitting diode (μRC-LED) targets ultra-short-reach chip-to-chip and on-board optical I/O, where the priority is to replace legacy copper with dense, power-efficient optical engines positioned close to advanced compute packages.

The company's 1310nm indium phosphide (InP) vertical-cavity surface-emitting laser (VCSEL) roadmap is aimed at single-mode optical engines that may be deployed in MBO or NPO architectures, while serving rack-scale and adjacent-rack links where high-temperature reliability, direct-drive operation, and lower system complexity become increasingly important.

"As AI systems scale, the challenge is not only how far data must travel optically but also how far high-speed electrical signals must travel before they become light," says chief scientist & co-founder professor Jung Han. "We believe InPHRED is well positioned to address both problems: micro-RC-LEDs for ultra-short-reach optical I/O close to advanced compute packages, and InP VCSELs for efficient single-mode optical engines that can support longer intra-data-center connectivity."

Its GaN micro-resonant-cavity light-emitting diode targets ultra-short-reach chip-to-chip and on-board optical I/O, where the priority is to replace legacy copper with dense, power-efficient optical engines positioned close to advanced compute packages

InPHRED is targeting initial demonstration milestones in first-quarter 2027 across both technology paths.

For μRC-LED optical I/O, InPHRED is targeting an initial demonstration of a 200-lane array architecture with 0.3 numerical aperture on sapphire. This milestone is intended to validate a path toward dense optical-I/O architectures in which very high channel counts may become practical with minimal or no per-channel microlens coupling complexity. The demonstration is expected to include initial proof metrics such as target coupling loss of below 3dB and system energy efficiency of 4pJ/bit.

For 1310nm interconnects, InPHRED is targeting an initial demonstration of a 32-channel, 50Gbps-per-lane 2D InP VCSEL optical engine. This milestone is intended to establish a foundational building block for future package-level optical solutions in which multiple engines could be tiled around the ASIC perimeter to minimize electrical reach. The demonstration is expected to include initial proof metrics such as target operating case temperature of 100°C with a path toward 120–150°C, and target fiber-coupling loss of below 2dB per channel.

As electrical I/O loss, thermal load and bandwidth density constraints intensify in AI infrastructure, InPHRED believes that multiple optical approaches will coexist across different reaches and system architectures. By extending its nanoporous semiconductor platform into both InP VCSEL and micro-RC-LED optical interconnects, the firm is pursuing a differentiated position across ultra-short-reach optical I/O and longer-reach intra-data-center connectivity.

InPHRED commercializes next-generation semiconductor solutions based on Yale University technology. Its product portfolio includes SWIR VCSELs and RC-LEDs built on a scalable nanoporous platform, enabling applications across sensing, digital health, and high-speed connectivity.

www.inphred.com

Nuvoton releases 4.5W 402nm violet laser, boosting power output by 1.5x

Replacement of h-line (405nm) mercury lamp light sources targets maskless lithography for advanced packaging

Nuvoton Technology of Kyoto, Japan has announced the start of mass production of the KLC434FL01WW high-power violet laser diode (402nm, 4.5W), which achieves what is claimed to be industry-leading optical output in a 9.0mm-diameter TO-9 CAN package, for continuous-wave (CW) operation at a case temperature (T_c) of 25°C. Due to the proprietary device structure and heat-dissipation design technology, the new product achieves 1.5 times the 3.0W optical output of the firm's conventional 402nm product in a TO-9 CAN package (the KLC432FL01WW), contributing to improved production throughput in optical equipment such as maskless lithography systems. Furthermore, adding this product to the firm's lineup enables the product portfolio to support major photosensitive materials used in advanced semiconductor packaging.

The new product expands Nuvoton's lineup of ultraviolet (378/379nm), violet (402nm) and indigo (420nm) semiconductor laser diodes designed to replace the i-line (365nm), h-line (405nm), and g-line (436nm) emission lines of mercury lamps, providing new options in light source selection.

Boosting 402nm laser power by 1.5x to 4.5W speeds maskless lithography system production throughput

Violet (402nm) laser diodes generally suffer from relatively low wall-plug efficiency and significant self-heating, and are also prone to short-wavelength-induced degradation, which makes stable high-power operation difficult.

To address these challenges, Nuvoton has developed a device structure that enhances wall-plug efficiency (WPE) and high-thermal-conduction package technology that effectively dissipates heat. These technologies were used in the firm's 379nm, 1.0W high-power ultraviolet laser diode for i-line applications launched in January, and have since been expanded to the violet (402nm) band for h-line applications.

The new 4.5W 402nm violet laser diode achieves 1.5 times the optical output of the prior product by applying the firm's proprietary facet coating technology (which suppresses degradation factors at the laser facets, improving the lifetime performance during high-power operation). Also, by adopting a

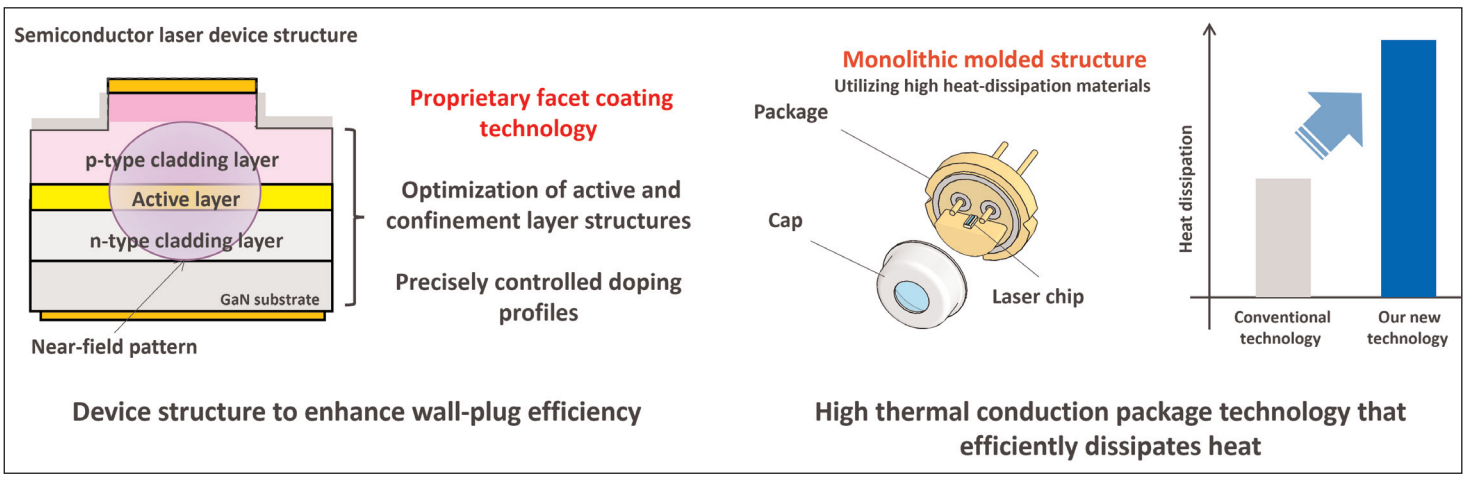


Figure 1: Device structure that enhances wall-plug efficiency and High thermal conduction package technology that effectively dissipates heat.

Main photosensitive materials	Our proposed products	Emission lines of a mercury lamp
i-line photoresist (Liquid photoresist)	High-Power Ultraviolet Laser Diode (379 nm, 1.0 W) Part No. : KLC330FL01WW	i-line (365 nm)
h-line compatible Dry film resist	High-Power Violet Laser Diode (402 nm, 4.5 W) Part No. : KLC434FL01WW	h-line (405 nm)

Featured products of this news release

Major photosensitive materials in maskless lithography for advanced semiconductor packages and proposed products.

monolithic molded structure using high-heat-dissipation materials for the package, Nuvoton has improved heat-dissipation performance.

By achieving both high power and high reliability, the new laser can enhance production throughput in industrial optical equipment where high quality is required, says the firm.

Expanded range of light sources for maskless lithography in advanced packaging supports multiple photosensitive materials

Nuvoton reckons that the new product can deliver significant value in maskless lithography for advanced packaging, a market that is growing rapidly, driven by expanding demand for artificial intelligence (AI) and other applications.

In circuit formation for advanced packages, maskless lithography technology that directly exposes (draws) wiring patterns based on design data has been attracting attention in recent years, as it enables not only cost reduction and development time shortening but also high-precision patterning correction in response to substrate warpage and distortion.

For laser diodes, which are one of the main light sources in maskless lithography technology, there has been demand for compatibility with wavelengths close to the i-line (365nm) and h-line (405nm), which are the emission lines of mercury lamps, in order to correspond to the main photosensitive materials, as well as higher output for the purpose of improving the production throughput of equipment.

Nuvoton says that this expansion of its range of semiconductor laser-based light sources for maskless lithography in advanced packaging from i-line (365nm) to h-line (405nm) mercury lamp replacement enables consistent support for multiple major photosensitive materials while contributing to higher production throughput of equipment.

The h-line (405nm) emission of mercury lamps is used in a wide range of fields such as photocuring, 3D printing, sensing, biomedical applications, and marking. So, Nuvoton says that its new 4.5W 402nm violet laser diode provides a new option as an alternative light source for these applications.

Furthermore, by leveraging its high-power performance, it can contribute to improving the efficiency of processes that were difficult to realize in the past, as well as to creating new optical applications, the firm reckons.

The new product was exhibited at OPIE'26 (OPTICS & PHOTONICS International Exhibition) at Pacifico Yokohama, Japan (22–24 April). Mass production starts in May.

www.opie.jp/en
www.nuvoton.com/products/laser-diodes/semiconductor-laser/violet

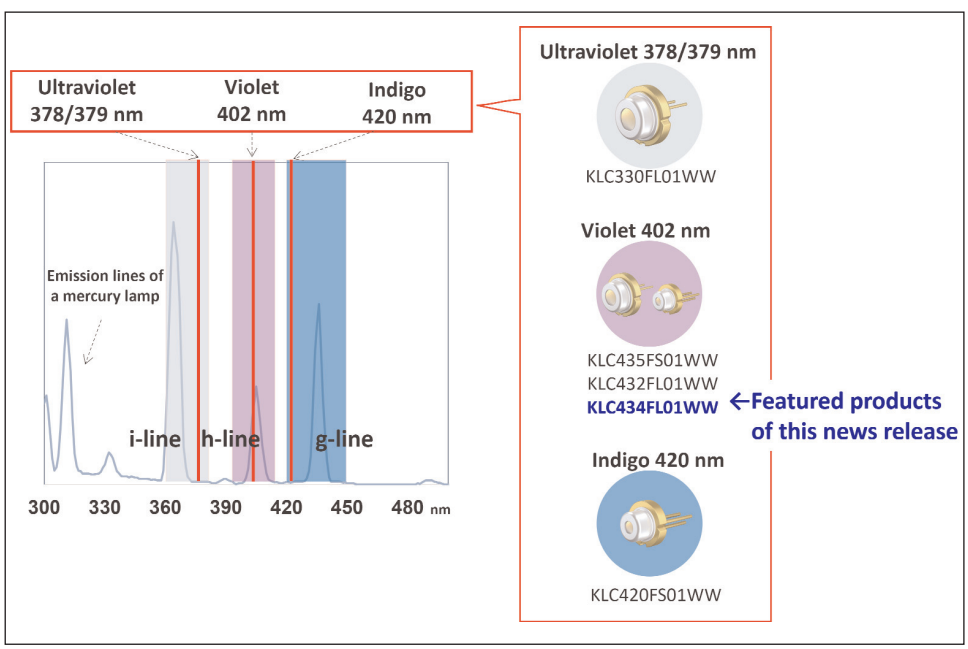


Figure 2: Mercury lamp replacement solution using semiconductor lasers developed byNuvoton.

BluGlass completes upsized AUS$8m placement

Proceeds to be used to scale GaN laser operations, add fab equipment, and support contracts

BluGlass Ltd of Silverwater, Australia — which develops and manufactures gallium nitride (GaN) visible laser diodes based on its proprietary low-temperature, low-hydrogen remote-plasma chemical vapor deposition (RPCVD) technology — has received commitments from investors to raise about AUS$8m (before costs) at an issue price of AUS$0.24 per share. The upsized placement includes one free attaching option for every share subscribed for under the placement, exercisable at AUS$0.38 and expiring on 31 May 2028.

The placement comprises a AUS$2.3m cornerstone investment from the board and management, inclusive of a AUS$2m commitment from executive chair Omer Granit. Board participation and the issue of attaching options is subject to shareholder approval.

Funds will be used to scale BluGlass' GaN laser operations, additional fab equipment, and support new and existing contracts.

"Strong demand from new and existing institutional and sophisticated investors reflects BluGlass' operational momentum, delivering almost US$3m in development contracts and orders in recent months," says Granit. "This capital enhances BluGlass' ability to develop and supply high-fidelity GaN lasers for emerging strategic technologies, capitalizing on global investment in critical manufacturing technologies and supporting the continued conversion of our more than US$100m project pipeline," he adds.

"Board and management's participation in the raise reinforces our confidence in BluGlass' GaN laser technology, growing addressable market, and long-term growth runway. Lasers are a critical component for all next-generation technologies, and we are well positioned to take share as adoption of GaN lasers increase exponentially," Granit continues.

"Our growing customer base includes the US Department of War, the Indian Ministry of Defence, tier-1 defence primes, and Fortune 500 technology companies, reflecting our unique position as one of just two GaN laser suppliers with US manufacturing facilities at a time when the Government is increasingly onshoring critical capabilities," notes CEO & executive director Jim Haden. "We've had a strong start to the calendar year with momentum continuing to build across multiple target verticals, including defence & aerospace, quantum and biotech."

Placement details

BluGlass has secured firm commitments of AUS$8m and proposes the issuance of 33.5 million new shares to institutional and sophisticated investors at an issue price of AUS$0.24 per share.

Participants in the placement will receive one unquoted free-attaching option for each placement share with an exercise price of AUS$0.38 and expiry date of 31 May 2028. The attaching options shall not be listed. Director participation in the placement and issue of attaching options are subject to shareholder approval at an extraordinary general meeting (EGM) on or around 25 May.

Shares under the placement will be issued as follows:

- Tranche 1 placement to raise $5.6m (before costs) through the issuance of about 23.5 million new shares (to be allotted on 17 April) pursuant to the company's placement capacity under Listing Rules 7.1 and 7.1A; and
- Tranche 2 placement to certain investors, including board and management to raise AUS$2.4m (before costs) through the issuance of 10.1 million new shares (to be allotted on or around 28 May).

The issue price of $0.24 is a:

- 7% discount to the 15-day volume-weighted average price;
- 9% discount to the 5-day volume-weighted average price; and
- 2% discount to the last traded price.

Executive chair services agreement

While the board considers independent specialist remuneration advice, Granit has entered into an interim executive services agreement with BluGlass for an initial term ending on 30 April. Granit is entitled to total remuneration of US$25,000 per month as executive chair. Consistent with this agreement, the firm has paid Granit US$75,000 remuneration as executive chair for the period 1 January–31 March. The board expects to finalze Granit's ongoing remuneration structure in the coming weeks.

www.bluglass.com.au

BluGlass signs AUS$1.3m collaboration agreement

BluGlass has entered a AUS$1.3m strategic collaboration with a "Fortune 500 global mass-capacity data storage leader".

The collaboration will leverage BluGlass' expertise in laser technology to support the customer's future photonics research and development.

"Rapid advances in photonics are accelerating demand for more efficient, lower-power, and increasingly compact technologies," says CEO Jim Haden. "BluGlass' solutions are being selected by strategic partners and industry leaders to help solve complex innovation challenges."

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NUBURU wins counter-drone directed-energy order from government defense electronics organization in Asia–Pacific

Operational evaluation yields initial $250,000 deployment order; $575,000–800,000 phase 2 order expected

NUBURU Inc of Centennial, CO, USA (a dual-use defense & security platform company focused on non-kinetic effects, directed-energy technologies, and software-orchestrated defense systems) says that its subsidiary Lyocon S.r.l. (an Italian laser-technology company specializing in the design, manufacturing and integration of high-power blue laser systems for industrial applications) has secured an initial deployment order for its portable directed-energy laser dazzler system for counter-drone (C-UAV) defense applications from a tier-one government-owned defense electronics organization operating within a centralized government procurement framework in a major Asia–Pacific defense market.

Counter-drone technologies have rapidly become a priority across global defense agencies as the proliferation of low-cost unmanned aerial systems (UAS) continues to reshape modern battlefield and security environments, driving demand for scalable, non-kinetic mitigation solutions capable of real-time deployment.

The customer organization is a government-controlled defense electronics and systems integrator operating at the core of national defense infrastructure. The organization designs, develops and deploys mission-critical defense systems across multiple domains, including electronic warfare, secure communications, sensor technologies, and integrated command-and-control architectures. It plays a central role in national defense modernization initiatives and large-scale program execution, supporting system integration, deployment and lifecycle management across multiple operational environments.

Following a structured multi-phase validation and operational evaluation process — including prototype trials, production-level testing, and technical performance verification — the engagement has progressed into initial operational deployment, marking the company's transition from system validation to early-stage field deployment within a government-led defense environment.

NUBURU says that it has has secured an initial deployment order valued at about $250,000. This represents the first commercial deployment within a broader engagement framework and establishes an early revenue pathway within a large-scale government defense ecosystem.

From validation to operational deployment

The order reflects the completion of a multi-phase engagement process that included:

- prototype development and testing;
- production-prototype validation; and
- technical evaluation and performance verification.

NUBURU believes that this progression validates both the technical performance and operational relevance of Lyocon's directed-energy system in real-world defense scenarios and supports further integration into existing defense architectures.

The system is expected to deliver attractive gross margin characteristics consistent with high-value directed-energy and defense electronics systems, with potential for further improvement as production volumes scale.

Follow-on program expansion discussions

In parallel with the initial deployment, NUBURU and the customer are engaged in ongoing discussions regarding a potential second-phase program that is expected to include:

- lower-power (1W) system configurations;
- expanded operational deployment scenarios; and
- broader production scope across additional units.

NUBURU estimates that this potential phase 2 opportunity could range between about $575,000 and $800,000, subject to further technical validation, evolving operational requirements, and formal contractual agreements.

Subject to successful execution of the initial deployment, a follow-on program could be formalized during 2026, with deliveries anticipated in 2027.

Scalable system architecture and production readiness

The Lyocon directed-energy system has been engineered with a focus on modularity, scalability and manufacturability, enabling:

- rapid transition from initial deployments to larger-scale production programs;
- flexible configuration across multiple power levels and mission profiles; and
- integration into layered counter-drone and electronic warfare architectures.

NUBURU believes that the system offers compelling economic characteristics consistent with semiconductor-based directed-energy technologies, with potential for margin expansion as production volumes scale and supply chain efficiencies are realized.

Positioning within a national defense ecosystem

NUBURU believes that engagement with the customer provides a strategic entry point into a government-led defense procurement and deployment ecosystem characterized by centralized integration, multi-branch operational requirements, and repeat procurement cycles.

The customer's role as a national defense electronics provider and system integrator positions it as a key gateway for deployment across:

- multiple operational units within the armed forces;
- homeland security and border protection applications; and
- integrated air defense and counter-UAV frameworks.

NUBURU believes that successful execution of this deployment may support broader replication opportunities within similar government-led defense ecosystems globally.

Addressing a rapidly expanding global market

The proliferation of low-cost UAVs across both tactical and commercial environments continues to drive urgent demand for effective counter-drone technologies across military, homeland security, and critical infrastructure sectors.

Industry research indicates that the global counter-UAS market is expected to exceed $20bn by 2030, driven by increasing adoption of layered defense systems combining detection, electronic warfare, and directed-energy mitigation capabilities.

Portable non-kinetic mitigation systems are emerging as a critical segment within this market, driven by the need to protect personnel, mobile assets, and sensitive infrastructure in dynamic operational environments.

Portable directed-energy system for field deployment

Lyocon's counter-drone system leverages NUBURU's semiconductor laser expertise and is engineered to provide non-kinetic optical countermeasures against UAV threats.

Key capabilities include:

- multi-wavelength configuration (green, blue, infrared);
- scalable optical power (1–10W);
- adjustable beam divergence (2.5–50mrad);
- precision beam control and dynamic regulation;
- lightweight, rifle-mounted architecture; and
- compatibility with standard military platforms.

The system is designed to:

- disrupt UAV visual and sensor systems;
- degrade electro-optical and infrared payloads;
- provide tactical perimeter defense; and
- enable rapid deployment in operational environments.

Strategic positioning within NUBURU's defense platform

The Lyocon program represents a key component of NUBURU's broader defense & security platform, including activities led by Nuburu Defense LLC, which integrates:

- directed-energy technologies;
- electronic warfare systems;
- AI-enabled mission software; and
- mobile and tactical defense solutions.

Lyocon operates as a subsidiary within the NUBURU group and serves as a core operating unit for its directed-energy and defense-related initiatives.

Management commentary

"This initial deployment marks an important milestone for our team as we transition from development and validation into operational field deployment," says Lyocon's executive director Paola Zanzola. "The successful completion of the evaluation process demonstrates the effectiveness of our technology in real-world scenarios and supports further expansion into broader defense applications, he adds. "

"This engagement represents a significant step in NUBURU's strategy to establish a scalable presence within the global counter-drone defense market," says Dario Barisoni, co-CEO of NUBURU Inc & CEO of Nuburu Defense LLC. "Entry into a government-led defense ecosystem of this scale validates both our technology and our broader platform approach, and we believe it provides a foundation for future expansion across additional programs and international markets."

Commercial outlook

NUBURU expects that this initial deployment may:

- serve as a reference implementation for additional defense customers;
- support follow-on procurement opportunities; and
- enable expansion into broader operational programs.

NUBURU says that it will continue to advance discussions with defense and security organizations globally as part of its commercial expansion strategy.

www.lyocon.com
www.nuburu.net
www.orbitopenplatform.com

Vexlum and Menlo to streamline optical clock development

Partnership to accelerate transformation of navigation, data synchronization, and fundamental physics research with new modular optical precision technology

Finland-based laser developer and maker Vexlum (which was spun off from Tampere University of Technology's Optoelectronics Research Centre in 2017) and precision photonics technology provider Menlo Systems GmbH of Martinsried near Munich, Germany, are collaborating to accelerate the development of ultra-precise optical atomic clock timekeeping by providing an accessible, modular photonics source.

Currently, the complexity and cost make it difficult to build and operate optical atomic clocks at scale. Vexlum and Menlo are joining forces to develop a system that makes building optical clocks more accessible, reliable and cost-effective. The collaboration is part of the VEQTOR project, funded by EUROSTARS, a program supporting the advancement of quantum technology within Europe.

The aim of the collaboration is to combine Vexlum's high-power lasers with Menlo's precision metrology instrumentation, resulting in a standardized light source that fulfills the extreme requirements demanded by the most precise clocks to date, ultimately allowing research institutions and companies to easily build optical atomic clocks. Applications for optical atomic clocks include GPS-independent navigation, secure data synchronization on a continental scale, for example, for stock trading, and unlocking precise gravitational sensing for large-scale infrastructure monitoring and the test of fundamental physical theories.

Optical atomic clocks achieve accuracy levels that surpass microwave-based cesium atomic clocks by more than two orders of magnitude. This is because optical clocks 'tick' at the frequency of visible light, which oscillates about 100,000 times faster than microwaves, providing unparalleled resolution for time measurement.

At the VEQTOR kick-off meeting in Tampere, Finland: From left: Antti Rantaniemi, Riina Hietikko, Meri-Tuuli Pirttilä and Riku Keskinen of Vexlum, Martin Wolferstetter and Felix Balling of Menlo Systems, and Jussi-Pekka Penttinen, Tommi Hakulinen and Topi Uusitalo of Vexlum.

However, despite their extraordinary precision, optical clocks are not yet ready to deliver their full potential.

"The laser systems these clocks rely on are often sourced from several suppliers, are complex systems on their own, and typically require at least some level of hands-on operation," says Dr Felix Balling, project lead at Menlo. "This, in turn, makes their system integration, stabilization, and 24/7 operation extremely difficult. Our collaboration with Vexlum aims to close this gap by developing a next-generation turn-key system that can make optical clocks practical, scalable, and ready for real-world use."

By integrating a dedicated laser platform built by Vexlum, Menlo Systems addresses the challenge of sourcing the many different laser colors needed to cool, trap, initialize and measure the neutral strontium-87 (Sr) atoms used in the most advanced atomic clocks. Using its semiconductor laser technology, Vexlum says that it can easily provide all the laser solutions needed to work with Menlo Systems' frequency control and metrology packages for any type of optical atomic clocks, enabling scientists to assemble their optical clock systems more rapidly.

The aim of the collaboration is to combine Vexlum's high-power lasers with Menlo's precision metrology instrumentation

"The rapid advances in laser and optics miniaturization are fundamentally changing the cost structure of quantum technology," says Riina Hietikko, project manager at Vexlum. "By leveraging Vexlum's vertical-external-cavity surface-emitting laser (VECSEL) technology, the necessary light sources can be provided in packages that are smaller, more robust, and more affordable than ever before. This level of integration means scientists can now skip the tedious, months-long effort of stabilizing and calibrating independent laser systems and jump straight to their experiments, accelerating discovery and the path to commercial applications."

Both Vexlum and Menlo Systems are core partners in major EU-funded initiatives, including the Horizon Innovation Action project AQuRA (Advanced Quantum Clock for Real-World Applications).

These projects, which involve Finnish and German industrial and research institutions, are explicitly focused on strengthening the supply chain for robust, transportable optical clock components and accelerating the technology's deployment from the laboratory into commercial and real-world environments.

Both Vexlum and Menlo exhibited their technology and talking about their new partnership in Noordwijk, Netherlands (20–23 April) at the 39th European Frequency and Time Forum (EFTF) international Conference and exhibition organized by the European Space Agency (ESA).

www.vexlum.com

Aeluma secures over $4m in contracts

Firm partners with Tower and Sumitomo Chemical

Aeluma Inc of Goleta, CA, USA has been awarded more than $4m in contracts from the US Government to accelerate scaling of its semiconductor heterogeneous integration platform for quantum and high-speed datacom applications.

The awards directly support Aeluma's commercialization strategy while deepening relationships with government stakeholders and manufacturing partners. The firm reckons scaling wafer production and fabrication with Tower Semiconductor and Sumitomo Chemical Advanced Technology further positions it at the forefront of high-growth markets across AI infrastructure, defense, and quantum.

"Traction in our target markets continues to grow," notes Aeluma's founder & CEO Jonathan Klamkin Ph.D. "Programs like these are important for both our near-term commercialization strategy as well as long-term diversification. These contracts provide non-dilutive funding to accelerate commercialization, and to strengthen our relationship with key government partners in making manufacturing of next-generation photonic systems more viable."

Accelerating scalable quantum and AI infrastructure

Aeluma's technology combines the performance of compound semiconductors with the scale of mainstream microelectronics manufacturing. The new contracts will accelerate the development and transition of the firm's heterogeneous integration platform for quantum dot lasers and quantum nonlinear materials.

MOCVD quantum dot lasers

Quantum dot laser technology offers superior performance including high power handling, reliability, and low noise — key requirements for quantum applications and AI data-center interconnects, including co-packaged optics (CPO). Aeluma leverages high-throughput metal-organic chemical vapor deposition (MOCVD), a proven approach for mass-market applications such as vertical-cavity surface-emitting lasers (VCSELs) for facial identification in mobile phones. The firm's MOCVD quantum dot technology will be leveraged to build multi-channel photonic integrated circuits for quantum applications.

Quantum nonlinear photonics

Aeluma is advancing a scalable aluminium gallium arsenide (AlGaAs) nonlinear materials platform for generation and manipulation of photons for quantum communication, computing, and sensing. Compared to other materials such as lithium niobate (LN), aluminium nitride (AlN), or barium titanate (BTO), Aeluma's AlGaAs offers what is claimed to be superior efficiency and versatility, characteristics important for practical quantum systems. The firm previously unveiled a successful demonstration of AlGaAs integration on CMOS standard 200mm silicon. The ability to manufacture with 200mm and 300mm silicon provides a path to integrate with low-loss silicon nitride waveguides commonly used for quantum photonic circuits.

The new contracts aim to advance the quantum dot and quantum nonlinear photonic platforms through targeted demonstrations and scaling efforts. This includes development at Aeluma's facility in Goleta, CA, as well as activities with supply chain partners including Tower Semiconductor and Sumitomo Chemical Advanced Technology.

"With the broad adoption of our silicon photonics (SiPho) platforms, we see great value in the laser market as a new, large, untapped opportunity for Tower," says Dr Edward Preisler, VP & general manager of Tower's RF business unit. "Aeluma's technology helps promote a more responsive and resilient ecosystem, by providing a path to laser manufacturing on larger-dimension silicon wafers," he adds.

"The market demand for lasers and detectors has grown significantly and we view Aeluma's technology as a promising solution to address supply chain constraints," says Dr Ken Campman, president & executive officer of Sumitomo Chemical Advanced Technologies. "We look forward to further developing our relationship to help address the requirements for datacom, sensing and other markets."

www.aeluma.com

Aeluma receives NASA award for integrated QD lasers

Aeluma has received an award from NASA to advance its integrated quantum dot laser platform for datacom and sensing applications.

Quantum dot lasers are increasingly being considered for AI data-center interconnect applications due to their potential for high power handling, reliability and low noise. Beyond standalone photonic components, integrating quantum dot lasers directly on silicon addresses one of the fundamental limitations of silicon photonics, on-chip optical gain, while preserving the cost, scale and integration advantages of CMOS manufacturing. Aeluma says its large-diameter wafer heterogeneous integration platform provides a viable path to integrated quantum dot laser solutions for high-growth markets across AI infrastructure, consumer sensing, defense & aerospace, and quantum.

"Interest in quantum dot lasers for datacom and sensing continues to grow," says founder & CEO Jonathan Klamkin Ph.D. "This award provides non-dilutive funding to accelerate commercialization efforts and to strengthen our relationships with NASA and key manufacturing partners."

Asahi Kasei and Kyoto University achieve laser oscillation in 2µm-band infrared PCSEL

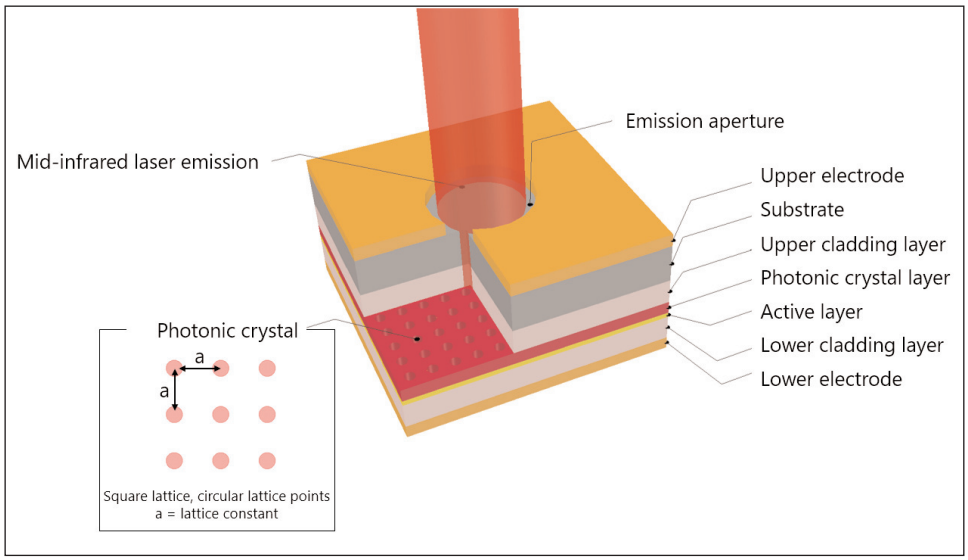
Miniaturization of optical sensing systems targets high-precision measurement of trace gases

In collaboration with the Kyoto University Institute for Advanced Study, Tokyo-based Asahi Kasei Microdevices Corp (AKM, a member of the Asahi Kasei Group's Material sector) has achieved laser oscillation in a 2µm-band infrared photonic crystal surface-emitting laser (PCSEL). This should enable the miniaturization of next-generation sensing systems while maintaining PCSEL's high directionality and narrow spectral bandwidth, the firm adds.

The research results were presented at the 73rd Japan Society of Applied Physics Spring Meeting 2006 (15–18 March).

First developed in the early 2000s, PCSEL technology was invented by a research team at Kyoto University led by professor Susumu Noda. Compared to conventional lasers, it offers higher functionality in a compact device. In recent years, demand has increased for higher-brightness, narrow-linewidth light sources for applications such as biomolecule sensing and breath gas analysis, driving the need for small, mass-producible infrared lasers. Together, AKM and Kyoto University sought to optimize the light source structure, culminating in a laser oscillation in the 2µm band using a PCSEL.

This achievement in PCSEL technology is well suited to high-sensitivity greenhouse gas detection, as the 2µm wavelength band includes absorption lines associated with gases such as CO_2 and CH_4. By combining this property with the high directionality and narrow linewidth of PCSELs, applications are expected in fields requiring high-precision measurement of trace gases.



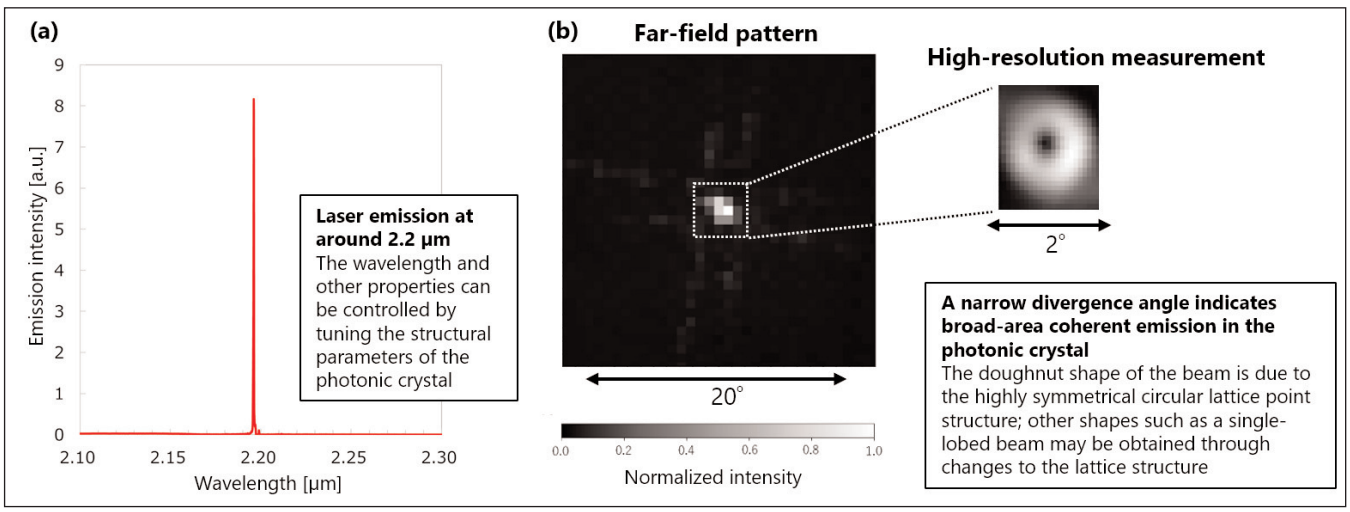
Structure of the photonic crystal surface-emitting laser (PCSEL).

"These advancements demonstrate the strong potential of PCSEL for applications requiring high power and precise optical control," says Yoshinobu Fujimoto, general manager of R&D at AKM's Business Development Center. "By combining AKM's technological background with the expertise of professor Susumu Noda and his team at Kyoto University, we are unlocking new performance capabilities that could benefit a wide range of applications."

AKM plans to accelerate R&D of 2µm-band PCSEL technology with a focus on manufacturability and advanced photonic crystal designs.

www.asahi-kasei.com
https://meeting.jsap.or.jp/english

9 April 2026



Laser emission characteristics of the 2µm-band infrared PCSEL: (a) emission spectrum, (b) beam pattern.

Vector Photonics demos free-space optical communication using PCSEL outside of a lab

Fraunhofer UK system proves real-world practicality for secure, long-distance, fast communications

Vector Photonics Ltd of the West of Scotland Science Park (which was spun off from the University of Glasgow in 2020, based on research led by professor Richard Hogg) has announced the first successful public demonstration of photonic crystal surface-emitting lasers (PCSEL) technology for optical communication outside of a lab. On 31 March, the firm's PCSELs were used to transmit data across the River Clyde from the Glasgow Science Centre to the Clydeside Distillery, using a system designed and built by Fraunhofer UK.

"This is a major step forward for Vector Photonics, proving that our technology is a commercial reality in real-world applications," says CEO & founder Dr Richard Taylor. "The demo is the most advanced application of a PCSEL to date, advancing it from a Technology Readiness level (TRL) of 4/5 to 6/7." Employing the technology in open space means that it can perform successfully under different environmental conditions — temperature, humidity, precipitation, wind turbulence — and over a considerable distance. Previously, only lab experiments using ideal conditions and simulations have been attempted.

PCSELs combine the high power of edge-emitting lasers with the speed and surface emission of vertical-cavity surface-emitting lasers (VCSEL). They are highly advantageous for secure, free-space optical communication systems due to their ability to emit narrow, high-brightness beams with excellent beam quality and low divergence, which is critical for minimizing signal loss over long distances. Unlike conventional laser sources, PCSELs combine the benefits of surface emission with coherent, single-mode output, enabling efficient coupling into free-space optics without the need for complex beam-shaping elements.

Vector Photonics' CEO & founder Dr Richard Taylor with the PCSEL and optical communications system at the demo across the River Clyde.

These properties position PCSELs as a next-generation laser source for compact free-space optical communication systems, enabling faster, secure internet connections between buildings, campuses and even satellites, without relying on cables or radio signals, says Vector Photonics. With its wide wavelength flexibility spanning ultraviolet to far-infrared, PCSEL technology can also be applied to artificial intelligence (AI) data centers, LiDAR systems and additive manufacturing (3D printing).

The free-space optical communication system was designed and constructed using Vector Photonics' PCSELs by Fraunhofer UK's Fraunhofer Centre for Applied Photonics, which is a not-for-profit research and technology organisation (RTO) established in Glasgow in 2012 in partnership with the University of Strathclyde and based in the Technology & Innovation Centre, in Glasgow City Innovation District. Data transfer at 50Mbps was demonstrated over 500m, with error rates below standard forward-error correction thresholds. This was twice the system spec required for the experiment, but well below the figure achievable by PCSELs, which have a naturally high data rate.

"This project has been a great opportunity to deploy Fraunhofer CAP' s capabilities in the development of optical systems to assist Vector Photonics in demonstrating the growing maturity of PCSELs and the potential of this important new diode laser technology in optical communications," comments Fraunhofer CAP's principal researcher Dr Gerald Bonner.

www.vectorphotonics.co.uk
www.cap.fraunhofer.co.uk
www.nature.com/articles/s41598-023-45414-7

AOI breaks ground on $300m Sugar Land expansion to power future of AI connectivity

New 210,000ft² manufacturing warehouse expansion to be operational by Summer

In February, Applied Optoelectronics Inc (AOI) of Sugar Land, TX, USA (a designer and manufacturer of optical and hybrid fibre-coaxial networking products for AI data centers, cable TV and broadband fiber access networks) hosted a groundbreaking ceremony for its new 210,000ft² manufacturing warehouse expansion.

The ceremony marked a milestone in its $300m investment in the region, and the next chapter in AOI's strategy to strengthen domestic manufacturing, scale advanced optical transceiver production, and reinforce Sugar Land as a growing hub for AI infrastructure innovation.

Held at the new building site at 1111 Gillingham Lane in Sugar Land, the event brought together AOI executives, employees, construction partners, and local and county officials to celebrate the expansion, which is expected to create more than 500 new jobs over the next five years for the programming of AOI's automated production lines.

"We plan to increase our investment in this facility and our headquarters from $150m to potentially $300m by the end of next year," notes AOI's founder, president & CEO Dr Thompson Lin. "This expansion project, intended to support the growing needs of our industry and customers, will position us as one of the largest domestic suppliers of optical transceivers for the AI and data-center industry," he believes.

AOI executives and city and county leaders participated in a ceremonial dig to commemorate the construction.

Partnership with Sugar Land and Fort Bend County

The event welcomed guests including Mayor Carol McCutcheon of Sugar Land, along with other city and county leaders. Local leaders recognized AOI's role as a technology innovator and employer, and the positive effects the expansion will bring to the community through job creation, supply chain activity, and long-term capital investment. The City of Sugar Land Office of Economic Development and Fort Bend County provided a $2m incentive package as part of a 10-year economic partnership to support the project.

"The state of Texas has done a phenomenal job in positioning itself to be the leader in AI," comments AOI's chief financial officer & chief strategy officer Dr Stefan Murry. "We are proud to expand our US footprint, manufacturing capacity, and bring new jobs to Sugar Land," he adds. "We are deeply appreciative of our hardworking employees, and the local, state and federal officials whose ongoing support has been instrumental to our expansion plans."

AOI plans the new expansion to be operational by Summer as it scales production to serve AI and data-center customers.

www.ao-inc.com

AOI receives new order for 800G data-center transceivers from major hyperscale customer

Shipments to start in Q2/2026 and be completed by mid-Q3

Applied Optoelectronics Inc (AOI) of Sugar Land, TX, USA (a designer and manufacturer of optical and hybrid fibre-coaxial networking products for AI data centers, cable TV and broadband fiber access networks) has received a new volume order from one of its major hyperscale customers for 800G single-mode data-center transceivers to help expand its network capacity for AI-driven workloads.

"AI infrastructure expansion is accelerating, and requires significantly higher bandwidth at scale," notes founder, chairman & CEO Dr Thompson Lin. "Our customers are adopting 800G not just for capacity and performance, but to manage long-term operating costs. Deploying 800G now helps to prevent network bottlenecks, improves power efficiency and lowers cost per bit, reducing the need for frequent upgrades," he adds.

"Locking in reliable transceiver capacity is critical for our customers' supply chain strategies," says chief financial officer & chief strategy officer Stefan Murry. "This early order for 800G is expected to support GPU cluster buildup, in line with our customer's large-scale infrastructure expansion plans," he adds. "Coming shortly after last week's announcement of 1.6Tb orders from this same customer, this initial 800G volume order, totaling more than $53m, is expected to be the first of more to come as it scales for rollouts across its clusters and regions."

Following product qualifications, shipments are expected to start in second-quarter 2026 and be completed by middle of third-quarter 2026.

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AOI showcases 25dBm ultra-high-power ELSFP for next-generation AI infrastructure

OFC demonstrations also include 6.4T on-board optics, powered by 400mW ELSFP

At the Optical Fiber Communication Conference and Exhibition (OFC 2026) in Los Angeles (15–19 March), Applied Optoelectronics Inc (AOI) of Sugar Land, TX, USA (a designer and manufacturer of optical and hybrid fibre-coaxial networking products for AI data centers, cable TV and broadband fiber access networks) demonstrated how its solutions support modern data centers with the bandwidth, power and density needed for future AI systems.

AOI says that, over the past few years, it has strategically enhanced its portfolio to provide the high-performance optical sources required for the industry's shift toward silicon photonics, near-packaged optics (NPO) and co-packaged optics (CPO) architectures. The firm recently celebrated plans to expand its domestic manufacturing capacity with a groundbreaking ceremony at the new 210,000ft^2 facility near its headquarters in Sugar Land, where it expects to have the largest production capacity for AI-focused data-center transceivers in the USA.

At OFC, AOI showcased its transceiver range — from 100G to 1.6T, alongside a live 6.4T on-board optics (OBO) demonstration, powered by the firm's 400mW external laser small-form-factor pluggable (ELSFP).

AOI's 25dBm ultra-high-power ELSFP

At the heart of AOI's next-generation showcase was the 400mW laser continuous wave (CW) for 25dBm ELSFP. This laser source provides the critical high-link-budget foundation required for CPO/NPO architectures. By combining extreme power with a hot-swappable, highly serviceable design, AOI says that it ensures the reliability essential for mission-critical GPU clusters.

"Reliability and performance are non-negotiable as the industry shifts toward more demanding GPU fabrics," says Fred Chang, senior VP & North American general manager at AOI. "Our 25dBm ELSFP solution addresses these needs by providing the unmatched power and mission-critical reliability required for complex AI networking, offering a high-performance, hot-swappable solution that is ready to scale hyperscale infrastructures today."

Additional booth highlights

AOI says that its 6.4T OBO high-density integrated photonics demo represented a key advance in AI networking. While the industry trends toward NPO and CPO, OBO provides an immediate, high-density solution for the signal integrity needs of hyperscale AI infrastructure.

Also on dispay at OFC were AOI's 800G and 1.6T optical interconnects: Engineered for the extreme throughput demands of modern GPU fabrics, these provide the scalable bandwidth necessary to support evolving large language models and intensive AI training workloads.

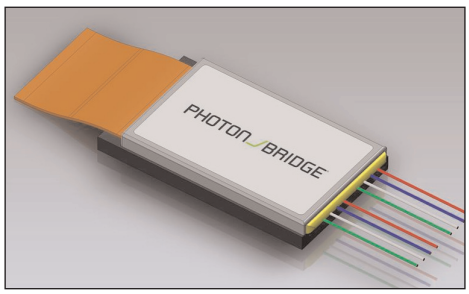
Photon Bridge and PHIX partner on DWDM external laser sources for hyperscale AI data centers

Photonic integration expertise to combine with PHIX's packaging to accelerate volume production for CPOs and high-density interconnects

Eindhoven-based photonic integration firm Photon Bridge and PhiX B.V. of Enschede, The Netherlands have partnered to advance Photon Bridge's high-performance DWDM external laser source transmit optical sub-assembly (TOSA), targeting co-packaged optics (CPO) and high-density optical interconnects for AI data-center infrastructure.

Photon Bridge drives end-to-end product development, spanning multi-wavelength external laser source design, photonic integration platform, packaging architecture, and thermal simulation, underpinned by in-house expertise across the optical module stack.

As a specialized photonic packaging house with a track record of taking advanced designs from prototype through to volume production, PHIX brings complementary capabilities that support Photon Bridge's path from advanced design to a deployment-ready module.



Photon Bridge DWDM external laser source Transmit Optical Sub-Assembly (TOSA).

PHIX's model, which bridges early-stage development to high-volume manufacturing, is said to provide a well-defined and proven route to scale for Photon Bridge's TOSA.

The collaboration reflects a shared commitment to developing a sustained working relationship within the Dutch photonics ecosystem, and to accelerating the availability of high-performance optical engines for next-generation AI infrastructure.

"Photon Bridge is building a true product company, spanning from the photonic chip to the fully integrated module," says the firm's chief operating officer John Anderton. "The market needs a packaged, deployment-ready external laser source, and that is exactly what we are delivering. PHIX's expertise and their model of developing packages to manufacturing readiness before transferring to volume production gives us a clear and reliable path to scale. Collaborating with world-class partners in our local ecosystem is central to how we operate," he adds.

"Their full-stack photonic integration approach aligns strongly with the demands of CPO and AI interconnects," comments PHIX's chief techhnology officer Jeroen Duis. "At PHIX, we enable innovative photonics companies to transition efficiently from advanced design to volume packaging."

www.photonbridge.ai
www.phix.com

Sivers collaborates with Jabil on energy-efficient 1.6T pluggable optical transceiver module

Solution delivers exceptional speeds at 2.5x lower energy footprint for AI data centers

Sivers Semiconductors AB of Kista, Sweden (which supplies RF beam-former ICs and lasers for AI data-center, SATCOM, defense and telecom applications) says that its high-performance distributed feedback (DFB) lasers are to be used by global engineering, supply chain and manufacturing solutions provider Jabil Inc to develop a 1.6T linear receive optical (LRO) transceiver module. The new pluggable module will provide highly energy-efficient optical interconnect speeds to accelerate deployment for next-generation hyperscale AI data centers.

The collaboration aims to address the growing demand for power-efficient, high-performance optical solutions for AI infrastructure.

According to the market research report 'Optics for AI clusters' issued by LightCounting in January, 800G-and-higher-speed optical transceivers will comprise 80% of the pluggables market by 2030, which is projected to grow globally to 225 milion units shipped that year.

"Energy efficiency is now a hard requirement in AI infrastructure scaling," says Alex McCann, managing director for Sivers' Photonics business.

"Our customers are pushing for more bandwidth without increasing power consumption," says Jason Wildt, VP & general manager of photonics at Jabil. "Working with Sivers will allow us to deliver a 1.6T LRO solution that meets both data-center performance and power targets at scale."

www.sivers-semiconductors.com

OpenLight and TFC advance silicon photonics back-end integration supporting up to 400G on TGV substrate

Test board for 400G EAM, based on heterogeneous integration of InP-on-Si, available for testing, and includes a modulator driver

Photonic application-specific integrated circuit (PASIC) chip designer and manufacturer OpenLight of Goleta, Santa Barbara, CA, USA (which launched as an independent company in June 2022, introducing the first open silicon photonics platform with heterogeneously integrated III-V lasers, modulators, amplifiers and detectors) has announced continued progress in its ecosystem partnership with Suzhou TFC Optical Communication Co Ltd (a provider of optical sub-assembly integrated solutions and advanced optoelectronic package manufacturing services), building on the collaboration first announced in 2025 to fast track the back-end process for silicon photonics production and optical communication systems. The partnership remains focused on advancing the integration, assembly and manufacturing workflows required to bring highly integrated silicon photonics optical engines to market, with the OLP-PM13306 400G test board serving as the most recent example of this progress.

The OLP-PM13306 is designed to enable testing and evaluation of OpenLight's 400G electro-absorption modulator (EAM) by integrating a high-speed driver alongside the photonic integrated circuit (PIC) on a through-glass-via (TGV)-based high-speed printed circuit board (PCB), combined with a low-loss fiber attach unit (FAU). The complete optical sub-assembly — including TGV-based PCB design, FAU integration, and assembly — was designed and manufactured by TFC. This device was showcased in OpenLight's booth at OFC 2026.

As silicon photonics adoption continues to accelerate across data-center, AI/ML, and emerging optical networking applications, the maturity of the back-end ecosystem has become increasingly critical to support higher levels of photonic integration and increasing per-lane data-rate requirements.

Since the initial partnership announcement at OFC 2025, OpenLight and TFC have expanded the scope of their collaboration to support higher-speed optical engines and evolving integration requirements. TFC has supported optical sub-assembly activities for OpenLight's 100G- and 200G-per-lane transmitter PICs and this collaboration has now extended to 400G-per-lane devices. These efforts reflect the partnership's focus on maturing integration and assembly workflows in parallel with increasing data-rate requirements for silicon photonics optical engines.

The OpenLight–TFC collaboration provides customers with an expanded ecosystem option for optical sub-assembly, helping streamline the supply chain from completed wafers through full fiber-attached optical engines. The partnership aims to reduce complexity, improve manufacturability, and support faster time to market.

"As silicon photonics adoption continues to grow, success increasingly depends on the readiness of the back-end ecosystem," says OpenLight's CEO Dr Adam Carter. "Our continued collaboration with TFC is focused on enabling practical, scalable integration and assembly workflows that customers will need as optical engines become more highly integrated and move toward production," he adds.

"TFC is proud to support our customers in the development of the next generation of silicon photonics such as the showcased 400G EAM on TGV substrate" says TFC's CEO Lucy Ou. "We continued to invest in the key technologies associated with advanced optical sub-assembly, optoelectronic and system integration solutions, leveraging one of our seven global facilities across three countries," he adds. "By working closely with OpenLight, we are translating advanced photonic integration into scalable manufacturable optical sub-assemblies that can support broader industry adoption."

www.tfcsz.com

Nano-ridge surface-emitting lasers on 300mm silicon

First demonstration uses one-dimensional photonic crystal concept.

Ghent University and imec in Belgium have reported the fabrication of one-dimensional photonic crystal nano-ridge surface-emitting lasers (NRSELs) epitaxially grown on a standard 300mm silicon (Si) wafer, claimed to be the first experimental demonstration of such devices [Eslam M. B. Fahmy et al., Light: Science & Applications, v15, p120, 2006].

The Ghent–imec team have previously reported electrically pumped nano-ridge edge-emitting laser diodes, also produced on 300mm silicon [see Semiconductor Today report]. Vertical-cavity surface-emitting lasers (VCSELs) are widely used in datacom, spectroscopy and distance/position-sensing applications, e.g. in computer mice and smartphones.

VCSELs are quite complicated to fabricate, while the Ghent–imec NRSEL scheme is relatively simple. However, this first report is limited to optical pumping, and the team admits that arranging electrical contacts without blocking the emissions could be tricky.

The researchers see the direct integration on standard silicon as potentially leading to other photonic or even electronic devices. The spectral range could be shifted from around 980nm to other wavelengths by varying the indium gallium arsenide (InGaAs) composition of the active region or by using a different semiconductor family, such as the antimony-based GaSb.

The nano-ridges of III–V material (Figure 1) were grown on 300mm-diameter (001) Si wafers using an aspect ratio trapping (ART) strategy. In the first step, silicon fins in silicon dioxide (SiO_2) were realized from a shallow trench isolation process. The fins were etched with tetra-methylammonium hydroxide to expose two {111} facets of the silicon crystal structure at the bottom of the etching. The {111} planes are favored for the III–V growth to avoid defects such as anti-phase disorder.

Metal-organic vapor phase epitaxy (MOVPE) was deployed to grow the III–V ridges consisting of three indium gallium arsenide ($In_{0.23}Ga_{0.77}As$) quantum wells (QWs) in GaAs barrier material. Once the grown material emerged from the trenches, careful growth control enabled a box shape to be maintained. The wells were 11nm thick. The structure was capped with lattice-matched indium gallium phosphide (InGaP).

The nano-ridge arrays were fabricated in 5mmx5mm blocks. The ridge period matching the gain bandwidth of the 410nm-high, 197-wide nano-ridges was 380nm (Figure 2).

Simulations were used to design the 1D photonic crystal structure. The electric field direction of the trapped bound states in the continuum (BIC) modes were designed to be near parallel with the ridge structure, parallel with the QWs. "It is well-known that the compressively strained InGaAs QWs embedded within the GaAs nano-ridges provide the highest gain for this polarization," the researchers comment.

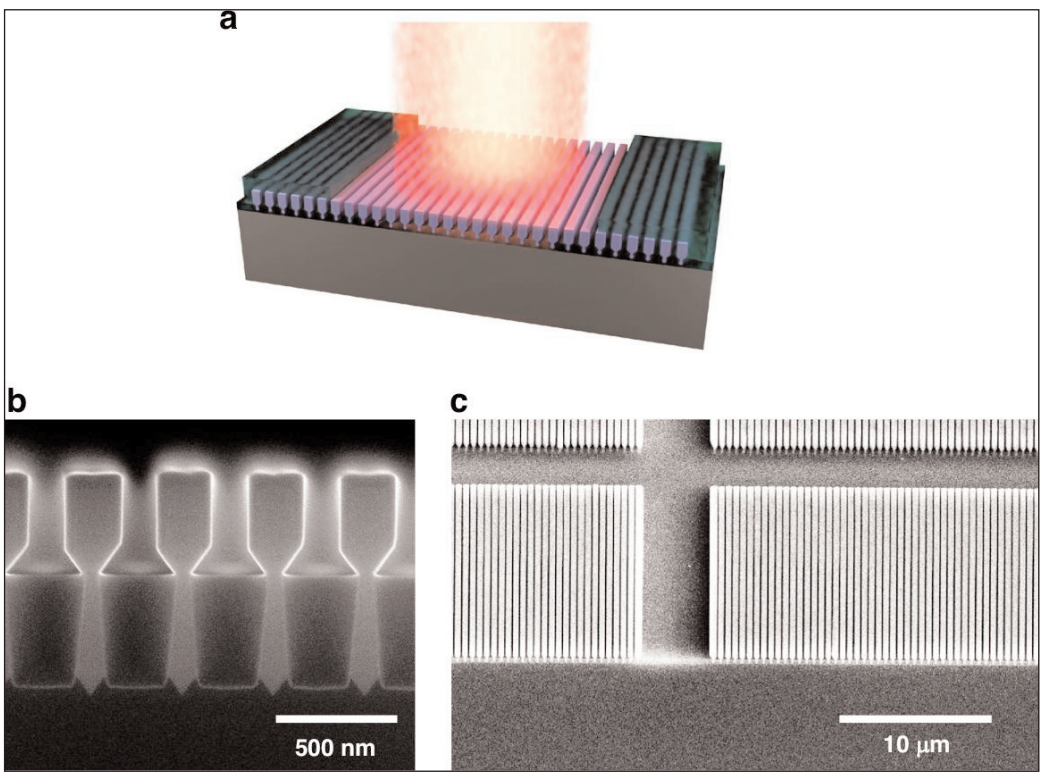


Figure 1. a NRSEL system. b Scanning electron microscope (SEM) cross section of cleaved array of nano-ridges. c Top-view SEM image of arrays of nano-ridges on silicon wafer

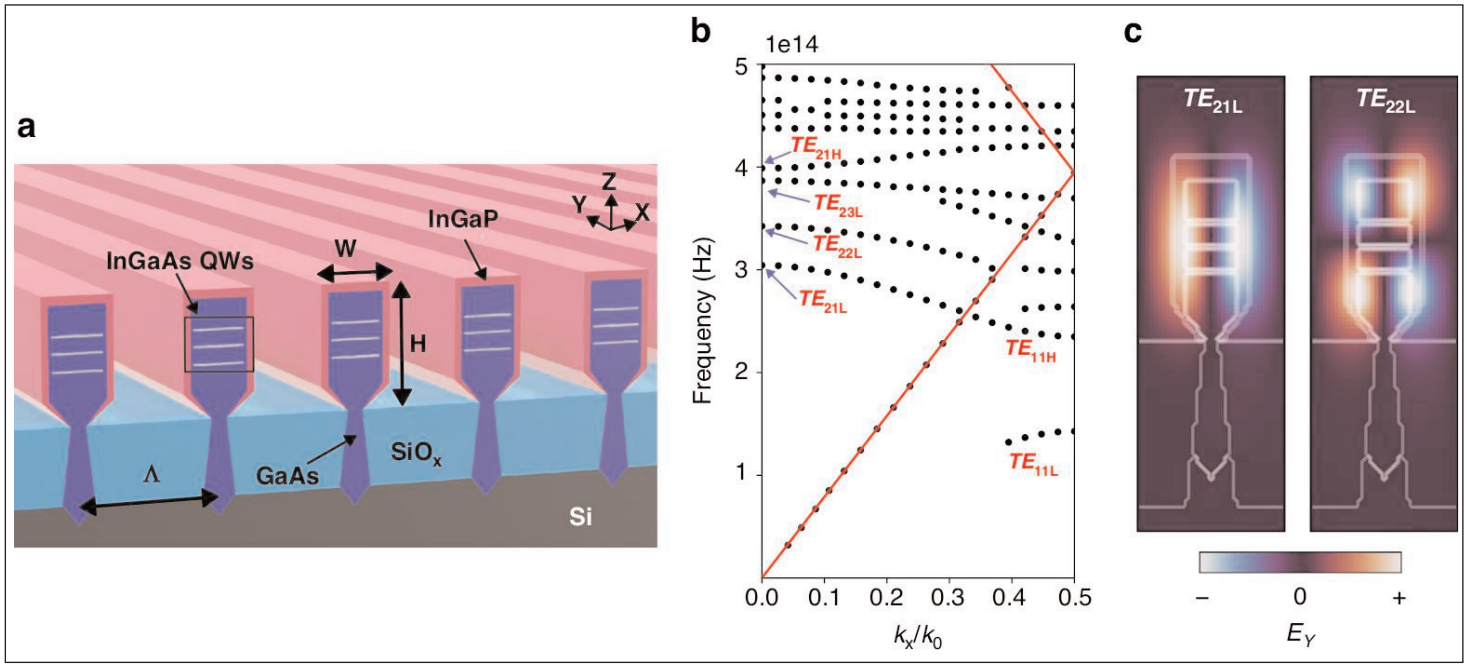


Figure 2. a Schematic array of nano-ridges with most relevant dimensional parameters. b Dispersion diagram from 2D-FDTD. Radiation continuum above light line (red). c Calculated electric field for first two band edge modes at γ point (k_x/k_0=0).

The finite size of the real-world devices inevitably leads to leakages away from the cavity, hopefully in the desired surface-emitting direction.

The blocks for the NRSELs were patterned and then etched using inductively coupled plasma.

Lateral confinement was provided by spin coating photoresist that filled the ridge array in the mirror sections (Figure 3). Optical lithography was used to pattern the NRSEL region for removal. The effect of the photoresist was to shift the band structure to longer wavelengths due to the 1.6 refractive index (n), compared with the near 1 value for air. The cavity mode is thus placed in a bandgap of the confinement structures, giving a mirroring effect. The mirror regions were 15μm wide.

The optical pumping was through a nanosecond-

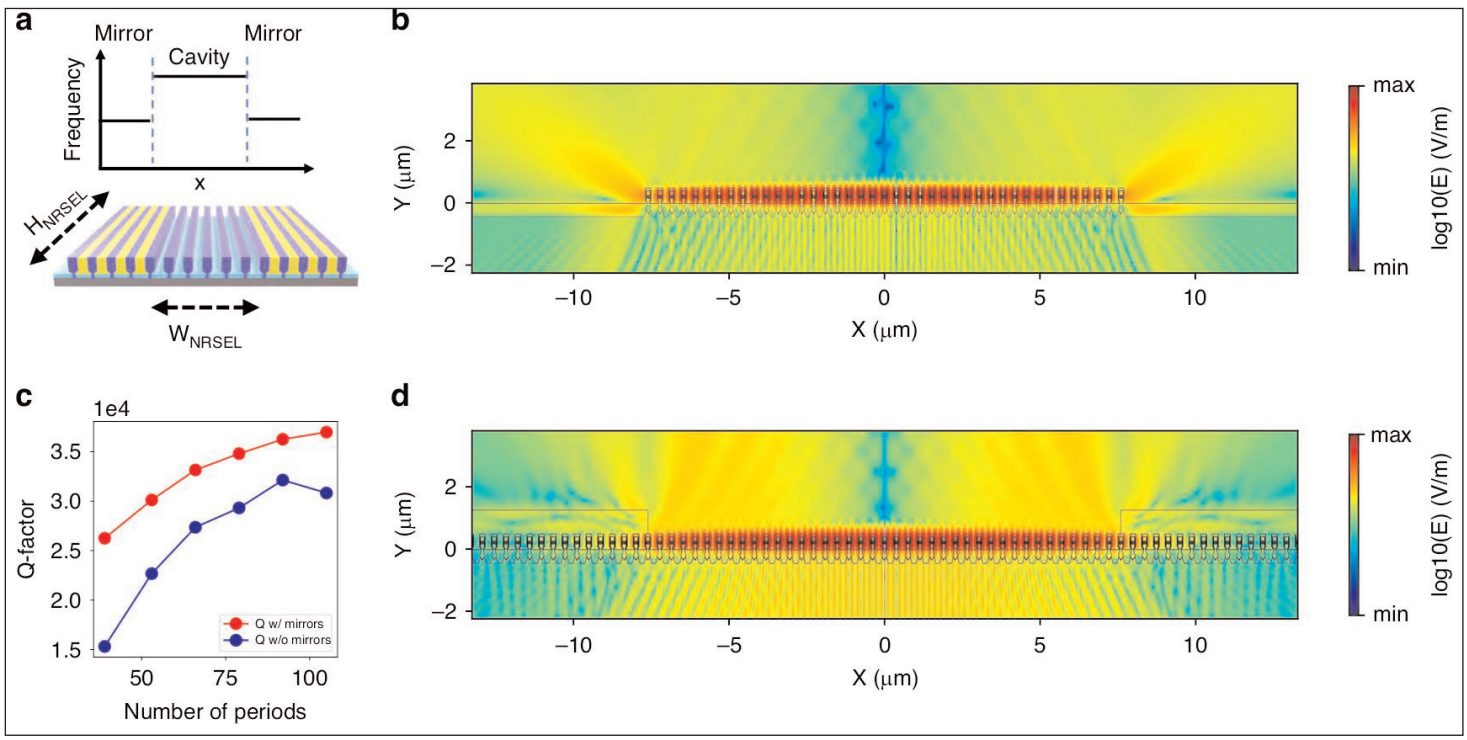


Figure 3. a Side mirrors defined by locally shifting slow trapped Bloch mode to longer wavelength. b, d 2D-FDTD simulations of finite nano-ridge crystal without and with mirrors, respectively. c Calculated Q-factor for TE_{21L} mode without and with side mirrors, as a function of number of periods.

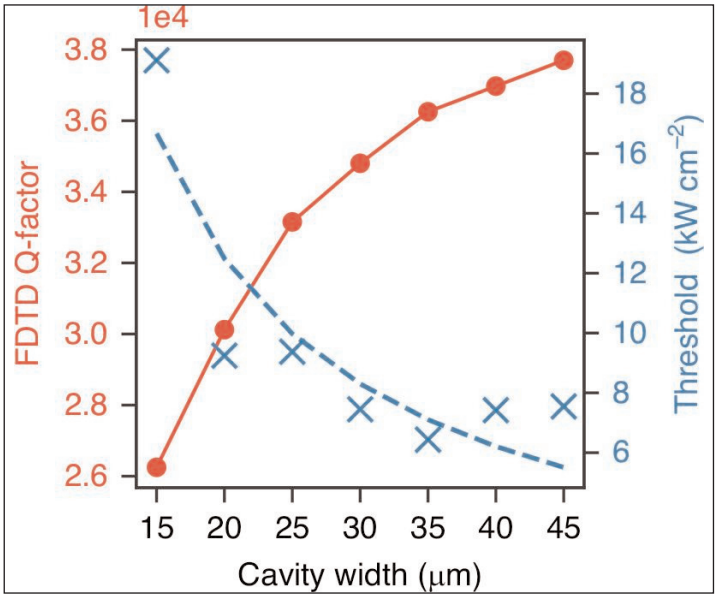


Figure 4. Mean laser threshold data and Q-factor calculated from 2D-FDTD simulation, along with a/W+b fit, versus cavity width (W).

pulsed 532nm wavelength 300μm-diameter spot from a Nd:YAG laser.

The laser emission wavelength was around 984nm for a device with a 20μm-wide, 15μm-high cavity. The narrowest linewidth was 0.9nm, measured just above threshold. "We believe the linewidth to be limited by the pulsed optical pumping," the researchers report.

The researchers studied the effect of varying the cavity width on the threshold (Figure 4). The leveling off of the threshold reduction with width is attributed to the saturation of the Q-factor enhancement expected, based on 2D finite difference time-domain (FDTD) simulations.

The researchers comment: "The saturation of the threshold might indicate the influence of random disorder effects, as longer-cavity photonic crystal lasers tend to suffer higher losses (often referred to as slow-light induced losses) when operating near the band-edge. Notably, the minimum lasing threshold was found for devices with a 35μm cavity, which also exhibited the smallest spread in threshold values—suggesting that the optimal cavity dimension minimizes the impact of fabrication-induced disorder." ■

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https://semiconductor-today.com/news_items/2025/jan/imec-230125.shtml

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Micro-LED transfer via electrochemical etch

UCSB researchers transfer arrays of devices down to 3µm onto silicon.

University of California Santa Barbara (UCSB) in the USA claims the first demonstration of fully functional vertical micro-scale light-emitting diodes (micro-LEDs), spanning device dimensions down to 3µm, transferred via selective electrochemical etching and direct wafer bonding [Yifan Yao et al, Appl. Phys. Lett., v128, p121103, 2026].

The team comments: "This proof-of-concept demonstration establishes a low-damage, high-throughput pathway for mass transfer of III-nitride devices, enabling scalable heterogeneous integration with various functional platforms for micro-displays, optical communications, and sensing systems."

Although indium gallium nitride (InGaN) LEDs can be grown on silicon, the performance of such devices tends to be impacted by defects generated by the lattice mismatch and thermal mismatch of the respective materials. Silicon platforms are desired for their ability to produce low-cost, large-area electronic drive circuitry, not to mention photonic integrated circuit (PIC) structures, incorporating waveguides and so on.

The alternative method is to transfer reduced defect LEDs produced on more suitable substrates such as bulk or free-standing GaN, or lower-cost sapphire, which is closer to GaN in lattice structural terms than silicon.

A typical method of separation of LEDs from the sapphire growth substrate is laser lift-off (LLO), which involves concentrated laser light thermally decomposing GaN near the substrate, allowing removal and transfer.

The team comments: "Although widely adopted in industry, LLO involves high interfacial temperatures that often exceed the growth temperature of the active region and therefore can induce crystal damage or cracking during the release process and is fundamentally limited to substrates that are transparent to the ultraviolet laser."

The epitaxial material for the devices included an electrochemical etching release layer of n-type GaN

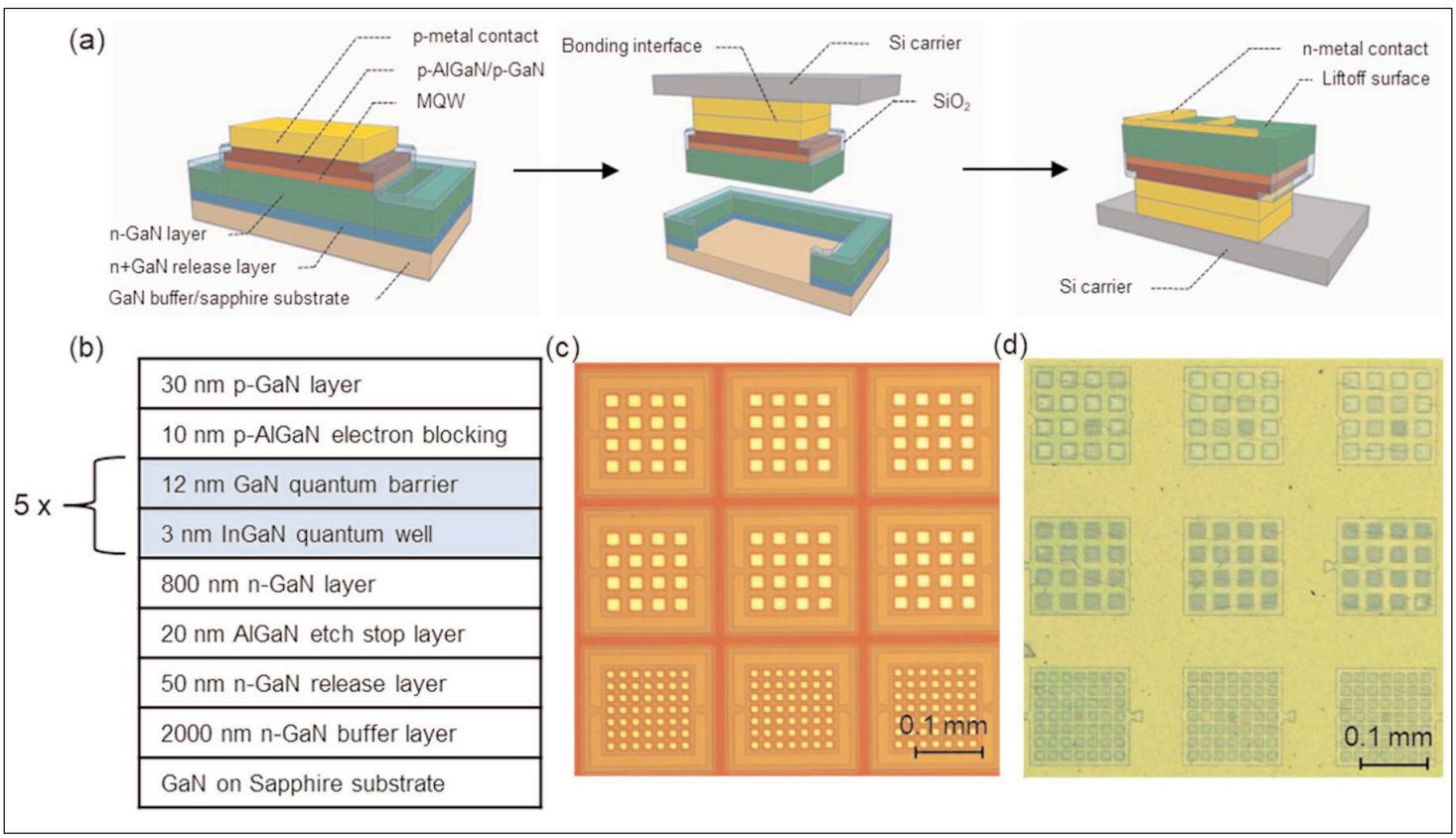

Figure 1. (a) Micro-LED transfer process scheme. (b) Epitaxial structure. Differential interference contrast microscopy false-colored images: (c) before EC etching and bonding (from p-side) and (d) after transfer to silicon carrier substrate (from n-side).

with silicon doping of $10^{20}/cm^3$, much higher than the other n-GaN layers: less than $3x10^{18}/cm^3$ for the 800nm n-GaN device contact layer (Figure 1). An unintentionally doped aluminium gallium nitride (AlGaN) layer served to stop the etching and protect the upper layers.

The researchers comment: "The doping concentration in the release layer is significantly higher than the n-type doping concentration in the rest of the structures, which is essential for the high selectivity of the electrochemical etching process and the structural integrity of the release structure."

The LED devices were passivated with 25nm atomic-layer-deposited (ALD) silicon dioxide (SiO_2). The devices were grouped in uniform 160μm x 160μm pads. Trenches were etched with reactive ions around the pads to expose the etch-release layer sidewalls.

The researchers report: "Employing a uniform pad geometry across different devices minimizes lateral over-etching during the electrochemical etching process and thereby improves uniformity of the release process. Trenches were designed with thin tethers to partially anchor the pad, preventing lateral displacement after the detachment from the substrate."

The lateral electrochemical etch rate was 20μm/min, much faster than the typical sub-100nm/min of the photoelectrochemical processes often reported. The devices were then flip-chip bonded to a silicon carrier. The bond between the chips and carrier consisted of the p-contact metals of the devices, palladium/aluminium/titanium/gold, and gold contacts on the silicon.

During the thermocompression bonding the pads were vertically lifted-off the growth substrate, breaking the tethers. The researchers explain: "The tethers therefore are designed to be strong enough in the axial direction to ensure spatial registration during electrochemical etching, yet brittle enough to enable rupture during the bonding-induced bending."

The surface roughness of the electrochemically etched surface was 0.57nm, root-mean-square, according to atomic force microscopy (AFM). A single common n-contact connected the devices in parallel, with single LED addressing available through the separate p-contacts.

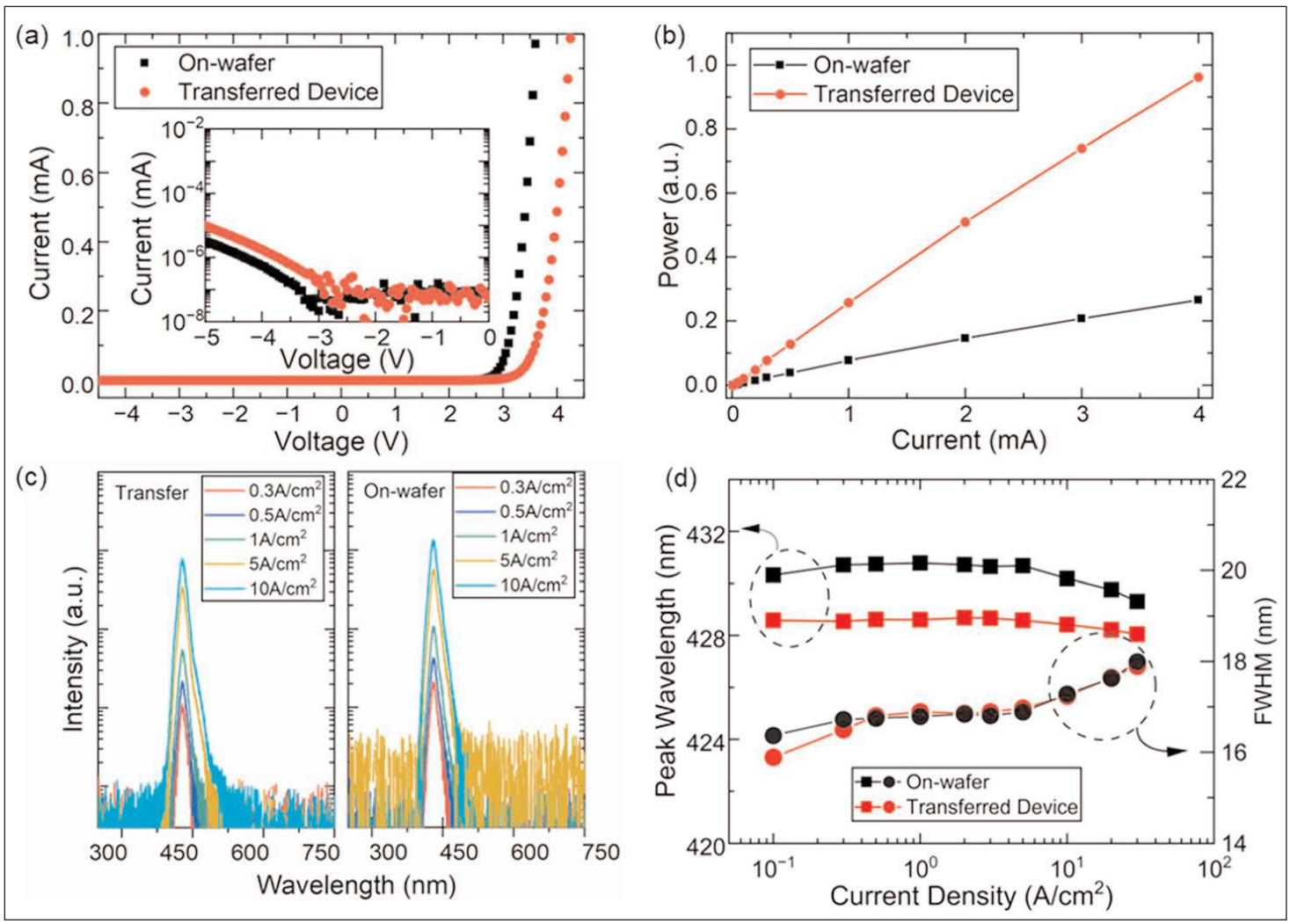

Figure 2. (a) Current–voltage (I–V) characteristics of on-wafer and transferred normal-sized LEDs; inset: log-scaled reverse leakage current. (b) Optical output power. (c) Electroluminescence spectra. (d) Extracted peak wavelength and FWHM as a function of current density.

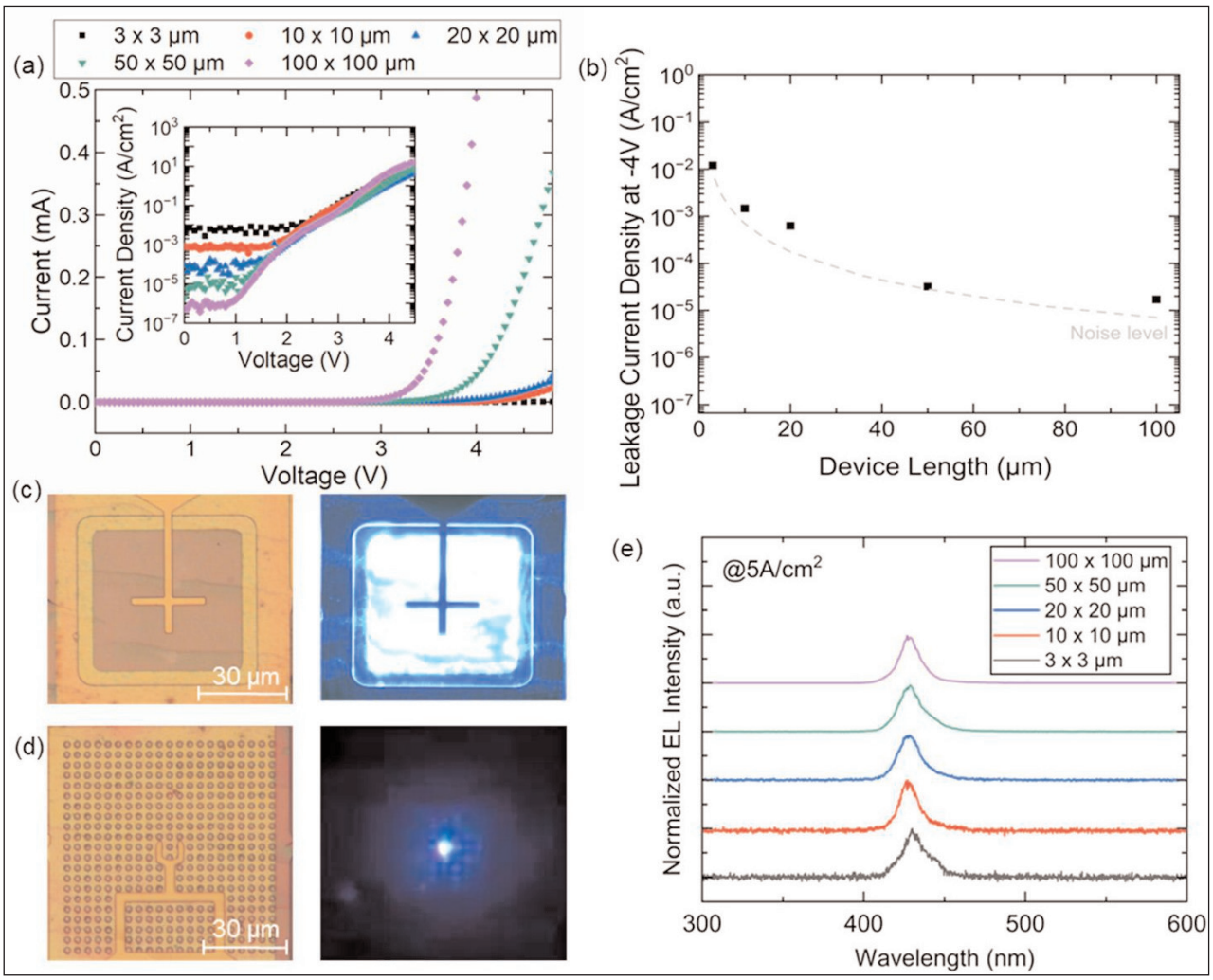

Figure 3. (a) Current density–voltage (J–V) characteristics of transferred micro-LEDs with varied mesa sizes. (b) Reverse leakage current density measured at –4V with instrument noise floor (normalized by mesa area) indicated by dashed line; optical microscope image and emission images of (c) 100μm x 100μm and (d) 3μm x 3μm micro-LED arrays. (e) Normalized electroluminescence spectra at 5A/cm².

The diode turn-on voltage of the transferred devices was 3.45V, about 0.5V higher than in measurements on the growth wafer (Figure 2).

The researchers comment: "This can be attributed to the increased contact resistance of the n-type contact (Ti/Au) on the exposed etch-stop layer and increased lateral spreading resistance from thinner n-type GaN layers in transferred devices. Forming a low-resistance contact is inherently challenging on an exposed surface due to the combination of nitrogen polarity and the lack of heavy doping."

The team suggests a number of strategies to reduce the contact resistance, such as surface pretreatment, different metal contact stacks, and controlled low-temperature post-annealing. The low reverse leakage current after transfer contrasts with laser lift-off processes that suffer from thermal damage and related performance degradation such as increased reverse current, indicating the presence of parasitic current paths.

The output power of the transferred devices demonstrated a 2.2x enhancement over the on-wafer measurements. "This improvement is attributed to the higher light-extraction efficiency of the thin-film flip-chip (TFFC) architecture, in which the released epilayer is bonded onto a reflective Pd/Al/Ti/Au metal contact," the team explains.

The spectral content of the emissions shows a blue-shift attributed to carrier screening from the quantum-confined Stark effect (QCSE), and full-width at half-maximum (FWHM) broadening from band filling.

The researchers add: "The slight reduction in both peak wavelength and wavelength shift with increasing current observed in the transferred devices is attributed to minor strain relaxation in the active region following the transfer process."

The square device sizes were varied between side lengths of 100μm down to 3μm (Figure 3). These were arranged in arrays, where allowed by the 160μm pad size.

The researchers report: "The leakage current density measured at –4V exhibits clear size dependence and remains low for all device sizes, comparable to state-of-the-art InGaN micro-LEDs."

As the exposed length of the dry-etched side walls of the smaller devices increases, so does the opportunity for parasitic current leakage paths to form there. ■

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Red InGaN micro-LEDs with narrow FWHM and high EQE

Researchers use a photonic crystal structure to achieve 5nm linewidth and 12% external quantum efficiency.

University of Michigan in the USA has claimed the highest external quantum efficiency (EQE) and smallest linewidth so far for red-emitting indium gallium nitride (InGaN) micro-LEDs, using photonic crystal (PhC) structures [Yuanpeng Wu et al, Light: Science & Applications v15, p133, 2026].

Further, the emission wavelength was stable for a wide range of injection currents. The 5nm full-width at half maximum (FWHM) was about one order of magnitude narrower than previously reported values.

The researchers see narrow linewidths as "paramount for achieving high color purity".

The InGaN family of semiconductor alloys has a wide range of potential emission wavelengths. As the indium content increases, however, the device efficiency tends to deteriorate. High indium fractions are needed

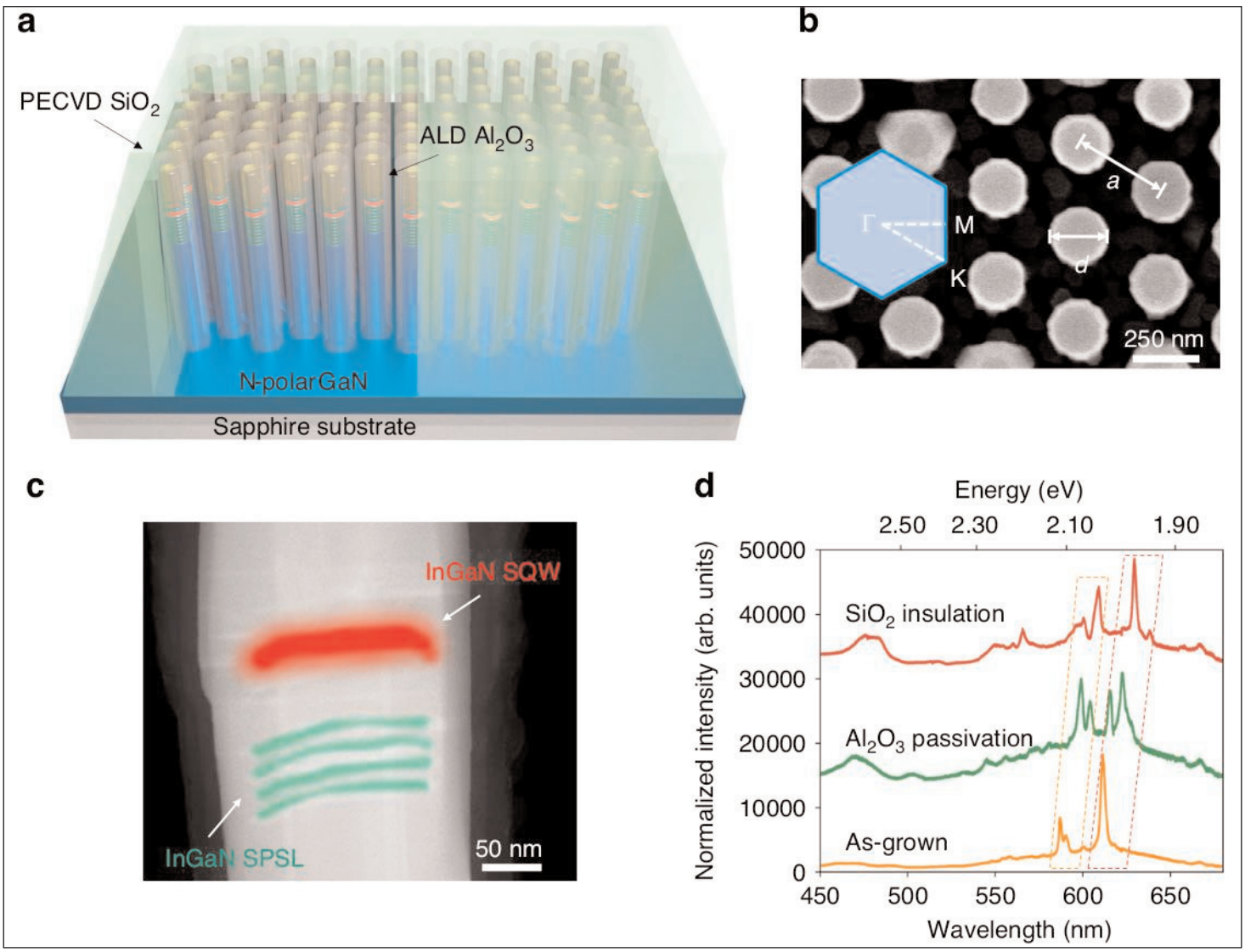

Figure 1. a InGaN/GaN nanowire array scheme in photonic crystal structure. b Top view scanning electron microscope (SEM) image of as-grown InGaN/GaN PhC structure, and (inset) corresponding reciprocal lattice. c Cross-sectional false-color scanning transmission electron microscope (STEM) image of active region. d Photoluminescence spectra from sample as-grown (orange), after Al_2O_3 passivation (green) and SiO_2 deposition (red). Evolution of photonic crystal mode indicated by dashed rectangles.

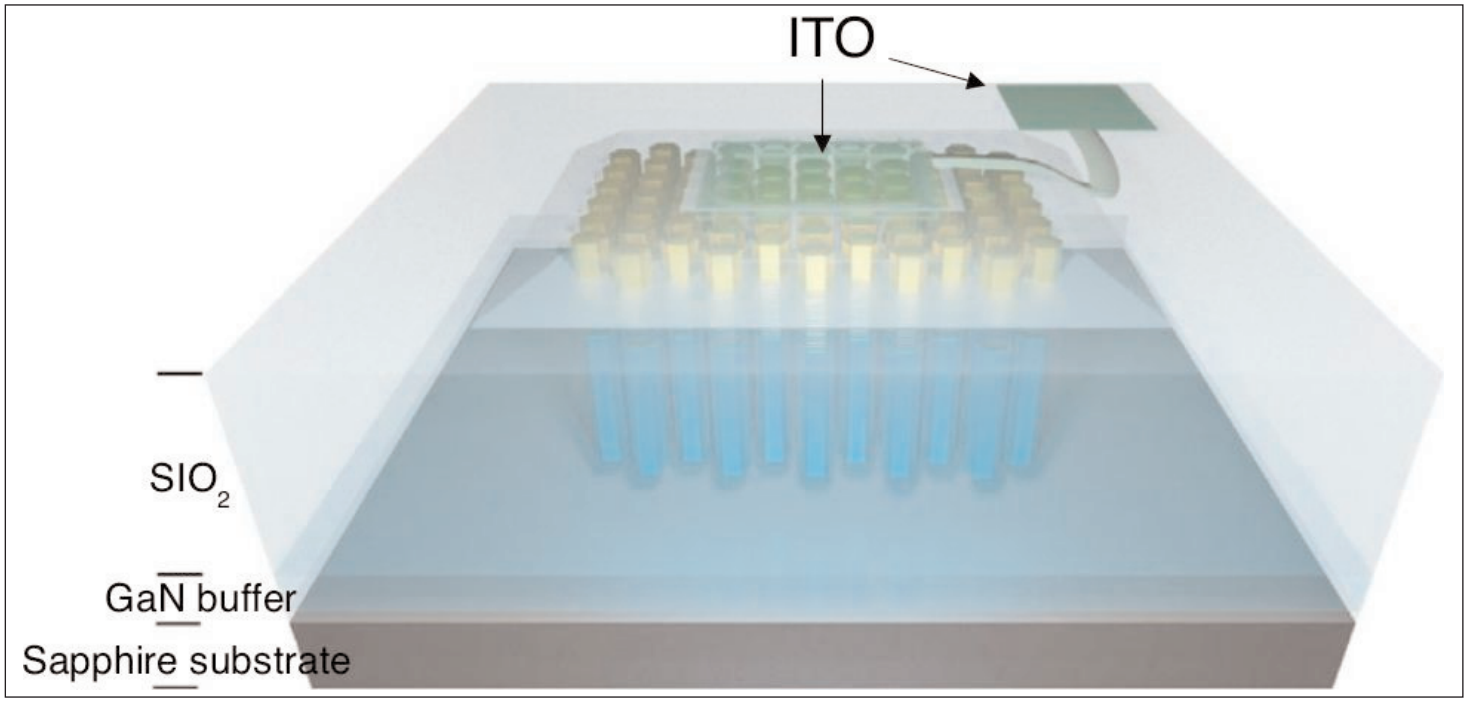

Figure 2. Micro-LED device structure.

for longer red wavelengths, impeding development of full-color InGaN micro-LED arrays.

The team explains: "While the EQE of blue and green InGaN micro-LEDs has increased significantly, the EQE of micrometer-scale red InGaN micro-LED is well below 1%, and few groups have reported several percent EQE values, which can be mainly attributed to the high densities of defects and dislocations in high-indium-composition InGaN quantum wells (QW)."

The Michigan devices could lead to "monolithic integration of GaN-based RGB-pixelated micro-LEDs with CMOS-based driver circuitry."

The researchers comment: "The near-diffraction-limited emission area and ability to form large, ordered arrays make them highly promising for ultra-high-resolution micro-displays in augmented/virtual/mixed reality. The narrow-linewidth emission and directionality of the photonic band-edge modes are advantageous for visible-light communication, wherein the reduced spectral crosstalk and high modulation bandwidth expected from nanoscale emitters could support high-speed, low-latency optical data links in next-generation wireless systems."

The photonic crystal (PhC) structure consisted of a hexagonal/triangular array of vertical III–nitride 220nm-diameter nanowires grown from a N-polar GaN/sapphire substrate using a 10nm titanium mask (Figure 1). The nanowires included a red single quantum well (SQW) of InGaN grown on top of an InGaN short-period superlattice (SPSL). The SPSL released the strain between GaN and InGaN, enabling better indium incorporation in the SQW: around 36% on the c-plane and 40% on the semi-polar plane near the edges of the nanowires. The lattice constant (a) of the hexagonal array was 360nm.

The researchers found a dominant photoluminescence (PL) peak at 612nm with a 3nm FWHM, attributed to the Γ_1 band-edge mode of the PhC. Other modes resulted in lesser peaks at 587nm and 591nm.

Surface passivation with 10nm atomic layer deposition (ALD) aluminium oxide (Al_2O_3) split the dominant peak into two, at 616nm and 623nm. The two shorter wavelengths shifted to 599nm and 604nm. Further shifts were seen with plasma-enhanced chemical vapor deposition (PECVD) of 300nm silicon dioxide (SiO_2) for electrical insulation: to 629nm for the dominant peak.

The researchers comment: "Such a shift can be

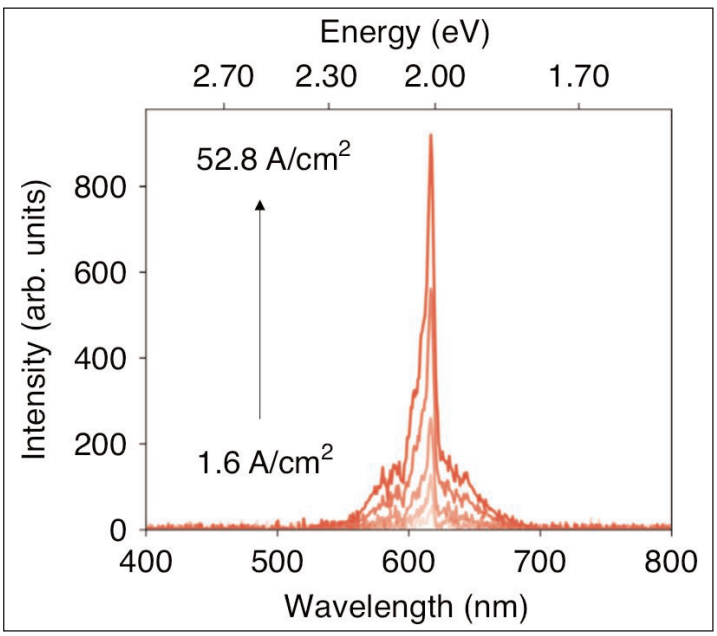

Figure 3. Current-dependent EL spectra for the micro-LED.

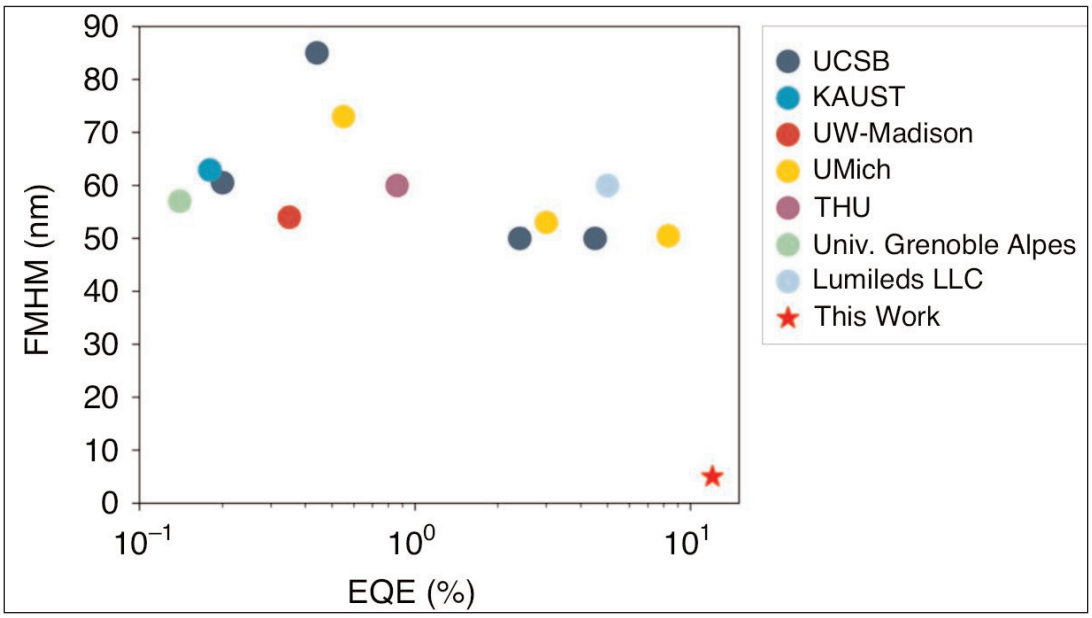

Figure 4. Benchmark of EQE and linewidth values for previously reported InGaN-based red micro-LEDs with device areas less than 400μm^2.

attributed to the variation of the refractive index distribution, wherein the presence of the SiO_2 increases the average background refractive index."

Variation of the PL excitation power between 80mW/cm2 and 14.8W/cm^2 showed negligible shift in the peak positions. The team points out that this "is in direct contrast to the significant blue-shift of 20–50nm observed in conventional red InGaN LEDs due to the screening of the quantum-confined Stark effect. The excited carriers within the InGaN SQW generate spontaneous emission coupled to the photonic band-edge mode of the PhC structure, wherein the emission wavelength is insensitive to the carrier density, and a negligible shift in peak wavelength is obtained."

The researchers fabricated the PhC arrays into micro-LEDs (Figure 2). The p-contact window consisted of indium tin oxide (ITO) transparent conducting material. The n-contact metal was titanium/gold.

The electroluminescence response from a device with a 5μmx5μm window showed a peak emission around 617nm with 5nm FWHM (Figure 3). The peak position did not vary under injection current densities ranging between 1.6A/cm^2 and 52.8A/cm^2. The chromaticity coordinate of the red-emitting micro-LED was (0.67, 0.33).

The researchers comment: "This coordinate coincides with that of the primary red color in the widely used National Television Standards Committee (NTSC) standard and is beyond the color gamut area of the Adobe RGB. In previously reported InGaN red-emitting micro-LEDs, while excellent color purity can be achieved at low current densities of a few A/cm^2, the chromaticity coordinates deviate from the red region, and the color gamut coverage reduces due to the significant blue-shift with injection current."

The peak EQE reached 12% at 4A/cm^2 (Figure 4) when the devices were subjected to further fabrication with deposition of an aluminium/titanium/gold mirror on the ITO current-injection window region.

The team explains the high EQE: "Directional emissions primarily along the vertical direction of the nanowire PhC structure were measured, which effectively improved the light-extraction efficiency." ■

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Power electronics market to grow at 10% CAGR to over $65bn by 2036

Wide-bandgap semiconductors are supporting higher-voltage operation and new power architectures across data centers, EVs and renewables, notes IDTechEx.

OEMs across power electronics applications are demanding increased efficiency and power density for power electronics components, while also insisting on solid reliability and device miniaturization. To enable this, wide-bandgap (WBG) semiconductors silicon carbide (SiC) and gallium nitride (GaN) are being adopted across the power electronics market. These WBG power semiconductors support higher-voltage operation and new power architectures across data centers, electric vehicles (EVs) and renewables.

Driven largely by the demand for use EVs and data centers, the power electronics market will rise rapidly, at a 10% compound annual growth rate (CAGR) over the next decade, to more than US$65bn by 2036, forecasts IDTechEx in its new report 'Power Electronics Market 2026-2036: Data Centers, Electric Vehicles, and Renewables'.

The report tracks innovation trends across the power electronics market, which are being pushed by OEMs across the data-center, electric vehicle, and renewable energy industries, among others. Data centers, electric vehicles and renewables power electronics operate at significantly different power ratings and across a wide range of different environmental conditions. The demands and cost considerations for each are also vastly different. As a result, power electronics innovation developments across each industry differ considerably.

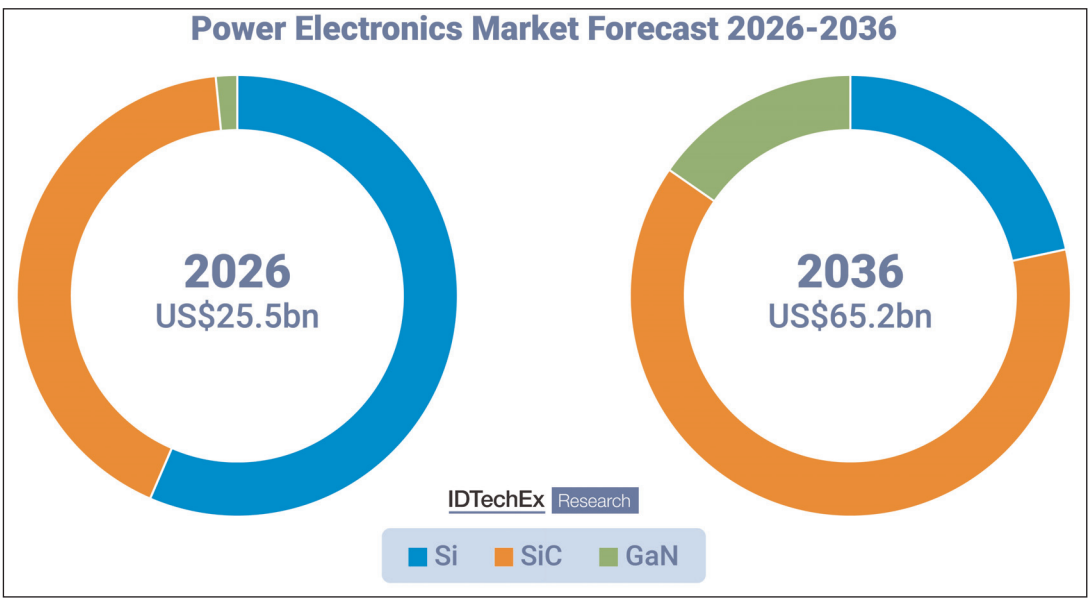
By understanding the innovation demands for power electronics across applications, IDTechEx says that it provides clarity on the power electronics market as a whole, predicting overall megatrends and wider barriers to adoption.

Electric vehicles: SiC to dominate; GaN will take more time to consolidate

While silicon IGBTs have remained the dominant power device of choice for the past 20 years of traction inverters, alongside other silicon power devices for the onboard charger and DC–DC converter, wide-bandgap technologies such as SiC MOSFETs occupy a significant and growing portion of the EV power electronics market.

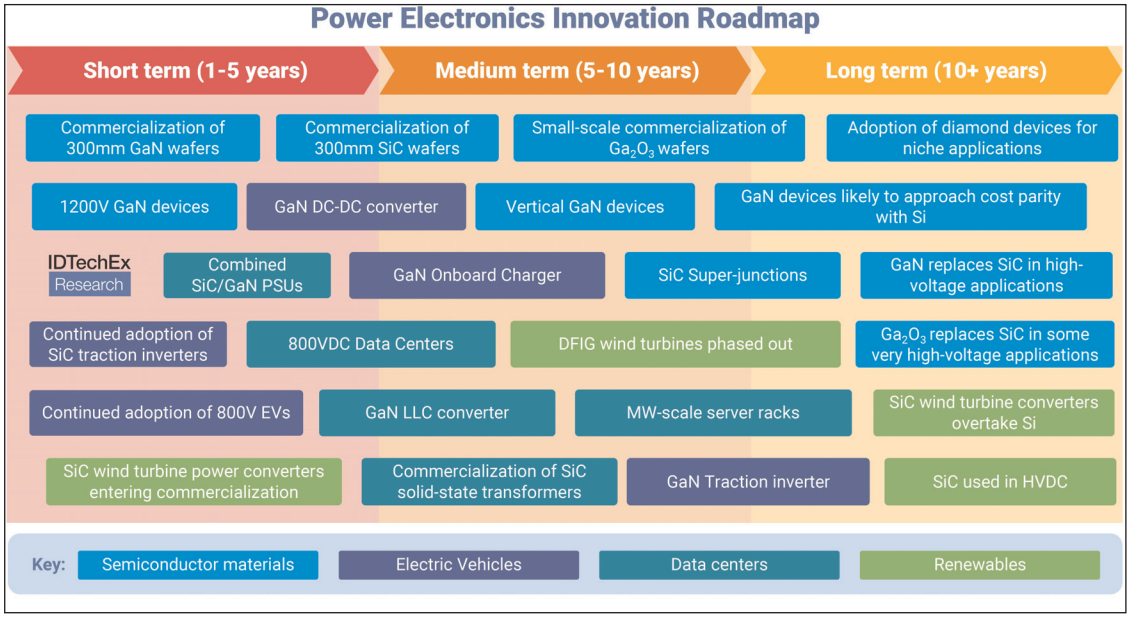
IDTechEx predicts that SiC MOSFETs will form the majority of the EV traction inverter market by 2036, as well as the majority of the onboard charger and DC–DC converter market. The high-temperature operation, faster switching speeds, and smaller form factor lead to improved efficiency, as well as weight and volume savings that ultimately support increased range and EV performance.

GaN has significant potential in EVs, but the development of automotive GaN depends on proof of its long-term reliability in an EV environment, as well as its ability to operate at high voltages for 800V EV power architectures.



SiC will take the majority share of the power electronics industry by 2036, with significant uptake of GaN power electronics over the next ten years.

Data centers: wide-bandgap enables shift to 800VDC power architecture



Short-, medium-, and long-term roadmap of technology innovations in semiconductor materials for silicon, WBG and UWBG, as well as innovations in electric vehicles, data centers, and renewable energy.

The data-center industry has transformed since the widespread adoption of AI in 2023. AI models are becoming increasingly complex and require larger computational power for training. This has resulted in the rapid development of new generations of AI chips, which draw higher levels of power. The AI data-center power electronics industry must adapt to support future generations of AI training.

Wide-bandgap semiconductors are expected to become more prevalent in power supply units (PSUs) for data centers, as well as for point-of-load power conversion. The increased switching frequency and breakdown voltage of SiC and GaN enable more powerful and efficient power conversion devices in smaller form factors, while still maintaining the necessary reliability for AI training and inference. IDTechEx's report includes a 10-year forecast of silicon, SiC and GaN in data centers, predicting considerable uptake of GaN over the next ten years, especially for PSU and point-of-load power conversion.

At the same time, data-center power architecture will undergo a paradigm shift in the coming years, moving from AC power delivery to an 800VDC (HVDC) data-center power architecture. This transition is expected to simplify data-center power electronics, reducing the number of power conversion stages and points of failure. At the same time, this will increase overall data-center efficiency and enable the 1MW rack expected by the end of the decade.

The report includes a 10-year data-center power architecture forecast; IDTechEx expects that 800VDC will become the dominant power architecture for new AI data centers over the forecast period. IDTechEx compares the data-center power electronics market with the EV power electronics market, identifying key cross-overs and shared innovations between the two.

Wind energy: silicon's proven reliability slow the adoption of wide-bandgap technology

While comprising a relatively small segment of the overall power electronics market, power electronics for wind energy represents an important contrast to the EV and data-center industries. With even higher power ratings, more challenging conditions (extreme temperature fluctuations, high humidity, and salt spray) and significant costs in the case of failure, the wind power electronics industry has been hesitant to adopt newer wide-bandgap power electronics innovations, opting instead for the long-proven reliability of silicon technology.

Tracking partnerships between wind OEMs and SiC suppliers, and through conversations with players such as Hitachi Energy, IDTechEx has produced a 10-year forecast of silicon and SiC demand for wind power converters, forecasting a steady adoption of SiC in the wind power electronics industry over the next ten years. The adoption of SiC in the wind industry represents a shift in wide-bandgap technology; its long-term reliability has been sufficiently proven in harsh environments to extend its range of applications into renewable energy.

From the sterilized environment of an AI data center, where strong demand for increased power density to train next-generation AI models is driving investment in power electronics innovation, to wind turbine power converters, where strong cost pressure and reliability considerations are paramount, power electronics innovations look very different across industries. With applications so different and yet so inter-related, a cross-industry approach must be taken to understand how innovations in one field affect others. The report is said to provide the analysis of semiconductor materials and application innovations required to fully understand the power electronics industry as a whole. ■

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Silicon aluminium nitride on GaN MISHEMTs for 6G and X-band

Fujitsu device achieves 74.3% power-added efficiency and 10.4W/mm P_{out}.

Japan's Fujitsu Ltd has claimed the first silicon aluminium nitride (SiAlN) metal-insulator-semiconductor high-electron-mobility transistor (MIS HEMT) to achieve the coexistence of more than 70% power-added efficiency (PAE) and 10W/mm output power (P_{out}) in the 8–12GHz X-band [Yuichi Minoura et al, Applied Physics Express, v19, p021010, 2026].

The SiAlN combination is expected to have a high dielectric constant, intermediate between the values for AlN and SiN, with AlN tending to be higher than SiN's value of about 8. A high-dielectric-constant gate stack should suppress effects that degrade transconductance performance.

High-efficiency and high-power X-band HEMTs have potential for microwave power amplifiers. The 8GHz performance of the Fujitsu HEMTs also falls in the third frequency range (FR3, 7.125–24.25GHz) proposed for 6G mobile communications. This would add to the 5G FR1 (0.410–7.125GHz) and FR2 (24.25–71.0GHz) 'New Radio' (NR) bands.

Other uses for X-band devices with high efficiency and power ratings would include defense and meteorological applications for radar systems with varying long detection range and high resolution combinations in compact form factors.

The researchers comment: "For these applications, it is crucial to achieve both high output power and efficiency in power amplifiers to ensure communication range, reduce power consumption, and simplify cooling mechanisms."

The MIS structure is needed to reduce the performance impacts of gate leakage and constrained gate voltage swing. The team reports: "Until now, satisfactory MIS HEMTs operating at ultra-high speeds in the GHz range have not been realized due to issues with the quality of the gate dielectric film itself and the GaN-based semiconductor interface."

The researchers comment that increasing output power by increasing the gate width runs into problems at high frequency: "We believe that increasing the total gate width by increasing the gate width per finger or the number of gate fingers leads to problems such as an increase in gate resistance and phase misalignment within the same device when the device size becomes larger. Therefore, we prefer to increase the output power density, assuming sufficient heat dissipation, and have pursued research and development with a target of 10W/mm."

The epitaxial material for the device was grown by metal-organic chemical vapor deposition (MOCVD) on a hydride vapor phase epitaxy (HVPE) semi-insulating GaN substrate (Figure 1).

The 10nm SiAlN gate insulator was also grown by MOCVD, immediately after the semiconductor layers. The SiAlN also provided passivation. The Si:Al ratio was found to be 77:23, according to x-ray photoelectron spectroscopy (XPS) analysis.

The researchers comment: "Depositing the SiAlN just after epitaxial growth can reduce damage to the GaN-based semiconductor from subsequent device processing, such as plasma or wet chemical treatments."

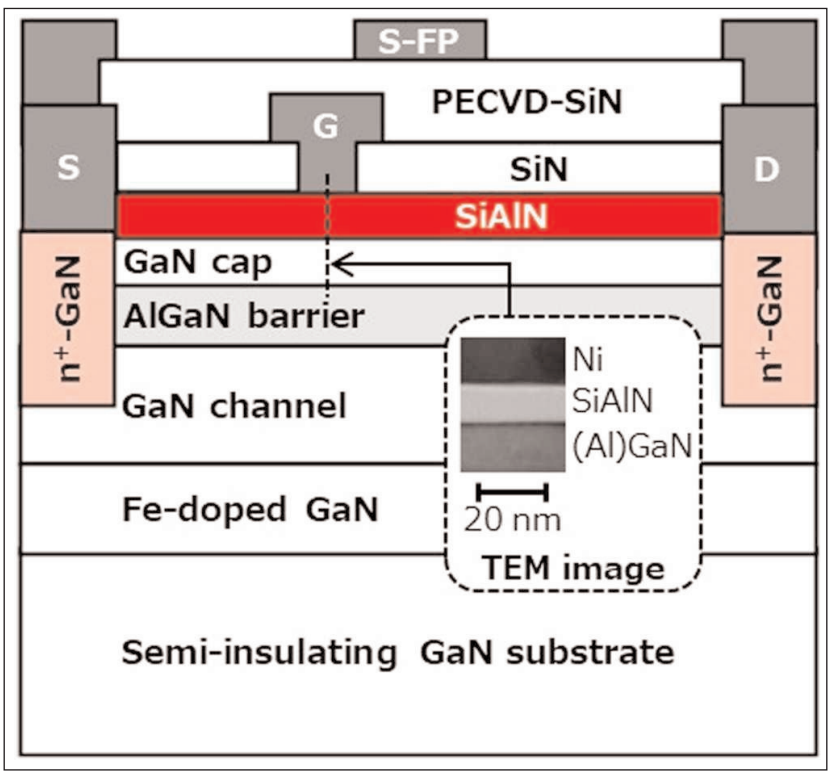

Figure 1. Cross-sectional GaN SiAlN MIS HEMT scheme. Inset: transmission electron microscope image of gate cross-section.

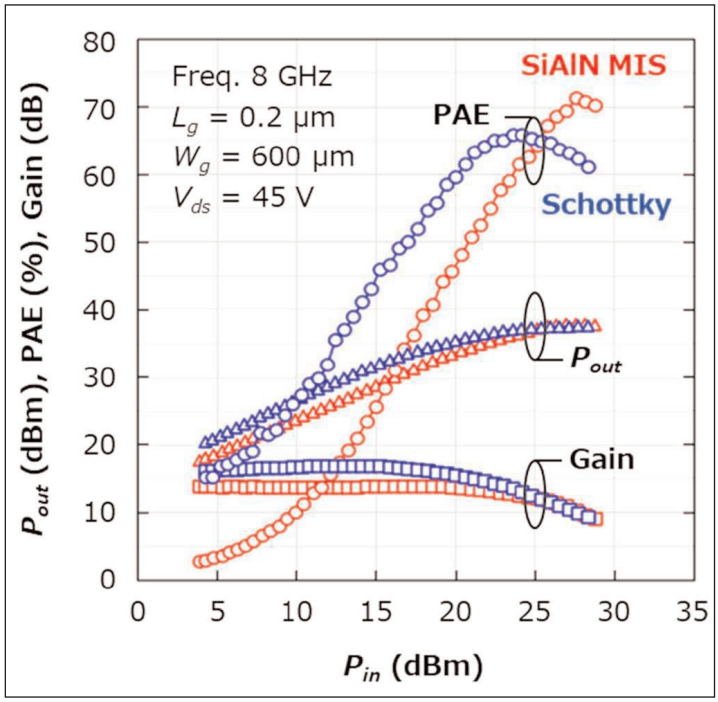

Figure 2. Power characteristics of Schottky and SiAlN MIS HEMTs by on-wafer load-pull measurements in pulse mode at 8GHz.

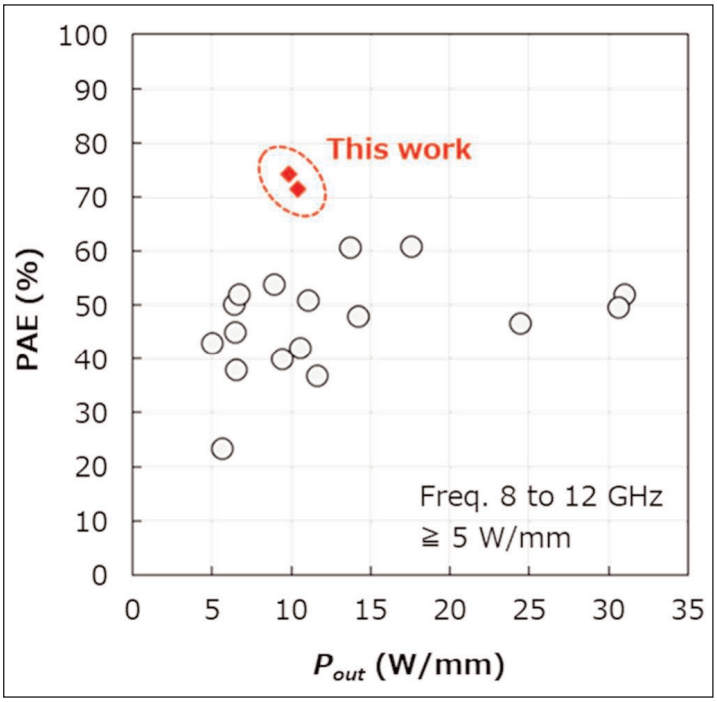

Figure 3. Benchmark of maximum PAE and output power density for GaN-based HEMTs exhibiting 5W/mm at X-band.

The SiAlN was then covered with SiN with a view to preventing degradation of the upper interface of the SiAlN during subsequent device processes and as part of a gate field-plate (FP). The SiAlN also served as an etch stop for the gate recess dry etch with a selectivity ratio of 2.8 for SiN over the SiAlN.

A post-deposition sheet resistance study on epitaxial structures with the SiAlN dielectric gave a value of 339Ω/❑, compared with 348Ω/❑, for SiN only.

The ohmic source/drain electrodes were recessed with re-grown heavily doped n-GaN also applied using MOCVD. The ohmic metal contacts were titanium/aluminium. The gate metal was nickel/gold. The gate length was 0.2µm. A source FP was also constructed using a plasma-enhanced chemical vapor deposition (PECVD) SiN spacer.

Compared with a Schottky gate structure, the SiAlN MIS HEMT showed up to four orders of magnitude lower reverse and forward gate leakage current in two-terminal gate measurements. The turn-on gate voltage was increased from 0.8V for the Schottky structure to 4V for the MIS HEMT. The higher turn-on should enable a higher input voltage swing. The reverse breakdown occurred at 384V, compared with 194V for a Schottky HEMT.

Three-terminal measurements gave a maximum transconductance (g_{mmax}) of 258mS/mm at 10V drain bias, compared with 338mS/mm for the Schottky HEMT.

The researchers comment: "Although the SiAlN MIS HEMT exhibited a lower gm due to the presence of the gate dielectric, its deeper Vth enabled a larger I_d of 1325mA/mm at a gate voltage (V_{gs}) of +2V, compared to 1069mA/mm for the Schottky HEMT."

The threshold voltages (V_{th}) for the MIS and Schottky HEMTs were −5.81V and −2.42V, respectively. At +4V gate potential the drain current of the MIS HEMT reached 1404mA/mm, promising for increased output power density.

The threshold shift during −0.5V/s downward gate sweeps was 25mV. "This remarkably small dependence of V_{th} on the positive gate bias pre-stress indicates the high quality of both the gate dielectric and the dielectric/semiconductor interface," the team reports.

The researchers performed load-pull measurements with 1% duty cycle for pulsed operation (Figure 2). At 8GHz, the power-added efficiency reached 74.3%, when the impedance matching was optimized for efficiency. The corresponding output power (P_{out}) was 9.8W/mm. With impedance matching aimed at high P_{out} the SiAlN HEMT achieved 10.4W/mm, along with 71.4% PAE. The reference Schottky HEMT only managed 66.0% PAE and 8.9W/mm P_{out}.

To explore performance in the S-band, also used in wireless communications and radar, the researchers reduced the frequency to 3GHz. The PAE increased to 80.6% with P_{out} also increasing slightly to 10.5W/mm. Thus, the researchers conclude that the SiAlN MIS HEMT structure could offer performance operation across a wide range of frequencies.

The researchers present a benchmark plot to compare with previous reports (Figure 3). ■

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Author: Mike Cooke

Single- and multi-channel AlScN barriers

GaN channel heterostructures achieve a record 45Ω/❑ sheet resistance.

Cornell University in the USA claims the lowest sheet resistance so far for gallium nitride (GaN) single- and multi-channel heterostructures with aluminium scandium nitride (AlScN) barriers [Aias Asteris et al, J. Appl. Phys., v139, p075708, 2026].

The researchers see their work as contributing to next-generation high-speed, high-power GaN-based electronics. At low temperature the sheet resistance was even lower (around 3x), which may "enable new cryogenic devices, such as low-insertion-loss RF switches".

Multi-channel structures can be fabricated into fin or gate-all-around field effect transistors (FETs).

The researchers used molecular beam epitaxy (MBE) on 7mmx7mm semi-insulating metal-polar GaN-on-sapphire template coupons to grow AlScN/GaN heterostructures. The GaN buffer layer was grown with the substrate at 575°C temperature and $1.7x10^{-7}$Torr pressure with a Ga-rich condition. Single- and multi-channel structures were developed. The single-channel stack consisted of a 400nm GaN buffer, AlN and GaN interlayers, and AlScN barrier. The structure was capped with 2nm GaN to protect the AlScN from degradation, since material containing aluminium tends to oxidize.

A two-dimensional electron gas was expected from simulations to form under the AlN due to band bending near the buffer/AlN interface. The thicknesses of the AlN and AlScN were designed to be strain balanced to the underlying GaN crystal lattice. AlN is tensile strained, and AlScN provides a compressive counter-balance. The researchers comment that there is "substantial variation in reported lattice-matching conditions between AlScN and GaN, with scandium concentrations ranging from 9% to 20% across different studies."

A further limitation is that AlScN tends to form in mixed phases when the Sc content exceeds 25%. Also, the 2DEG carrier concentration tends to decrease with high-Sc-content barriers. This increases sheet resistance.

The purpose of the GaN interlayer was to increase the distance from the AlScN without too rapidly increasing the 2DEG density induced by a thicker AlN interlayer. Once 2DEG densities become too large the mobility, which measures the ability of electric fields to move carriers, decreases in a way that increases net sheet resistance.

A range of interlayer and barrier thicknesses were studied at room temperature (300K) and cryogenic (77K) temperature (Figure 1). The lowest sheet resistance, 169Ω/❑, was measured with 3nm AlN and 2nm GaN interlayers and 6nm AlScN barrier. The 2DEG density and mobility were $3.88x10^{13}$/cm^2 and 951cm^{2}cm/V-s, respectively.

Reducing the GaN/AlN interlayer thicknesses to 1nm/3nm and 2nm/2nm increased the resistance to 177Ω/❑ and 181Ω/❑, respectively. The 1nm/3nm combination reduced the 2DEG density to $3.74x10^{13}$/cm^2, and the mobility to 946cm^{2}cm/V-s. The 2nm/2nm managed to increase the mobility to 1370cm^{2}cm/V-s, but at the cost of significantly reduced 2DEG density, $2.52x10^{13}$/cm^2.

With a view to reducing sheet resistances further, the researchers explored multi-channel structures with 1nm/2nm GaN/AlN interlayers (Figure 2).

The team comments: "Multi-channel realization requires minimal strain to preserve a pseudomorphic structure, which may be hindered by sequential

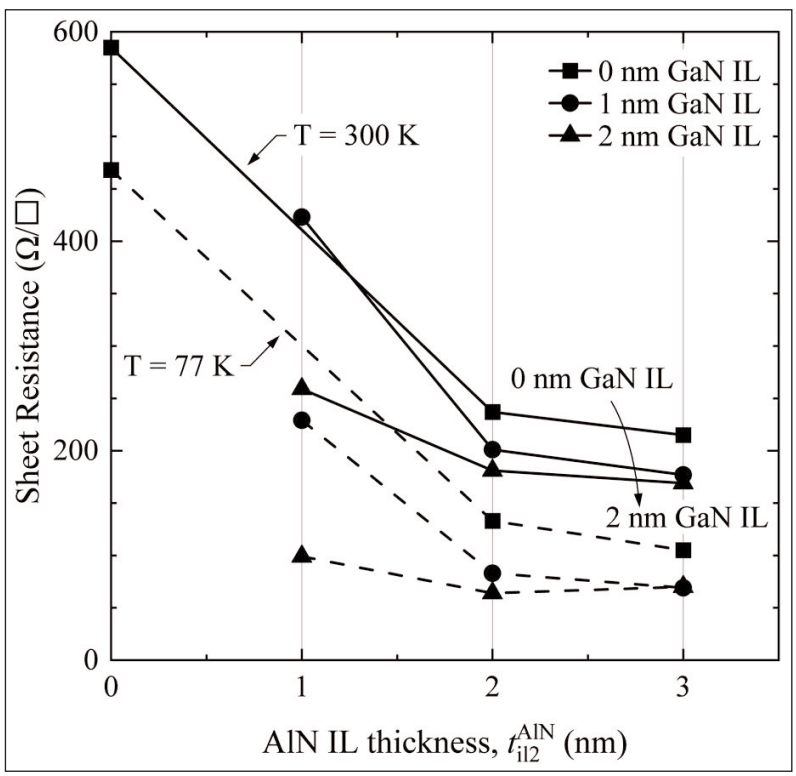

Figure 1. Experimental sheet resistance of single-channel $Al_{0.88}Sc_{0.12}N$/GaN heterostructures at 300K (solid) and 77K (dashed) with assorted interlayer (IL) configurations.

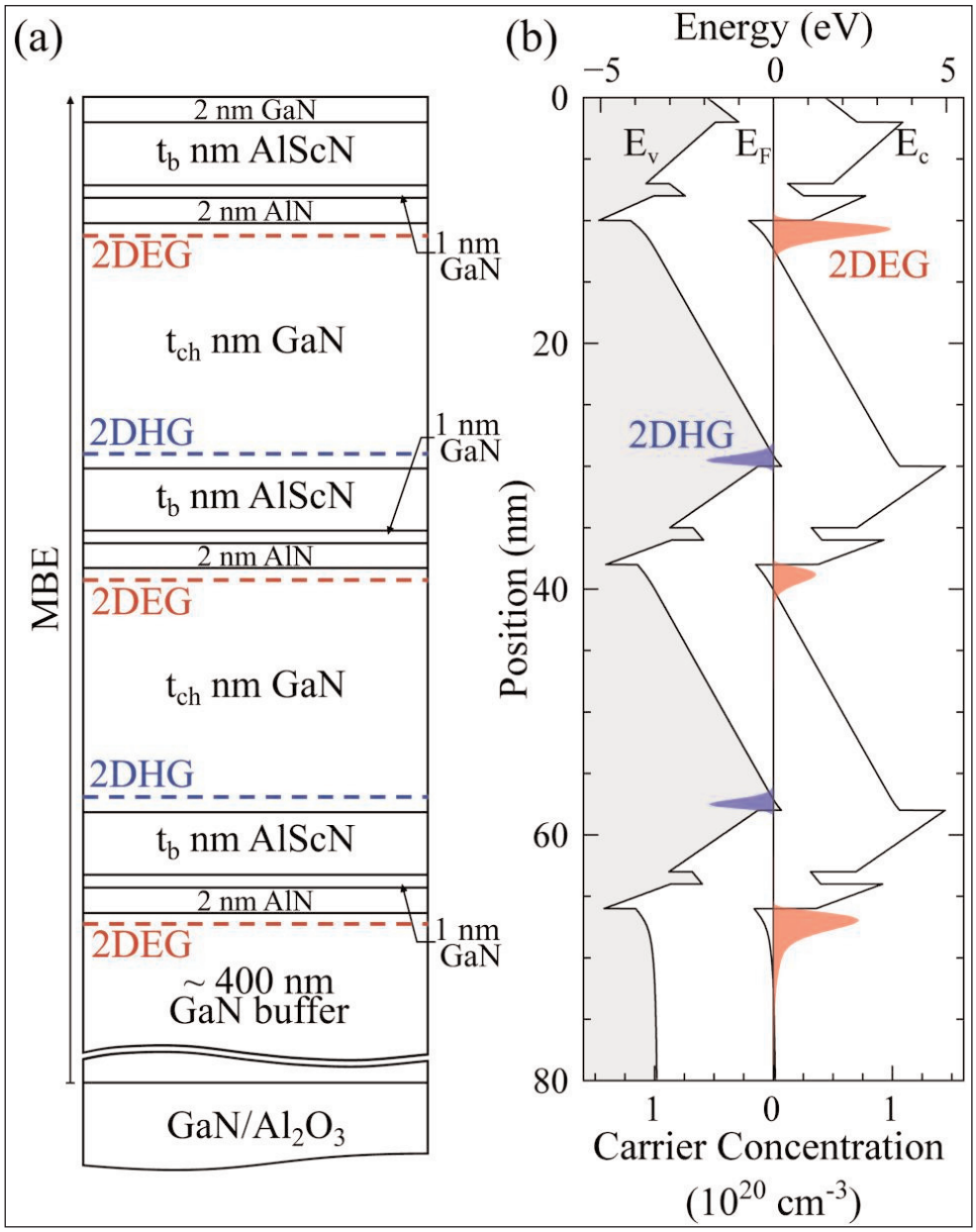

Figure 2. (a) Cross-sectional schematic and (b) simulated energy band diagram of multi-channel AlScN/GaN heterostructure.

AlN layers due to significant strain energy accumulation. While strain balance can minimize this accumulation, it demands thicker AlScN barriers of higher Sc content for thicker AlN interlayers. There are risks, however, associated with thick high-Sc AlScN layers, which include pronounced surface roughening due to growth under nitrogen-rich conditions, poor field management due to increased charge density, as well as complicated device fabrication due to increased stack thickness."

The researchers studied AlScN barriers with thicknesses in the range 5–10nm, and 12–18% Sc content. Hall-effect measurements showed n-type conductivity with carrier densities reaching 8.90×10^{13}/cm^2 with 5-periods of 5nm AlScN barriers at 18% Sc content. The GaN channel layers were 40nm. The sheet resistance was 45Ω/❑ and the mobility was 1550cm^2/V-s.

The researchers found no evidence for the parallel two-dimensional hole gases (2DHGs) predicted by their energy-band simulations. The team comments: "If present, 2DHGs are likely masked by 2DEGs due to the significantly higher mobility of the latter compared to the former. Unbalanced electron and hole charge densities can also hinder the detection of 2DHGs."

The team points out that 2DHGs "constitute parasitic parallel conduction channels and can degrade device performance. Their formation can be prevented via intentional donor doping, which enables precise control over 2DEG and 2DHG densities, and in turn device miniaturization.

The choice of structure for use in devices would need to be optimized for the application. Thinner structures can be favored for improved electrostatic control via gate structures in high-speed deployments. Thicker structures may offer improved conductivity/on-resistance for power applications.

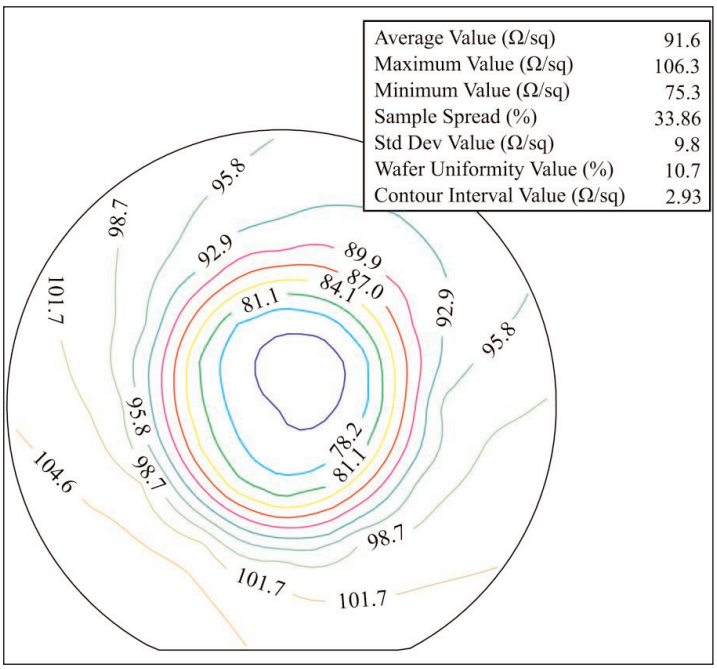

Figure 3. Sheet resistance for three-channel 5nm/1nm/2nm/40nm AlScN/GaN/AlN/GaN heterostructure grown on a 50mm wafer.

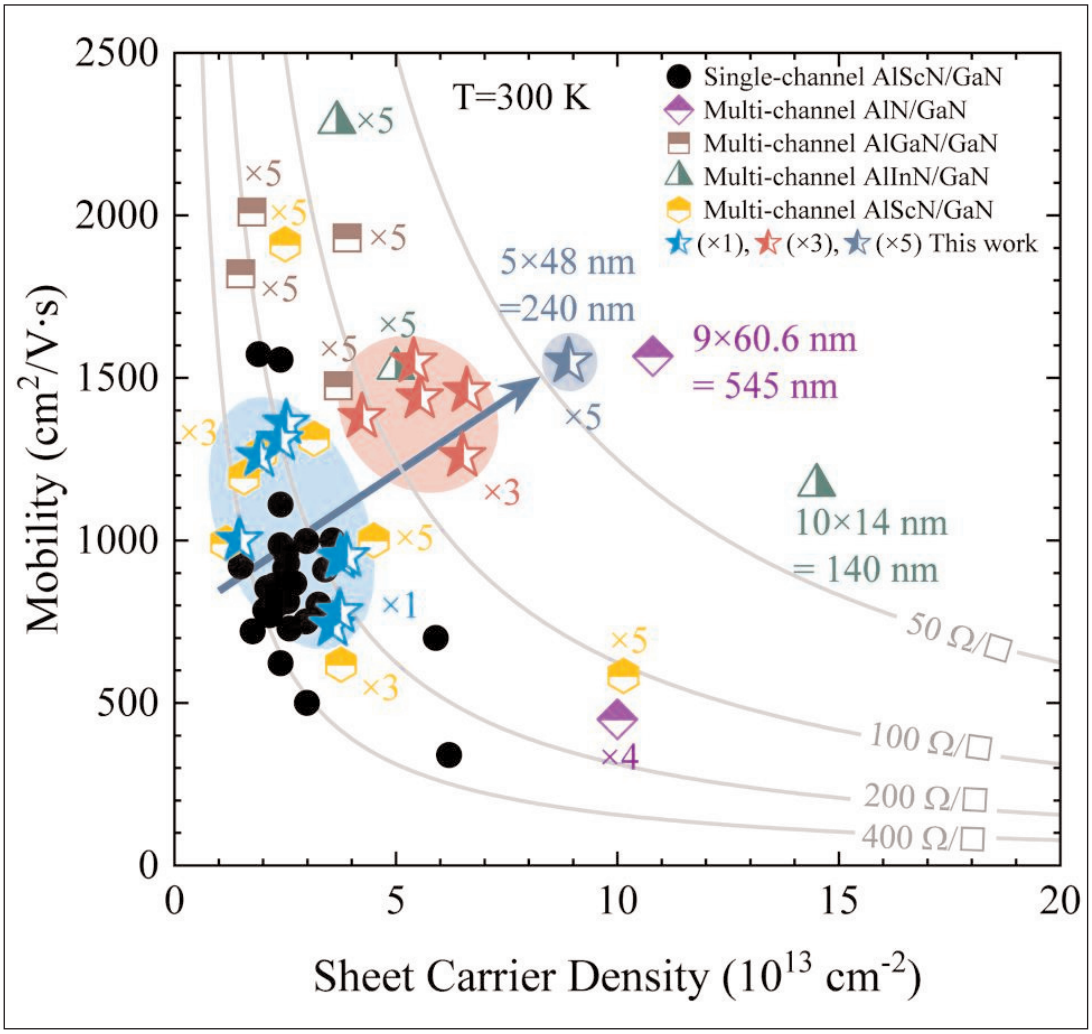

Figure 4. Benchmark of room-temperature Hall data for single- and multi-channel AlScN/GaN heterostructures against previous reports of GaN-based schemes.

With a view to manufacturing the researchers grew a heterostructure on a 50mm-diameter GaN/sapphire template, rather than the 7mmx7mm coupons, and report the sheet resistance (Figure 3). "The high uniformity over the growth surface indicates the ability for upward scaling of multi-channel AlScN/GaN heterostructures," says the team.

The Cornell work puts the AlScN structure sheet resistance near to those of AlN/GaN (36Ω/❑) and AlInN/GaN reports (Figure 4), state-of-the-art multi-channel III–nitride systems. ■

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MARUWA CO LTD
3-83, Minamihonjigahara-cho,
Owariasahi, Aichi 488-0044, Japan
Tel: +81 572 52 2317
www.maruwa-g.com/e/products/ceramic

sp3 Diamond Technologies
2220 Martin Avenue,
Santa Clara, CA 95050, USA
Tel: +1 877 773 9940
Fax: +1 408 492 0633
www.sp3inc.com

Sumitomo Electric Semiconductor Materials Inc
7230 NW Evergreen Parkway,
Hillsboro, OR 97124, USA
Tel: +1 503 693 3100 x207
Fax: +1 503 693 8275
www.sesmi.com

The Fox Group Inc
200 Voyageur Drive, Montreal,
Quebec H9R 6A8, Canada
Tel: +1 925 980 5645
Fax: +1 514 630 0227
www.thefoxgroupinc.com

III/V-Reclaim
Wald 10, 84568 Pleiskirchen,
Germany
Tel: +49 8728 911 093
Fax: +49 8728 911 156
www.35reclaim.de

TECDIA Inc
2700 Augustine Drive, Suite 110,
Santa Clara, CA 95054 , USA
Tel: +1 408 748 0100
Fax: +1 408 748 0111
Contact Person: Cathy W. Hung
E-mail: sales@tecdia.com
www.tecdia.com

Wafer Technology Ltd
34 Maryland Road, Tongwell,
Milton Keynes, Bucks, MK15 8HJ, UK
Tel: +44 (0)1908 210444
Fax: +44 (0)1908 210443
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www.waferworld.com

4 Epiwafer foundry

Albemarle Cambridge Chemical Ltd
Unit 5 Chesterton Mills,
French's Road, Cambridge CB4 3NP,
UK
Tel: +44 (0)1223 352244
Fax: +44 (0)1223 352444
www.camchem.co.uk

Intelligent Epitaxy Technology Inc
1250 E Collins Blvd,
Richardson, TX 75081-2401,
USA
Tel: +1 972 234 0068
Fax: +1 972 234 0069
www.intelliepi.com

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Fax: +33 1 45 10 69 53
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Fax: +1 514 630 0227
www.thefoxgroupinc.com

5 Deposition materials

Materion Advanced Materials Group
2978 Main Street,
Buffalo, NY 14214,
USA
Tel: +1 716 837 1000
Fax: +1 716 833 2926
www.williams-adv.com

Matheson Tri-Gas
6775 Central Avenue,
Newark, CA 94560, USA
Tel: +1 510 793 2559
Fax: +1 510 790 6241
www.mathesontrigas.com

Nouryon Functional Chemicals B.V.
Zutphenseweg 10, 7418 AJ
Deventer,
The Netherlands
Tel. +31 652 478554
https://hpmo.nouryon.com

Praxair Electronics
542 Route 303,
Orangeburg, NY 10962,
USA
Tel: +1 845 398 8242
Fax: +1 845 398 8304
www.praxair.com/electronics

Vital Thin Film Materials (Guangdong) Co Ltd (Vital Materials subsidiary)
18G, 18th Floor, Shenzhen Free
Trade Centre, No.111 Taizi Road,
Nanshan District,
Shenzhen, Guangdong, China 518067
Tel: (+86) 0755-21651348
sales@vitaltfm.com

www.vitaltfm.com
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6 Deposition equipment

AIXTRON SE
Dornkaulstr. 2,
52134 Herzogenrath,
Germany
Tel: +49 2407 9030 0
Fax: +49 2407 9030 40
www.aixtron.com

ETC (LPE subsidiary)
Via Falzarego, 820021 Baranzate (Mi),
Italy
Tel: +39 02 383 41 51
Fax: +39 02 383 06 118
www.lpe-epi.com

Evatec AG
Hauptstrasse 1a,
CH-9477 Trübbach,
Switzerland
Tel: +41 81 403 8000
Fax: +41 81 403 8001
www.evatecnet.com

FHR Anlagenbau Gmbh
(Vital Materials subsidiary)
Am Hügel 2, D-01458
Ottendorf-Okrilla,
Germany
Tel: +49 35205 520-0
E-mail: sales@fhr.de
E-mail: sales@vitalchem.com
www.fhr.biz
Vital Materials is the world's leading producer of rare metals as well as the first Chinese manufacturer to deliver G11 rotary ITO target. Vital is also one of the world's three major supplier of infrared materials, a key supplier of compound semiconductor substrates, and a strategic partner of the world's largest thin film solar manufacturer.

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Via Falzarego, 8
20021 Baranzate (Mi), Italy
Tel: +39 02 383 41 51
Fax: +39 02 383 06 118
www.lpe-epi.com

PLANSEE High Performance Materials
6600 Reutte,
Austria
Tel: +43 5672 600 2422
info@plansee.com
www.plansee.com

Plasma-Therm LLC
10050 16th Street North,
St. Petersburg, FL 33716,
USA
Tel: +1 727 577 4999
Fax: +1 727 577 7035
www.plasmatherm.com

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31 rue Casimir Périer, BP 70083,
95873 Bezons Cedex,
France
Tel: +33 (0) 1 39 96 65 00
Fax: +33 (0) 1 39 47 45 62
www.riber.com

SVT Associates Inc
7620 Executive Drive,
Eden Prairie, MN 55344,
USA
Tel: +1 952 934 2100
Fax: +1 952 934 2737
www.svta.com

Temescal, a division of Ferrotec
4569-C Las Positas Rd,
Livermore, CA 94551,
USA
Tel: +1 925 245 5817
Fax: +1 925 449-4096
www.temescal.net

Veeco Instruments Inc
100 Sunnyside Blvd.,
Woodbury, NY 11797,
USA
Tel: +1 516 677 0200
Fax: +1 516 714 1231
www.veeco.com

7 Wafer processing materials

Kayaku Advanced Materials Inc
200 Flanders Road,
Westborough, MA 01581,
USA
Tel: +1 617 965 5511
www.kayakuam.com

Praxair Electronics
(see section 5 for full contact details)

Versum Materials
8555 S. River Parkway,
Tempe, AZ 85284,
USA
Tel: +1 602 282 1000
www.versummaterials.com

8 Wafer processing equipment

Evatec AG
Hauptstrasse 1a,
CH-9477 Trübbach,
Switzerland
Tel: +41 81 403 8000
Fax: +41 81 403 8001
www.evatecnet.com

EV Group
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Fax: +44 (0) 1389 879 042
www.logitech.uk.com

Plasma-Therm LLC
(see section 6 for full contact details)

SAMCO International Inc
532 Weddell Drive,
Sunnyvale, CA, USA
Tel: +1 408 734 0459
Fax: +1 408 734 0961
www.samcointl.com

SPTS Technology Ltd
Ringland Way, Newport NP18 2TA,
Wales, UK
Tel: +44 (0)1633 414000
Fax: +44 (0)1633 414141
www.spts.com

SUSS MicroTec AG
Schleißheimer Strasse 90,
85748 Garching, Germany
Tel: +49 89 32007 0
Fax: +49 89 32007 162
www.suss.com

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1024 Ecublens,
Switzerland
Tel +41 21 694 35 00
Fax +41 21 694 35 01
www.synova.ch

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2700 Augustine Drive, Suite 110,
Santa Clara, CA 95054 ,
USA
Tel: +1-408-748-0100
Fax: +1-408-748-0111
Contact Person: Cathy W. Hung
Email: sales@tecdia.com
www.tecdia.com

Veeco Instruments Inc
(see section 6 for full contact details)

9 Materials & metals

Goodfellow Cambridge Ltd
Ermine Business Park, Huntingdon,
Cambridgeshire PE29 6WR, UK
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Fax: +44 (0) 1480 424900
www.goodfellow.com

PLANSEE High Performance Materials
6600 Reutte,
Austria
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info@plansee.com
www.plansee.com

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2700 Augustine Drive, Suite 110,
Santa Clara, CA 95054,
USA
Tel: +1 408 748 0100
Fax: +1 408 748 0111
www.tecdia.com

10 Gas and liquid handling equipment

Cambridge Fluid Systems
12 Trafalgar Way, Bar Hill,
Cambridge CB3 8SQ,
UK
Tel: +44 (0)1954 786800
Fax: +44 (0)1954 786818
www.cambridge-fluid.com

CS CLEAN SOLUTIONS GmbH
Fraunhoferstrasse 4,
Ismaning, 85737,
Germany
Tel: +49 89 96 24000
Fax: +49 89 96 2400122
www.csclean.com

Entegris Inc
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Tel: +1 978 436 6500
Fax: +1 978 436 6735
www.entegris.com

IEM Technologies Ltd
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Bridgwater, Somerset TA6 5JJ, UK
Tel: +44 (0)1278 420555
Fax: +44 (0)1278 420666
www.iemtec.com

Vacuum Barrier Corporation
4 Barton Lane,
Woburn, MA 01801,
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Tel: +1 781 933 3570
Fax: +1 781 933 9428
www.vacuumbarrier.com

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8555 S. River Parkway,
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Tel: +1 602 282 1000
www.versummaterials.com

11 Process monitoring and control

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2300 Walden Avenue,
Buffalo, NY 14225,
USA
Tel: +1 800 223 2389
Tel: +1 716 684 4500
www.conaxtechnologies.com

k-Space Associates Inc
2182 Bishop Circle
East, Dexter, MI 48130,
USA
Tel: +1 734 426 7977
Fax: +1 734 426 7955
www.k-space.com

KLA-Tencor
One Technology Dr,
1-2221I, Milpitas,
CA 95035, USA
Tel: +1 408 875 3000
Fax: +1 408 875 4144
www.kla-tencor.com

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Bregstrasse 90,
D-78120 Furtwangen im Schwarzwald,
Germany
Tel: +49 7723 9197 0
Fax: +49 7723 9197 22
www.wepcontrol.com

12 Inspection equipment

Bruker
Oestliche Rheinbrueckenstrasse 49,
Karlsruhe, 76187, Germany
Tel: +49 (0)721 595 2888
Fax: +49 (0)721 595 4587
www.bruker.com

KLA–Tencor
160 Rio Robles, Suite 103D,
San Jose, CA 94538-7306,
USA
Tel: +1 408 875-3000
Fax: +1 510 456-2498
www.kla-tencor.com

13 Characterization equipment

J.A. Woollam Co. Inc.
645 M Street Suite 102,
Lincoln, NE 68508, USA
Tel: +1 402 477 7501
Fax: +1 402 477 8214
www.jawoollam.com

Lake Shore Cryotronics Inc
575 McCorkle Boulevard,
Westerville, OH 43082, USA
Tel: +1 614 891 2244
Fax: +1 614 818 1600
www.lakeshore.com

14 Chip test equipment

Riff Company Inc
1484 Highland Avenue, Cheshire,
CT 06410, USA
Tel: +1 203-272-4899
Fax: +1 203-250-7389
www.riff-co.com

Tektronix Inc
14150 SW Karl Braun Drive,
P.O.Box 500, OR 97077, USA
www.tek.com

15 Assembly/packaging materials

ePAK International Inc
4926 Spicewood Springs Road,
Austin, TX 78759, USA
Tel: +1 512 231 8083
Fax: +1 512 231 8183
www.epak.com

Gel-Pak
31398 Huntwood Avenue,
Hayward, CA 94544, USA
Tel: +1 510 576 2220
Fax: +1 510 576 2282
www.gelpak.com

Wafer World Inc
(see section 3 for full contact details)

Materion Advanced Materials Group
2978 Main Street,
Buffalo, NY 14214, USA
Tel: +1 716 837 1000
Fax: +1 716 833 2926
www.williams-adv.com

16 Assembly/packaging equipment

CST Global Ltd
4 Stanley Boulevard,
Hamilton International
Technology Park,
Blantyre, Glasgow G72 0BN, UK
Tel: +44 (0) 1698 722072
www.cstglobal.uk

Kulicke & Soffa Industries
1005 Virginia Drive,
Fort Washington,
PA 19034,
USA
Tel: +1 215 784 6000
Fax: +1 215 784 6001
www.kns.com

Palomar Technologies Inc
2728 Loker Avenue West,
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USA
Tel: +1 760 931 3600
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16 Albert St . Auburn ,
MA 01501, USA
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Fax: +1 508-832-0506
www.pi.ws
www.pi-usa.us

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Fax: +1 408 748 0111
www.tecdia.com

17 Assembly/packaging foundry

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10987 Via Frontera,
San Diego, CA 92127, USA
Tel: +1 858 674 4676
Fax: +1 8586 74 4681
www.quikicpak.com

18 Chip foundry

CST Global Ltd
4 Stanley Boulevard, Hamilton International Technology Park,
Blantyre, Glasgow, G72 0BN,
UK
Tel: +44 (0) 1698 722072
www.cstglobal.uk

United Monolithic Semiconductors
Route departementale 128,
BP46, Orsay, 91401,
France
Tel: +33 1 69 33 04 72
Fax: +33 169 33 02 92
www.ums-gaas.com

19 Facility equipment

RENA Technologies NA
3838 Western Way NE,
Albany, OR 97321, USA
Tel: +1 541 917 3626
www.rena-na.com

Vacuum Barrier Corporation
4 Barton Lane, Woburn, MA 01801,
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www.vacuumbarrier.com

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20 Facility consumables

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www.plansee.com

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401 Airport Rd, Elkton,
MD 21921-4236,
USA
Tel: +1 410 392 4440
Fax: +1 410 506 8749
www.gore.com

21 Computer hardware & software

Crosslight Software Inc
121-3989 Henning Dr.,
Burnaby, BC, V5C 6P8,
Canada
Tel: +1 604 320 1704
Fax: +1 604 320 1734
www.crosslight.com

Semiconductor Technology Research Inc
10404 Patterson Ave.,
Suite 108, Richmond,
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USA
Tel: +1 804 740 8314
Fax: +1 804 740 3814
www.semitech.us

22 Used equipment

Brumley South Inc
422 North Broad Street,
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NC 28115,
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USA
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Fax: +1-408-748-0111
Contact Person: Cathy W. Hung
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24 Resources

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7140 San Jose, CA 95126, USA
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www.alshuktz.com

SEMI Global Headquarters
San Jose, CA 95134,
USA
Tel: +1 408 943 6900
www.semi.org

Yole Développement
69006 Lyon,
France
Tel: +33 472 83 01 86
www.yole.fr

event calendar

If you would like your event listed in *Semiconductor Today*'s Event Calendar, then please e-mail all details to the Editor at mark@semiconductor-today.com

3–8 May 2026
SID Display Week 2026
Los Angeles, CA, USA
E-mail: registration@sid.org
www.displayweek.org

17–21 May 2026
2026 Conference on Lasers & Electro-Optics (CLEO)
Charlotte, NC, USA
E-mail: info@cleoconference.org
www.cleoconference.org

18–21 May 2026
CS MANTECH 2026 (International Conference on Compound Semiconductor Manufacturing Technology)
Portland Marriott Downtown Waterfront hotel, Portland, OR, USA
E-mail: exhibitor@csmantech.org
www.csmantech.org

24–28 May 2026
CSW 2026 (Compound Semiconductor Week)
Kumamoto-Jo Hall, Kumamoto, Japan
E-mail: secretariat@csw2026.org
www.csw-jpn.org

24–28 May 2026
WOCSDICE–EXMATEC 2026: 49th Workshop on Compound Semiconductor Devices and Integrated Circuits (WOCSDICE) 20th Expert Evaluation and Control of Compound Semiconductor Materials and Technologies (EXMATEC)
Gdansk, Poland
E-mail: we2026@unipress.waw.pl
https://wocsdice-exmatec-2026.syskonf.pl/

26–29 May 2026
IEEE 76th Electronic Components and Technology Conference (ECTC 2026)
JW Marriott & Ritz-Carlton Grande Lakes Resort, Orlando, FL, USA
E-mail: borabal@ieee.org
www.ectc.net

31 May–4 June 2026
International Power Electronics Conference (IPEC-Nagasaki 2026- ECCE Asia)
Dejima Messe Nagasaki, Nagasaki, Japan
E-mail: ipec2026@or.knt.co.jp
www.ipec2026.org

7–12 June 2026
2026 IEEE/MTT-S International Microwave Symposium (IMS 2026)
Boston, MA, USA
E-mail: exhibits@horizonhouse.com
www.ims-ieee.org/about-ims/past-and-future-ims

9–11 June 2026
PCIM 2026 (Expo & Conference on Power Electronics, Intelligent Motion, Renewable Energy and Energy Management)
Nuremberg, Germany
E-mail: pcim_visitors@mesago.com
www.mesago.de/en/PCIM/main.htm

advertisers' index

14–18 June 2026
2026 IEEE/JSAP Symposium on VLSI Technology & Circuits
Hilton Hawaiian Village, Honolulu, HI, USA
E-mail: vlsi@vlsisymposium.org
www.vlsisymposium.org

15–17 June 2026
SCAPE 2026 – International Wide-Bandgap Power Electronics Applications Workshop
Stockholm, Sweden
E-mail: info@svenskelektronik.com
https://svenskelektronik.se/scape-2026

21–24 June 2026
84th Device Research Conference (DRC 2026)
University of Michigan in Ann Arbor, Ann Arbor, MI, USA
E-mail: deviceresearchconference@gmail.com
https://2026.deviceresearchconference.org

28 June – 1 July 2026
ALD/ALE 2026: AVS 26th International Conference on Atomic Layer Deposition (ALD 2026), featuring the 13th International Atomic Layer Etching Workshop (ALE 2026)
Tampa, FL, USA
E-mail: della@avs.org
https://ald2026.avs.org

12–16 July 2026
24th International Conference on Molecular Beam Epitaxy (ICMBE 2026)
Sheratoon Ann Arbor Hotel, Ann Arbor, MI, USA
E-mail: ICMBE-2026-organizers@umich.edu
https://icmbe2026.eecs.umich.edu/registration

20–21 July 2026
Global Summit on Optics, Photonics and Laser Technologies (GPOL 2026)
Paris, France
E-mail: optics@intellimeetings.org
https://optics.intelliglobalconferences.com

22–24 July 2026
The 9th International Congress on Advanced Materials Science and Engineering (AMSE-2026)
Zagrab, Croatia
E-mail: eve@istci.org
https://istci.org/amse2026/

23–27 August 2026
SPIE Optics & Photonics 2026
San Diego, CA, USA
E-mail: customerservice@spie.org
www.spie.org/conferences-and-exhibitions/optics-and-photonics

26–28 August 2026
PCIM Asia Shenzhen 2026 (International Exhibition and Conference for Power Electronics, Intelligent Motion, Renewable Energy and Energy Management)
Shenzhen, China
E-mail: pcimasia@china.messefrankfurt.com
https://pcimasia-shanghai.cn.messefrankfurt.com

30 August – 3 September 2026
21st International Conference on Defects Recognition, Imaging and Physics in Semiconductors (DRIP21)
Warsaw, Poland
E-mail: info@drip21.pl
www.drip21.pl

4–9 September 2026
29th European Microwave Week (EuMW 2026)
ExCel, London, UK
E-mail: eumwreg@itnint.com
www.eumweek.com

9–11 September 2026
China International Optoelectronic Exposition (CIOE 2026)
Shenzhen World Exhibition and Convention Center, China
E-mail:cioe@cioe.cn
www.cioe.cn/en

14–18 September 2026
Energy Conversion Congress & Expo Europe (ECCE Europe 2026)
Valencia, Spain
E-mail: info@ecce-europe.org
https://ipec2026.org/ecce-europe/

20–22 September 2026
3rd Biannual IEEE Workshop on Wide Bandgap Power Devices & Applications in Europe (WiPDA-Europe 2026)
AAU Innovate, Aalborg University, Denmark
E-mail:WiPDA2026@energy.aau.dk
www.energy.aau.dk/wipda-europe-2026-e156452

4–8 October 2026
IEEE Energy Conversion Congress & Expo (ECCE 2026)
Vancouver, British Columbia, Canada
E-mail: info@ieee-ecce.org
www.ieee-ecce.org/2026

13–15 October 2026
SEMICON West 2026
Moscone Center, San Francisco, CA, USA
E-mail: semiconwest@semi.org
www.semiconwest.org

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